



NOAA Technical Memorandum NMFS-AFSC-149

## **Aerial Surveys of Belugas in Cook Inlet, Alaska, June 2001, 2002, 2003, and 2004**

by

D. J. Rugh, K. E. W. Sheldon, C. L. Sims, B. A. Mahoney,  
B. K. Smith, L. K. Litzky, and R. C. Hobbs

**U.S. DEPARTMENT OF COMMERCE**  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Alaska Fisheries Science Center

February 2005

## NOAA Technical Memorandum NMFS

The National Marine Fisheries Service's Alaska Fisheries Science Center uses the NOAA Technical Memorandum series to issue informal scientific and technical publications when complete formal review and editorial processing are not appropriate or feasible. Documents within this series reflect sound professional work and may be referenced in the formal scientific and technical literature.

The NMFS-AFSC Technical Memorandum series of the Alaska Fisheries Science Center continues the NMFS-F/NWC series established in 1970 by the Northwest Fisheries Center. The NMFS-NWFSC series is currently used by the Northwest Fisheries Science Center.

This document should be cited as follows:

Rugh, D. J., K. E. W. Shelden, C. L. Sims, B. A. Mahoney, B. K. Smith, L. K. Litzky, and R. C. Hobbs. 2005. Aerial surveys of belugas in Cook Inlet, Alaska, June 2001, 2002, 2003, and 2004. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-149, 71 p.

Reference in this document to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.



NOAA Technical Memorandum NMFS-AFSC-149

# **Aerial Surveys of Belugas in Cook Inlet, Alaska, June 2001, 2002, 2003, and 2004**

by

David J. Rugh<sup>1</sup>, Kim E.W. Sheldon<sup>1</sup>, Christy L. Sims<sup>1</sup>,  
Barbara A. Mahoney<sup>2</sup>, Brad K. Smith<sup>2</sup>,  
Laura K. Litzky<sup>1</sup>, and Roderick C. Hobbs<sup>1</sup>

<sup>1</sup> National Marine Mammal Laboratory  
Alaska Fisheries Science Center  
7600 Sand Point Way N.E.  
Seattle, WA 98115  
[www.afsc.noaa.gov](http://www.afsc.noaa.gov)

<sup>2</sup> National Marine Fisheries Service  
Alaska Regional Office  
222 W 7th Ave., Box 43  
Anchorage, AK 99513

## **U.S. DEPARTMENT OF COMMERCE**

Carlos M. Gutierrez, Secretary

### **National Oceanic and Atmospheric Administration**

Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (ret.), Under Secretary and Administrator

### **National Marine Fisheries Service**

William T. Hogarth, Assistant Administrator for Fisheries

February 2005

**This document is available to the public through:**

National Technical Information Service  
U.S. Department of Commerce  
5285 Port Royal Road  
Springfield, VA 22161

*[www.ntis.gov](http://www.ntis.gov)*

### **Notice to Users of this Document**

This document is being made available in .PDF format for the convenience of users; however, the accuracy and correctness of the document can only be certified as was presented in the original hard copy format.



## Abstract

The National Marine Fisheries Service (NMFS) has conducted aerial surveys of the beluga population in Cook Inlet, Alaska, each June and/or July since 1993. Results from 1993 to 2000 were published in Rugh et al. (2000a). The current document is a collection of field reports for the subsequent years, from 2001 to 2004. Surveys were done 5-12 June 2001 (55 flight hours; 29.3 hours good effort), 4-11 June 2002 (45 flight hours; 24.4 hours good effort), 31 May -12 June 2003 (61 flight hours; 30.5 hours good effort), and 2-9 June 2004 (45 flight hours; 19.0 hours good effort). All surveys were flown in an Aero Commander (twin-engine, high-wing aircraft) at a target altitude of 244 m (800 ft) and speed of 185 km/hour (100 knots), consistent with previous surveys. Tracklines were flown 1.4 km from shore along coastal areas around the entire Inlet, including islands, and offshore transects were designed to run the length of Cook Inlet or cross it, minimizing overlap within each season as well as between years. These searches effectively covered 25% to 31% of the entire Inlet in each of the 4 years, but nearly 100% of the coastal areas were surveyed each year. In particular, most of the upper Inlet, where belugas have been found consistently, was surveyed five to six times each year. Paired, independent observers searched on the coastal (left) side of the plane, where virtually all beluga sightings occur, while a single observer searched on the right. A computer operator/data recorder was also on the left side. After finding beluga groups, a series of aerial passes allowed four primary observers to each make four or more independent counts of every group, (i.e., typically 16 aerial counts for each group). In addition, whale groups were videotaped for later analysis and more precise counts

in the laboratory. During these surveys, only two belugas were seen in lower Cook Inlet (south of East and West Foreland), none were seen in the upper Inlet south of North Foreland and Point Possession, but many were seen in the Susitna Delta (33%), Knik Arm (31%), and Turnagain Arm/Chickaloon Bay (36%). The annual sums of medians from aerial counts provide a quick index of relative abundance, not corrected for estimates of whales missed and assuming there may be some exchange of whales between areas. Annual index counts have not changed appreciably from 1998 to 2004 (192, 217, 184, 210, 181, 174, and 187, respectively), but these counts are lower than those made from 1993 to 1997 (302, 276, 322, 287, and 261, respectively). These annual medians mirror the abundance estimates that have been corrected for missed whales (653, 491, 594, 440, 347, 367, 435, 386, 313, 357, and 366 for the years 1994-2004, respectively).



## Contents

Abstract .....	iii
Introduction .....	1
Study Area .....	2
Methods .....	3
Aircraft and Data Entry .....	3
Tracklines .....	4
Tides and Light .....	4
Counting Protocol .....	6
Cameras .....	8
Results .....	9
Survey Effort .....	9
Summary Counts .....	11
Daily Reports for 5-12 June 2001 .....	12
Daily Reports for 4-11 June 2002 .....	14
Daily Reports for 31 May to 12 June 2003 .....	17
Daily Reports for 2-9 June 2004 .....	20
Discussion .....	23
Acknowledgments .....	25
Citations .....	26
Tables .....	31
Figures .....	37
Appendix I - Summaries of Other Marine Mammals in Cook Inlet .....	47
Appendix II - Sighting Data of Other Marine Mammals .....	49



## Introduction

Belugas (*Delphinapterus leucas*) are distributed around most of Alaska from Yakutat Bay to the Alaska/Yukon border (Hazard 1988). Five stocks are recognized in this region: Cook Inlet, Bristol Bay, Eastern Bering Sea, Eastern Chukchi Sea, and the Beaufort Sea (Angliss and Lodge 2004, O’Corry-Crowe et al. 1997). The most isolated of these is the Cook Inlet stock, separated from the others by the Alaska Peninsula (Laidre et al. 2000). Belugas in Cook Inlet are very concentrated in a few river mouths and bays during parts of the year (Rugh et al. 2000a). The small size (approximately 400 whales; Hobbs et al. 2000a) and geographic and genetic isolation of the whales in Cook Inlet (O’Corry-Crowe et al. 1997, Laidre et al. 2000, Rugh et al. 2000a), in combination with their strong site fidelity, has made this stock vulnerable to anthropogenic impacts. Until 1999, these whales were subjected to an unregulated harvest (Mahoney and Sheldon 2000), but on 31 May 2000, the stock of belugas in Cook Inlet was designated as depleted under the Marine Mammal Protection Act (65 FR 34590) and is now managed with a small, regulated, subsistence harvest by Alaska Natives.

Each June/July since 1993, the National Marine Fisheries Service (NMFS) has conducted annual aerial surveys to study the distribution and abundance of belugas in Cook Inlet (Withrow et al. 1994, Rugh et al. 1995, 1996, 1997a, 1997b, 1999, 2000b, 2001, 2002, 2003, 2004). This project has been in cooperation with the Cook Inlet Marine Mammal Council (CIMMC) and the Alaska Beluga Whale Commission (ABWC). Aerial surveys are proven to be the most efficient method for collecting distribution and abundance data for belugas in Cook Inlet and have been used for many years prior to the NMFS surveys (e.g., Klinkhart 1966, Calkins et al. 1975, Murray and Fay 1979, Calkins 1984). The NMFS studies

have been the most thorough and intensive (Rugh et al. 2000a). The primary objectives for the current study are to document sighting locations and count belugas in Cook Inlet while maintaining a continuity with preceding studies to allow for inter-year trend analyses. Results from 1993 to 2000 were published in Rugh et al. (2000a). The current document is a collation of field reports for subsequent years from 2001 to 2004.

### **Study Area**

Cook Inlet is a major inland sea in south-central Alaska covering approximately 20,000 km<sup>2</sup>. The southern boundary is an opening into the Gulf of Alaska approximately 85 km across from Cape Douglas to Elizabeth Island. The northern limit, at the Susitna River, is 315 km north of Cape Douglas. From there two substantial tidal estuaries extend to the northeast (Knik Arm, roughly 55 km long) and southeast (Turnagain Arm, 75 km). The shoreline of Cook Inlet (1,350 km) is highly irregular with considerable freshwater input from many rivers and creeks, including glacial melt. Detritus from glacial erosion and strong tidal fluxes keep the waters of upper Cook Inlet (north of the East and West Forelands) extremely turbid to the point of being nearly opaque with silt. A description of beluga habitat in Cook Inlet can be found in Moore et al. (2000). Anchorage, the largest city in Alaska, served as the base of operations for these aerial surveys. Refueling stops were sometimes made in Homer, Kenai, Birchwood, and Palmer. The aerial surveys covered coastal areas of nearly all of Cook Inlet as well as much of the offshore waters.

## Methods

### Aircraft and Data Entry

The survey aircraft, an Aero Commander 680 FLP (*N7UP*), has twin-engines, high-wings, and 10-hour flying capability. There are bubble windows at each of the observer positions, maximizing the effective search area (Fig. 1). Two observers were on the left side of the aircraft providing independent search effort on the side where virtually all belugas were seen – near the coast. A third observer searched on the right (offshore) side of the aircraft without a second observer because of the low probability of making beluga sightings more than 3 km from the coast. A data recorder sat at a computer desk in the left-rear portion of the aircraft where distance from shore could be monitored. An intercom system provided communication among the observers, data recorder, and pilots, but a selective listening device was used to aurally isolate each observer position. Observer seating positions were noted each time they were changed, generally every 1-2 hours to minimize fatigue. Location data were collected from a portable global positioning system (GPS) interfaced with the laptop computer used to enter sighting data. Data entries included routine updates of time, locations (every 2 seconds), start and stop of search effort, percent cloud cover, sea state (Beaufort scale as a function of the wind on the water surface), glare (on the left and right), and visibility (on the left and right). Visibility was documented in five subjective categories from excellent to useless. Best counting conditions (excellent visibility) were when sea state was less than 3 on the Beaufort scale (no white-capping), there was a light overcast (reducing glare), the sun was well above the horizon (for good lighting), windows were clean (even small dust particles or smears distracted from sighting effort), and the observer was

comfortable (back pain, air sickness, etc. can reduce search effort). When conditions were considered poor or useless, they were treated in the analysis as unsampled areas. Only the typical search area (e.g.,  $>10^\circ$  below the horizon and  $10^\circ$  to  $60^\circ$  to the side) was considered when selecting a visibility category.

### **Tracklines**

Coastal surveys were conducted approximately 1.4 km offshore. The objective was to search all nearshore, shallow waters where belugas are typically seen in late spring/early summer (Rugh et al. 2000a). The trackline distance from shore was monitored with an inclinometer such that the shoreline was generally kept  $10^\circ$  below horizontal while the aircraft was at the standard altitude of 244 m (800 ft). Ground speed was approximately 185 km/hour (100 knots). This coastal survey included searches up rivers until the water appeared to be less than 1 m deep, based on the appearance of rapids or riffles or as recommended by Native hunters who have flown with us in the past.

In addition to the coastal surveys, systematic transects were flown across the Inlet. Offshore tracklines were designed to run the length of Cook Inlet or cross it, minimizing overlap. Each year there has been an attempt to alter the offshore sampling effort to conduct as broad an array of searches as is practical.

### **Tides and Light**

The broad geographical range of these surveys in conjunction with rapidly changing tide heights – as much as 9.5 m (30 ft) – made it impractical to survey at specific tidal

conditions (such as at low tide) throughout Cook Inlet. However, there was an attempt to synchronize flight timings with low tides in the Susitna Delta and Knik Arm. This was primarily to minimize the effective survey area; at low tide, a large proportion of upper Cook Inlet has exposed mudflats that would otherwise have to be surveyed. It has proved best to survey Knik Arm during a rising tide because whale groups were relatively more concentrated as they followed the tide up flooding channels. Also, when the whales started going north, they moved away from the intense air traffic associated with Elmendorf Air Force Base, Merrill Field, Hood Lake, and the Anchorage International Airport. Whales sighted near Anchorage usually could not be circled (see Counting Protocol) because of the density of air traffic in that area.

Tidal changes in Turnagain Arm can be so rapid that tide rips compromised visibility, so it proved best to survey there on a high tide while it was slack. Also, at high tide, belugas in Chickaloon Bay are sometimes grouped close to shore or in Chickaloon River (at the southeastern edge of Chickaloon Bay) where they are relatively easy to count. The timing of aerial surveys in areas south of Point Possession and North Foreland was a function of weather, not tides.

Increased emphasis on surveying during preferred tidal conditions is thought to improve the efficiency of the aerial surveys but probably does not significantly affect the visibility of whales, as long as the whales are still over shallow waters. If they retreat to deep waters off the shelf, their surfacing intervals may change, making them harder to find. Also, when beluga groups are scattered over deep water areas, it is possible they are more readily missed than when they are close to shore or moving through river channels.

Although there are many hours of daylight in the Cook Inlet area during early June (just prior to the summer solstice), light levels were low enough at night to limit our survey to hours between 0730 and 2030, local time. The flight schedule for every survey day was designed to take advantage of tidal patterns, as described above, relative to workable daylight hours.

### **Counting Protocol**

Immediately upon seeing a beluga group, each observer independently reported the sighting to the recorder. As the aircraft passed abeam of the whales, the observer informed the recorder of the inclinometer angle, whale travel direction, and notable behaviors but not group size. With each sighting, the observer's position (left front, left center, etc.) was recorded. An important component of the survey protocol was the independence of the paired observers (i.e., that they not cue each other to their sightings). Visual barriers between the observers and headsets that did not allow them to hear each other ensured independence. After a group of whales was reported, the trackline was maintained until the group was well behind the wing; then the aircraft returned to the group and began a circling routine. This allowed each observer full opportunity to independently sight and report whale groups. The pilot and data recorder did not cue the observers to the presence of a whale group until it was clear whether or not the primary observers had seen it.

The whale group location was established at the onset of the aerial counting passes by flying directly over the group, recording starts and stops of group perimeters. The flight pattern used to count a whale group involved an extended oval around the longitudinal axis of



the group with turns made well beyond the ends of the group. Counts of whales were made on each pass down the long axis of the oval. There were typically eight or more separate counting opportunities per whale group with two observers counting. Counts began and ended on a cue from the front observer, starting when the leading edge of the group was close enough to be counted and ending when the trailing edge went behind the wing line. This provided a precise record of the duration of each counting effort. The paired observers each made independent counts and wrote down their results along with date, time, pass number, and quality of the count. The quality of a count was a function of how well the observers saw the location of a group, not how many whales were at the surface on the respective pass. Ratings were A (if glare, whitecaps, or distance did not compromise the counting effort) through F (if it was not practical to count whales on the respective pass). Only quality A and B estimates were used in the analysis. Only whales that were at the surface during a counting pass were included; whale tracks in the muddy water or ripples were not counted. Count records were not shared among aerial team members until each season's surveys were completed. This was done to maximize the independence of each observer's counts.

Because most whale groups were counted on eight different aerial passes, and because two observers were counting on each pass, there were usually 16 counts made per group per day, not including counts made later from video tapes (see Hobbs et al. 2000b). The daily aerial counts are represented by medians of each of the four observers' median counts on multiple passes over a group. The process of using medians instead of maximums or means reduces the effect of outliers (extremes in high or low counts) and makes the results more

comparable to other surveys which lack multiple passes over whale groups. Medians are also more appropriate than maximums when counts are corrected for missed whales.

After median counts were calculated for each location on each day, annual indexes were established from the highest daily sums. This procedure of using high counts ameliorates problems with partially or totally missing whale groups in certain areas on some days. The process of using daily high counts is a modification of the procedure used previously (Rugh et al. 2000a) in that formerly the highest count for each area was used irrespective of day, particularly by treating the Susitna/ Knik Arm areas as separate from Turnagain Arm/ Chickaloon Bay. However, because of the evident movement of whales between these areas in upper Cook Inlet on some days, over-counting was avoided by not adding counts from different days, except for sightings made in the lower Inlet.

## **Cameras**

Two digital video cameras were operated together on most counting passes by having the pair mounted together on a common board. The “standard” camera (a Sony Digital 8 DCR-TRV103 in 2001 and 2002 and a Sony DVCAM, DSR-PDX10 Model L10A in 2003 and 2004<sup>1</sup>) was adjusted to keep the entire group of belugas in view (generally at maximum wide angle), but magnification was kept constant throughout a pass. The second camera (a Sony DSR PD100a used 2001-04) was kept at maximal optical zoom (12x). Images from the “standard” camera were studied in the laboratory for whale counts relative to the precise

---

<sup>1</sup>The change in video cameras was tested on three flights 31 May to 2 June 2003. Although the new camera has a higher resolution, no apparent differences were found in counting whales in the images.

length of time that images were available to be counted (Hobbs et al. 2000b) These counts from video were used to determine the abundance estimates<sup>2</sup> (Hobbs et al. 2000a). Images from the camera kept at maximal zoom were examined for subtle surfacings that did not show up in the standard video and for color ratios (white adults vs. dark juveniles) within the respective groups (as described in Litzky 2001). Analysis of both the aerial counts and counts from the video tapes are detailed in Hobbs et al. (2000b) for 1994-2000 data.

In addition, on half of the aerial passes in 2003 and 2004, a digital still camera (Nikon D1X with a 300 mm Nikkor AF lens) was mounted alongside the video camera used for standard wide angle video. The still camera was fired when there were whales in view, unlike the video camera which videotaped well before and after a whale group passed through the field of view. The digital still images provided greater detail to help detect calves, which are darker than the adults and do not rise above the surface as much as the white adults do (Sims et al. 2003). Results from the photographic aspects of these aerial surveys will be reported in subsequent documents but are not included here.

## **Results**

### **Survey Effort**

Each year (2001-04), aerial surveys covered all or nearly all of the coastal areas of Cook Inlet (Figs. 2, 4, 6, 8). Table 1 summarizes survey dates and effort information. The

---

<sup>2</sup>Although whale counts made from video were used in abundance estimates, the median counts made by observers in the aircraft provided a quick, efficient approximation of relative abundance. Aerial counts could also be used as a proxy (with appropriate corrections relative to each observer and group density) for video counts when videoing was inadequate for a particular group.

number of flights ranged from 13 to 17 each season, and individual flights ranged from 0.8 to 6.5 hours. Flight hours (45-61 hours per season) are the sum of time spent in the air, whether or not a search effort was underway. Systematic search effort (25-29 hours per season) does not include time spent circling whale groups, deadheading without a search effort, or periods with poor visibility. Poor visibility hours (0.8-1.5 hours per season; 2.8-6.0% of the search effort; Table 1) are the sum of time spent in the air when excess glare, fog, whitecaps, or similar problems interfered with the survey effort, as determined by the left-front observer.

The composite of these annual aerial surveys provided a thorough coverage of the coast of Cook Inlet (1,388 km) for most of the area within approximately 3 km of shore. In addition, there were many kilometers of systematic transects flown across the Inlet (Table 1). The percent coverage (25-31%) shown in Table 1 uses 19,863 km<sup>2</sup> as the surface area of Cook Inlet and assumes a 2.0 km transect swath (1.4 km on the left plus 1.4 km on the right, less the 0.8 km blind zone beneath the aircraft). However, each year these surveys covered virtually 100% of the coastal areas. Most of upper Cook Inlet was surveyed five or six times each year, especially areas where belugas have consistently been found in the past – such as the Susitna Delta, Knik Arm, and Chickaloon Bay.

Three of the primary observers (authors of this report) have flown with this project on all or almost all of these surveys since 1993. The other observers have flown on two to five of the seasons. Differences between observers' sighting performances (whether or not an observer found whale groups seen by others and how high or low that observer's counts were relative to the other observers) are incorporated into correction factors for the abundance estimates (see Hobbs et al. 2000b), but in the analyses used here, medians provide sufficient

compensation for most differences between observers. The use of medians (instead of means or maximum counts) and the consistency of the observation team have meant that changes in index counts between years are probably not a function of observer performance.

### **Summary Counts**

Medians of counts of belugas are shown for each area for the respective dates in Tables 2 to 5, and sighting locations are shown in Figures 3, 5, 7, and 9. Typically, there were four good counts made by each observer for each group; therefore, medians were usually from 16 counts per group. The annual median index counts for all observers for 2001-04 were 210, 181, 174, and 187, respectively. These summary counts do not reflect any correction for missed whales. Calculations for whale groups missed during these aerial surveys and estimates of abundance are described in Hobbs et al. (2000a, 2000b). Abundance estimates with the respective covariances (CVs) are shown in Table 6. The abundance estimates are on average 1.87 times larger than the index counts. This correction factor could be used to calculate a crude estimate of absolute abundance when only aerial counts are available, but it does not factor in variables such as densities of whale groups, individual observer performance, search time, etc.

During these surveys, only two belugas were seen in lower Cook Inlet (an adult and young whale on the north side of Kachemak Bay, 8 June 2001; Fig. 3), none were seen in the upper Inlet south of North Foreland and Point Possession, but many were seen in the Susitna Delta (33%), Knik Arm (31%), and Turnagain Arm/Chickaloon Bay (36%; Table 6). Most of the belugas in the Susitna Delta were in dense groups near the mouth of the Little Susitna

River; only a few sightings were as far west as Beluga River. In Knik Arm, belugas were often spread over a large area, but they were most commonly found in or near Eagle Bay, depending on the tide. Turnagain Arm had belugas several times near the entrance to the fiord (southeast of Anchorage), but only one time during these 4 years was a group seen well up in Turnagain Arm (50 by count on 9 June 2004 near Sixmile Creek). Chickaloon Bay usually had belugas near the south shore, most often in an area 3 km southeast of Point Possession east to Chickaloon River. Annual counts in Chickaloon were often in the range of 20-50, but in 2004 counts were as high as 176, and for the first time there appeared to be exchanges of belugas between the Susitna Delta and Chickaloon Bay within the timeframe of the survey; that is, when counts were low in the Susitna area, they were high in Chickaloon and vice versa.

### **Daily Reports for 5-12 June 2001**

On the 3 three days (5-7 June) and last 3 days (10-12 June) of the 2001 survey, a total of six standard coastal tracklines were flown around upper Cook Inlet (Fig. 2). Typically, the route proceeded from Anchorage, around Fire Island, south to Point Possession, then down the coast to East Foreland and across the Inlet to West Foreland (although for 10-12 June, the route made a shortcut from Point Possession directly west to North Foreland), then north to the Susitna Delta (including flights up the McArthur, Beluga, Susitna, and Little Susitna rivers), Knik Arm (up Knik River as far as Eklutna), Turnagain Arm, and Chickaloon Bay (including Chickaloon River). There were two flights on each of these 6 days, with 5.9 to 7.3 flight hours per day. Ideal counting conditions and thorough coverage of the upper Inlet

occurred during most of the five surveys on 5-7 and 10-11 June, but on the sixth survey, 12 June, winds in Turnagain Arm, a wide dispersal of whales in Chickaloon Bay, and difficulties with dense aerial traffic in and around Knik Arm made for poor survey conditions. Therefore, the upper Inlet was adequately sampled five times in 2001.

Beluga groups were found in the Susitna Delta (44 to 114 whales on different days, most were between the west mouth of the Susitna River and the Little Susitna River), Knik Arm (60 to 127 whales, mostly along coastal areas south of Goose Bay and Eagle Bay at low tide), in Turnagain Arm (8 to 10 on different days, the first time our surveys have found belugas here since 1994), and in Chickaloon Bay (12 to 34 whales concentrated in Chickaloon River or on the south shore of the bay, but scattered when away from shore; Fig. 2). Belugas in Turnagain Arm and Chickaloon Bay are assumed to mingle and separate easily between days. It is also assumed that belugas mingle easily between the Susitna Delta and Knik Arm, but there seemed to be relatively little mingling between whales north and south of Anchorage, at least not during this 9-day survey period. Sighting locations were nearly identical to those made in most previous years except for a small group (~10 by count) in Turnagain Arm, seen 5 June in a whirlpool near Bird Point, and the same or similar group was seen near Potter's Marsh (south of Anchorage) on 11 June in the morning and later that day seen again midway across the mouth of Turnagain Arm. On other days, no belugas were seen in Turnagain Arm, but counts in Chickaloon Bay were sometimes higher by an equal amount, indicating that whales seen in Turnagain Arm on one day may have joined the group in Chickaloon Bay on another day.

On 8 and 9 June, the lower Inlet was surveyed by following the east coast from Point Possession south to Elizabeth Island (including a flight up the Kenai River and around Kachemak Bay). Then an offshore trackline was flown north to Anchorage along the east third of the Inlet. On the following day, an offshore trackline was flown south from Anchorage along the west third of the Inlet. After reaching Cape Douglas, the survey continued north up the west side of Cook Inlet as far as West Foreland; then an offshore transect was followed back to Anchorage (Fig. 2). Refueling and rest stops were made in Homer on each of these two days.

For the first time since June 1994, belugas were seen by our observers in Kachemak Bay. An adult and young whale (not a calf) were near the north shore of the bay, halfway between Homer and the east end of Kachemak Bay. They were in shallow, clear water and appeared to be eating or nosing the seafloor. No other belugas were seen on this day except at the end of the flight in Chickaloon Bay.

### **Daily Reports for 4-11 June 2002**

Because the weather forecast for 4-5 June 2002 indicated unusually calm conditions throughout Cook Inlet, the aerial survey effort started in the lower Inlet, an area susceptible to storms from the Gulf of Alaska. Conditions remained nearly ideal throughout this period with generally low sea states and heavy overcast (reducing glare) but very little rain. On 4 June, the survey followed an offshore trackline down the western third of the Inlet and returned on a coastal survey of the western side. On 5 June, the survey went south along the east shore to the southern limit of Cook Inlet and then returned to Anchorage along a trackline bordering



the eastern third of the Inlet (Fig. 4). Although one beluga group was seen near Point Possession while en route to the lower inlet, no belugas were encountered south of the Forelands (lower Cook Inlet) even though many other marine mammals were seen (see Appendix I).

On each day 6-11 June, attempts were made to survey all coastal areas of upper Cook Inlet. After a particularly thorough survey of the area on 7 June (as represented in Fig. 4), it was decided that the remaining surveys did not need to go south of Point Possession or North Foreland, focusing instead on areas where belugas have been found in the past. A frontal system elevated the sea state on 8-9 June, reducing survey options to only Knik Arm, where waters were relatively protected. On 10-11 June, conditions were again favorable in most areas except that Turnagain Arm and the offshore areas of Chickaloon Bay remained difficult to survey because of high winds.

Belugas were found in Chickaloon Bay, sometimes as far west as Point Possession or east near Chickaloon River, but none were seen in Turnagain Arm in spite of several good to excellent surveys of that area. Median counts in Chickaloon Bay were 11 on 6 June and 10 on 7 June. Belugas were seen here on other days as well, but winds were too high to make good counts.

The Susitna Delta was surveyed well on 6 and 7 June. Visibility was excellent on these days, and the survey effort included tracklines nearly halfway across the Inlet. However, no belugas were seen here even though this is the area where belugas have been found consistently during the past decade. High winds lowered visibility in this area on 8 and 9 June, but on 10 and 11 June, conditions were again good. On 10 June, 32 belugas were

counted in 2 groups between Beluga River and the Susitna River, and on 11 June the count rose to 93 in one “long” group in a north-south line south of the Susitna River. The group was moving east in an echelon formation. It appears there were exchanges of whales between the Susitna area and Knik Arm during the survey period. Some of this distribution may be a function of tides.

In 2002, most of the beluga sightings occurred in Knik Arm. Because Knik Arm is relatively protected from winds, counts were made here on each of the six upper Inlet surveys. Median daily counts in Knik Arm ranged from 54 to 97 (Table 3). There were from 1 to 7 groups seen here on different days with group sizes ranging from 1 to 87 whales. Although the whales seemed to consolidate into fewer groups when the tide was low, on an incoming tide they moved north, following channels in long lines which made them easier to count. Also, when the whales retreated to the south with an ebbing tide, they concentrated in an area where it is not practical to fly our racetrack pattern for counts because of restricted air space around Elmendorf Air Base, Merrill Field, and the Anchorage International Airport. At high tide, belugas would spread out across the shallow mud flats, making it difficult to recognize perimeters of groups and impractical to circle them for counts and videotaping. Therefore, it appears that the ideal time to survey Knik Arm was approximately an hour after the tide started to rise.

### **Daily Reports for 31 May to 12 June 2003**

On the first 3 days of the project in 2003 (31 May to 2 June), camera systems were tested to compare videos used during previous surveys to a new higher resolution digital camera (see Methods) and to test a digital still camera for documenting small, dark calves.

Upper Cook Inlet was surveyed on 3 June in excellent conditions (Fig. 6). Winds were mild and skies clear. A high tide in Turnagain Arm meant the waters were flat and visibility excellent. No whales were found within Turnagain Arm, but a large group of belugas (median count of 64) was found in Chickaloon Bay. The survey then continued around Point Possession and south to the Forelands, then north around the Susitna Delta, including surveys up Beluga, Susitna, and Little Susitna Rivers. A small group of belugas (median count of 16) was found near the mouth of the Little Susitna River, and a large group (median count of 94) was in Eagle Bay of Knik Arm. The sum of these counts (174) was the highest this season. Locations where belugas were found on this day – Chickaloon Bay, at the mouth of the Little Susitna River, and in Knik Arm – were very typical of the sighting distribution at this time of year. After making this thorough survey of upper Cook Inlet, it was decided that the remaining surveys did not need to go more than a few kilometers south of Point Possession or Beluga River, focusing instead on areas where belugas are known to occur (Rugh et al. 2000b).

On 4 June, another survey was made of upper Cook Inlet, but winds compromised the search in Turnagain Arm. Two groups of belugas were found in Chickaloon Bay, but counts here (40 whales) were lower than on the previous day because high winds caused deteriorated viewing conditions. The survey then continued south to Moose Point and west across the

Inlet to Threemile Creek then north around the Susitna Delta. Although survey conditions were good, no belugas were found in the Susitna area. Knik Arm had good to excellent viewing conditions. Whales were again found in Eagle Bay. The median count here was 77, which is less than the count made on 3 June.

On 5 June, winds picked up, making it too difficult to survey all of Turnagain Arm, although a group of belugas (25 whales) was seen southeast of Anchorage (near Potter's Marsh). Poor sighting conditions in Chickaloon Bay meant that the only group found there (median count of 1) was in the protected waters of Chickaloon River. In spite of excellent conditions in the Susitna Delta, no whales were found there, and in Knik Arm viewing conditions were good, but only one small group (median count of 7) was found, perhaps because the tide was high. It appears that when the tide is high, the whales disperse over a large area in the middle of Knik Arm, which makes them hard to find and count.

Another survey of upper Cook Inlet was made on 6 June. Wind and rain prevented an effective survey of Turnagain Arm, but conditions were good in Chickaloon Bay. Belugas (median count of 21) were found in Chickaloon River. In the search around the Susitna Delta, belugas were found at Beluga River (2 maximum count), at the mouth of the Susitna River (10 maximum count), and the Little Susitna River (2 maximum count), but in all of these cases, the median count was zero because these small groups were hard to find during the multiple passes made near the sighting area. In Knik Arm, two groups were found (median counts 86 and 6), resulting in counts similar to those made on 3 June (median count of 94).

The east side of lower Cook Inlet was surveyed on 7 June (Fig. 6). Thorough coverage was made along all coastal areas between Point Possession and Elizabeth Island.

Transects were then flown across the Inlet and back to Homer then continuing north up the western third of the Inlet, including a survey around Kalgin Island. No belugas were found, but many other marine mammals were seen (Appendix I), making it evident that visibility was not a problem.

Upper Cook Inlet was surveyed again on 8 June under excellent conditions, starting at Threemile Creek and covering the Susitna Delta. Belugas were found near Beluga River (6 whales) and the mouth of the Little Susitna River (28 whales). Whales were found scattered across the central portion of Knik Arm (30 whales), but they were spread out and difficult to count 2 hours after low tide.

No flight was made on 9 June due to the lack of good options with tidal conditions, and this break allowed the observers to catch up on data edits, including video reviews and backups of digital photos.

Upper Cook Inlet was surveyed on 10 June, starting at West Foreland and going north across the Susitna Delta. Belugas were again found at Beluga River (4 whales), east of the Susitna River (15 whales), and near the Little Susitna River (23 whales). In Knik Arm, several groups of belugas (62 whales) were found spread over a large area. Increasing rain prevented a search of Turnagain Arm and Chickaloon Bay.

A final survey of upper Cook Inlet was made on 11 June, again under excellent conditions. The search began at Fire Island and continued into Turnagain Arm to Bird Point where the tide was so low the survey was not continued any farther east. No whales were found in Turnagain Arm. In Chickaloon Bay, the waters were calm, and 4 groups of belugas were found (52 whales total). The Susitna Delta was surveyed, and three groups were found

in essentially the same locations as on 10 June, so no counts were made in order to get to Knik Arm on a low tide. One large group (53 whales) was found in the middle of Knik Arm, and 2 small groups (19 and 6 whales) were in the southern part of Knik Arm. In this area of dense air traffic, counts were made on only one or two passes as allowed by air traffic control. The sum of median counts of belugas along the north side of Cook Inlet (Susitna Delta to Knik Arm) was the same on 10 and 11 June (119) as it was on 3 June (110).

The last day of surveying during the 2003 season, 12 June, was used to complete the coverage of lower Cook Inlet. In the morning, fog covered most of the Inlet north of Homer, but visibility was good to excellent south of there. A survey of the west coast was made from Cape Douglas north to Oil Bay, then across the Inlet to Homer. After a refueling break in Homer, the survey recrossed the Inlet, including a coastal route around Augustine Island and then north up the coast as far as West Foreland, followed by a direct flight to Anchorage. Visibility was good throughout the coastal portion of this survey, but no belugas were seen.

#### **Daily Reports for 2-9 June 2004**

A survey was flown on 2 June 2004 with the intention of doing a complete coverage of upper Cook Inlet (Fig. 8); however, Turnagain Arm and Chickaloon Bay were too windy, so the survey started at Fire Island and flew south to East Foreland and across the Inlet to Big River (Redoubt Bay) then north to the Susitna Delta. A large group of belugas was found near the Little Susitna River (Table 5; Fig. 9). It was to be counted after taking a break in Anchorage; however, radio communication problems terminated the survey early this day.

The survey on 3 June had a mix of excellent to poor visibility in Turnagain Arm and Chickaloon Bay at high tide. No belugas were found, probably because the search was compromised by visibility. Conditions were good as far south as Kenai Airport, where the plane was refueled and enough time passed for the tides to lower in the Susitna area. From Kenai, the survey flew west to Drift River and north along the coastline and rivers until 2 groups of whales (median counts = 5 + 94; Table 5) were found near the Little Susitna River (in the same area as a group was seen on the previous day, 2 June). The survey of Knik Arm resulted in no beluga sightings in spite of excellent conditions. This is the first time no significant whale groups have been seen in Knik Arm by these annual surveys since July 1995.

Upper Cook Inlet was surveyed again on 4 June. Conditions were excellent in Turnagain Arm and Chickaloon Bay (at high tide), and as has been typical for almost every survey since 1993, a small group of belugas (11 whales) was found in Chickaloon Bay. The search continued south to Kenai, and after refueling it went directly to North Foreland and along the coast in excellent viewing conditions (heavy overcast, no wind) around the Susitna Delta and Knik Arm. A large group of belugas (65 whales) was found west of the Little Susitna River, in the same location as on the previous 2 days. No whales were found in Knik Arm.

On 5-6 June the lower half of Cook Inlet was surveyed to take advantage of favorable weather conditions (Fig. 8). On 5 June the survey searched coastal areas on the east side and returned north on a series of straight-line transects up the west third of the Inlet, including coastal surveys around Augustine and Kalgin Islands. On the second day, straight-line transects were flown south on the east third of the Inlet as far as Cape Douglas then up the west coast (plus a refueling stop in Homer) to West Foreland and then straight to Anchorage. Conditions

for the coastal surveys on these two days were generally excellent and many marine mammals were seen (see Appendix I) but no belugas.

Upper Cook Inlet was resurveyed on 7 June, starting with Chickaloon Bay to better synchronize the timing with high tide in Turnagain Arm. Two groups of belugas (129 and 47 whales) were found in Chickaloon Bay, the largest numbers ever seen there. The survey also covered Turnagain Arm, the Susitna Delta, and Knik Arm. No belugas were found outside of Chickaloon Bay other than a small group (11 whales) at Theodore River, southwest of the mouth of Susitna River.

Upper Cook Inlet was surveyed again on 8 June. Rain and fog limited the search initially to the Susitna area. A small group of belugas (15 whales) was found near the Little Susitna River, similar to the small group found near the Theodore River on the previous day. The survey then went to Point Possession and down the east coast to Kenai Airport. When weather improved, surveys were resumed and many belugas were again found in Chickaloon Bay (44 + 9 + 20 + 39 whales) and near the entrance to Turnagain Arm (37 whales), and again none were in Knik Arm, in spite of good survey conditions.

The final survey, on 9 June, covered most coastal areas in upper Cook Inlet north of Moose Point and North Foreland. Two groups of belugas (9 + 32 whales) were found in and near the Little Susitna River (a location consistent with almost all surveys this season), well up in Turnagain Arm near Sixmile Creek (50 whales; the largest group seen in Turnagain since these surveys began in 1993), and in Chickaloon Bay (65 whales in a wide scatter across most of the nearshore area). It seems some of the whales that had been in Chickaloon Bay over the past few days may have returned to the Susitna Delta.



## Discussion

In Cook Inlet, belugas concentrate near river mouths or shallow bays during late spring and early summer across the northernmost reaches of the Inlet, especially in the Susitna Delta, Knik Arm, and Chickaloon Bay (Figs. 3, 5, 7, and 9; Rugh et al. 2000a). These concentrations apparently last from mid-May to July or later and are very likely associated with the migration of anadromous fish, particularly eulachon (*Thaleichthys pacificus*) and several species of Pacific salmon (*Onchorynchus* spp., Moore et al. 2000) .

Historically many belugas were seen in both upper and lower Cook Inlet in June and July (Rugh et al. 2000a). However, between 1993 and 1995, during the first 3 years of the NMFS surveys, very few belugas (less than 3% of all of the annual sightings) were in the lower Inlet, south of the East and West Forelands (Table 6), and in subsequent years, 1996-2004, hardly any (one whale in Tuxedni Bay in 1997 and two in Kachemak Bay in 2001) have been seen in the lower Inlet during these surveys. Furthermore, in the southern half of the upper Inlet, south of North Foreland and Point Possession, sighting rates dropped from an annual average of 1.5% in 1993-95 to zero for all subsequent years. Sighting conditions have generally been ideal during these aerial surveys, but the only places where belugas were consistently found were in the northern portion of the upper Inlet (Table 6). Many sea otters, harbor seals, harbor porpoise, gray whales, fins, and humpback whales were seen in the lower Inlet (Appendix I and II), so the lack of beluga sightings there was not due to poor visibility.

Research protocol and coverage area for the annual aerial surveys of Cook Inlet have been kept consistent to minimize variables in inter-year analyses. The type of aircraft, window

configuration, altitude, air speed, and coastal search patterns were constant, and most of the observers have been on many or all of the previous surveys, maintaining continuity in effort. On all but one of these 12 annual surveys, flights were in the first half of June. Each year there have been 4-6 replicate flights around upper Cook Inlet. The large number of flights per year across many years and the consistency of effort have helped us detect patterns of whale distribution. Although these aerial surveys do provide a broad-scale picture of the whale distribution each June, tagging provides much more detail, albeit of only a few whales (e.g., 14 belugas tagged by Hobbs et al. In review). Results from tagged whales show that the beluga distribution seen during the June aerial surveys is representative of most of the summer through to late autumn. In winter, the whales dispersed into deeper waters and farther south, but they never left Cook Inlet.

Median estimates presented in Table 6 are a rough index of relative abundance. Calculated abundances with their respective CVs, also shown in Table 6, include corrections for whales missed within the viewing range of observers and whales missed because they were beneath the surface throughout an aerial counting pass. Estimates from 1994 to 2000 were reported in Hobbs et al. (2000a), and abundance estimates for surveys from 2001 to 2003 are from NMFS unpublished data (R.C. Hobbs, NMML, NOAA Fisheries, pers. commun.). The abundance estimates, with their associated CVs, are the appropriate values to be used in interyear trend analyses. Still, both median index counts and the abundance estimates reflect a similar trend (Fig. 10) showing declines until 1998 and no clear trend in numbers thereafter.

## Acknowledgments

Douglas DeMaster, Sue Moore, and Paul Wade have each in turn served as Program Leaders of NMML's Cetacean Assessment and Ecology Program during the conception, preparation, and conduct of this multi-year project. Dave Weintraub (Commander NW, Ltd., Wenatchee, WA) helped provide us with the aircraft and flew with us on virtually every survey. His investment in this project is greatly appreciated. Randy Weber was our primary pilot in 2002 and 2004; Jay Sefferen (for most of the season) and Earl Johnson (for 2 days) were our primary pilots in 2003. The pilots filled a critical role in keeping the aircraft at the preferred altitude and distance from shore while flying intricate patterns over rapidly moving whale groups all the while watching for aircraft in an exceptionally busy airspace. Prior to 2003, data entries were made using a program created by James Cabbage (Cascadia Research Collective, Olympia, WA). In 2003 and 2004, data entries were made on a program originally developed for harbor porpoise surveys in the northeast Atlantic (made available through Debi Palka, Woods Hole, MA; software designed by Lex Hiby of Conservation Research Ltd, UK and Phil Lovell of Sea Mammal Research Unit, Scotland). Kristin Laidre (NMML) provided mapping of survey tracklines and sighting data in 2001 and 2002. Kim Goetz (Duke University, North Carolina) revamped and unified the database. Reviews of this document were provided by Tonya Zeppelin (NMML) and David Withrow (NMML). Technical edits were provided by Gary Duker and James Lee of the Alaska Fisheries Science Center Publications Unit. This survey was conducted under MMPA Scientific Research Permit No. 782-1438.

### Citations

- Angliss, R.P., and K.L. Lodge. 2004. Alaska marine mammal stock assessments, 2003. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-144, 230 p.
- Calkins, D.G. 1984. Belukha whale. Vol. IX in: Susitna hydroelectric project; final report; big game studies, Alaska Dept. Fish Game Doc. No. 2328.
- Calkins, D.G., K.W. Pitcher, and K. Schneider. 1975. Distribution and abundance of marine mammals in the Gulf of Alaska. Rep. for USDOC/NOAA. Available from Alaska Dept. Fish Game, 333 Raspberry Rd., Anchorage, AK 99518-1599. 67 p.
- Hazard, K. 1988. Beluga whale, *Delphinapterus leucas*, p. 195-235. In J.W. Lentfer (editor), Selected marine mammals of Alaska: Species accounts with research and management recommendations. Mar. Mammal Comm., Washington D.C.
- Hobbs, R.C., D.J. Rugh, and D.P. DeMaster. 2000a. Abundance of beluga whales, *Delphinapterus leucas*, in Cook Inlet, Alaska, 1994-2000. Mar. Fish. Rev. 62(3):37-45.
- Hobbs, R.C., J.M. Waite, and D.J. Rugh. 2000b. Beluga, *Delphinapterus leucas*, group sizes in Cook Inlet, Alaska, based on observer counts and aerial video. Mar. Fish. Rev. 62(3):46-59.
- Hobbs, R.C., K. L. Laidre, D. J. Vos, B. A. Mahoney, and M. Eagleton. In review. Movements and area use of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska. Arctic.
- Klinkhart, E.G. 1966. The beluga whale in Alaska. Alaska Dept. Fish and Game, Juneau, Fed. Aid Wildl. Restor. Proj. Rep. Vol. VII, Proj. W-6-R and W-14-R. 11 p.

- Laidre, K.L., K.E.W. Shelden, D.J. Rugh, and B.A. Mahoney. 2000. Beluga, *Delphinapterus leucas*, distribution and survey effort in the Gulf of Alaska. *Mar. Fish. Rev.* 62(3):27-36.
- Litzky, L.K. 2001. Monitoring recovery status and age structure of Cook Inlet, Alaska belugas by skin color determination. Masters Thesis Univ. Washington, Seattle. 76 p.
- Mahoney, B.A., and K.E.W. Shelden. 2000. Harvest history of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska. *Mar. Fish. Rev.* 62(3):124-133.
- Moore, S.E., D.J. Rugh, K.E. Shelden, L.K. Litzky, and B.A. Mahoney. 2000. Beluga, *Delphinapterus leucas*, habitat associations in Cook Inlet, Alaska. *Mar. Fish. Rev.* 62(3):60-80.
- Murray, N.K., and F.H. Fay. 1979. The white whales or belukhas, *Delphinapterus leucas*, of Cook Inlet, Alaska. Unpubl. doc. prepared for June 1979 meeting of the Subcommittee on Small Cetaceans of the Sci. Comm. of the Int. Whaling Comm. College of Env. Sci., Univ. Alaska, Fairbanks. 7 p.
- O'Corry-Crowe, G.M., R.S. Suydam, A. Rosenberg, K.J. Frost, and A.E. Dizon. 1997. Phylogeography, population structure and dispersal patterns of the beluga whale *Delphinapterus leucas* in the western Nearctic revealed by mitochondrial DNA. *Mol. Ecol.* 6:955-970.
- Rugh, D.J., R.P. Angliss, D.P. DeMaster, and B.A. Mahoney. 1995. Aerial surveys of belugas in Cook Inlet, Alaska, June 1994. Unpubl. Doc. (SC/47/SM10) submitted to the IWC Scientific Committee, June 1995. 14 p.

- Rugh, D.J., K.E.W. Shelden, R.P. Angliss, D.P. DeMaster, and B.A. Mahoney. 1996. Aerial surveys of beluga whales in Cook Inlet, Alaska, July 1995. Unpubl. Doc. (SC/48/SM8) submitted to the IWC Scientific Committee, May 1996. 21 p.
- Rugh, D.J., K.E.W. Shelden, J.M. Waite, R.C. Hobbs, and B.A. Mahoney. 1997a. Aerial surveys of beluga whales in Cook Inlet, Alaska, June 1996. Unpubl. Doc. (SC/49/SM19) submitted to the IWC Scientific Committee, Sept. 1997. 22 p.
- Rugh, D.J., R.C. Hobbs, K.E.W. Shelden, and J.M. Waite. 1997b. Aerial surveys of beluga whales in Cook Inlet, Alaska, June 1997. Unpubl. Doc. (SC/49/SM20) submitted to the IWC Scientific Committee, Sept. 1997. 17 p.
- Rugh, D.J., R.C. Hobbs, K.E.W. Shelden, B.A. Mahoney, and L.K. Litzky. 1999. Surveys of beluga whales in Cook Inlet, Alaska, June 1998. Unpubl. Doc. (SC/51/SM11) submitted to the IWC Scientific Committee, May 1999. 11 p.
- Rugh, D.J., K.E.W. Shelden, and B.A. Mahoney. 2000a. Distribution of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska, during June/July 1993-2000. Mar. Fish. Rev. 63(3):6-21.
- Rugh, D.J., K.E.W. Shelden, B.A. Mahoney, L.K. Litzky, R.C. Hobbs, and K.L. Laidre. 2000b. Aerial surveys of beluga whales in Cook Inlet, Alaska, June 1999, p. 1-10. In A.L. Lopez and D.P. DeMaster (editors), Marine Mammal Protection Act and Endangered Species Act implementation program 1999. AFSC Processed Rep. 2000-11, 195 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

- Rugh, D., K.E.W. Sheldon, B.A. Mahoney, and L.K. Litzky. 2001. Aerial surveys of belugas in Cook Inlet, Alaska, June 2000, p. 1-11. *In* A.L. Lopez and R.P. Angliss (editors), Marine Mammal Protection Act and Endangered Species Act implementation program 2000. AFSC Processed Report 2001-06, 115 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.
- Rugh, D., B.A. Mahoney, L.K. Litzky, and B. Smith. 2002. Aerial surveys of beluga in Cook Inlet, Alaska, June 2002. Unpubl. Doc. Natl. Mar. Mammal Lab., NMFS, NOAA, 7600 Sand Point Way NE Seattle WA 98115. 12 p.
- Rugh, D.J., B.A. Mahoney, C.L. Sims, B.K. Smith, and R.C. Hobbs. 2003. Aerial surveys of belugas in Cook Inlet, Alaska, June 2003. Unpubl. Doc. Natl. Mar. Mammal Lab., NMFS, NOAA, 7600 Sand Point Way NE Seattle WA 98115. 13 p.
- Rugh, D.J., K.E.W. Sheldon, C.L. Sims, B.A. Mahoney, B.K. Smith, and R.C. Hobbs. 2004. Aerial surveys of belugas in Cook Inlet, Alaska, June 2004. Unpubl. Doc. Natl. Mar. Mammal Lab., NMFS, NOAA, 7600 Sand Point Way NE Seattle WA 98115. 16 p.
- Sims, C.L., R.C. Hobbs, and D.J. Rugh. 2003. Developing a calving rate index for beluga in Cook Inlet, Alaska using aerial videography and photography. Abstract (poster) in the Fifteenth Biennial Conference on the Biology of Marine Mammals. Greensboro, North Carolina. 14-19 Dec. 2003.

Withrow, D.E., K.E.W. Sheldon, D.J. Rugh, and R.C. Hobbs. 1994. Beluga whale, *Delphinapterus leucas*, distribution and abundance in Cook Inlet, 1993, p. 128-153, *In* H. Braham and D. DeMaster (editors), Marine Mammal Assessment Program: Status of stocks and impacts of incidental take; 1993. Annual Rept. submitted to Office of Protected Resources, Natl. Mar. Fish. Serv. 1335 East-West Highway, Silver Spring MD 20910.



Table 1.-- Summaries of effort during aerial surveys of Cook Inlet 2001-04.

	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
Survey dates	5-12 June	4-11 June	31 May* to 12 June	2-9 June
Number of flights	16	13	17	14
Flight hours	55 hour	45 hour	61 hour	45 hour
Systematic search	30.8 hour	25.9 hour	31.8 hour	19.8 hour
Poor visibility	1.5 hour (5.1%)	1.5 hour (6.0%)	1.3 hour (4.7%)	0.8 hour (2.8%)
Good search effort	29.3 hour	24.4 hour	30.5 hour	19.0 hour
Offshore tracklines	1,186 km	1,234 km	1,146 km	1,653 km
Total coverage of Cook Inlet	26%	26%	25%	31%
Primary observers	Rugh Mahoney Shelden Litzky	Rugh Mahoney Smith Litzky	Rugh Mahoney Smith Sims	Rugh Mahoney/ Smith Shelden Sims

\*Including 3 days of test flights.

Table 2.-- Counts of belugas seen during aerial surveys of Cook Inlet in June 2001. Counts are medians from the four observers doing multiple counts of each group of whales. Dashes indicate no survey, and zeros indicate that the area was surveyed but no whales were seen. Sites are listed in a clockwise order around Cook Inlet.

Location	5 June	6 June	7 June	8-9 June	10 June	11 June
Turnagain Arm (north and east of Chickaloon Bay)	8	0	0	--	0	10
Chickaloon Bay/ Pt. Possession	22	14	12	--	<b>34</b>	21
Pt. Possession to East Foreland	0	0	0	0	--	--
Mid-Inlet east of Trading Bay	--	--	--	0	--	--
East Foreland to Homer	--	--	--	0	--	--
Kachemak Bay	--	--	--	<b>2</b>	--	--
West side of lower Cook Inlet	--	--	--	0	--	--
Redoubt Bay	--	--	--	0	--	--
Trading Bay	0	0	0	--	--	--
Susitna Delta (N. Foreland to Pt. Mackenzie)	48	44	97	--	<b>114</b>	71
Knik Arm	127	107	72	--	<b>60</b>	61
Fire Island	0	0	0	--	--	0
$\Sigma =$					<b>210</b>	





Table 5.-- Median counts of belugas seen during aerial surveys of Cook Inlet in June 2004. Counts are medians from the four observers doing multiple counts of each group of whales. Dashes indicate no survey, and zeros indicate that the area was surveyed but no whales were seen. Sites are listed in a clockwise order around Cook Inlet.

Location	2 June	3 June	4 June	5 June	6 June	7 June	8 June	9 June
Turnagain Arm (not incl. Chickaloon Bay)	---	0	0	---	---	0	37	50
Chickaloon Bay/ Pt. Possession	---	---	11	---	---	<b>176</b>	112	65
Pt. Possession to East Foreland	0	0	0	0	---	---	0	---
Mid-Inlet near Trading Bay	---	---	0	0	0	---	---	---
East Foreland to Homer	---	---	---	0	---	---	---	---
Kachemak Bay	---	---	---	0	---	---	---	---
West side of lower Cook Inlet	---	---	---	---	0	---	---	---
Redoubt Bay	0	0	---	---	0	---	---	---
Trading Bay	0	0	---	---	---	---	---	---
Susitna Delta (N. Foreland to Pt. Mackenzie)	*	99	65	---	---	<b>11</b>	15	41
Knik Arm	---	0	0	---	---	0	0	0
Fire Island	0	0	0	---	---	0	0	0
	$\Sigma =$					<b>187</b>		

\* Large beluga group seen but not counted.

Table 6.-- Summary of index counts made during aerial surveys of belugas in Cook Inlet in June or July 1993-2004 with abundance estimates and the respective CV (Hobbs et al. 2000a; NMML unpubl. data). Old index counts treated Turnagain Arm/Chickaloon Bay separately from the rest of upper Cook Inlet. The new index uses the highest daily count from all of upper Cook Inlet. Highest median counts of belugas in each of six zones are shown; the sum of these high counts do not usually equal the index counts because in the latter case, highest daily sums were used, not highest counts per site (see Tables 2-5).

Year	Survey dates	Index counts		Abundance estimates	CV	Zones in Cook Inlet					
						1	2	3	4	5	6
		old	new								
1993	2-5 June	304	<b>302</b>	---	---	1	9	169	80	8	49
1994	1-5 June	281	<b>276</b>	653	0.43	10	1	248	0	6	17
1995	18-24 July	324	<b>322</b>	491	0.44	14	4	287	1	0	18
1996	11-17 June	307	<b>287</b>	594	0.28	0	0	368	29	0	41
1997	8-10 June	264	<b>261</b>	440	0.14	1	0	73	161	0	29
1998	9-15 June	193	<b>192</b>	347	0.29	0	0	109	93	0	42
1999	8-14 June	217	<b>217</b>	367	0.14	0	0	160	28	0	30
2000	6-13 June	184	<b>184</b>	435	0.23	0	0	114	42	0	28
2001	5-12 June	211	<b>210</b>	386	0.09	2	0	114	127	10	34
2002	4-11 June	192	<b>181</b>	313	0.12	0	0	93	97	0	11
2003	3-12 June	174	<b>174</b>	357	0.11	0	0	41	94	25	65
2004	2-9 June	187	<b>187</b>	366	0.20	0	0	99	0	50	176

Zones used in this table:

- 1) Lower Cook Inlet, including all of the Inlet south of East and West Forelands.
- 2) Mid-Inlet, which is bordered on the south by East and West Forelands and on the north by Point Possession and North Foreland.
- 3) Susitna Delta, bordered by Beluga River and Point MacKenzie, including Fire Island.
- 4) Knik Arm, with a southern boundary defined by Point MacKenzie and Point Woronzof.
- 5) Turnagain Arm, including all waters east of Fire Island but not Chickaloon Bay.
- 6) Chickaloon Bay, bordered by Point Possession and Burnt Island.

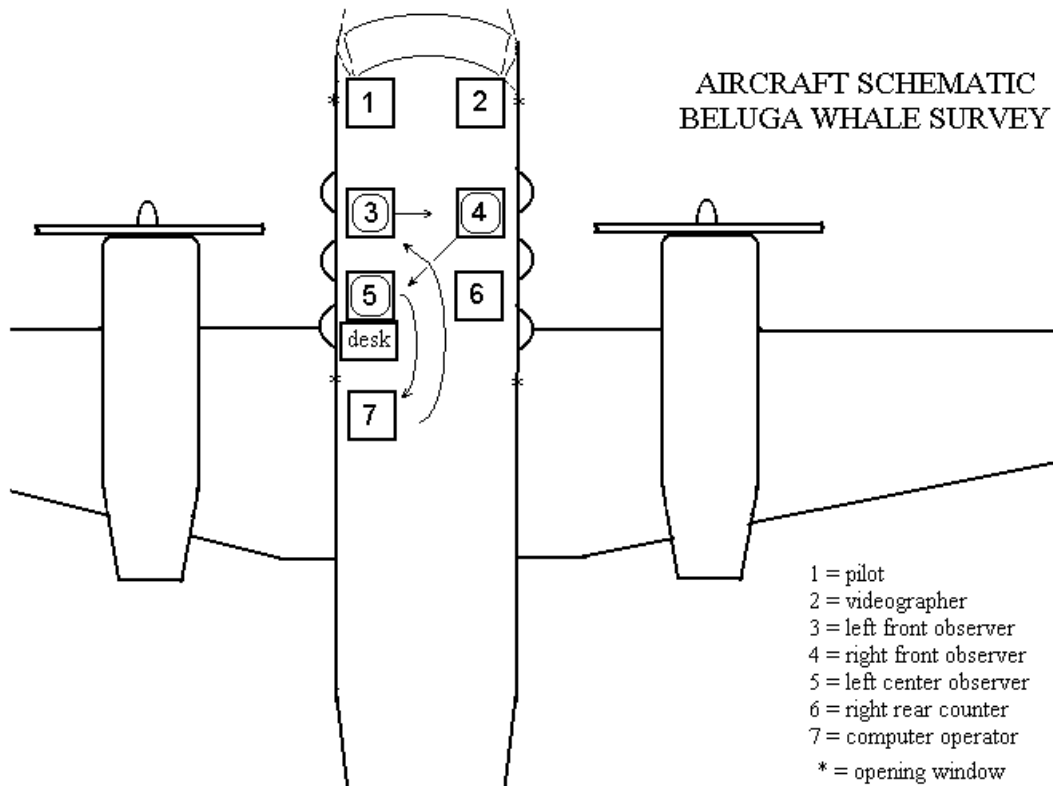


Figure 1.-- Aircraft schematic showing the configuration used for observers on aerial surveys of Cook Inlet.

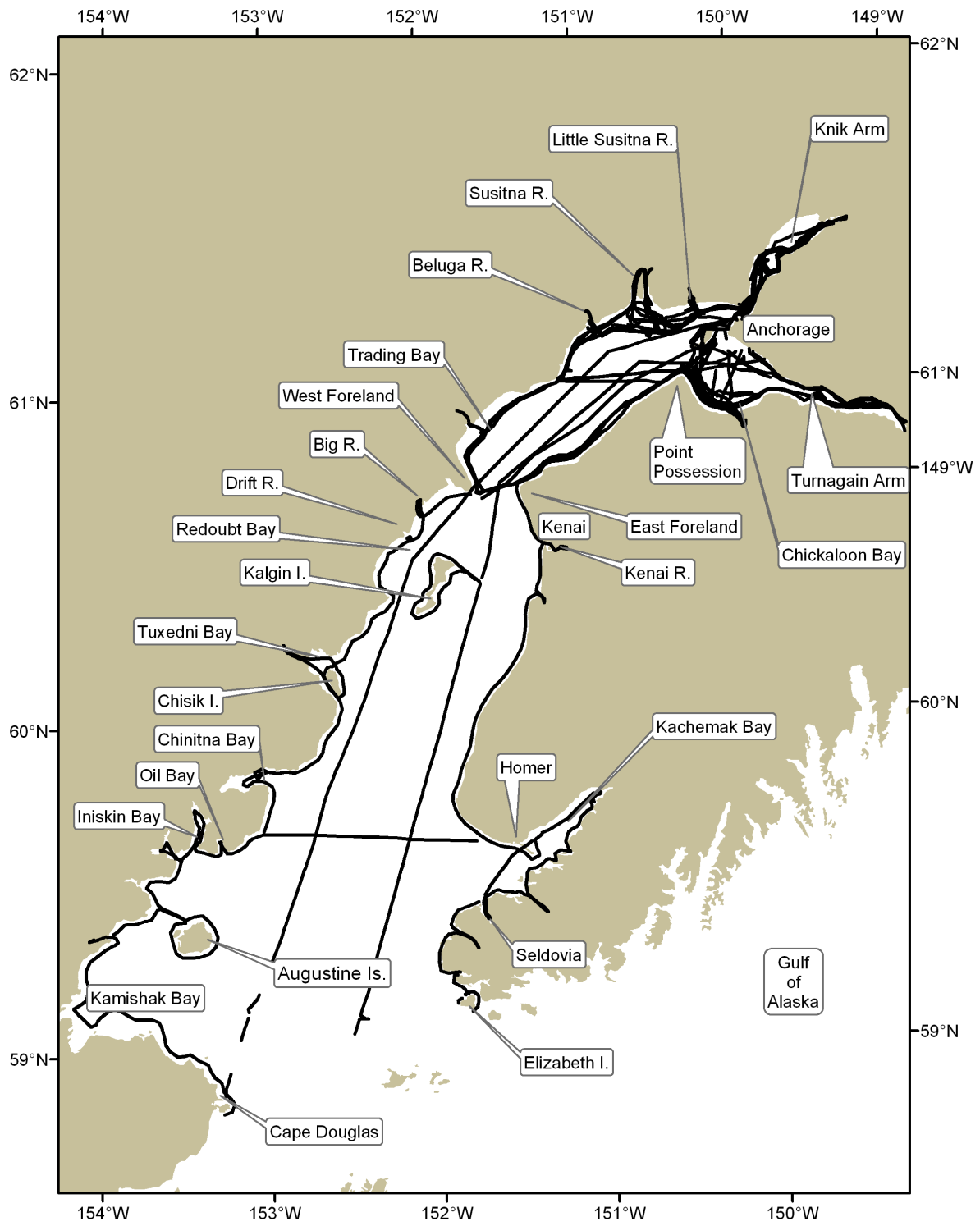


Figure 2. -- Aerial survey tracklines in Cook Inlet June 2001.



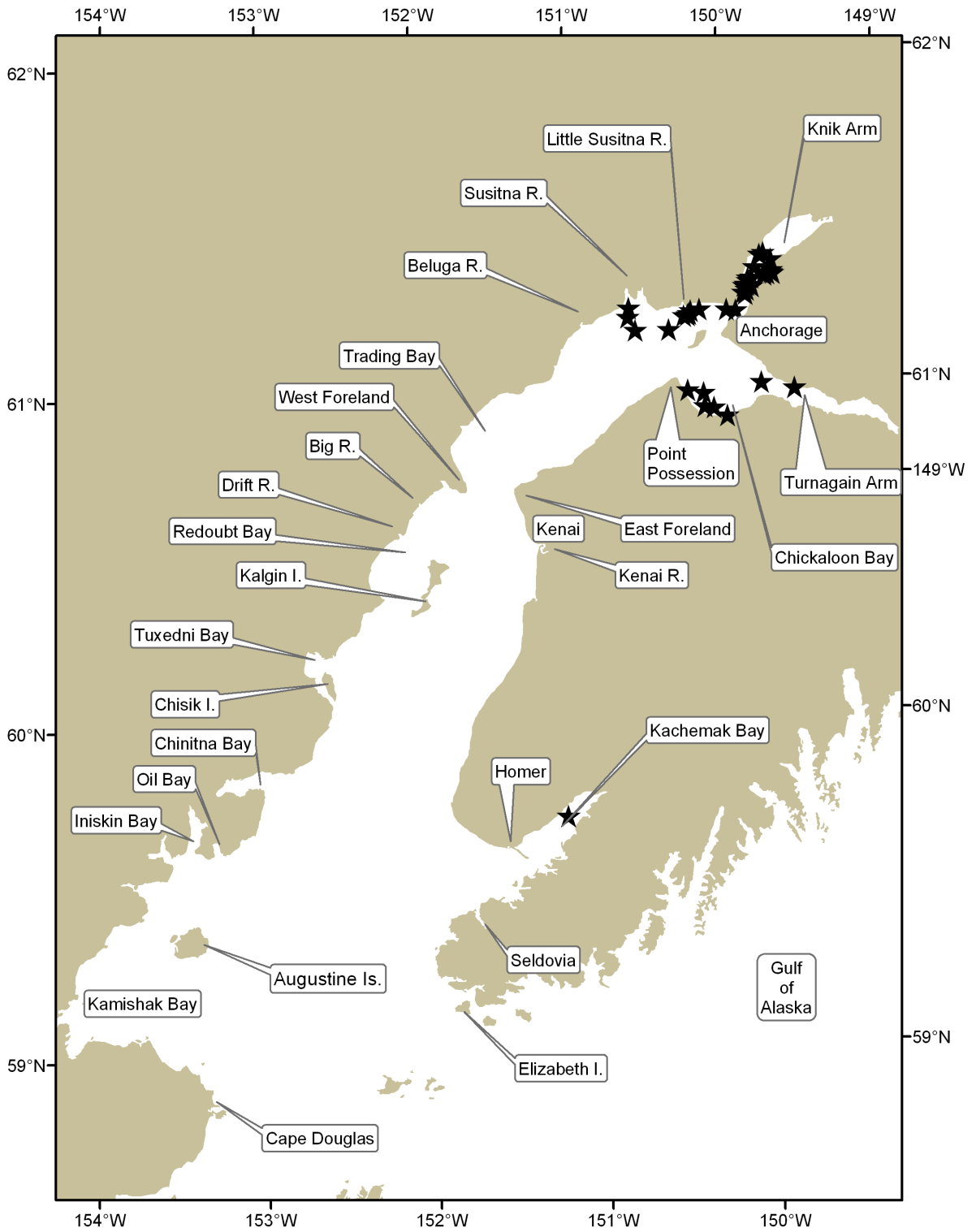


Figure 3. -- Beluga sightings in Cook Inlet June 2001.

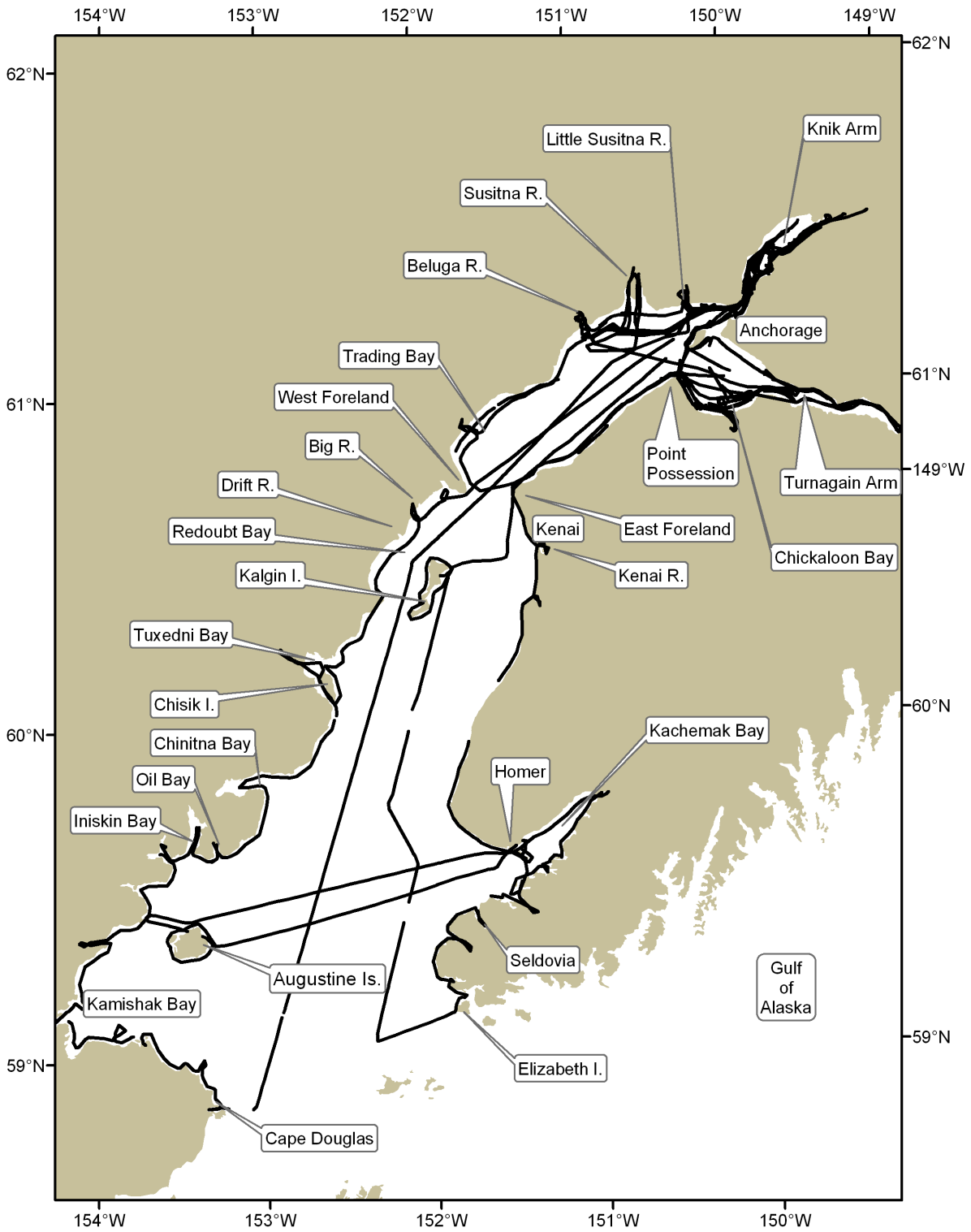


Figure 4. -- Aerial survey tracklines in Cook Inlet June 2002.

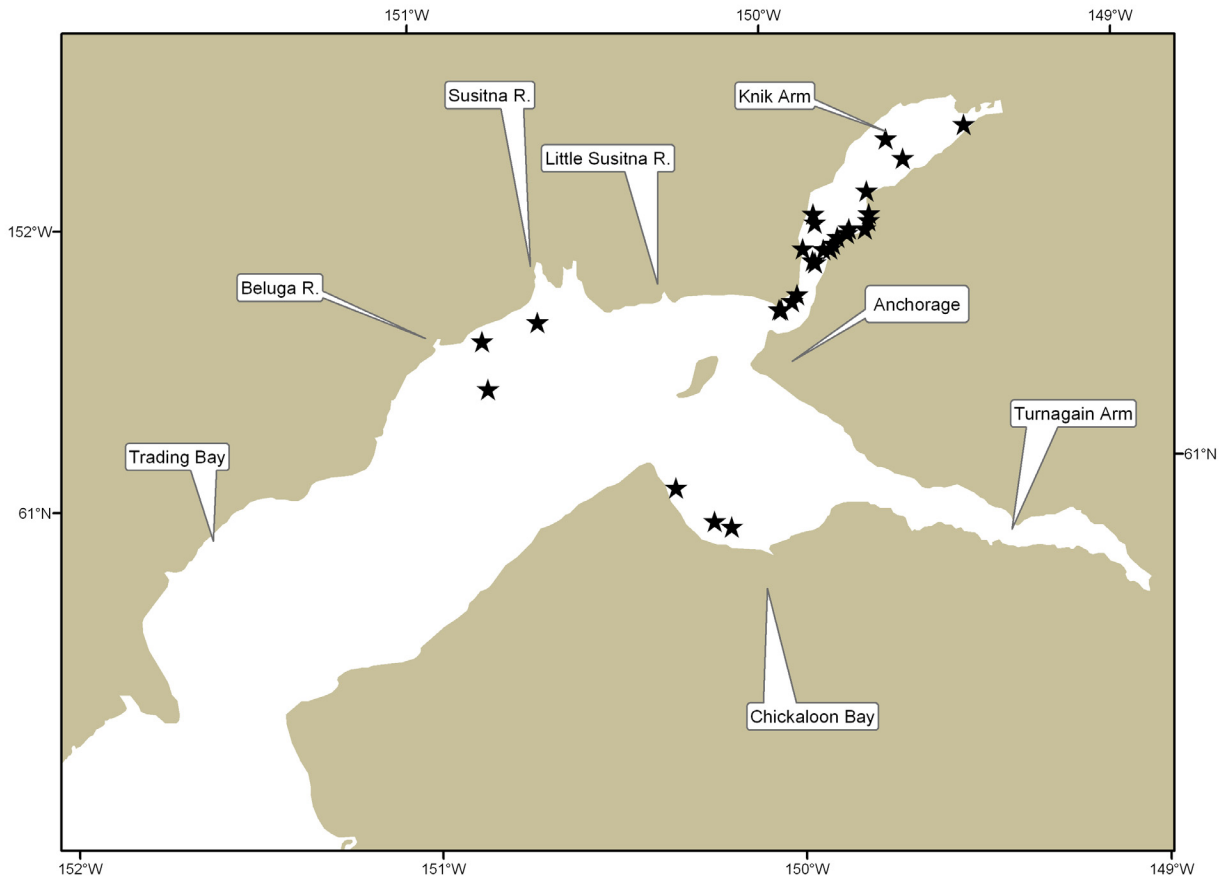


Figure 5. -- Beluga sightings in Cook Inlet June 2002.

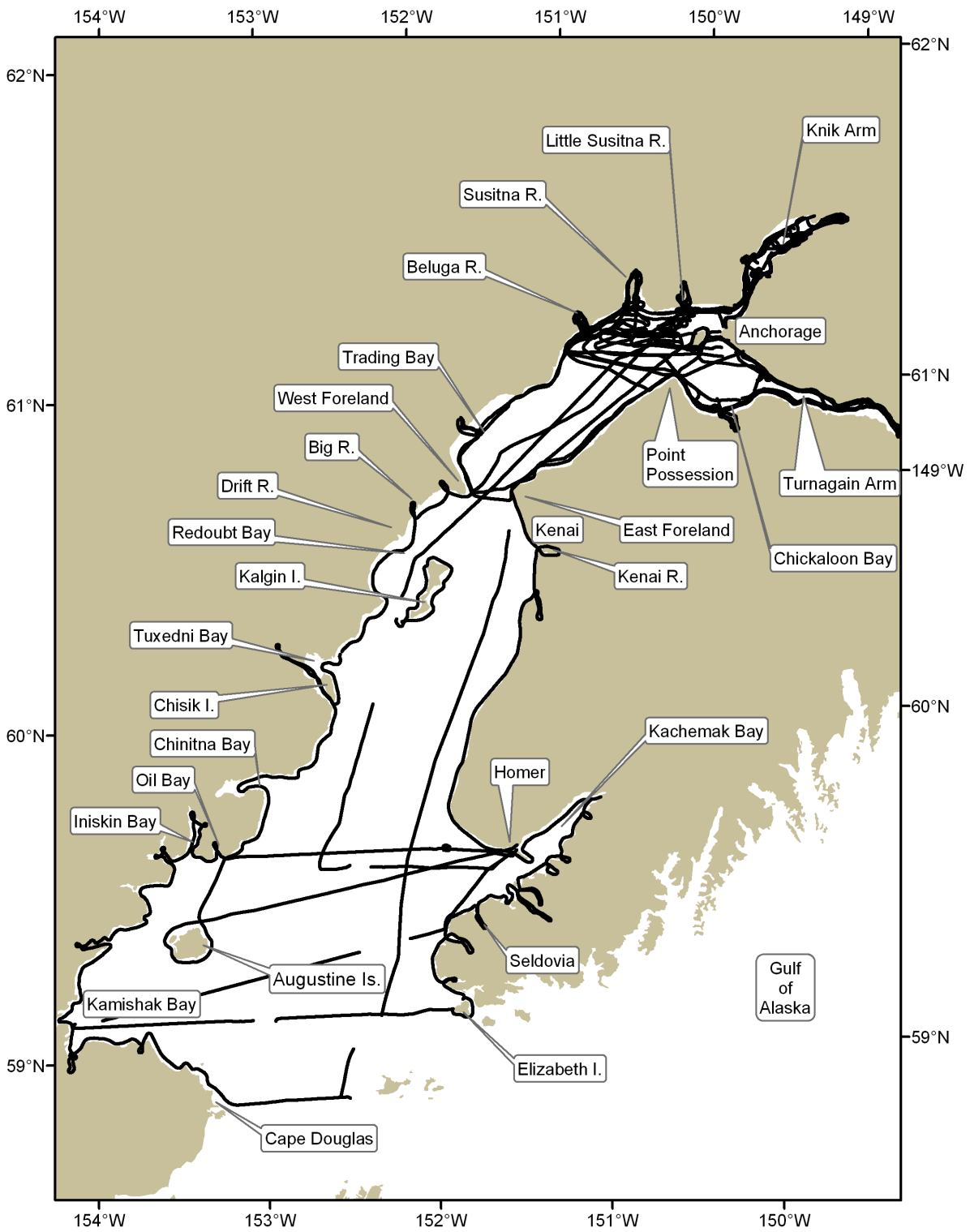


Figure 6. -- Aerial survey tracklines in Cook Inlet June 2003.

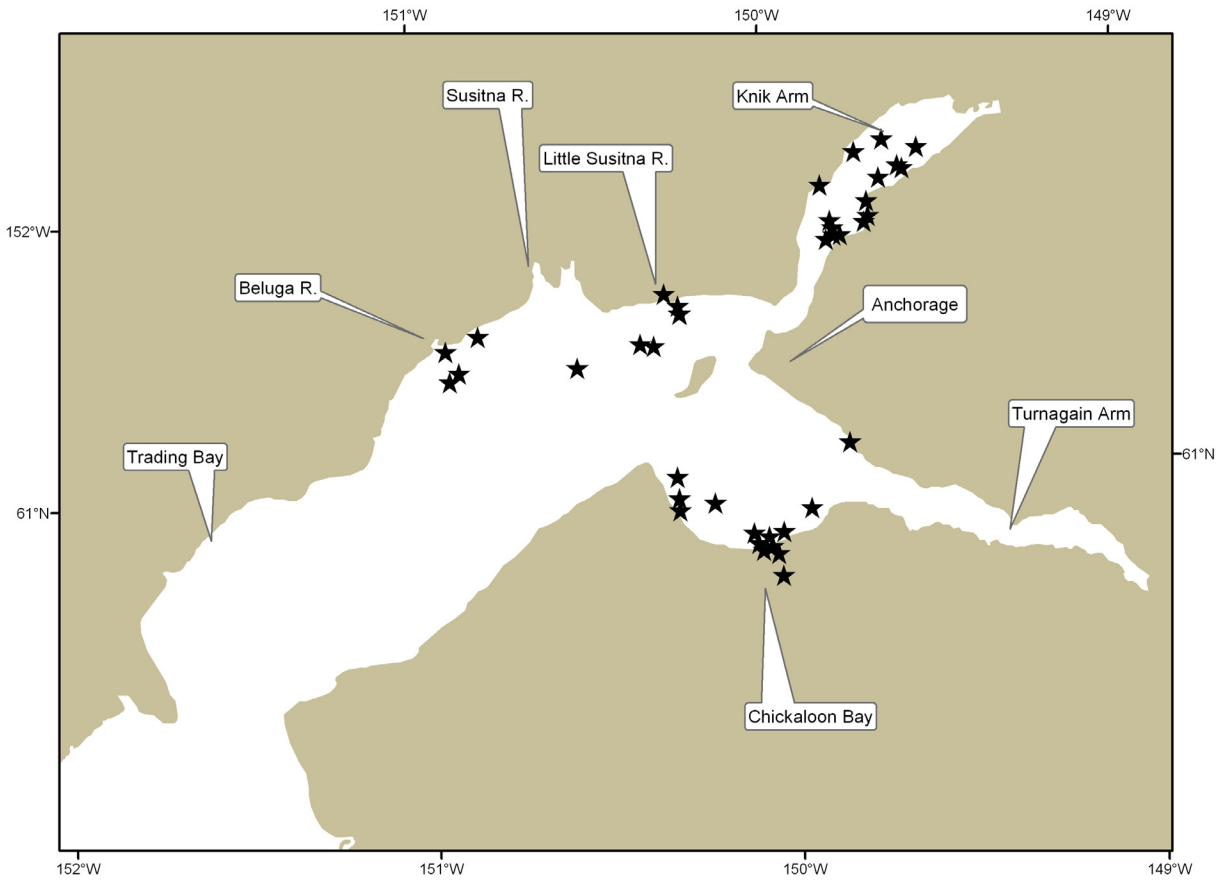


Figure 7. -- Beluga sightings in Cook Inlet June 2003.

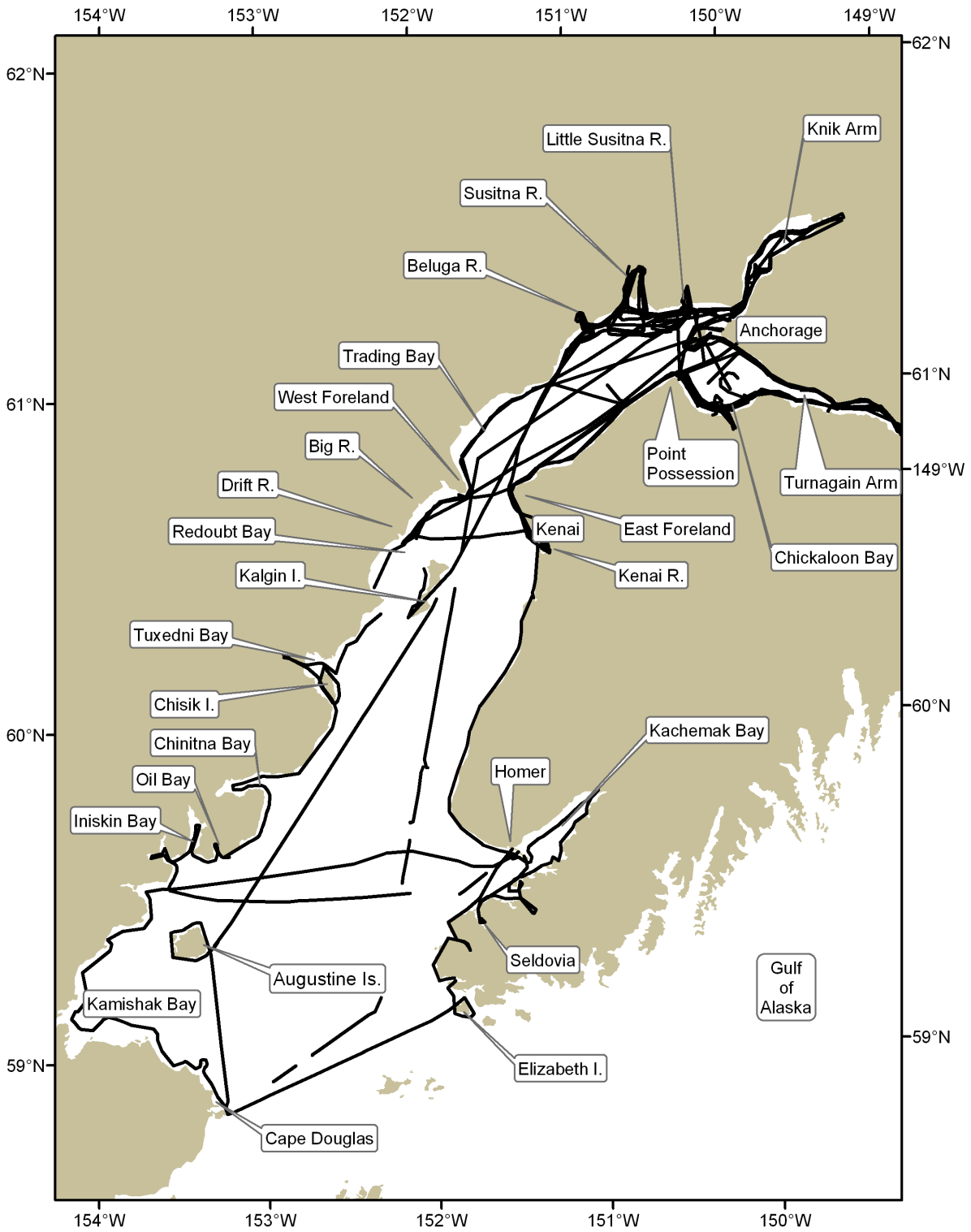


Figure 8. -- Aerial survey tracklines in Cook Inlet June 2004.

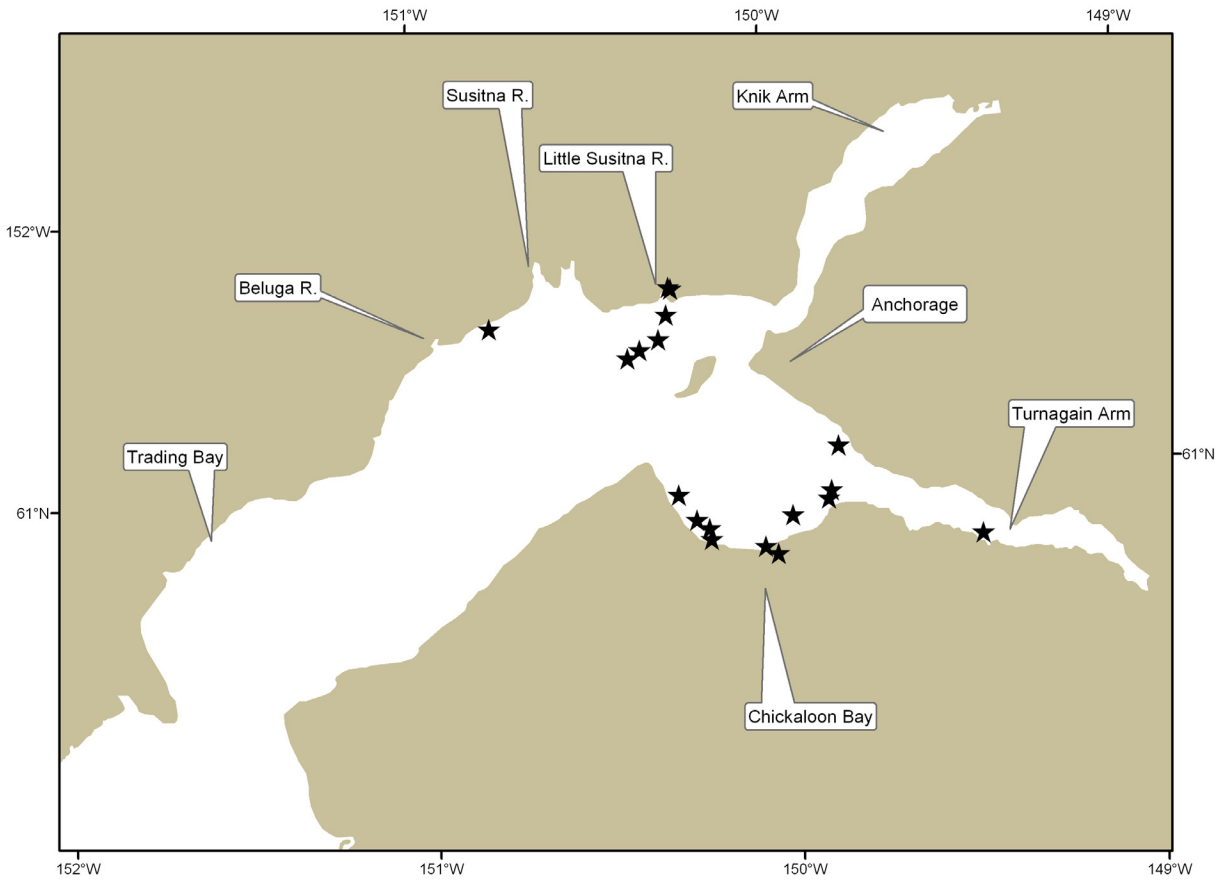


Figure 9. -- Beluga sightings in Cook Inlet June 2004.

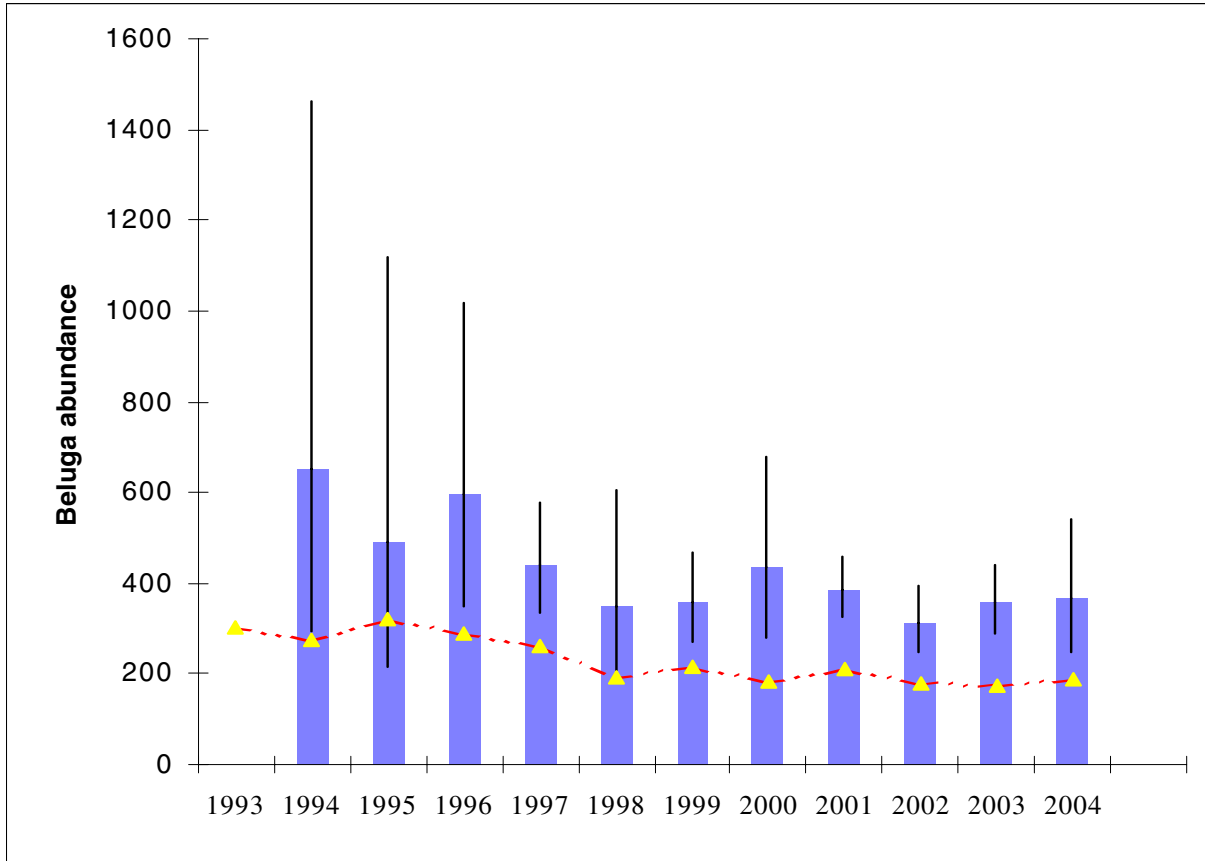


Figure 10.-- Abundance estimates (histogram bars), with their associated CVs (vertical lines), and median counts (triangles) of belugas in Cook Inlet as available for June or July 1993 to 2004.



Summaries of marine mammals sightings (other than belugas) made during aerial surveys of Cook Inlet in June or July 1993-2004. The target species for these surveys was beluga whales, so records of other species of large whales are considered good, but porpoises and sea otters might have been undercounted (they are not as visible in the distant sighting range), and pinnipeds were definitely undercounted because the observers searched over the water, not on rocks or beaches.

	Scientific name/ northernmost sighting/ comments	Total sightings	Count range	Median count	Total count
Cetaceans					
<b>Fin whales</b>	<i>Balaenoptera physalus</i>  59°29.9'N 152°27.9'W (Midway Augustine I./ Homer)	9	1-4	2	19
<b>Minke</b>	<i>Balaenoptera acutorostrata</i>  59°50.1'N 152°03.0'W (NW of Anchor Point)	2	1	1	2
<b>Humpbacks</b>	<i>Megaptera novaeangliae</i>  59°51.7'N 151°57.9'W (West of Kachemak Bay)	62	1-10	2	169
<b>Gray whales</b>	<i>Eschrichtius robustus</i>  59°37.2'N 153°18.2'W (Between Iniskin and Oil Bays)  Sightings included a cow/calf pair, and some indications of feeding	5	1-2	1	7
<b>Killer whales</b>	<i>Orcinus orca</i>  59°32.7'N 151°27.6'W (South shore of Kachemak Bay, opposite Homer)  Sightings included two calves	8	1-5	5	23
<b>Dall's porpoise</b>	<i>Phocoenoides dalli</i>  59°39.0'N 153°26.3'W (Iniskin Bay)	9	1-6	3	25

	Scientific name/ northernmost sighting/ comments	Total sightings	Count range	Median count	Total count
<b>Harbor porpoise</b>	<i>Phocoena phocoena</i>  60°43.9'N 151°41.8'W (North of West Foreland)  Twice there were high densities: 45 sightings in 1994 south of Tuxedni Bay and 59 sightings in 2004 south of Chinitna Bay	251	1-3	1	280
<b>Unidentified cetaceans</b>	60°41.9'N 151°37.5'W (possible minke or humpback SE of West Foreland)	11	1-2	1	13
Pinnipeds					
<b>Steller sea lions</b>	<i>Eumetopias jubatus</i>  59°49.8'N 152°43.6'W (East of Chinitna Bay)  Concentrations on Elizabeth I. (6-76), Shaw I. (20-42), Akumwarvik Bay (35- 40), Iniskin to Chinitna Bays (4-75)	42	1-76	1	560
<b>Harbor seals</b>	<i>Phoca vitulina</i>  61°28.8'N 149°20.0'W (Bridge over Knik River)  Concentrations (and max counts) were at Fox R. (700), Susitna R. (300), Tuxedni Bay (205), Iniskin (200), Big R. (190), Chickaloon Bay (150), McNeil R. (120). Harbor seals are the only marine mammals other than belugas that are routinely found in the upper Inlet.	387	1-700	12	13,279
<b>Unidentified pinnipeds</b>	61°14.2'N 150°44.0'W (Theodore R., near Susitna R, probably a harbor seal.)	16	1-6	1	24
<b>Sea otters</b>	<i>Enhydra lutris</i>  60°23.8'N 151°57.6'W (south end Kalgin I.)  Sea otters were generally around Kamishak Bay or Kachemak Bay. Only 2 were between these areas.	384	1-180	1	2,111

Marine mammals sightings (other than belugas) made during aerial surveys of Cook Inlet in June or July 1993-2004.

Species	Count	Yr/mm/dd	Latitude	Longitude	Descriptive location
Fin whale	2	2001/06/08	59 : 4.7 N	152 : 19.4 W	N of Barren Islands
Fin whale	3	2003/06/07	59 : 5.6 N	152 : 55.4 W	Midway Shaw I./Barren Is.
Fin whale	2	2003/06/12	59 : 4.9 N	152 : 25.7 W	NW of Barren Islands
Fin whale	1	2003/06/12	59 : 5.8 N	152 : 25.9 W	NW of Barren Islands
Fin whale	4	2003/06/12	59 : 4.2 N	152 : 26.4 W	NW of Barren Islands
Fin whale	4	2003/06/12	59 : 4.2 N	152 : 27.0 W	NW of Barren Islands
Fin whale	1	2004/06/05	59 : 2.6 N	152 : 23.6 W	NW of Barren Islands
Fin whale	1	2004/06/05	59 : 3.0 N	152 : 23.9 W	NW of Barren Islands
Fin whale	1	2004/06/06	59 : 29.9 N	152 : 28.0 W	Midway Augustine I./Homer
Minke whale	1	1998/06/14	59 : 50.1 N	152 : 3.0 W	NW of Anchor Pt.
Minke whale	1	1999/06/10	59 : 42.2 N	151 : 49.3 W	Anchor Pt./ Homer
Humpback	3	1994/06/04	59 : 17.5 N	152 : 0.7 W	Near Port Graham
Humpback	5	1996/06/14	59 : 3.7 N	152 : 17.5 W	N of Barren Islands
Humpback	1	1999/06/14	59 : 13.1 N	151 : 57.4 W	NW Elizabeth Island
Humpback	4	1999/06/14	59 : 7.3 N	152 : 45.6 W	NW of Barren Islands
Humpback	1	2000/06/09	59 : 10.1 N	151 : 59.8 W	W of Elizabeth Island
Humpback	1	2000/06/09	59 : 1.6 N	153 : 10.5 W	E of Shaw Island
Humpback	5	2000/06/09	59 : 13.3 N	152 : 34.4 W	N of Barren Islands
Humpback	2	2000/06/09	59 : 15.9 N	152 : 22.7 W	N of Barren Islands
Humpback	2	2000/06/10	59 : 35.0 N	151 : 19.1 W	Across Kachemak from Homer
Humpback	2	2001/06/08	59 : 9.7 N	151 : 54.0 W	Elizabeth Island
Humpback	1	2001/06/08	59 : 10.0 N	151 : 53.3 W	Elizabeth Island
Humpback	1	2001/06/08	59 : 9.0 N	151 : 46.8 W	Elizabeth Island
Humpback	1	2001/06/08	59 : 9.5 N	151 : 59.4 W	W of Elizabeth Island
Humpback	1	2001/06/08	59 : 7.9 N	152 : 4.9 W	W of Elizabeth Island
Humpback	8	2001/06/08	59 : 5.5 N	152 : 15.9 W	N of Barren Islands
Humpback	2	2001/06/08	59 : 5.1 N	152 : 16.8 W	N of Barren Islands
Humpback	2	2001/06/08	59 : 4.9 N	152 : 16.5 W	N of Barren Islands
Humpback	3	2001/06/08	59 : 4.9 N	152 : 15.2 W	N of Barren Islands
Humpback	3	2001/06/08	59 : 4.8 N	152 : 16.1 W	N of Barren Islands
Humpback	1	2001/06/08	59 : 4.5 N	152 : 22.6 W	N of Barren Islands
Humpback	9	2001/06/08	59 : 6.8 N	152 : 29.1 W	N of Barren Islands
Humpback	7	2001/06/08	59 : 7.4 N	152 : 25.0 W	N of Barren Islands
Humpback	1	2001/06/08	59 : 7.0 N	152 : 24.7 W	N of Barren Islands
Humpback	9	2001/06/08	59 : 6.8 N	152 : 25.3 W	NW of Barren Islands
Humpback	5	2001/06/09	59 : 12.2 N	153 : 3.6 W	Augustine Is./ Cape Douglas
Humpback	3	2001/06/09	59 : 10.4 N	153 : 1.7 W	Augustine Is./ Cape Douglas
Humpback	2	2001/06/09	59 : 10.1 N	153 : 1.4 W	Augustine Is./ Cape Douglas
Humpback	1	2001/06/09	59 : 9.0 N	153 : 8.4 W	Augustine Is./ Cape Douglas
Humpback	1	2001/06/09	59 : 7.6 N	153 : 6.7 W	Augustine Is./ Cape Douglas
Humpback	2	2002/06/04	59 : 8.9 N	152 : 56.3 W	Augustine Is./ Cape Douglas
Humpback	6	2002/06/04	59 : 10.0 N	152 : 57.0 W	Augustine Is./ Cape Douglas
Humpback	2	2002/06/05	59 : 11.7 N	151 : 48.8 W	Elizabeth Island

Humpback	1	2002/06/05	59 : 10.1 N	151 : 54.3 W	Elizabeth Island
Humpback	3	2002/06/05	59 : 8.6 N	151 : 55.5 W	Elizabeth Island
Humpback	2	2002/06/05	59 : 8.7 N	151 : 57.7 W	Elizabeth Island
Humpback	3	2002/06/05	59 : 7.5 N	151 : 54.5 W	Elizabeth Island
Humpback	2	2002/06/05	59 : 7.9 N	151 : 53.2 W	Elizabeth Island
Humpback	2	2002/06/05	59 : 7.1 N	151 : 50.7 W	Elizabeth Island
Humpback	2	2002/06/05	59 : 7.1 N	151 : 50.7 W	Elizabeth Island
Humpback	4	2003/06/07	59 : 8.3 N	152 : 55.7 W	Augustine Is./ Cape Douglas
Humpback	1	2003/06/07	59 : 35.5 N	152 : 29.1 W	W of Kachemak Bay
Humpback	3	2003/06/12	59 : 7.5 N	152 : 19.2 W	N of Barren Islands
Humpback	10	2003/06/12	59 : 5.0 N	152 : 27.2 W	NW of Barren Islands
Humpback	2	2003/06/12	59 : 4.9 N	152 : 25.7 W	NW of Barren Islands
Humpback	1	2003/06/12	59 : 6.6 N	152 : 26.3 W	NW of Barren Islands
Humpback	3	2003/06/12	59 : 6.8 N	152 : 27.1 W	NW of Barren Islands
Humpback	2	2003/06/12	59 : 5.4 N	152 : 27.0 W	NW of Barren Islands
Humpback	2	2003/06/12	59 : 4.7 N	152 : 25.3 W	NW of Barren Islands
Humpback	1	2003/06/12	59 : 4.9 N	152 : 25.4 W	NW of Barren Islands
Humpback	3	2003/06/12	59 : 6.2 N	152 : 26.5 W	NW of Barren Islands
Humpback	8	2003/06/12	59 : 4.9 N	152 : 27.2 W	NW of Barren Islands
Humpback	2	2003/06/12	59 : 38.5 N	151 : 53.2 W	W of Kachemak Bay
Humpback	3	2004/06/05	59 : 2.7 N	152 : 24.0 W	NW of Barren Islands
Humpback	1	2004/06/05	59 : 2.7 N	152 : 23.3 W	NW of Barren Islands
Humpback	2	2004/06/06	59 : 51.7 N	151 : 57.9 W	W of Kachemak Bay
Humpback	1	2004/06/06	59 : 43.4 N	152 : 6.3 W	W of Kachemak Bay
Humpback	1	2004/06/06	59 : 41.3 N	152 : 8.2 W	W of Kachemak Bay
Humpback	1	2004/06/06	59 : 39.5 N	152 : 7.9 W	W of Kachemak Bay
Humpback	1	2004/06/06	59 : 2.1 N	152 : 42.9 W	NW of Barren Islands
Humpback	1	2004/06/06	59 : 1.8 N	152 : 39.6 W	NW of Barren Islands
Humpback	2	2004/06/06	59 : 2.4 N	152 : 44.0 W	NW of Barren Islands
Humpback	2	2004/06/06	59 : 29.9 N	152 : 3.1 W	W of Kachemak Bay
Gray whale	2	1994/06/04	59 : 37.2 N	153 : 18.2 W	Iniskin/ Oil Bay
Gray whale	1	1994/06/04	59 : 22.9 N	151 : 55.4 W	Near Port Graham
Gray whale	2	2000/06/09	58 : 58.0 N	152 : 18.5 W	N of Barren Islands
Gray whale	1	2001/06/08	59 : 8.6 N	151 : 53.5 W	Elizabeth Island
Gray whale	1	2001/06/08	59 : 10.6 N	151 : 51.9 W	Elizabeth Island
Killer whale	3	1994/06/04	59 : 11.0 N	152 : 60.0 W	Augustine Is./ Cape Douglas
Killer whale	5	1997/06/09	59 : 32.7 N	151 : 27.6 W	S shore Kachemak Bay opp Homer
Killer whale	4	2001/06/08	59 : 21.8 N	151 : 56.3 W	Port Graham
Killer whale	2	2001/06/08	59 : 22.0 N	151 : 56.4 W	Port Graham
Killer whale	1	2001/06/08	59 : 21.0 N	151 : 56.9 W	Port Graham
Killer whale	4	2001/06/08	59 : 21.0 N	151 : 56.7 W	English Bay
Killer whale	2	2001/06/08	59 : 21.8 N	151 : 56.7 W	English Bay
Killer whale	2	2001/06/08	59 : 21.5 N	151 : 57.4 W	English Bay
Dall's porpoise	2	1997/06/09	59 : 39.0 N	153 : 26.3 W	Iniskin Bay
Dall's porpoise	6	1999/06/14	59 : 7.3 N	152 : 44.4 W	NW of Barren Islands
Dall's porpoise	5	2000/06/09	59 : 11.3 N	152 : 10.3 W	N of Barren Islands
Dall's porpoise	3	2000/06/09	59 : 10.8 N	152 : 6.5 W	N of Barren Islands
Dall's porpoise	1	2000/06/09	59 : 7.7 N	152 : 8.1 W	Near Elizabeth Is.
Dall's porpoise	3	2000/06/09	59 : 5.2 N	152 : 33.1 W	NW of Barren Islands
Dall's porpoise	3	2000/06/09	59 : 5.3 N	153 : 10.1 W	Augustine Is./ Cape Douglas

Dall's porpoise	1	2000/06/09	59 : 8.2 N	152 : 57.5 W	Augustine Is./ Cape Douglas
Dall's porpoise	1	2000/06/09	59 : 8.7 N	152 : 55.2 W	Augustine Is./ Cape Douglas
Harbor porpoise	1	1993/06/04	59 : 38.0 N	151 : 36.1 W	Russian Village/ Coal Pt.
Harbor porpoise	1	1993/06/04	59 : 37.8 N	151 : 34.6 W	Russian Village/ Coal Pt.
Harbor porpoise	1	1993/06/04	59 : 32.9 N	151 : 28.7 W	Coal Pt./ Jakolof Bay
Harbor porpoise	1	1993/06/04	59 : 29.7 N	151 : 47.8 W	South side Kachemak Bay
Harbor porpoise	1	1993/07/27	59 : 29.6 N	151 : 38.9 W	South side Kachemak Bay
Harbor porpoise	2	1993/07/27	60 : 29.4 N	152 : 17.5 W	North of Tuxedni
Harbor porpoise	1	1993/07/27	60 : 30.4 N	152 : 16.1 W	North of Tuxedni
Harbor porpoise	1	1994/06/03	59 : 46.8 N	150 : 59.0 W	Fox R.
Harbor porpoise	1	1994/06/03	59 : 43.9 N	152 : 31.7 W	mid-inlet
Harbor porpoise	1	1994/06/03	59 : 52.4 N	152 : 33.7 W	mid-inlet
Harbor porpoise	1	1994/06/03	59 : 58.0 N	152 : 12.3 W	mid-inlet
Harbor porpoise	1	1994/06/04	59 : 14.8 N	154 : 7.1 W	North of Nordyke Is.
Harbor porpoise	2	1994/06/04	59 : 40.2 N	153 : 7.1 W	North of Oil Bay
Harbor porpoise	1	1994/06/04	59 : 38.9 N	152 : 24.8 W	mid-inlet
Harbor porpoise	1	1994/06/04	59 : 38.1 N	153 : 9.5 W	mid-inlet
Harbor porpoise	1	1994/06/04	59 : 38.1 N	153 : 9.5 W	mid-inlet
Harbor porpoise	1	1994/06/04	59 : 38.1 N	153 : 9.5 W	mid-inlet
Harbor porpoise	2	1994/06/04	59 : 44.4 N	153 : 0.0 W	Oil Bay/ Chinitna Bay
Harbor porpoise	1	1994/06/04	60 : 0.6 N	152 : 35.0 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 0.9 N	152 : 34.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 1.4 N	152 : 34.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 1.4 N	152 : 34.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 2.4 N	152 : 33.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 2.8 N	152 : 33.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 3.0 N	152 : 33.1 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 3.3 N	152 : 32.9 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 3.7 N	152 : 32.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.0 N	152 : 32.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.1 N	152 : 32.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.1 N	152 : 32.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.3 N	152 : 32.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.4 N	152 : 32.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.5 N	152 : 32.9 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.5 N	152 : 32.9 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.7 N	152 : 33.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.8 N	152 : 33.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.8 N	152 : 33.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.8 N	152 : 33.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.8 N	152 : 33.3 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 4.8 N	152 : 33.3 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.2 N	152 : 33.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.2 N	152 : 33.7 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.2 N	152 : 33.7 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.3 N	152 : 33.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.3 N	152 : 33.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.3 N	152 : 33.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.4 N	152 : 34.0 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.4 N	152 : 34.0 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.4 N	152 : 34.0 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.6 N	152 : 34.2 W	Oil Bay/ Tuxedni Bay

Harbor porpoise	1	1994/06/04	60 : 5.6 N	152 : 34.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.6 N	152 : 34.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.6 N	152 : 34.2 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.7 N	152 : 34.3 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.8 N	152 : 34.4 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.8 N	152 : 34.4 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.8 N	152 : 34.5 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.8 N	152 : 34.5 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 5.9 N	152 : 34.5 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 6.1 N	152 : 34.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 6.1 N	152 : 34.8 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	1	1994/06/04	60 : 10.3 N	152 : 39.6 W	Oil Bay/ Tuxedni Bay
Harbor porpoise	3	1994/06/04	60 : 21.0 N	152 : 17.1 W	Tuxedni/ Redoubt Bay
Harbor porpoise	3	1994/06/04	60 : 22.8 N	152 : 13.7 W	Tuxedni/ Redoubt Bay
Harbor porpoise	1	1995/07/22	59 : 33.0 N	151 : 28.8 W	Halibut Cove/ McDonald Spit
Harbor porpoise	3	1995/07/22	59 : 0.5 N	153 : 29.6 W	near Douglas River
Harbor porpoise	1	1995/07/22	60 : 12.1 N	152 : 33.0 W	mid-inlet
Harbor porpoise	1	1996/06/14	60 : 9.5 N	152 : 6.4 W	mid-inlet
Harbor porpoise	1	1996/06/15	59 : 44.5 N	152 : 28.1 W	mid-inlet
Harbor porpoise	1	1996/06/15	59 : 44.3 N	152 : 32.1 W	mid-inlet
Harbor porpoise	1	1996/06/15	59 : 43.3 N	152 : 55.7 W	mid-inlet
Harbor porpoise	1	1996/06/15	59 : 43.1 N	153 : 0.4 W	mid-inlet
Harbor porpoise	1	1996/06/15	60 : 0.3 N	152 : 35.4 W	Johnson River/ Tuxedni Bay
Harbor porpoise	1	1996/06/15	60 : 13.2 N	152 : 32.1 W	Tuxedni Bay
Harbor porpoise	3	1997/06/08	60 : 43.9 N	151 : 41.8 W	Just north of West Foreland
Harbor porpoise	1	1997/06/09	59 : 37.1 N	153 : 32.9 W	South of Iniskin Bay
Harbor porpoise	1	1997/06/09	59 : 43.9 N	153 : 25.4 W	Iniskin Bay
Harbor porpoise	1	1998/06/13	60 : 6.7 N	152 : 0.9 W	mid-inlet
Harbor porpoise	1	1998/06/13	60 : 13.2 N	152 : 13.3 W	mid-inlet
Harbor porpoise	1	1998/06/14	60 : 3.7 N	152 : 33.1 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 56.5 N	152 : 18.7 W	mid-inlet
Harbor porpoise	2	1998/06/14	59 : 55.9 N	152 : 17.0 W	mid-inlet
Harbor porpoise	2	1998/06/14	59 : 54.1 N	152 : 12.7 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 43.9 N	152 : 32.6 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 43.2 N	152 : 54.1 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 43.1 N	152 : 59.9 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 38.4 N	152 : 42.9 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 38.3 N	152 : 42.5 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 36.7 N	152 : 34.2 W	mid-inlet
Harbor porpoise	1	1998/06/14	59 : 29.6 N	151 : 57.7 W	mid-inlet
Harbor porpoise	1	1999/06/10	59 : 50.2 N	152 : 28.3 W	mid-inlet
Harbor porpoise	2	1999/06/10	60 : 2.8 N	152 : 11.7 W	mid-inlet
Harbor porpoise	2	1999/06/10	60 : 14.4 N	151 : 59.7 W	mid-inlet
Harbor porpoise	1	1999/06/10	60 : 14.5 N	151 : 58.5 W	mid-inlet
Harbor porpoise	1	1999/06/10	60 : 14.5 N	151 : 57.8 W	mid-inlet
Harbor porpoise	1	1999/06/10	60 : 14.6 N	151 : 52.6 W	mid-inlet
Harbor porpoise	1	1999/06/10	60 : 24.1 N	151 : 42.0 W	mid-inlet
Harbor porpoise	1	1999/06/10	60 : 26.5 N	151 : 47.0 W	mid-inlet
Harbor porpoise	1	1999/06/10	60 : 37.6 N	151 : 48.5 W	mid-inlet
Harbor porpoise	1	1999/06/11	60 : 27.0 N	152 : 9.0 W	mid-inlet
Harbor porpoise	1	1999/06/11	60 : 23.2 N	152 : 12.9 W	mid-inlet
Harbor porpoise	1	1999/06/14	60 : 22.2 N	152 : 10.9 W	mid-inlet
Harbor porpoise	1	1999/06/14	60 : 0.5 N	152 : 20.2 W	mid-inlet

Harbor porpoise	1	1999/06/14	60 : 0.1 N	152 : 24.4 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 60.0 N	152 : 26.3 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 59.9 N	152 : 27.1 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 59.8 N	152 : 28.2 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 59.7 N	152 : 29.9 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 59.6 N	152 : 30.7 W	mid-inlet
Harbor porpoise	2	1999/06/14	59 : 54.6 N	152 : 29.6 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 54.3 N	152 : 28.8 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 54.2 N	152 : 28.6 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 53.6 N	152 : 27.0 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 51.8 N	152 : 22.1 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 51.7 N	152 : 21.9 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 51.4 N	152 : 21.3 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 50.1 N	152 : 17.8 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 35.4 N	152 : 19.8 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 35.4 N	152 : 23.9 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 4.9 N	152 : 47.4 W	mid-inlet
Harbor porpoise	1	1999/06/14	59 : 46.6 N	152 : 58.6 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	1999/06/14	59 : 50.6 N	153 : 2.5 W	Chinitna Bay
Harbor porpoise	1	1999/06/14	60 : 7.2 N	152 : 32.3 W	Tuxedni Bay
Harbor porpoise	2	2000/06/09	59 : 31.2 N	153 : 44.5 W	Ursus Cove
Harbor porpoise	1	2000/06/09	59 : 14.2 N	154 : 6.2 W	Bruin Bay/ Nordyke Is
Harbor porpoise	1	2000/06/09	59 : 5.8 N	153 : 39.6 W	mid-inlet
Harbor porpoise	1	2000/06/09	59 : 42.9 N	152 : 49.2 W	mid-inlet
Harbor porpoise	1	2000/06/09	59 : 47.7 N	152 : 58.8 W	mid-inlet
Harbor porpoise	1	2000/06/09	59 : 47.4 N	152 : 31.0 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 36.1 N	151 : 22.5 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 22.3 N	151 : 40.0 W	mid-inlet
Harbor porpoise	2	2000/06/10	60 : 31.0 N	151 : 33.2 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 25.6 N	151 : 54.4 W	mid-inlet
Harbor porpoise	3	2000/06/10	60 : 10.2 N	151 : 54.8 W	mid-inlet
Harbor porpoise	2	2000/06/10	60 : 10.0 N	151 : 58.8 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 9.9 N	152 : 1.9 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 9.8 N	152 : 5.9 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 9.5 N	152 : 12.6 W	mid-inlet
Harbor porpoise	1	2000/06/10	60 : 7.8 N	152 : 31.2 W	Chisik/ Anchor Pt.
Harbor porpoise	1	2000/06/10	60 : 6.7 N	152 : 28.5 W	Chisik/ Anchor Pt.
Harbor porpoise	2	2000/06/10	60 : 0.5 N	152 : 17.8 W	Chisik/ Anchor Pt.
Harbor porpoise	1	2000/06/10	59 : 38.0 N	151 : 32.7 W	mid-inlet
Harbor porpoise	1	2000/06/10	59 : 38.7 N	151 : 26.1 W	mid-inlet
Harbor porpoise	1	2000/06/10	59 : 55.4 N	152 : 39.2 W	mid-inlet
Harbor porpoise	2	2000/06/10	60 : 25.0 N	151 : 41.7 W	mid-inlet
Harbor porpoise	1	2001/06/08	59 : 40.7 N	151 : 9.7 W	Kachemak Bay
Harbor porpoise	1	2001/06/08	59 : 29.6 N	151 : 39.8 W	Kachemak Bay
Harbor porpoise	1	2001/06/08	59 : 33.5 N	152 : 16.7 W	mid-inlet
Harbor porpoise	1	2001/06/08	59 : 34.2 N	152 : 12.7 W	mid-inlet
Harbor porpoise	1	2001/06/08	60 : 8.0 N	151 : 52.2 W	Tuxedni/ Kalgin
Harbor porpoise	1	2001/06/08	60 : 22.6 N	152 : 4.8 W	Tuxedni/ Kalgin
Harbor porpoise	1	2001/06/08	60 : 30.1 N	151 : 38.0 W	Tuxedni/ Kalgin
Harbor porpoise	1	2001/06/09	60 : 4.2 N	152 : 25.4 W	Chisik/ Augustine Is.
Harbor porpoise	2	2001/06/09	59 : 45.2 N	152 : 40.8 W	Chisik/ Augustine Is.
Harbor porpoise	1	2001/06/09	59 : 44.5 N	152 : 41.2 W	Chisik/ Augustine Is.
Harbor porpoise	1	2001/06/09	59 : 42.9 N	152 : 42.1 W	Chisik/ Augustine Is.

Harbor porpoise	1	2001/06/09	59 : 39.6 N	152 : 43.9 W	Chisik/ Augustine Is.
Harbor porpoise	1	2001/06/09	59 : 34.9 N	152 : 47.1 W	Chisik/ Augustine Is.
Harbor porpoise	2	2001/06/09	59 : 30.8 N	152 : 50.1 W	Chisik/ Augustine Is.
Harbor porpoise	1	2001/06/09	59 : 29.6 N	152 : 50.9 W	Chisik/ Augustine Is.
Harbor porpoise	1	2001/06/09	59 : 23.6 N	152 : 55.2 W	Chisik/ Augustine Is.
Harbor porpoise	1	2001/06/09	59 : 37.5 N	153 : 13.3 W	Oil Bay/ Chinitna Pt.
Harbor porpoise	1	2001/06/09	59 : 40.8 N	152 : 57.9 W	mid inlet
Harbor porpoise	2	2001/06/09	59 : 40.7 N	152 : 55.8 W	mid inlet
Harbor porpoise	1	2001/06/09	59 : 52.6 N	152 : 47.4 W	Chinitna Bay/ Tuxedni Bay
Harbor porpoise	1	2001/06/09	59 : 53.4 N	152 : 45.1 W	Chinitna Bay/ Tuxedni Bay
Harbor porpoise	1	2001/06/09	59 : 54.1 N	152 : 42.9 W	Chinitna Bay/ Tuxedni Bay
Harbor porpoise	1	2004/06/05	59 : 15.5 N	153 : 19.0 W	mid inlet
Harbor porpoise	1	2004/06/05	59 : 31.9 N	153 : 4.6 W	mid inlet
Harbor porpoise	1	2004/06/05	59 : 34.8 N	153 : 0.7 W	mid inlet
Harbor porpoise	1	2004/06/05	59 : 44.9 N	152 : 47.5 W	mid inlet
Harbor porpoise	1	2004/06/05	59 : 58.1 N	152 : 29.8 W	mid inlet
Harbor porpoise	1	2004/06/05	60 : 2.8 N	152 : 23.4 W	mid inlet
Harbor porpoise	1	2004/06/05	60 : 3.8 N	152 : 22.0 W	mid inlet
Harbor porpoise	1	2004/06/05	60 : 22.1 N	151 : 56.9 W	mid inlet
Harbor porpoise	1	2004/06/05	60 : 23.8 N	151 : 55.3 W	mid inlet
Harbor porpoise	1	2004/06/06	59 : 44.2 N	152 : 6.5 W	mid inlet
Harbor porpoise	1	2004/06/06	59 : 41.4 N	152 : 7.1 W	mid inlet
Harbor porpoise	1	2004/06/06	59 : 2.4 N	152 : 44.8 W	mid inlet
Harbor porpoise	1	2004/06/06	58 : 58.1 N	153 : 22.3 W	Cape Douglas/ Shaw Is.
Harbor porpoise	1	2004/06/06	59 : 5.2 N	153 : 39.2 W	Shaw Is./ Kamishak R.
Harbor porpoise	1	2004/06/06	59 : 8.2 N	154 : 9.5 W	N of Kamishak R.
Harbor porpoise	1	2004/06/06	59 : 12.7 N	154 : 4.3 W	N of Kamishak R.
Harbor porpoise	1	2004/06/06	59 : 26.7 N	153 : 41.3 W	Bruin Bay/ Ursus Cove
Harbor porpoise	1	2004/06/06	59 : 29.6 N	152 : 47.5 W	mid inlet
Harbor porpoise	1	2004/06/06	59 : 32.3 N	153 : 34.9 W	mid inlet
Harbor porpoise	2	2004/06/06	59 : 36.1 N	153 : 32.1 W	S of Iliamna Bay
Harbor porpoise	1	2004/06/06	59 : 36.9 N	153 : 33.8 W	Iliamna/ Iniskin Bay
Harbor porpoise	1	2004/06/06	59 : 37.3 N	153 : 31.5 W	Iliamna/ Iniskin Bay
Harbor porpoise	1	2004/06/06	59 : 37.4 N	153 : 31.0 W	Iliamna/ Iniskin Bay
Harbor porpoise	1	2004/06/06	59 : 38.9 N	153 : 27.3 W	Iliamna/ Iniskin Bay
Harbor porpoise	1	2004/06/06	59 : 39.2 N	153 : 27.0 W	Iliamna/ Iniskin Bay
Harbor porpoise	1	2004/06/06	59 : 38.4 N	153 : 17.2 W	Oil Bay
Harbor porpoise	1	2004/06/06	59 : 38.7 N	153 : 17.0 W	Oil Bay
Harbor porpoise	1	2004/06/06	59 : 37.6 N	153 : 14.8 W	Oil Pt./ Dry Bay
Harbor porpoise	1	2004/06/06	59 : 37.7 N	153 : 13.0 W	Oil Pt./ Dry Bay
Harbor porpoise	3	2004/06/06	59 : 40.9 N	153 : 3.8 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 41.1 N	153 : 3.1 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 41.3 N	153 : 2.5 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 41.5 N	153 : 2.1 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 42.5 N	153 : 1.2 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 42.6 N	153 : 1.2 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 42.7 N	153 : 1.1 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 42.7 N	153 : 1.1 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 43.3 N	153 : 0.7 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 43.3 N	153 : 0.7 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 43.3 N	153 : 0.7 W	Dry Bay/ Chinitna Bay
Harbor porpoise	1	2004/06/06	59 : 43.3 N	153 : 0.6 W	Dry Bay/ Chinitna Bay





Steller sea lion	40	1995/07/22	59 : 6.5 N	153 : 41.1 W	S of Akumwarvik Bay
Steller sea lion	35	1995/07/22	59 : 6.9 N	153 : 43.1 W	S of Akumwarvik Bay
Steller sea lion	75	1995/07/22	59 : 37.9 N	153 : 26.7 W	Iniskin Bay/ Chinitna Bay
Steller sea lion	40	1995/07/22	59 : 37.0 N	153 : 19.3 W	Iniskin Bay/ Chinitna Bay
Steller sea lion	1	1996/06/14	59 : 12.2 N	151 : 52.1 W	Near Elizabeth Is.
Steller sea lion	1	1996/06/14	59 : 9.7 N	151 : 53.7 W	Near Elizabeth Is.
Steller sea lion	25	1996/06/14	59 : 8.5 N	151 : 52.4 W	South side of Elizabeth Is.
Steller sea lion	70	1996/06/14	59 : 8.4 N	151 : 51.8 W	South side of Elizabeth Is.
Steller sea lion	1	1996/06/15	59 : 36.4 N	152 : 28.8 W	Bear Creek/ Seldovia
Steller sea lion	1	1996/06/15	59 : 32.7 N	152 : 11.8 W	Bear Creek/ Seldovia
Steller sea lion	1	1996/06/15	59 : 22.7 N	153 : 57.1 W	Near Contact Pt
Steller sea lion	1	1997/06/09	59 : 29.0 N	151 : 34.9 W	Noble Pt in Kachemak Bay
Steller sea lion	25	1997/06/09	59 : 8.3 N	151 : 52.3 W	S side Elizabeth Island
Steller sea lion	1	1999/06/10	59 : 49.8 N	152 : 43.6 W	Chinitna Bay
Steller sea lion	1	1999/06/14	59 : 31.0 N	153 : 17.8 W	NE of Augustine Island
Steller sea lion	3	2000/06/09	58 : 50.6 N	153 : 19.8 W	Cape Douglas; in the water
Steller sea lion	1	2000/06/09	58 : 51.3 N	153 : 13.1 W	Cape Douglas; in the water
Steller sea lion	6	2000/06/09	59 : 9.7 N	151 : 54.4 W	South side of Elizabeth Island
Steller sea lion	2	2001/06/08	59 : 28.0 N	151 : 43.6 W	Entrance of Seldovia Bay
Steller sea lion	1	2001/06/08	59 : 20.8 N	151 : 56.1 W	English Bay/ Elizabeth Island
Steller sea lion	1	2001/06/08	59 : 8.2 N	151 : 51.7 W	S side of Elizabeth Is.
Steller sea lion	2	2001/06/09	58 : 50.2 N	153 : 19.1 W	Cape Douglas
Steller sea lion	20	2001/06/09	58 : 58.9 N	153 : 22.8 W	Shaw Island
Steller sea lion	1	2002/06/04	58 : 55.7 N	153 : 19.5 W	Cape Douglas
Steller sea lion	42	2002/06/04	58 : 58.2 N	153 : 23.6 W	Shaw Island
Steller sea lion	1	2002/06/04	59 : 36.9 N	153 : 19.7 W	Rock Island
Steller sea lion	4	2002/06/04	59 : 38.4 N	153 : 10.3 W	Oil Bay
Steller sea lion	6	2002/06/04	59 : 39.1 N	153 : 8.8 W	Oil Bay
Steller sea lion	2	2002/06/05	59 : 9.0 N	151 : 52.9 W	Elizabeth Island
Steller sea lion	76	2003/06/07	59 : 8.3 N	151 : 52.5 W	Elizabeth Island
Steller sea lion	1	2003/06/07	59 : 7.7 N	151 : 48.8 W	Elizabeth Island
Steller sea lion	1	2004/06/06	59 : 8.5 N	153 : 55.0 W	Shaw Is./ Kamishak R.
Harbor seal	55	1993/06/02	61 : 11.9 N	150 : 38.2 W	Big Susitna R.
Harbor seal	1	1993/06/03	61 : 1.7 N	150 : 19.4 W	Chickaloon Bay
Harbor seal	1	1993/06/03	61 : 2.5 N	150 : 21.1 W	near Pt Possession
Harbor seal	7	1993/06/04	60 : 33.3 N	151 : 18.9 W	East Foreland/ Clam Gulch
Harbor seal	3	1993/06/04	60 : 27.2 N	151 : 18.0 W	East Foreland/ Clam Gulch
Harbor seal	1	1993/07/27	59 : 39.0 N	151 : 40.4 W	Anchor Pt./ Homer
Harbor seal	1	1993/07/27	59 : 29.6 N	151 : 34.7 W	Anchor Pt./ Homer
Harbor seal	4	1993/09/03	60 : 33.1 N	151 : 18.3 W	Kenai River
Harbor seal	1	1994/06/02	60 : 55.7 N	150 : 3.6 W	Chickaloon Bay
Harbor seal	25	1994/06/03	59 : 46.9 N	150 : 56.8 W	Fox River
Harbor seal	6	1994/06/03	59 : 47.8 N	150 : 56.7 W	Fox River
Harbor seal	1	1994/06/03	59 : 53.0 N	152 : 36.8 W	mid-inlet
Harbor seal	1	1994/06/03	59 : 52.6 N	152 : 34.6 W	mid-inlet
Harbor seal	50	1994/06/03	60 : 32.0 N	152 : 15.2 W	mid-inlet
Harbor seal	25	1994/06/04	60 : 16.5 N	152 : 1.5 W	mid-inlet
Harbor seal	32	1994/06/04	60 : 16.4 N	152 : 1.6 W	mid-inlet
Harbor seal	2	1994/06/04	59 : 57.3 N	152 : 19.7 W	mid-inlet
Harbor seal	1	1994/06/04	58 : 53.0 N	153 : 17.7 W	Cape Douglas
Harbor seal	1	1994/06/04	59 : 25.2 N	153 : 45.2 W	Bruin Bay/ Ursus Cove
Harbor seal	2	1994/06/04	59 : 28.7 N	153 : 41.8 W	Bruin Bay/ Ursus Cove

Harbor seal	1	1994/06/04	59 : 32.5 N	153 : 43.0 W	Ursus Cove/ Iliamna Bay
Harbor seal	35	1994/06/04	59 : 44.0 N	153 : 26.9 W	Iniskin Bay
Harbor seal	3	1994/06/04	59 : 38.3 N	153 : 26.2 W	Iniskin/ Oil Bay
Harbor seal	2	1994/06/04	59 : 37.9 N	153 : 25.4 W	Iniskin/ Oil Bay
Harbor seal	1	1994/06/04	59 : 37.9 N	153 : 12.0 W	North of Oil Bay
Harbor seal	1	1994/06/04	59 : 46.2 N	152 : 59.2 W	North of Oil Bay
Harbor seal	1	1994/06/04	59 : 50.6 N	153 : 0.5 W	North of Oil Bay
Harbor seal	1	1994/06/04	59 : 36.3 N	152 : 2.0 W	mid-inlet
Harbor seal	1	1994/06/04	59 : 15.8 N	151 : 59.4 W	W tip of Kenai Pen.
Harbor seal	1	1994/06/04	59 : 14.9 N	151 : 52.5 W	W tip of Kenai Pen.
Harbor seal	2	1994/06/04	59 : 38.7 N	153 : 9.8 W	Oil Bay/ Chinitna Bay
Harbor seal	5	1994/06/04	60 : 18.3 N	152 : 58.2 W	Tuxedni River
Harbor seal	50	1994/06/04	60 : 13.9 N	152 : 51.2 W	Tuxedni River
Harbor seal	23	1994/06/04	60 : 40.0 N	152 : 2.1 W	Drift R.
Harbor seal	1	1994/06/04	60 : 54.4 N	151 : 39.9 W	McArthur R.
Harbor seal	1	1994/06/04	60 : 54.4 N	151 : 39.9 W	McArthur R.
Harbor seal	4	1994/06/04	61 : 15.5 N	150 : 17.7 W	Little Su R.
Harbor seal	1	1994/06/05	60 : 56.4 N	150 : 2.6 W	Chickaloon Bay
Harbor seal	20	1995/07/18	60 : 57.4 N	150 : 1.3 W	Chickaloon Bay
Harbor seal	27	1995/07/21	61 : 12.4 N	150 : 36.3 W	Susitna R.
Harbor seal	30	1995/07/21	60 : 54.6 N	150 : 3.4 W	Chickaloon Bay
Harbor seal	140	1995/07/22	59 : 46.7 N	151 : 0.8 W	Fox R.
Harbor seal	1	1995/07/22	59 : 1.1 N	153 : 22.5 W	Shaw I.
Harbor seal	40	1995/07/22	59 : 4.2 N	153 : 51.2 W	Akumwarvik Bay
Harbor seal	120	1995/07/22	59 : 5.4 N	154 : 7.8 W	near McNeil River
Harbor seal	100	1995/07/22	59 : 6.0 N	154 : 8.3 W	near McNeil River
Harbor seal	2	1995/07/22	59 : 22.2 N	154 : 2.4 W	Bruin Bay
Harbor seal	11	1995/07/22	59 : 36.6 N	153 : 32.9 W	Iliamna Bay
Harbor seal	2	1995/07/22	59 : 37.4 N	153 : 31.0 W	Iliamna Bay
Harbor seal	150	1995/07/22	59 : 44.2 N	153 : 25.6 W	Iniskin Bay
Harbor seal	50	1995/07/22	59 : 37.7 N	153 : 26.3 W	Iniskin/ Chinitna Bay
Harbor seal	100	1995/07/22	59 : 37.5 N	153 : 25.4 W	Iniskin/ Chinitna Bay
Harbor seal	60	1995/07/22	59 : 49.9 N	153 : 10.9 W	Chinitna Bay
Harbor seal	40	1995/07/22	59 : 49.8 N	153 : 9.6 W	Chinitna Bay
Harbor seal	15	1995/07/22	60 : 13.2 N	152 : 48.9 W	Tuxedni River
Harbor seal	5	1995/07/22	60 : 39.0 N	152 : 2.0 W	Big River
Harbor seal	190	1995/07/22	60 : 39.3 N	152 : 0.4 W	Big River
Harbor seal	18	1995/07/22	60 : 42.8 N	151 : 52.4 W	Kustatan River
Harbor seal	13	1995/07/22	60 : 54.6 N	151 : 41.3 W	McArthur River
Harbor seal	2	1995/07/24	60 : 38.4 N	152 : 1.4 W	Big River
Harbor seal	11	1995/07/24	60 : 54.4 N	151 : 41.6 W	McArthur River
Harbor seal	2	1995/07/24	61 : 12.2 N	150 : 47.7 W	Susitna River
Harbor seal	13	1995/07/24	61 : 12.9 N	150 : 46.9 W	Lewis River
Harbor seal	9	1996/06/12	61 : 11.5 N	150 : 38.7 W	Susitna River
Harbor seal	100	1996/06/12	61 : 12.2 N	150 : 36.7 W	Susitna River
Harbor seal	1	1996/06/13	60 : 58.2 N	150 : 15.2 W	Turnagain Arm
Harbor seal	1	1996/06/13	60 : 58.2 N	150 : 41.5 W	Pt Possession/ E Foreland
Harbor seal	2	1996/06/13	60 : 54.5 N	150 : 50.9 W	Pt Possession/ E Foreland
Harbor seal	120	1996/06/14	59 : 46.6 N	150 : 58.8 W	Fox River
Harbor seal	2	1996/06/15	59 : 24.5 N	153 : 29.3 W	Augustine Island
Harbor seal	1	1996/06/15	59 : 24.1 N	153 : 33.7 W	Augustine Island
Harbor seal	1	1996/06/15	58 : 57.2 N	153 : 22.7 W	Cape Douglas
Harbor seal	1	1996/06/15	59 : 20.9 N	153 : 57.3 W	near Contact Pt.

Harbor seal	1	1996/06/15	59 : 31.3 N	153 : 43.8 W	S of Ursus Cove
Harbor seal	32	1996/06/15	59 : 49.6 N	153 : 13.1 W	Clear Water Creek
Harbor seal	12	1996/06/15	60 : 17.2 N	153 : 0.9 W	Tuxedni Bay
Harbor seal	15	1996/06/15	60 : 14.4 N	152 : 52.6 W	Tuxedni Bay
Harbor seal	70	1996/06/15	60 : 13.2 N	152 : 48.9 W	Tuxedni Bay
Harbor seal	115	1996/06/15	60 : 21.8 N	152 : 16.5 W	Polly Crk./ Redoubt Bay
Harbor seal	100	1996/06/15	60 : 31.3 N	152 : 15.2 W	Drift R.
Harbor seal	120	1996/06/15	60 : 40.2 N	151 : 59.1 W	Big R./ Kustatan R.
Harbor seal	75	1996/06/15	60 : 42.0 N	151 : 55.2 W	Big R./ Kustatan R.
Harbor seal	45	1996/06/15	60 : 42.4 N	151 : 53.4 W	Big R./ Kustatan R.
Harbor seal	115	1996/06/16	60 : 57.8 N	149 : 58.8 W	Chickaloon R.
Harbor seal	50	1996/06/16	60 : 58.0 N	150 : 0.9 W	Chickaloon Bay
Harbor seal	25	1996/06/16	60 : 57.9 N	150 : 5.1 W	Chickaloon R.
Harbor seal	1	1997/06/08	61 : 28.8 N	149 : 20.0 W	Knik R. Bridge
Harbor seal	4	1997/06/08	60 : 52.8 N	151 : 39.7 W	McArthur R.
Harbor seal	80	1997/06/09	59 : 46.3 N	151 : 2.7 W	Fox R.
Harbor seal	250	1997/06/09	59 : 46.6 N	151 : 0.9 W	Fox R.
Harbor seal	100	1997/06/09	59 : 46.8 N	151 : 0.4 W	Fox R.
Harbor seal	100	1997/06/09	59 : 47.1 N	150 : 59.1 W	Fox R.
Harbor seal	2	1997/06/09	59 : 50.1 N	153 : 13.5 W	Chinitna Bay
Harbor seal	7	1997/06/09	60 : 12.9 N	152 : 47.1 W	Tuxedni Bay
Harbor seal	50	1997/06/09	60 : 13.3 N	152 : 48.4 W	Tuxedni Bay
Harbor seal	10	1997/06/09	60 : 13.6 N	152 : 49.6 W	Tuxedni Bay
Harbor seal	5	1997/06/09	60 : 13.8 N	152 : 50.6 W	Tuxedni Bay
Harbor seal	35	1997/06/10	61 : 11.5 N	150 : 37.5 W	Susitna R.
Harbor seal	20	1997/06/10	61 : 11.2 N	150 : 37.9 W	Susitna R.
Harbor seal	6	1998/06/13	59 : 45.8 N	151 : 3.2 W	Fox R.
Harbor seal	700	1998/06/13	59 : 46.5 N	150 : 58.4 W	Fox R.
Harbor seal	1	1998/06/13	59 : 55.5 N	152 : 17.2 W	mid-inlet
Harbor seal	1	1998/06/13	60 : 13.3 N	152 : 13.6 W	mid-inlet
Harbor seal	1	1998/06/13	60 : 40.3 N	151 : 52.0 W	mid-inlet
Harbor seal	5	1998/06/14	59 : 25.3 N	153 : 22.5 W	Augustine I.
Harbor seal	10	1998/06/14	59 : 4.7 N	153 : 49.8 W	Douglas R.
Harbor seal	25	1998/06/14	60 : 21.8 N	152 : 15.9 W	near Harriet Pt.
Harbor seal	1	1998/06/14	60 : 30.9 N	152 : 15.9 W	S of Drift R.
Harbor seal	54	1998/06/14	60 : 31.4 N	152 : 15.0 W	S of Drift R.
Harbor seal	45	1998/06/14	60 : 31.6 N	152 : 14.6 W	S of Drift R.
Harbor seal	52	1998/06/15	61 : 13.4 N	150 : 48.6 W	Theodore R.
Harbor seal	180	1998/06/15	61 : 12.1 N	150 : 36.1 W	Susitna R.
Harbor seal	1	1999/06/09	61 : 8.9 N	151 : 1.1 W	near Tyonek
Harbor seal	1	1999/06/09	61 : 11.0 N	150 : 54.3 W	Beluga R.
Harbor seal	1	1999/06/09	61 : 12.4 N	150 : 47.9 W	Theodore/ Susitna R.
Harbor seal	2	1999/06/09	61 : 12.8 N	150 : 47.7 W	Theodore/ Susitna R.
Harbor seal	2	1999/06/09	61 : 12.6 N	150 : 48.5 W	Lewis R.
Harbor seal	7	1999/06/09	61 : 12.8 N	150 : 46.1 W	Theodore/ Susitna R.
Harbor seal	10	1999/06/09	61 : 12.5 N	150 : 40.5 W	Theodore/ Susitna R.
Harbor seal	2	1999/06/09	61 : 12.3 N	150 : 46.0 W	Theodore/ Susitna R.
Harbor seal	4	1999/06/09	61 : 11.2 N	150 : 30.8 W	Theodore/ Susitna R.
Harbor seal	37	1999/06/09	60 : 54.7 N	150 : 5.4 W	Chickaloon Bay
Harbor seal	40	1999/06/10	59 : 47.3 N	151 : 0.4 W	Fox R.
Harbor seal	35	1999/06/10	59 : 47.5 N	150 : 58.8 W	Fox R.
Harbor seal	1	1999/06/10	59 : 36.6 N	151 : 27.1 W	Kachemak Bay
Harbor seal	2	1999/06/10	59 : 50.2 N	152 : 27.3 W	mid-inlet

Harbor seal	3	1999/06/10	60 : 14.1 N	152 : 17.9 W	mid-inlet
Harbor seal	1	1999/06/10	60 : 36.0 N	152 : 2.4 W	mid-inlet
Harbor seal	127	1999/06/11	60 : 13.3 N	152 : 49.8 W	Tuxedni Bay
Harbor seal	80	1999/06/11	60 : 31.9 N	152 : 15.2 W	S of drift R.
Harbor seal	15	1999/06/11	60 : 43.1 N	151 : 51.7 W	Kustatan R.
Harbor seal	20	1999/06/11	61 : 14.0 N	150 : 44.9 W	Susitna R.
Harbor seal	5	1999/06/12	60 : 57.4 N	149 : 56.8 W	Chickaloon Bay
Harbor seal	20	1999/06/12	60 : 57.7 N	150 : 6.3 W	Pt. Possession
Harbor seal	1	1999/06/12	61 : 1.0 N	150 : 19.1 W	near Shirleyville
Harbor seal	2	1999/06/12	61 : 12.5 N	150 : 48.2 W	Theodore R.
Harbor seal	1	1999/06/13	60 : 46.8 N	151 : 43.2 W	S Trading Bay
Harbor seal	22	1999/06/14	60 : 16.3 N	152 : 0.8 W	mid-inlet
Harbor seal	1	2000/06/08	61 : 22.8 N	150 : 32.2 W	Susitna R
Harbor seal	1	2000/06/08	61 : 14.2 N	150 : 44.0 W	Ivan R
Harbor seal	1	2000/06/08	61 : 13.6 N	150 : 46.3 W	Lewis R.
Harbor seal	2	2000/06/08	60 : 53.2 N	151 : 42.9 W	McArthur R.
Harbor seal	21	2000/06/08	60 : 55.4 N	150 : 6.3 W	Chickaloon Bay
Harbor seal	20	2000/06/08	60 : 55.4 N	150 : 5.1 W	Chickaloon Bay
Harbor seal	30	2000/06/08	60 : 55.4 N	150 : 5.0 W	Chickaloon Bay
Harbor seal	10	2000/06/08	60 : 55.3 N	150 : 3.8 W	Chickaloon Bay
Harbor seal	40	2000/06/09	60 : 41.8 N	151 : 54.1 W	Kustatan R.
Harbor seal	50+	2000/06/09	60 : 22.0 N	152 : 15.5 W	Harriet Pt
Harbor seal	205	2000/06/09	60 : 13.5 N	152 : 49.1 W	Tuxedni Bay
Harbor seal	12	2000/06/09	60 : 1.1 N	152 : 35.1 W	Tuxedni/ Chinitna
Harbor seal	25	2000/06/09	60 : 0.2 N	152 : 36.3 W	Tuxedni/ Chinitna
Harbor seal	5	2000/06/09	59 : 49.6 N	153 : 10.3 W	Chinitna Bay
Harbor seal	12	2000/06/09	59 : 49.4 N	153 : 9.0 W	Chinitna Bay
Harbor seal	16	2000/06/09	59 : 37.5 N	153 : 23.6 W	Iniskin Bay
Harbor seal	8	2000/06/09	59 : 37.5 N	153 : 24.6 W	Iniskin Bay
Harbor seal	10	2000/06/09	59 : 38.2 N	153 : 26.4 W	Iniskin Bay
Harbor seal	50	2000/06/09	59 : 38.5 N	153 : 26.6 W	Iniskin Bay
Harbor seal	23	2000/06/09	59 : 38.6 N	153 : 26.6 W	Iniskin Bay
Harbor seal	75	2000/06/09	59 : 44.4 N	153 : 26.0 W	Iniskin Bay
Harbor seal	160	2000/06/09	59 : 44.5 N	153 : 26.2 W	Iniskin Bay
Harbor seal	8	2000/06/09	59 : 37.5 N	153 : 31.3 W	Iniskin Bay
Harbor seal	4	2000/06/09	59 : 37.0 N	153 : 34.6 W	Cottonwood Bay
Harbor seal	2	2000/06/09	59 : 14.1 N	154 : 6.1 W	Bruin Bay/ Nordyke Is
Harbor seal	1	2000/06/09	59 : 11.8 N	154 : 6.4 W	Bruin Bay/ Nordyke Is
Harbor seal	40	2000/06/09	59 : 6.0 N	154 : 8.6 W	Akumwarvik Bay
Harbor seal	1	2000/06/09	59 : 5.4 N	154 : 8.5 W	Akumwarvik Bay
Harbor seal	80	2000/06/09	59 : 4.3 N	154 : 8.4 W	Akumwarvik Bay
Harbor seal	1	2000/06/09	59 : 5.4 N	153 : 57.3 W	Kamishak Bay
Harbor seal	1	2000/06/09	59 : 5.5 N	153 : 49.2 W	Kamishak Bay
Harbor seal	1	2000/06/09	59 : 6.3 N	153 : 48.0 W	Kamishak Bay
Harbor seal	65	2000/06/09	59 : 6.8 N	153 : 41.6 W	Kamishak Bay
Harbor seal	1	2000/06/09	59 : 2.7 N	153 : 37.8 W	Kamishak Bay
Harbor seal	8	2000/06/09	58 : 58.2 N	153 : 22.9 W	Shaw I.
Harbor seal	20	2000/06/09	58 : 57.6 N	153 : 22.5 W	Shaw I.
Harbor seal	15	2000/06/09	59 : 0.5 N	153 : 24.0 W	Shaw I.
Harbor seal	1	2000/06/09	60 : 57.9 N	150 : 42.9 W	n of East Foreland
Harbor seal	1	2000/06/10	60 : 54.3 N	151 : 38.1 W	McArthur R.
Harbor seal	65	2000/06/10	60 : 30.9 N	152 : 15.8 W	Redoubt Bay
Harbor seal	15	2000/06/10	59 : 45.4 N	151 : 3.3 W	Kachemak Bay

Harbor seal	10	2000/06/10	59 : 46.4 N	151 : 1.8 W	Kachemak Bay
Harbor seal	2	2000/06/10	59 : 46.7 N	151 : 1.1 W	Fox R.
Harbor seal	700	2000/06/10	59 : 46.9 N	150 : 59.9 W	Fox R.
Harbor seal	3	2000/06/10	59 : 39.4 N	151 : 25.1 W	Kachemak Bay
Harbor seal	35	2000/06/11	61 : 12.7 N	150 : 37.6 W	Susitna R.
Harbor seal	1	2000/06/11	61 : 12.6 N	150 : 46.8 W	Lewis R.
Harbor seal	1	2000/06/11	61 : 12.4 N	150 : 47.9 W	Theodore R.
Harbor seal	75	2000/06/12	60 : 56.0 N	150 : 6.0 W	Chickaloon Bay
Harbor seal	36	2000/06/12	60 : 56.6 N	150 : 6.7 W	Chickaloon Bay
Harbor seal	5	2000/06/12	61 : 11.2 N	150 : 38.9 W	Susitna R.
Harbor seal	40	2000/06/12	61 : 12.8 N	150 : 36.3 W	Theodore R.
Harbor seal	1	2000/06/12	61 : 12.3 N	150 : 47.5 W	Theodore R.
Harbor seal	1	2000/06/12	61 : 11.6 N	150 : 49.6 W	Theodore R.
Harbor seal	3	2000/06/12	61 : 13.9 N	150 : 45.3 W	Lewis R.
Harbor seal	1	2000/06/13	60 : 59.9 N	150 : 11.1 W	Chickaloon Bay
Harbor seal	1	2000/06/13	60 : 54.4 N	150 : 2.6 W	Chickaloon Bay
Harbor seal	2	2001/06/05	60 : 51.7 N	151 : 40.3 W	McArthur R.
Harbor seal	70	2001/06/05	61 : 12.9 N	150 : 39.0 W	Susitna R.
Harbor seal	1	2001/06/05	60 : 55.2 N	150 : 5.4 W	Chickaloon R.
Harbor seal	37	2001/06/05	60 : 54.9 N	150 : 5.0 W	Chickaloon R.
Harbor seal	1	2001/06/06	60 : 47.8 N	151 : 44.1 W	N of West Foreland
Harbor seal	1	2001/06/08	59 : 45.6 N	151 : 5.2 W	Fox R.
Harbor seal	85	2001/06/08	59 : 47.0 N	151 : 0.4 W	Fox R.
Harbor seal	13	2001/06/08	59 : 46.5 N	151 : 0.5 W	Fox R.
Harbor seal	292	2001/06/08	59 : 46.5 N	151 : 1.7 W	Fox R.
Harbor seal	3	2001/06/08	59 : 45.8 N	151 : 3.2 W	Fox R.
Harbor seal	42	2001/06/08	59 : 45.1 N	151 : 2.7 W	Fox R.
Harbor seal	10	2001/06/08	59 : 45.3 N	151 : 4.1 W	Fox R.
Harbor seal	3	2001/06/08	60 : 56.6 N	150 : 6.1 W	Chickaloon Bay
Harbor seal	1	2001/06/09	60 : 33.4 N	152 : 0.4 W	Drift R.
Harbor seal	1	2001/06/09	59 : 43.2 N	152 : 41.9 W	Chisik/ Augustine
Harbor seal	10	2001/06/09	59 : 36.5 N	153 : 32.7 W	S of Illiamna
Harbor seal	3	2001/06/09	59 : 36.7 N	153 : 33.5 W	S of Illiamna
Harbor seal	1	2001/06/09	59 : 39.8 N	153 : 26.5 W	Iniskin Bay
Harbor seal	40	2001/06/09	59 : 43.6 N	153 : 26.5 W	Iniskin Bay
Harbor seal	40	2001/06/09	59 : 43.9 N	153 : 26.6 W	Iniskin Bay
Harbor seal	80	2001/06/09	59 : 44.2 N	153 : 26.6 W	Iniskin Bay
Harbor seal	8	2001/06/09	59 : 44.4 N	153 : 26.7 W	Iniskin Bay
Harbor seal	1	2001/06/09	59 : 38.9 N	153 : 26.6 W	Iniskin/ Oil Bay
Harbor seal	12	2001/06/09	59 : 38.7 N	153 : 26.8 W	Iniskin/ Oil Bay
Harbor seal	10	2001/06/09	59 : 38.4 N	153 : 26.8 W	Iniskin/ Oil Bay
Harbor seal	20	2001/06/09	59 : 38.4 N	153 : 26.8 W	Iniskin/ Oil Bay
Harbor seal	5	2001/06/09	59 : 38.3 N	153 : 26.7 W	Iniskin/ Oil Bay
Harbor seal	4	2001/06/09	59 : 37.7 N	153 : 23.9 W	Iniskin/ Oil Bay
Harbor seal	2	2001/06/09	59 : 40.6 N	153 : 3.2 W	mid-inlet
Harbor seal	1	2001/06/09	60 : 12.7 N	152 : 46.9 W	Tuxedni Bay
Harbor seal	12	2001/06/09	60 : 13.0 N	152 : 48.4 W	Tuxedni Bay
Harbor seal	4	2001/06/09	60 : 13.1 N	152 : 48.9 W	Tuxedni Bay
Harbor seal	8	2001/06/09	60 : 13.4 N	152 : 50.3 W	Tuxedni Bay
Harbor seal	4	2001/06/09	60 : 13.5 N	152 : 50.4 W	Tuxedni Bay
Harbor seal	30	2001/06/09	60 : 21.6 N	152 : 15.7 W	Harriet Pt.
Harbor seal	1	2001/06/09	60 : 28.2 N	152 : 18.0 W	S of Drift R.
Harbor seal	45	2001/06/09	60 : 31.7 N	152 : 14.6 W	S of Drift R.

Harbor seal	18	2001/06/10	60 : 55.9 N	150 : 5.5 W	Chickaloon R.
Harbor seal	8	2001/06/10	60 : 55.2 N	150 : 5.1 W	Chickaloon R.
Harbor seal	12	2001/06/10	60 : 54.8 N	150 : 3.9 W	Chickaloon R.
Harbor seal	14	2001/06/10	61 : 12.5 N	150 : 36.0 W	Susitna R.
Harbor seal	39	2001/06/10	61 : 12.3 N	150 : 37.4 W	Susitna R.
Harbor seal	190	2001/06/10	61 : 12.4 N	150 : 39.3 W	Susitna R.
Harbor seal	100	2001/06/11	60 : 54.4 N	150 : 3.3 W	Chickaloon R.
Harbor seal	20	2001/06/11	60 : 54.3 N	150 : 2.9 W	Chickaloon R.
Harbor seal	10	2001/06/11	61 : 12.2 N	150 : 36.5 W	Ivan R.
Harbor seal	45	2001/06/11	60 : 58.1 N	149 : 57.0 W	Chickaloon Bay
Harbor seal	1	2001/06/11	60 : 56.7 N	150 : 6.5 W	Chickaloon R.
Harbor seal	100	2001/06/12	60 : 55.3 N	150 : 4.8 W	Chickaloon R.
Harbor seal	72	2001/06/12	60 : 55.0 N	150 : 4.6 W	Chickaloon R.
Harbor seal	10	2001/06/12	60 : 55.5 N	150 : 6.1 W	Chickaloon Bay
Harbor seal	180	2001/06/12	61 : 12.5 N	150 : 49.0 W	Lewis R.
Harbor seal	30	2001/06/12	61 : 13.0 N	150 : 47.4 W	Theodore R.
Harbor seal	100	2001/06/12	61 : 11.6 N	150 : 38.7 W	Susitna R.
Harbor seal	25	2002/06/04	60 : 36.5 N	151 : 50.1 W	mid-inlet
Harbor seal	30	2002/06/04	58 : 59.6 N	153 : 24.1 W	Shaw I.
Harbor seal	4	2002/06/04	59 : 5.1 N	153 : 48.6 W	near Douglas Reef
Harbor seal	20	2002/06/04	59 : 5.9 N	153 : 54.2 W	near Douglas Reef
Harbor seal	20	2002/06/04	59 : 5.9 N	153 : 54.2 W	near Douglas Reef
Harbor seal	25	2002/06/04	59 : 4.2 N	154 : 9.2 W	near Douglas Reef
Harbor seal	29	2002/06/04	59 : 4.7 N	154 : 8.9 W	near Douglas Reef
Harbor seal	12	2002/06/04	59 : 4.9 N	154 : 8.7 W	near Douglas Reef
Harbor seal	12	2002/06/04	59 : 6.0 N	154 : 9.2 W	near Douglas Reef
Harbor seal	33	2002/06/04	59 : 7.5 N	154 : 9.7 W	near Douglas Reef
Harbor seal	13	2002/06/04	59 : 11.1 N	154 : 8.7 W	McNeil Bay
Harbor seal	5	2002/06/04	59 : 10.2 N	154 : 6.0 W	McNeil Bay
Harbor seal	30	2002/06/04	59 : 10.2 N	154 : 5.6 W	McNeil Bay
Harbor seal	25	2002/06/04	59 : 11.2 N	154 : 4.8 W	McNeil Bay
Harbor seal	5	2002/06/04	59 : 11.3 N	154 : 5.3 W	McNeil Bay
Harbor seal	12	2002/06/04	59 : 24.8 N	153 : 28.9 W	Augustine I.
Harbor seal	12	2002/06/04	59 : 24.5 N	153 : 30.2 W	Augustine I.
Harbor seal	12	2002/06/04	59 : 24.5 N	153 : 30.9 W	Augustine I.
Harbor seal	1	2002/06/04	59 : 24.5 N	153 : 31.6 W	Augustine I.
Harbor seal	30	2002/06/04	59 : 24.1 N	153 : 33.6 W	Augustine I.
Harbor seal	1	2002/06/04	59 : 21.8 N	153 : 35.1 W	Augustine I.
Harbor seal	2	2002/06/04	59 : 21.3 N	153 : 34.3 W	Augustine I.
Harbor seal	2	2002/06/04	59 : 19.0 N	153 : 25.7 W	Augustine I.
Harbor seal	25	2002/06/04	59 : 20.1 N	153 : 21.0 W	Augustine I.
Harbor seal	1	2002/06/04	59 : 21.3 N	153 : 19.4 W	Augustine I.
Harbor seal	5	2002/06/04	59 : 24.4 N	153 : 28.9 W	Augustine I.
Harbor seal	4	2002/06/04	59 : 26.7 N	153 : 43.1 W	Ursus Cove
Harbor seal	3	2002/06/04	59 : 30.6 N	153 : 43.4 W	Ursus Cove
Harbor seal	31	2002/06/04	59 : 36.1 N	153 : 33.1 W	Iliamna Bay
Harbor seal	24	2002/06/04	59 : 36.8 N	153 : 33.7 W	Iliamna Bay
Harbor seal	41	2002/06/04	59 : 37.0 N	153 : 34.7 W	Iliamna Bay
Harbor seal	4	2002/06/04	59 : 37.1 N	153 : 29.8 W	Iliamna/ Iniskin Bay
Harbor seal	200	2002/06/04	59 : 44.4 N	153 : 25.1 W	Iniskin Bay
Harbor seal	45	2002/06/04	59 : 44.7 N	153 : 26.5 W	Iniskin Bay
Harbor seal	43	2002/06/04	59 : 44.0 N	153 : 26.6 W	Iniskin Bay
Harbor seal	52	2002/06/04	59 : 43.9 N	153 : 25.1 W	Iniskin Bay

Harbor seal	15	2002/06/04	59 : 38.4 N	153 : 26.3 W	Iniskin Bay
Harbor seal	27	2002/06/04	59 : 38.2 N	153 : 26.0 W	Iniskin Bay
Harbor seal	56	2002/06/04	59 : 38.0 N	153 : 25.7 W	Iniskin Bay
Harbor seal	50	2002/06/04	59 : 37.7 N	153 : 23.8 W	Iniskin Bay
Harbor seal	15	2002/06/04	60 : 0.4 N	152 : 35.2 W	Oil Bay
Harbor seal	8	2002/06/04	60 : 12.9 N	152 : 47.3 W	Tuxedni Bay
Harbor seal	14	2002/06/04	60 : 13.2 N	152 : 48.2 W	Tuxedni Bay
Harbor seal	10	2002/06/04	60 : 13.0 N	152 : 49.1 W	Tuxedni Bay
Harbor seal	3	2002/06/04	60 : 13.5 N	152 : 50.1 W	Tuxedni Bay
Harbor seal	3	2002/06/04	60 : 13.1 N	152 : 48.3 W	Tuxedni Bay
Harbor seal	2	2002/06/04	60 : 12.7 N	152 : 46.0 W	Tuxedni Bay
Harbor seal	20	2002/06/04	60 : 21.6 N	152 : 15.6 W	Harriet Pt.
Harbor seal	14	2002/06/04	60 : 39.1 N	152 : 1.8 W	Big R.
Harbor seal	8	2002/06/04	60 : 40.2 N	152 : 3.5 W	Big R.
Harbor seal	8	2002/06/04	60 : 38.6 N	152 : 2.7 W	Big R.
Harbor seal	60	2002/06/04	60 : 38.5 N	152 : 2.5 W	Big R.
Harbor seal	40	2002/06/04	60 : 38.9 N	151 : 58.3 W	Big R./ Kustatan R.
Harbor seal	40	2002/06/04	60 : 42.5 N	151 : 52.0 W	Kustatan R.
Harbor seal	150	2002/06/05	59 : 46.9 N	151 : 1.5 W	Fox R.
Harbor seal	120	2002/06/05	59 : 46.9 N	150 : 58.6 W	Fox R.
Harbor seal	10	2002/06/06	61 : 11.7 N	150 : 39.3 W	Susitna R.
Harbor seal	6	2002/06/06	60 : 54.5 N	151 : 40.2 W	McArthur R.
Harbor seal	1	2002/06/06	61 : 2.4 N	150 : 24.4 W	Pt. Possession
Harbor seal	4	2002/06/06	60 : 55.9 N	150 : 5.0 W	Chickaloon R.
Harbor seal	1	2002/06/07	60 : 53.4 N	151 : 38.4 W	McArthur R.
Harbor seal	5	2002/06/07	60 : 53.8 N	151 : 36.2 W	McArthur R.
Harbor seal	6	2002/06/07	61 : 11.3 N	150 : 47.5 W	Lewis R.
Harbor seal	50	2002/06/07	61 : 12.1 N	150 : 35.8 W	Susitna R.
Harbor seal	1	2002/06/07	61 : 7.6 N	150 : 52.5 W	Beluga R.
Harbor seal	3	2002/06/07	60 : 55.0 N	150 : 4.9 W	Chickaloon R.
Harbor seal	40	2002/06/09	60 : 56.6 N	150 : 6.0 W	Chickaloon R.
Harbor seal	44	2003/06/03	60 : 55.2 N	150 : 3.4 W	Chickaloon R.
Harbor seal	30	2003/06/03	61 : 10.3 N	150 : 37.1 W	Susitna R.
Harbor seal	3	2003/06/04	61 : 11.1 N	150 : 2.5 W	Knik Arm
Harbor seal	7	2003/06/05	60 : 56.7 N	149 : 55.8 W	Burnt I.
Harbor seal	150	2003/06/05	60 : 56.4 N	149 : 56.9 W	Burnt I.
Harbor seal	50	2003/06/05	60 : 54.6 N	150 : 4.6 W	Chickaloon Bay
Harbor seal	150	2003/06/05	61 : 12.8 N	150 : 49.1 W	Theodore/ Ivan R.
Harbor seal	50	2003/06/05	61 : 13.3 N	150 : 46.8 W	Theodore/ Ivan R.
Harbor seal	10	2003/06/05	61 : 21.0 N	149 : 43.7 W	Knik Arm
Harbor seal	15	2003/06/06	61 : 12.2 N	150 : 51.9 W	Theodore R.
Harbor seal	2	2003/06/06	61 : 16.7 N	150 : 38.8 W	Susitna R.
Harbor seal	1	2003/06/06	61 : 16.0 N	150 : 40.2 W	Susitna R.
Harbor seal	1	2003/06/07	59 : 37.6 N	151 : 32.7 W	Kachemak Bay
Harbor seal	1	2003/06/07	59 : 41.0 N	151 : 18.0 W	Kachemak Bay
Harbor seal	140	2003/06/07	59 : 46.5 N	150 : 59.3 W	Kachemak Bay
Harbor seal	10	2003/06/07	59 : 45.2 N	151 : 3.5 W	Kachemak Bay
Harbor seal	20	2003/06/07	59 : 42.5 N	151 : 6.9 W	Kachemak Bay
Harbor seal	10	2003/06/07	59 : 42.4 N	151 : 7.1 W	Kachemak Bay
Harbor seal	1	2003/06/07	59 : 34.9 N	151 : 17.4 W	Kachemak Bay
Harbor seal	55	2003/06/07	59 : 6.7 N	154 : 7.8 W	Kachemak Bay
Harbor seal	20	2003/06/08	60 : 55.1 N	150 : 3.5 W	Chickaloon Bay
Harbor seal	100	2003/06/08	61 : 13.0 N	150 : 49.4 W	Theodore R.



Harbor seal	10	2003/06/10	60 : 53.4 N	151 : 39.8 W	McArthur R.
Harbor seal	6	2003/06/10	60 : 53.4 N	151 : 38.2 W	Chickaloon Bay
Harbor seal	12	2003/06/11	60 : 57.0 N	149 : 54.7 W	Chickaloon Bay
Harbor seal	1	2003/06/11	61 : 1.4 N	150 : 18.2 W	Pt. Possession
Harbor seal	1	2003/06/12	59 : 52.0 N	152 : 51.5 W	Chinitna Bay
Harbor seal	50	2003/06/12	60 : 0.9 N	152 : 35.0 W	Chinitna Bay
Harbor seal	62	2003/06/12	60 : 13.7 N	152 : 50.9 W	Tuxedni Bay
Harbor seal	1	2003/06/12	60 : 13.3 N	152 : 48.8 W	Tuxedni Bay
Harbor seal	1	2003/06/12	60 : 21.8 N	152 : 15.1 W	Harriet Pt.
Harbor seal	95	2003/06/12	60 : 38.9 N	152 : 2.2 W	Big R.
Harbor seal	36	2003/06/12	60 : 39.7 N	151 : 59.1 W	Big R./ Kustatan R.
Harbor seal	10	2003/06/12	58 : 58.9 N	153 : 23.3 W	Cape Douglas
Harbor seal	2	2003/06/12	59 : 4.8 N	153 : 48.0 W	Cape Douglas
Harbor seal	15	2003/06/12	59 : 40.0 N	153 : 24.6 W	S of Iniskin Bay
Harbor seal	3	2003/06/12	59 : 38.2 N	153 : 25.9 W	Scott I.
Harbor seal	35	2004/06/02	60 : 37.8 N	151 : 59.6 W	Big R.
Harbor seal	75	2004/06/02	61 : 11.9 N	150 : 36.4 W	Susitna R.
Harbor seal	52	2004/06/03	60 : 54.7 N	150 : 4.3 W	Chickaloon Bay
Harbor seal	62	2004/06/03	60 : 37.4 N	151 : 59.8 W	Big R.
Harbor seal	50	2004/06/03	60 : 39.1 N	151 : 57.9 W	Big R.
Harbor seal	35	2004/06/03	60 : 39.1 N	151 : 57.9 W	Big R.
Harbor seal	25	2004/06/03	60 : 48.2 N	151 : 44.5 W	W Foreland/ MacArthur
Harbor seal	50	2004/06/03	60 : 52.8 N	151 : 38.5 W	W Foreland/ MacArthur
Harbor seal	35	2004/06/04	60 : 55.1 N	150 : 5.5 W	Chickaloon Bay
Harbor seal	250	2004/06/05	59 : 46.8 N	151 : 1.0 W	Fox R.
Harbor seal	50	2004/06/05	59 : 45.4 N	151 : 2.8 W	Fox R.
Harbor seal	150	2004/06/05	59 : 44.8 N	151 : 3.1 W	Fox R.
Harbor seal	1	2004/06/05	59 : 7.4 N	152 : 1.3 W	mid-inlet
Harbor seal	1	2004/06/05	58 : 52.0 N	153 : 15.3 W	Cape Douglas
Harbor seal	20	2004/06/06	59 : 0.2 N	153 : 21.7 W	Shaw I.
Harbor seal	45	2004/06/06	59 : 5.6 N	153 : 39.2 W	Shaw I./ Kamishak R.
Harbor seal	110	2004/06/06	59 : 6.3 N	154 : 2.3 W	Shaw I./ Kamishak R.
Harbor seal	7	2004/06/06	59 : 6.8 N	154 : 7.3 W	Kamishak R.
Harbor seal	16	2004/06/06	59 : 20.8 N	153 : 56.1 W	N of Kamishak R.
Harbor seal	26	2004/06/06	59 : 37.9 N	153 : 25.7 W	Scott I.
Harbor seal	1	2004/06/06	60 : 11.7 N	152 : 43.3 W	Tuxedni Bay
Harbor seal	12	2004/06/06	60 : 13.3 N	152 : 48.8 W	Tuxedni Bay
Harbor seal	1	2004/06/06	60 : 12.5 N	152 : 45.1 W	Tuxedni Bay
Harbor seal	1	2004/06/06	60 : 12.3 N	152 : 43.8 W	Tuxedni Bay
Harbor seal	2	2004/06/06	60 : 12.3 N	152 : 43.5 W	Tuxedni Bay
Harbor seal	3	2004/06/06	60 : 12.5 N	152 : 31.8 W	S of Redoubt Pt
Harbor seal	100	2004/06/07	60 : 54.9 N	150 : 4.6 W	Chickaloon Bay
Harbor seal	20	2004/06/07	61 : 12.5 N	150 : 48.4 W	Theodore R.
Harbor seal	300	2004/06/07	61 : 13.0 N	150 : 48.4 W	Theodore R.
Harbor seal	60	2004/06/07	61 : 13.4 N	150 : 47.6 W	Lewis R.
Harbor seal	30	2004/06/08	61 : 12.5 N	150 : 49.3 W	Theodore R.
Harbor seal	32	2004/06/08	60 : 55.1 N	150 : 4.1 W	Chickaloon R.
Harbor seal	34	2004/06/08	60 : 55.2 N	150 : 5.2 W	Chickaloon R.
Harbor seal	20	2004/06/08	60 : 55.0 N	150 : 4.7 W	Chickaloon R.
Harbor seal	100+	2004/06/09	61 : 12.4 N	150 : 49.3 W	Theodore R.
Harbor seal	75	2004/06/09	60 : 54.8 N	150 : 4.4 W	Chickaloon Bay
Sea otter	1	1993/06/04	59 : 32.5 N	151 : 29.9 W	Kachemak Bay

Sea otter	1	1993/06/04	59 : 29.3 N	151 : 36.8 W	Kachemak Bay
Sea otter	1	1993/06/04	59 : 29.6 N	151 : 38.6 W	Kachemak Bay
Sea otter	3	1993/06/04	59 : 28.7 N	151 : 42.0 W	Kachemak Bay
Sea otter	2	1993/06/04	59 : 27.8 N	151 : 43.3 W	Kachemak Bay
Sea otter	1	1993/06/04	59 : 31.3 N	151 : 49.7 W	Kachemak Bay
Sea otter	1	1993/06/04	59 : 31.7 N	151 : 50.3 W	Kachemak Bay
Sea otter	1	1993/06/04	59 : 34.5 N	151 : 53.2 W	Kachemak Bay
Sea otter	1	1993/06/04	59 : 35.2 N	151 : 54.0 W	Kachemak Bay
Sea otter	1	1993/07/27	59 : 29.0 N	151 : 41.4 W	Kachemak Bay
Sea otter	1	1993/07/27	59 : 28.7 N	151 : 42.3 W	Kachemak Bay
Sea otter	1	1993/07/27	59 : 28.6 N	151 : 42.5 W	Kachemak Bay
Sea otter	1	1993/07/27	59 : 28.2 N	151 : 43.6 W	Kachemak Bay
Sea otter	1	1993/07/27	59 : 28.2 N	151 : 43.7 W	Kachemak Bay
Sea otter	1	1994/06/03	59 : 40.5 N	151 : 20.6 W	Kachemak Bay
Sea otter	2	1994/06/03	59 : 40.5 N	151 : 20.6 W	Kachemak Bay
Sea otter	1	1994/06/03	59 : 40.5 N	151 : 20.6 W	Kachemak Bay
Sea otter	1	1994/06/03	59 : 42.4 N	151 : 14.7 W	Kachemak Bay
Sea otter	1	1994/06/03	59 : 28.7 N	151 : 41.3 W	Kachemak Bay
Sea otter	2	1994/06/03	59 : 28.6 N	151 : 42.2 W	Kachemak Bay
Sea otter	1	1994/06/03	59 : 27.7 N	151 : 44.4 W	Kachemak Bay
Sea otter	2	1995/07/22	59 : 38.5 N	151 : 37.7 W	Kachemak Bay
Sea otter	25	1995/07/22	59 : 38.2 N	151 : 36.1 W	Kachemak Bay
Sea otter	12	1995/07/22	59 : 38.1 N	151 : 35.6 W	Kachemak Bay
Sea otter	2	1995/07/22	59 : 38.0 N	151 : 35.0 W	Kachemak Bay
Sea otter	2	1995/07/22	59 : 37.7 N	151 : 33.4 W	Kachemak Bay
Sea otter	1	1995/07/22	59 : 36.3 N	151 : 27.1 W	Kachemak Bay
Sea otter	25	1995/07/22	59 : 22.1 N	151 : 52.9 W	English Bay
Sea otter	20	1995/07/22	59 : 19.9 N	151 : 47.3 W	English Bay
Sea otter	1	1995/07/22	59 : 20.4 N	151 : 46.7 W	Port Graham
Sea otter	2	1995/07/22	59 : 21.4 N	151 : 48.4 W	Port Graham
Sea otter	2	1995/07/22	59 : 1.1 N	153 : 22.5 W	Shaw Island
Sea otter	1	1995/07/22	59 : 1.1 N	153 : 22.5 W	Shaw Island
Sea otter	1	1995/07/22	59 : 5.6 N	153 : 48.8 W	Akumwarvik Bay
Sea otter	15	1995/07/22	59 : 22.2 N	154 : 1.8 W	Bruin Bay
Sea otter	3	1996/06/14	59 : 38.3 N	151 : 26.9 W	Kachemak Bay
Sea otter	2	1996/06/14	59 : 42.0 N	151 : 15.7 W	Kachemak Bay
Sea otter	10	1996/06/14	59 : 45.4 N	151 : 7.8 W	Kachemak Bay
Sea otter	100	1996/06/14	59 : 45.7 N	151 : 6.7 W	Kachemak Bay
Sea otter	45	1996/06/14	59 : 32.9 N	151 : 28.1 W	Kachemak Bay
Sea otter	1	1996/06/15	59 : 28.8 N	151 : 53.0 W	N of Seldovia Bay
Sea otter	1	1996/06/15	59 : 25.0 N	153 : 28.2 W	Augustine Island
Sea otter	4	1996/06/15	59 : 24.9 N	153 : 28.4 W	Augustine Island
Sea otter	1	1996/06/15	59 : 24.8 N	153 : 28.7 W	Augustine Island
Sea otter	2	1996/06/15	59 : 24.8 N	153 : 28.7 W	Augustine Island
Sea otter	1	1996/06/15	59 : 24.6 N	153 : 28.9 W	Augustine Island
Sea otter	1	1996/06/15	59 : 24.5 N	153 : 29.3 W	Augustine Island
Sea otter	1	1996/06/15	59 : 24.3 N	153 : 32.7 W	Augustine Island
Sea otter	1	1996/06/15	59 : 24.1 N	153 : 33.9 W	Augustine Island
Sea otter	1	1996/06/15	59 : 21.5 N	153 : 19.4 W	Augustine Island
Sea otter	9	1996/06/15	59 : 23.3 N	153 : 20.5 W	Augustine Island
Sea otter	1	1996/06/15	58 : 56.8 N	153 : 22.3 W	Augustine Island
Sea otter	1	1996/06/15	58 : 57.2 N	153 : 22.7 W	Cape Douglas
Sea otter	1	1996/06/15	59 : 4.3 N	153 : 54.0 W	Near Douglas River

Sea otter	1	1996/06/15	59 : 22.8 N	153 : 58.9 W	Near Contact Pt
Sea otter	1	1996/06/15	59 : 22.8 N	153 : 56.5 W	Bruin Bay
Sea otter	1	1996/06/15	59 : 30.7 N	153 : 42.8 W	South of Ursus Cove
Sea otter	1	1996/06/15	59 : 31.9 N	153 : 45.1 W	Ursus Cove/ Iliamna Bay
Sea otter	1	1996/06/15	59 : 38.6 N	153 : 26.3 W	Iliamna Bay
Sea otter	2	1996/06/15	59 : 38.2 N	153 : 25.9 W	Iliamna Bay
Sea otter	1	1996/06/15	59 : 38.0 N	153 : 25.1 W	Iliamna Bay
Sea otter	1	1996/06/15	59 : 37.2 N	153 : 21.7 W	Iliamna Bay/ Oil Bay
Sea otter	6	1997/06/09	59 : 41.7 N	151 : 15.6 W	Kachemak Bay
Sea otter	7	1997/06/09	59 : 43.1 N	151 : 11.7 W	Kachemak Bay
Sea otter	15	1997/06/09	59 : 43.8 N	151 : 9.9 W	Kachemak Bay
Sea otter	4	1997/06/09	59 : 44.5 N	151 : 8.6 W	Kachemak Bay
Sea otter	8	1997/06/09	59 : 44.9 N	151 : 7.8 W	Kachemak Bay
Sea otter	1	1997/06/09	59 : 45.6 N	151 : 6.1 W	Kachemak Bay
Sea otter	1	1997/06/09	59 : 39.4 N	151 : 13.1 W	Kachemak Bay
Sea otter	1	1997/06/09	59 : 33.7 N	151 : 23.0 W	Kachemak Bay
Sea otter	11	1997/06/09	59 : 33.6 N	151 : 24.1 W	Kachemak Bay
Sea otter	22	1997/06/09	59 : 33.0 N	151 : 28.4 W	Kachemak Bay
Sea otter	1	1997/06/09	59 : 31.4 N	151 : 59.0 W	Kachemak Bay
Sea otter	1	1997/06/09	59 : 30.7 N	152 : 0.5 W	Kachemak Bay
Sea otter	1	1997/06/09	59 : 29.9 N	152 : 2.1 W	Kachemak Bay
Sea otter	2	1997/06/09	59 : 4.2 N	153 : 40.3 W	Cape Douglas/ Kamishak R.
Sea otter	2	1997/06/09	59 : 6.0 N	153 : 40.4 W	Cape Douglas/ Kamishak R.
Sea otter	1	1997/06/09	59 : 6.3 N	153 : 40.8 W	Cape Douglas/ Kamishak R.
Sea otter	1	1997/06/09	59 : 6.7 N	153 : 42.1 W	Cape Douglas/ Kamishak R.
Sea otter	40	1997/06/09	59 : 5.6 N	154 : 1.6 W	Cape Douglas/ Kamishak R.
Sea otter	1	1997/06/09	59 : 7.7 N	154 : 10.0 W	Near Kamishak R.
Sea otter	1	1997/06/09	59 : 24.7 N	153 : 52.9 W	N of Contact Pt
Sea otter	1	1997/06/09	59 : 18.9 N	153 : 25.5 W	Augustine Island
Sea otter	2	1997/06/09	59 : 19.3 N	153 : 23.2 W	Augustine Island
Sea otter	2	1997/06/09	59 : 25.6 N	153 : 25.9 W	Augustine Island
Sea otter	1	1997/06/09	59 : 25.4 N	153 : 26.6 W	Augustine Island
Sea otter	5	1997/06/09	59 : 24.9 N	153 : 28.5 W	Augustine Island
Sea otter	1	1997/06/09	59 : 25.7 N	153 : 41.2 W	N Kamishak Bay
Sea otter	1	1997/06/09	59 : 38.9 N	153 : 36.9 W	Iliamna Bay
Sea otter	1	1998/06/13	59 : 38.3 N	151 : 39.3 W	Kachemak Bay
Sea otter	7	1998/06/13	59 : 37.5 N	151 : 35.5 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 37.4 N	151 : 34.1 W	Kachemak Bay
Sea otter	5	1998/06/13	59 : 36.5 N	151 : 28.0 W	Kachemak Bay
Sea otter	2	1998/06/13	59 : 39.7 N	151 : 21.7 W	Kachemak Bay
Sea otter	2	1998/06/13	59 : 40.4 N	151 : 19.4 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 40.6 N	151 : 18.8 W	Kachemak Bay
Sea otter	2	1998/06/13	59 : 41.4 N	151 : 16.1 W	Kachemak Bay
Sea otter	4	1998/06/13	59 : 45.1 N	151 : 7.2 W	Kachemak Bay
Sea otter	55	1998/06/13	59 : 33.6 N	151 : 25.1 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 32.2 N	151 : 28.0 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 29.4 N	151 : 31.1 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 34.1 N	151 : 46.1 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 34.2 N	151 : 46.0 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 35.5 N	151 : 43.0 W	Kachemak Bay
Sea otter	1	1998/06/13	59 : 38.0 N	151 : 35.3 W	Kachemak Bay
Sea otter	1	1998/06/14	59 : 36.1 N	151 : 27.2 W	Kachemak Bay
Sea otter	1	1998/06/14	59 : 37.7 N	151 : 34.7 W	Kachemak Bay

Sea otter	1	1998/06/14	59 : 37.6 N	151 : 36.7 W	Kachemak Bay
Sea otter	1	1998/06/14	59 : 36.8 N	151 : 47.9 W	Kachemak Bay
Sea otter	1	1998/06/14	59 : 25.7 N	153 : 25.2 W	Augustine Island
Sea otter	1	1998/06/14	59 : 25.7 N	153 : 25.3 W	Augustine Island
Sea otter	1	1998/06/14	59 : 25.4 N	153 : 26.9 W	Augustine Island
Sea otter	3	1998/06/14	59 : 24.9 N	153 : 28.6 W	Augustine Island
Sea otter	1	1998/06/14	59 : 24.4 N	153 : 32.4 W	Augustine Island
Sea otter	1	1998/06/14	59 : 23.5 N	153 : 20.2 W	Augustine Island
Sea otter	1	1998/06/14	59 : 1.8 N	153 : 36.4 W	Douglas Reef
Sea otter	1	1998/06/14	59 : 2.0 N	153 : 36.5 W	Douglas Reef
Sea otter	5	1998/06/14	59 : 2.7 N	153 : 37.4 W	Douglas Reef
Sea otter	1	1998/06/14	59 : 5.7 N	153 : 45.9 W	Douglas River
Sea otter	2	1998/06/14	59 : 5.0 N	153 : 49.5 W	Douglas River
Sea otter	4	1998/06/14	59 : 4.3 N	153 : 51.9 W	Douglas River
Sea otter	12	1998/06/14	59 : 4.5 N	153 : 54.6 W	Douglas River
Sea otter	1	1998/06/14	59 : 4.7 N	153 : 55.8 W	Douglas River
Sea otter	4	1998/06/14	59 : 4.7 N	153 : 56.5 W	Douglas River
Sea otter	4	1998/06/14	59 : 5.0 N	153 : 58.3 W	Douglas River
Sea otter	1	1998/06/14	59 : 5.3 N	154 : 2.0 W	Douglas River
Sea otter	180	1998/06/14	59 : 5.1 N	154 : 4.0 W	Akumwarvik Bay
Sea otter	1	1998/06/14	60 : 23.8 N	151 : 57.6 W	Kalgin Island
Sea otter	1	1999/06/10	59 : 40.6 N	151 : 44.7 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 40.5 N	151 : 44.6 W	Kachemak Bay
Sea otter	2	1999/06/10	59 : 40.5 N	151 : 44.4 W	Kachemak Bay
Sea otter	2	1999/06/10	59 : 39.7 N	151 : 42.6 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 39.3 N	151 : 41.3 W	Kachemak Bay
Sea otter	5	1999/06/10	59 : 39.0 N	151 : 40.6 W	Kachemak Bay
Sea otter	2	1999/06/10	59 : 38.9 N	151 : 40.2 W	Kachemak Bay
Sea otter	5	1999/06/10	59 : 38.8 N	151 : 40.0 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 38.5 N	151 : 38.0 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 38.4 N	151 : 37.8 W	Kachemak Bay
Sea otter	12	1999/06/10	59 : 38.4 N	151 : 37.7 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 38.3 N	151 : 37.0 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 38.2 N	151 : 35.5 W	Kachemak Bay
Sea otter	2	1999/06/10	59 : 37.5 N	151 : 30.8 W	Kachemak Bay
Sea otter	70	1999/06/10	59 : 40.5 N	151 : 22.0 W	Kachemak Bay
Sea otter	2	1999/06/10	59 : 40.3 N	151 : 9.0 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 33.5 N	151 : 22.9 W	Kachemak Bay
Sea otter	2	1999/06/10	59 : 29.0 N	151 : 35.5 W	Kachemak Bay
Sea otter	1	1999/06/10	59 : 20.6 N	151 : 58.6 W	Kachemak Bay
Sea otter	3	1999/06/10	59 : 37.3 N	151 : 28.7 W	Kachemak Bay
Sea otter	1	1999/06/10	60 : 15.9 N	151 : 24.7 W	S of Kasilof R.
Sea otter	1	1999/06/14	59 : 37.5 N	151 : 44.8 W	Kachemak Bay
Sea otter	2	1999/06/14	59 : 35.8 N	151 : 31.4 W	Kachemak Bay
Sea otter	1	1999/06/14	59 : 35.1 N	151 : 35.9 W	Kachemak Bay
Sea otter	1	1999/06/14	59 : 35.0 N	151 : 36.4 W	Kachemak Bay
Sea otter	1	1999/06/14	59 : 34.9 N	151 : 42.1 W	Kachemak Bay
Sea otter	1	1999/06/14	59 : 34.9 N	151 : 45.7 W	Kachemak Bay
Sea otter	2	1999/06/14	59 : 34.9 N	151 : 46.3 W	Kachemak Bay
Sea otter	2	1999/06/14	59 : 34.9 N	151 : 46.8 W	Kachemak Bay
Sea otter	1	1999/06/14	59 : 34.9 N	151 : 49.0 W	Kachemak Bay
Sea otter	1	1999/06/14	59 : 35.0 N	151 : 49.1 W	Kachemak Bay
Sea otter	3	1999/06/14	59 : 35.0 N	151 : 57.8 W	Kachemak Bay

Sea otter	6	1999/06/14	59 : 35.1 N	151 : 59.1 W	Kachemak Bay
Sea otter	2	1999/06/14	59 : 1.1 N	153 : 24.5 W	Shaw Island
Sea otter	1	1999/06/14	59 : 32.2 N	153 : 44.3 W	S of Iliamna Bay
Sea otter	3	2000/06/09	59 : 4.8 N	154 : 8.4 W	McNeil Head/ Akumwarvik Bay
Sea otter	1	2000/06/09	59 : 4.9 N	153 : 55.7 W	Kachemak Bay
Sea otter	1	2000/06/09	59 : 4.6 N	153 : 54.3 W	Kachemak Bay
Sea otter	1	2000/06/09	59 : 4.4 N	153 : 53.2 W	Kachemak Bay
Sea otter	1	2000/06/09	59 : 4.2 N	153 : 52.1 W	Kachemak Bay
Sea otter	1	2000/06/09	59 : 5.4 N	153 : 39.4 W	Kachemak Bay
Sea otter	1	2000/06/09	59 : 4.0 N	153 : 39.4 W	Kachemak Bay
Sea otter	1	2000/06/09	59 : 2.0 N	153 : 36.8 W	Kachemak Bay
Sea otter	1	2000/06/09	58 : 57.2 N	153 : 22.1 W	Shaw Island
Sea otter	1	2000/06/09	58 : 57.0 N	153 : 21.9 W	Shaw Island
Sea otter	1	2000/06/09	58 : 57.0 N	153 : 21.9 W	Shaw Island
Sea otter	1	2000/06/09	59 : 18.8 N	152 : 0.4 W	English Bay
Sea otter	1	2000/06/09	59 : 28.6 N	153 : 26.4 W	Augustine Island
Sea otter	10	2000/06/09	59 : 28.5 N	153 : 29.8 W	Augustine Island
Sea otter	2	2000/06/09	59 : 28.5 N	153 : 30.4 W	Augustine Island
Sea otter	2	2000/06/09	59 : 28.5 N	153 : 31.0 W	Augustine Island
Sea otter	1	2000/06/09	59 : 26.4 N	153 : 34.9 W	Augustine Island
Sea otter	10	2000/06/09	59 : 26.1 N	153 : 33.3 W	Augustine Island
Sea otter	1	2000/06/09	59 : 20.3 N	153 : 10.1 W	E of Augustine Island
Sea otter	25	2000/06/10	59 : 42.2 N	151 : 48.3 W	Anchor Point
Sea otter	40	2000/06/10	59 : 39.2 N	151 : 27.0 W	Kachemak Bay
Sea otter	6	2000/06/10	59 : 25.3 N	151 : 43.1 W	Kachemak Bay
Sea otter	6	2000/06/10	59 : 26.0 N	151 : 43.6 W	Kachemak Bay
Sea otter	2	2000/06/10	59 : 28.3 N	151 : 43.1 W	Kachemak Bay
Sea otter	50	2000/06/10	59 : 28.7 N	151 : 41.9 W	Kachemak Bay
Sea otter	2	2000/06/10	59 : 29.1 N	151 : 40.5 W	Kachemak Bay
Sea otter	1	2000/06/10	59 : 28.6 N	151 : 33.8 W	Kachemak Bay
Sea otter	1	2000/06/10	59 : 33.4 N	151 : 23.3 W	Kachemak Bay
Sea otter	6	2000/06/10	59 : 42.3 N	151 : 14.9 W	Kachemak Bay
Sea otter	4	2000/06/10	59 : 41.6 N	151 : 16.9 W	Kachemak Bay
Sea otter	3	2000/06/10	59 : 41.6 N	151 : 17.1 W	Kachemak Bay
Sea otter	1	2000/06/10	59 : 41.6 N	151 : 17.1 W	Kachemak Bay
Sea otter	2	2000/06/10	59 : 41.3 N	151 : 17.9 W	Kachemak Bay
Sea otter	3	2000/06/10	59 : 41.2 N	151 : 18.1 W	Kachemak Bay
Sea otter	2	2000/06/10	59 : 40.9 N	151 : 19.3 W	Kachemak Bay
Sea otter	9	2000/06/10	59 : 40.8 N	151 : 19.8 W	Kachemak Bay
Sea otter	1	2000/06/10	59 : 40.6 N	151 : 20.9 W	Kachemak Bay
Sea otter	4	2000/06/10	59 : 40.4 N	151 : 21.8 W	Kachemak Bay
Sea otter	1	2000/06/10	59 : 40.2 N	151 : 22.5 W	Kachemak Bay
Sea otter	1	2000/06/10	59 : 40.2 N	151 : 22.8 W	Kachemak Bay
Sea otter	15	2000/06/10	59 : 39.8 N	151 : 24.4 W	Kachemak Bay
Sea otter	32	2000/06/10	59 : 39.7 N	151 : 24.6 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 41.1 N	151 : 17.0 W	Kachemak Bay
Sea otter	3	2001/06/08	59 : 41.1 N	151 : 17.0 W	Kachemak Bay
Sea otter	2	2001/06/08	59 : 41.3 N	151 : 16.1 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 43.0 N	151 : 9.8 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 45.9 N	151 : 4.6 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 46.0 N	151 : 4.4 W	Kachemak Bay
Sea otter	23	2001/06/08	59 : 42.3 N	151 : 7.7 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 29.2 N	151 : 30.5 W	Kachemak Bay

Sea otter	1	2001/06/08	59 : 24.6 N	151 : 42.3 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 24.6 N	151 : 42.3 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 28.3 N	151 : 43.0 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 23.1 N	151 : 55.0 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 22.1 N	151 : 53.6 W	Kachemak Bay
Sea otter	7	2001/06/08	59 : 22.1 N	151 : 54.3 W	Kachemak Bay
Sea otter	2	2001/06/08	59 : 22.0 N	151 : 55.1 W	Kachemak Bay
Sea otter	1	2001/06/08	59 : 21.4 N	151 : 55.6 W	Port Graham
Sea otter	6	2001/06/09	59 : 5.2 N	153 : 38.9 W	Kamishak Bay
Sea otter	1	2001/06/09	59 : 9.0 N	153 : 55.2 W	Kamishak Bay
Sea otter	1	2001/06/09	59 : 7.3 N	154 : 1.3 W	Kamishak Bay
Sea otter	1	2001/06/09	59 : 6.9 N	154 : 1.7 W	Kamishak Bay
Sea otter	1	2001/06/09	59 : 6.6 N	154 : 2.1 W	Kamishak Bay
Sea otter	4	2001/06/09	59 : 6.3 N	154 : 2.3 W	Kamishak Bay
Sea otter	2	2001/06/09	59 : 24.7 N	153 : 48.1 W	Kamishak Bay
Sea otter	1	2001/06/09	59 : 26.8 N	153 : 36.9 W	Kamishak Bay
Sea otter	1	2002/06/04	59 : 5.1 N	154 : 3.4 W	Kamishak Bay
Sea otter	1	2002/06/04	59 : 5.1 N	154 : 3.8 W	Kamishak Bay
Sea otter	10	2002/06/04	59 : 26.8 N	153 : 37.0 W	Kamishak Bay
Sea otter	20	2002/06/04	59 : 26.7 N	153 : 35.1 W	Kamishak Bay
Sea otter	25	2002/06/04	59 : 26.4 N	153 : 33.4 W	Kamishak Bay
Sea otter	1	2002/06/04	59 : 37.2 N	151 : 43.5 W	Kachemak Bay
Sea otter	1	2002/06/04	59 : 37.4 N	151 : 40.9 W	Kachemak Bay
Sea otter	1	2002/06/04	59 : 34.5 N	151 : 37.5 W	Kachemak Bay
Sea otter	1	2002/06/05	59 : 38.2 N	151 : 37.0 W	Kachemak Bay
Sea otter	1	2002/06/05	59 : 37.9 N	151 : 34.7 W	Kachemak Bay
Sea otter	6	2002/06/05	59 : 37.6 N	151 : 32.6 W	Kachemak Bay
Sea otter	2	2002/06/05	59 : 40.0 N	151 : 22.6 W	Kachemak Bay
Sea otter	15	2002/06/05	59 : 40.5 N	151 : 20.0 W	Kachemak Bay
Sea otter	3	2002/06/05	59 : 40.9 N	151 : 18.4 W	Kachemak Bay
Sea otter	25	2002/06/05	59 : 40.9 N	151 : 18.1 W	Kachemak Bay
Sea otter	9	2002/06/05	59 : 41.1 N	151 : 17.1 W	Kachemak Bay
Sea otter	25	2002/06/05	59 : 41.4 N	151 : 16.6 W	Kachemak Bay
Sea otter	6	2002/06/05	59 : 42.1 N	151 : 14.9 W	Kachemak Bay
Sea otter	1	2002/06/05	59 : 42.6 N	151 : 13.1 W	Kachemak Bay
Sea otter	6	2002/06/05	59 : 42.9 N	151 : 12.7 W	Kachemak Bay
Sea otter	1	2002/06/05	59 : 46.3 N	151 : 4.7 W	Kachemak Bay
Sea otter	1	2002/06/05	59 : 34.5 N	151 : 18.5 W	Kachemak Bay
Sea otter	1	2002/06/05	59 : 26.0 N	151 : 43.6 W	Seldovia Bay
Sea otter	1	2002/06/05	59 : 20.4 N	151 : 46.7 W	Seldovia Bay
Sea otter	1	2002/06/05	59 : 20.4 N	151 : 46.7 W	Seldovia Bay
Sea otter	1	2002/06/05	59 : 21.6 N	151 : 50.1 W	Seldovia Bay
Sea otter	4	2002/06/05	59 : 13.4 N	151 : 55.3 W	Seldovia Bay
Sea otter	1	2002/06/05	59 : 9.7 N	151 : 52.6 W	Elizabeth Island
Sea otter	1	2003/06/07	59 : 37.9 N	151 : 36.2 W	Kachemak Bay
Sea otter	1	2003/06/07	59 : 37.4 N	151 : 31.2 W	Kachemak Bay
Sea otter	1	2003/06/07	59 : 36.4 N	151 : 27.9 W	Kachemak Bay
Sea otter	20	2003/06/07	59 : 39.9 N	151 : 23.2 W	Kachemak Bay
Sea otter	15	2003/06/07	59 : 40.2 N	151 : 22.0 W	Kachemak Bay
Sea otter	3	2003/06/07	59 : 40.8 N	151 : 18.9 W	Kachemak Bay
Sea otter	19	2003/06/07	59 : 41.7 N	151 : 16.3 W	Kachemak Bay
Sea otter	40	2003/06/07	59 : 42.3 N	151 : 14.8 W	Kachemak Bay
Sea otter	6	2003/06/07	59 : 42.7 N	151 : 13.6 W	Kachemak Bay

Sea otter	8	2003/06/07	59 : 42.8 N	151 : 13.3 W	Kachemak Bay
Sea otter	4	2003/06/07	59 : 42.9 N	151 : 12.9 W	Kachemak Bay
Sea otter	3	2003/06/07	59 : 43.5 N	151 : 11.3 W	Kachemak Bay
Sea otter	1	2003/06/07	59 : 44.4 N	151 : 9.4 W	Kachemak Bay
Sea otter	1	2003/06/07	59 : 36.3 N	151 : 15.1 W	Kachemak Bay
Sea otter	56	2003/06/07	59 : 33.6 N	151 : 23.7 W	Kachemak Bay
Sea otter	20	2003/06/07	59 : 33.2 N	151 : 25.5 W	Kachemak Bay
Sea otter	1	2003/06/07	59 : 36.0 N	151 : 34.5 W	Kachemak Bay
Sea otter	2	2003/06/07	59 : 34.7 N	151 : 42.6 W	Kachemak Bay
Sea otter	1	2003/06/07	59 : 34.8 N	151 : 45.3 W	Kachemak Bay
Sea otter	3	2003/06/12	59 : 30.5 N	153 : 21.0 W	Augustine Island
Sea otter	5	2003/06/12	59 : 38.5 N	152 : 0.6 W	W of Kachemak Bay
Sea otter	1	2003/06/12	59 : 38.0 N	151 : 45.7 W	Kachemak Bay
Sea otter	8	2003/06/12	59 : 38.0 N	151 : 44.9 W	Kachemak Bay
Sea otter	1	2003/06/12	59 : 36.8 N	151 : 43.0 W	Augustine Island
Sea otter	1	2003/06/12	59 : 36.7 N	151 : 43.7 W	Augustine Island
Sea otter	1	2003/06/12	59 : 36.7 N	151 : 43.7 W	Augustine Island
Sea otter	1	2003/06/12	59 : 36.6 N	151 : 44.3 W	Augustine Island
Sea otter	11	2003/06/12	59 : 36.6 N	151 : 44.3 W	Augustine Island
Sea otter	41	2003/06/12	59 : 36.5 N	151 : 45.4 W	Augustine Island
Sea otter	1	2003/06/12	59 : 36.3 N	151 : 48.7 W	Augustine Island
Sea otter	1	2003/06/12	59 : 36.2 N	151 : 49.1 W	Augustine Island
Sea otter	1	2003/06/12	59 : 35.9 N	151 : 52.0 W	Augustine Island
Sea otter	2	2003/06/12	59 : 35.8 N	151 : 53.2 W	Augustine Island
Sea otter	1	2003/06/12	59 : 35.1 N	151 : 59.8 W	Augustine Island
Sea otter	1	2003/06/12	59 : 35.0 N	152 : 0.6 W	Augustine Island
Sea otter	1	2003/06/12	59 : 35.0 N	152 : 0.7 W	Augustine Island
Sea otter	1	2003/06/12	59 : 34.8 N	152 : 2.5 W	Augustine Island
Sea otter	1	2003/06/12	59 : 30.0 N	152 : 46.4 W	mid-inlet
Sea otter	1	2004/06/05	59 : 45.0 N	151 : 53.0 W	Kachemak Bay
Sea otter	3	2004/06/05	59 : 37.7 N	151 : 35.3 W	Kachemak Bay
Sea otter	12	2004/06/05	59 : 37.2 N	151 : 31.7 W	Kachemak Bay
Sea otter	15	2004/06/05	59 : 36.3 N	151 : 29.2 W	Kachemak Bay
Sea otter	26	2004/06/05	59 : 36.1 N	151 : 30.5 W	Kachemak Bay
Sea otter	27	2004/06/05	59 : 36.4 N	151 : 28.3 W	Kachemak Bay
Sea otter	16	2004/06/05	59 : 36.2 N	151 : 27.9 W	Kachemak Bay
Sea otter	7	2004/06/05	59 : 37.6 N	151 : 25.0 W	Kachemak Bay
Sea otter	12	2004/06/05	59 : 38.3 N	151 : 24.5 W	Mud Bay
Sea otter	2	2004/06/05	59 : 40.1 N	151 : 19.2 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 41.3 N	151 : 15.4 W	Kachemak Bay
Sea otter	4	2004/06/05	59 : 41.8 N	151 : 14.0 W	Kachemak Bay
Sea otter	10	2004/06/05	59 : 42.3 N	151 : 12.8 W	Kachemak Bay
Sea otter	5	2004/06/05	59 : 42.4 N	151 : 12.4 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 42.5 N	151 : 12.2 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 42.7 N	151 : 11.8 W	Kachemak Bay
Sea otter	3	2004/06/05	59 : 42.9 N	151 : 11.3 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 43.1 N	151 : 10.6 W	Kachemak Bay
Sea otter	8	2004/06/05	59 : 43.3 N	151 : 10.2 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 43.4 N	151 : 10.0 W	Kachemak Bay
Sea otter	4	2004/06/05	59 : 43.5 N	151 : 9.8 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 43.8 N	151 : 8.9 W	Kachemak Bay
Sea otter	3	2004/06/05	59 : 44.0 N	151 : 8.6 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 44.4 N	151 : 7.6 W	Kachemak Bay

Sea otter	2	2004/06/05	59 : 44.7 N	151 : 7.2 W	Kachemak Bay
Sea otter	28	2004/06/05	59 : 41.3 N	151 : 8.6 W	Kachemak Bay
Sea otter	11	2004/06/05	59 : 41.2 N	151 : 8.7 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 33.9 N	151 : 22.8 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 33.8 N	151 : 23.2 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 33.5 N	151 : 24.4 W	Kachemak Bay
Sea otter	3	2004/06/05	59 : 33.5 N	151 : 24.6 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 33.3 N	151 : 25.0 W	Kachemak Bay
Sea otter	3	2004/06/05	59 : 33.3 N	151 : 25.3 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 32.8 N	151 : 28.5 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 32.4 N	151 : 30.4 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 29.4 N	151 : 40.2 W	Kachemak Bay
Sea otter	3	2004/06/05	59 : 28.6 N	151 : 42.3 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 34.5 N	151 : 36.8 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 21.2 N	151 : 48.8 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 20.5 N	151 : 47.7 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 20.1 N	151 : 47.3 W	Kachemak Bay
Sea otter	2	2004/06/05	59 : 21.5 N	151 : 49.2 W	Kachemak Bay
Sea otter	1	2004/06/05	59 : 25.7 N	153 : 23.5 W	Augustine Island
Sea otter	2	2004/06/05	59 : 25.8 N	153 : 25.2 W	Augustine Island
Sea otter	17	2004/06/05	59 : 25.7 N	153 : 25.8 W	Augustine Island
Sea otter	1	2004/06/05	59 : 25.6 N	153 : 26.2 W	Augustine Island
Sea otter	2	2004/06/05	59 : 25.6 N	153 : 26.3 W	Augustine Island
Sea otter	2	2004/06/05	59 : 25.4 N	153 : 27.2 W	Augustine Island
Sea otter	8	2004/06/05	59 : 25.0 N	153 : 28.2 W	Augustine Island
Sea otter	2	2004/06/05	59 : 24.9 N	153 : 28.8 W	Augustine Island
Sea otter	1	2004/06/05	59 : 24.5 N	153 : 29.9 W	Augustine Island
Sea otter	1	2004/06/05	59 : 24.2 N	153 : 33.1 W	Augustine Island
Sea otter	4	2004/06/05	59 : 19.6 N	153 : 22.5 W	Augustine Island
Sea otter	9	2004/06/05	59 : 20.0 N	153 : 21.4 W	Augustine Island
Sea otter	4	2004/06/05	59 : 20.2 N	153 : 21.0 W	Augustine Island
Sea otter	3	2004/06/06	58 : 59.0 N	153 : 23.0 W	Cape Douglas/ Shaw Island
Sea otter	16	2004/06/06	58 : 59.9 N	153 : 21.9 W	Shaw Island
Sea otter	4	2004/06/06	59 : 0.9 N	153 : 22.1 W	Shaw Island
Sea otter	1	2004/06/06	59 : 1.0 N	153 : 23.2 W	Shaw Island
Sea otter	1	2004/06/06	59 : 0.9 N	153 : 23.5 W	Shaw Island
Sea otter	1	2004/06/06	59 : 0.9 N	153 : 24.0 W	Shaw Island
Sea otter	3	2004/06/06	59 : 0.6 N	153 : 29.7 W	Shaw Is./ Kamishak R.
Sea otter	5	2004/06/06	59 : 0.6 N	153 : 29.8 W	Shaw Is./ Kamishak R.
Sea otter	13	2004/06/06	59 : 4.4 N	153 : 39.1 W	Shaw Is./ Kamishak R.
Sea otter	3	2004/06/06	59 : 4.8 N	153 : 39.2 W	Shaw Is./ Kamishak R.
Sea otter	1	2004/06/06	59 : 6.6 N	153 : 40.7 W	Shaw Is./ Kamishak R.
Sea otter	27	2004/06/06	59 : 7.8 N	153 : 50.7 W	Shaw Is./ Kamishak R.
Sea otter	1	2004/06/06	59 : 8.0 N	153 : 51.8 W	Shaw Is./ Kamishak R.
Sea otter	1	2004/06/06	59 : 8.1 N	153 : 52.0 W	Shaw Is./ Kamishak R.
Sea otter	2	2004/06/06	59 : 8.7 N	153 : 56.7 W	Shaw Is./ Kamishak R.
Sea otter	3	2004/06/06	59 : 8.3 N	153 : 58.5 W	Shaw Is./ Kamishak R.
Sea otter	1	2004/06/06	59 : 8.2 N	153 : 58.8 W	Shaw Is./ Kamishak R.
Sea otter	1	2004/06/06	59 : 7.9 N	154 : 9.0 W	N of Kamishak R.
Sea otter	3	2004/06/06	59 : 37.9 N	152 : 16.3 W	Ursus Pt/ Homer (mid-inlet)
Sea otter	1	2004/06/06	59 : 35.1 N	151 : 45.8 W	Kachemak Bay
Sea otter	1	2004/06/06	59 : 34.9 N	151 : 44.4 W	Kachemak Bay
Sea otter	1	2004/06/06	59 : 32.8 N	153 : 34.3 W	Ursus Pt/ Homer



Sea otter	2	2004/06/06	59 : 33.8 N	153 : 33.2 W	Ursus Pt/ Homer
Sea otter	1	2004/06/06	59 : 38.4 N	153 : 37.2 W	Cottonwood Crk./ Iliamna Bay
Sea otter	1	2004/06/06	59 : 38.5 N	153 : 26.5 W	Scott Island
Sea otter	3	2004/06/06	59 : 38.2 N	153 : 26.2 W	Scott Island
Sea otter	4	2004/06/06	59 : 37.0 N	153 : 22.3 W	Big Rock Island
Sea otter	1	2004/06/06	59 : 42.6 N	153 : 1.2 W	Dry Bay/ Chinitna Bay
Sea otter	1	2004/06/06	59 : 42.6 N	153 : 1.2 W	Dry Bay/ Chinitna Bay
Sea otter	1	2004/06/06	59 : 43.4 N	153 : 0.6 W	Dry Bay/ Chinitna Bay
Sea otter	1	2004/06/06	59 : 45.0 N	152 : 59.7 W	Dry Bay/ Chinitna Bay
Sea otter	1	2004/06/06	59 : 45.8 N	152 : 59.2 W	Dry Bay/ Chinitna Bay
Sea otter	1	2004/06/06	59 : 45.8 N	152 : 59.2 W	Dry Bay/ Chinitna Bay
Sea otter	1	2004/06/06	59 : 45.8 N	152 : 59.2 W	Dry Bay/ Chinitna Bay
Unidentified:					
Cetacean	1	1993/06/04	60 : 4.3 N	152 : 30.6 W	Tuxedni Bay
Cetacean	1	1994/06/03	59 : 55.3 N	152 : 6.9 W	mid-inlet
Cetacean	1	1994/06/04	59 : 39.0 N	152 : 22.4 W	mid-inlet
Cetacean	1	1999/06/10	59 : 36.9 N	151 : 28.5 W	Kachemak Bay
Cetacean	1	1999/06/14	60 : 41.9 N	151 : 37.5 W	SE of West Foreland
Cetacean	1	2000/06/09	58 : 59.2 N	152 : 6.2 W	mid-inlet
Cetacean	1	2000/06/09	59 : 1.7 N	153 : 9.8 W	mid-inlet
Cetacean	2	2000/06/09	59 : 43.9 N	152 : 51.8 W	mid-inlet
Cetacean	1	2000/06/09	59 : 37.5 N	153 : 13.4 W	Oil Bay
Cetacean	1	2000/06/09	59 : 36.8 N	153 : 21.4 W	Oil Bay
Cetacean	2	2000/06/09	59 : 17.8 N	152 : 14.1 W	mid-inlet
Marine mammal	2	1994/06/04	59 : 5.0 N	153 : 59.2 W	Douglas R./ Kamishak R.
Marine mammal	1	2000/06/10	60 : 27.0 N	152 : 8.9 W	Near Kalgin Island
Marine mammal	1	2003/06/12	59 : 4.2 N	153 : 40.0 W	Cape Douglas
Marine mammal	1	2003/06/12	59 : 30.0 N	152 : 46.2 W	Augustine Island
Pinniped	1	1993/06/04	59 : 29.4 N	151 : 47.5 W	mid-inlet
Pinniped	2	1994/06/04	59 : 32.5 N	152 : 39.5 W	mid-inlet
Pinniped	1	1996/06/15	59 : 24.9 N	153 : 47.0 W	Rocky Cove
Pinniped	1	1998/06/13	60 : 40.6 N	151 : 51.3 W	mid-inlet
Pinniped	1	1998/06/14	61 : 1.6 N	151 : 8.8 W	mid-inlet
Pinniped	6	1999/06/09	61 : 12.7 N	150 : 48.2 W	Susitna R.
Pinniped	1	1999/06/11	60 : 24.4 N	152 : 14.9 W	Harriet Pt.
Pinniped	1	2000/06/08	61 : 14.2 N	150 : 44.0 W	Theodore R
Pinniped	1	2000/06/09	60 : 40.4 N	151 : 57.9 W	Big R.
Pinniped	1	2000/06/09	59 : 19.0 N	153 : 33.6 W	Augustine Island
Pinniped	2	2000/06/09	59 : 22.8 N	153 : 36.3 W	Augustine Island
Pinniped	1	2003/06/07	60 : 4.3 N	152 : 20.1 W	Near Kalgin Island

---

## RECENT TECHNICAL MEMORANDUMS

Copies of this and other NOAA Technical Memorandums are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22167 (web site: [www.ntis.gov](http://www.ntis.gov)). Paper and microfiche copies vary in price.

### AFSC-

- 148 EILER, J. H., T. R. SPENCER, J. J. PELLA, M. M. MASUDA, and R. R. HOLDER. 2004. Distribution and movement patterns of chinook salmon returning to the Yukon River basin in 2000-2002, 99 p. NTIS No. PB2005-100707.
- 147 MCELDERRY, H., J. SCHRADER, D. MCCULLOUGH, J. ILLINGWORTH, S. FITZGERALD, and S. DAVIS. 2004. Electronic monitoring of seabird interactions with trawl third-wire cables on trawl vessels - a pilot study, 39 p. NTIS No. PB2005-100243.
- 146 WING, B. L., and D. R. BARNARD. 2004. A field guide to Alaskan corals, 67 p. NTIS No. PB2005-100429.
- 145 RUGH, D. J., B. A. MAHONEY, and B. K. SMITH. 2004. Aerial surveys of beulga whales in Cook Inlet, Alaska, between June 2001 and June 2002, 26 p. NTIS No. PB2004-106479.
- 144 ANGLISS, R. A., and K. L. LODGE. 2004. Alaska marine mammal stock assessments, 2003, 224 p. NTIS No. PB2005-100248.
- 143 ZENGER, H. H. JR. 2004. Data report: 2002 Aleutian Islands bottom trawl survey, 247 p. NTIS No. PB2004-105068.
- 142 STEVENSON, D. E. 2004. Identification of skates, sculpins, and smelts by observers in North Pacific groundfish fisheries (2002-2003), 67 p. NTIS No. PB2004-105817.
- 141 HOFF, G. R., and L. L. BRITT. 2003. The 2002 eastern Bering Sea upper continental slope survey of groundfish and invertebrate resources, 261 p. NTIS No. PB2004-101668.
- 140 STONE, R. P., and M. M. MASUDA. 2003. Characteristics of benthic sediments from areas open and closed to bottom trawling in the Gulf of Alaska., 40 p. + Appendices (111 p.). NTIS No. PB2004-100650
- 139 JOHNSON, S. W., M. L. MURPHY, D. J. CSEPP, P. M. HARRIS, and J. F. THEDINGA. 2003. A survey of fish assemblages in eelgrass and kelp habitats of southeastern Alaska, 39 p. NTIS No. PB2004-100139.
- 138 PEREZ, M. A. 2003. Compilation of marine mammal incidental take data from the domestic and joint venture groundfish fisheries in the U.S. EEZ of the North Pacific, 1989-2001, 145 p. NTIS No. PB2004-100649
- 137 MASELKO, J. M., A. C. WERTHEIMER, and J. F. THEDINGA. 2003. Selection and application of a mark-and-recapture technique for estimating pink salmon escapements, 44 p. NTIS No. PB2003-107101.
- 136 BARBEAUX, S. J., and M. W. DORN. 2003. Spatial and temporal analysis of eastern Bering Sea echo integration-trawl survey and catch data of walleye pollock, *Theragra chalcogramma*, for 2001 and 2002, 34 p. NTIS No. PB2003-106479.
- 135 DIETER, B. E., D. A. WION, and R. A. MCCONNAUGHEY. 2003. Mobile fishing gear effects on benthic habitats: A bibliography (second edition), 207 p. NTIS No. PB2003-105080.
- 134 ROBSON, B. W. (editors). 2002. Fur seal investigations, 2000-2001, 80 p. NTIS No. PB2003-103825.