



NOAA Technical Memorandum NMFS-AFSC-138

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

by
M. A. Perez

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

September 2003

NOAA Technical Memorandum NMFS

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This document should be cited as follows:

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. U. S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-138, 145 p.

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M. A. Perez

National Marine Mammal Laboratory
Alaska Fisheries Science Center
7600 Sand Point Way N.E.
Seattle, WA 98115
www.afsc.noaa.gov

U.S. DEPARTMENT OF COMMERCE

Donald L. Evans, 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

September 2003

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ABSTRACT

This report presents a compilation by species, year, area, and gear type (trawl, longline, pot, and jig) of observer data on incidental take by the domestic (1989-2001) and joint venture (1989-1990) groundfish fisheries in the U.S. Exclusive Economic Zone of Alaska and the U.S. West Coast. Nineteen species of marine mammals (276 individuals) were observed killed or injured. Four of these 19 marine mammal species are classified as endangered under the Endangered Species Act: the western population only of the Steller sea lion (*Eumetopias jubatus*), the humpback whale (*Megaptera novaeangliae*), the fin whale (*Balaenoptera physalus*), and the sperm whale (*Physeter macrocephalus*). Sperm whales were not killed in groundfish gear, but two sperm whales were considered seriously injured after becoming entangled in and released with trailing longline gear. The only take recorded for the jig fishery was one Dall's porpoise (*Phocoenoides dalli*) entangled in the lines and released with trailing gear; no marine mammals were directly killed by jig gear. Thirteen individual marine mammals sustained minor injuries before being returned to the sea, and 26 other individuals returned to the sea unharmed after either being caught by the gear or boarding the vessel of their own volition. Sea otters (*Enhydra lutris*) were reported killed in the groundfish fisheries only by pot gear, and only in 1992. Stratified random sampling ratio estimates were used to calculate total bycatch. The at-sea Pacific whiting trawl fishery off the coasts of Washington, Oregon, and California was estimated to have incidentally caught and killed a total of 44 marine mammals between 1990 and 2001. In Alaska, the domestic trawl fishery was estimated to have incidentally killed a total of 445 marine mammals during the years from 1989 to 2001. The estimated average annual bycatch of Steller sea lions by the domestic trawl fisheries in Alaska during 1990-2001 was about 10% of the level of the average annual estimated take (127 sea lions) by the joint venture fisheries in Alaska during 1985-1989.

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INTRODUCTION

Assessing the status of marine mammal stocks includes determining various sources of natural and human-induced mortality. One source of human-induced mortality that has impacted marine mammal populations is incidental take (bycatch) in commercial fisheries. For example, Steller sea lions (*Eumetopias jubatus*) were incidentally caught by foreign and joint venture groundfish trawl fisheries in Alaska during 1973-1988, and bycatch of adult female sea lions in these fisheries was considered an important source of mortality during the 1970s in the early phases of the decline of the Steller sea lion populations in Alaska (Loughlin and York 2000; Perez and Loughlin 1991).

Section 3(13) of the Marine Mammal Protection Act of 1972 (MMPA) states that the term "take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. Section 3(18) of the Endangered Species Act of 1973 defines the term "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Incidental take is unintentional or accidental take which might occur during an otherwise lawful activity. Amendments to the MMPA in 1994 required that fisheries be managed based on incidental serious injuries and mortalities, and these amendments also allowed the Secretary of Commerce to prohibit, as necessary, the use by fisheries of deterrence of marine mammals.

The National Marine Mammal Laboratory (NMML) and the North Pacific Groundfish Observer Program (NPGOP) at the Alaska Fisheries Science Center (AFSC), National Marine Fisheries Service (NMFS), have been compiling and analyzing data collected by observers on the interactions of marine mammals with fisheries in the North Pacific Ocean and Bering Sea since the early 1970s. Data collected since 1989 by observers aboard vessels of the U.S. domestic groundfish fisheries have been analyzed annually to assess: 1) the levels of incidental take, and 2) the number of animals subjected to deterrence to prevent interactions with fishing gear (including predation on groundfish catches). The NPGOP published several reports during

the early 1990s that summarized the history, sampling methods, and groundfish catch statistics of the joint venture (1989-1990) and domestic groundfish fisheries (1990-1991) in Alaska and the North Pacific Ocean (Berger et al. 1990; Guttormsen et al. 1990, 1992a, 1992b, 1992c; Narita et al. 1994). No comparable reports have been published for the years 1992 to 2001. The sampling methods used by observers at sea are detailed in the NPGOP training manual for observers (AFSC 2001). This manual undergoes annual revision to include changes in fishery regulations, improved sampling design, and recent additions to data collection requirements.

The domestic fishery is harvested by a variety of gear types, but most observer trips occur on vessels using one of three types: trawl, longline, or pot (AFSC 2001). Trawl vessels fish with a net towed behind the boat. The net is shaped like a large funnel. At the end of this funnel is a bag called the codend, which collects fish caught by the net. A non-pelagic trawl is the use of any trawl net towed by one vessel which does not meet the configuration (e.g., mesh size, fishing line, ropes, floats, weights, etc.) specified for a pelagic trawl net in the fishing regulations. Trawlers make up the largest component of vessels which carry observers and include both catcher vessels and catcher/processor vessels (C/Ps). Catcher vessels are generally small boats that do not process their catch. Catcher/processors have factories and freezers aboard. It is the ability to freeze fish that differentiates C/Ps from catcher boats, and a vessel which freezes whole fish is still considered a C/P. Longline vessels fish with fixed hooks strung along a ground line. The longline can be several miles long and can have thousands of baited hooks attached. The longline fleet is made up of both catcher boats and C/Ps. Pot vessels fish with fixed steel traps, or "pots". The fish enter the pot in search of bait and become trapped inside. Most pot vessels are catcher boats, but there are a few C/Ps. A few observers have also been placed on jig (hook and line) fishing vessels which fish using a single, non-buoyed, weighted line with hooks attached and a moving retrieval device (longline vessels use a stationary, buoyed, and anchored line with hooks and a fixed roller device for retrieval). Observers are not placed on U.S. fishing vessels less than 60 feet in length. The joint venture groundfish fisheries during 1989 and 1990 consisted of U.S. catcher boats using trawl gear that

delivered their fish to foreign processor vessels of the following countries: the People's Republic of China, Iceland, Japan, the Republic of Korea, Poland, and the former Soviet Union (Russia).

The purpose of this report is to present a compilation by year and gear type (trawl, longline, pot, and jig) of the incidental take of marine mammals by the domestic groundfish fisheries (1989-2001) and the joint venture trawl fisheries (1989-1990) in the U.S. Exclusive Economic Zone (EEZ) off Alaska and the U.S. West Coast. The marine mammal bycatch data from all years (1989-2001) have been reanalyzed in this study based on updated information on species identification from canine tooth specimens and DNA analyses, as well as the current requirement to manage fisheries based on data from both serious injuries and mortalities. Average annual trends or interannual differences in catch rates, biological data collected by observers from incidentally caught marine mammals, and the predominant groundfish catch species when marine mammals were incidentally caught by the domestic groundfish fisheries during 1989-2001 is discussed by Perez (in prep.^a).

METHODS

In this report, rates of incidental take are presented by gear type (trawl, longline, pot, and jig), year (1989-2001), and statistical reporting area. The statistical reporting areas for the groundfish fisheries in the U.S. EEZ off Alaska and the U.S. West Coast were redefined and modified between 1989 and 1993 from the original system developed for the International North Pacific Fisheries Commission (INPFC, 1952-1992) to the current management area definitions (Appendix 1). The results from each statistical area were also summarized by the three geographical regions of the U.S. EEZ: 1) the Bering Sea and Aleutian Islands (Fig. 1); 2) the Gulf of Alaska (Fig. 2); and 3) the North Pacific Ocean off the coasts of Washington, Oregon, and California (Fig. 3).

Observer data were combined with fishery data to produce estimates of incidental take as described in the following paragraphs. Ratio estimates (for each subgroup of species, gear type,

statistical area, and year) of total marine mammal incidental take by the groundfish fisheries were derived using two data components: 1) the number of observed marine mammals caught per metric ton (t) of fishing effort monitored by observers onboard at-sea vessels (but not from observers stationed at shoreside processing plants), and 2) the estimated total commercial fishing effort (metric tons).

Total Fishing Effort (Fishery Catch Data)

The only effort data available for the entire fishery (all years, gears, and areas) was estimated total weights (t) of catches. The total fishery catch weights for the joint venture trawl fisheries during 1989-1990 were compiled by Berger et al. (1990) and Guttormsen et al. (1992b). The estimated total weight of fish (retained plus discarded amounts) caught by all vessels in the domestic fishery, including those vessels without observers, and for each calendar week by statistical area were derived from the "Blend" database of the NMFS Alaska Regional Office. The Blend database combines industry and observer data from the following sources: 1) shoreside processor weekly production reports, 2) catcher/processor weekly production reports, and 3) observer reports of total estimated catch. The Blend database summarizes catch by week except for 1989 which was summarized by month. The total weights of groundfish catches in the at-sea trawl fisheries off the coasts of Washington, Oregon, and California were based only on observer reports since 1992.

The total numbers of vessels that fished, days of fishing, hauls or sets deployed, and gear devices (nets, hooks, pots, or jigs) used by all vessels (observed and unobserved vessels) in any particular area during a given week were not available. Table 1 lists vessel observer coverage and effort by fishing days and gear type for observed cruises during 1989-2001 by year and region. Based on data (not presented here) in the NORPAC (observer database maintained by the NPGOP) and Blend databases, approximately 80% of the total groundfish catch by the entire trawl and longline fisheries was taken by observed vessels (28% for pot and 1% for jig vessels). Applying these percentages to the data presented in Table 1 may provide estimates for the total

numbers of days fished or sets deployed in the entire fishery. This assumes constant average proportions of tonnage caught in sets deployed per day by gear type among all vessels; assumptions that are untested.

The locations where trawl sets occurred on observed cruises in the Bering Sea, Aleutian Islands, and Gulf of Alaska are shown for pelagic trawls in Figure 4, non-pelagic trawls in Figure 5, and joint venture trawls in Figure 6. The locations where trawl sets occurred on observed cruises off Washington, Oregon, and California are shown for pelagic trawls in Figure 7, non-pelagic trawls in Figure 8, and joint venture trawls in Figure 9. The locations where longline sets occurred on observed cruises in the Bering Sea, Aleutian Islands, and Gulf of Alaska are shown in Figure 10. The locations where pot sets occurred on observed cruises in the Bering Sea, Aleutian Islands, and Gulf of Alaska are shown in Figure 11.

Two known biases must be considered when using catch tonnage as a measure of fishing effort. First, part of the groundfish catch on longline gear is lost to predation by marine mammals or sharks prior to retrieval, and there is no way to account for the weight of the lost catch from the empty hooks or remaining fish fragments (heads, lips, etc.). Second, the weight of some prohibited species bycatch or miscellaneous catch may be included in NORPAC, but not in the Blend database. The first bias (loss to predation) affects both NORPAC and the Blend databases equally, and thus may be considered negligible. The second bias is also mainly an issue for longline fisheries, for which prohibited fish species bycatch or miscellaneous catch items can sometimes represent up to 18% of the total weight of the longline set. Inclusion of such data in the NORPAC database will produce conservative (lower) estimates of total take compared to the Blend data since the species composition matrix will be different between the two databases for the same vessels. However, exclusion of these prohibited species weights from NORPAC likely would inflate catch rates and estimates. The species composition matrices of the two databases were not modified because there is no reliable method of estimating the weight of excluded prohibited fish bycatch or miscellaneous catch items in the unobserved fishery.

The regional totals of catch weights for the entire fishery presented in the tables in this report vary slightly from totals presented elsewhere because the catch weights were summed by strata to obtain regional totals. The Blend database is a hybrid of industry and observer data, and there is sometimes a discrepancy in catch data reported by statistical area, vessel class, and week between the two databases. It was necessary to account for differences in catch weights between the two data sets when the total groundfish catch weight on observed cruises exceeded that of the reported fishery tonnage in the same stratum. In all cases the NORPAC data were considered the minimum levels for catch (i.e., less than or equal to the expected "Blend" value; the "Blend" values were adjusted to equal the observer data when the former was lower).

Observer Data

AFSC (2001) provides a complete and detailed discussion of all observer duties, record-keeping forms and data codes, and procedures used to record and sample marine mammal bycatch and sightings, in addition to the procedures used by observers to monitor fishing effort and the composition of the groundfish catch. The observer's duties and priorities consist of collecting catch information, estimating total tonnage of groundfish caught, sampling for species composition of fish in the catch and the incidence of prohibited crab and fish species in the catch, collecting biological data on various species, and watching for incidental take of marine mammals and seabirds. The NPGOP Observer Manual (AFSC 2001) states that the first priority of an observer is to record incidental takes and collect specimens of short-tailed albatross (*Phoebastria albatrus*), to record takes of marine mammals, and to collect canine teeth from pinnipeds (except walrus, *Odobenus rosmarus*) and tissue samples from cetaceans. Bycatch of short-tailed albatross and marine mammals take precedence over recording fishing effort and catch. This is a shift in priorities from those assigned to observers on foreign and joint venture vessels in the 1970s and 1980s when marine mammal incidental catch data were secondary and not to interfere with the collection of fishery catch data (Perez and Loughlin 1991). In addition to the collection of pinniped teeth (for identification of species and age estimation) and cetacean

tissue samples (for identification of species and stock structure), observers are also asked to determine sex and length of any marine mammal found dead in the catch and to take photographs of any marine mammal involved in an interaction.

The "unidentified" categories used in this study do not imply the take of mammals from species not listed in Table 2. Rather, in most cases, the unidentified animals can be presumed to belong to one of the identified species of pinnipeds or cetaceans, but positive identification was not possible. This was generally because they were either not seen or examined closely by the observer, or they were in advanced stages of decomposition.

Observers recorded marine mammal interactions with fishing gear and vessels on standardized forms (or, since 1997, electronically through the ATLAS At-Sea Program on vessels equipped for satellite transmission of computer data). Marine mammal data forms for the domestic groundfish fisheries were still in development in 1989, and most observers on domestic vessels used the joint venture fishery marine mammal forms that year. Some improvements to the data collection forms and marine mammal duties of observers have been made since 1990. For example, estimating the proportion of each gear set monitored began in 1992, and groundfish catch predation has been routinely recorded since 1997.

Observers were instructed to randomly pre-select hauls (sets) which they would monitor for incidental take of marine mammals. These randomly selected hauls or sets were used to calculate unbiased bycatch rates and estimates of total takes by the observed and unobserved fraction of the entire fleet of the groundfish fisheries. Observers also recorded interactions with marine mammals in unmonitored hauls on the same vessel whether the observer actually saw the animal involved with the interaction or was subsequently informed of the incident by the crew. However, in most cases the observer did see (and measure) the incidentally caught marine mammal from an unsampled haul, after being informed by the crew of the animal's capture.

Estimated Incidental Take

All observed marine mammals (actually seen and examined by the observer) which were seriously injured, killed by the gear or the vessel propeller, or lethally taken by the crew (none were reported during 1989-2001) during monitored hauls (sets) were included in bycatch rate estimations. The following data were not included in the bycatch estimation procedures used in this study (but their recorded occurrences are listed in Appendices 2 and 3): 1) animals which boarded the vessel or climbed on gear of their own volition, or were caught by the gear and subsequently returned to the sea unharmed or with only minor injuries; 2) carcasses in varying states of decomposition which were caught by the gear but were presumed to have died at some time prior to fishing operations, including dead animals for which the time and cause of death was unknown; 3) reported occurrences of isolated marine mammal parts (e.g., walrus tusks, pieces of baleen, skulls, or bones), miscellaneous unidentifiable fragments (tissue, blubber, or skin), or solitary aborted fetuses.

The seriousness of the injuries or trailing gear was not determined by the observers, nor was it recorded in NORPAC. Angliss and DeMaster (1998) provide guidelines for classifying injuries and/or trailing gear as either a "serious injury" or a "minor injury". A marine mammal observed incidentally taken in a monitored set and also considered a "serious injury" was included in bycatch rate estimations. Comments (edited) recorded by observers on the condition of each of the animals which were injured or had trailing gear are listed in Appendix 4.

Total incidental takes of marine mammals were calculated as ratio estimates on the basis of the number of observed marine mammals incidentally caught per metric ton of groundfish in monitored hauls (sets). Ratio estimates (with tonnage as the effort parameter) were previously applied to the foreign and joint venture trawl fisheries (Perez and Loughlin 1991). They were applied in this study to analyses of marine mammal data from all gear types in the domestic groundfish fisheries for which tonnage was the only available effort statistic.

All observed hauls within each stratum were used to calculate the mean and variance of marine mammal bycatch. A ratio estimate allowed for unequal size hauls, but assumed the observed portion of each haul was an independent sample unit. In fact, each haul was not independent because hauls occurred in groups (cluster samples) for a vessel with a NMFS-certified observer onboard for a series of fishing days (a cruise). For simplicity, the vessel-cruise cluster sampling and the different observer sampling rates for various vessel size classes were ignored in this analysis. Although approximately 70% of the total number of trawl, longline, or pot sets and 54% of jig sets (Table 1) on a given cruise were monitored by an observer for marine mammal interactions, the actual proportion of the groundfish catch within a particular set monitored by an observer varied by gear type and circumstance (e.g., time and priority constraints). By definition, observed trawl hauls were considered monitored for marine mammal interactions in their entirety (100%). However, the percentage of the groundfish catch of longline, pot, and jig sets monitored for marine mammal interactions varied from 0 to 100%. Thus, a smaller percentage of the groundfish catch (tonnage basis) in these fisheries was observed for marine mammal bycatch than for the trawl fishery. The NORPAC database contained estimated weights of the entire groundfish catch (all species combined) in whole sets (official total catch); these weights were adjusted by the percentage of the set monitored for marine mammals to obtain the weight of the observed portion of groundfish catch in the set.

Catch rates and estimates of incidental take for each species (and combined species) of marine mammals were calculated for each 4-week period (minimum stratum level) by year, statistical area, gear type, and vessel class (catcher/processor, mothership/processor, or catcher-only vessel). Each of the 13, 4-week periods per year were defined as four calendar weeks (ending on the same day of the week as the "Blend" database stratum) with partial weeks (at the start or end of the year) included in the first or last period. Bycatch rates and estimated takes were calculated independently for each stratum, and estimates of total bycatch and variance for each stratum were summed (stratified) to calculate rates and estimates for annual and regional totals. The statistical formulae used in this process are listed in the Appendix 5. The

total number of hauls (sets) in the entire fishery was estimated using the proportion of hauls (sets) for observed tonnage (NORPAC) to the total fishery catch tonnage ("Blend") to derive data necessary to estimate parameters in the calculation of standard errors of catch rates.

Rates and variance of incidental take for each stratum were calculated by the simple random sampling ratio estimate (\hat{R}) method, using the sum of the marine mammals observed killed or seriously injured by fishing operations divided by the sum of the observed tonnage of fish catch in monitored hauls. Total estimated bycatch (\hat{Y}_{R_s}) was calculated by the separate ratio estimate method in stratified random sampling (Cochran 1977, Levy and Lemeshow 1999). The fraction of hauls observed in the total fishery is unknown; instead, the percentage of total tonnage sampled was used as an estimate of the fraction of total effort observed. The resulting values are reported as multiples of 10,000 t of fish catch.

Total estimated incidental take of marine mammals was first calculated by multiplying the observed rate of incidental take (per metric ton of fish catch) in each stratum by the total tonnage caught by the entire fishery in the same stratum. Second, the estimated takes of all strata were summed (stratified) to obtain the total bycatch (stratified random sampling ratio estimator, \hat{Y}_{R_s}) by year and area. Third, the calculated stratified random sampling ratio estimator was adjusted (\hat{Y}_A) to include the number of additional marine mammal mortality takes reported by observers which were both 1) unobserved and/or unmonitored, and 2) occurred only in strata which had zero or unknown bycatch (i.e., bycatch reported by observers in strata where marine mammal bycatch was not observed in monitored hauls). This adjustment was necessary to prevent underestimation of annual and regional bycatch when incidental take was known to occur but was missed by the sampling design. Unobserved and/or unmonitored takes from strata which had observed monitored takes were ignored because they comprised a fraction of the estimated bycatch for a stratum. These adjustments were only made on the estimates of the total number of marine mammals taken by the entire fishery; the bycatch rates and confidence intervals presented in this report were calculated using data only from observed marine mammals taken in randomly sampled, monitored sets.

Estimated values of bycatch were rounded to the nearest integer. Upper confidence limits were rounded up to the nearest integer larger than or equal to the calculated value; the lower confidence interval limit values were rounded down to the nearest integer smaller than or equal to the calculated value. Thus, some minor rounding errors occur when adding the tabular integer totals across statistical areas (or combining species). If it is important to know the value of \hat{Y}_{R_s} , rather than \hat{Y}_A , it is easy to determine the value of \hat{Y}_{R_s} (before the adjustment of additional takes was made) directly from the tables by the following procedure: multiply the catch rate (\hat{R} , after dividing by 10,000) times the total groundfish catch (t) to obtain the result (\hat{Y}_{R_s}) which should then be rounded up to the smallest integer larger than or equal to the calculated value.

The ratio estimates and catch rates presented in this report were calculated by summing the ratio estimate results (stratification) from individual subgroups of the data based on gear type, year, statistical area, vessel class, and month (4-week period). Thus, although similar, the values of the ratio estimates and catch rates in this report will be slightly different from those previously presented annually during the last decade in stock assessment reports (e.g., Angliss and Lodge 2002, Carretta et al. 2002), unpublished reports or memoranda where the data were merely aggregated (pooled) and then recalculated by non-stratified ratio estimates in any combination of the data by time, area, or vessel class. In addition, because this report included recently updated information on species identification from teeth specimens and DNA analyses, as well as the inclusion of data from serious injuries, the numbers of observed and estimated incidental takes will also slightly vary from the previously published stock assessment reports. Differences in observer coverage (by tonnage) listed in the tables of this report from Appendix 6 in Angliss and Lodge (2002) are merely the result of the stratification process in summing the updated groundfish catch data in the Blend and NORPAC databases.

RESULTS AND DISCUSSION

Incidental Take

Nineteen species of marine mammals have been observed killed or injured by fishing operations during 1989-2001 (Table 2). Four of these 19 marine mammal species are classified as endangered under the Endangered Species Act: the western population only of the Steller sea lion, the humpback whale (*Megaptera novaeangliae*), the fin whale (*Balaenoptera physalus*), and the sperm whale (*Physeter macrocephalus*).

Steller sea lions often congregate around a vessel to feed from a discard chute, a trawl codend, or a longline as it being retrieved. Vessel crews have deterred sea lions from damaging the groundfish catch (e.g., Pacific cod, *Gadus macrocephalus*; walleye pollock, *Theragra chalcogramma*) and/or gear, or from being caught by the gear using several methods, including noise devices, pole gaffs, or firecrackers (“seal bombs”) to frighten the animals. Acoustical deterrence devices have also been used to prevent other marine mammal species such as killer whales (*Orcinus orca*) and sperm whales, which may feed on groundfish (e.g., Greenland halibut, *Reinhardtius hippoglossoides*; Pacific halibut, *Hippoglossus stenolepis*; sablefish, *Anoplopoma fimbria*) directly from longline gear. Whales feeding directly on hooked groundfish are the most common type of interactions between marine mammals and longline vessels. Six other species of marine mammals have also been infrequently observed involved in these predation or deterrence interactions (Table 2). However, interactions involving predation of the groundfish catch by marine mammals and deterrence of the mammals from the gear by crew members are not considered incidental take, and they will not be discussed in this report. They are referenced here because they are one of the factors involved in the chances that a marine mammal will be incidentally taken by the fishery. Most marine mammal predation and deterrence interactions do not result in incidental takes. The frequency of observed predation interactions by marine mammals on the groundfish catch during 1997-2001 and observed deterrence interactions by the crew is discussed separately by Perez (in prep.^b).

During 1989-2001, a total of 276 marine mammals of the 19 identified species were observed (in monitored sets) killed or seriously injured incidental to commercial fishing operations (trawl, longline, pot, or jig gear) in the U.S. EEZ off Alaska and the U.S. West Coast (Tables 3-7). The locations in Alaska and off the coasts of Washington, Oregon, and California where these species were taken by the domestic and joint venture groundfish fisheries during 1989-2001 are shown in Figures 12-17 as follows: northern fur seals, *Callorhinus ursinus* (Fig. 12); California sea lions *Zalophus californianus* (Fig. 13); Steller sea lions (Figs. 13 and 14); walruses (Fig. 12); bearded seals, *Erignathus barbatus* (Fig. 15); harbor seals, *Phoca vitulina* (Figs. 13 and 15); spotted seals, *Phoca largha* (Fig. 15); ringed seals, *Pusa hispida* (Fig. 15); ribbon seals, *Histiophoca fasciata* (Fig. 15); northern elephant seals, *Mirounga angustirostris* (Figs. 13 and 15); humpback whales (Fig. 16); minke whales, *Balaenoptera acutorostrata* (Fig. 16); fin whales (Fig. 16); sperm whales (Fig. 16); Pacific white-sided dolphins, *Lagenorhynchus obliquidens* (Figs. 13 and 17); killer whales (Fig. 17); harbor porpoises, *Phocoena phocoena* (Fig. 17); Dall's porpoises, *Phocoenoides dalli* (Figs. 13 and 17); and sea otters, *Enhydra lutris* (Fig. 12).

The domestic trawl fisheries in the Bering Sea, the Aleutian Islands region, and the Gulf of Alaska was estimated to have incidentally killed a total of 445 marine mammals during the years from 1989 to 2001: 25 northern fur seals, 176 Steller sea lions, 27 walruses, 18 bearded seals, 27 harbor seals, 6 spotted seals, 20 ringed seals, 4 ribbon seals, 3 northern elephant seals, 3 humpback whales, 2 minke whales, 3 fin whales, 2 Pacific white-sided dolphins, 13 killer whales, 8 harbor porpoises, 82 Dall's porpoises, 15 unidentified pinnipeds, 9 unidentified cetaceans, and 2 unidentified marine mammals (Table 3). The at-sea Pacific whiting trawl fishery off the coasts of Washington, Oregon, and California was estimated to have incidentally caught and killed a total of 44 marine mammals between 1990 and 2001: 5 California sea lions, 5 Steller sea lions, 4 harbor seals, 6 northern elephant seals, 4 Pacific white-sided dolphins, 18 Dall's porpoises, and 2 unidentified pinnipeds (Table 3). During 1989 and 1990, the joint venture trawl fisheries caught and killed an estimated 17 marine mammals in Alaska (2 northern

fur seals; 8 Steller sea lions; 2 walruses; 3 harbor seals; and 2 minke whales) and 14 individuals in the North Pacific Ocean off the coasts of Washington, Oregon, and California (8 Pacific white-sided dolphins, 4 Dall's porpoises, and 2 unidentified cetaceans) (Table 4).

Catch rates and bycatch estimates for pelagic and non-pelagic trawl gears were combined in Table 3 because the blend database does not distinguish between these two gear types prior to 1996. Northern fur seals, Steller sea lions, bearded seals, harbor seals, killer whales, and Dall's porpoises have been observed killed by both types of trawl gear. However, except for the Steller sea lion in the Bering Sea, the numbers of observed mortalities were insufficient in most years to justify illustrating bycatch estimates by type of trawl gear. Catch rates and estimates of Steller sea lion mortalities were greater for non-pelagic trawl gear hauls than for pelagic trawl gear hauls (observer coverage was similar for both trawl gears), although fishing effort (groundfish tonnage caught) using pelagic trawl gear was approximately twice the amount caught with non-pelagic trawl gear (Fig. 18).

Longline gear may have directly killed an estimated total of 154 marine mammals between 1990 and 2001 in Alaska (but this estimate may be high as discussed in the next section below): 66 Steller sea lions, 39 harbor seals, 3 ribbon seals, 15 northern elephant seals, 4 Pacific white-sided dolphins, 4 killer whales, 9 Dall's porpoises, and 14 unidentified pinnipeds (Table 5). Although no sperm whales were reported killed by the groundfish gear, two sperm whales were entangled and considered seriously injured by trailing longline gear (Table 5). An observer saw one unidentified baleen whale that was released with trailing gear after being seriously injured by entanglement in the buoy line of an unmonitored pot set (Table 6); this was the only cetacean reported taken by the pot fishery in Alaska during 1989-2001. The only take by the jig fishery was one Dall's porpoise which was considered to have suffered a serious injury when entangled with trailing gear (Table 7); no marine mammals have been reported directly killed by groundfish jig gear.

Thirteen marine mammals (2 northern fur seals, 7 Steller sea lions, 2 unidentified otariids, 1 walrus, and 1 Dall's porpoise) suffered minor injuries or were entangled in

non-threatening amounts of trailing gear before being released alive to the sea (Appendix 2). Sixteen pinnipeds (4 northern fur seals, 9 Steller sea lions, and 3 unidentified pinnipeds) boarded the vessel of their own volition and 10 other marine mammals (1 northern fur seal, 4 Steller sea lions, 2 walruses, 1 unidentified pinniped, and 2 unidentified dolphin/porpoises) were caught or entangled by the gear but subsequently freed by the crew and returned to the sea; all 26 of these animals apparently were unharmed by the interaction (Appendix 2). A detailed list of all marine mammal bycatch reported by observers onboard groundfish vessels in the U.S. EEZ off Alaska and the U.S. West Coast during 1989-2001 is presented in Appendices 2 and 3.

Only in 1992 were sea otters reported killed by any type of groundfish gear. That year observers saw eight sea otters caught in monitored pot sets that occurred during May to August in locations near the fishing closure zones around Steller sea lion rookeries on Attu Island (observed pot fishing did not occur at the same nearshore locations in subsequent years during the same months). An additional 10 sea otters were estimated killed by the pot fishery that year (Table 6). Seven harbor seals were estimated killed by the pot fishery between 1990 and 2001 (Table 6).

Ratio Estimates

One problem with ratio estimates as applied here, regardless of stratification, is that the level of observer coverage directly influences the catch rate calculations. In strata with low observer coverage, and where marine mammal takes also occurred, the calculated bycatch rates and estimates will tend to be high. Stratification preserves this slight upward bias. This can be seen in Table 5 where the stratified estimated incidental takes of Steller sea lions (Areas 630 and 650) and harbor seals (Area 650) by longline gear are probably overestimates. However, as can be seen in Tables 3-7, there were few such instances. The calculated values were retained in this report because there was no basis to change any value only because it seemed high.

Distribution and abundance of marine mammals vary geographically and temporally in the regions discussed in this study, and the susceptibility of mammals to interactions with fishing

gear vary accordingly. The stratified ratio estimate method was used to partially account for seasonal and spatial variability in the absence of other data related to marine mammal biology. This approach seemed more reasonable than assuming that the bycatch rates for strata representing different areas and seasons in the monitored fishery would also apply to any unmonitored area of Alaska at any time of the year, which has sometimes been done in the past when using a simple ratio estimate approach with aggregated (pooled) data for an entire region or year comprising a single stratum.

The stratified estimates of total bycatch in this study should be conservative because any possible bycatch in strata (by time, area, and vessel class) without any observer coverage was not included. However, should there have been any bycatch in these unobserved strata, it was presumably minimal (unless unusual types of takes occurred in such strata due to different fishing conditions or marine mammal biology, but there is no basis to expect such a scenario). The percentage of the vessel fleet which fished in strata that was unobserved by the NPGOP (all sets in such strata were unmonitored) was generally small, or the amount of fishing that occurred on these unobserved vessels is low. For the combined years (1989-2001), the percentages of the total fishery catch by gear type in these unobserved strata were: 2.0% (domestic trawl), 0.02% (joint venture trawl), 7.8% (longline), 15.0% (pot) and 97.1% (jig). Although the pot and jig gear fisheries were largely unobserved because the vessels generally are too small to accommodate an observer and the fishery is considered to present a low probability of interaction, the fishing effort using these gear types was very low compared to trawl catches. The percentage of the total groundfish catch taken by gear for all years (1989-2001) combined was 88.8% by domestic trawl gear, 3.5% by joint venture trawl gear, 6.5% by longline gear, 1.1% by pot gear, and 0.02% by jig gear. Thus, it seems reasonable to assume that the estimations of marine mammal bycatch using the stratified separate ratio estimate method accounted for the vast majority of expected incidental take by the groundfish fisheries in the U.S. EEZ. off Alaska and the U.S. West Coast.

Marine Mammal Bycatch and Stock Assessment

Stock assessment reports for marine mammals (e.g., Angliss and Lodge 2002, Carretta et al. 2002) base their assessments on the most recent 5 years of information on marine mammal serious injury and mortality. However, the data in Tables 3-7 provide the bycatch rates and estimates on an annual basis. Appendix 6 lists data on the average annual rates and estimates for 1997-2001 which have been based on Tables 3-7 and taken from Perez (in prep^b) and modified by the author to be consistent with marine mammal stock definitions (Angliss and Lodge 2002, Carretta et al. 2002) and the format of Tables 3-7 of the present report. Thus, the data in Appendix 6 lend themselves to being used in stock assessment reports consistent with current practice.

Three endangered marine mammal species were observed killed or seriously injured by gear used in the domestic groundfish fisheries in the 1990s that were not observed killed or injured by the foreign or joint venture fisheries in the 1970s or 1980s: the humpback whale, the fin whale, and the sperm whale. It is possible that any one of these three species may also have been involved in critical bycatch interactions under similar circumstances involving trawl or longline gear in the foreign or joint venture groundfish fisheries prior to the 1990s when monitoring of marine mammal bycatch by observers was less prevalent than in the domestic fishery.

The annual incidental mortality catch rates of Steller sea lions caught by domestic trawl gear in Alaska during 1990-2001 ranged from 0.014 to 0.180 (0.051 ± 0.008 , average annual stratified rate) sea lions per 10,000 t of groundfish catch (Table 3, and Perez in prep.^a). The average annual incidental mortality rate of Steller sea lions in the domestic groundfish fishery in Alaska during 1990-2001 was only 1% of the pooled years' bycatch rate (1.212 ± 0.146) for the joint-venture groundfish fisheries during 1985-1989 (based on data in Table 4, and Perez and Loughlin 1991). The estimated average annual bycatch of Steller sea lions by domestic trawl fisheries in Alaska during 1990-2001 was about 10% of the level of the average annual estimated take (127 sea lions) by the joint venture fisheries in Alaska during 1985-1989 (based on data in

Table 4, and Perez and Loughlin 1991). Closure of fishing areas near sea lion rookeries in the Aleutian Islands and Bering Sea since 1990 is one of the reasons for the decline in incidental mortality rates of Steller sea lions between 1985 and 2001; also, fewer Steller sea lions would be expected to encounter fishing vessels each year due to the continuing decline (5% annual rate, Loughlin and York 2000) of the western stock of the Steller sea lion.

Under the implementation of regulations in Section 118 of the MMPA (50 CFR 229.2), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery (16 U.S.C. 1387 (c)(1)). The categorization of a fishery in the LOF determines whether participants in that fishery may be required to comply with certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements. Owners of vessels or gear engaging in a Category I or II fishery are required to register with NMFS and obtain a marine mammal authorization from NMFS in order to lawfully incidentally take a marine mammal in a commercial fishery. Owners of vessels or gear engaged in a Category III fishery are not required to register with NMFS or obtain a marine mammal authorization. All of the commercial groundfish fisheries discussed in this report were classified as "Category III" fisheries in the LOFs from 1996 to 2002 (60 FR 67063, 28 December 1995; 62 FR 33, 2 January 1997; 63 FR 5748, 4 February 1998; 64 FR 9067, 24 February 1999; 65 FR 24448, 26 April 2000; 66 FR 42780, 15 August 2001; 67 FR 2410, 17 January 2002) because they did not have a sufficiently high level of direct serious injury or mortality to necessitate any management actions via Section 118 of the MMPA. However, the Interim North Pacific Groundfish Observer Program which monitors the groundfish fisheries in Alaska and off the coasts of Washington, Oregon, and California has been extended through 31 December 2007 (67 FR 72595, 6 December 2002).

NMFS has proposed elevating the Bering Sea and Aleutian Islands groundfish trawl fishery to Category II in 2003 based on their Tier 2 analysis (68 FR 1414, 10 January 2003). The total annual incidental mortality and serious injury across all fisheries is greater than or

equal to 10% of the PBR levels for the following stocks: western North Pacific humpback whales, eastern North Pacific resident killer whales, eastern North Pacific transient killer whales, central North Pacific humpback whales, and western U.S. Steller sea lions (68 FR 1414, 10 January 2003). NMFS noted that the Bering Sea and Aleutian Islands trawl fishery could also qualify for elevation to Category I because the total annual mortality and serious injury of the western North Pacific stock of humpback whales in this fishery is 0.4 animals per year, or 57.1% of the PBR level (0.7 animals per year); however, there is insufficient data at present to determine if this level of mortality and serious injury impacts only the western North Pacific stock of humpback whales or also the central North Pacific stock of humpback whales, in which case reclassification to Category I may not be justified (68 FR 1414, 10 January 2003).

ACKNOWLEDGMENTS

This report would not have been possible without the enthusiasm and accomplishments of the 2,630 observers who completed their arduous assignments to monitor the groundfish catch and incidental take of marine mammals onboard 808 vessels of the domestic and joint venture groundfish fisheries during 1989-2001. The staff of the North Pacific Groundfish Observer Program (NPGOP) at the Alaska Fisheries Science Center (AFSC) trained and debriefed the observers, and edited and processed the data for inclusion in the NORPAC database. NPGOP staff including Steve Barbeaux, Jerry Berger, Bob Carlson (deceased), Sheryl Corey, Dan Decker, Steve Hochberg, Kitty MacCauley, Ren Narita, and Karen Teig assisted the author with the retrieval of data which were only found in logbooks or erroneously recorded in NORPAC. Mike Brown, Glen Campbell, Angie Greig, Mike Guttormsen, Terry Hiatt, Dan Holland, and Brad Stenberg (all AFSC), and Mary Furuness of the Alaska Regional Office, NMFS, assisted the author in obtaining the "Blend" data for the domestic fisheries. Jerry Berger provided the "Blend" data for the joint venture fisheries. Species identification of marine mammals was verified by the staff of the National Marine Mammal Laboratory (NMML), AFSC, from

photographs, canine teeth from pinnipeds, and tissue specimens from cetaceans that were occasionally taken by observers. Identification and ageing of canine teeth was coordinated by John Sease and Jim Thomason. Marilyn Dahlheim and Christy Sims coordinated the processing the tissue samples for transmittal to the Southwest Fisheries Science Center which conducted the DNA analysis. AFSC Graphics Unit staff assisted with the preparation of figures. Reviews by Robyn Angliss, Jeff Breiwick, and John Sease were helpful in improving the quality of this paper.

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Table 1.—Total number of vessels ^a, days ^b, and hauls (sets) monitored for marine mammal bycatch by U.S. observers aboard fishing vessels in the domestic and joint venture groundfish fisheries in the U.S. Exclusive Economic Zone off Alaska and the U.S. West Coast during 1989-2001 by gear, region and year. The total numbers of vessels, days and hauls with marine mammal interactions ^c are also listed.

Gear	Vessel coverage		Effort by fishing days		Effort by gear deployment			
	Region Year	Number of fishing vessels with observers	Number of fishing vessels with marine mammal interactions	Number of fishing days monitored by observers	Number of fishing days with marine mammal interactions	Total number of hauls on vessel cruises with observers	Number of hauls monitored by observers	Number of hauls with marine mammal interactions
Trawl gear vessels								
Bering Sea								
	1989	49	9	1,366	6	5,183	3,770	6
	1990	122	41	11,969	43	46,182	28,448	43
	1991	155	42	14,650	56	53,265	31,558	59
	1992	160	49	13,501	80	50,320	32,246	81
	1993	153	38	10,848	46	41,775	28,479	46
	1994	148	33	11,517	39	42,340	28,717	39
	1995	162	39	10,397	32	40,333	27,572	33
	1996	168	36	11,480	32	42,763	28,868	35
	1997	156	33	10,531	51	39,610	25,657	52
	1998	141	34	9,975	66	33,992	23,339	68
	1999	133	35	8,073	49	27,252	20,324	58
	2000	142	37	9,455	64	31,477	23,818	69
	2001	136	32	9,289	48	30,926	23,652	52
Gulf of Alaska								
	1989	20	0	135	0	481	331	0
	1990	122	30	3,022	5	10,988	7,623	5
	1991	161	30	2,815	4	9,473	6,049	4
	1992	151	35	2,681	1	8,762	6,277	1
	1993	117	22	2,329	5	8,083	5,866	5
	1994	106	19	1,796	2	5,889	4,155	2
	1995	152	24	1,956	0	6,042	4,622	0
	1996	141	33	1,985	8	7,149	5,029	8
	1997	127	21	2,030	3	5,943	4,491	3
	1998	132	19	2,092	3	5,582	4,395	3
	1999	116	21	1,720	3	4,539	3,408	3
	2000	83	18	1,548	6	4,209	3,314	6
	2001	86	17	1,586	3	4,064	3,145	3
Alaska (all areas combined)								
	1989	63	9	1,495	6	5,664	4,101	6
	1990	164	41	14,962	48	57,170	36,071	48
	1991	205	42	17,400	60	62,738	37,607	63
	1992	200	49	16,152	81	59,082	38,523	82
	1993	197	40	13,168	51	49,858	34,345	51
	1994	185	34	13,299	41	48,229	32,872	41
	1995	197	39	12,313	32	46,375	32,194	33
	1996	200	40	13,421	40	49,912	33,897	43
	1997	196	35	12,541	54	45,553	30,148	55
	1998	193	34	12,036	69	39,574	27,734	71
	1999	181	36	9,775	52	31,791	23,732	61
	2000	180	39	10,993	70	35,686	27,132	75
	2001	176	33	10,864	51	34,990	26,797	55

Table 1.--Continued.

Gear	Vessel coverage		Effort by fishing days		Effort by gear deployment			
	Region Year	Number of fishing vessels with observers	Number of fishing vessels with marine mammal interactions	Number of fishing days monitored by observers	Number of fishing days with marine mammal interactions	Total number of hauls on vessel cruises with observers	Number of hauls monitored by observers	Number of hauls with marine mammal interactions
Trawl gear vessels (continued)								
Washington, Oregon, and California (at-sea processing Pacific whiting fishery) ^d								
	1989	0	-	0	-	0	-	-
	1990	4	3	36	0	172	97	0
	1991	18	7	797	0	5,011	2,633	0
	1992	26	12	697	2	3,577	2,448	2
	1993	18	9	337	0	1,809	1,122	0
	1994	17	7	494	1	3,746	1,781	1
	1995	17	6	337	1	2,244	1,214	1
	1996	16	6	341	1	2,621	1,675	1
	1997	16	4	366	2	2,862	1,634	2
	1998	13	6	381	5	2,976	2,234	5
	1999	12	6	426	2	3,025	1,849	2
	2000	14	10	475	4	2,463	2,016	4
	2001	12	6	408	1	2,226	2,117	1
Longline gear vessels								
Bering Sea								
	1989	2	0	69	0	178	0	0
	1990	48	10	2,842	9	6,293	5,122	11
	1991	68	6	4,286	6	9,094	5,682	6
	1992	65	10	5,583	8	14,069	10,748	8
	1993	61	14	4,079	32	10,733	8,331	39
	1994	64	12	4,494	19	11,402	8,600	21
	1995	65	16	4,747	21	12,063	8,737	26
	1996	60	12	4,683	17	12,155	8,662	18
	1997	50	39	5,260	149	13,705	9,580	184
	1998	51	38	5,348	222	14,651	10,634	295
	1999	55	42	4,747	227	13,443	9,801	310
	2000	52	42	5,684	408	17,132	12,318	567
	2001	48	36	6,107	164	19,437	12,914	209
Gulf of Alaska								
	1989	1	0	11	0	25	0	0
	1990	80	10	993	6	2,809	2,268	6
	1991	90	1	820	0	2,300	1,648	0
	1992	109	6	1,115	3	3,275	2,608	3
	1993	97	11	1,033	3	3,095	2,415	3
	1994	44	9	412	0	1,203	968	0
	1995	109	12	1,184	7	3,000	2,468	8
	1996	95	8	889	3	2,349	1,863	3
	1997	73	34	705	38	1,830	1,502	60
	1998	76	35	636	47	1,614	1,338	73
	1999	67	38	617	45	1,630	1,354	62
	2000	68	45	718	67	1,936	1,538	105
	2001	63	33	731	41	2,011	1,589	54

Table 1.--Continued.

Gear	Vessel coverage		Effort by fishing days		Effort by gear deployment			
	Region Year	Number of fishing vessels with observers	Number of fishing vessels with marine mammal interactions	Number of fishing days monitored by observers	Number of fishing days with marine mammal interactions	Total number of hauls on vessel cruises with observers	Number of hauls monitored by observers	Number of hauls with marine mammal interactions
Longline gear vessels (continued)								
Alaska (all areas combined)								
	1989	2	0	80	0	203	0	0
	1990	97	13	3,834	15	9,102	7,390	17
	1991	130	6	5,105	6	11,394	7,330	6
	1992	141	11	6,698	11	17,344	13,356	11
	1993	120	16	5,106	35	13,828	10,746	42
	1994	77	12	4,906	19	12,605	9,568	21
	1995	127	20	5,919	28	15,063	11,205	34
	1996	119	14	5,566	20	14,504	10,525	21
	1997	100	53	5,958	187	15,535	11,082	244
	1998	99	53	5,977	269	16,265	11,972	368
	1999	90	52	5,362	272	15,073	11,155	372
	2000	94	66	6,396	475	19,068	13,856	672
	2001	92	53	6,830	205	21,448	14,503	263
Washington, Oregon, and California (no vessels in the at-sea processing Pacific whiting fishery used longline gear during 1989-2001)								
Pot gear vessels								
Bering Sea								
	1989	0	-	0	-	0	-	-
	1990	8	0	198	0	1,145	639	0
	1991	17	1	424	0	1,678	920	0
	1992	41	3	1,282	8	7,019	3,669	8
	1993	14	0	165	0	746	644	0
	1994	30	0	445	0	1,805	1,437	0
	1995	64	3	1,022	1	3,917	3,099	1
	1996	82	1	1,493	0	5,111	3,714	0
	1997	53	2	871	0	2,259	1,775	0
	1998	53	5	580	0	1,201	1,002	0
	1999	89	7	880	1	2,341	1,856	1
	2000	67	3	699	1	1,434	1,152	1
	2001	60	0	745	0	1,654	1,347	0
Gulf of Alaska								
	1989	0	-	0	-	0	-	-
	1990	15	0	194	0	1,336	834	0
	1991	21	0	246	0	1,194	844	0
	1992	42	2	370	0	1,548	1,019	0
	1993	18	0	161	0	596	368	0
	1994	12	0	139	0	565	464	0
	1995	56	2	408	0	1,314	999	0
	1996	46	1	245	0	574	452	0
	1997	28	2	161	0	310	255	0
	1998	31	2	237	1	649	422	1
	1999	47	3	377	1	847	706	1
	2000	46	1	421	0	865	710	0
	2001	22	3	202	0	602	384	0

Table 1.--Continued.

Gear	Vessel coverage		Effort by fishing days		Effort by gear deployment			
	Region Year	Number of fishing vessels with observers	Number of fishing vessels with marine mammal interactions	Number of fishing days monitored by observers	Number of fishing days with marine mammal interactions	Total number of hauls on vessel cruises with observers	Number of hauls monitored by observers	Number of hauls with marine mammal interactions
Pot gear vessels (continued)								
Alaska (all areas combined)								
	1989	0	-	0	-	0	-	-
	1990	19	0	389	0	2,481	1,473	0
	1991	35	1	665	0	2,872	1,764	0
	1992	68	3	1,621	8	8,567	4,688	8
	1993	26	0	318	0	1,342	1,012	0
	1994	36	0	579	0	2,370	1,901	0
	1995	93	4	1,403	1	5,231	4,098	1
	1996	101	2	1,701	0	5,685	4,166	0
	1997	67	4	1,006	0	2,569	2,030	0
	1998	67	6	809	1	1,850	1,424	1
	1999	107	8	1,240	2	3,188	2,562	2
	2000	98	4	1,114	1	2,299	1,862	1
	2001	75	3	940	0	2,256	1,731	0
Washington, Oregon, and California (no vessels in the at-sea processing Pacific whiting fishery used pot gear during 1989-2001)								
Jig gear vessels								
Bering Sea								
	1989	0	-	0	-	0	-	-
	1990	0	-	0	-	0	-	-
	1991	0	-	0	-	0	-	-
	1992	0	-	0	-	0	-	-
	1993	0	-	0	-	0	-	-
	1994	2	0	11	0	15	9	0
	1995	1	1	2	1	2	1	1
	1996	1	0	1	0	1	0	0
	1997	0	-	0	-	0	-	-
	1998	0	-	0	-	0	-	-
	1999	0	-	0	-	0	-	-
	2000	1	0	4	0	5	5	0
	2001	0	-	0	-	0	-	-
Gulf of Alaska								
	1989	0	-	0	-	0	-	-
	1990	0	-	0	-	0	-	-
	1991	0	-	0	-	0	-	-
	1992	1	0	3	0	34	34	0
	1993	0	-	0	-	0	-	-
	1994	0	-	0	-	0	-	-
	1995	0	-	0	-	0	-	-
	1996	0	-	0	-	0	-	-
	1997	0	-	0	-	0	-	-
	1998	1	0	10	0	20	0	0
	1999	0	-	0	-	0	-	-
	2000	0	-	0	-	0	-	-
	2001	1	0	5	0	14	0	0

Table 1.--Continued.

Gear	Region Year	Vessel coverage		Effort by fishing days		Effort by gear deployment		
		Number of fishing vessels with observers	Number of fishing vessels with marine mammal interactions	Number of fishing days monitored by observers	Number of fishing days with marine mammal interactions	Total number of hauls on vessel cruises with observers	Number of hauls monitored by observers	Number of hauls with marine mammal interactions
Jig gear vessels								
Alaska (all areas combined)								
	1989	0	-	0	-	0	-	-
	1990	0	-	0	-	0	-	-
	1991	0	-	0	-	0	-	-
	1992	1	0	3	0	34	34	0
	1993	0	-	0	-	0	-	-
	1994	1	0	11	0	15	9	0
	1995	1	1	2	1	2	1	1
	1996	0	-	1	0	1	0	0
	1997	0	-	0	-	0	-	-
	1998	0	-	10	0	20	0	0
	1999	0	-	0	-	0	-	-
	2000	1	0	4	0	5	5	0
	2001	0	-	5	0	14	0	0
Washington, Oregon and California (no vessels in the at-sea processing Pacific whiting fishery used jig gear during 1989-2001)								
Joint venture trawl gear vessels								
Bering Sea								
	1989	119	14	4,924	17	15,987	9,764	17
	1990	64	5	1,450	5	4,401	2,526	5
Gulf of Alaska								
	1989	2	0	2	0	2	2	0
	1990	0	-	0	-	0	-	-
Alaska (all areas combined)								
	1989	119	14	4,924	17	15,989	9,766	17
	1990	64	5	1,450	5	4,401	2,526	5
Washington, Oregon and California								
	1989	44	1	2,236	1	9,994	7,285	1
	1990	33	3	1,727	4	7,970	5,439	4

^a Vessels with multiple observer cruises or observers during the calendar year were counted only once.

^b Fishing days are the number of calendar days per vessel that set gear to catch groundfish on each day.

^c The marine mammal interactions referred to in this table include any type of interaction (e.g., marine mammals killed or injured by fishing operations; animals boarding vessels of their own volition or entangled in the gear and subsequently released unharmed; catch of decomposed carcasses or body parts; marine mammal predation on the groundfish catch; deterrence of animals from the catch by the crew).

^d Observers were placed on 100% of the fishing vessels in the at-sea processing Pacific whiting fishery.

Table 2.—List of marine mammal species that interacted with any type of fishing gear or vessel operations in the domestic and joint venture groundfish fisheries in the U.S. Exclusive Economic Zone off Alaska and the U.S. West Coast during 1989-2001. The common types of interactions reported by observers are summarized for each species.

Marine mammal interactions with groundfish fisheries					
Marine mammal species	Killed by fishing operations or serious injuries ^a	Released from gear unharmed or minor injuries ^b	Decomposed carcasses or body parts in gear ^c	Predation on groundfish catch ^d	Deterrence from groundfish catch by crew ^{e,f}
Northern fur seal (<i>Callorhinus ursinus</i>)	Yes	Yes	Yes	Yes	Yes
California sea lion (<i>Zalophus californianus</i>)	Yes	No	No	No	No
Steller sea lion (<i>Eumetopias jubatus</i>)	Yes	Yes	Yes	Yes	Yes
Unidentified otariids ^g	Yes	Yes	Yes	Yes	No
Walrus (<i>Odobenus rosmarus</i>)	Yes	Yes	Yes	No	No
Bearded seal (<i>Erignathus barbatus</i>)	Yes	No	Yes	No	No
Harbor seal (<i>Phoca vitulina</i>)	Yes	No	Yes	Yes	No
Spotted seal (<i>Phoca largha</i>)	Yes	No	Yes	No	No
Ringed seal (<i>Pusa hispida</i>)	Yes	No	Yes	No	No
Ribbon seal (<i>Histiophoca fasciata</i>)	Yes	No	No	No	No
Northern elephant seal (<i>Mirounga angustirostris</i>)	Yes	No	No	Yes	Yes
Unidentified phocids ^g	Yes	No	Yes	No	No
Unidentified pinnipeds ^g	Yes	Yes	Yes	Yes	Yes
Gray whale (<i>Eschrichtius robustus</i>)	No	No	Yes	No	No
Humpback whale (<i>Megaptera novaeangliae</i>)	Yes	No	Yes	Yes	No
Minke whale (<i>Balaenoptera acutorostrata</i>)	Yes	No	Yes	Maybe ^h	No
Fin whale (<i>Balaenoptera physalus</i>)	Yes	No	No	Yes	No
Unidentified baleen whales ^g	Yes	No	Yes	Maybe ⁱ	No
Sperm whale (<i>Physeter macrocephalus</i>)	Yes ^j	No	No	Yes	Yes
Bering Sea beaked whale (<i>Mesoplodon stejnegeri</i>)	No	No	Maybe ^k	No	No
Beluga whale (<i>Delphinapterus leucas</i>)	No	No	Yes	No	No
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>)	Yes	No	No	No	No
Killer whale (<i>Orcinus orca</i>)	Yes	No	Yes	Yes	Yes
Harbor porpoise (<i>Phocoena phocoena</i>)	Yes	No	Yes	No	No
Dall's porpoise (<i>Phocoenoides dalli</i>)	Yes	Yes	Yes	Yes	Yes
Unidentified dolphins/porpoises ^g	Yes	Yes	Yes	Yes	No
Unidentified whales ^g	Yes	No	Yes	Yes	No
Unidentified cetaceans ^{g,1}	Yes	No	Yes	Yes	No
Sea otter (<i>Enhydra lutris</i>)	Yes	No	Yes	No	No

Table 2.--Continued.

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- ^a Includes any type of incidental take that resulted in mortality including gear entanglement, propeller strikes, and serious injuries resulting from wounds or trailing gear (including broken longline hooks stuck in the mouth).
- ^b Includes any type of incidental take that did not impair the survivability of the animal in which the marine mammal was either caught by the gear or boarded the vessel and was subsequently released alive by the crew.
- ^c Includes any type of incidental take of carcasses or miscellaneous body parts from animals that were known to have died previous to gear deployment or were not confirmed to have been killed by the gear or fishing operations.
- ^d Includes any type of predation interaction of the marine mammal on the groundfish catch (not discards); these interactions (which are not classified as incidental takes) are not discussed in this paper. Observers did not routinely record these types of interactions before 1996.
- ^e Includes any method of deterrence, with or without devices, actively used by the crew to prevent the animal from interacting with the gear; these interactions (which are not classified as incidental takes) are not discussed in this paper.
- ^f Although amendments in 1994 to the MMPA allowed for prohibition of the use by fisheries of deterrence of marine mammals, the same types of deterrence methods were used every year during 1989-2001 in the domestic groundfish fisheries in Alaska, especially in the longline fishery directed at killer whales, sperm whales, and Steller sea lions.
- ^g Includes animals from any of the identified marine mammal species.
- ^h There was one interaction where a minke whale was observed near the trawl net as it was retrieved, but the observer could not confirm that the groundfish were eaten from the catch.
- ⁱ There was one interaction where an unidentified large whale, possibly a baleen whale, was observed feeding on the groundfish catch from the trawl net as it was retrieved..
- ^j No sperm whales were reported killed directly by the gear or during fishing operations; however, two sperm whales with trailing longline gear were considered serious injuries.
- ^k Beaked whale skulls were caught on two occasion in the trawl gear, and these skulls may have been from Bering Sea beaked whales.
- ^l Unidentifiable carcasses in very advanced stages of decomposition or miscellaneous cetacean bones without flesh found isolated in the groundfish catch may have come from any cetacean species that occurs in the area, including species not listed in this table. For example, one decomposed Risso's dolphin (*Grampus griseus*) was caught by trawl gear in the foreign and joint venture groundfish fisheries in the Bering Sea and Aleutian Islands during 1973-1988 (Perez and Loughlin 1991).

Table 3.--Number of marine mammals, by species, incidentally caught by trawl vessels of the domestic groundfish fishery in the U.S. Exclusive Economic Zone in the Bering Sea, Gulf of Alaska and off Washington, Oregon, and California, 1989-2001, reported by U.S. fishery observers, including an estimation of the total incidental mortality by area and year. Catch rates are the ratio (\hat{R}) and standard error ($s(\hat{R})$) of the observed incidental take of marine mammals killed (or seriously injured) monitored during fishing operations to the observed groundfish catch (per 10,000 metric tons [t] basis). The coefficient of variation (CV) of the catch rate is also listed. Estimated mortality of marine mammals as bycatch is the adjusted ratio estimate (\hat{Y}_A) and its 95% confidence interval ($L_{95\%}$).

Species Area Year	Groundfish			Number of marine mammals monitored in hauls	Marine mammals					
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)		Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Northern fur seal (<i>Callorhinus ursinus</i>)										
Area 513										
1991	131,327.6	52.1	2,708	1	0.0960	0.0436	0.4539	1	1 to 3	a
1992	146,316.9	60.8	3,955	1	0.1068	0.0642	0.6010	2	1 to 4	b
1993	138,851.7	65.6	4,175	0	-	-	-	1	-	c
1996	320,830.4	61.1	4,968	1	0.0548	0.0361	0.6575	3	1 to 5	b,c
2000	172,982.1	75.0	3,909	0	-	-	-	1	-	c
2001	228,946.9	83.5	4,488	1	0.0606	0.0320	0.5286	1	1 to 3	b
Area 514										
1991	129,649.9	56.2	4,259	1	0.2155	0.1726	0.8012	3	1 to 8	b
1992	120,409.9	62.7	4,657	1	0.1276	0.0754	0.5908	2	1 to 4	b
1994	28,870.1	50.3	895	2	1.4108	0.7129	0.5053	4	2 to 9	a
Area 517										
1998	476,976.8	64.3	7,062	1	0.0732	0.0628	0.8571	3	1 to 10	b
Area 519										
1991	144,663.4	46.1	1,711	1	0.1605	0.1215	0.7569	2	1 to 6	b
Area 521										
1994	192,038.4	60.9	2,452	0	-	-	-	1	-	c
Area 540										
1992	132,528.2	75.4	3,441	1	0.1008	0.0505	0.5015	1	1 to 3	a
Bering Sea (all areas combined)										
1991	2,079,538.3	51.9	31,558	3	0.0307	0.0140	0.4553	6	3 to 13	a
1992	1,939,721.3	61.1	32,246	3	0.0229	0.0076	0.3310	5	3 to 8	a
1993	1,843,180.1	64.0	28,479	0	-	-	-	1	-	c
1994	1,873,140.4	63.9	28,717	2	0.0217	0.0110	0.5053	5	2 to 9	a,c
1996	1,753,240.7	64.2	28,868	1	0.0100	0.0066	0.6575	3	1 to 5	b,c
1998	1,504,106.7	65.7	23,339	1	0.0232	0.0199	0.8571	3	1 to 10	b
2000	1,501,472.6	74.3	23,818	0	-	-	-	1	-	c
2001	1,693,350.6	76.6	23,652	1	0.0082	0.0043	0.5286	1	1 to 3	b

Table 3.--Continued.

Species Area Year	Groundfish			Number of marine mammals monitored in hauls	Marine mammals					
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)		Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Northern fur seal (<i>Callorhinus ursinus</i>) (continued)										
Alaska (all areas combined)										
1991	2,303,244.6	50.7	37,607	3	0.0277	0.0126	0.4553	6	3 to 13	a
1992	2,171,839.7	58.8	38,523	3	0.0204	0.0068	0.3310	5	3 to 8	a
1993	2,058,671.8	61.3	34,345	0	-	-	-	1	-	c
1994	2,071,375.7	61.0	32,872	2	0.0197	0.0099	0.5053	5	2 to 9	a,c
1996	1,917,979.1	61.8	33,897	1	0.0092	0.0060	0.6575	3	1 to 5	b,c
1998	1,715,831.4	62.1	27,734	1	0.0204	0.0175	0.8571	3	1 to 10	b
2000	1,661,213.8	70.1	27,132	0	-	-	-	1	-	c
2001	1,845,796.4	72.5	26,797	1	0.0075	0.0040	0.5286	1	1 to 3	b
California sea lion (<i>Zalophus californianus</i>)										
Area 670										
1998	59,909.3	78.1	1,113	1	0.2388	0.1307	0.5473	1	1 to 3	b
1999	91,419.1	66.1	1,221	0	-	-	-	1	-	c
Area 710										
1994	135,615.8	52.0	1,328	1	0.1774	0.1356	0.7641	2	1 to 7	b
1999	52,429.3	72.8	628	1	0.2157	0.0734	0.3404	1	1 to 2	a
Washington, Oregon, and California (all areas combined)										
1994	181,236.6	53.4	1,781	1	0.1328	0.1014	0.7641	2	1 to 7	b
1998	147,395.7	77.3	2,234	1	0.0971	0.0531	0.5473	1	1 to 3	b
1999	143,848.4	68.6	1,849	1	0.0786	0.0268	0.3404	2	1 to 2	a,c,d
Steller sea lion (<i>Eumetopias jubatus</i>)										
Area 509										
1994	514,168.5	66.0	7,910	2	0.0548	0.0208	0.3794	3	2 to 5	a
1998	516,185.8	64.8	7,480	1	0.0260	0.0131	0.5053	1	1 to 3	a
1999	275,106.0	68.8	4,416	1	0.0550	0.0321	0.5833	2	1 to 4	b
2000	374,475.6	68.6	6,140	1	0.0308	0.0112	0.3633	2	1 to 2	a,c,d
2001	249,741.8	64.7	4,429	3	0.1719	0.0578	0.3360	4	3 to 8	a
Area 510										
1989	895,871.1	9.7	2,682	2	0.2058	0.1564	0.7599	18	2 to 46	b
Area 513										
1992	146,316.9	60.8	3,955	4	0.4158	0.1217	0.2927	7	4 to 10	a,c
1994	294,050.6	68.6	6,176	4	0.1961	0.0545	0.2781	6	4 to 9	a
1996	320,830.4	61.1	4,968	0	-	-	-	1	-	c
1997	201,887.3	59.7	4,962	1	0.0811	0.0506	0.6232	3	1 to 4	b,c
1998	144,833.4	65.6	3,244	0	-	-	-	2	-	c
2000	172,982.1	75.0	3,909	2	0.1359	0.0370	0.2721	2	2 to 4	a
2001	228,946.9	83.5	4,488	3	0.1888	0.0620	0.3284	4	3 to 8	a

Table 3.--Continued.

Species Area Year	Groundfish			Number of marine mammals monitored in hauls	Marine mammals					
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)		Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Steller sea lion (<i>Eumetopias jubatus</i>) (continued)										
Area 514										
1990	18,132.1	64.5	736	2	1.8506	0.8158	0.4408	3	2 to 7	a
1991	129,649.9	56.2	4,259	1	0.1326	0.0858	0.6471	4	1 to 4	b,c
1992	120,409.9	62.7	4,657	8	0.9009	0.1774	0.1969	12	8 to 16	a,c
1993	72,109.3	67.3	2,479	2	0.4014	0.1579	0.3933	3	2 to 6	a
1994	28,870.1	50.3	895	0	-	-	-	2	-	c
1996	55,206.7	58.8	1,288	1	0.2925	0.1809	0.6182	3	1 to 4	b,c
1997	66,131.5	68.0	1,768	4	0.8766	0.2436	0.2779	6	4 to 9	a
2000	10,501.8	79.2	380	0	-	-	-	1	-	c
Area 515										
1990	375,928.6	44.6	3,473	4	0.1386	0.0668	0.4815	5	4 to 11	a
Area 516										
1990	13,294.5	43.7	341	0	-	-	-	1	-	c
Area 517										
1992	524,466.6	63.2	6,476	1	0.0283	0.0162	0.5726	1	1 to 4	b
1993	766,492.1	63.8	7,627	2	0.0414	0.0251	0.6078	3	2 to 7	b
1998	476,976.8	64.3	7,062	1	0.0257	0.0111	0.4305	1	1 to 3	a
1999	518,061.4	71.0	6,984	1	0.0228	0.0090	0.3928	1	1 to 3	a
2000	501,934.8	71.0	7,048	1	0.0288	0.0160	0.5549	1	1 to 4	b
Area 519										
1991	144,663.4	46.1	1,711	1	0.1605	0.1215	0.7569	2	1 to 6	b
1995	86,880.2	58.3	941	1	0.1436	0.0640	0.4454	1	1 to 3	a
Area 521										
1990	900,127.6	58.4	8,766	1	0.0177	0.0108	0.6108	3	1 to 4	b,c
1991	589,622.8	54.9	8,043	3	0.0879	0.0332	0.3779	6	3 to 10	a,c
1999	216,928.0	84.0	2,657	1	0.0493	0.0125	0.2535	2	1 to 2	a,e
2001	415,833.2	86.5	5,014	0	-	-	-	1	-	c
Area 524										
2000	9,474.8	70.3	222	1	1.3093	0.5706	0.4358	1	1 to 3	a
Area 540										
1989	35,253.5	6.2	177	3	1.4163	0.8793	0.6208	5	3 to 12	b
1990	151,619.1	69.1	3,925	3	0.2549	0.0727	0.2853	5	3 to 7	a,c
1991	137,337.9	63.0	1,881	6	0.7124	0.1810	0.2541	10	6 to 15	a
Area 541										
1999	35,513.8	79.0	788	1	0.3344	0.1329	0.3973	1	1 to 3	a
Area 542										
1994	53,100.7	48.0	739	1	0.4070	0.2979	0.7320	2	1 to 6	b
1995	100,157.2	71.4	1,392	1	0.1515	0.0886	0.5848	2	1 to 4	b
1996	63,953.5	65.3	935	1	0.2606	0.1651	0.6338	2	1 to 4	b
1998	33,783.6	69.1	500	3	1.3048	0.5445	0.4173	4	3 to 9	a

Table 3.--Continued.

Species Area Year	Groundfish			Number of marine mammals monitored in hauls	Marine mammals					
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)		Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Steller sea lion (<i>Eumetopias jubatus</i>) (continued)										
Area 542 (continued)										
1999	29,662.1	79.2	500	1	0.4902	0.2767	0.5644	1	1 to 4	b
2000	32,740.1	83.4	743	1	0.3342	0.0983	0.2942	1	1 to 2	a
2001	43,701.6	82.8	715	1	0.2816	0.1221	0.4335	1	1 to 3	a
Area 543										
1997	40,816.1	77.2	697	1	0.3232	0.1592	0.4925	3	1 to 3	a,e
1999	28,423.7	83.9	559	2	0.8938	0.2936	0.3285	3	2 to 5	a
Bering Sea (all areas combined)										
1989	1,169,294.0	12.2	3,770	5	0.2004	0.1227	0.6125	23	5 to 52	b
1990	2,172,601.4	58.0	28,448	10	0.0646	0.0150	0.2327	17	10 to 21	a,c
1991	2,079,538.3	51.9	31,558	11	0.0914	0.0182	0.1992	22	11 to 27	a,c
1992	1,939,721.3	61.1	32,246	13	0.0949	0.0150	0.1579	20	13 to 25	a,c
1993	1,843,180.1	64.0	28,479	4	0.0329	0.0121	0.3690	6	4 to 11	a
1994	1,873,140.4	63.9	28,717	7	0.0574	0.0133	0.2321	13	7 to 16	a,c
1995	1,819,353.3	65.8	27,572	2	0.0152	0.0058	0.3787	3	2 to 5	a
1996	1,753,240.7	64.2	28,868	2	0.0187	0.0083	0.4429	6	2 to 7	a,c
1997	1,703,642.9	62.1	25,657	6	0.0514	0.0118	0.2302	12	6 to 13	a,c,e
1998	1,504,106.7	65.7	23,339	5	0.0464	0.0135	0.2910	9	5 to 11	a,c
1999	1,321,918.0	73.6	20,324	7	0.0677	0.0123	0.1823	10	7 to 13	a,e
2000	1,501,472.6	74.3	23,818	6	0.0485	0.0085	0.1750	9	6 to 10	a,c
2001	1,693,350.6	76.6	23,652	7	0.0581	0.0124	0.2125	11	7 to 14	a,c
Area 610										
1990	53,651.4	47.2	1,668	1	0.2375	0.1830	0.7703	1	1 to 4	b
1998	50,719.0	35.1	547	1	0.3125	0.1911	0.6116	2	1 to 4	b
2001	47,613.9	19.0	423	1	1.1439	0.9917	0.8670	5	1 to 15	b
Area 620										
1990	32,212.2	60.3	1,910	1	0.5216	0.3330	0.6385	2	1 to 4	b
Area 630										
1993	123,497.0	36.5	3,584	1	0.1331	0.0839	0.6300	2	1 to 4	b
1994	103,961.9	33.0	2,400	1	0.3116	0.2581	0.8284	3	1 to 9	b
Gulf of Alaska (all areas combined)										
1990	217,901.8	44.6	7,623	2	0.1356	0.0667	0.4922	3	2 to 6	a
1993	215,491.7	38.5	5,866	1	0.0763	0.0481	0.6300	2	1 to 4	b
1994	198,235.3	33.1	4,155	1	0.1634	0.1354	0.8284	3	1 to 9	b
1998	211,724.6	36.0	4,395	1	0.0749	0.0458	0.6116	2	1 to 4	b
2001	152,445.8	27.4	3,145	1	0.3573	0.3098	0.8670	5	1 to 15	b
Alaska (all areas combined)										
1989	1,304,574.7	11.5	4,101	5	0.1796	0.1100	0.6125	23	5 to 52	b
1990	2,390,503.2	56.8	36,071	12	0.0710	0.0149	0.2104	20	12 to 24	a,c
1991	2,303,244.6	50.7	37,607	11	0.0825	0.0164	0.1992	22	11 to 27	a,c
1992	2,171,839.7	58.8	38,523	13	0.0848	0.0134	0.1579	20	13 to 25	a,c
1993	2,058,671.8	61.3	34,345	5	0.0375	0.0120	0.3199	8	5 to 13	a

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Steller sea lion (<i>Eumetopias jubatus</i>) (continued)										
Alaska (all areas combined) (continued)										
1994	2,071,375.7	61.0	32,872	8	0.0675	0.0177	0.2620	16	8 to 22	a,c
1995	1,988,746.8	63.9	32,194	2	0.0139	0.0053	0.3787	3	2 to 5	a
1996	1,917,979.1	61.8	33,897	2	0.0171	0.0076	0.4429	6	2 to 7	a,c
1997	1,901,588.1	58.9	30,148	6	0.0460	0.0106	0.2302	12	6 to 13	a,c,e
1998	1,715,831.4	62.1	27,734	6	0.0499	0.0131	0.2628	11	6 to 13	a,c
1999	1,506,099.6	68.5	23,732	7	0.0594	0.0108	0.1823	10	7 to 13	a,e
2000	1,661,213.8	70.1	27,132	6	0.0439	0.0077	0.1750	9	6 to 10	a,c
2001	1,845,796.4	72.5	26,797	8	0.0829	0.0280	0.3377	16	8 to 26	a,c
Area 710										
1994	135,615.8	52.0	1,328	0	-	-	-	1	-	c
1997	84,433.4	76.1	1,019	0	-	-	-	1	-	c
2000	71,494.9	80.4	1,085	0	-	-	-	1	-	c
Area 720										
1997	5,635.0	42.4	44	0	-	-	-	1	-	c
2001	8,944.5	91.0	161	1	1.1180	0	0	1	-	a
Washington, Oregon, and California (all areas combined)										
1994	181,236.6	53.4	1,781	0	-	-	-	1	-	c
1997	147,390.4	65.7	1,634	0	-	-	-	2	-	c
2000	122,560.7	80.6	2,016	0	-	-	-	1	-	c
2001	102,129.0	96.2	2,117	1	0.0979	0	0	1	-	a
Walrus (<i>Odobenus rosmarus</i>)										
Area 509										
1997	482,772.6	58.0	6,866	1	0.0332	0.0204	0.6152	2	1 to 4	b
Area 513										
1995	215,418.1	68.0	5,213	0	-	-	-	1	-	c
1998	144,833.4	65.6	3,244	0	-	-	-	1	-	c
2000	172,982.1	75.0	3,909	0	-	-	-	2	-	c
Area 514										
1991	129,649.9	56.2	4,259	3	0.3419	0.1178	0.3445	5	3 to 8	a,c
1992	120,409.9	62.7	4,657	4	0.4789	0.1333	0.2782	6	4 to 9	a
1993	72,109.3	67.3	2,479	2	0.4014	0.1579	0.3933	4	2 to 6	a,e
1994	28,870.1	50.3	895	0	-	-	-	1	-	c
1995	32,063.5	63.3	1,002	0	-	-	-	1	-	c
Area 517										
1997	426,600.2	63.7	6,247	1	0.0354	0.0205	0.5791	2	1 to 4	b
Area 521										
1991	589,622.8	54.9	8,043	1	0.0260	0.0153	0.5893	2	1 to 4	b

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Walrus (<i>Odobenus rosmarus</i>) (continued)											
Bering Sea (all areas combined)											
	1991	2,079,538.3	51.9	31,558	4	0.0287	0.0085	0.2974	7	4 to 10	a,c
	1992	1,939,721.3	61.1	32,246	4	0.0297	0.0083	0.2782	6	4 to 9	a
	1993	1,843,180.1	64.0	28,479	2	0.0157	0.0062	0.3933	4	2 to 6	a,e
	1994	1,873,140.4	63.9	28,717	0	-	-	-	1	-	c
	1995	1,819,353.3	65.8	27,572	0	-	-	-	2	-	c
	1997	1,703,642.9	62.1	25,657	2	0.0183	0.0077	0.4234	4	2 to 6	a
	1998	1,504,106.7	65.7	23,339	0	-	-	-	1	-	c
	2000	1,501,472.6	74.3	23,818	0	-	-	-	2	-	c
Bearded seal (<i>Erignathus barbatus</i>)											
Area 509											
	1999	275,106.0	68.8	4,416	0	-	-	-	1	-	c
	2001	249,741.8	64.7	4,429	1	0.0696	0.0454	0.6513	2	1 to 4	b
Area 513											
	1991	131,327.6	52.1	2,708	1	0.1552	0.1111	0.7154	2	1 to 5	b
	1994	294,050.6	68.6	6,176	1	0.0508	0.0292	0.5747	2	1 to 4	b,c
	1998	144,833.4	65.6	3,244	1	0.1026	0.0586	0.5709	1	1 to 4	b
	1999	170,833.2	73.3	3,158	1	0.0970	0.0612	0.6309	2	1 to 4	b
	2000	172,982.1	75.0	3,909	1	0.0925	0.0566	0.6119	2	1 to 4	b
Area 514											
	1991	129,649.9	56.2	4,259	1	0.1214	0.0732	0.6027	2	1 to 4	b
Area 517											
	1991	396,528.4	43.3	5,880	1	0.0364	0.0202	0.5538	1	1 to 4	b
Area 521											
	1994	192,038.4	60.9	2,452	0	-	-	-	2	-	c
	1995	59,844.6	63.7	799	0	-	-	-	1	-	c
Bering Sea (all areas combined)											
	1991	2,079,538.3	51.9	31,558	3	0.0243	0.0092	0.3787	5	3 to 9	a
	1994	1,873,140.4	63.9	28,717	1	0.0080	0.0046	0.5747	4	1 to 4	b,e,d
	1995	1,819,353.3	65.8	27,572	0	-	-	-	1	-	c
	1998	1,504,106.7	65.7	23,339	1	0.0099	0.0056	0.5709	1	1 to 4	b
	1999	1,321,918.0	73.6	20,324	1	0.0125	0.0079	0.6309	3	1 to 4	b,c
	2000	1,501,472.6	74.3	23,818	1	0.0107	0.0065	0.6119	2	1 to 4	b
	2001	1,693,350.6	76.6	23,652	1	0.0103	0.0067	0.6513	2	1 to 4	b
Harbor seal (<i>Phoca vitulina</i>)											
Area 509											
	1994	514,168.5	66.0	7,910	2	0.0653	0.0296	0.4537	3	2 to 7	a
	1996	508,895.5	61.0	9,801	1	0.0351	0.0233	0.6631	2	1 to 5	b
	1997	482,772.6	58.0	6,866	1	0.0366	0.0241	0.6593	2	1 to 5	b

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals							
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)			
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$		
Harbor seal (<i>Phoca vitulina</i>) (continued)											
Area 513											
1992	146,316.9	60.8	3,955	1	0.1206	0.0793	0.6581	2	1 to 5	b	
1996	320,830.4	61.1	4,968	1	0.0472	0.0275	0.5838	2	1 to 4	b	
Area 514											
1992	120,409.9	62.7	4,657	1	0.1335	0.0818	0.6128	2	1 to 4	b	
Area 515											
1990	375,928.6	44.6	3,473	0	-	-	-	1	-	c	
Area 517											
1990	303,749.0	67.8	5,370	1	0.0484	0.0275	0.5673	1	1 to 4	b	
1994	580,767.3	63.4	7,119	1	0.0241	0.0129	0.5355	1	1 to 3	b	
Area 521											
1999	216,928.0	84.0	2,657	1	0.0846	0.0570	0.6743	2	1 to 5	b	
Area 524											
2000	9,474.8	70.3	222	1	1.4003	0.7009	0.5005	1	1 to 3	a	
Bering Sea (all areas combined)											
1990	2,172,601.4	58.0	28,448	1	0.0068	0.0038	0.5673	2	1 to 4	b,c	
1992	1,939,721.3	61.1	32,246	2	0.0174	0.0079	0.4516	4	2 to 7	a	
1994	1,873,140.4	63.9	28,717	3	0.0254	0.0091	0.3568	5	3 to 9	a	
1996	1,753,240.7	64.2	28,868	2	0.0188	0.0084	0.4478	4	2 to 7	a	
1997	1,703,642.9	62.1	25,657	1	0.0104	0.0068	0.6593	2	1 to 5	b	
1999	1,321,918.0	73.6	20,324	1	0.0139	0.0094	0.6743	2	1 to 5	b	
2000	1,501,472.6	74.3	23,818	1	0.0088	0.0044	0.5005	1	1 to 3	a	
Area 610											
1991	90,029.0	41.0	1,913	1	0.3034	0.2422	0.7981	3	1 to 8	b	
Area 620											
1992	40,291.7	36.3	965	1	0.8771	0.7446	0.8490	4	1 to 10	b	
Gulf of Alaska (all areas combined)											
1991	223,706.3	39.5	6,049	1	0.1221	0.0975	0.7981	3	1 to 8	b	
1992	232,118.4	40.1	6,277	1	0.1522	0.1293	0.8490	4	1 to 10	b	
Alaska (all areas combined)											
1990	2,390,503.2	56.8	36,071	1	0.0062	0.0035	0.5673	2	1 to 4	b,c	
1991	2,303,244.6	50.7	37,607	1	0.0119	0.0095	0.7981	3	1 to 8	b	
1992	2,171,839.7	58.8	38,523	3	0.0318	0.0155	0.4872	8	3 to 14	a	
1994	2,071,375.7	61.0	32,872	3	0.0230	0.0082	0.3568	5	3 to 9	a	
1996	1,917,979.1	61.8	33,897	2	0.0172	0.0077	0.4478	4	2 to 7	a	
1997	1,901,588.1	58.9	30,148	1	0.0093	0.0061	0.6593	2	1 to 5	b	
1999	1,506,099.6	68.5	23,732	1	0.0122	0.0082	0.6743	2	1 to 5	b	
2000	1,661,213.8	70.1	27,132	1	0.0080	0.0040	0.5005	1	1 to 3	a	

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Harbor seal (<i>Phoca vitulina</i>) (continued)											
Area 670											
1996	61,619.3	74.1	1,000	0	-	-	-	1	-	c	
2000	50,754.0	80.8	922	1	0.1970	0.0002	0.0009	1	1 to 2	a	
Area 710											
2000	71,494.9	80.4	1,085	1	0.1643	0.0636	0.3872	1	1 to 3	a	
Area 720											
1997	5,635.0	42.4	44	0	-	-	-	1	-	c	
Washington, Oregon, and California (all areas combined)											
1996	129,920.8	65.2	1,675	0	-	-	-	1	-	c	
1997	147,390.4	65.7	1,634	0	-	-	-	1	-	c	
2000	122,560.7	80.6	2,016	2	0.1774	0.0371	0.2091	2	2 to 4	a	
Spotted seal (<i>Phoca largha</i>)											
Area 509											
1997	482,772.6	58.0	6,866	1	0.0254	0.0109	0.4302	1	1 to 3	a	
Area 513											
1996	320,830.4	61.1	4,968	1	0.0544	0.0356	0.6538	2	1 to 4	b	
Area 514											
1996	55,206.7	58.8	1,288	2	0.5898	0.2593	0.4397	3	2 to 7	a	
Bering Sea (all areas combined)											
1996	1,753,240.7	64.2	28,868	3	0.0285	0.0104	0.3660	5	3 to 9	a	
1997	1,703,642.9	62.1	25,657	1	0.0072	0.0031	0.4302	1	1 to 3	a	
Ringed seal (<i>Pusa hispida</i>)											
Area 510											
1989	895,871.1	9.7	2,682	1	0.1566	0.1516	0.9683	14	1 to 41	b	
Area 514											
1992	120,409.9	62.7	4,657	1	0.1290	0.0770	0.5974	2	1 to 4	b	
Area 517											
2000	501,934.8	71.0	7,048	1	0.0288	0.0160	0.5548	1	1 to 4	b	
Area 521											
1996	51,494.9	79.3	843	1	0.2845	0.1592	0.5598	1	1 to 4	b	
2001	415,833.2	86.5	5,014	2	0.0505	0.0078	0.1552	2	2 to 3	a	

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A		$L_{95\%}$
Ringed seal (<i>Pusa hispida</i>) (continued)											
Bering Sea (all areas combined)											
	1989	1,169,294.0	12.2	3,770	1	0.1200	0.1162	0.9683	14	1 to 41	b
	1992	1,939,721.3	61.1	32,246	1	0.0080	0.0048	0.5974	2	1 to 4	a
	1996	1,753,240.7	64.2	28,868	1	0.0084	0.0047	0.5598	1	1 to 4	b
	2000	1,501,472.6	74.3	23,818	1	0.0096	0.0053	0.5548	1	1 to 4	b
	2001	1,693,350.6	76.6	23,652	2	0.0124	0.0019	0.1552	2	2 to 3	a
Ribbon seal (<i>Histiophoca fasciata</i>)											
Area 517											
	1990	303,749.0	67.8	5,370	1	0.0459	0.0246	0.5345	1	1 to 3	b
	1996	480,233.6	67.4	7,294	0	-	-	-	1	-	c
	2001	453,898.8	75.7	5,124	0	-	-	-	1	-	c
Area 519											
	1997	77,114.2	59.7	688	1	0.1411	0.0406	0.2878	1	1 to 2	a
Bering Sea (all areas combined)											
	1990	2,172,601.4	58.0	28,448	1	0.0064	0.0034	0.5345	1	1 to 3	b
	1996	1,753,240.7	64.2	28,868	0	-	-	-	1	-	c
	1997	1,703,642.9	62.1	25,657	1	0.0064	0.0018	0.2878	1	1 to 2	a
	2001	1,693,350.6	76.6	23,652	0	-	-	-	1	-	c
Northern elephant seal (<i>Mirounga angustirostris</i>)											
Area 515											
	1990	375,928.6	44.6	3,473	1	0.0280	0.0063	0.2264	1	1 to 2	a
Bering Sea (all areas combined)											
	1990	2,172,601.4	58.0	28,448	1	0.0049	0.0011	0.2264	1	1 to 2	a
Area 610											
	1990	53,651.4	47.2	1,668	1	0.2639	0.1435	0.5437	1	1 to 3	b
Area 630											
	1993	123,497.0	36.5	3,584	0	-	-	-	1	-	c
Gulf of Alaska (all areas combined)											
	1990	217,901.8	44.6	7,623	1	0.0650	0.0353	0.5437	1	1 to 3	b
	1993	215,491.7	38.5	5,866	0	-	-	-	1	-	c
Alaska (all areas combined)											
	1990	2,390,503.2	56.8	36,071	2	0.0103	0.0034	0.3263	2	2 to 5	a
	1993	2,058,671.8	61.3	34,345	0	-	-	-	1	-	c

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Northern elephant seal (<i>Mirounga angustirostris</i>) (continued)											
Area 670											
	1999	91,419.1	66.1	1,221	0	-	-	-	1	-	c
	2000	50,754.0	80.8	922	1	0.2720	0.1419	0.5217	1	1 to 3	b
Area 710											
	1996	58,524.7	61.4	610	1	0.3193	0.2184	0.6842	2	1 to 5	b
	1998	87,486.4	76.8	1,121	1	0.2501	0.1842	0.7366	2	1 to 6	b
Washington, Oregon, and California (all areas combined)											
	1996	129,920.8	65.2	1,675	1	0.1438	0.0984	0.6842	2	1 to 5	b
	1998	147,395.7	77.3	2,234	1	0.1484	0.1093	0.7366	2	1 to 6	b
	1999	143,848.4	68.6	1,849	0	-	-	-	1	-	c
	2000	122,560.7	80.6	2,016	1	0.1126	0.0588	0.5217	1	1 to 3	b
Unidentified pinnipeds ^f											
Area 509											
	1995	612,399.3	66.6	7,703	1	0.0246	0.0142	0.5794	2	1 to 4	b
Area 511											
	1991	178,115.6	45.0	3,375	1	0.0860	0.0507	0.5895	2	1 to 4	b
Area 513											
	1991	131,327.6	52.1	2,708	0	-	-	-	1	-	c
	1992	146,316.9	60.8	3,955	1	0.1242	0.0834	0.6709	2	1 to 5	b
	1994	294,050.6	68.6	6,176	1	0.0508	0.0292	0.5751	1	1 to 4	b
Area 514											
	1992	120,409.9	62.7	4,657	0	-	-	-	1	-	c
	1999	26,128.7	75.1	509	0	-	-	-	1	-	c
	2001	7,657.7	71.6	206	1	2.3788	1.5936	0.6699	2	1 to 5	b
Area 517											
	1990	303,749.0	67.8	5,370	0	-	-	-	1	-	c
Area 521											
	1991	589,622.8	54.9	8,043	0	-	-	-	1	-	c
Area 524											
	1994	5,437.5	66.3	114	0	-	-	-	1	-	c
Bering Sea (all areas combined)											
	1990	2,172,601.4	58.0	28,448	0	-	-	-	1	-	c
	1991	2,079,538.3	51.9	31,558	1	0.0074	0.0043	0.5895	4	1 to 4	b,c,d
	1992	1,939,721.3	61.1	32,246	1	0.0094	0.0063	0.6709	3	1 to 5	b,c
	1994	1,873,140.4	63.9	28,717	1	0.0080	0.0046	0.5751	2	1 to 4	b,c
	1995	1,819,353.3	65.8	27,572	1	0.0083	0.0048	0.5794	2	1 to 4	b
	1999	1,321,918.0	73.6	20,324	0	-	-	-	1	-	c
	2001	1,693,350.6	76.6	23,652	1	0.0108	0.0072	0.6699	2	1 to 5	b

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Unidentified pinnipeds ^f (continued)											
Alaska (all areas combined)											
	1990	2,390,503.2	56.8	36,071	0	-	-	-	1	-	c
	1991	2,303,244.6	50.7	37,607	1	0.0066	0.0039	0.5895	4	1 to 4	b,c,d
	1992	2,171,839.7	58.8	38,523	1	0.0084	0.0056	0.6709	3	1 to 5	b,c
	1994	2,071,375.7	61.0	32,872	1	0.0072	0.0041	0.5751	2	1 to 4	b,c
	1995	1,988,746.8	63.9	32,194	1	0.0076	0.0044	0.5794	2	1 to 4	b
	1999	1,506,099.6	68.5	23,732	0	-	-	-	1	-	c
	2001	1,845,796.4	72.5	26,797	1	0.0099	0.0066	0.6699	2	1 to 5	b
Area 710											
	2000	71,494.9	80.4	1,085	1	0.1399	0.0001	0.0008	1	1 to 2	a
Area 730											
	1991	65,957.8	53.4	918	0	-	-	-	1	-	c
Washington, Oregon, and California (all areas combined)											
	1991	212,260.8	50.5	2,633	0	-	-	-	1	-	c
	2000	122,560.7	80.6	2,016	1	0.0816	0.0001	0.0008	1	1 to 2	a
Humpback whale (<i>Megaptera novaeangliae</i>)											
Area 509											
	1999	275,106.0	68.8	4,416	1	0.0519	0.0284	0.5472	1	1 to 3	b
Area 517											
	1998	476,976.8	64.3	7,062	1	0.0370	0.0243	0.6581	2	1 to 5	b
Bering Sea (all areas combined)											
	1998	1,504,106.7	65.7	23,339	1	0.0117	0.0077	0.6581	2	1 to 5	b
	1999	1,321,918.0	73.6	20,324	1	0.0108	0.0059	0.5472	1	1 to 3	b
Alaska (all areas combined)											
	1998	1,715,831.4	62.1	27,734	1	0.0103	0.0068	0.6581	2	1 to 5	b
	1999	1,506,099.6	68.5	23,732	1	0.0095	0.0052	0.5472	1	1 to 3	b
Minke whale (<i>Balaenoptera acutorostrata</i>)											
Area 517											
	2000	501,934.8	71.0	7,048	1	0.0314	0.0191	0.6060	2	1 to 4	b
Bering Sea (all areas combined)											
	2000	1,501,472.6	74.3	23,818	1	0.0105	0.0064	0.6060	2	1 to 4	b
Alaska (all areas combined)											
	2000	1,661,213.8	70.1	27,132	1	0.0095	0.0058	0.6060	2	1 to 4	b

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
<i>Fin whale (Balaenoptera physalus)</i>											
Area 620											
1999	53,111.5	38.5	1,025	1	0.5599	0.4568	0.8160	3	1 to 8	b	
Gulf of Alaska (all areas combined)											
1999	184,181.6	31.7	3,408	1	0.1615	0.1317	0.8160	3	1 to 8	b	
Alaska (all areas combined)											
1999	1,506,099.6	68.5	23,732	1	0.0197	0.0161	0.8160	3	1 to 8	b	
<i>Pacific white-sided dolphin (Lagenorhynchus obliquidens)</i>											
Area 522											
1992	63,139.0	50.2	732	1	0.2544	0.1570	0.6173	2	1 to 4	b	
Bering Sea (all areas combined)											
1992	1,939,721.3	61.1	32,246	1	0.0083	0.0051	0.6173	2	1 to 4	b	
Alaska (all areas combined)											
1992	2,171,839.7	58.8	38,523	1	0.0074	0.0046	0.6173	2	1 to 4	b	
Area 670											
1998	59,909.3	78.1	1,113	1	0.1669	0	0	1	1	a	
Area 710											
1996	58,524.7	61.4	610	0	-	-	-	2	-	c	
Area 720											
1996	9,776.8	32.6	65	0	-	-	-	1	-	c	
Washington, Oregon, and California (all areas combined)											
1996	129,920.8	65.2	1,675	0	-	-	-	3	-	c	
1998	147,395.7	77.3	2,234	1	0.0678	0	0	1	1	a	
<i>Killer whale (Orcinus orca)</i>											
Area 510											
1989	895,871.1	9.7	2,682	0	-	-	-	2	-	c	
Area 511											
1992	260,875.2	58.2	4,427	1	0.0590	0.0348	0.5909	2	1 to 4	b	
Area 517											
1998	476,976.8	64.3	7,062	1	0.0352	0.0224	0.6369	2	1 to 4	b	
2001	453,898.8	75.7	5,124	0	-	-	-	1	-	c	
Area 519											
1997	77,114.2	59.7	688	1	0.1411	0.0403	0.2856	1	1 to 2	a	
2001	146,223.1	56.3	1,147	1	0.0935	0.0486	0.5199	1	1 to 3	b	

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Killer whale (<i>Orcinus orca</i>) (continued)											
Area 521											
	1991	589,622.8	54.9	8,043	1	0.0274	0.0170	0.6182	2	1 to 4	b
	1993	254,165.8	64.0	3,445	0	-	-	-	1	-	c
	1999	216,928.0	84.0	2,657	0	-	-	-	1	-	c
Bering Sea (all areas combined)											
	1989	1,169,294.0	12.2	3,770	0	-	-	-	2	-	c
	1991	2,079,538.3	51.9	31,558	1	0.0078	0.0048	0.6182	2	1 to 4	b
	1992	1,939,721.3	61.1	32,246	1	0.0079	0.0047	0.5909	2	1 to 4	b
	1993	1,843,180.1	64.0	28,479	0	-	-	-	1	-	c
	1997	1,703,642.9	62.1	25,657	1	0.0064	0.0018	0.2856	1	1 to 2	a
	1998	1,504,106.7	65.7	23,339	1	0.0112	0.0071	0.6369	2	1 to 4	b
	1999	1,321,918.0	73.6	20,324	0	-	-	-	1	-	c
	2001	1,693,350.6	76.6	23,652	1	0.0081	0.0042	0.5199	2	1 to 3	b,c
Alaska (all areas combined)											
	1989	1,304,574.7	11.5	4,101	0	-	-	-	2	-	c
	1991	2,303,244.6	50.7	37,607	1	0.0070	0.0043	0.6182	2	1 to 4	b
	1992	2,171,839.7	58.8	38,523	1	0.0071	0.0042	0.5909	2	1 to 4	b
	1993	2,058,671.8	61.3	34,345	0	-	-	-	1	-	c
	1997	1,901,588.1	58.9	30,148	1	0.0057	0.0016	0.2856	1	1 to 2	a
	1998	1,715,831.4	62.1	27,734	1	0.0098	0.0062	0.6369	2	1 to 4	b
	1999	1,506,099.6	68.5	23,732	0	-	-	-	1	-	c
	2001	1,845,796.4	72.5	26,797	1	0.0074	0.0039	0.5199	2	1 to 3	b,c
Harbor porpoise (<i>Phocoena phocoena</i>)											
Area 509											
	1994	514,168.5	66.0	7,910	1	0.0230	0.0090	0.3922	1	1 to 3	a
Area 513											
	1998	144,833.4	65.6	3,244	1	0.1214	0.0795	0.6553	2	1 to 5	b
	2001	228,946.9	83.5	4,488	1	0.0759	0.0495	0.6521	2	1 to 4	b
Area 517											
	1995	576,498.4	64.2	8,212	1	0.0198	0.0069	0.3502	1	1 to 2	a
	1997	426,600.2	63.7	6,247	1	0.0454	0.0316	0.6964	2	1 to 5	b
Bering Sea (all areas combined)											
	1994	1,873,140.4	63.9	28,717	1	0.0063	0.0025	0.3922	1	1 to 3	a
	1995	1,819,353.3	65.8	27,572	1	0.0063	0.0022	0.3502	1	1 to 2	a
	1997	1,703,642.9	62.1	25,657	1	0.0114	0.0079	0.6964	2	1 to 5	b
	1998	1,504,106.7	65.7	23,339	1	0.0117	0.0077	0.6553	2	1 to 5	b
	2001	1,693,350.6	76.6	23,652	1	0.0103	0.0067	0.6521	2	1 to 4	b
Alaska (all areas combined)											
	1994	2,071,375.7	61.0	32,872	1	0.0057	0.0022	0.3922	1	1 to 3	a
	1995	1,988,746.8	63.9	32,194	1	0.0057	0.0020	0.3502	1	1 to 2	a

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Harbor porpoise (<i>Phocoena phocoena</i>) (continued)										
Alaska (all areas combined) (continued)										
1997	1,901,588.1	58.9	30,148	1	0.0102	0.0071	0.6964	2	1 to 5	b
1998	1,715,831.4	62.1	27,734	1	0.0102	0.0067	0.6553	2	1 to 5	b
2001	1,845,796.4	72.5	26,797	1	0.0094	0.0061	0.6521	2	1 to 4	b
Dall's porpoise (<i>Phocoenoides dalli</i>)										
Area 509										
1993	374,720.0	62.5	5,804	1	0.0366	0.0183	0.5003	1	1 to 3	a
1995	612,399.3	66.6	7,703	1	0.0228	0.0121	0.5319	1	1 to 3	b
1996	508,895.5	61.0	9,801	3	0.1053	0.0520	0.4940	5	3 to 11	a
1998	516,185.8	64.8	7,480	0	-	-	-	1	-	c
1999	275,106.0	68.8	4,416	1	0.1085	0.0842	0.7762	3	1 to 8	b
Area 511										
1990	146,318.2	58.8	2,999	1	0.1234	0.0882	0.7148	2	1 to 5	b
1992	260,875.2	58.2	4,427	1	0.1252	0.1043	0.8332	3	1 to 9	b
Area 513										
1994	294,050.6	68.6	6,176	0	-	-	-	2	-	c
Area 517										
1990	303,749.0	67.8	5,370	1	0.0378	0.0136	0.3595	1	1 to 2	a
1992	524,466.6	63.2	6,476	3	0.0598	0.0073	0.1228	3	3 to 4	a
1993	766,492.1	63.8	7,627	0	-	-	-	1	-	c
1994	580,767.3	63.4	7,119	1	0.0243	0.0132	0.5420	1	1 to 3	b
1995	576,498.4	64.2	8,212	1	0.0244	0.0132	0.5393	1	1 to 3	b
1996	480,233.6	67.4	7,294	1	0.0263	0.0120	0.4556	1	1 to 3	a
1997	426,600.2	63.7	6,247	2	0.0813	0.0395	0.4854	3	2 to 7	a
1998	476,972.6	64.3	7,062	2	0.0827	0.0448	0.5414	4	2 to 9	b
Area 519										
1996	72,918.5	62.5	760	1	0.1827	0.0913	0.4998	1	1 to 3	a
1997	77,114.2	59.7	688	1	0.1741	0.0882	0.5069	1	1 to 3	a
1998	86,601.1	58.1	884	1	0.3299	0.2649	0.8031	3	1 to 8	b
Area 520										
1989	238,169.4	22.7	911	1	0.1992	0.1768	0.8874	5	1 to 14	b
Area 521										
1990	900,127.6	58.4	8,766	2	0.0503	0.0283	0.5632	5	2 to 10	b
1991	589,622.8	54.9	8,043	1	0.0276	0.0172	0.6215	2	1 to 4	b
1993	254,165.8	64.0	3,445	2	0.1210	0.0715	0.5912	3	2 to 7	b
1994	192,038.4	60.9	2,452	2	0.1438	0.0534	0.3712	3	2 to 5	a
1997	259,433.0	62.0	2,515	2	0.1004	0.0343	0.3420	3	2 to 5	a
1999	216,928.0	84.0	2,657	1	0.0846	0.0571	0.6745	2	1 to 5	b
2000	296,931.4	84.4	3,499	3	0.1055	0.0126	0.1195	4	3 to 4	a,c,d
2001	415,833.2	86.5	5,014	2	0.0695	0.0273	0.3928	3	2 to 6	a

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Dall's porpoise (<i>Phocoenoides dalli</i>) (continued)											
Area 540											
	1990	151,619.1	69.1	3,925	1	0.1086	0.0683	0.6294	2	1 to 4	b
	1992	132,528.2	75.4	3,441	0	-	-	-	1	-	c
Area 541											
	1994	95,711.4	71.9	1,461	1	0.1295	0.0571	0.4412	1	1 to 3	a
Bering Sea (all areas combined)											
	1989	1,169,294.0	12.2	3,770	1	0.0406	0.0360	0.8874	5	1 to 13	b
	1990	2,172,601.4	58.0	28,448	5	0.0420	0.0141	0.3361	10	5 to 16	a
	1991	2,079,538.3	51.9	31,558	1	0.0078	0.0049	0.6215	2	1 to 4	b
	1992	1,939,721.3	61.1	32,246	4	0.0330	0.0142	0.4291	7	4 to 12	a,c
	1993	1,843,180.1	64.0	28,479	3	0.0241	0.0105	0.4369	5	3 to 9	a,c
	1994	1,873,140.4	63.9	28,717	4	0.0289	0.0074	0.2570	7	4 to 9	a,c
	1995	1,819,353.3	65.8	27,572	2	0.0154	0.0058	0.3788	3	2 to 5	a
	1996	1,753,240.7	64.2	28,868	5	0.0454	0.0159	0.3507	8	5 to 14	a
	1997	1,703,642.9	62.1	25,657	5	0.0435	0.0119	0.2727	7	5 to 12	a
	1998	1,504,106.7	65.7	23,339	3	0.0452	0.0208	0.4608	8	3 to 13	a,c
	1999	1,321,918.0	73.6	20,324	2	0.0365	0.0199	0.5450	5	2 to 10	b
	2000	1,501,472.6	74.3	23,818	3	0.0209	0.0025	0.1195	4	3 to 4	a,c,d
	2001	1,693,350.6	76.6	23,652	2	0.0171	0.0067	0.3928	3	2 to 6	a
Area 610											
	1996	45,236.2	36.4	814	1	0.5886	0.4685	0.7960	3	1 to 7	b
	1998	50,719.0	35.1	547	1	0.3125	0.1914	0.6125	2	1 to 4	b
Area 620											
	1993	40,718.9	45.8	1,094	1	0.5395	0.4029	0.7468	2	1 to 6	b
Gulf of Alaska (all areas combined)											
	1993	215,491.7	38.5	5,866	1	0.1019	0.0761	0.7468	2	1 to 6	b
	1996	164,738.4	36.6	5,029	1	0.1616	0.1287	0.7960	3	1 to 7	b
	1998	211,724.6	36.0	4,395	1	0.0749	0.0458	0.6125	2	1 to 4	b
Alaska (all areas combined)											
	1989	1,304,574.7	11.5	4,101	1	0.0364	0.0323	0.8874	5	1 to 13	b
	1990	2,390,503.2	56.8	36,071	5	0.0382	0.0128	0.3361	10	5 to 16	a
	1991	2,303,244.6	50.7	37,607	1	0.0071	0.0044	0.6215	2	1 to 4	b
	1992	2,171,839.7	58.8	38,523	4	0.0295	0.0127	0.4291	7	4 to 12	a,c
	1993	2,058,671.8	61.3	34,345	4	0.0323	0.0124	0.3828	8	4 to 12	a,c
	1994	2,071,375.7	61.0	32,872	4	0.0261	0.0067	0.2570	7	4 to 9	a,c
	1995	1,988,746.8	63.9	32,194	2	0.0141	0.0053	0.3788	3	2 to 5	a
	1996	1,917,979.1	61.8	33,897	6	0.0553	0.0183	0.3300	11	6 to 18	a
	1997	1,901,588.1	58.9	30,148	5	0.0390	0.0106	0.2727	7	5 to 12	a
	1998	1,715,831.4	62.1	27,734	4	0.0489	0.0191	0.3913	10	4 to 15	a,c
	1999	1,506,099.6	68.5	23,732	2	0.0320	0.0174	0.5450	5	2 to 10	b
	2000	1,661,213.8	70.1	27,132	3	0.0189	0.0023	0.1195	4	3 to 4	a,c,d
	2001	1,845,796.4	72.5	26,797	2	0.0157	0.0062	0.3928	3	2 to 6	a

Table 3.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Dall's porpoise (<i>Phocoenoides dalli</i>) (continued)											
Area 670											
	1997	57,322.0	52.6	571	0	-	-	-	2	-	c
	1998	59,909.3	78.1	1,113	1	0.2839	0.1822	0.6416	2	1 to 4	b
Area 710											
	1992	97,916.3	71.2	1,499	1	0.2035	0.1437	0.7063	2	1 to 5	b
	1994	135,615.8	52.0	1,328	0	-	-	-	2	-	c
	1996	58,524.7	61.4	610	0	-	-	-	1	-	c
	1997	84,433.4	76.1	1,019	1	0.1264	0.0318	0.2518	1	1 to 2	a
	1998	87,486.4	76.8	1,121	1	0.1143	0	0	1	1	a
	1999	52,429.3	72.8	628	1	0.1907	0.0002	0.0009	1	1 to 2	a
Area 720											
	1997	5,635.0	42.4	44	2	10.7033	8.7365	0.8162	6	2 to 16	b
Washington, Oregon, and California (all areas combined)											
	1992	158,854.4	71.4	2,448	1	0.1255	0.0886	0.7063	2	1 to 5	b
	1994	181,236.6	53.4	1,781	0	-	-	-	2	-	c
	1996	129,920.8	65.2	1,675	0	-	-	-	1	-	c
	1997	147,390.4	65.7	1,634	3	0.4816	0.3345	0.6945	9	3 to 17	bc
	1998	147,395.7	77.3	2,234	2	0.1832	0.0740	0.4041	3	2 to 5	a
	1999	143,848.4	68.6	1,849	1	0.0695	0.0001	0.0009	1	1 to 2	a
Unidentified cetaceans ^g											
Area 513											
	1994	294,050.6	68.6	6,176	0	-	-	-	1	-	c
Area 517											
	1993	766,492.1	63.8	7,627	1	0.0173	0.0086	0.4963	1	1 to 3	a
Area 521											
	1990	900,127.6	58.4	8,766	1	0.0184	0.0116	0.6302	3	1 to 4	bc
	1991	589,622.8	54.9	8,043	1	0.0290	0.0187	0.6445	2	1 to 4	b
	2001	415,833.2	86.5	5,014	1	0.0255	0.0060	0.2352	2	1 to 2	a,e
Bering Sea (all areas combined)											
	1990	2,172,601.4	58.0	28,448	1	0.0076	0.0048	0.6302	3	1 to 4	bc
	1991	2,079,538.3	51.9	31,558	1	0.0082	0.0053	0.6445	2	1 to 4	b
	1993	1,843,180.1	64.0	28,479	1	0.0072	0.0036	0.4963	1	1 to 3	a
	1994	1,873,140.4	63.9	28,717	0	-	-	-	1	-	c
	2001	1,693,350.6	76.6	23,652	1	0.0063	0.0015	0.2352	2	1 to 2	a,e
Alaska (all areas combined)											
	1990	2,390,503.2	56.8	36,071	1	0.0069	0.0044	0.6302	3	1 to 4	bc
	1991	2,303,244.6	50.7	37,607	1	0.0074	0.0048	0.6445	2	1 to 4	b
	1993	2,058,671.8	61.3	34,345	1	0.0065	0.0032	0.4963	1	1 to 3	a
	1994	2,071,375.7	61.0	32,872	0	-	-	-	1	-	c
	2001	1,845,796.4	72.5	26,797	1	0.0057	0.0013	0.2352	2	1 to 2	a,e

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Unidentified marine mammals ^h										
Area 511										
1990	146,318.2	58.8	2,999	1	0.1280	0.0876	0.6838	2	1 to 5	b
Bering Sea (all areas combined)										
1990	2,172,601.4	58.0	28,448	1	0.0086	0.0059	0.6838	2	1 to 5	b
Alaska (all areas combined)										
1990	2,390,503.2	56.8	36,071	1	0.0078	0.0054	0.6838	2	1 to 5	b
All marine mammal species combined										
Area 508										
1993	412.1	24.0	8	0	-	-	-	-	-	
1994	23.1	51.1	3	0	-	-	-	-	-	
1995	NF	-	-	-	-	-	-	-	-	
1996	NF	-	-	-	-	-	-	-	-	
1997	NF	-	-	-	-	-	-	-	-	
1998	12.6	60.2	1	0	-	-	-	-	-	
1999	NF	-	-	-	-	-	-	-	-	
2000	5.2	0	0	-	-	-	-	-	-	
2001	NF	-	-	-	-	-	-	-	-	
Area 509										
1993	374,720.0	62.5	5,804	1	0.0366	0.0183	0.5003	1	1 to 3	a
1994	514,168.5	66.0	7,910	5	0.1430	0.0373	0.2607	7	5 to 12	a
1995	612,399.3	66.6	7,703	2	0.0473	0.0187	0.3948	3	2 to 6	a
1996	508,895.5	61.0	9,801	4	0.1404	0.0569	0.4053	7	4 to 13	a
1997	482,772.6	58.0	6,866	3	0.0953	0.0335	0.3513	5	3 to 8	a
1998	516,185.8	64.8	7,480	1	0.0260	0.0131	0.5053	2	1 to 3	a,c
1999	275,106.0	68.8	4,416	3	0.2155	0.0945	0.4386	7	3 to 12	a,c
2000	374,475.6	68.6	6,140	1	0.0308	0.0112	0.3633	2	1 to 2	a,c,d
2001	249,741.8	64.7	4,429	4	0.2416	0.0733	0.3036	6	4 to 10	a
Area 510										
1989	895,871.1	9.7	2,682	3	0.3624	0.2179	0.6011	34	3 to 71	b,c
Area 511										
1990	146,318.2	58.8	2,999	2	0.2514	0.1243	0.4943	4	2 to 8	a
1991	178,115.6	45.0	3,375	1	0.0860	0.0507	0.5895	2	1 to 4	b
1992	260,875.2	58.2	4,427	2	0.1842	0.1100	0.5971	5	2 to 11	b
Area 512										
1990	779.4	35.1	21	0	-	-	-	-	-	
1991	241.1	63.2	7	0	-	-	-	-	-	
1992	925.5	0	0	-	-	-	-	-	-	
1993	25.0	0	0	-	-	-	-	-	-	
1994	101.0	0	0	-	-	-	-	-	-	
1995	NF	-	-	-	-	-	-	-	-	
1996	480.9	0	0	-	-	-	-	-	-	

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 512 (continued)										
1997	NF	-	-	-	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-	-
1999	141.4	0	0	-	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-	-
2001	127.7	0	0	-	-	-	-	-	-	-
Area 513										
1990	176,529.5	59.5	2,062	0	-	-	-	-	-	-
1991	131,327.6	52.1	2,708	2	0.2512	0.1193	0.4749	4	2 to 7	a,c
1992	146,316.9	60.8	3,955	7	0.7674	0.1792	0.2336	13	7 to 17	a,c
1993	138,851.7	65.6	4,175	0	-	-	-	1	-	c
1994	294,050.6	68.6	6,176	6	0.2977	0.0684	0.2298	13	6 to 13	a,c,d
1995	215,418.1	68.0	5,213	0	-	-	-	1	-	c
1996	320,830.4	61.1	4,968	3	0.1564	0.0576	0.3686	8	3 to 9	a,c
1997	201,887.3	59.7	4,962	1	0.0811	0.0506	0.6232	3	1 to 4	b,c
1998	144,833.4	65.6	3,244	2	0.2240	0.0988	0.4410	6	2 to 6	a,c,d
1999	170,833.2	73.3	3,158	1	0.0970	0.0612	0.6309	2	1 to 4	b
2000	172,982.1	75.0	3,909	3	0.2284	0.0676	0.2960	7	3 to 7	a,c,d
2001	228,946.9	83.5	4,488	5	0.3253	0.0856	0.2630	7	5 to 12	a
Area 514										
1990	18,132.1	64.5	736	2	1.8506	0.8158	0.4408	3	2 to 7	a
1991	129,649.9	56.2	4,259	6	0.8114	0.2374	0.2926	14	6 to 17	a,c
1992	120,409.9	62.7	4,657	15	1.7699	0.2598	0.1468	25	15 to 28	a,c
1993	72,109.3	67.3	2,479	4	0.8028	0.2231	0.2779	7	4 to 9	a,e
1994	28,870.1	50.3	895	2	1.4108	0.7129	0.5053	7	2 to 9	a,c
1995	32,063.5	63.3	1,002	0	-	-	-	1	-	c
1996	55,206.7	58.8	1,288	3	0.8823	0.3161	0.3583	6	3 to 9	a,c
1997	66,131.5	68.0	1,768	4	0.8766	0.2436	0.2779	6	4 to 9	a
1998	6,459.7	66.8	198	0	-	-	-	-	-	-
1999	26,128.7	75.1	509	0	-	-	-	1	-	c
2000	10,501.8	79.2	380	0	-	-	-	1	-	c
2001	7,657.7	71.6	206	1	2.3788	1.5936	0.6699	2	1 to 5	b
Area 515										
1990	375,928.6	44.6	3,473	5	0.1667	0.0671	0.4023	7	5 to 12	a,c
Area 516										
1990	13,294.5	43.7	341	0	-	-	-	1	-	c
1991	16,263.6	46.0	446	0	-	-	-	-	-	-
1992	21,389.4	51.9	562	0	-	-	-	-	-	-
1993	15,226.4	53.4	447	0	-	-	-	-	-	-
1994	31,741.6	51.7	814	0	-	-	-	-	-	-
1995	7,800.7	58.1	314	0	-	-	-	-	-	-
1996	9,750.7	58.7	435	0	-	-	-	-	-	-
1997	3,528.3	55.8	97	0	-	-	-	-	-	-
1998	4,959.6	73.1	172	0	-	-	-	-	-	-
1999	12,776.2	66.3	365	0	-	-	-	-	-	-
2000	27,352.4	66.9	237	0	-	-	-	-	-	-
2001	64,894.7	78.3	1,016	0	-	-	-	-	-	-

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 517										
1990	303,749.0	67.8	5,370	3	0.1322	0.0393	0.2971	5	3 to 7	a,c
1991	396,528.4	43.3	5,880	1	0.0364	0.0202	0.5538	1	1 to 4	b
1992	524,466.6	63.2	6,476	4	0.0881	0.0178	0.2018	5	4 to 7	a
1993	766,492.1	63.8	7,627	3	0.0587	0.0266	0.4527	5	3 to 9	a,c
1994	580,767.3	63.4	7,119	2	0.0485	0.0185	0.3810	3	2 to 5	a
1995	576,498.4	64.2	8,212	2	0.0442	0.0149	0.3368	3	2 to 5	a
1996	480,233.6	67.4	7,294	1	0.0263	0.0120	0.4556	2	1 to 3	a,c
1997	426,600.2	63.7	6,247	4	0.1621	0.0546	0.3366	7	4 to 12	a
1998	476,976.8	64.3	7,062	6	0.2539	0.0846	0.3334	12	6 to 21	a
1999	518,061.4	71.0	6,984	1	0.0228	0.0090	0.3928	1	1 to 3	a
2000	501,934.8	71.0	7,048	3	0.0891	0.0295	0.3313	4	3 to 8	a
2001	453,898.8	75.7	5,124	0	-	-	-	2	-	c
Area 518										
1991	323,197.1	57.3	2,632	0	-	-	-	-	-	
1992	4,783.3	65.7	237	0	-	-	-	-	-	
1993	2,359.2	31.9	78	0	-	-	-	-	-	
1994	3,964.7	52.8	91	0	-	-	-	-	-	
1995	1,814.8	49.0	57	0	-	-	-	-	-	
1996	1,129.8	97.7	11	0	-	-	-	-	-	
1997	239.9	92.9	11	0	-	-	-	-	-	
1998	442.3	56.9	3	0	-	-	-	-	-	
1999	430.5	76.4	17	0	-	-	-	-	-	
2000	245.3	45.6	19	0	-	-	-	-	-	
2001	453.7	19.6	23	0	-	-	-	-	-	
Area 519										
1991	144,663.4	46.1	1,711	2	0.3210	0.1718	0.5353	5	2 to 10	b
1992	106,550.7	67.5	1,163	0	-	-	-	-	-	
1993	23,469.7	64.7	282	0	-	-	-	-	-	
1994	55,327.8	56.0	750	0	-	-	-	-	-	
1995	86,880.2	58.3	941	1	0.1436	0.0640	0.4454	1	1 to 3	a
1996	72,918.5	62.5	760	1	0.1827	0.0913	0.4998	1	1 to 3	a
1997	77,114.2	59.7	688	3	0.4563	0.1051	0.2304	4	3 to 6	a
1998	86,601.1	58.1	884	1	0.3299	0.2649	0.8031	3	1 to 8	b
1999	7,299.8	60.4	350	0	-	-	-	-	-	
2000	16,521.4	83.2	293	0	-	-	-	-	-	
2001	146,223.1	56.3	1,147	1	0.0935	0.0486	0.5199	1	1 to 3	b
Area 520										
1989	238,169.4	22.7	911	1	0.1992	0.1768	0.8874	5	1 to 14	b
Area 521										
1990	900,127.6	58.4	8,766	4	0.0864	0.0325	0.3756	11	4 to 14	a,c
1991	589,622.8	54.9	8,043	7	0.1979	0.0476	0.2407	15	7 to 18	a,c
1992	558,336.5	57.2	6,596	0	-	-	-	-	-	
1993	254,165.8	64.0	3,445	2	0.1210	0.0715	0.5912	4	2 to 7	b,c
1994	192,038.4	60.9	2,452	2	0.1438	0.0534	0.3712	6	2 to 6	a,c,d
1995	59,844.6	63.7	799	0	-	-	-	1	-	c

Table 3.--Continued.

Species Area Year	Groundfish			Number of marine mammals monitored in hauls	Marine mammals					
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)		Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 540										
1989	35,253.5	6.2	177	3	1.4163	0.8793	0.6208	5	3 to 12	b
1990	151,619.1	69.1	3,925	4	0.3635	0.0998	0.2746	7	4 to 9	a,c
1991	137,337.9	63.0	1,881	6	0.7124	0.1810	0.2541	10	6 to 15	a
1992	132,528.2	75.4	3,441	1	0.1008	0.0505	0.5015	2	1 to 3	a,c
Area 541										
1993	125,876.0	66.4	2,386	0	-	-	-	-	-	
1994	95,711.4	71.9	1,461	1	0.1295	0.0571	0.4412	1	1 to 3	a
1995	57,943.6	67.4	941	0	-	-	-	-	-	
1996	61,593.9	56.5	951	0	-	-	-	-	-	
1997	44,395.9	62.7	612	0	-	-	-	-	-	
1998	31,065.9	77.2	765	0	-	-	-	-	-	
1999	35,513.8	79.0	788	1	0.3344	0.1329	0.3973	1	1 to 3	a
2000	34,889.7	74.6	944	0	-	-	-	-	-	
2001	24,264.0	70.3	619	0	-	-	-	-	-	
Area 542										
1993	43,937.5	71.3	1,031	0	-	-	-	-	-	
1994	53,100.7	48.0	739	1	0.4070	0.2979	0.7320	2	1 to 6	b
1995	100,157.2	71.4	1,392	1	0.1515	0.0886	0.5848	2	1 to 4	b
1996	63,953.5	65.3	935	1	0.2606	0.1651	0.6338	2	1 to 4	b
1997	44,605.2	75.8	589	0	-	-	-	-	-	
1998	33,783.6	69.1	500	3	1.3048	0.5445	0.4173	4	3 to 9	a
1999	29,662.1	79.2	500	1	0.4902	0.2767	0.5644	1	1 to 4	b
2000	32,740.1	83.4	743	1	0.3342	0.0983	0.2942	1	1 to 2	a
2001	43,701.6	82.8	715	1	0.2816	0.1221	0.4335	1	1 to 3	a
Area 543										
1993	5,750.2	62.3	166	0	-	-	-	-	-	
1994	15,632.7	51.1	162	0	-	-	-	-	-	
1995	24,567.6	67.5	486	0	-	-	-	-	-	
1996	59,063.3	65.3	885	0	-	-	-	-	-	
1997	40,816.1	77.2	697	1	0.3232	0.1592	0.4925	3	1 to 3	a,e
1998	53,439.3	72.2	682	0	-	-	-	-	-	
1999	28,423.7	83.9	559	2	0.8938	0.2936	0.3285	3	2 to 5	a
2000	19,654.4	91.3	343	0	-	-	-	-	-	
2001	29,736.6	79.9	507	0	-	-	-	-	-	
Bering Sea (all areas combined)										
1989	1,169,294.0	12.2	3,770	7	0.3610	0.1728	0.4787	44	7 to 82	a,c
1990	2,172,601.4	58.0	28,448	20	0.1409	0.0226	0.1604	37	20 to 41	a,c
1991	2,079,538.3	51.9	31,558	25	0.2063	0.0279	0.1352	50	31 to 55	a,c
1992	1,939,721.3	61.1	32,246	30	0.2315	0.0269	0.1161	51	34 to 56	a,c
1993	1,843,180.1	64.0	28,479	10	0.0800	0.0176	0.2200	19	10 to 22	a,c,e
1994	1,873,140.4	63.9	28,717	19	0.1557	0.0220	0.1412	40	21 to 40	a,c,d
1995	1,819,353.3	65.8	27,572	6	0.0451	0.0097	0.2159	12	6 to 12	a,c
1996	1,753,240.7	64.2	28,868	14	0.1298	0.0238	0.1833	27	14 to 31	a,c
1997	1,703,642.9	62.1	25,657	18	0.1549	0.0216	0.1394	30	19 to 34	a,c,e

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Bering Sea (all areas combined) (continued)										
1998	1,504,106.7	65.7	23,339	13	0.1593	0.0348	0.2187	28	13 to 35	a,c
1999	1,321,918.0	73.6	20,324	12	0.1414	0.0270	0.1913	23	12 to 26	a,c,e
2000	1,501,472.6	74.3	23,818	13	0.1090	0.0145	0.1326	22	13 to 22	a,c,d
2001	1,693,350.6	76.6	23,652	17	0.1414	0.0195	0.1380	28	17 to 31	a,c,e
Area 610										
1989	26,913.8	2.0	49	0	-	-	-	-	-	
1990	53,651.4	47.2	1,668	2	0.5015	0.2325	0.4637	3	2 to 6	a
1991	90,029.0	41.0	1,913	1	0.3034	0.2422	0.7981	3	1 to 8	b
1992	72,292.6	47.2	1,801	0	-	-	-	-	-	
1993	44,593.3	35.5	854	0	-	-	-	-	-	
1994	35,011.6	32.6	491	0	-	-	-	-	-	
1995	50,513.4	50.4	789	0	-	-	-	-	-	
1996	45,236.2	36.4	814	1	0.5886	0.4685	0.7960	3	1 to 7	b
1997	52,356.8	35.2	762	0	-	-	-	-	-	
1998	50,719.0	35.1	547	2	0.6250	0.2710	0.4336	4	2 to 6	a
1999	46,989.3	24.1	492	0	-	-	-	-	-	
2000	45,809.4	22.4	580	0	-	-	-	-	-	
2001	47,613.9	19.0	423	1	1.1439	0.9917	0.8670	5	1 to 15	b
Area 620										
1989	31,894.6	6.6	29	0	-	-	-	-	-	
1990	32,212.2	60.3	1,910	1	0.5216	0.3330	0.6385	2	1 to 4	b
1991	26,744.0	32.6	729	0	-	-	-	-	-	
1992	40,291.7	36.3	965	1	0.8771	0.7446	0.8490	4	1 to 10	b
1993	40,718.9	45.8	1,094	1	0.5395	0.4029	0.7468	2	1 to 6	b
1994	47,594.1	32.0	952	0	-	-	-	-	-	
1995	34,265.8	41.5	946	0	-	-	-	-	-	
1996	47,266.7	34.7	1,490	0	-	-	-	-	-	
1997	54,895.0	30.5	1,117	0	-	-	-	-	-	
1998	63,634.7	33.4	1,177	0	-	-	-	-	-	
1999	53,111.5	38.5	1,025	1	0.5599	0.4568	0.8160	3	1 to 8	b
2000	22,125.4	29.1	438	0	-	-	-	-	-	
2001	28,899.3	26.1	494	0	-	-	-	-	-	
Area 630										
1989	68,510.5	6.5	184	0	-	-	-	-	-	
1990	120,270.7	36.9	3,247	0	-	-	-	-	-	
1991	96,328.2	39.3	3,079	0	-	-	-	-	-	
1992	112,236.1	36.6	3,209	0	-	-	-	-	-	
1993	123,497.0	36.5	3,584	1	0.1331	0.0839	0.6300	3	1 to 4	b,c
1994	103,961.9	33.0	2,400	1	0.3116	0.2581	0.8284	3	1 to 9	b
1995	76,254.3	39.9	2,615	0	-	-	-	-	-	
1996	64,925.2	36.0	2,433	0	-	-	-	-	-	
1997	79,795.6	29.0	2,324	0	-	-	-	-	-	
1998	86,950.9	35.0	2,552	0	-	-	-	-	-	

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 659 (continued)										
1994	NF	-	-	-	-	-	-	-	-	
1995	NF	-	-	-	-	-	-	-	-	
1996	NF	-	-	-	-	-	-	-	-	
1997	20.7	100.0	1	0	-	-	-	-	-	
1998	1.3	0	0	-	-	-	-	-	-	
1999	NF	-	-	-	-	-	-	-	-	
2000	NF	-	-	-	-	-	-	-	-	
2001	NF	-	-	-	-	-	-	-	-	
Gulf of Alaska (all areas combined)										
1989	135,280.7	5.5	331	0	-	-	-	-	-	
1990	217,901.8	44.6	7,623	3	0.2006	0.0755	0.3765	4	3 to 8	a
1991	223,706.3	39.5	6,049	1	0.1221	0.0975	0.7981	3	1 to 8	b
1992	232,118.4	40.1	6,277	1	0.1522	0.1293	0.8490	4	1 to 10	b
1993	215,491.7	38.5	5,866	2	0.1782	0.0900	0.5051	5	2 to 8	a,c
1994	198,235.3	33.1	4,155	1	0.1634	0.1354	0.8284	3	1 to 9	b
1995	169,393.5	43.7	4,622	0	-	-	-	-	-	
1996	164,738.4	36.6	5,029	1	0.1616	0.1287	0.7960	3	1 to 7	b
1997	197,945.2	31.8	4,491	0	-	-	-	-	-	
1998	211,724.6	36.0	4,395	2	0.1497	0.0649	0.4336	4	2 to 6	a
1999	184,181.6	31.7	3,408	1	0.1615	0.1317	0.8160	3	1 to 8	b
2000	159,741.2	31.2	3,314	0	-	-	-	-	-	
2001	152,445.8	27.4	3,145	1	0.3573	0.3098	0.8670	5	1 to 15	b
Alaska (all areas combined)										
1989	1,304,574.7	11.5	4,101	7	0.3235	0.1549	0.4787	44	7 to 82	a,c
1990	2,390,503.2	56.8	36,071	23	0.1463	0.0217	0.1480	41	24 to 46	a,c
1991	2,303,244.6	50.7	37,607	26	0.1981	0.0269	0.1358	53	33 to 58	a,c
1992	2,171,839.7	58.8	38,523	31	0.2230	0.0277	0.1242	55	36 to 61	a,c
1993	2,058,671.8	61.3	34,345	12	0.0902	0.0184	0.2034	24	12 to 26	a,c,e
1994	2,071,375.7	61.0	32,872	20	0.1564	0.0237	0.1517	42	22 to 43	a,c,d
1995	1,988,746.8	63.9	32,194	6	0.0413	0.0089	0.2159	12	6 to 12	a,c
1996	1,917,979.1	61.8	33,897	15	0.1325	0.0244	0.1841	31	16 to 35	a,c
1997	1,901,588.1	58.9	30,148	18	0.1388	0.0193	0.1394	30	19 to 34	a,c,e
1998	1,715,831.4	62.1	27,734	15	0.1581	0.0316	0.1997	32	16 to 38	a,c
1999	1,506,099.6	68.5	23,732	13	0.1438	0.0287	0.1995	26	13 to 31	a,c,e
2000	1,661,213.8	70.1	27,132	13	0.0986	0.0131	0.1326	22	13 to 22	a,c,d
2001	1,845,796.4	72.5	26,797	18	0.1593	0.0312	0.1961	33	18 to 41	a,c,e
Area 670										
1989	NF	-	-	-	-	-	-	-	-	
1990	18.1	46.4	8	0	-	-	-	-	-	
1991	6,427.1	46.4	64	0	-	-	-	-	-	
1992	42,021.1	71.1	670	0	-	-	-	-	-	
1993	10,595.9	34.9	84	0	-	-	-	-	-	
1994	45,583.2	57.8	453	0	-	-	-	-	-	
1995	8,667.2	58.9	100	0	-	-	-	-	-	
1996	61,619.3	74.1	1,000	0	-	-	-	1	-	c

Table 3.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 740									
1989	NF	-	-	-	-	-	-	-	-
1990	NF	-	-	-	-	-	-	-	-
1991	0.8	100.0	17	0	-	-	-	-	-
1992	NF	-	-	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-
1995	NF	-	-	-	-	-	-	-	-
1996	NF	-	-	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Washington, Oregon, and California (all areas combined)									
1989	NF	-	-	-	-	-	-	-	-
1990	4,738.4	53.4	97	0	-	-	-	-	-
1991	212,260.8	50.5	2,633	0	-	-	-	1	c
1992	158,854.4	71.4	2,448	1	0.1255	0.0886	0.7063	2	1 to 5
1993	98,727.0	66.5	1,122	0	-	-	-	-	-
1994	181,236.6	53.4	1,781	1	0.1328	0.1014	0.7641	5	1 to 7
1995	103,717.8	56.1	1,214	0	-	-	-	-	-
1996	129,920.8	65.2	1,675	1	0.1438	0.0984	0.6842	7	1 to 7
1997	147,390.4	65.7	1,634	3	0.4816	0.3345	0.6945	12	3 to 17
1998	147,395.7	77.3	2,234	5	0.4966	0.1423	0.2866	7	5 to 12
1999	143,848.4	68.6	1,849	2	0.1481	0.0268	0.1806	4	2 to 4
2000	122,560.7	80.6	2,016	4	0.3716	0.0695	0.1870	5	4 to 7
2001	102,129.0	96.2	2,117	1	0.0979	0	0	1	1

NF = No trawl fishing.

- ^a The estimated lower 95% confidence level was less than the number of animals reported by U.S. observers; the number of marine mammals monitored in hauls was used as a substitute.
- ^b The estimated lower 95% confidence level was less than zero; the number of marine mammals monitored in hauls was used as a substitute.
- ^c Reported bycatch occurred only in the nonsampled hauls of observed cruises.
- ^d The estimated upper 95% confidence level was less than the adjusted estimated bycatch; the latter was used as a substitute.
- ^e The number of animals reported killed (or with serious injuries or trailing gear) during fishing operations by observers from both sampled and unmonitored hauls exceeded the estimated bycatch in some component strata; the number reported dead was used as a substitute in those particular strata.
- ^f Includes pinnipeds that may belong to one of the identified species.
- ^g Includes cetaceans that may belong to one of the identified species.
- ^h Includes animals that may belong to any one of the identified marine mammal species.

Table 4.--Number of marine mammals, by species, incidentally caught by trawl vessels of the joint venture (JV) groundfish fisheries (countries combined^a) in the U.S. Exclusive Economic Zone in the Bering Sea, Gulf of Alaska, and off Washington, Oregon, and California, 1989-1990, reported by U.S. fishery observers, including an estimation of the total incidental mortality by area and year. Catch rates are the ratio (\hat{R}) and standard error ($s(\hat{R})$) of the observed incidental take of marine mammals killed (or seriously injured) monitored during fishing operations to the observed groundfish catch (per 10,000 metric tons [t] basis). The coefficient of variation (CV) of the catch rate is also listed. Estimated mortality of marine mammals as bycatch is the adjusted ratio estimate (\hat{Y}_A) and its 95% confidence interval ($L_{95\%}$).

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of JV hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Northern fur seal (<i>Callorhinus ursinus</i>)										
Area 520 1989	116,375.2	46.1	1,218	1	0.1947	0.1457	0.7479	2	1 to 6	b
Bering Sea (all areas combined) 1989	540,006.2	57.2	9,764	1	0.0420	0.0314	0.7479	2	1 to 6	b
Alaska (all areas combined) 1989	540,037.3	57.2	9,766	1	0.0420	0.0314	0.7479	2	1 to 6	b
Steller sea lion (<i>Eumetopias jubatus</i>)										
Area 510 1989	412,075.1	60.6	8,438	3	0.1116	0.0399	0.3578	6	3 to 8	c,d
Area 520 1989	116,375.2	46.1	1,218	1	0.1947	0.1461	0.7504	2	1 to 6	b
Bering Sea (all areas combined) 1989	540,006.2	57.2	9,764	4	0.1271	0.0438	0.3447	8	4 to 12	c,d
Alaska (all areas combined) 1989	540,037.3	57.2	9,766	4	0.1271	0.0438	0.3447	8	4 to 12	c,d
Walrus (<i>Odobenus rosmarus</i>)										
Area 510 1990	133,617.4	43.5	2,526	1	0.1424	0.0979	0.6880	2	1 to 5	b
Bering Sea (all areas combined) 1990	133,617.4	43.5	2,526	1	0.1424	0.0979	0.6880	2	1 to 5	b
Harbor seal (<i>Phoca vitulina</i>)										
Area 510 1989	412,075.1	60.6	8,438	1	0.0644	0.0508	0.7882	3	1 to 7	b

Table 4.--Continued.

Species	Groundfish				Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of JV hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Harbor seal (<i>Phoca vitulina</i>) (continued)											
Bering Sea (all areas combined)											
	1989	540,006.2	57.2	9,764	1	0.0492	0.0388	0.7882	3	1 to 7	b
Alaska (all areas combined)											
	1989	540,037.3	57.2	9,766	1	0.0492	0.0388	0.7882	3	1 to 7	b
Minke whale (<i>Balaenoptera acutorostrata</i>)											
Area 510											
	1989	412,075.1	60.6	8,438	1	0.0378	0.0227	0.5995	2	1 to 4	b
Bering Sea (all areas combined)											
	1989	540,006.2	57.2	9,764	1	0.0289	0.0173	0.5995	2	1 to 4	b
Alaska (all areas combined)											
	1989	540,037.3	57.2	9,766	1	0.0289	0.0173	0.5995	2	1 to 4	b
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>)											
Area 710											
	1990	102,014.8	69.9	4,091	0	-	-	-	8	-	d
Washington, Oregon, and California (all areas combined)											
	1990	172,081.1	62.8	5,439	0	-	-	-	8	-	d
Dall's porpoise (<i>Phocoenoides dalli</i>)											
Area 710											
	1990	102,014.8	69.9	4,091	1	0.1374	0.0736	0.5354	1	1 to 3	b
Area 720											
	1989	100,553.3	58.5	2,739	1	0.1393	0.0745	0.5348	1	1 to 3	b
	1990	61,628.2	51.0	1,030	0	-	-	-	2	-	d
Washington, Oregon, and California (all areas combined)											
	1989	204,809.9	66.4	7,285	1	0.0684	0.0366	0.5348	1	1 to 3	b
	1990	172,081.1	62.8	5,439	1	0.0815	0.0436	0.5354	3	1 to 3	b,d,e
Unidentified cetaceans ^f											
Area 710											
	1990	102,014.8	69.9	4,091	0	-	-	-	2	-	d

Table 4.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of JV hauls observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Alaska (all areas combined)										
1989	540,037.3	57.2	9,766	7	0.2471	0.0686	0.2776	15	7 to 21	c,d
1990	133,617.4	43.5	2,526	1	0.1424	0.0979	0.6880	2	1 to 5	b
Area 670										
1989	8,055.5	80.5	385	0	-	-	-	-	-	
1990	6,588.9	62.7	220	0	-	-	-	-	-	
Area 710										
1989	94,213.0	73.8	4,136	0	-	-	-	-	-	
1990	102,014.8	69.9	4,091	1	0.1374	0.0736	0.5354	11	1 to 11	b,d,e
Area 720										
1989	100,553.3	58.5	2,739	1	0.1393	0.0745	0.5348	1	1 to 3	b
1990	61,628.2	51.0	1,030	0	-	-	-	2	-	d
Area 730										
1989	1,988.2	55.3	25	0	-	-	-	-	-	
1990	1,849.2	61.7	98	0	-	-	-	-	-	
Area 740										
1989	NF	-	-	-	-	-	-	-	-	
1990	NF	-	-	-	-	-	-	-	-	
Washington, Oregon, and California (all areas combined)										
1989	204,809.9	66.4	7,285	1	0.0684	0.0366	0.5348	1	1 to 3	b
1990	172,081.1	62.8	5,439	1	0.0815	0.0436	0.5354	13	1 to 13	b,d,e

NF = No joint venture trawl fishing.

- ^a The U.S. joint venture groundfish fisheries in Alaska and the North Pacific during 1989 and 1990 were with the following countries: the People's Republic of China, Iceland, Japan, the Republic of Korea, Poland, and the former Soviet Union (Russia).
- ^b The estimated lower 95% confidence level was less than zero; the number of marine mammals monitored in hauls was used as a substitute.
- ^c The estimated lower 95% confidence level was less than the number of animals reported by U.S. observers; the number of marine mammals monitored in hauls was used as a substitute.
- ^d Reported bycatch occurred only in the nonsampled hauls of observed cruises.
- ^e The estimated upper 95% confidence level was less than the adjusted estimated bycatch; the latter was used as a substitute.
- ^f Includes cetaceans that may belong to one of the identified species.

Table 5.--Number of marine mammals, by species, incidentally caught by longline vessels of the domestic groundfish fishery in the U.S. Exclusive Economic Zone in the Bering Sea and Gulf of Alaska, 1989-2001, reported by U.S. fishery observers, including an estimation of the total incidental mortality by area and year. Catch rates are the ratio (\hat{R}) and standard error ($s(\hat{R})$) of the observed incidental take of marine mammals killed (or seriously injured) monitored during fishing operations to the observed groundfish catch (per 10,000 metric tons [t] basis). The coefficient of variation (CV) of the catch rate is also listed. Estimated mortality of marine mammals as bycatch is the adjusted ratio estimate (\hat{Y}_A) and its 95% confidence interval ($L_{95\%}$).

Species Area Year	Groundfish			Marine mammals							
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)			
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$		
<i>Steller sea lion (Eumetopias jubatus)</i>											
Area 521											
1993	43,375.1	29.4	3,040	1	0.8473	0.7225	0.8527	4	1 to 10	a	
Bering Sea (all areas combined)											
1993	103,077.9	26.2	8,331	1	0.3565	0.3040	0.8527	4	1 to 10	a	
Area 630											
1995	11,921.1	13.8	747	1	23.5821	23.2748	0.9870	28	1 to 83	a	
Area 650											
1990	7,367.6	2.6	47	1	37.5234	36.9446	0.9846	28	1 to 83	a	
2000	5,544.6	8.8	188	1	10.8508	9.8951	0.9119	6	1 to 17	a	
Gulf of Alaska (all areas combined)											
1990	31,771.6	20.4	2,268	1	8.7014	8.5672	0.9846	28	1 to 81	a	
1995	37,447.0	17.1	2,468	1	7.5072	7.4094	0.9870	28	1 to 83	a	
2000	34,883.9	13.5	1,538	1	1.7247	1.5728	0.9119	6	1 to 17	a	
Alaska (all areas combined)											
1990	96,431.3	55.4	7,390	1	2.8669	2.8227	0.9846	28	1 to 81	a	
1993	145,797.0	22.0	10,746	1	0.2521	0.2149	0.8527	4	1 to 10	a	
1995	170,850.6	24.4	11,205	1	1.6454	1.6240	0.9870	28	1 to 83	a	
2000	172,700.3	32.1	13,856	1	0.3484	0.3177	0.9119	6	1 to 17	a	
<i>Harbor seal (Phoca vitulina)</i>											
Area 524											
1993	2,228.9	29.8	115	1	16.9706	0	0	4	-	b	
Bering Sea (all areas combined)											
1993	103,077.9	26.2	8,331	1	0.3670	0	0	4	-	b	
Area 640											
1995	4,218.2	16.5	318	0	-	-	-	1	-	c	
Area 650											
1995	6,452.8	4.9	180	1	51.9617	54.7412	1.0535	34	1 to 104	a	
Gulf of Alaska (all areas combined)											
1995	37,447.0	17.1	2,468	1	8.9539	9.4329	1.0535	35	1 to 103	a,c	

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Harbor seal (<i>Phoca vitulina</i>) (continued)										
Alaska (all areas combined)										
1993	145,797.0	22.0	10,746	1	0.2594	0	0	4	-	b
1995	170,850.6	24.4	11,205	1	1.9625	2.0675	1.0535	35	1 to 103	a,c
Ribbon seal (<i>Phoca fasciata</i>)										
Area 521										
2001	51,519.7	31.9	3,931	1	0.5847	0.4786	0.8185	3	1 to 8	a
Bering Sea (all areas combined)										
2001	143,194.4	29.9	12,914	1	0.2104	0.1722	0.8185	3	1 to 8	a
Northern elephant seal (<i>Mirounga angustirostris</i>)										
Area 630										
1990	12,969.8	25.6	1,297	1	4.7233	4.3320	0.9172	7	1 to 18	a,c
1993	13,493.7	10.8	850	1	5.8633	5.5223	0.9418	8	1 to 23	a
Gulf of Alaska (all areas combined)										
1990	31,771.6	20.4	2,268	1	1.9281	1.7684	0.9172	7	1 to 18	a,c
1993	42,719.1	11.8	2,415	1	1.8520	1.7443	0.9418	8	1 to 23	a
Alaska (all areas combined)										
1990	96,431.3	55.4	7,390	1	0.6353	0.5826	0.9172	7	1 to 18	a,c
1993	145,797.0	22.0	10,746	1	0.5427	0.5111	0.9418	8	1 to 23	a
Unidentified pinnipeds ^d										
Area 509										
1995	15,878.6	24.7	966	0	-	-	-	1	-	c
Area 516										
1999	2,438.2	36.4	177	1	6.2859	3.6659	0.5832	2	1 to 4	a
Area 524										
2001	2,884.8	30.5	319	1	10.3529	8.3830	0.8097	3	1 to 8	a
Area 540										
1992	27,757.7	40.6	2,902	1	0.9682	0.7709	0.7962	3	1 to 7	a
Bering Sea (all areas combined)										
1992	129,967.6	33.6	10,748	1	0.2068	0.1646	0.7962	3	1 to 7	a
1995	133,403.6	26.5	8,737	0	-	-	-	1	-	c
1999	123,607.8	32.1	9,801	1	0.1240	0.0723	0.5832	2	1 to 4	a
2001	143,194.4	29.9	12,914	1	0.2086	0.1689	0.8097	3	1 to 8	a

Table 5.--Continued.

Species Area Year	Groundfish			Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)		Bycatch rate			Estimated bycatch		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Unidentified pinnipeds ^d (continued)										
Area 630										
1995	11,921.1	13.8	747	1	4.5043	4.0002	0.8881	5	1 to 15	a
Gulf of Alaska (all areas combined)										
1995	37,447.0	17.1	2,468	1	1.4339	1.2734	0.8881	5	1 to 15	a
Alaska (all areas combined)										
1992	176,585.3	28.0	13,356	1	0.1522	0.1212	0.7962	3	1 to 7	a
1995	170,850.6	24.4	11,205	1	0.3143	0.2791	0.8881	6	1 to 15	a,c
1999	156,282.4	27.9	11,155	1	0.0981	0.0572	0.5832	2	1 to 4	a
2001	172,371.8	26.7	14,503	1	0.1733	0.1403	0.8097	3	1 to 8	a
Sperm whale (<i>Physeter macrocephalus</i>) ^e										
Area 640										
1997	2,278.3	18.6	173	1	12.1777	9.9498	0.8171	3	1 to 8	a
2000	2,333.8	31.4	272	1	9.5728	7.1809	0.7501	2	1 to 6	a
Gulf of Alaska (all areas combined)										
1997	31,944.8	13.6	1,502	1	0.8685	0.7096	0.8171	3	1 to 8	a
2000	34,883.9	13.5	1,538	1	0.6404	0.4804	0.7501	2	1 to 6	a
Alaska (all areas combined)										
1997	193,223.5	28.1	11,082	1	0.1436	0.1173	0.8171	3	1 to 8	a
2000	172,700.3	32.1	13,856	1	0.1294	0.0970	0.7501	2	1 to 6	a
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>)										
Area 513										
1995	10,759.1	27.7	465	1	3.4105	2.9128	0.8541	4	1 to 10	a
Bering Sea (all areas combined)										
1995	133,403.6	26.5	8,737	1	0.2751	0.2349	0.8541	4	1 to 10	a
Alaska (all areas combined)										
1995	170,850.6	24.4	11,205	1	0.2148	0.1834	0.8541	4	1 to 10	a
Killer whale (<i>Orcinus orca</i>)										
Area 517										
1995	19,761.0	26.9	1,235	0	-	-	-	1	-	c
Area 521										
1999	41,927.7	32.8	2,912	1	0.5641	0.4280	0.7587	2	1 to 6	a

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 514 (continued)									
1993	6.8	0	0	-	-	-	-	-	-
1994	23.3	18.6	1	0	-	-	-	-	-
1995	21.4	13.7	1	0	-	-	-	-	-
1996	15.5	0	0	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-
1998	55.6	34.2	1	0	-	-	-	-	-
1999	34.0	48.1	16	0	-	-	-	-	-
2000	8.6	0	0	-	-	-	-	-	-
2001	121.4	5.1	5	0	-	-	-	-	-
Area 515									
1990	2,673.4	42.3	377	0	-	-	-	-	-
Area 516									
1990	44.2	4.3	1	0	-	-	-	-	-
1991	14.3	68.1	5	0	-	-	-	-	-
1992	322.6	26.1	67	0	-	-	-	-	-
1993	54.3	41.8	9	0	-	-	-	-	-
1994	14.1	0	0	-	-	-	-	-	-
1995	199.6	26.3	13	0	-	-	-	-	-
1996	530.8	15.3	24	0	-	-	-	-	-
1997	754.2	22.0	51	0	-	-	-	-	-
1998	710.5	26.6	35	0	-	-	-	-	-
1999	2,438.2	36.4	177	1	6.2859	3.6659	0.5832	2	1 to 4 ^a
2000	605.9	26.4	42	0	-	-	-	-	-
2001	3,108.7	29.6	192	0	-	-	-	-	-
Area 517									
1990	8,171.9	53.6	652	0	-	-	-	-	-
1991	11,854.6	33.0	449	0	-	-	-	-	-
1992	16,162.1	27.0	1,287	0	-	-	-	-	-
1993	7,584.7	25.3	532	0	-	-	-	-	-
1994	17,732.5	28.6	1,175	1	2.1754	1.8756	0.8622	4	1 to 11 ^a
1995	19,761.0	26.9	1,235	0	-	-	-	1	^c
1996	17,955.1	28.5	1,099	0	-	-	-	-	-
1997	21,685.5	31.4	1,325	0	-	-	-	-	-
1998	23,592.3	34.2	1,934	0	-	-	-	-	-
1999	19,700.3	34.4	1,551	0	-	-	-	1	^c
2000	27,247.0	36.1	2,275	0	-	-	-	-	-
2001	19,516.9	31.2	1,923	0	-	-	-	-	-
Area 518									
1991	1,062.7	69.9	280	0	-	-	-	-	-
1992	1,749.5	32.4	242	0	-	-	-	-	-
1993	3,358.5	25.3	405	0	-	-	-	-	-
1994	2,415.6	29.5	375	0	-	-	-	-	-
1995	3,284.0	30.2	462	0	-	-	-	-	-
1996	3,119.2	30.8	424	0	-	-	-	-	-
1997	1,544.6	26.1	168	0	-	-	-	-	-
1998	1,857.9	28.8	245	0	-	-	-	-	-

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 518 (continued)									
1999	2,618.5	34.3	360	0	-	-	-	-	-
2000	2,019.9	41.2	364	0	-	-	-	-	-
2001	2,283.6	30.7	282	0	-	-	-	-	-
Area 519									
1991	2,076.8	23.2	183	0	-	-	-	-	-
1992	2,112.1	20.9	186	0	-	-	-	-	-
1993	2,262.7	21.4	235	0	-	-	-	-	-
1994	1,745.4	19.7	199	0	-	-	-	-	-
1995	3,660.2	29.2	323	0	-	-	-	-	-
1996	1,434.8	24.3	136	0	-	-	-	-	-
1997	2,228.8	19.5	172	0	-	-	-	-	-
1998	1,267.3	24.5	144	0	-	-	-	-	-
1999	907.9	20.6	114	0	-	-	-	-	-
2000	2,327.1	31.0	238	0	-	-	-	-	-
2001	1,361.6	17.8	115	0	-	-	-	-	-
Area 520									
1989	11,327.2	0	0	-	-	-	-	-	-
Area 521									
1990	43,425.3	80.0	3,077	0	-	-	-	-	-
1991	66,371.2	54.1	3,123	0	-	-	-	-	-
1992	64,915.5	34.0	4,637	0	-	-	-	-	-
1993	43,375.1	29.4	3,040	1	0.8473	0.7225	0.8527	4	1 to 10 ^a
1994	55,632.2	24.6	3,443	0	-	-	-	-	-
1995	59,726.7	25.3	3,338	1	0.6723	0.5827	0.8667	4	1 to 11 ^a
1996	47,779.3	23.9	2,832	0	-	-	-	-	-
1997	71,510.7	30.3	3,594	0	-	-	-	-	-
1998	59,218.0	33.7	3,722	0	-	-	-	-	-
1999	41,927.7	32.8	2,912	1	0.5641	0.4280	0.7587	2	1 to 6 ^a
2000	45,324.6	37.4	3,623	0	-	-	-	-	-
2001	51,519.7	31.9	3,931	1	0.5847	0.4786	0.8185	3	1 to 8 ^a
Area 522									
1990	6,143.5	76.1	327	0	-	-	-	-	-
1991	11,139.1	60.3	501	0	-	-	-	-	-
1992	7,251.2	31.3	590	0	-	-	-	-	-
Area 523									
1993	5,004.3	26.7	338	0	-	-	-	-	-
1994	5,765.4	27.9	379	0	-	-	-	-	-
1995	8,895.1	28.2	599	0	-	-	-	-	-
1996	5,909.3	23.2	351	0	-	-	-	-	-
1997	8,006.2	29.9	480	0	-	-	-	-	-
1998	7,012.3	32.3	511	0	-	-	-	-	-
1999	5,578.4	26.0	386	0	-	-	-	-	-
2000	4,341.9	39.9	409	0	-	-	-	-	-
2001	3,025.5	28.2	309	0	-	-	-	-	-

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 524										
1993	2,228.9	29.8	115	1	16.9706	0	0	4	4	b
1994	2,854.3	27.4	151	0	-	-	-	-	-	
1995	1,534.0	25.7	63	0	-	-	-	-	-	
1996	2,078.8	25.1	91	0	-	-	-	-	-	
1997	5,969.1	35.7	269	0	-	-	-	-	-	
1998	2,613.6	35.1	210	0	-	-	-	-	-	
1999	2,586.6	36.7	185	0	-	-	-	-	-	
2000	1,551.6	66.7	157	0	-	-	-	-	-	
2001	2,884.8	30.5	319	1	10.3529	8.3830	0.8097	3	1 to 8	a
Area 530										
1989	NF	-	-	-	-	-	-	-	-	
1990	NF	-	-	-	-	-	-	-	-	
1991	NF	-	-	-	-	-	-	-	-	
1992	19.3	0	0	-	-	-	-	-	-	
1993	NF	-	-	-	-	-	-	-	-	
1994	1.5	0	0	-	-	-	-	-	-	
1995	NF	-	-	-	-	-	-	-	-	
1996	NF	-	-	-	-	-	-	-	-	
1997	NF	-	-	-	-	-	-	-	-	
1998	NF	-	-	-	-	-	-	-	-	
1999	NF	-	-	-	-	-	-	-	-	
2000	NF	-	-	-	-	-	-	-	-	
2001	0.1	0	0	-	-	-	-	-	-	
Area 540										
1989	3,377.0	0	0	-	-	-	-	-	-	
1990	3,245.2	53.5	627	0	-	-	-	-	-	
1991	7,402.8	64.7	1,118	0	-	-	-	-	-	
1992	27,757.7	40.6	2,902	1	0.9682	0.7709	0.7962	3	1 to 7	a
Area 541										
1993	22,934.9	16.4	1,532	0	-	-	-	-	-	
1994	7,021.3	25.3	1,023	0	-	-	-	-	-	
1995	7,361.2	30.4	960	0	-	-	-	-	-	
1996	6,794.0	32.0	924	0	-	-	-	-	-	
1997	8,092.5	29.8	836	0	-	-	-	-	-	
1998	11,678.2	36.0	1,351	0	-	-	-	-	-	
1999	6,621.3	25.5	759	0	-	-	-	-	-	
2000	8,160.9	39.1	1,138	0	-	-	-	-	-	
2001	6,511.8	28.7	950	0	-	-	-	-	-	
Area 542										
1993	4,155.8	35.6	739	0	-	-	-	-	-	
1994	4,424.1	32.2	680	0	-	-	-	-	-	
1995	2,026.1	34.4	297	0	-	-	-	-	-	
1996	2,544.7	22.8	362	0	-	-	-	-	-	
1997	3,242.2	38.0	353	0	-	-	-	-	-	

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 542 (continued)										
1998	6,100.4	47.6	780	0	-	-	-	-	-	
1999	5,120.1	29.0	659	0	-	-	-	-	-	
2000	7,676.3	47.4	1,239	0	-	-	-	-	-	
2001	4,196.9	34.9	815	0	-	-	-	-	-	
Area 543										
1993	5,865.5	32.2	703	0	-	-	-	-	-	
1994	613.9	25.8	164	0	-	-	-	-	-	
1995	269.3	12.5	14	0	-	-	-	-	-	
1996	684.5	15.2	54	0	-	-	-	-	-	
1997	38.5	0	0	-	-	-	-	-	-	
1998	1,260.5	38.0	121	0	-	-	-	-	-	
1999	501.4	12.8	18	0	-	-	-	-	-	
2000	8,363.3	29.0	578	0	-	-	-	-	-	
2001	14,792.7	28.1	1,374	0	-	-	-	-	-	
Bering Sea (all areas combined)										
1989	18,329.4	0	0	-	-	-	-	-	-	
1990	64,659.7	72.6	5,122	0	-	-	-	-	-	
1991	100,127.4	52.6	5,682	0	-	-	-	-	-	
1992	129,967.6	33.6	10,748	1	0.2068	0.1646	0.7962	3	1 to 7	a
1993	103,077.9	26.2	8,331	2	0.7235	0.3040	0.4202	8	2 to 14	b
1994	113,159.0	26.1	8,600	1	0.3409	0.2939	0.8622	4	1 to 11	a
1995	133,403.6	26.5	8,737	2	0.5761	0.3511	0.6094	10	2 to 17	a,c
1996	123,578.4	27.0	8,662	0	-	-	-	-	-	-
1997	161,278.7	31.0	9,580	0	-	-	-	-	-	-
1998	138,777.2	34.0	10,634	0	-	-	-	-	-	-
1999	123,607.8	32.1	9,801	2	0.3153	0.1622	0.5143	5	2 to 8	a,c
2000	137,816.4	36.7	12,318	0	-	-	-	-	-	-
2001	143,194.4	29.9	12,914	2	0.4189	0.2412	0.5757	6	2 to 13	a
Area 610										
1989	5,518.9	0	0	-	-	-	-	-	-	
1990	4,351.7	40.0	375	0	-	-	-	-	-	
1991	3,404.8	41.0	415	0	-	-	-	1	-	c
1992	10,733.0	27.0	1,049	0	-	-	-	-	-	
1993	8,393.7	17.3	469	0	-	-	-	-	-	
1994	4,810.4	13.2	209	0	-	-	-	-	-	
1995	10,555.7	31.3	1,052	0	-	-	-	-	-	
1996	7,693.0	23.4	556	0	-	-	-	-	-	
1997	8,216.0	23.5	553	0	-	-	-	-	-	
1998	7,686.9	22.6	418	0	-	-	-	-	-	
1999	9,303.2	20.8	539	0	-	-	-	-	-	
2000	8,042.4	21.8	479	0	-	-	-	-	-	
2001	7,247.7	18.0	543	0	-	-	-	-	-	
Area 620										
1989	2,428.0	0	0	-	-	-	-	-	-	
1990	2,227.7	30.5	266	0	-	-	-	-	-	
1991	3,195.8	30.1	296	0	-	-	-	-	-	

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 620 (continued)									
1992	4,602.0	24.0	438	0	-	-	-	-	-
1993	4,034.8	26.8	481	0	-	-	-	-	-
1994	2,526.7	28.5	249	0	-	-	-	-	-
1995	1,363.9	30.9	169	0	-	-	-	-	-
1996	1,998.2	29.4	180	0	-	-	-	-	-
1997	1,438.7	25.6	142	0	-	-	-	-	-
1998	2,253.4	41.9	199	0	-	-	-	-	-
1999	1,325.0	18.7	72	0	-	-	-	-	-
2000	1,411.3	37.3	144	0	-	-	-	-	-
2001	1,440.3	20.7	136	0	-	-	-	-	-
Area 630									
1989	9,529.6	0	0	-	-	-	-	-	-
1990	12,969.8	25.6	1,297	1	4.7233	4.3320	0.9172	7	1 to 18
1991	12,869.4	9.2	521	0	-	-	-	-	-
1992	15,571.1	7.0	719	0	-	-	-	-	-
1993	13,493.7	10.8	850	1	5.8633	5.5223	0.9418	8	1 to 23
1994	10,340.2	6.6	362	0	-	-	-	-	-
1995	11,921.1	13.8	747	2	28.0863	23.6160	0.8408	33	2 to 89
1996	10,644.5	12.3	608	0	-	-	-	-	-
1997	12,077.3	10.4	477	0	-	-	-	-	-
1998	12,277.0	7.9	343	0	-	-	-	-	-
1999	13,369.7	8.5	437	0	-	-	-	-	-
2000	14,957.9	8.1	455	0	-	-	-	-	-
2001	11,752.9	6.9	460	0	-	-	-	-	-
Area 640									
1989	6,976.8	0	0	-	-	-	-	-	-
1990	4,854.9	11.3	283	0	-	-	-	-	-
1991	4,437.2	17.2	357	0	-	-	-	-	-
1992	5,874.5	10.8	350	0	-	-	-	-	-
1993	5,944.1	16.6	563	0	-	-	-	-	-
1994	4,955.7	5.6	131	0	-	-	-	-	-
1995	4,218.2	16.5	318	0	-	-	-	1	-
1996	2,978.9	22.3	310	0	-	-	-	-	-
1997	2,278.3	18.6	173	1	12.1777	9.9498	0.8171	3	1 to 8
1998	2,179.6	19.6	192	0	-	-	-	-	-
1999	1,811.1	17.8	133	0	-	-	-	-	-
2000	2,333.8	31.4	272	1	9.5728	7.1809	0.7501	2	1 to 6
2001	2,040.7	23.7	254	0	-	-	-	-	-
Area 649									
1992	533.8	0	0	-	-	-	-	-	-
1993	591.3	2.0	9	0	-	-	-	-	-
1994	338.2	0	0	-	-	-	-	-	-
1995	449.1	0.3	2	0	-	-	-	-	-
1996	124.1	0	0	-	-	-	-	-	-
1997	244.8	0	0	-	-	-	-	-	-
1998	233.6	0	0	-	-	-	-	-	-
1999	352.5	0	0	-	-	-	-	-	-

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Area 649 (continued)										
2000	203.2	0	0	-	-	-	-	-	-	
2001	144.0	0	0	-	-	-	-	-	-	
Area 650										
1989	7,084.6	0	0	-	-	-	-	-	-	
1990	7,367.6	2.6	47	1	37.5234	36.9446	0.9846	28	1 to 83	a
1991	6,606.1	2.2	59	0	-	-	-	-	-	
1992	7,004.9	0.9	52	0	-	-	-	-	-	
1993	6,597.6	0.8	42	0	-	-	-	-	-	
1994	7,897.5	0.2	17	0	-	-	-	-	-	
1995	6,452.8	4.9	180	1	51.9617	54.7412	1.0535	34	1 to 104	a
1996	5,976.2	7.5	209	0	-	-	-	-	-	
1997	4,669.0	7.6	156	0	-	-	-	-	-	
1998	4,768.2	8.2	184	0	-	-	-	-	-	
1999	4,234.7	7.4	172	0	-	-	-	-	-	
2000	5,544.6	8.8	188	1	10.8508	9.8951	0.9119	6	1 to 17	a
2001	4,514.1	7.7	194	0	-	-	-	-	-	
Area 659										
1992	2,298.3	0	0	-	-	-	-	-	-	
1993	3,663.9	0	1	0	-	-	-	-	-	
1994	1,521.7	0	0	-	-	-	-	-	-	
1995	2,486.3	0	0	-	-	-	-	-	-	
1996	2,608.3	0	0	-	-	-	-	-	-	
1997	3,020.7	0	1	0	-	-	-	-	-	
1998	3,066.4	0.1	2	0	-	-	-	-	-	
1999	2,278.3	0	1	0	-	-	-	-	-	
2000	2,390.7	0	0	-	-	-	-	-	-	
2001	2,037.6	0	2	-	-	-	-	-	-	
Gulf of Alaska (all areas combined)										
1989	31,537.9	0	0	-	-	-	-	-	-	
1990	31,771.6	20.4	2,268	2	10.6295	8.7478	0.8230	35	2 to 89	a,c
1991	30,513.2	14.6	1,648	0	-	-	-	1	-	c
1992	46,617.7	12.4	2,608	0	-	-	-	-	-	
1993	42,719.1	11.8	2,415	1	1.8520	1.7443	0.9418	8	1 to 23	a
1994	32,390.5	7.2	968	0	-	-	-	-	-	
1995	37,447.0	17.1	2,468	3	17.8951	12.0624	0.6741	68	3 to 156	a,c
1996	32,027.4	15.0	1,863	0	-	-	-	-	-	
1997	31,944.8	13.6	1,502	1	0.8685	0.7096	0.8171	3	1 to 8	a
1998	32,465.1	13.8	1,338	0	-	-	-	-	-	
1999	32,674.6	12.1	1,354	0	-	-	-	-	-	
2000	34,883.9	13.5	1,538	2	2.3651	1.6445	0.6953	8	2 to 20	a
2001	29,177.4	11.1	1,589	0	-	-	-	-	-	
Alaska (all areas combined)										
1989	49,867.3	0	0	-	-	-	-	-	-	
1990	96,431.3	55.4	7,390	2	3.5022	2.8822	0.8230	35	2 to 89	a,c
1991	130,640.7	43.7	7,330	0	-	-	-	1	-	c
1992	176,585.3	28.0	13,356	1	0.1522	0.1212	0.7962	3	1 to 7	a

Table 5.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of longline sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
All marine mammal species combined (continued)										
Alaska (all areas combined) (continued)										
1993	145,797.0	22.0	10,746	3	1.0542	0.5545	0.5260	16	3 to 32	^a
1994	145,549.5	21.9	9,568	1	0.2650	0.2285	0.8622	4	1 to 11	^a
1995	170,850.6	24.4	11,205	5	4.3721	2.6580	0.6080	78	5 to 164	^{a,c}
1996	155,605.7	24.6	10,525	0	-	-	-	-	-	
1997	193,223.5	28.1	11,082	1	0.1436	0.1173	0.8171	3	1 to 8	^a
1998	171,242.8	30.2	11,972	0	-	-	-	-	-	
1999	156,282.4	27.9	11,155	2	0.2494	0.1283	0.5143	5	2 to 8	^{a,c}
2000	172,700.3	32.1	13,856	2	0.4777	0.3322	0.6953	8	2 to 20	^a
2001	172,371.8	26.7	14,503	2	0.3480	0.2004	0.5757	6	2 to 13	^a

NF = No longline fishing.

- ^a The estimated lower 95% confidence level was less than zero; the number of marine mammals monitored in hauls was used as a substitute.
- ^b The estimated lower 95% confidence level was less than the number of animals reported by U.S. observers; the number of marine mammals monitored in hauls was used as a substitute.
- ^c Reported bycatch occurred only in the nonsampled hauls of observed cruises.
- ^d Includes pinnipeds that may belong to one of the identified species.
- ^e No sperm whales have been observed killed by any type of groundfish fishery gear in Alaska. These estimates were based solely on one animal in each of two years which was observed caught and released with trailing longline gear; these takes were classified as serious injuries.

Table 6.--Number of marine mammals, by species, incidentally caught by pot fishery vessels of the domestic groundfish fishery in the U.S. Exclusive Economic Zone in the Bering Sea and Gulf of Alaska, 1989-2001, reported by U.S. fishery observers, including an estimation of the total incidental mortality by area and year. Catch rates are the ratio (\hat{R}) and standard error ($s(\hat{R})$) of the observed incidental take of marine mammals killed (or seriously injured) monitored during fishing operations to the observed groundfish catch (per 10,000 metric tons [t] basis). The coefficient of variation (CV) of the catch rate is also listed. Estimated mortality of marine mammals as bycatch is the adjusted ratio estimate (\hat{Y}_A) and its 95% confidence interval ($L_{95\%}$).

Species	Groundfish			Marine mammals							
	Area Year	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Harbor seal (<i>Phoca vitulina</i>)											
Area 512											
1995	271.7	56.6	36	1	113.4541	91.0995	0.8030	3	1 to 9	a	
Area 540											
1992	6,743.0	44.5	1,952	0	-	-	-	1	-	b	
Bering Sea (all areas combined)											
1992	15,039.6	32.5	3,669	0	-	-	-	1	-	b	
1995	21,407.2	19.5	3,099	1	1.4399	1.1562	0.8030	3	1 to 8	a	
Area 610											
1998	1,938.0	7.2	92	1	8.0322	5.1998	0.6474	2	1 to 4	a	
Area 630											
1995	9,891.4	5.6	543	0	-	-	-	1	-	b	
Gulf of Alaska (all areas combined)											
1995	16,412.2	7.7	999	0	-	-	-	1	-	b	
1998	12,133.8	6.1	422	1	1.2829	0.8305	0.6474	2	1 to 4	a	
Alaska (all areas combined)											
1992	25,378.4	23.0	4,688	0	-	-	-	1	-	b	
1995	37,819.4	14.4	4,098	1	0.8150	0.6544	0.8030	4	1 to 8	a,b	
1998	26,708.8	10.7	1,424	1	0.5828	0.3773	0.6474	2	1 to 4	a	
Unidentified phocids^c											
Area 542											
1999	780.7	27.2	231	1	17.6515	9.0324	0.5117	1	1 to 3	a	
Bering Sea (all areas combined)											
1999	17,631.2	16.2	1,856	1	0.7816	0.4000	0.5117	1	1 to 3	a	
Alaska (all areas combined)											
1999	37,158.6	10.7	2,562	1	0.3709	0.1898	0.5117	1	1 to 3	a	

Table 6.--Continued.

Species Area Year	Groundfish			Marine mammals						
	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Unidentified baleen whales ^d										
Area 513 1998	899.5	27.6	61	0	-	-	-	1	-	b
Bering Sea (all areas combined) 1998	14,575.0	14.6	1,002	0	-	-	-	1	-	b
Alaska (all areas combined) 1998	26,708.8	10.7	1,424	0	-	-	-	1	-	b
Sea otter (<i>Enhydra lutris</i>)										
Area 540 1992	6,743.0	44.5	1,952	8	26.0409	6.6577	0.2557	18	8 to 27	e
Bering Sea (all areas combined) 1992	15,039.6	32.5	3,669	8	11.6753	2.9849	0.2557	18	8 to 27	e
Alaska (all areas combined) 1992	25,378.4	23.0	4,688	8	6.9190	1.7689	0.2557	18	8 to 27	e
All marine mammal species combined										
Area 508										
1993	NF	-	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-	-
1995	71.3	50.4	13	0	-	-	-	-	-	-
1996	31.7	0	0	-	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-	-
2000	21.7	0	0	-	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-	-
Area 509										
1993	306.5	37.9	79	0	-	-	-	-	-	-
1994	2,380.4	19.2	315	0	-	-	-	-	-	-
1995	4,072.1	17.1	488	0	-	-	-	-	-	-
1996	8,890.1	12.0	680	0	-	-	-	-	-	-
1997	5,396.0	17.9	547	0	-	-	-	-	-	-
1998	3,041.5	15.6	244	0	-	-	-	-	-	-
1999	2,589.5	16.4	226	0	-	-	-	-	-	-
2000	4,817.7	7.1	138	0	-	-	-	-	-	-
2001	2,801.3	7.9	110	0	-	-	-	-	-	-
Area 510										
1989	89.1	0	0	-	-	-	-	-	-	-

Table 6.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 511									
1990	603.8	39.8	150	0	-	-	-	-	-
1991	877.7	20.6	69	0	-	-	-	-	-
1992	1,623.5	44.6	529	0	-	-	-	-	-
Area 512									
1990	13.0	42.2	4	0	-	-	-	-	-
1991	NF	-	-	-	-	-	-	-	-
1992	NF	-	-	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-
1995	271.7	56.6	36	1	113.4541	91.0995	0.8030	3	1 to 9 ^a
1996	858.1	5.0	62	0	-	-	-	-	-
1997	132.1	1.3	5	0	-	-	-	-	-
1998	9.1	0	0	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Area 513									
1990	191.1	50.1	117	0	-	-	-	-	-
1991	1.7	5.5	1	0	-	-	-	-	-
1992	1,551.0	5.7	149	0	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	0.6	74.1	6	0	-	-	-	-	-
1995	17.4	38.7	4	0	-	-	-	-	-
1996	59.4	0.7	2	0	-	-	-	-	-
1997	117.9	2.7	3	0	-	-	-	-	-
1998	899.5	27.6	61	0	-	-	-	1	- ^b
1999	305.4	12.1	27	0	-	-	-	-	-
2000	909.1	16.6	42	0	-	-	-	-	-
2001	849.3	21.9	47	0	-	-	-	-	-
Area 514									
1990	NF	-	-	-	-	-	-	-	-
1991	10.2	0	0	-	-	-	-	-	-
1992	38.0	0	0	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	0.2	77.8	2	0	-	-	-	-	-
1995	2.6	47.6	2	0	-	-	-	-	-
1996	21.6	0	0	-	-	-	-	-	-
1997	3.7	40.9	1	0	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Area 515									
1990	490.4	33.6	174	0	-	-	-	-	-

Table 6.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 516									
1990	1.6	0	0	-	-	-	-	-	-
1991	29.4	97.3	17	0	-	-	-	-	-
1992	12.4	0	0	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-
1995	9.2	72.9	7	0	-	-	-	-	-
1996	1,250.9	33.2	164	0	-	-	-	-	-
1997	223.1	11.6	24	0	-	-	-	-	-
1998	52.7	0	0	-	-	-	-	-	-
1999	6.7	29.6	1	0	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	0.3	0	0	-	-	-	-	-	-
Area 517									
1990	299.4	21.4	79	0	-	-	-	-	-
1991	555.0	45.1	111	0	-	-	-	-	-
1992	671.1	50.3	203	0	-	-	-	-	-
1993	299.7	68.4	89	0	-	-	-	-	-
1994	640.8	38.7	210	0	-	-	-	-	-
1995	2,624.8	27.6	568	0	-	-	-	-	-
1996	2,250.8	31.4	503	0	-	-	-	-	-
1997	2,473.0	33.3	273	0	-	-	-	-	-
1998	686.8	26.6	134	0	-	-	-	-	-
1999	1,240.3	26.6	197	0	-	-	-	-	-
2000	3,538.6	12.2	225	0	-	-	-	-	-
2001	2,039.5	21.5	129	0	-	-	-	-	-
Area 518									
1991	215.8	6.3	25	0	-	-	-	-	-
1992	784.5	22.3	240	0	-	-	-	-	-
1993	341.9	24.8	93	0	-	-	-	-	-
1994	430.5	32.6	71	0	-	-	-	-	-
1995	609.8	22.8	116	0	-	-	-	-	-
1996	1,021.0	17.6	136	0	-	-	-	-	-
1997	332.7	14.8	85	0	-	-	-	-	-
1998	296.9	10.0	30	0	-	-	-	-	-
1999	700.5	15.3	90	0	-	-	-	-	-
2000	376.1	18.3	87	0	-	-	-	-	-
2001	58.6	2.0	8	0	-	-	-	-	-
Area 519									
1991	1,993.7	24.0	227	0	-	-	-	-	-
1992	2,673.7	15.9	405	0	-	-	-	-	-
1993	1,278.8	37.4	368	0	-	-	-	-	-
1994	4,934.5	27.5	787	0	-	-	-	-	-
1995	12,419.1	13.7	1,275	0	-	-	-	-	-
1996	13,761.1	15.5	1,263	0	-	-	-	-	-
1997	13,541.6	13.9	706	0	-	-	-	-	-
1998	8,449.3	12.2	441	0	-	-	-	-	-

Table 6.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 519 (continued)									
1999	7,342.2	10.9	467	0	-	-	-	-	-
2000	6,836.4	6.6	280	0	-	-	-	-	-
2001	8,079.8	12.4	535	0	-	-	-	-	-
Area 520									
1989	56.9	0	0	-	-	-	-	-	-
Area 521									
1990	259.3	34.8	93	0	-	-	-	-	-
1991	102.4	29.3	65	0	-	-	-	-	-
1992	920.4	14.3	175	0	-	-	-	-	-
1993	5.3	100.0	15	0	-	-	-	-	-
1994	180.0	32.4	40	0	-	-	-	-	-
1995	166.8	43.6	49	0	-	-	-	-	-
1996	878.9	16.0	119	0	-	-	-	-	-
1997	396.1	43.9	101	0	-	-	-	-	-
1998	350.5	21.8	39	0	-	-	-	-	-
1999	508.3	19.6	24	0	-	-	-	-	-
2000	355.2	30.9	61	0	-	-	-	-	-
2001	1,916.2	9.9	64	0	-	-	-	-	-
Area 522									
1990	30.2	77.1	22	0	-	-	-	-	-
1991	8.7	43.3	5	0	-	-	-	-	-
1992	22.1	36.9	16	0	-	-	-	-	-
Area 523									
1993	NF	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-
1995	NF	-	-	-	-	-	-	-	-
1996	119.6	0	0	-	-	-	-	-	-
1997	1.3	0	0	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-
2000	<0.1	100.0	3	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Area 524									
1993	NF	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-
1995	NF	-	-	-	-	-	-	-	-
1996	NF	-	-	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-
1998	304.1	1.7	9	0	-	-	-	-	-
1999	556.4	6.5	20	0	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	1,497.8	30.3	65	0	-	-	-	-	-

Table 6.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 543 (continued)									
1999	1,366.0	29.7	153	0	-	-	-	-	-
2000	224.2	14.9	11	0	-	-	-	-	-
2001	387.9	25.9	138	0	-	-	-	-	-
Bering Sea (all areas combined)									
1989	173.3	0	0	-	-	-	-	-	-
1990	1,889.2	36.2	639	0	-	-	-	-	-
1991	7,102.4	34.4	920	0	-	-	-	-	-
1992	15,039.6	32.5	3,669	8	11.6753	2.9849	0.2557	19	8 to 27
1993	2,232.1	39.8	644	0	-	-	-	-	-
1994	8,765.7	25.8	1,437	0	-	-	-	-	-
1995	21,407.2	19.5	3,099	1	1.4399	1.1562	0.8030	3	1 to 8
1996	34,492.0	17.0	3,714	0	-	-	-	-	-
1997	23,215.2	17.5	1,775	0	-	-	-	-	-
1998	14,575.0	14.6	1,002	0	-	-	-	1	-
1999	17,631.2	16.2	1,856	1	0.7816	0.4000	0.5117	1	1 to 3
2000	20,232.1	9.4	1,152	0	-	-	-	-	-
2001	18,001.6	15.3	1,347	0	-	-	-	-	-
Area 610									
1989	102.7	0	0	-	-	-	-	-	-
1990	168.4	5.1	4	0	-	-	-	-	-
1991	1,097.8	4.8	15	0	-	-	-	-	-
1992	800.1	11.7	65	0	-	-	-	-	-
1993	687.6	5.0	29	0	-	-	-	-	-
1994	1,275.1	0.6	8	0	-	-	-	-	-
1995	2,720.5	11.5	145	0	-	-	-	-	-
1996	1,828.2	4.6	79	0	-	-	-	-	-
1997	1,308.9	10.7	57	0	-	-	-	-	-
1998	1,938.0	7.2	92	1	8.0322	5.1998	0.6474	2	1 to 4
1999	2,963.6	8.3	111	0	-	-	-	-	-
2000	4,992.9	2.5	49	0	-	-	-	-	-
2001	3,138.2	8.7	187	0	-	-	-	-	-
Area 620									
1989	17.0	0	0	-	-	-	-	-	-
1990	638.8	41.0	226	0	-	-	-	-	-
1991	3,312.4	8.3	133	0	-	-	-	-	-
1992	1,905.2	13.8	286	0	-	-	-	-	-
1993	2,441.3	10.6	154	0	-	-	-	-	-
1994	1,407.8	0	0	-	-	-	-	-	-
1995	3,258.0	8.7	249	0	-	-	-	-	-
1996	3,336.1	4.7	101	0	-	-	-	-	-
1997	1,942.5	0.5	18	0	-	-	-	-	-
1998	4,033.8	6.1	61	0	-	-	-	-	-
1999	8,468.1	6.1	296	0	-	-	-	-	-
2000	3,754.2	13.5	218	0	-	-	-	-	-
2001	2,184.6	2.3	42	0	-	-	-	-	-

Table 6.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of pot sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 650 (continued)									
1996	NF	-	-	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-
1999	7.6	0	0	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	0.3	6.4	1	0	-	-	-	-	-
Area 659									
1992	<0.1	0	0	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	NF	-	-	-	-	-	-	-	-
1995	<0.1	0	0	-	-	-	-	-	-
1996	NF	-	-	-	-	-	-	-	-
1997	5.9	0	0	-	-	-	-	-	-
1998	10.6	0	0	-	-	-	-	-	-
1999	44.2	0	0	-	-	-	-	-	-
2000	39.6	0	0	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Gulf of Alaska (all areas combined)									
1989	415.3	0	0	-	-	-	-	-	-
1990	7,449.2	12.3	834	0	-	-	-	-	-
1991	10,613.5	9.3	844	0	-	-	-	-	-
1992	10,338.8	9.1	1,019	0	-	-	-	-	-
1993	9,937.5	6.6	368	0	-	-	-	-	-
1994	9,345.5	6.8	464	0	-	-	-	-	-
1995	16,412.2	7.7	999	0	-	-	-	1	-
1996	12,438.5	4.6	452	0	-	-	-	-	-
1997	9,684.0	3.7	255	0	-	-	-	-	-
1998	12,133.8	6.1	422	1	1.2829	0.8305	0.6474	2	1 to 4
1999	19,527.4	5.7	706	0	-	-	-	-	-
2000	17,918.7	6.9	710	0	-	-	-	-	-
2001	7,795.9	5.5	384	0	-	-	-	-	-
Alaska (all areas combined)									
1989	588.6	0	0	-	-	-	-	-	-
1990	9,338.4	17.1	1,473	0	-	-	-	-	-
1991	17,715.9	19.4	1,764	0	-	-	-	-	-
1992	25,378.4	23.0	4,688	8	6.9190	1.7689	0.2557	19	8 to 27
1993	12,169.7	12.7	1,012	0	-	-	-	-	-
1994	18,111.1	16.0	1,901	0	-	-	-	-	-
1995	37,819.4	14.4	4,098	1	0.8150	0.6544	0.8030	4	1 to 8
1996	46,930.5	13.7	4,166	0	-	-	-	-	-
1997	32,899.3	13.5	2,030	0	-	-	-	-	-
1998	26,708.8	10.7	1,424	1	0.5828	0.3773	0.6474	3	1 to 4
1999	37,158.6	10.7	2,562	1	0.3709	0.1898	0.5117	1	1 to 3
2000	38,150.8	8.2	1,862	0	-	-	-	-	-
2001	25,797.5	12.3	1,731	0	-	-	-	-	-

Table 6.--Continued.

NF = No fishing with pots.

- ^a The estimated lower 95% confidence level was less than zero; the number of marine mammals monitored in hauls was used as a substitute.
- ^b Reported bycatch occurred only in the nonsampled hauls of observed cruises.
- ^c The observed, unidentified phocid may have been a harbor seal, but the canine tooth specimen did not appear to be a typical harbor seal tooth. If it was not a harbor seal, then it would be the first known occurrence of another phocid species caught by pot fishing gear in the groundfish fisheries in Alaska.
- ^d An unidentified baleen whale with trailing gear is the only cetacean known to have been impacted by pot gear in Alaska during 1989-2001.
- ^e The estimated lower 95% confidence level was less than the number of animals reported by U.S. observers; the number of marine mammals monitored in hauls was used as a substitute.

Table 7.--Number of marine mammals, by species, incidentally caught by jig fishery vessels of the domestic groundfish fishery in the U.S. Exclusive Economic Zone in the Bering Sea and Gulf of Alaska, 1989-2001, reported by U.S. fishery observers, including an estimation of the total incidental mortality by area and year. Catch rates are the ratio (\hat{R}) and standard error ($s(\hat{R})$) of the observed incidental take of marine mammals killed (or seriously injured) monitored during fishing operations to the observed groundfish catch (per 10,000 metric tons [t] basis). The coefficient of variation (CV) of the catch rate is also listed. Estimated mortality of marine mammals as bycatch is the adjusted ratio estimate (\hat{Y}_A) and its 95% confidence interval ($L_{95\%}$).

Species	Groundfish				Marine mammals					
	Area	Total catch (t)	Percent of catch observed	Number of jig sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
Dall's porpoise (<i>Phocoenoides dalli</i>)										
Area 517										
1995	0.6	100.0	1	1	16,393.443	0	0	1	1	
Bering Sea (all areas combined)										
1995	616.2	0.1	1	1	16.229	0	0	1	-	
Alaska (all areas combined)										
1995	1,217.1	0.1	1	1	8.216	0	0	1	-	
All marine mammal species combined										
Area 508										
1993	NF	-	-	-	-	-	-	-	-	
1994	NF	-	-	-	-	-	-	-	-	
1995	NF	-	-	-	-	-	-	-	-	
1996	NF	-	-	-	-	-	-	-	-	
1997	NF	-	-	-	-	-	-	-	-	
1998	5.0	0	0	-	-	-	-	-	-	
1999	NF	-	-	-	-	-	-	-	-	
2000	NF	-	-	-	-	-	-	-	-	
2001	NF	-	-	-	-	-	-	-	-	
Area 509										
1993	NF	-	-	-	-	-	-	-	-	
1994	NF	-	-	-	-	-	-	-	-	
1995	NF	-	-	-	-	-	-	-	-	
1996	0.8	0	0	-	-	-	-	-	-	
1997	NF	-	-	-	-	-	-	-	-	
1998	NF	-	-	-	-	-	-	-	-	
1999	NF	-	-	-	-	-	-	-	-	
2000	NF	-	-	-	-	-	-	-	-	
2001	6.5	0	0	-	-	-	-	-	-	
Area 510	[No jig fishing in this area during 1989]									
Area 511	[No jig fishing in this area during 1990-1992]									
Area 512	[No jig fishing in this area during 1990-2001]									
Area 513	[No jig fishing in this area during 1990-2001]									

Table 7.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of jig sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 514 [No jig fishing in this area during 1990-2001]									
Area 515 [No jig fishing in this area during 1990]									
Area 516 [No jig fishing in this area during 1990-2001]									
Area 517									
1990	NF	-	-	-	-	-	-	-	-
1991	NF	-	-	-	-	-	-	-	-
1992	NF	-	-	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	3.4	100.0	2	0	-	-	-	-	-
1995	0.6	100.0	1	1	16,393.443	0	0	1	1
1996	NF	-	-	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Area 518									
1991	NF	-	-	-	-	-	-	-	-
1992	NF	-	-	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	28.6	0	0	-	-	-	-	-	-
1995	NF	-	-	-	-	-	-	-	-
1996	7.7	0	0	-	-	-	-	-	-
1997	NF	-	-	-	-	-	-	-	-
1998	NF	-	-	-	-	-	-	-	-
1999	NF	-	-	-	-	-	-	-	-
2000	NF	-	-	-	-	-	-	-	-
2001	2.6	0	0	-	-	-	-	-	-
Area 519									
1991	NF	-	-	-	-	-	-	-	-
1992	0.7	0	0	-	-	-	-	-	-
1993	2.4	0	0	-	-	-	-	-	-
1994	807.6	1.0	7	0	-	-	-	-	-
1995	615.6	0	0	-	-	-	-	-	-
1996	264.3	0	0	-	-	-	-	-	-
1997	200.5	0	0	-	-	-	-	-	-
1998	191.0	0	0	-	-	-	-	-	-
1999	100.1	0	0	-	-	-	-	-	-
2000	39.0	0.1	5	0	-	-	-	-	-
2001	45.4	0	0	-	-	-	-	-	-
Area 520 [No jig fishing in this area during 1989]									
Area 521 [No jig fishing in this area during 1990-2001]									

Table 7.--Continued.

Species	Groundfish			Marine mammals						
	Area Year	Total catch (t)	Percent of catch observed	Number of jig sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
						\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)										
Area 522 [No jig fishing in this area during 1990-1992]										
Area 523 [No jig fishing in this area during 1993-2001]										
Area 524 [No jig fishing in this area during 1993-2001]										
Area 530 [No jig fishing in this area during 1989-2001]										
Area 540 [No jig fishing in this area during 1989-1992]										
Area 541										
	1993	32.5	0	0	-	-	-	-	-	-
	1994	2.8	0	0	-	-	-	-	-	-
	1995	NF	-	-	-	-	-	-	-	-
	1996	0.5	0	0	-	-	-	-	-	-
	1997	NF	-	-	-	-	-	-	-	-
	1998	NF	-	-	-	-	-	-	-	-
	1999	71.8	0	0	-	-	-	-	-	-
	2000	31.2	0	0	-	-	-	-	-	-
	2001	19.1	0	0	-	-	-	-	-	-
Area 542										
	1993	NF	-	-	-	-	-	-	-	-
	1994	NF	-	-	-	-	-	-	-	-
	1995	NF	-	-	-	-	-	-	-	-
	1996	NF	-	-	-	-	-	-	-	-
	1997	NF	-	-	-	-	-	-	-	-
	1998	NF	-	-	-	-	-	-	-	-
	1999	NF	-	-	-	-	-	-	-	-
	2000	3.4	0	0	-	-	-	-	-	-
	2001	NF	-	-	-	-	-	-	-	-
Area 543 [No jig fishing in this area during 1993-2001]										
Bering Sea (all areas combined)										
	1989	NF	-	-	-	-	-	-	-	-
	1990	NF	-	-	-	-	-	-	-	-
	1991	NF	-	-	-	-	-	-	-	-
	1992	0.7	0	0	-	-	-	-	-	-
	1993	34.9	0	0	-	-	-	-	-	-
	1994	842.3	1.4	9	0	-	-	-	-	-
	1995	616.2	0.1	1	1	16.229	0	0	1	-
	1996	273.3	0	0	-	-	-	-	-	-
	1997	200.5	0	0	-	-	-	-	-	-
	1998	196.0	0	0	-	-	-	-	-	-
	1999	172.0	0	0	-	-	-	-	-	-
	2000	73.7	0	5	0	-	-	-	-	-
	2001	73.7	0	0	-	-	-	-	-	-

Table 7.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of jig sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 610									
1989	NF	-	-	-	-	-	-	-	-
1990	NF	-	-	-	-	-	-	-	-
1991	34.8	0	0	-	-	-	-	-	-
1992	60.7	0	0	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	81.5	0	0	-	-	-	-	-	-
1995	72.1	0	0	-	-	-	-	-	-
1996	266.0	0	0	-	-	-	-	-	-
1997	73.5	0	0	-	-	-	-	-	-
1998	67.4	0	0	-	-	-	-	-	-
1999	64.9	0	0	-	-	-	-	-	-
2000	56.9	0	0	-	-	-	-	-	-
2001	210.7	0	0	-	-	-	-	-	-
Area 620									
1989	NF	-	-	-	-	-	-	-	-
1990	NF	-	-	-	-	-	-	-	-
1991	116.6	0	0	-	-	-	-	-	-
1992	3.6	0	0	-	-	-	-	-	-
1993	NF	-	-	-	-	-	-	-	-
1994	14.5	0	0	-	-	-	-	-	-
1995	1.3	0	0	-	-	-	-	-	-
1996	46.6	0	0	-	-	-	-	-	-
1997	32.0	0	0	-	-	-	-	-	-
1998	60.9	0	0	-	-	-	-	-	-
1999	13.4	0	0	-	-	-	-	-	-
2000	44.8	0	0	-	-	-	-	-	-
2001	39.8	0	0	-	-	-	-	-	-
Area 630									
1989	NF	-	-	-	-	-	-	-	-
1990	0.9	0	0	-	-	-	-	-	-
1991	363.6	0	0	-	-	-	-	-	-
1992	410.3	0.2	34	0	-	-	-	-	-
1993	113.2	0	0	-	-	-	-	-	-
1994	267.2	0	0	-	-	-	-	-	-
1995	441.2	0	0	-	-	-	-	-	-
1996	224.6	0	0	-	-	-	-	-	-
1997	191.3	0	0	-	-	-	-	-	-
1998	109.8	0	0	-	-	-	-	-	-
1999	89.7	0	0	-	-	-	-	-	-
2000	149.8	0	0	-	-	-	-	-	-
2001	103.7	0	0	-	-	-	-	-	-
Area 640									
1989	NF	-	-	-	-	-	-	-	-
1990	NF	-	-	-	-	-	-	-	-
1991	2.7	0	0	-	-	-	-	-	-
1992	1.2	0	0	-	-	-	-	-	-

Table 7.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of jig sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Area 640 (continued)									
1993	NF	-	-	-	-	-	-	-	-
1994	9.9	0	0	-	-	-	-	-	-
1995	21.2	0	0	-	-	-	-	-	-
1996	13.1	0	0	-	-	-	-	-	-
1997	0.3	0	0	-	-	-	-	-	-
1998	1.3	0	0	-	-	-	-	-	-
1999	27.4	0	0	-	-	-	-	-	-
2000	0.1	0	0	-	-	-	-	-	-
2001	0.2	0	0	-	-	-	-	-	-
Area 649									
1992	2.6	0	0	-	-	-	-	-	-
1993	4.1	0	0	-	-	-	-	-	-
1994	0.6	0	0	-	-	-	-	-	-
1995	4.6	0	0	-	-	-	-	-	-
1996	2.0	0	0	-	-	-	-	-	-
1997	12.1	0	0	-	-	-	-	-	-
1998	14.2	0	0	-	-	-	-	-	-
1999	6.9	0	0	-	-	-	-	-	-
2000	0.6	0	0	-	-	-	-	-	-
2001	NF	-	-	-	-	-	-	-	-
Area 650									
1989	NF	-	-	-	-	-	-	-	-
1990	0.2	0	0	-	-	-	-	-	-
1991	18.3	0	0	-	-	-	-	-	-
1992	17.2	0	0	-	-	-	-	-	-
1993	13.9	0	0	-	-	-	-	-	-
1994	44.3	0	0	-	-	-	-	-	-
1995	57.9	0	0	-	-	-	-	-	-
1996	45.1	0	0	-	-	-	-	-	-
1997	29.0	0	0	-	-	-	-	-	-
1998	30.0	0	0	-	-	-	-	-	-
1999	23.9	0	0	-	-	-	-	-	-
2000	21.3	0	0	-	-	-	-	-	-
2001	11.4	0	0	-	-	-	-	-	-
Area 659									
1992	0.3	0	0	-	-	-	-	-	-
1993	7.7	0	0	-	-	-	-	-	-
1994	4.7	0	0	-	-	-	-	-	-
1995	2.6	0	0	-	-	-	-	-	-
1996	16.4	0	0	-	-	-	-	-	-
1997	2.1	0	0	-	-	-	-	-	-
1998	1.7	0	0	-	-	-	-	-	-
1999	0.5	0	0	-	-	-	-	-	-
2000	1.1	0	0	-	-	-	-	-	-
2001	0.4	0	0	-	-	-	-	-	-

Table 7.--Continued.

Species Area Year	Groundfish			Marine mammals					
	Total catch (t)	Percent of catch observed	Number of jig sets observed (n)	Number of marine mammals monitored in hauls	Bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)	
					\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$
All marine mammal species combined (continued)									
Gulf of Alaska (all areas combined)									
1989	NF	-	-	-	-	-	-	-	-
1990	1.1	0	0	-	-	-	-	-	-
1991	536.1	0	0	-	-	-	-	-	-
1992	495.9	0.2	34	0	-	-	-	-	-
1993	138.9	0	0	-	-	-	-	-	-
1994	422.7	0	0	-	-	-	-	-	-
1995	600.9	0	0	-	-	-	-	-	-
1996	613.7	0	0	-	-	-	-	-	-
1997	340.2	0	0	-	-	-	-	-	-
1998	285.3	0	0	-	-	-	-	-	-
1999	226.8	0	0	-	-	-	-	-	-
2000	274.6	0	0	-	-	-	-	-	-
2001	366.2	0	0	-	-	-	-	-	-
Alaska (all areas combined)									
1989	NF	-	-	-	-	-	-	-	-
1990	1.1	0	0	-	-	-	-	-	-
1991	536.1	0	0	-	-	-	-	-	-
1992	496.6	0.2	34	0	-	-	-	-	-
1993	173.8	0	0	-	-	-	-	-	-
1994	1,265.0	0.9	9	0	-	-	-	-	-
1995	1,217.1	0.1	1	1	8.216	0	0	1	-
1996	887.0	0	0	-	-	-	-	-	-
1997	540.7	0	0	-	-	-	-	-	-
1998	481.4	0	0	-	-	-	-	-	-
1999	398.8	0	0	-	-	-	-	-	-
2000	348.3	0	5	0	-	-	-	-	-
2001	439.9	0	0	-	-	-	-	-	-

NF = No fishing with jigs.

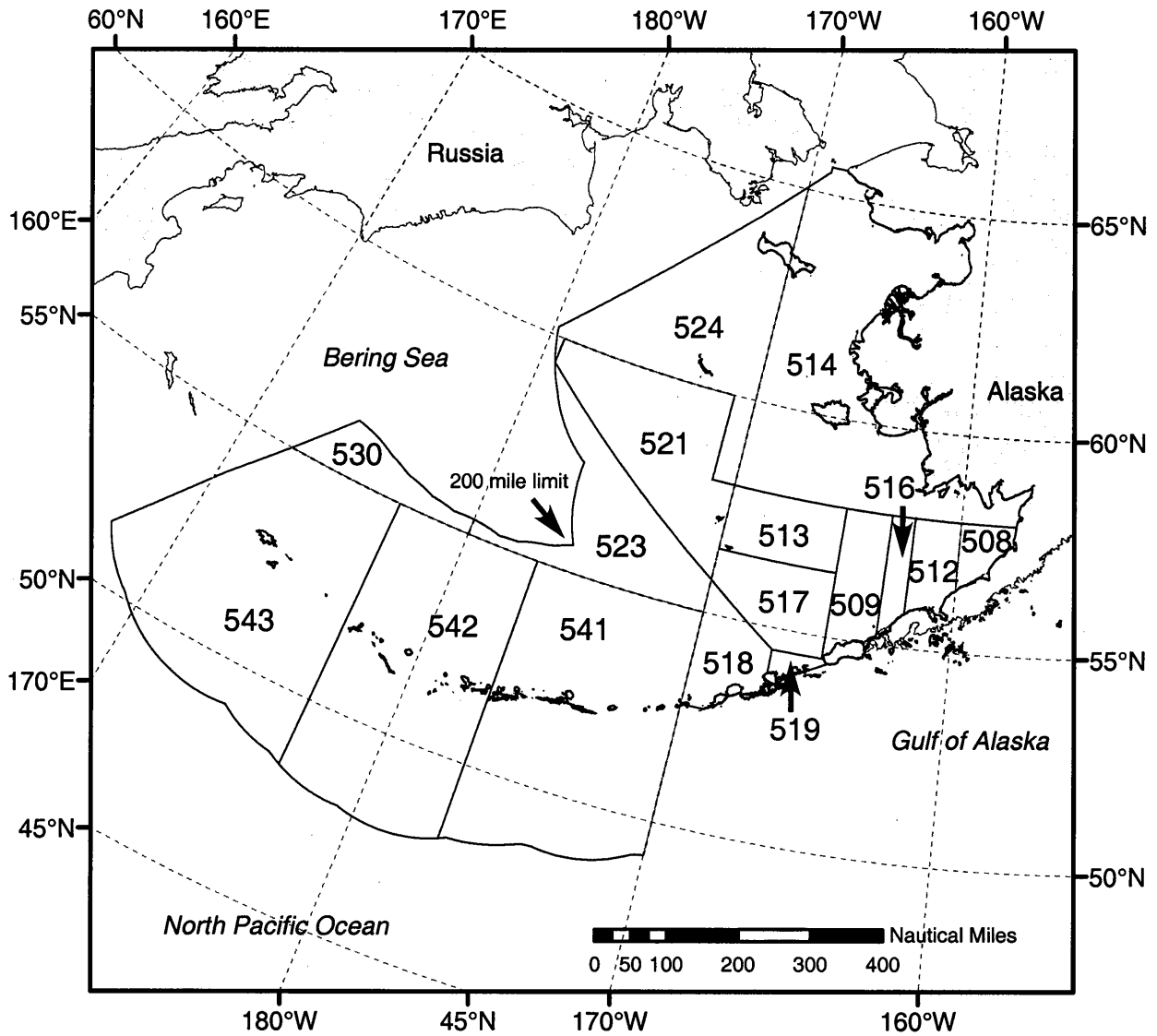


Figure 1. Statistical fishing areas in the Bering Sea and Aleutian Islands region used to summarize catch and effort data. See Appendix Table 1 for a list of fishery area changes that occurred during 1989-2000 by merging and splitting some of these areas.

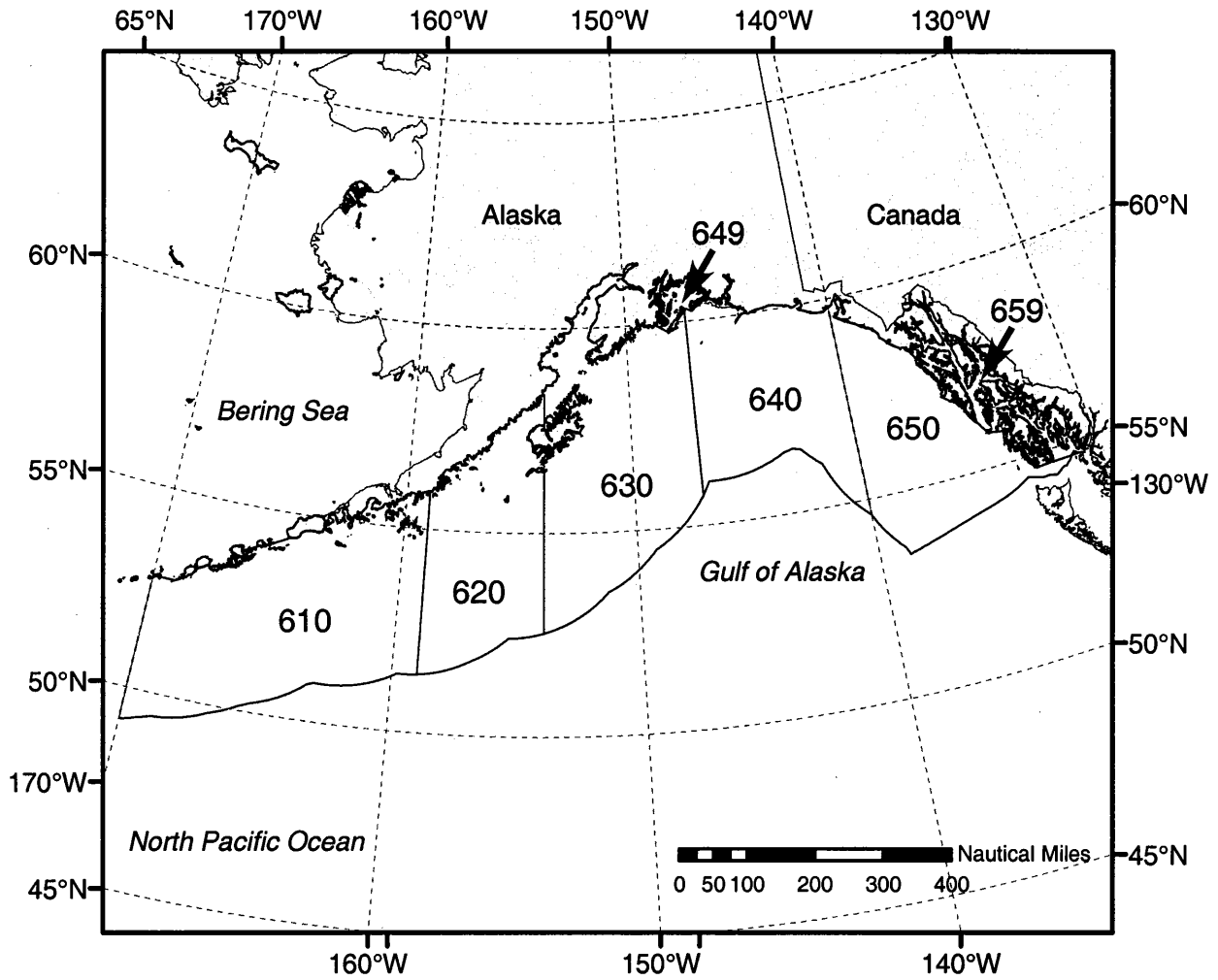


Figure 2. Statistical fishing areas in the Gulf of Alaska region used to summarize catch and effort data. See Appendix Table 1 for a list of fishery area changes that occurred during 1989-2000 by merging and splitting some of these areas.

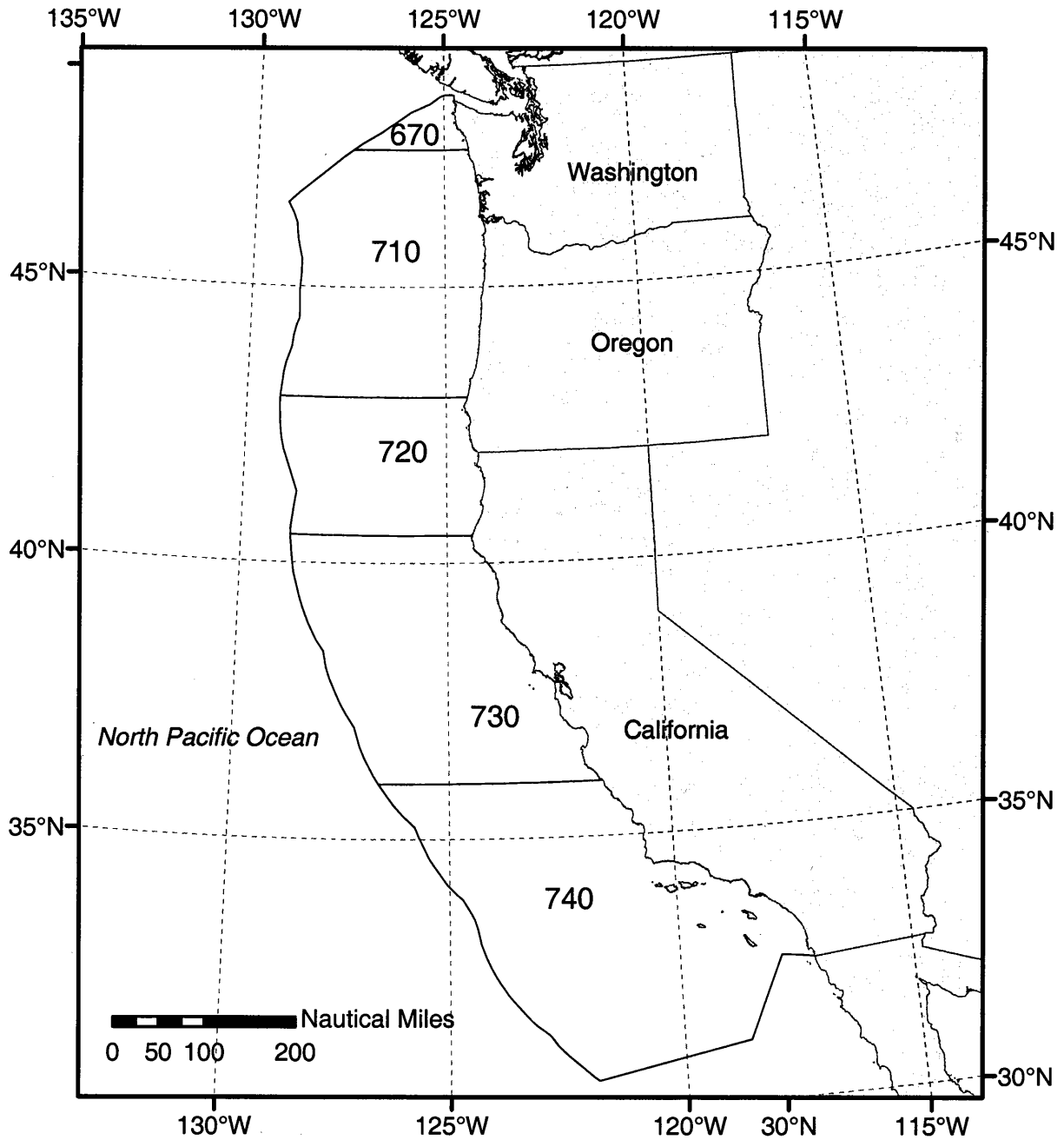


Figure 3. Statistical fishing areas in the North Pacific Ocean off the coasts of Washington, Oregon, and California used to summarize catch and effort data.

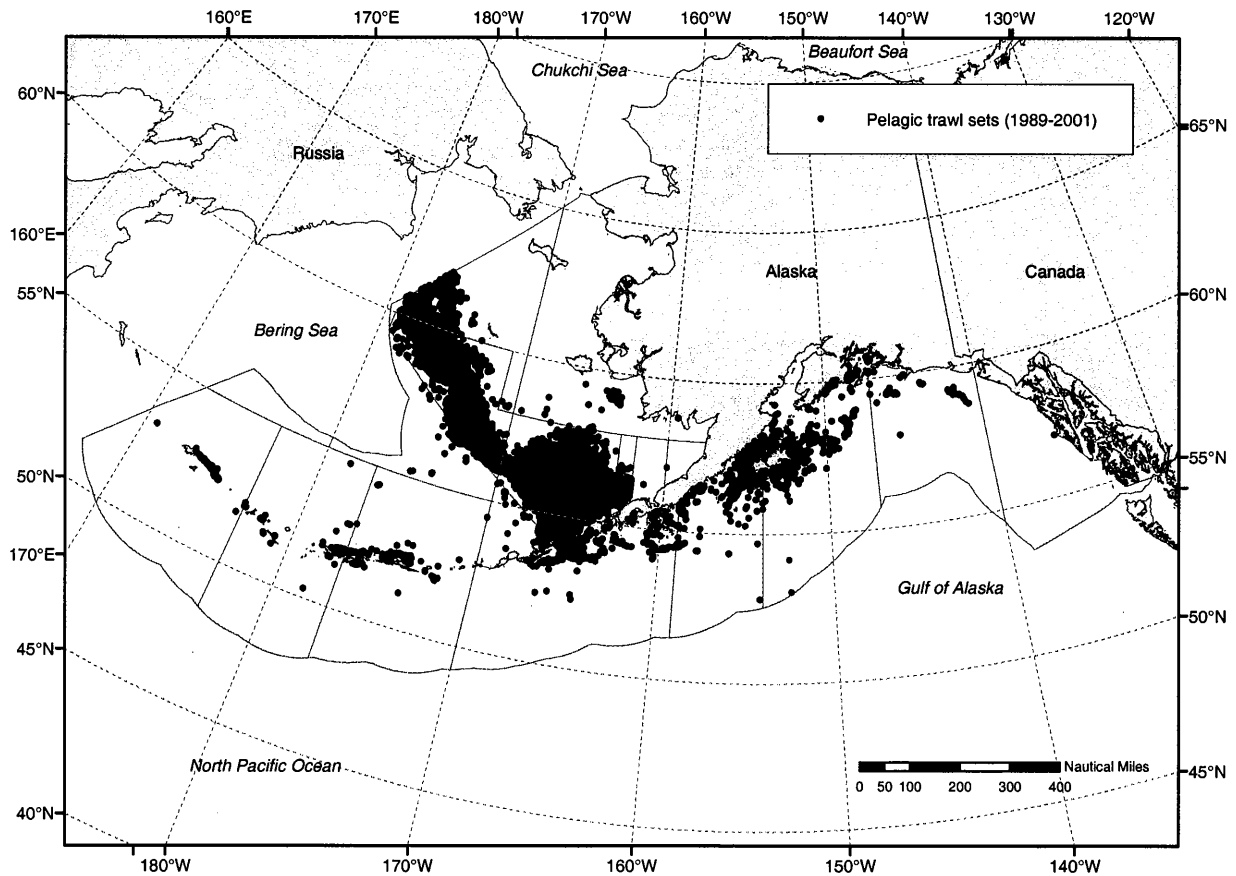


Figure 4. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where pelagic trawl gear was used during fishing operations in the domestic groundfish fishery, 1989-2001. Only trawl sets on vessels with observers were included.

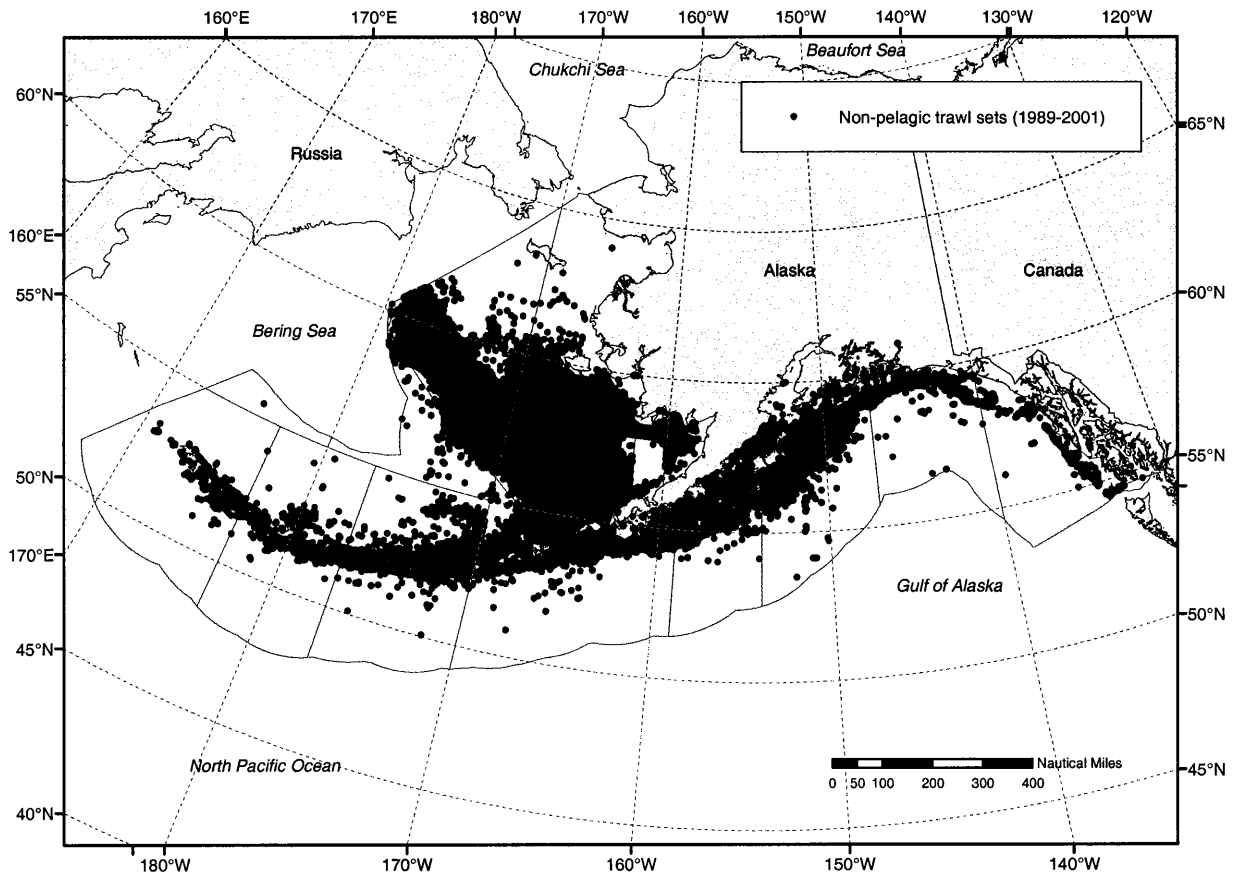


Figure 5. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where non-pelagic trawl gear was used during fishing operations in the domestic groundfish fishery, 1989-2001. Only trawl sets on vessels with observers were included.

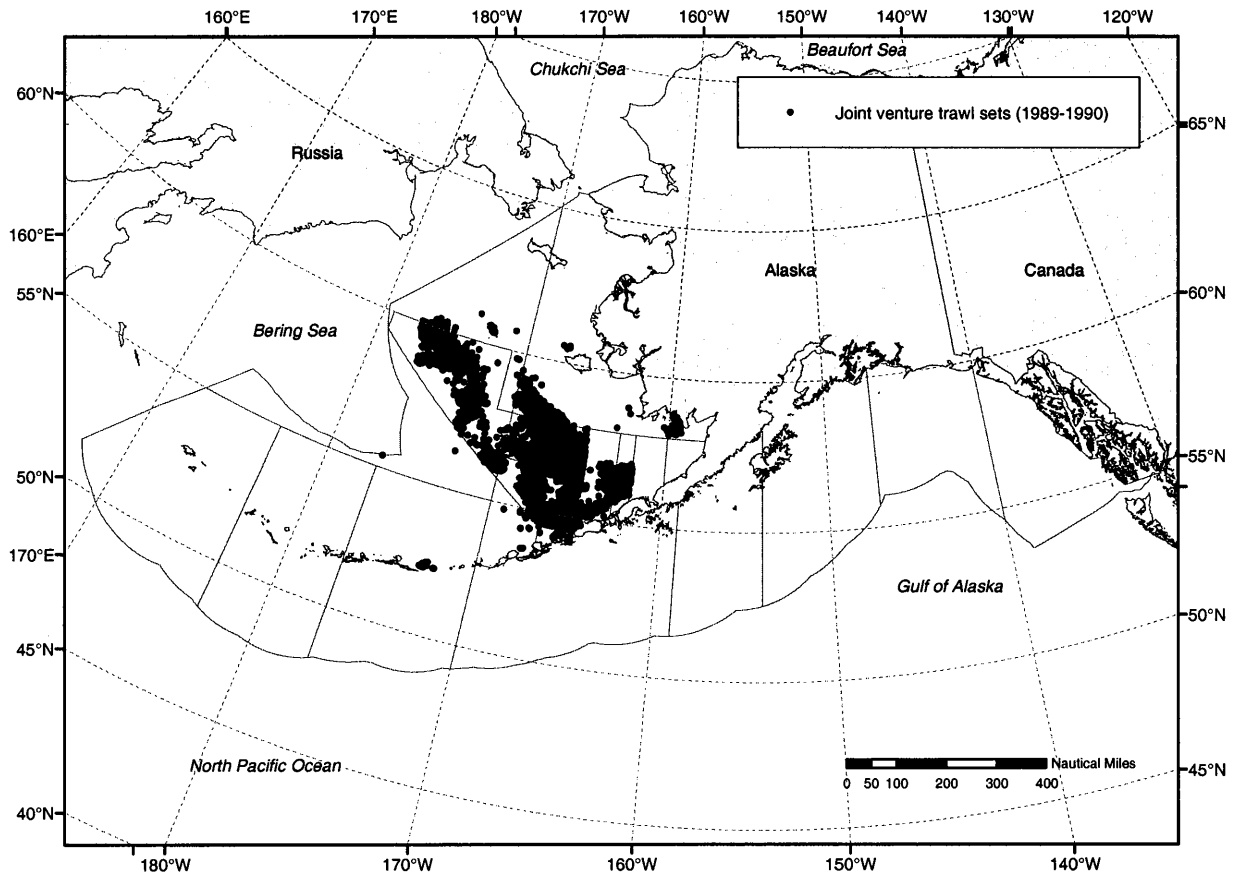


Figure 6. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where trawl gear was used during fishing operations in the joint venture groundfish fisheries, 1989-1990. Only trawl sets on vessels with observers were included.

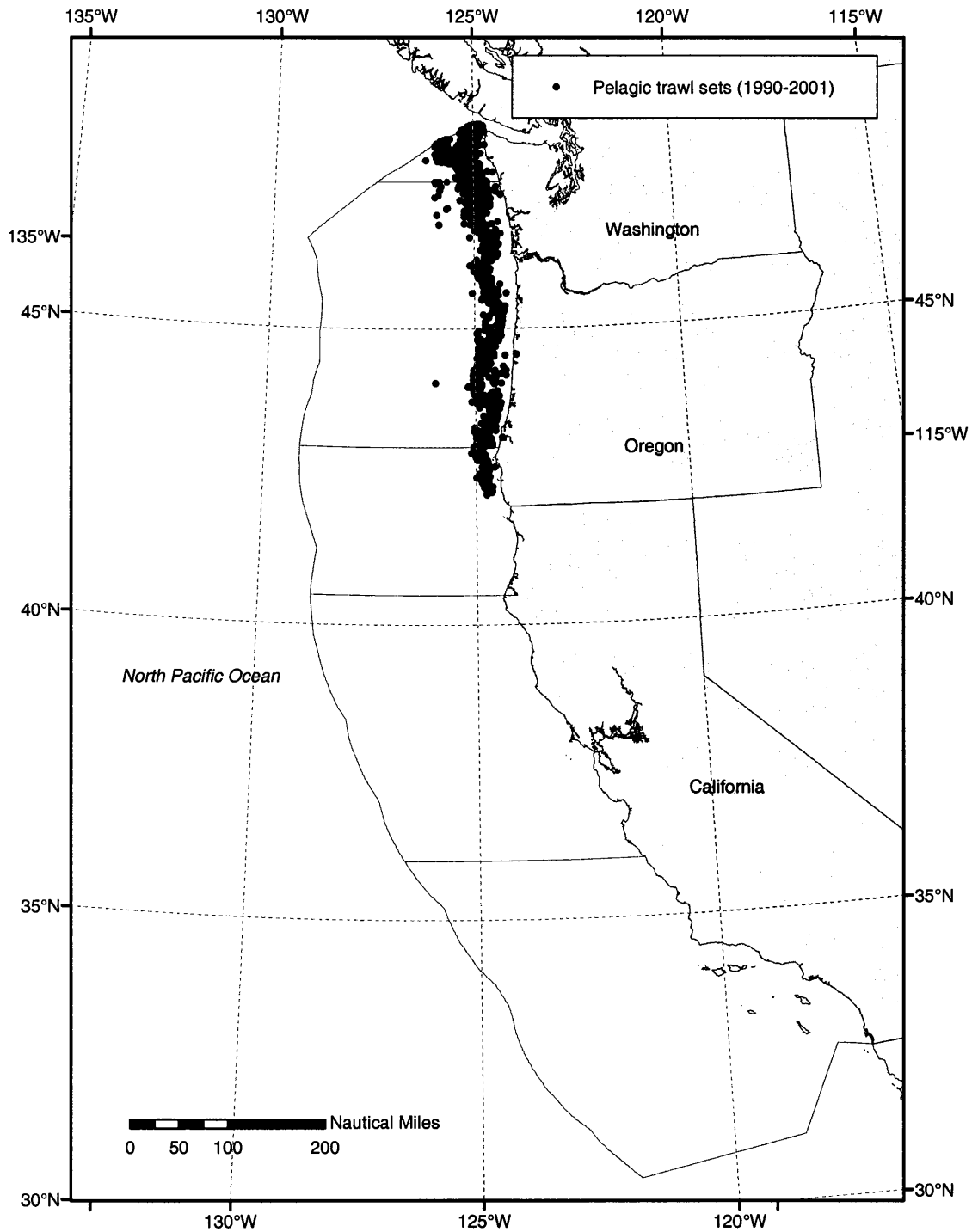


Figure 7. Locations in the North Pacific Ocean off Washington, Oregon, and California where pelagic trawl gear was used during fishing operations in the domestic groundfish fishery, 1990-2001. Only trawl sets on vessels with observers were included.

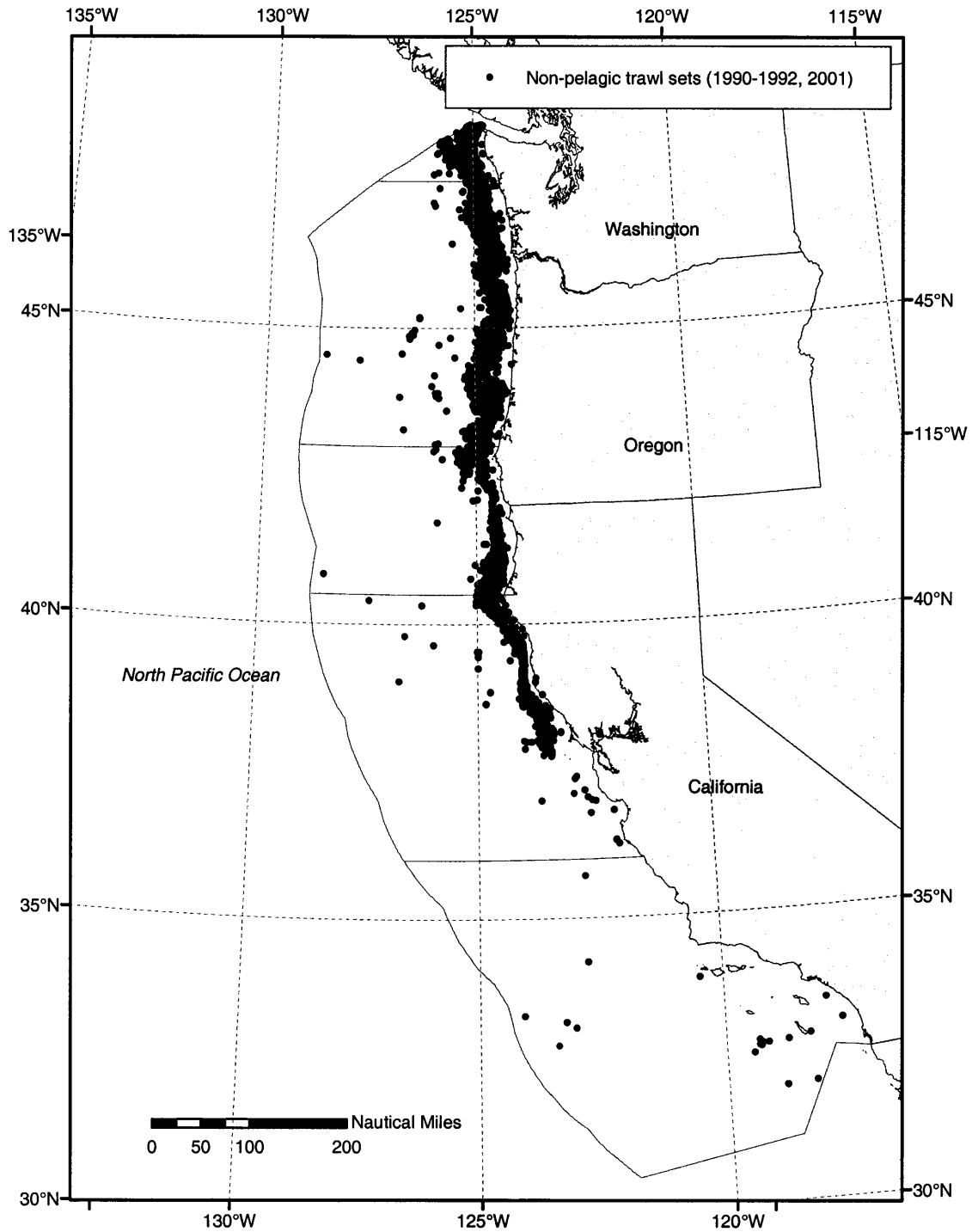


Figure 8. Locations in the North Pacific Ocean off Washington, Oregon, and California where non-pelagic trawl gear was used during fishing operations in the domestic groundfish fishery, 1990-1992 and 2001. Only trawl sets on vessels with observers were included.

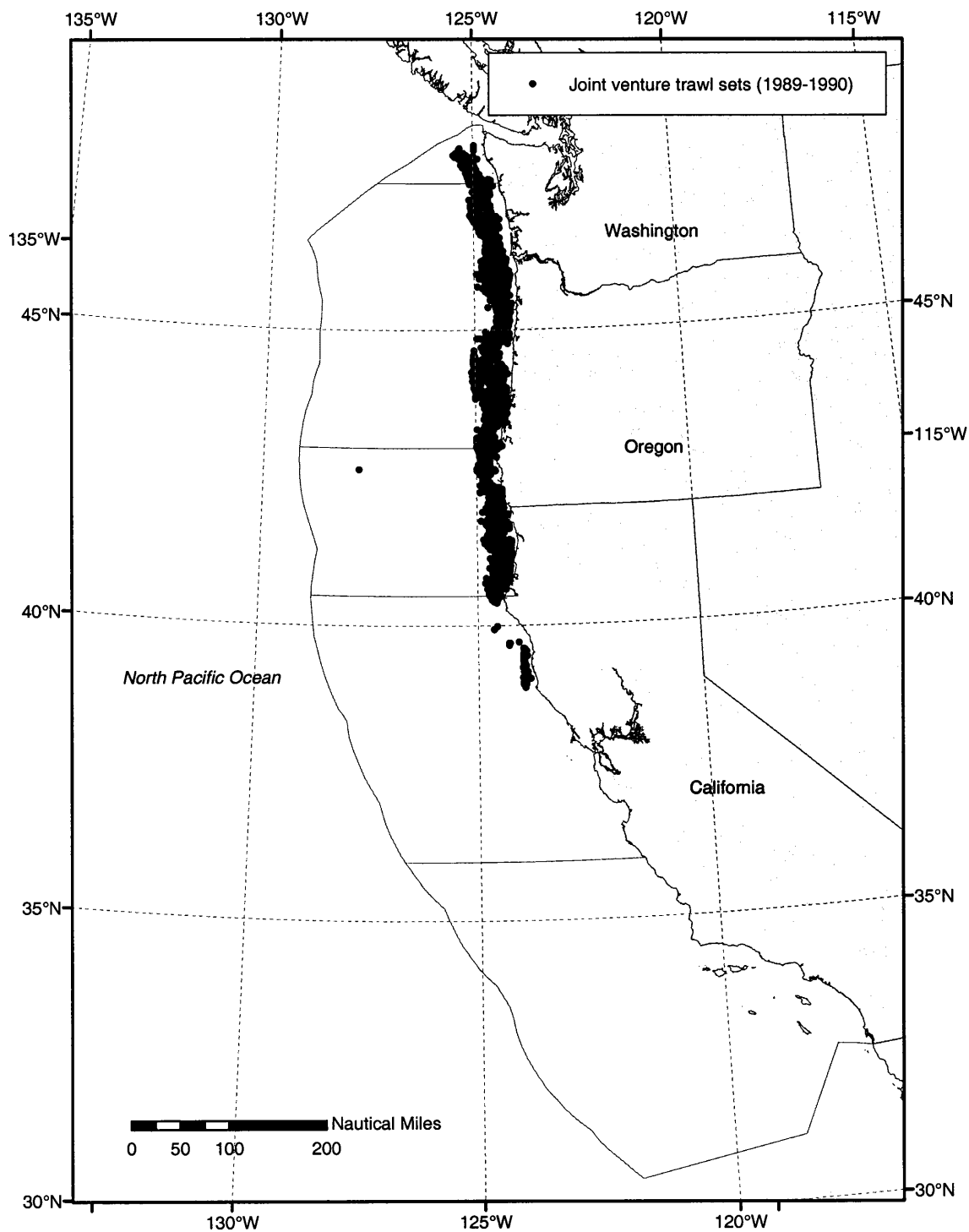


Figure 9. Locations in the North Pacific Ocean off Washington, Oregon, and California where trawl gear was used during fishing operations in the joint venture groundfish fisheries, 1989-1990. Only trawl sets on vessels with observers were included.

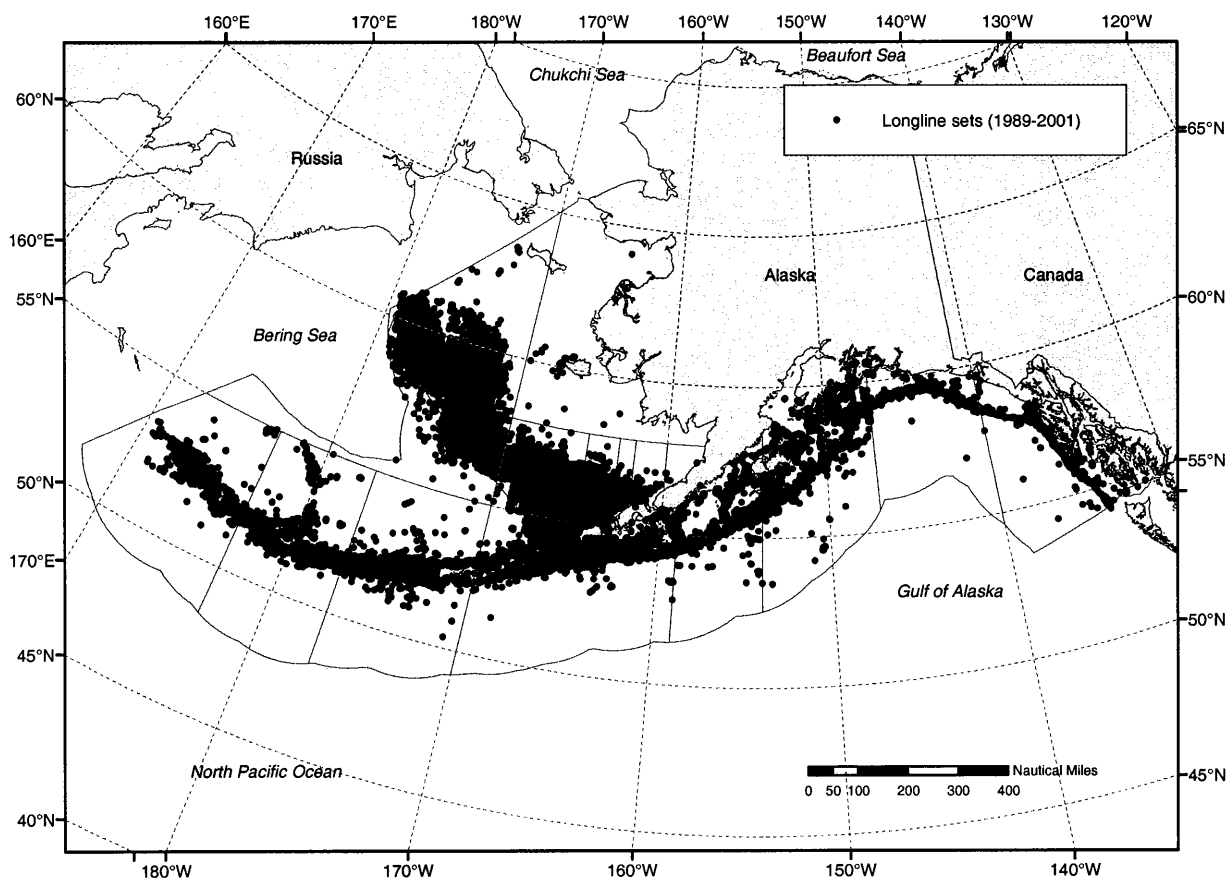


Figure 10. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where longline gear was used during fishing operations in the domestic groundfish fishery, 1989-2001. Only longline sets on vessels with observers were included.

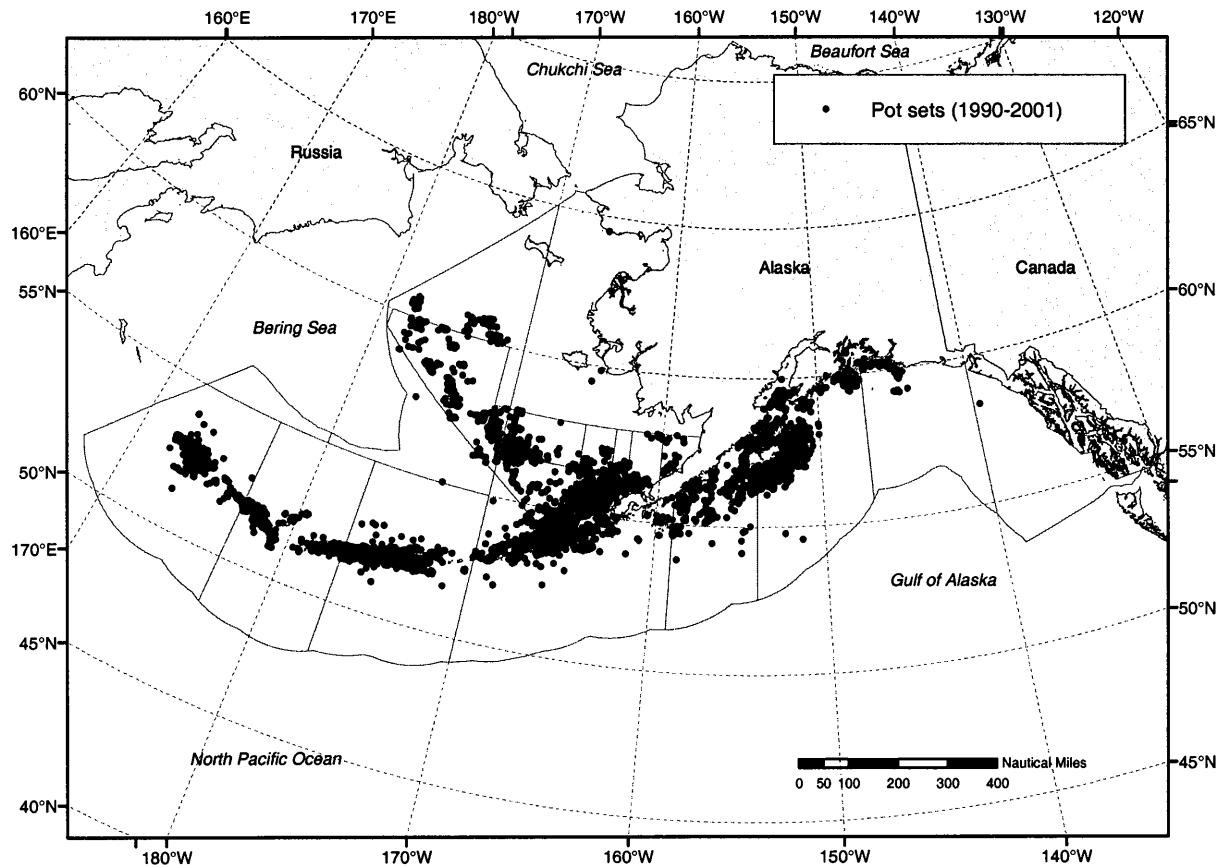


Figure 11. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where pot gear was used during fishing operations in the domestic groundfish fishery, 1990-2001. Only pot sets on vessels with observers were included.

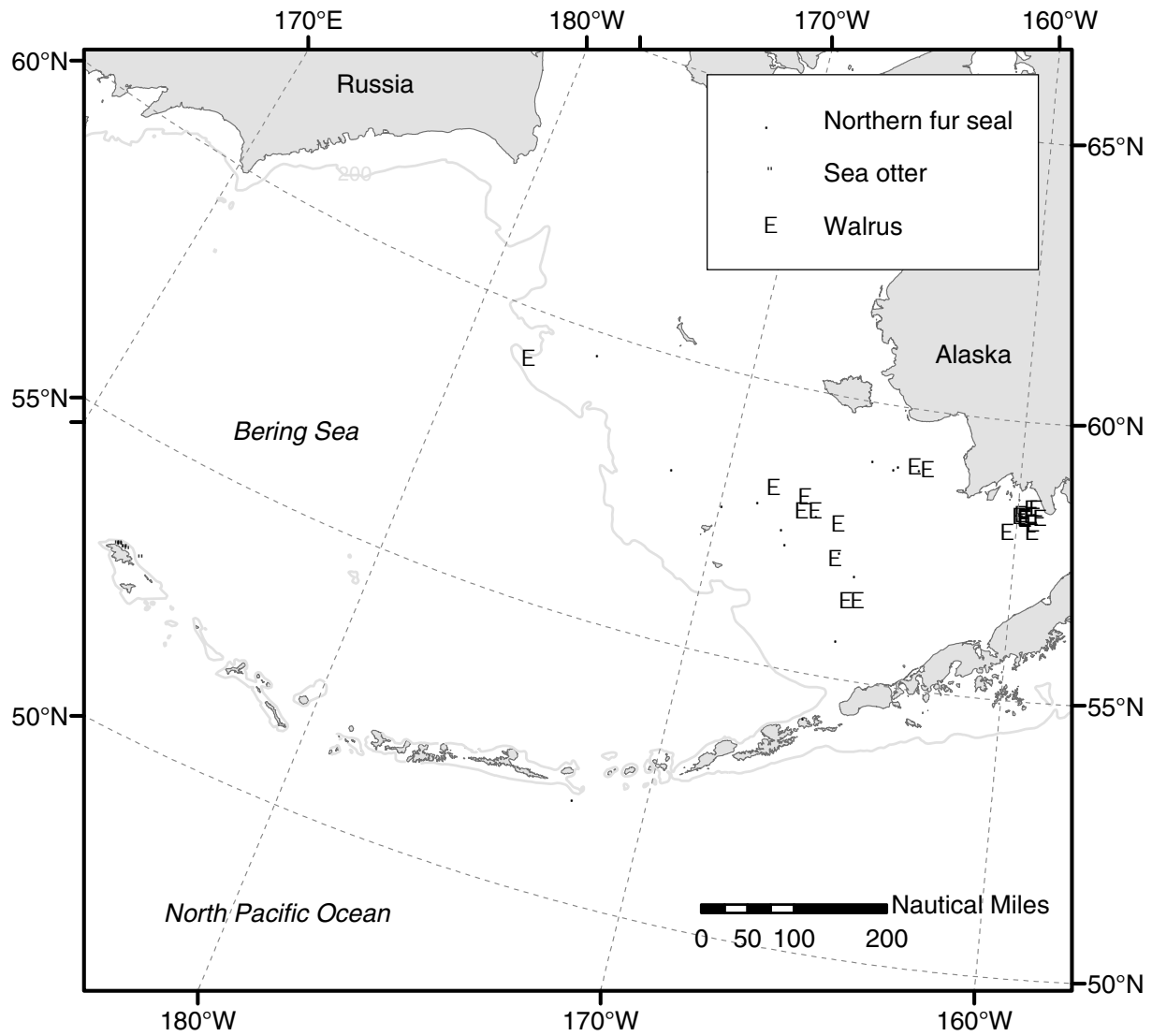


Figure 12. Locations in Alaska where northern fur seals, walrus, and sea otters were incidentally taken by domestic and joint venture groundfish fisheries, 1989-2001. Only animals which were either killed or seriously injured during fishing operations were included. The 200 m depth contour is also indicated.

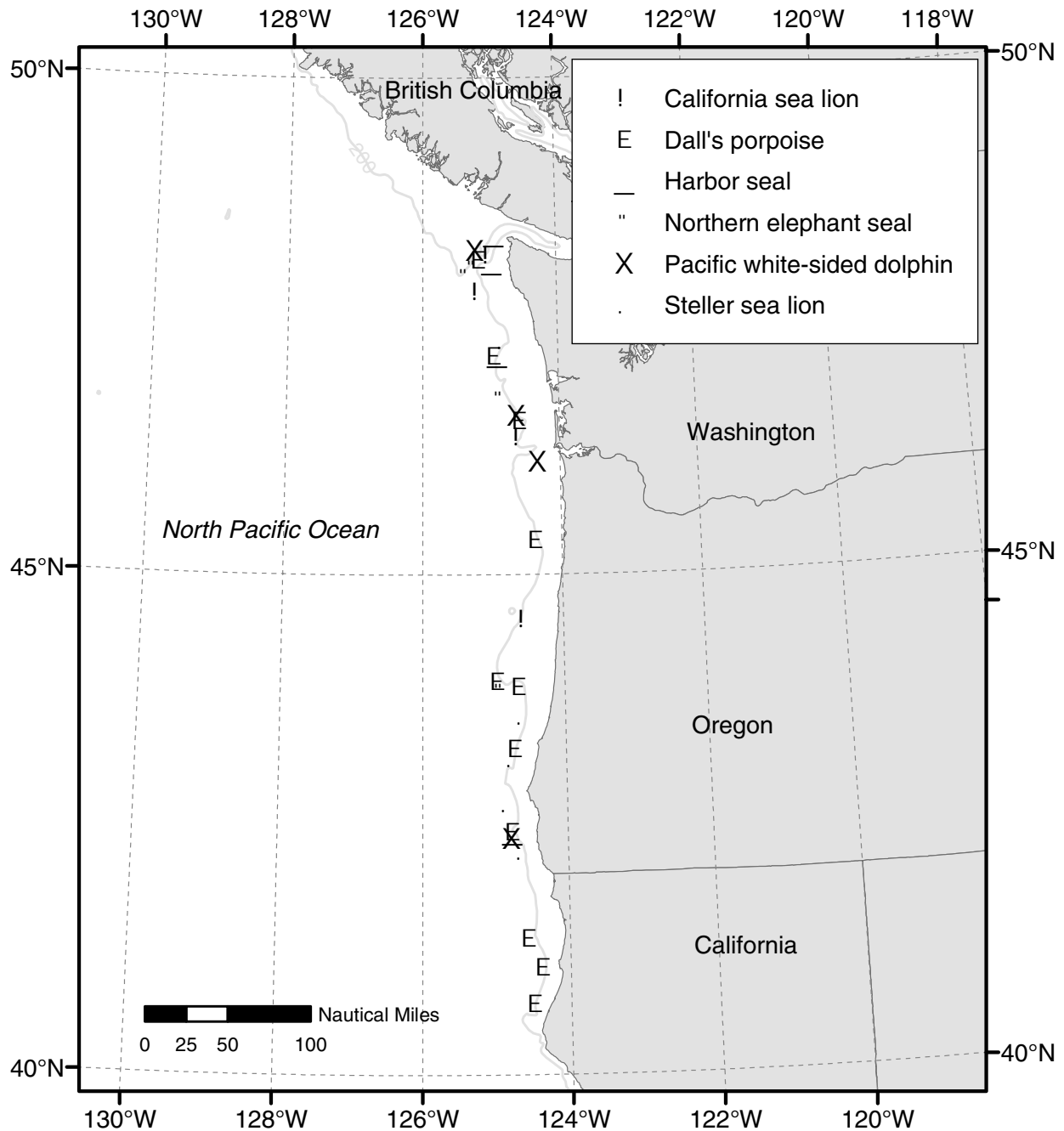


Figure 13. Locations in the North Pacific Ocean off Washington, Oregon, and California where California sea lions, Steller sea lions, harbor seals, northern elephant seals, Pacific white-sided dolphins, and Dall's porpoises were incidentally taken by domestic and joint venture groundfish fisheries, 1989-2001. Only animals which were either killed or seriously injured during fishing operations were included. The 200 m depth contour is also indicated.

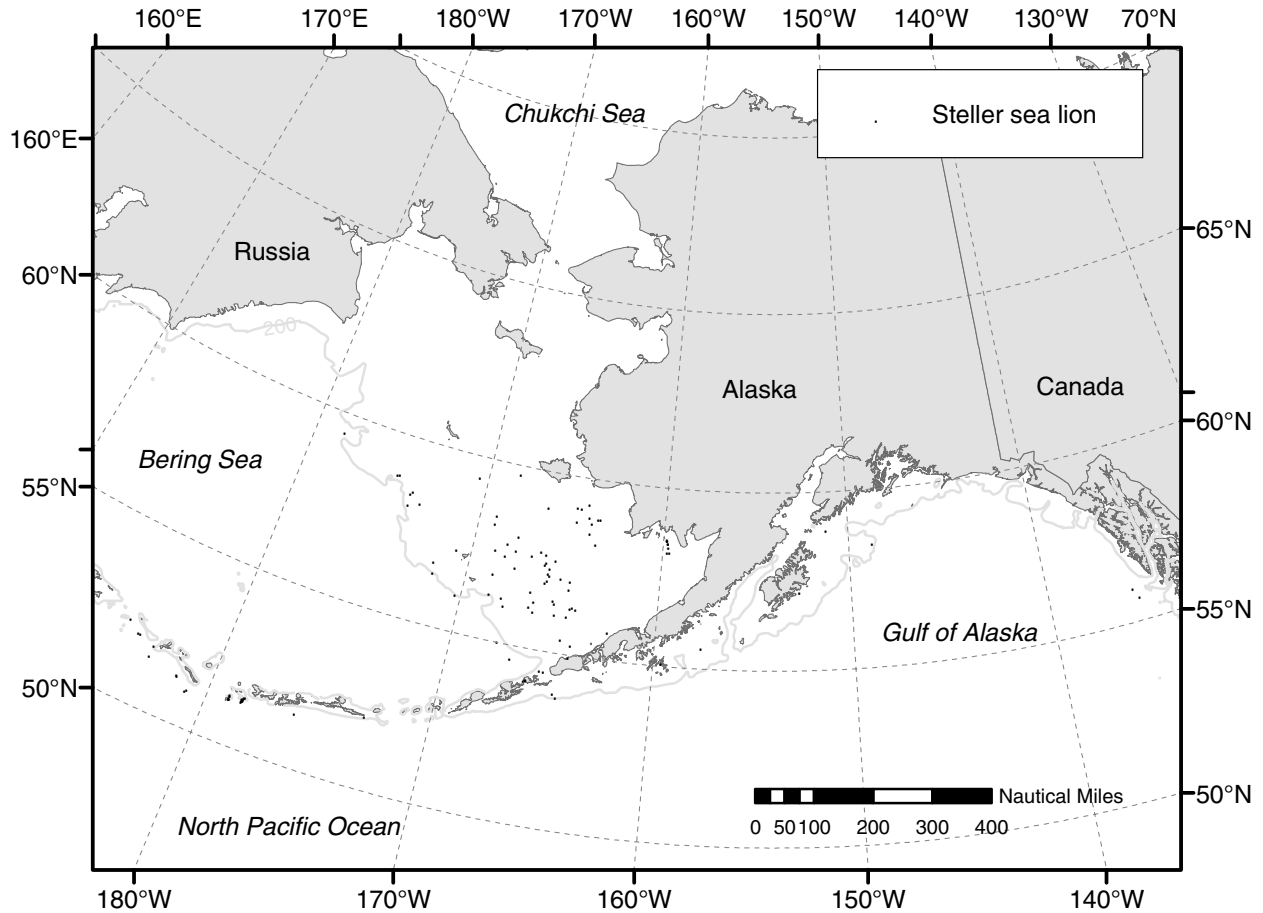


Figure 14. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where Steller sea lions were incidentally taken by domestic and joint venture groundfish fisheries, 1989-2001. Only animals which were either killed or seriously injured during fishing operations were included. The 200 m depth contour is also indicated.

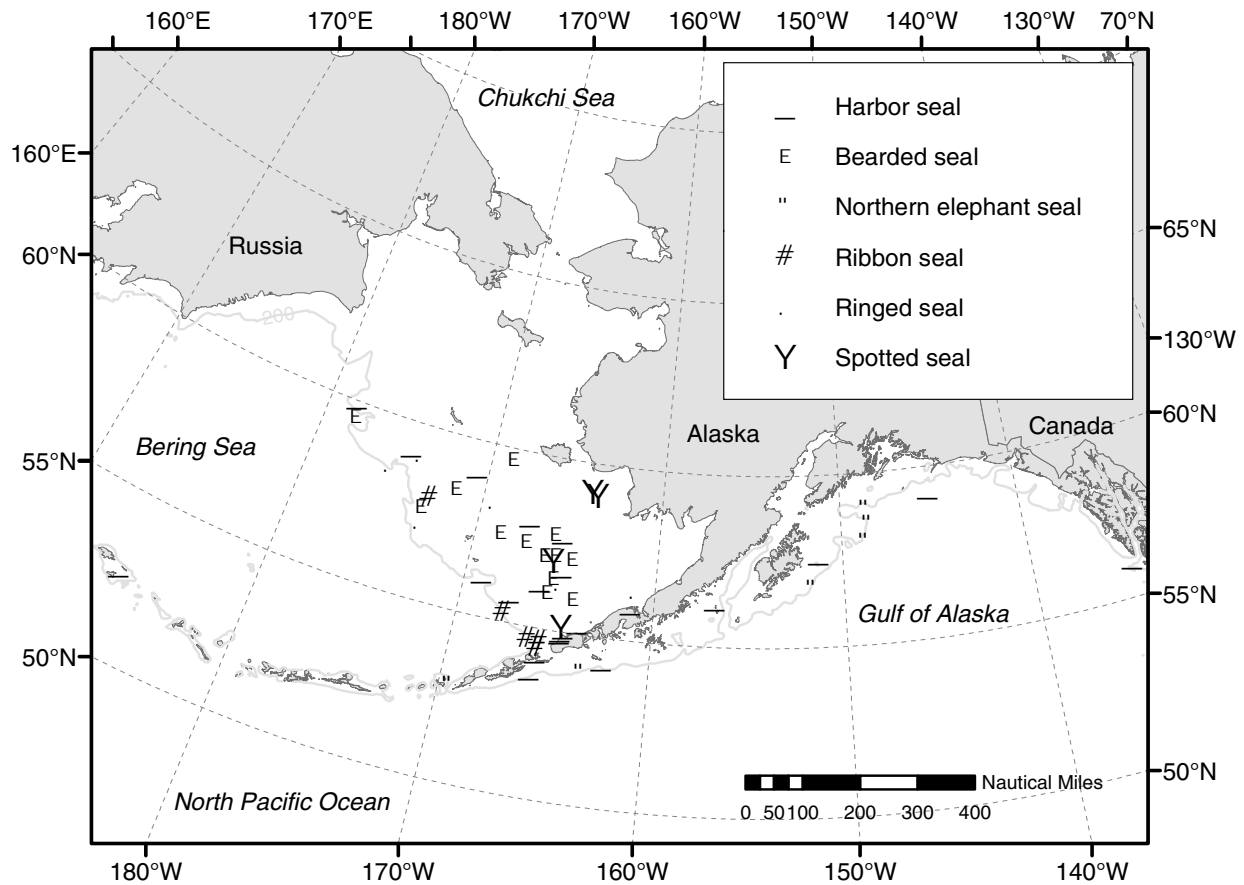


Figure 15. Locations in the Bering Sea, Aleutian Islands, and Gulf of Alaska where bearded seals, harbor seals, spotted seals, ringed seals, ribbon seals, and northern elephant seals were incidentally taken by domestic and joint venture groundfish fisheries, 1989-2001. Only animals which were either killed or seriously injured during fishing operations were included. The 200 m depth contour is also indicated.

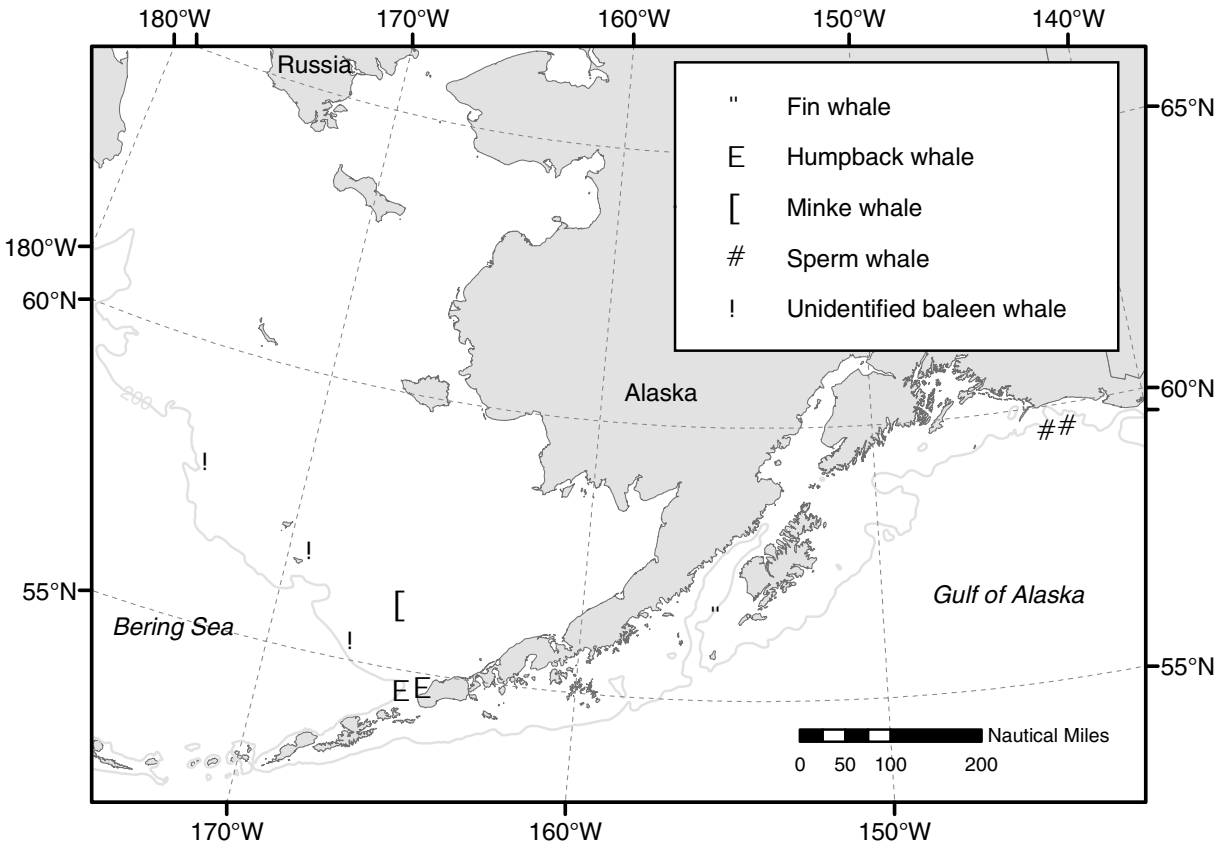


Figure 16. Locations in the Bering Sea and Gulf of Alaska where humpback whales, minke whales, fin whales, and sperm whales were incidentally taken by domestic groundfish fisheries, 1989-2001. Only animals which were either killed or seriously injured during fishing operations were included. The unidentified baleen whales (due to limited observation) belonged to one of the three identified species. The 200 m depth contour is also indicated.

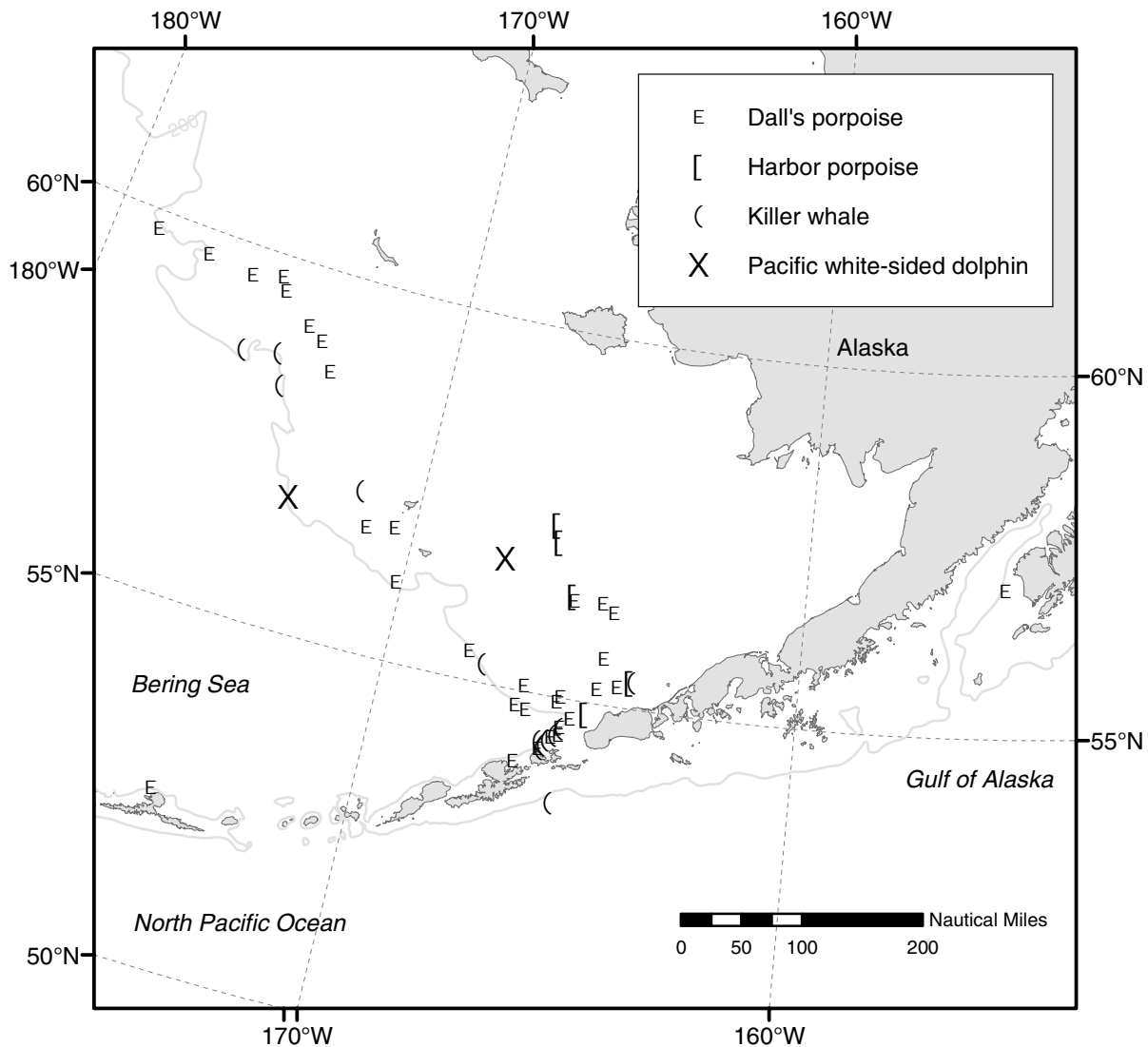


Figure 17. Locations in the Bering Sea and Gulf of Alaska where Pacific white-sided dolphins, killer whales, harbor porpoises, and Dall's porpoises were incidentally taken by domestic groundfish fisheries, 1989-2001. Only animals which were either killed or seriously injured during fishing operations were included. The 200 m depth contour is also indicated.

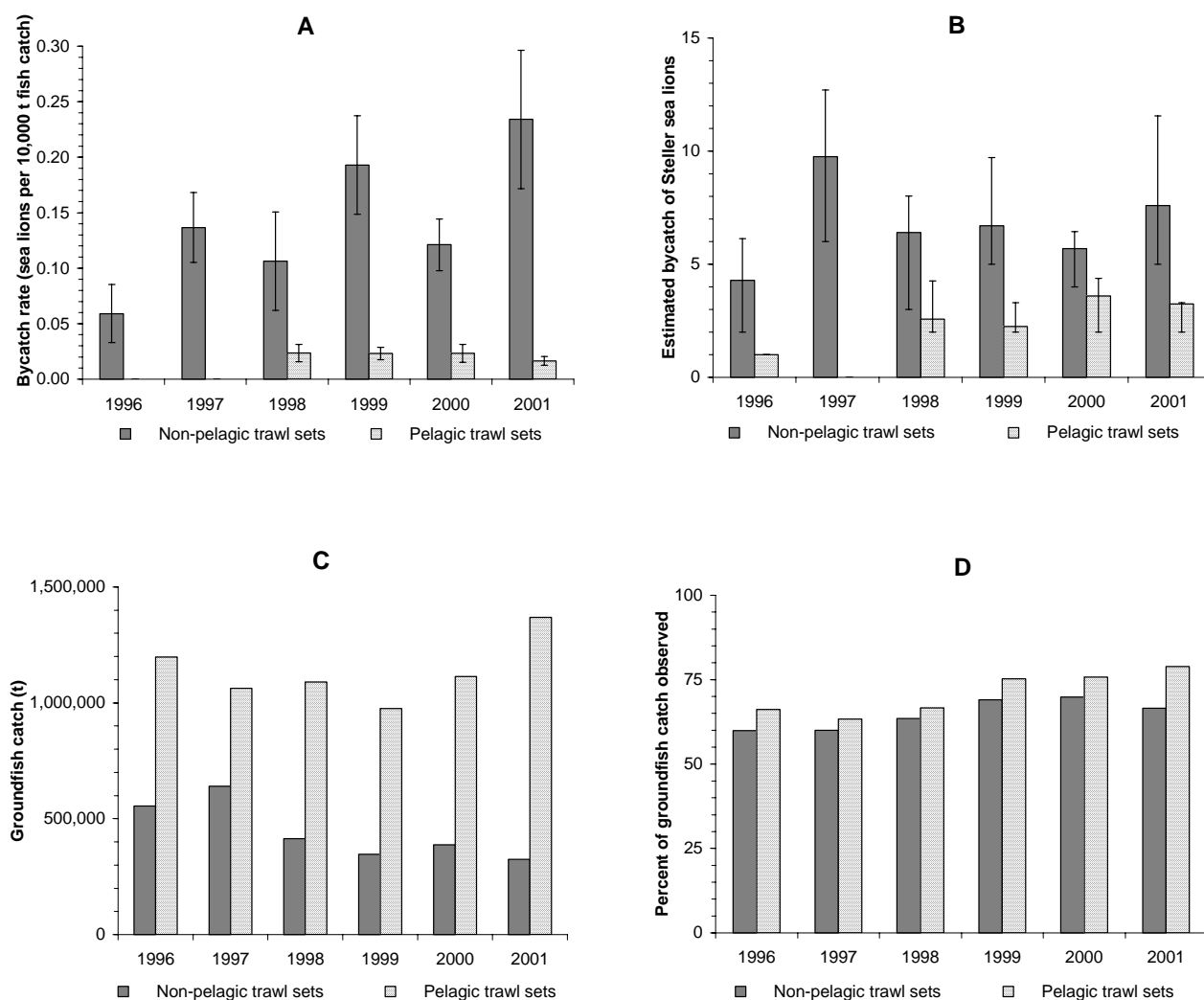


Figure 18. Incidental take (bycatch) of Steller sea lions by type of trawl gear used in the domestic trawl fishery in the Bering Sea, 1996-2001: (A) the bycatch rate (and standard error) per 10,000 metric tons of the groundfish catch; (B) the estimated total number (and standard error) of Steller sea lions killed or seriously injured; (C) the total groundfish catch (metric tons); and (D) the percent of the total groundfish catch observed.

Appendix 1.--List of statistical fishing areas in the U.S. Exclusive Economic Zone (EEZ) of the Bering Sea and North Pacific Ocean by year of analysis, 1989-2001. See Figures 1-3 for boundary locations of these areas.

Statistical fishing area	Analysis years	Old INPFC statistical area ^a	Comments
Bering Sea			
Area 508	1993-2001	-	Formerly included in Area 511
Area 509	1993-2001	-	Formerly included in Area 511
Area 510	1989 (1990; JV only)	Area-I	Divided into areas 511, 512, 513, 514, 515, 516, and 517 in 1990
Area 511	1990-1992	-	Divided into areas 508 and 509 in 1993
Area 512	1990-2001	-	-
Area 513	1990-2001	-	-
Area 514	1990-2001	-	-
Area 515	1990	-	Divided into areas 518 and 519 in 1991
Area 516	1990-2001	-	-
Area 517	1990-2001	-	-
Area 518	1991-2001	-	Formerly included in Area 515
Area 519	1991-2001	-	Formerly included in Area 515
Area 520	1989 (1990; JV only)	Area-II	Divided into areas 521 and 522 in 1990
Area 521	1990-2001	-	-
Area 522	1990-1992	-	Divided into areas 523 and 524 in 1993
Area 523	1993-2001	-	Formerly included in Area 522
Area 524	1993-2001	-	Formerly included in Area 522
Area 530	1989-2001	Area-III	-
Area 540	1989-1992	Area-IV	Divided into areas 541, 542 and 543 in 1993
Area 541	1993-2001	-	Formerly included in Area 540
Area 542	1993-2001	-	Formerly included in Area 540
Area 543	1993-2001	-	Formerly included in Area 540
Gulf of Alaska			
Area 610	1989-2001	Shumagin	-
Area 620	1989-2001	Chirikof	-
Area 630	1989-2001	Kodiak	-
Area 640	1989-2001	Yakutat	-
Area 649	1992-2001	-	Prince William Sound area; extracted from areas 630 and 640 in 1992
Area 650	1989-2001	Southeastern	-
Area 659	1992-2001	-	Extracted from Area 650 in 1992

Appendix 1.--Continued.

Statistical fishing area	Analysis years	Old INPFC statistical area ^a	Comments
Washington, Oregon and California (Northwest Region)			
Area 670	1990-2001	Vancouver	-
Area 710	1990-2001	Columbia	-
Area 720	1990-2001	Eureka	-
Area 730	1990-1992	Monterey	At-sea whiting fisheries processing operations restricted in this area since 1993
Area 740	1991	Conception	At-sea whiting fisheries processing operations restricted in this area during all years, except for an experimental jack mackerel fishery in 1991 (which has been included in this study)

INPFC = International North Pacific Fisheries Commission (1952-1992).

^a These are the statistical areas used by Perez and Loughlin (1991) to analyze incidental catch of marine mammals by foreign and joint venture trawl vessels in the U.S. EEZ of the North Pacific during 1973-1988.

Appendix 2.--List of marine mammals incidentally taken by U.S. vessels (by gear and region) of the domestic groundfish fisheries in the U.S. Exclusive Economic Zone off Alaska and the U.S. West Coast, 1989-2001.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pelagic trawl gear vessels							
Bering Sea							
Area 509							
	12 September 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°17'N 164°25'W
	14 September 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°31'N 164°00'W
	25 September 1998	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°33'N 164°11'W
	8 September 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°30'N 164°18'W
	16 September 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	Not recorded ²
	12 March 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	55°36'N 164°32'W
	15 October 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	No	55°13'N 164°46'W
	14 September 1999	<i>Erignathus barbatus</i>	1	Killed by gear	No	No	56°01'N 164°14'W
	18 September 1996	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	55°12'N 164°33'W
	7 October 1997	<i>Phoca largha</i>	1	Killed by gear	Yes	Yes	55°09'N 164°37'W
	8 February 1996	Unidentified pinniped	1	Carcass	No	No	55°36'N 164°06'W
	2 February 1999	<i>Megaptera novaeangliae</i>	1	Killed by gear	Yes	Yes	54°45'N 164°51'W
	27 August 1995	Unidentified baleen whale ³	1	Decomposed	Yes	Yes	57°02'N 164°30'W
	20 July 1993	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°39'N 164°57'W
	21 January 1995	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°22'N 163°56'W
	9 September 1996	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°17'N 164°22'W
	24 September 1996	<i>Phocoenoides dalli</i>	2	Killed by gear	Yes	Yes	55°12'N 164°50'W
	15 August 1999	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°38'N 164°47'W
	12 February 1997	Unidentified whale	1	Decomposed	No	No	55°45'N 164°49'W
	26 September 1998	Unidentified whale	1	Bones only	Yes	Yes	56°20'N 164°30'W
	6 October 1998	Unidentified whale	1	Bones only	Yes	Yes	56°14'N 164°10'W
	13 September 1995	Unidentified small whale	1	Skull/bones	Yes	Yes	56°02'N 164°48'W
	28 June 2001	Unidentified cetacean	1	Misc. flesh ⁴	Yes	No	55°11'N 164°34'W
	29 September 1993	Unidentified marine mammal	1	Bones only	Yes	Yes	55°27'N 164°26'W
	2 November 2000	Unidentified marine mammal	1	Decomposed	No	Yes	56°51'N 164°46'W
Area 510							
	14 May 1989	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°28'N 167°50'W
Area 511							
	21 January 1992	<i>Orcinus orca</i>	1	Killed by gear	Yes	Yes	55°23'N 164°02'W
	3 July 1990	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°39'N 163°45'W
	8 February 1992	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°24'N 164°04'W
	25 March 1990	Unidentified whale	1	Decomposed	Yes	Yes	55°27'N 164°42'W
Area 513							
	2 September 1996	<i>Callorhinus ursinus</i>	1	Killed by gear	No	Yes	57°01'N 165°03'W
	8 June 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°05'N 168°31'W
	11 September 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°35'N 165°08'W
	2 October 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°33'N 166°11'W
	11 October 1996	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	No	56°47'N 166°26'W
	19 February 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°31'N 168°30'W
	1 September 1997	Unidentified otariid	1	Decomposed	Yes	Yes	56°42'N 168°01'W
	10 October 2001	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°50'N 167°23'W
	13 October 1996	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	56°57'N 165°07'W
	19 August 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	57°11'N 165°54'W
	15 December 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	56°33'N 167°23'W
	19 December 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	56°42'N 167°50'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 513 (continued)							
	25 September 1996	Unidentified dolphin/porpoise	1	Unharm ⁵	Yes	Yes	57°03'N 166°00'W
	13 February 1992	Unidentified whale	1	Bones only	Yes	Yes	56°30'N 169°57'W
	5 September 2000	Unidentified whale	1	Decomposed	Yes	Yes	56°30'N 166°26'W
	2 October 1996	Unidentified cetacean	1	Decomposed	Yes	Yes	57°07'N 166°27'W
Area 515							
	9 July 1990	<i>Eumetopias jubatus</i>	4	Killed by gear	Yes	Yes	54°20'N 165°52'W
Area 517							
	4 June 1990	<i>Callorhinus ursinus</i>	1	Unharm ⁵	Yes	Yes	54°56'N 165°07'W
	4 June 1990	<i>Callorhinus ursinus</i>	1	Minor injury	Yes	Yes	54°56'N 165°07'W
	9 September 1998	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	55°49'N 165°18'W
	30 August 1990	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	54°30'N 165°44'W
	21 September 1993	<i>Eumetopias jubatus</i>	2	Killed by gear	Yes	Yes	56°16'N 165°02'W
	13 October 1995	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	54°34'N 165°35'W
	11 October 1998	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°16'N 166°08'W
	29 September 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°16'N 167°41'W
	11 October 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°23'N 166°24'W
	12 July 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	55°50'N 165°51'W
	1 September 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°04'N 168°09'W
	14 February 1996	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	56°00'N 165°05'W
	11 August 1991	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	56°06'N 165°37'W
	7 September 1993	<i>Phoca vitulina</i>	1	Carcass ⁶	Yes	No	54°50'N 165°49'W
	12 October 2000	<i>Pusa hispida</i>	1	Killed by gear	Yes	Yes	56°26'N 165°03'W
	15 September 1996	<i>Histriophoca fasciata</i>	1	Killed by gear	No	Yes	54°37'N 165°37'W
	24 August 2001	<i>Histriophoca fasciata</i>	1	Killed by gear	No	Yes	55°15'N 167°42'W
	25 October 1998	<i>Megaptera novaeangliae</i>	1	Killed by gear	Yes	Yes	54°38'N 165°30'W
	14 September 2000	<i>Balaenoptera acutorostrata</i>	1	Killed by gear	Yes	Yes	56°12'N 165°59'W
	13 September 1990	Unidentified baleen whale	1	Bones only	Yes	Yes	56°16'N 168°13'W
	9 August 1993	Unidentified baleen whale	1	Killed by gear ⁷	Yes	Yes	55°23'N 167°16'W
	4 August 2001	Unidentified baleen whale	1	Decomposed	Yes	Yes	54°30'N 165°37'W
	28 July 2000	Unidentified beaked whale	1	Skull only	Yes	Yes	55°02'N 165°29'W
	20 September 1994	<i>Delphinapterus leucas</i>	1	Decomposed	Yes	Yes	56°11'N 165°36'W
	1 September 1999	<i>Orcinus orca</i>	1	Decomposed	No	Yes	54°42'N 165°36'W
	5 July 1990	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°36'N 165°08'W
	7 August 1992	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°46'N 166°26'W
	8 August 1992	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°48'N 166°21'W
	4 September 1992	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°01'N 165°40'W
	12 October 1993	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	54°54'N 166°00'W
	8 October 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	56°23'N 165°01'W
	30 August 1995	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°48'N 166°42'W
	11 February 1996	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°45'N 165°22'W
	9 February 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	56°21'N 165°44'W
	16 October 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°36'N 165°34'W
	19 February 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°58'N 165°23'W
	30 August 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°25'N 168°02'W
	19 June 1991	Unidentified dolphin/porpoise	1	Carcass	No	No	55°35'N 168°25'W
	5 September 1990	Unidentified whale	1	Decomposed	Yes	Yes	54°41'N 165°57'W
	19 February 1991	Unidentified whale	1	Decomposed	No	Yes	55°01'N 165°16'W
	10 December 1992	Unidentified whale	1	Decomposed	Yes	No	54°43'N 165°37'W
	24 September 1994	Unidentified whale	1	Decomposed	Yes	Yes	56°18'N 165°22'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 517 (continued)							
	8 September 1998	Unidentified whale	1	Decomposed	Yes	Yes	54°47'N 165°22'W
	15 October 1998	Unidentified whale	1	Bones only	No	Yes	56°25'N 166°00'W
	4 March 1992	Unidentified large whale	1	Bones only	Yes	Yes	56°23'N 169°42'W
	31 August 1993	Unidentified large whale	1	Bones only	Yes	Yes	54°38'N 165°30'W
	18 August 1994	Unidentified large whale	1	Bones only	Yes	Yes	54°59'N 165°57'W
	31 August 1994	Unidentified large whale	1	Bones only	Yes	Yes	54°45'N 165°19'W
	11 September 1993	Unidentified marine mammal	1	Decomposed	Yes	Yes	56°22'N 165°25'W
	20 October 1998	Unidentified marine mammal	1	Decomposed	Yes	Yes	54°40'N 165°36'W
	20 October 1998	Unidentified marine mammal	1	Bones only	No	No	54°43'N 165°06'W
Area 519							
	31 August 1991	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	54°20'N 165°53'W
	31 August 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	54°20'N 165°53'W
	28 August 1995	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	54°17'N 165°59'W
	16 October 1997	<i>Histiophoca fasciata</i>	1	Killed by gear	Yes	Yes	54°26'N 165°42'W
	15 October 1997	<i>Orcinus orca</i>	1	Killed by gear	Yes	Yes	54°17'N 165°58'W
	18 September 1996	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°02'N 166°30'W
	10 September 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°16'N 165°59'W
	5 October 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°27'N 165°44'W
	10 October 1996	Unidentified dolphin/porpoise	1	Decomposed	Yes	Yes	54°20'N 165°54'W
	20 February 1992	Unidentified large whale	1	Bones only	Yes	Yes	54°28'N 166°22'W
	15 October 1997	Unidentified marine mammal	1	Decomposed	Yes	Yes	54°27'N 165°41'W
Area 520							
	30 June 1989	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	58°51'N 173°16'W
Area 521							
	15 July 1991	<i>Callorhinus ursinus</i>	1	Boarded ship	Yes	Yes	58°19'N 173°13'W
	15 July 1991	<i>Callorhinus ursinus</i>	1	Boarded ship	Yes	Yes	58°21'N 173°16'W
	15 July 1991	<i>Callorhinus ursinus</i>	1	Boarded ship	Yes	Yes	58°21'N 173°17'W
	1 September 1994	<i>Callorhinus ursinus</i>	1	Killed by gear	No	Yes	58°10'N 171°48'W
	7 July 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	No	No	58°40'N 173°51'W
	13 September 1990	<i>Eumetopias jubatus</i>	1	Serious injury	Yes	Yes	59°04'N 174°41'W
	14 June 1991	<i>Eumetopias jubatus</i>	1	Carcass	No	No	58°49'N 174°09'W
	14 June 1991	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°50'N 174°12'W
	17 June 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°00'N 171°39'W
	23 June 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	No	No	57°30'N 170°40'W
	23 June 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°28'N 173°11'W
	28 August 1991	<i>Eumetopias jubatus</i>	1	Minor injury ⁸	Yes	Yes	58°29'N 174°11'W
	19 August 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	No	58°44'N 173°43'W
	25 August 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°20'N 173°48'W
	20 July 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	56°42'N 171°34'W
	26 July 2001	<i>Eumetopias jubatus</i>	1	Boarded ship	Yes	Yes	57°35'N 173°18'W
	26 July 2001	<i>Eumetopias jubatus</i>	1	Boarded ship	Yes	Yes	57°45'N 173°07'W
	28 July 2001	<i>Eumetopias jubatus</i>	1	Boarded ship	Yes	Yes	58°09'N 173°24'W
	11 May 1990	Unidentified otariid ⁹	1	Minor injury	Yes	No	57°31'N 171°45'W
	15 June 1991	Unidentified otariid	1	Killed by gear	No	Yes	58°57'N 174°06'W
	1 August 2001	Unidentified otariid	1	Boarded ship	Yes	No	58°53'N 173°50'W
	16 July 1990	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	59°25'N 175°07'W
	14 September 1990	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°22'N 175°12'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 521 (continued)							
	15 June 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°40'N 174°12'W
	23 August 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°52'N 173°09'W
	10 July 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°35'N 172°55'W
	9 September 1994	<i>Erignathus barbatus</i>	1	Killed by gear	No	Yes	58°28'N 171°35'W
	13 August 1991	<i>Phoca vitulina</i>	1	Decomposed	Yes	Yes	59°33'N 174°35'W
	4 September 1999	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	59°20'N 174°46'W
	28 July 2001	<i>Pusa hispida</i>	1	Killed by gear	Yes	Yes	57°17'N 173°06'W
	5 September 2001	<i>Pusa hispida</i>	1	Killed by gear	Yes	Yes	58°36'N 175°35'W
	7 May 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	59°13'N 178°05'W
	14 June 1991	Unidentified pinniped	1	Carcass	No	No	57°27'N 173°01'W
	25 July 1991	Unidentified pinniped	1	Carcass	No	No	58°51'N 174°46'W
	25 July 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	58°37'N 173°37'W
	27 July 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	58°59'N 173°43'W
	18 August 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	58°30'N 173°59'W
	28 June 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	57°32'N 172°51'W
	19 February 1993	Unidentified pinniped	1	Decomposed	Yes	Yes	56°54'N 171°23'W
	27 August 2001	Unidentified pinniped	1	Misc. flesh ¹⁰	Yes	No	58°55'N 173°40'W
	5 September 2001	<i>Balaenoptera acutorostrata</i>	1	Misc. flesh ¹¹	Yes	No	58°51'N 175°25'W
	16 July 1990	Unidentified baleen whale	1	Baleen only	Yes	Yes	58°36'N 173°34'W
	31 August 1991	Unidentified baleen whale ¹²	1	Decomposed	Yes	Yes	59°36'N 177°03'W
	11 July 1992	Unidentified baleen whale	1	Baleen only	Yes	Yes	58°50'N 173°51'W
	4 September 1999	Unidentified baleen whale	1	Skull only	No	Yes	59°09'N 174°53'W
	8 September 2000	Unidentified baleen whale	1	Decomposed	Yes	Yes	59°34'N 175°49'W
	11 July 2001	Unidentified baleen whale	1	Decomposed ¹³	Yes	Yes	56°59'N 172°30'W
	26 July 2001	Unidentified baleen whale	1	Killed by gear	Yes	Yes	57°55'N 173°25'W
	18 June 1991	<i>Orcinus orca</i>	1	Killed by gear	Yes	Yes	57°12'N 171°35'W
	20 August 1999	<i>Orcinus orca</i>	1	Killed by gear	Yes	No	58°42'N 174°40'W
	22 June 1990	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°01'N 173°37'W
	12 July 1990	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°10'N 174°04'W
	31 August 1991	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	59°31'N 177°00'W
	16 August 1993	<i>Phocoenoides dalli</i>	2	Killed by gear	Yes	Yes	58°43'N 174°21'W
	17 July 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	58°32'N 174°27'W
	8 December 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	57°04'N 171°47'W
	11 September 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°29'N 176°14'W
	14 September 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°38'N 176°13'W
	9 September 1999	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°32'N 174°57'W
	20 July 2000	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	56°44'N 171°12'W
	15 August 2000	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	58°39'N 173°11'W
	8 September 2000	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°36'N 175°57'W
	10 September 2000	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°40'N 177°16'W
	18 August 2001	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°42'N 175°08'W
	22 September 2001	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	56°06'N 170°09'W
	18 July 1990	Unidentified dolphin/porpoise	1	Killed by gear	Yes	No	59°21'N 174°59'W
	14 August 1990	Unidentified dolphin/porpoise	1	Killed by gear	Yes	Yes	59°27'N 175°21'W
	26 August 1991	Unidentified dolphin/porpoise	1	Killed by gear	Yes	Yes	59°12'N 176°19'W
	28 August 1990	Unidentified whale	1	Bones only	Yes	Yes	59°14'N 175°59'W
	26 March 1991	Unidentified whale	1	Decomposed	Yes	Yes	59°09'N 178°12'W
	8 May 1991	Unidentified whale	1	Decomposed	Yes	Yes	58°57'N 177°57'W
	27 July 1991	Unidentified whale	1	Skull/bones	Yes	Yes	56°34'N 170°36'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 521 (continued)							
	14 October 2000	Unidentified whale	1	Bones only	Yes	Yes	59°37'N 176°04'W
	4 September 1998	Unidentified small whale	1	Decomposed	Yes	Yes	57°16'N 172°41'W
	14 April 2001	Unidentified large whale	1	Bones only	Yes	Yes	56°50'N 170°18'W
	16 September 2001	Unidentified large whale	1	Bones only	Yes	Yes	59°28'N 176°11'W
	25 July 2001	Unidentified cetacean ¹⁴	1	Trailing gear	No	No	57°35'N 173°47'W
	3 July 1990	Unidentified marine mammal	1	Bones only	Yes	Yes	58°37'N 173°15'W
	13 September 2000	Unidentified marine mammal	1	Bones only	Yes	Yes	59°27'N 176°37'W
	30 August 2001	Unidentified marine mammal	1	Bones only	Yes	Yes	58°50'N 174°17'W
Area 523							
	22 July 2001	Unidentified pinniped	2	Boarded ship	Yes	No	56°51'N 173°15'W
	19 August 1993	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	56°35'N 172°09'W
Area 540							
	24 June 1992	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	52°20'N 171°58'W
	26 October 1990	Unidentified dolphin/porpoise	1	Carcass	Yes	Yes	52°20'N 172°48'W
Area 541							
	16 March 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	52°27'N 174°23'W
Gulf of Alaska							
Area 610							
	2 June 1998	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	55°17'N 159°25'W
	1 June 1996	Unidentified baleen whale	1	Skull only	Yes	Yes	55°05'N 160°17'W
	14 September 1996	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°28'N 160°25'W
	1 June 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	55°14'N 159°18'W
	4 September 1997	Unidentified whale	1	Decomposed	Yes	Yes	55°02'N 163°03'W
Area 620							
	7 October 1999	<i>Balaenoptera physalus</i>	1	Killed by gear	Yes	Yes	56°35'N 155°30'W
	2 June 1993	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	57°03'N 155°00'W
Area 630							
	12 July 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°23'N 152°29'W
	25 January 2001	<i>Eumetopias jubatus</i>	1	Boarded ship	Yes	Yes	58°02'N 152°22'W
Washington, Oregon, and California							
Area 670							
	30 May 1998	<i>Zalophus californianus</i>	1	Killed by gear	Yes	Yes	47°51'N 125°10'W
	25 October 1999	<i>Zalophus californianus</i>	1	Killed by gear	No	Yes	48°13'N 125°00'W
	30 July 1996	<i>Phoca vitulina</i>	1	Killed by gear	No	Yes	48°26'N 124°56'W
	6 September 2000	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	48°09'N 124°58'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pelagic trawl gear vessels (continued)							
Washington, Oregon, and California (continued)							
Area 670 (continued)							
	19 June 1999	<i>Mirounga angustirostris</i>	1	Killed by gear	No	Yes	48°05'N 125°15'W
	10 July 2000	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	48°00'N 125°22'W
	9 November 1998	<i>Lagenorhynchus obliquidens</i>	1	Killed by gear	Yes	Yes	48°16'N 125°13'W
	15 October 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	48°12'N 125°12'W
	16 October 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	48°09'N 125°13'W
	6 August 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	48°10'N 125°10'W
Area 710							
	18 April 1994	<i>Zalophus californianus</i>	1	Killed by gear	Yes	Yes	44°34'N 124°33'W
	31 May 1999	<i>Zalophus californianus</i>	1	Killed by gear	Yes	Yes	46°23'N 124°35'W
	1 May 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	47°21'N 124°48'W
	29 May 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	43°10'N 124°45'W
	20 May 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	43°35'N 124°36'W
	16 May 2000	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	47°13'N 124°54'W
	29 May 1996	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	43°50'N 124°55'W
	27 May 1998	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	46°46'N 124°52'W
	15 October 2000	Unidentified phocid	1	Killed by gear	Yes	Yes	44°31'N 124°49'W
	22 April 1995	<i>Eschrichtius robustus</i>	1	Decomposed	Yes	Yes	43°48'N 124°48'W
	27 May 1996	<i>Lagenorhynchus obliquidens</i>	2	Killed by gear	No	Yes	46°36'N 124°38'W
	26 April 1992	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	45°56'N 124°43'W
	15 April 1994	<i>Phocoenoides dalli</i>	2	Killed by gear	No	Yes	43°56'N 124°57'W
	1 June 1996	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	47°12'N 124°57'W
	7 June 1997	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	43°53'N 124°39'W
	15 July 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	45°21'N 124°23'W
	21 June 1999	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	46°33'N 124°35'W
	19 April 1993	Unidentified large whale	1	Carcass	Yes	No	44°28'N 124°45'W
Area 720							
	30 May 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	42°14'N 124°38'W
	16 May 1997	<i>Phoca vitulina</i>	1	Killed by gear	No	Yes	42°26'N 124°46'W
	26 May 1996	<i>Lagenorhynchus obliquidens</i>	1	Killed by gear	No	Yes	42°22'N 124°47'W
	30 May 1997	<i>Phocoenoides dalli</i>	2	Killed by gear	Yes	Yes	42°26'N 124°46'W
Area 730							
	16 April 1991	Unidentified pinniped	1	Killed by gear	No	No	38°00'N 123°29'W
	9 April 1992	Unidentified dolphin/porpoise	1	Unharmd	Yes	Yes	38°51'N 124°43'W
Non-pelagic trawl gear vessels							
Bering Sea							
Area 509							
	29 August 2001	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	57°09'N 164°53'W
	30 January 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°02'N 164°30'W
	30 July 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	55°08'N 164°01'W
	2 October 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°16'N 164°30'W
	11 February 1996	Unidentified otariid	1	Decomposed	No	Yes	56°09'N 164°50'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 509 (continued)							
	15 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°05'N 164°04'W
	16 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°04'N 164°44'W
	30 March 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	56°28'N 164°13'W
	7 February 1996	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	54°42'N 164°53'W
	7 April 1997	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	56°27'N 164°55'W
	29 October 1998	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°58'N 164°57'W
	19 August 1999	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°47'N 163°53'W
	20 August 1999	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°49'N 164°37'W
	17 April 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°10'N 163°07'W
	22 April 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°48'N 164°53'W
	20 August 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°37'N 164°31'W
	30 November 2000	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°05'N 164°36'W
	5 October 2001	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	57°10'N 164°36'W
	1 May 1994	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	55°03'N 164°42'W
	1 May 1994	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	55°07'N 164°41'W
	7 February 1997	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	55°25'N 163°52'W
	31 May 1999	<i>Phoca vitulina</i>	1	Decomposed	Yes	Yes	57°21'N 164°53'W
	10 February 1995	Unidentified phocid	1	Killed by gear	Yes	Yes	55°45'N 163°59'W
	15 June 1993	Unidentified pinniped	1	Decomposed	Yes	Yes	57°05'N 164°34'W
	14 March 1995	Unidentified pinniped	1	Decomposed	Yes	Yes	56°16'N 164°28'W
	12 February 2001	Unidentified baleen whale	1	Decomposed	Yes	Yes	55°01'N 164°34'W
	11 March 1998	<i>Orcinus orca</i>	1	Decomposed	Yes	Yes	55°09'N 164°36'W
	13 March 1994	<i>Phocoena phocoena</i>	1	Killed by gear	Yes	Yes	55°23'N 164°05'W
	9 March 1999	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	55°01'N 164°54'W
	31 March 1995	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	56°22'N 164°33'W
	19 September 1998	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	56°17'N 164°43'W
	4 November 1998	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	55°42'N 164°59'W
	19 February 2000	<i>Phocoenoides dalli</i>	1	Skull only	Yes	Yes	55°30'N 164°04'W
	8 February 1993	Unidentified dolphin/porpoise	1	Decomposed	Yes	Yes	56°01'N 163°48'W
	29 January 1995	Unidentified dolphin/porpoise	1	Decomposed	No	No	55°59'N 163°11'W
	21 March 1997	Unidentified dolphin/porpoise	1	Decomposed	Yes	Yes	55°01'N 164°47'W
	10 February 1993	Unidentified whale	1	Decomposed	Yes	Yes	55°28'N 164°01'W
	26 March 1996	Unidentified whale	1	Decomposed	Yes	Yes	54°57'N 164°39'W
	26 March 1996	Unidentified whale	1	Decomposed	Yes	Yes	55°04'N 164°23'W
	8 April 1996	Unidentified whale	1	Bones only	Yes	Yes	56°45'N 164°38'W
	14 February 1997	Unidentified whale	1	Bones only	Yes	Yes	55°14'N 164°21'W
	21 February 1997	Unidentified whale	1	Bones only	Yes	Yes	55°23'N 164°12'W
	18 October 2001	Unidentified whale	1	Skull only	Yes	Yes	57°19'N 163°46'W
	1 April 1997	Unidentified large whale	1	Bones only	Yes	Yes	56°26'N 164°26'W
	22 October 2001	Unidentified large whale	1	Bones only	Yes	No	57°02'N 163°22'W
	4 May 1998	Unidentified cetacean	1	Bones only	Yes	Yes	56°43'N 164°52'W
	14 March 1999	Unidentified cetacean	1	Bones only	Yes	Yes	56°26'N 164°30'W
	28 January 1993	Unidentified marine mammal	1	Decomposed	Yes	Yes	55°12'N 164°27'W
	10 March 1995	Unidentified marine mammal	1	Bones only	Yes	Yes	55°17'N 164°24'W
	27 March 1995	Unidentified marine mammal	1	Bones only	Yes	No	56°24'N 164°50'W
	30 May 1996	Unidentified marine mammal	1	Bones only	Yes	Yes	56°49'N 164°07'W
	18 March 1997	Unidentified marine mammal	1	Skull/bones	No	Yes	55°03'N 164°18'W
	22 April 1998	Unidentified marine mammal	1	Decomposed	Yes	Yes	54°55'N 164°59'W
	31 March 1999	Unidentified marine mammal	1	Bones only	Yes	Yes	56°28'N 164°22'W

Appendix 2.--Continued.

Area Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)						
Bering Sea (continued)						
Area 509 (continued)						
17 April 2000	Unidentified marine mammal	1	Bones only	Yes	No	57°10'N 163°07'W
27 November 2000	Unidentified marine mammal	1	Decomposed	Yes	Yes	57°14'N 164°50'W
11 October 2001	Unidentified marine mammal	1	Decomposed	No	Yes	57°24'N 164°43'W
Area 510						
10 April 1989	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	54°38'N 165°06'W
19 November 1989	<i>Eumetopias jubatus</i>	1	Boarded ship	No	No	54°41'N 165°11'W
2 July 1989	<i>Pusa hispida</i>	1	Killed by gear	Yes	Yes	56°30'N 161°04'W
2 November 1989	Unidentified baleen whale	1	Skull only	Yes	Yes	55°03'N 167°18'W
25 October 1989	<i>Orcinus orca</i>	1	Hit propeller	No	No	54°23'N 166°02'W
26 October 1989	<i>Orcinus orca</i>	1	Serious injury ¹⁵	No	No	54°20'N 165°55'W
9 July 1989	<i>Enhydra lutris</i>	1	Decomposed	Yes	Yes	56°09'N 161°38'W
Area 511						
7 February 1990	<i>Eumetopias jubatus</i>	1	Decomposed	No	Yes	55°08'N 164°25'W
12 February 1990	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	55°00'N 164°47'W
8 May 1992	<i>Eumetopias jubatus</i>	1	Decomposed	No	No	56°54'N 163°50'W
5 May 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	56°58'N 163°59'W
15 May 1992	Unidentified phocid	1	Decomposed	Yes	Yes	56°41'N 163°30'W
19 February 1991	Unidentified pinniped	1	Decomposed	No	No	55°26'N 163°50'W
3 April 1991	Unidentified pinniped	1	Killed by gear	Yes	Yes	54°58'N 164°39'W
10 May 1990	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	55°22'N 163°58'W
14 February 1990	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	55°27'N 163°56'W
22 January 1990	Unidentified whale	1	Bones only	Yes	Yes	56°29'N 163°00'W
6 February 1990	Unidentified marine mammal	1	Killed by gear	Yes	Yes	55°13'N 164°08'W
15 May 1991	Unidentified marine mammal	1	Carcass	No	Yes	57°49'N 159°59'W
Area 513						
20 September 1990	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	57°50'N 169°13'W
28 August 1991	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	57°35'N 167°43'W
5 September 1992	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	57°41'N 169°30'W
22 October 1992	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	57°59'N 168°42'W
10 July 1993	<i>Callorhinus ursinus</i>	1	Killed by gear	No	Yes	57°46'N 169°51'W
9 October 1994	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	57°13'N 165°54'W
12 August 1995	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	57°04'N 165°22'W
3 September 1996	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	57°23'N 165°40'W
8 September 1996	<i>Callorhinus ursinus</i>	1	Decomposed	No	Yes	57°14'N 165°57'W
24 September 1997	<i>Callorhinus ursinus</i>	1	Decomposed	No	Yes	57°14'N 165°22'W
25 October 1997	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	57°26'N 165°25'W
27 October 1997	<i>Callorhinus ursinus</i>	1	Decomposed	No	Yes	57°26'N 166°07'W
28 July 1999	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	56°41'N 166°57'W
9 August 2000	<i>Callorhinus ursinus</i>	1	Killed by gear	No	Yes	57°21'N 167°31'W
7 August 2001	<i>Callorhinus ursinus</i>	1	Killed by gear ¹⁶	Yes	Yes	57°57'N 166°40'W
8 August 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°38'N 168°06'W
17 October 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°48'N 166°41'W
19 October 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°54'N 165°58'W
18 November 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	57°45'N 168°40'W
16 May 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°31'N 165°39'W
16 May 1994	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	57°31'N 165°39'W
18 May 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°21'N 165°36'W
27 October 1994	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	57°08'N 165°52'W
3 May 1996	<i>Eumetopias jubatus</i>	1	Decomposed	No	Yes	57°11'N 166°10'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 513 (continued)							
	21 April 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	56°40'N 165°13'W
	21 April 1997	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	56°39'N 165°20'W
	15 November 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°47'N 165°25'W
	4 December 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	57°23'N 165°41'W
	24 April 1998	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	57°26'N 165°24'W
	4 May 1998	<i>Eumetopias jubatus</i>	1	Killed by gear	No	No	57°58'N 166°15'W
	26 November 1998	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	57°11'N 165°41'W
	24 April 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°37'N 165°56'W
	29 April 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°40'N 165°53'W
	4 June 2000	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	57°43'N 165°53'W
	10 June 2000	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	57°46'N 165°35'W
	8 June 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°08'N 165°47'W
	3 October 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°18'N 165°00'W
	2 August 1995	Unidentified otariid	1	Decomposed	No	No	57°09'N 166°05'W
	23 August 1995	Unidentified otariid	1	Decomposed	Yes	Yes	57°06'N 166°49'W
	30 October 2001	Unidentified otariid	1	Carcass	No	Yes	57°22'N 165°50'W
	31 May 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°45'N 168°34'W
	18 September 1991	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	57°12'N 165°47'W
	20 September 1991	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	57°09'N 166°03'W
	5 June 1992	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°37'N 166°03'W
	7 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°43'N 166°29'W
	9 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°38'N 166°39'W
	11 August 1992	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	57°58'N 165°35'W
	13 August 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°05'N 165°42'W
	17 September 1992	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°54'N 165°40'W
	19 September 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°52'N 167°20'W
	30 October 1992	<i>Odobenus rosmarus</i>	1	Skull only	Yes	No	57°02'N 165°38'W
	31 October 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°11'N 165°42'W
	9 September 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°09'N 165°50'W
	18 September 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°05'N 165°35'W
	4 October 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°49'N 165°34'W
	9 October 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°53'N 165°51'W
	4 November 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°13'N 165°45'W
	13 August 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	56°46'N 165°36'W
	29 August 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°06'N 165°34'W
	22 September 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°11'N 166°14'W
	15 October 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°09'N 166°01'W
	5 August 1995	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°22'N 165°07'W
	6 August 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°24'N 165°02'W
	9 August 1995	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°37'N 165°14'W
	10 August 1995	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	57°08'N 165°53'W
	14 August 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°50'N 165°54'W
	27 August 1995	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°09'N 165°48'W
	26 September 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°04'N 165°08'W
	27 September 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°57'N 165°56'W
	28 September 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°54'N 165°51'W
	4 October 1995	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°08'N 165°40'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 513 (continued)							
	16 August 1997	<i>Odobenus rosmarus</i>	1	Carcass	No	Yes	57°21'N 165°26'W
	25 August 1997	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	No	57°18'N 165°16'W
	26 August 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°33'N 165°33'W
	29 August 1997	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	57°23'N 165°17'W
	3 September 1997	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	57°44'N 165°19'W
	7 September 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	56°30'N 165°47'W
	11 September 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°15'N 165°35'W
	14 September 1997	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°36'N 165°59'W
	24 September 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°58'N 166°12'W
	29 May 1998	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	56°31'N 166°05'W
	13 June 1998	<i>Odobenus rosmarus</i>	1	Skull only	No	Yes	57°46'N 165°14'W
	15 June 1998	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	57°54'N 166°49'W
	18 June 1998	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°49'N 165°53'W
	28 July 1998	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°17'N 165°10'W
	28 September 1998	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°08'N 165°51'W
	2 April 1999	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	56°50'N 166°03'W
	22 August 1999	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	56°30'N 165°58'W
	3 September 1999	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°22'N 167°25'W
	22 March 2000	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	57°51'N 167°16'W
	4 April 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°13'N 168°05'W
	5 May 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°25'N 165°09'W
	4 June 2000	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	57°45'N 165°59'W
	4 June 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°41'N 165°28'W
	13 July 2000	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°45'N 167°07'W
	31 July 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°39'N 167°09'W
	1 August 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	57°30'N 166°18'W
	16 August 2000	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	No	57°22'N 167°20'W
	16 October 2000	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°41'N 166°14'W
	7 November 2000	<i>Odobenus rosmarus</i>	1	Skull only	No	Yes	57°39'N 165°33'W
	7 April 2001	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	57°43'N 166°07'W
	11 October 2001	<i>Odobenus rosmarus</i>	1	Carcass	Yes	Yes	56°48'N 165°02'W
	23 July 1991	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	57°32'N 168°38'W
	19 September 1994	<i>Erignathus barbatus</i>	1	Killed by gear	No	Yes	57°09'N 166°04'W
	15 October 1994	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	57°12'N 165°30'W
	2 May 1998	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	57°48'N 165°42'W
	31 August 1999	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	56°31'N 165°25'W
	20 August 2000	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	57°27'N 167°11'W
	30 August 1992	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	57°55'N 165°22'W
	28 April 1996	<i>Phoca largha</i>	1	Killed by gear	Yes	Yes	57°01'N 165°34'W
	6 April 1999	<i>Phoca largha</i>	1	Decomposed	Yes	Yes	56°43'N 166°25'W
	12 March 1997	<i>Pusa hispida</i>	1	Decomposed	Yes	Yes	56°53'N 166°05'W
	6 May 1991	Unidentified phocid	1	Killed by gear	No	No	57°54'N 167°54'W
	5 August 1992	Unidentified phocid	1	Decomposed	Yes	Yes	57°04'N 165°45'W
	26 September 1992	Unidentified phocid ¹⁷	1	Killed by gear	Yes	Yes	57°54'N 167°34'W
	19 April 1990	Unidentified pinniped	1	Decomposed	Yes	Yes	56°46'N 169°25'W
	31 August 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	57°33'N 167°03'W
	4 July 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	56°37'N 165°18'W
	20 October 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	57°57'N 166°38'W
	12 November 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	57°58'N 169°10'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 513 (continued)							
	20 September 1994	Unidentified pinniped	1	Decomposed	Yes	No	57°03'N 165°30'W
	26 October 1994	Unidentified pinniped	1	Decomposed	No	Yes	57°13'N 165°56'W
	5 November 1994	Unidentified pinniped	1	Killed by gear	Yes	Yes	57°42'N 165°38'W
	6 August 1995	Unidentified pinniped	1	Decomposed	Yes	No	57°09'N 165°57'W
	13 September 1995	Unidentified pinniped	1	Decomposed	Yes	Yes	57°09'N 165°20'W
	1 October 1995	Unidentified pinniped	1	Carcass	Yes	Yes	57°42'N 165°22'W
	8 October 1995	Unidentified pinniped	1	Decomposed	Yes	No	57°05'N 165°54'W
	21 August 2001	Unidentified pinniped	1	Decomposed	Yes	Yes	56°45'N 168°43'W
	17 March 2000	<i>Eschrichtius robustus</i>	1	Decomposed	Yes	Yes	57°53'N 166°45'W
	5 August 1994	Unidentified baleen whale	1	Aborted fetus ¹⁸	Yes	Yes	57°20'N 165°30'W
	12 September 1994	Unidentified baleen whale	1	Decomposed	Yes	Yes	57°01'N 165°57'W
	23 September 1996	Unidentified baleen whale	1	Skull only	No	Yes	57°26'N 165°20'W
	4 December 1997	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	57°21'N 165°41'W
	8 August 1998	<i>Phocoena phocoena</i>	1	Killed by gear	Yes	Yes	57°07'N 166°22'W
	30 April 2000	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	57°30'N 165°39'W
	28 September 2000	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	57°13'N 166°08'W
	16 August 2001	<i>Phocoena phocoena</i>	1	Killed by gear	Yes	Yes	57°21'N 166°31'W
	4 October 1997	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	56°49'N 165°59'W
	2 September 1999	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	56°48'N 166°00'W
	25 October 1992	Unidentified dolphin/porpoise	1	Decomposed	Yes	Yes	57°50'N 169°04'W
	24 August 1994	Unidentified dolphin/porpoise	1	Killed by gear	No	Yes	57°05'N 165°31'W
	5 October 1995	Unidentified dolphin/porpoise	1	Decomposed	Yes	Yes	57°10'N 165°40'W
	30 March 2001	Unidentified dolphin/porpoise	1	Skull/bones	Yes	Yes	57°37'N 166°18'W
	2 April 1996	Unidentified whale	1	Bones only	No	Yes	57°00'N 165°07'W
	26 September 1996	Unidentified whale	1	Skull only	Yes	Yes	57°29'N 165°16'W
	13 March 1997	Unidentified whale	1	Bones only	Yes	Yes	56°45'N 165°04'W
	21 September 1997	Unidentified whale	1	Bones only	Yes	Yes	57°28'N 165°42'W
	30 May 1998	Unidentified whale	1	Bones only	Yes	Yes	56°34'N 166°19'W
	22 September 1998	Unidentified whale	1	Bones only	Yes	Yes	57°11'N 166°13'W
	8 November 1998	Unidentified whale	1	Bones only	Yes	Yes	57°10'N 165°48'W
	25 August 1999	Unidentified whale	1	Bones only	Yes	Yes	56°52'N 168°27'W
	27 August 2000	Unidentified whale	1	Skull only	Yes	Yes	56°39'N 165°02'W
	30 July 2001	Unidentified whale	1	Bones only	Yes	Yes	57°29'N 166°32'W
	7 October 2001	Unidentified whale	1	Bones only	Yes	Yes	57°33'N 166°21'W
	13 November 2001	Unidentified whale	1	Bones only	Yes	Yes	57°17'N 167°49'W
	28 September 2000	Unidentified small whale	1	Bones only	Yes	Yes	57°13'N 166°08'W
	14 July 1993	Unidentified large whale	1	Bones only	Yes	Yes	57°23'N 168°55'W
	22 October 1993	Unidentified large whale	1	Bones only	Yes	Yes	57°18'N 165°34'W
	24 October 1994	Unidentified large whale	1	Bones only	Yes	Yes	57°15'N 165°36'W
	9 August 1995	Unidentified large whale	1	Bones only	No	Yes	57°06'N 165°08'W
	17 March 1997	Unidentified large whale	1	Bones only	Yes	Yes	56°40'N 165°56'W
	2 September 1997	Unidentified cetacean	1	Decomposed	Yes	Yes	57°21'N 165°42'W
	6 October 2000	Unidentified cetacean	1	Bones only	Yes	Yes	56°56'N 165°57'W
	24 September 1994	Unidentified marine mammal	1	Bones only	Yes	Yes	56°51'N 165°49'W
	2 August 1995	Unidentified marine mammal	1	Decomposed	Yes	Yes	57°06'N 165°29'W
	17 August 1997	Unidentified marine mammal	1	Bones only	No	No	57°21'N 165°25'W
	23 September 1997	Unidentified marine mammal	1	Bones only	No	Yes	57°55'N 165°54'W
	27 April 1998	Unidentified marine mammal	1	Decomposed	Yes	Yes	57°35'N 165°59'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 513 (continued)							
	8 September 1998	Unidentified marine mammal	1	Bones only	Yes	Yes	57°09'N 165°56'W
	9 October 1998	Unidentified marine mammal	1	Bones only	Yes	Yes	56°45'N 165°57'W
	30 October 1998	Unidentified marine mammal	1	Bones only	Yes	Yes	57°12'N 166°04'W
	8 May 1999	Unidentified marine mammal	1	Carcass	Yes	No	57°18'N 165°23'W
	16 June 2000	Unidentified marine mammal	1	Bones only	No	Yes	57°02'N 166°07'W
	17 June 2000	Unidentified marine mammal	1	Bones only	Yes	Yes	57°02'N 166°08'W
	6 October 2000	Unidentified marine mammal	1	Decomposed	Yes	Yes	56°56'N 165°57'W
Area 514							
	24 May 1991	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	58°30'N 159°17'W
	22 June 1992	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	No	59°00'N 164°19'W
	23 June 1992	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	59°04'N 164°11'W
	23 June 1992	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	58°57'N 163°21'W
	25 September 1992	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	58°01'N 166°53'W
	17 June 1994	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	59°06'N 165°05'W
	24 June 1994	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	59°03'N 163°26'W
	7 June 1999	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	58°36'N 163°50'W
	12 November 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°42'N 168°59'W
	16 November 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°28'N 168°59'W
	21 May 1991	<i>Eumetopias jubatus</i>	1	Boarded ship	Yes	Yes	58°20'N 159°19'W
	3 July 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	58°32'N 159°31'W
	14 August 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°24'N 159°35'W
	14 August 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	58°40'N 159°33'W
	15 September 1991	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°59'N 169°12'W
	10 May 1992	<i>Eumetopias jubatus</i>	2	Killed by gear	Yes	Yes	58°39'N 159°33'W
	12 May 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°46'N 159°37'W
	15 May 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°44'N 159°36'W
	15 May 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°45'N 159°37'W
	21 May 1992	<i>Eumetopias jubatus</i>	1	Unharmed	Yes	Yes	58°38'N 159°19'W
	7 June 1992	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°17'N 159°18'W
	30 June 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°12'N 166°17'W
	29 July 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°58'N 168°11'W
	29 August 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°00'N 168°05'W
	9 September 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	58°15'N 167°36'W
	22 September 1992	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°14'N 168°27'W
	13 May 1993	<i>Eumetopias jubatus</i>	1	Decomposed	No	No	59°30'N 164°19'W
	21 May 1993	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°28'N 164°05'W
	23 May 1993	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°59'N 163°13'W
	24 May 1993	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°58'N 163°48'W
	27 May 1993	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	59°14'N 163°48'W
	23 October 1993	<i>Eumetopias jubatus</i>	1	Decomposed	No	Yes	58°04'N 168°15'W
	10 June 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	58°23'N 163°28'W
	20 June 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	59°21'N 164°42'W
	24 June 1994	<i>Eumetopias jubatus</i>	1	Carcass	No	No	59°09'N 163°38'W
	16 May 1996	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°41'N 163°50'W
	27 May 1996	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	59°07'N 163°29'W
	1 June 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°25'N 159°27'W
	1 June 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°58'N 164°38'W
	8 June 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°20'N 164°28'W
	12 June 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°06'N 163°22'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 514 (continued)							
	13 June 1997	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	59°00'N 163°13'W
	23 April 1998	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°21'N 163°32'W
	13 May 1999	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	58°09'N 168°42'W
	18 June 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	59°08'N 163°59'W
	16 August 1990	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°06'N 166°26'W
	11 October 1990	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°58'N 169°10'W
	14 May 1991	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	58°12'N 160°42'W
	17 May 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°00'N 160°21'W
	18 May 1991	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°10'N 168°22'W
	23 May 1991	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	No	58°21'N 159°32'W
	7 July 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°33'N 159°30'W
	19 July 1991	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	59°21'N 168°50'W
	31 July 1991	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°18'N 159°45'W
	25 August 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°08'N 168°51'W
	4 September 1991	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°03'N 159°27'W
	5 September 1991	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	58°01'N 159°30'W
	14 September 1991	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°16'N 169°04'W
	3 May 1992	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°01'N 160°17'W
	10 May 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°01'N 160°23'W
	11 May 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°33'N 159°21'W
	13 May 1992	<i>Odobenus rosmarus</i>	1	Carcass	Yes	No	58°23'N 159°41'W
	13 May 1992	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	58°20'N 159°51'W
	14 May 1992	<i>Odobenus rosmarus</i>	1	Killed by gear	No	No	58°19'N 159°45'W
	14 May 1992	<i>Odobenus rosmarus</i>	1	Carcass	Yes	No	58°19'N 159°33'W
	15 May 1992	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°13'N 159°27'W
	15 May 1992	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°19'N 159°56'W
	21 May 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°16'N 159°49'W
	27 May 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°34'N 159°29'W
	4 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°36'N 159°33'W
	16 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°21'N 164°21'W
	25 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°06'N 164°04'W
	30 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°18'N 166°08'W
	1 August 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°10'N 166°31'W
	4 August 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°15'N 167°05'W
	7 August 1992	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°29'N 159°32'W
	10 September 1992	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	58°03'N 169°45'W
	13 September 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°15'N 169°04'W
	12 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	59°21'N 163°55'W
	14 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	No	58°55'N 163°28'W
	14 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°16'N 164°02'W
	16 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°33'N 164°06'W
	17 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	58°01'N 167°13'W
	20 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°05'N 163°31'W
	22 May 1993	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°58'N 163°15'W
	24 May 1993	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°59'N 163°43'W
	24 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°55'N 163°28'W
	25 May 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°02'N 164°12'W
	3 June 1993	<i>Odobenus rosmarus</i>	2	Unharmed	Yes	Yes	58°18'N 159°32'W
	3 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°03'N 163°43'W
	9 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°16'N 164°51'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 514 (continued)							
	11 June 1993	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	58°17'N 159°44'W
	12 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°25'N 159°38'W
	13 June 1993	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	58°22'N 159°52'W
	19 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°56'N 163°39'W
	19 June 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°02'N 164°10'W
	5 August 1993	<i>Odobenus rosmarus</i>	1	Decomposed	No	No	58°18'N 169°53'W
	17 May 1994	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	58°29'N 159°23'W
	30 May 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°12'N 163°39'W
	11 June 1994	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°39'N 163°37'W
	24 June 1994	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°52'N 163°57'W
	28 June 1994	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	59°19'N 164°33'W
	9 November 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°01'N 167°28'W
	25 July 1995	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°53'N 166°30'W
	28 July 1995	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°10'N 164°01'W
	28 July 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°18'N 164°07'W
	7 August 1995	<i>Odobenus rosmarus</i>	1	Carcass	Yes	No	58°47'N 168°37'W
	10 August 1995	<i>Odobenus rosmarus</i>	1	Killed by gear	No	Yes	58°07'N 167°15'W
	12 August 1995	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°01'N 165°26'W
	21 August 1995	<i>Odobenus rosmarus</i>	1	Skull only	Yes	No	58°04'N 169°27'W
	22 August 1995	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°51'N 169°10'W
	9 May 1996	<i>Odobenus rosmarus</i>	1	Minor injury	No	Yes	59°08'N 163°56'W
	10 May 1996	<i>Odobenus rosmarus</i>	1	Skull only	No	Yes	59°01'N 163°55'W
	13 May 1996	<i>Odobenus rosmarus</i>	1	Carcass	Yes	Yes	58°57'N 164°19'W
	13 May 1996	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°51'N 164°32'W
	21 May 1996	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°59'N 164°10'W
	2 June 1996	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	59°02'N 163°42'W
	15 June 1996	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°56'N 163°54'W
	9 May 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°02'N 163°48'W
	16 May 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°08'N 162°58'W
	17 May 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°16'N 163°34'W
	3 May 1999	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°13'N 168°34'W
	19 June 1999	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°31'N 164°22'W
	25 May 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°02'N 164°00'W
	27 May 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°28'N 169°10'W
	31 May 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°01'N 163°58'W
	1 June 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°52'N 163°48'W
	15 July 1991	<i>Erignathus barbatus</i>	1	Killed by gear	Yes	Yes	59°41'N 168°50'W
	30 May 1992	<i>Erignathus barbatus</i>	1	Decomposed	Yes	Yes	58°39'N 168°51'W
	6 May 2000	<i>Erignathus barbatus</i>	1	Bones only	No	Yes	58°43'N 168°44'W
	16 July 1991	<i>Phoca vitulina</i>	1	Decomposed	No	Yes	59°38'N 168°54'W
	11 July 1992	<i>Phoca vitulina</i>	1	Decomposed	No	Yes	59°24'N 165°39'W
	5 September 1992	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	58°14'N 167°19'W
	10 July 1991	<i>Phoca largha</i>	1	Carcass	Yes	Yes	59°25'N 168°20'W
	29 May 1992	<i>Phoca largha</i>	1	Decomposed	Yes	Yes	58°45'N 168°38'W
	20 June 1992	<i>Phoca largha</i>	1	Decomposed	No	Yes	60°08'N 169°59'W
	6 May 1996	<i>Phoca largha</i>	1	Killed by gear	Yes	Yes	59°11'N 164°03'W
	6 May 1996	<i>Phoca largha</i>	1	Decomposed	Yes	Yes	59°19'N 164°05'W
	6 May 1996	<i>Phoca largha</i>	1	Decomposed	No	No	59°28'N 164°30'W
	14 June 1996	<i>Phoca largha</i>	1	Killed by gear	Yes	Yes	59°05'N 163°43'W
	1 June 1992	<i>Pusa hispida</i>	1	Killed by gear	Yes	Yes	58°23'N 169°24'W

Appendix 2.--Continued.

Area Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)						
Bering Sea (continued)						
Area 514 (continued)						
11 May 1993	Unidentified phocid	1	Decomposed	Yes	No	59°19'N 163°48'W
24 June 1994	Unidentified phocid	1	Decomposed	Yes	Yes	58°58'N 163°31'W
3 June 1997	Unidentified phocid	1	Decomposed	Yes	Yes	59°33'N 164°15'W
9 May 1999	Unidentified phocid	1	Killed by gear	No	Yes	58°15'N 168°12'W
21 May 1999	Unidentified phocid	1	Decomposed	No	Yes	58°26'N 169°34'W
29 May 2000	Unidentified phocid	1	Decomposed	Yes	Yes	58°33'N 163°35'W
26 May 2001	Unidentified phocid	1	Killed by gear	Yes	Yes	58°48'N 164°18'W
31 July 1991	Unidentified pinniped	1	Decomposed	Yes	No	58°50'N 168°37'W
12 September 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	59°11'N 169°15'W
5 October 1991	Unidentified pinniped	1	Decomposed	Yes	Yes	59°07'N 168°44'W
11 May 1992	Unidentified pinniped	1	Decomposed	Yes	No	58°33'N 159°21'W
24 May 1992	Unidentified pinniped	1	Killed by gear	Yes	No	58°34'N 159°30'W
2 September 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	58°12'N 167°53'W
7 September 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	58°12'N 168°08'W
10 September 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	58°03'N 166°42'W
28 September 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	58°00'N 166°44'W
8 June 1993	Unidentified pinniped	1	Decomposed	No	Yes	59°01'N 164°16'W
23 June 1994	Unidentified pinniped	1	Decomposed	Yes	No	59°04'N 163°33'W
24 June 1994	Unidentified pinniped	1	Decomposed	Yes	No	59°03'N 163°31'W
26 June 1994	Unidentified pinniped	1	Carcass	Yes	No	58°00'N 165°38'W
20 August 1995	Unidentified pinniped	1	Carcass	No	No	59°17'N 169°06'W
8 June 1996	Unidentified pinniped	1	Decomposed	Yes	Yes	59°00'N 164°00'W
26 August 1996	Unidentified pinniped	1	Decomposed	Yes	Yes	58°37'N 164°44'W
26 August 1996	Unidentified pinniped	1	Decomposed	Yes	Yes	58°38'N 164°49'W
15 June 1997	Unidentified pinniped	1	Decomposed	No	Yes	59°00'N 163°16'W
27 May 2000	Unidentified pinniped	1	Decomposed	Yes	Yes	59°34'N 169°18'W
24 May 1996	<i>Delphinapterus leucas</i>	1	Decomposed	Yes	Yes	59°02'N 164°10'W
18 August 1999	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	58°05'N 165°09'W
17 August 1999	Unidentified dolphin/porpoise	1	Decomposed	Yes	Yes	58°01'N 164°41'W
8 September 1992	Unidentified whale	1	Bones only	Yes	Yes	58°14'N 167°35'W
24 August 1995	Unidentified whale	1	Bones only	Yes	Yes	58°10'N 169°47'W
17 May 1999	Unidentified whale	1	Bones only	Yes	Yes	58°17'N 168°05'W
15 June 1996	Unidentified large whale	1	Bones only	No	Yes	58°59'N 163°56'W
28 September 1993	Unidentified cetacean	1	Carcass	No	No	58°06'N 168°14'W
19 April 2000	<i>Enhydra lutris</i>	1	Decomposed	Yes	Yes	59°12'N 163°40'W
11 September 1993	Unidentified marine mammal	1	Decomposed	Yes	Yes	58°16'N 169°58'W
19 May 1999	Unidentified marine mammal	1	Bones only	Yes	Yes	58°16'N 168°03'W
9 May 2000	Unidentified marine mammal	1	Bones only	Yes	Yes	58°50'N 169°41'W
Area 515						
5 October 1990	<i>Phoca vitulina</i>	1	Killed by gear	No	Yes	54°22'N 165°44'W
9 November 1990	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	52°53'N 169°29'W
23 August 1990	Unidentified whale ¹⁹	1	Decomposed	Yes	Yes	54°21'N 166°08'W
Area 516						
3 January 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	No	No	56°00'N 162°15'W
25 January 1996	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	55°59'N 162°47'W
12 February 1999	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	56°05'N 162°57'W
23 January 1990	Unidentified whale	1	Bones only	Yes	Yes	56°24'N 162°54'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 517							
	20 September 1999	<i>Callorhinus ursinus</i>	1	Aborted fetus	Yes	Yes	56°21'N 165°21'W
	14 October 2000	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	56°26'N 166°27'W
	3 April 1990	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	54°56'N 165°10'W
	18 March 1992	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	54°40'N 165°19'W
	21 April 1996	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	55°09'N 165°32'W
	9 October 1999	<i>Eumetopias jubatus</i>	3	Boarded ship	Yes	Yes	54°35'N 165°29'W
	14 May 1990	Unidentified otariid	1	Killed by gear	No	No	56°24'N 169°42'W
	30 September 1995	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	56°06'N 165°06'W
	1 April 1997	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	56°25'N 165°17'W
	13 April 1990	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	56°21'N 169°14'W
	6 September 1994	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	56°26'N 166°09'W
	18 August 1990	<i>Histiophoca fasciata</i>	1	Killed by gear	Yes	Yes	54°38'N 166°15'W
	23 April 1995	Unidentified pinniped	1	Decomposed	Yes	Yes	56°19'N 165°21'W
	4 August 2001	Unidentified pinniped	1	Decomposed	Yes	Yes	55°17'N 167°57'W
	11 July 1998	Unidentified baleen whale	1	Decomposed	Yes	Yes	54°30'N 165°38'W
	25 August 2000	Unidentified beaked whale	1	Skull only	Yes	Yes	56°01'N 169°34'W
	10 July 1996	<i>Orcinus orca</i>	1	Decomposed	Yes	Yes	54°30'N 165°29'W
	1 August 1998	<i>Orcinus orca</i>	1	Hit propeller	Yes	Yes	54°30'N 165°42'W
	14 August 1998	<i>Orcinus orca</i>	1	Decomposed	Yes	Yes	55°18'N 168°03'W
	18 August 2001	<i>Orcinus orca</i>	1	Hit propeller	Yes	No	54°36'N 165°34'W
	9 April 1995	<i>Phocoena phocoena</i>	1	Killed by gear	Yes	Yes	54°51'N 165°02'W
	8 September 1997	<i>Phocoena phocoena</i>	1	Killed by gear	Yes	Yes	56°25'N 165°48'W
	10 May 1990	Unidentified whale	1	Bones only	Yes	Yes	56°27'N 168°50'W
	6 April 1995	Unidentified whale	1	Decomposed	Yes	Yes	54°38'N 165°11'W
	25 February 1997	Unidentified whale	1	Bones only	Yes	Yes	54°40'N 165°17'W
	1 March 1997	Unidentified whale	1	Bones only	No	Yes	56°16'N 166°04'W
	4 March 1997	Unidentified whale	1	Bones only	Yes	Yes	54°42'N 165°16'W
	14 March 1998	Unidentified whale	1	Decomposed	Yes	Yes	54°52'N 165°07'W
	11 November 1998	Unidentified whale	1	Bones only	Yes	Yes	54°30'N 165°47'W
	2 March 2000	Unidentified whale	1	Bones only	Yes	No	56°11'N 166°41'W
	13 April 2000	Unidentified whale	1	Bones only	Yes	Yes	54°50'N 165°06'W
	18 February 2001	Unidentified small whale	1	Skull only	Yes	Yes	54°44'N 165°10'W
	18 March 1994	Unidentified large whale	1	Decomposed	Yes	Yes	54°53'N 165°03'W
	23 April 1995	Unidentified large whale	1	Bones only	Yes	Yes	56°21'N 165°41'W
	17 April 1998	Unidentified large whale	1	Decomposed	Yes	Yes	55°39'N 165°13'W
	9 November 1998	Unidentified cetacean	1	Skull only	Yes	Yes	54°30'N 166°01'W
	14 April 2000	Unidentified cetacean	1	Carcass	Yes	No	56°22'N 166°11'W
	10 May 1990	Unidentified marine mammal	1	Decomposed	Yes	Yes	56°27'N 168°50'W
	11 April 1995	Unidentified marine mammal	1	Decomposed	Yes	No	54°43'N 165°06'W
	1 April 1996	Unidentified marine mammal	1	Bones only	No	Yes	54°47'N 165°02'W
	18 April 1996	Unidentified marine mammal	1	Skull only	Yes	Yes	54°39'N 165°09'W
	27 August 1999	Unidentified marine mammal	1	Decomposed	Yes	Yes	54°35'N 166°21'W
Area 519							
	28 March 1991	<i>Eumetopias jubatus</i>	1	Unharmful	Yes	Yes	54°28'N 165°35'W
	11 August 2001	<i>Orcinus orca</i>	1	Hit propeller	Yes	Yes	54°25'N 165°51'W
	26 October 1991	Unidentified whale	1	Decomposed	Yes	Yes	54°26'N 166°44'W
	28 October 1991	Unidentified whale	1	Decomposed	Yes	Yes	54°23'N 166°18'W
	9 August 2001	Unidentified whale	1	Bones only	Yes	Yes	54°21'N 165°58'W
	14 April 1992	Unidentified small whale	1	Bones only	Yes	Yes	54°26'N 165°06'W
	11 November 1998	Unidentified cetacean	1	Bones only	Yes	Yes	54°27'N 165°51'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 521							
	24 July 1998	<i>Callorhinus ursinus</i>	1	Boarded ship	Yes	Yes	59°08'N 174°06'W
	7 May 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°15'N 170°10'W
	22 April 1993	Unidentified otariid	1	Decomposed	Yes	No	59°53'N 178°14'W
	12 June 1990	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°29'N 173°24'W
	24 June 1990	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	59°11'N 174°01'W
	18 April 1991	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	59°09'N 177°45'W
	7 July 1991	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°45'N 173°26'W
	31 May 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°21'N 171°30'W
	4 June 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°10'N 171°11'W
	8 July 1992	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	58°42'N 173°15'W
	19 April 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°20'N 177°35'W
	28 August 1994	<i>Erignathus barbatus</i>	1	Killed by gear	No	Yes	57°42'N 173°11'W
	2 April 1995	<i>Erignathus barbatus</i>	1	Killed by gear	No	Yes	59°33'N 178°16'W
	7 April 1993	<i>Phoca vitulina</i>	1	Decomposed	No	Yes	59°30'N 178°06'W
	28 July 1996	<i>Pusa hispida</i>	1	Killed by gear	Yes	Yes	59°10'N 174°03'W
	22 May 1992	Unidentified pinniped	1	Decomposed	Yes	Yes	58°10'N 171°02'W
	29 July 1996	<i>Balaenoptera acutorostrata</i>	1	Decomposed	No	Yes	58°58'N 173°57'W
	22 March 1993	<i>Orcinus orca</i>	1	Killed by gear	No	Yes	58°35'N 175°36'W
	25 July 1991	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	59°45'N 178°47'W
	7 August 1992	<i>Phocoenoides dalli</i>	1	Minor injury	Yes	Yes	57°17'N 173°49'W
	16 March 1993	Unidentified whale	1	Skull only	Yes	Yes	59°01'N 178°11'W
	23 July 1995	Unidentified whale	2	Bones only	No	No	59°42'N 177°01'W
	14 March 1997	Unidentified whale	1	Bones only	Yes	No	59°43'N 178°09'W
	17 July 1998	Unidentified whale	1	Skull only	Yes	Yes	58°38'N 173°47'W
	31 July 2001	Unidentified whale	1	Bones only	Yes	Yes	59°53'N 177°40'W
	6 April 1993	Unidentified large whale	1	Bones only	Yes	Yes	58°35'N 175°56'W
	19 September 1998	Unidentified large whale	1	Skull only	Yes	Yes	58°45'N 174°53'W
	14 July 2001	Unidentified large whale	1	Bones only	Yes	Yes	57°01'N 170°55'W
	25 March 2000	Unidentified cetacean	1	Bones only	Yes	Yes	58°03'N 173°51'W
	26 July 2000	Unidentified cetacean	1	Decomposed	Yes	Yes	59°54'N 177°33'W
	9 August 2000	Unidentified cetacean	1	Decomposed	Yes	Yes	59°47'N 177°11'W
	8 April 1995	Unidentified marine mammal	1	Decomposed	No	No	58°40'N 176°56'W
	17 March 1997	Unidentified marine mammal	1	Bones only	Yes	No	58°50'N 177°43'W
	22 March 1997	Unidentified marine mammal	1	Bones only	No	No	58°38'N 176°49'W
Area 522							
	21 June 1992	<i>Phoca largha</i>	1	Decomposed	No	Yes	60°54'N 171°19'W
	23 April 1991	Unidentified phocid	1	Carcass	No	No	56°43'N 173°20'W
	29 March 1992	<i>Lagenorhynchus obliquidens</i>	1	Killed by gear	Yes	Yes	56°50'N 173°18'W
Area 524							
	12 August 1993	<i>Eumetopias jubatus</i>	1	Decomposed	Yes	Yes	60°27'N 172°34'W
	19 May 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°37'N 170°23'W
	9 August 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	60°32'N 172°39'W
	20 August 1993	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	60°28'N 172°36'W
	21 August 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	60°34'N 172°41'W
	28 August 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	60°40'N 172°51'W
	14 August 1994	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	60°31'N 172°41'W
	19 March 1997	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	60°13'N 178°28'W
	24 May 2000	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	59°02'N 170°15'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)							
Bering Sea (continued)							
Area 524 (continued)							
	19 May 2000	<i>Phoca vitulina</i>	1	Decomposed	Yes	Yes	59°31'N 170°22'W
	27 May 2000	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	59°18'N 170°49'W
	13 March 1994	Unidentified pinniped	1	Killed by gear	Yes	No	60°05'N 178°58'W
	2 May 1997	Unidentified baleen whale	1	Baleen only	Yes	Yes	60°50'N 178°17'W
	15 August 2001	Unidentified baleen whale	1	Baleen only	Yes	Yes	60°09'N 178°38'W
Area 540							
	20 March 1992	<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	51°59'N 172°03'W
	3 July 1989	<i>Eumetopias jubatus</i>	3	Killed by gear	Yes	Yes	51°32'N 178°58'W
	4 April 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	52°16'N 172°51'W
	9 May 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	51°38'N 178°23'W
	25 May 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°31'N 178°58'W
	30 May 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°31'N 178°55'W
	3 June 1990	<i>Eumetopias jubatus</i>	1	Unharmd	Yes	No	51°31'N 178°58'W
	4 March 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°35'N 178°22'W
	9 March 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°35'N 178°23'W
	9 March 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°37'N 178°20'W
	13 March 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°34'N 178°24'W
	21 March 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°36'N 178°20'W
	23 March 1991	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°37'N 178°21'W
	23 April 1992	<i>Eumetopias jubatus</i>	1	Decomposed	No	No	51°16'N 178°59'E
	21 June 1990	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	52°38'N 179°26'W
	26 March 1991	Unidentified pinniped	1	Carcass	No	No	51°38'N 178°26'W
	20 April 1992	<i>Balaenoptera acutorostrata</i>	1	Skull only	Yes	Yes	51°53'N 173°51'W
Area 541							
	20 March 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°45'N 175°56'W
	11 March 1999	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	51°48'N 175°45'W
	18 March 1999	Unidentified cetacean	1	Bones only	Yes	Yes	52°16'N 173°51'W
Area 542							
	14 April 1994	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°36'N 178°57'W
	26 March 1995	<i>Eumetopias jubatus</i>	1	Hit propeller	Yes	No	51°34'N 178°28'E
	28 March 1995	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°32'N 178°31'E
	11 April 1996	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°37'N 178°57'W
	5 March 1998	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°43'N 178°16'W
	25 March 1998	<i>Eumetopias jubatus</i>	2	Killed by gear	Yes	Yes	51°41'N 178°18'W
	11 February 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°15'N 179°05'E
	24 February 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°40'N 178°20'W
	2 February 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	51°17'N 179°09'E
	29 May 2001	Unidentified pinniped	1	Skull only	Yes	Yes	51°46'N 179°07'E
	27 March 1993	<i>Phocoenoides dalli</i>	1	Carcass	No	No	52°26'N 179°50'W
	4 September 2001	Unidentified marine mammal	1	Bones only	No	No	51°37'N 179°09'W
Area 543							
	6 April 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	51°45'N 176°59'E
	14 April 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	52°27'N 175°30'E
	19 April 1997	<i>Eumetopias jubatus</i>	1	Killed by gear	No	Yes	52°03'N 177°00'E
	7 October 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	52°11'N 176°14'E
	8 October 1999	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	52°11'N 176°07'E
	16 April 1996	Unidentified whale	1	Bones only	Yes	Yes	52°10'N 174°59'E
	29 September 1999	Unidentified large whale	1	Skull only	No	Yes	52°11'N 176°10'E

Appendix 2.--Continued.

Area Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)						
Gulf of Alaska						
Area 610						
17 January 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	54°05'N 164°30'W
30 September 1991	<i>Eumetopias jubatus</i>	1	Minor injury	Yes	Yes	53°44'N 164°09'W
18 October 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	53°59'N 164°19'W
9 March 1991	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	54°26'N 162°25'W
26 October 1990	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	53°56'N 163°19'W
14 February 1997	Unidentified dolphin/porpoise	1	Aborted fetus	Yes	Yes	55°16'N 159°25'W
26 April 1990	Unidentified whale	1	Bones only	Yes	Yes	54°24'N 162°12'W
27 April 1990	Unidentified whale	1	Bones only	Yes	Yes	54°25'N 162°17'W
21 March 1991	Unidentified whale	1	Decomposed	Yes	Yes	55°30'N 159°31'W
10 May 2000	Unidentified whale	1	Bones only	Yes	Yes	53°44'N 164°36'W
11 May 2000	Unidentified whale	1	Bones only	Yes	Yes	53°45'N 164°16'W
9 March 1991	Unidentified small whale	1	Decomposed	Yes	Yes	54°24'N 162°07'W
6 May 2000	Unidentified small whale	1	Skull only	No	Yes	53°44'N 164°51'W
18 July 1994	Unidentified large whale	1	Bones only	Yes	No	54°27'N 159°12'W
Area 620						
14 August 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	55°46'N 157°29'W
18 March 1992	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	56°27'N 156°53'W
11 May 1990	Unidentified baleen whale	1	Decomposed	Yes	Yes	55°30'N 156°05'W
1 July 1994	Unidentified baleen whale ³	1	Decomposed	Yes	Yes	55°35'N 155°49'W
25 April 1996	Unidentified baleen whale ³	1	Decomposed	Yes	Yes	57°58'N 154°42'W
1 May 1997	Unidentified whale	1	Bones only	Yes	Yes	56°52'N 157°01'W
Area 630						
26 July 1993	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	58°40'N 148°29'W
19 October 1996	<i>Eumetopias jubatus</i>	1	Minor injury	Yes	Yes	57°21'N 152°29'W
18 July 1999	<i>Phoca vitulina</i>	1	Decomposed	Yes	Yes	56°28'N 152°39'W
26 July 1993	<i>Mirounga angustirostris</i>	1	Killed by gear	No	Yes	58°32'N 148°29'W
6 April 2000	<i>Eschrichtius robustus</i>	1	Decomposed	Yes	Yes	57°00'N 152°25'W
23 July 2000	<i>Megaptera novaeangliae</i>	1	Decomposed	No	No	Not recorded ²
9 July 1995	<i>Orcinus orca</i>	1	Decomposed	No	Yes	58°34'N 148°38'W
21 March 1996	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	57°14'N 152°24'W
4 March 1993	Unidentified dolphin/porpoise	1	Skull only	Yes	Yes	56°38'N 152°30'W
10 December 1993	Unidentified whale	1	Bones only	Yes	Yes	56°27'N 153°34'W
5 March 1996	Unidentified whale	1	Bones only	Yes	Yes	59°24'N 149°43'W
5 May 1996	Unidentified small whale	1	Decomposed	Yes	Yes	57°39'N 151°46'W
14 March 1993	Unidentified large whale	1	Bones only	Yes	Yes	57°01'N 149°53'W
18 April 1998	Unidentified large whale	1	Skull only	Yes	Yes	57°49'N 149°36'W
9 July 1999	Unidentified large whale	1	Bones only	Yes	Yes	59°13'N 147°15'W
25 July 2001	Unidentified cetacean	1	Bones only	Yes	Yes	57°35'N 151°35'W
Area 640						
14 July 1996	Unidentified whale	1	Skull only	Yes	Yes	59°59'N 144°31'W
7 July 2000	Unidentified whale	1	Skull only	Yes	Yes	59°09'N 141°40'W
Area 650						
25 April 1990	Unidentified pinniped	1	Decomposed	Yes	Yes	57°14'N 136°19'W

Appendix 2.--Continued.

Area Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Non-pelagic trawl gear vessels (continued)						
Washington, Oregon and California						
Area 720 12 June 2001	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	42°43'N 124°50'W
Area 730 25 April 1991	Unidentified dolphin/porpoise	1	Carcass	No	No	38°30'N 123°39'W
Trawl vessels (gear not recorded)						
Alaska EEZ (area not recorded) 9 January 1991	<i>Orcinus orca</i>	1	Decomposed	No	Yes	Not recorded ²⁰
Longline gear vessels						
Bering Sea						
Area 509 24 November 1995	<i>Eumetopias jubatus</i>	1	Carcass	Yes	Yes	55°21'N 164°01'W
28 March 1995	Unidentified pinniped ⁹	1	Serious injury	Yes	No	55°14'N 163°54'W
27 January 2000	Unidentified cetacean	1	Bones only	Yes	Yes	55°57'N 164°44'W
24 November 1995	Unidentified marine mammal	1	Bones only	Yes	Yes	55°25'N 164°00'W
Area 513 17 February 1995	<i>Lagenorhynchus obliquidens</i>	1	Killed by gear	Yes	Yes	56°45'N 167°38'W
13 September 1995	Unidentified marine mammal	1	Bones only	Yes	Yes	56°35'N 167°00'W
Area 516 14 October 1999	Unidentified otariid	1	Killed by gear	Yes	Yes	56°30'N 162°54'W
Area 517 29 March 1999	<i>Phoca largha</i>	1	Carcass	Yes	Yes	56°27'N 169°10'W
16 January 1994	Unidentified pinniped	1	Carcass	Yes	Yes	55°54'N 168°24'W
11 February 1994	Unidentified baleen whale	1	Decomposed ²¹	Yes	Yes	56°25'N 166°33'W
4 September 1995	<i>Orcinus orca</i>	1	Killed by gear	Yes	Yes	55°17'N 167°40'W
2 October 1994	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	54°57'N 165°44'W
6 March 1999	<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	54°30'N 165°34'W
12 October 1996	Unidentified whale	1	Bones only	Yes	Yes	55°44'N 165°40'W
4 October 2001	Unidentified whale	1	Bones only	Yes	Yes	56°04'N 165°25'W
2 December 2001	Unidentified whale	1	Bones only	Yes	Yes	55°44'N 167°44'W
12 December 1998	Unidentified cetacean	1	Bones only	Yes	Yes	54°53'N 165°14'W
2 December 2000	Unidentified marine mammal	1	Bones only	No	No	55°09'N 165°01'W
21 August 2001	Unidentified marine mammal	1	Bones only	Yes	No	56°20'N 169°38'W
Area 519 5 December 1997	Unidentified pinniped	1	Unharméd ²²	No	No	54°21'N 165°45'W
Area 521 2 May 1993	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°40'N 178°21'W
19 March 1994	<i>Eumetopias jubatus</i>	1	Minor injury ²³	Yes	Yes	56°03'N 170°12'W
24 March 1995	<i>Eumetopias jubatus</i>	1	Minor injury ²⁴	Yes	No	58°39'N 176°34'W

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Longline gear vessels (continued)							
Bering Sea (continued)							
Area 521 (continued)							
	15 June 1990	<i>Odobenus rosmarus</i>	1	Tusks only	Yes	Yes	58°56'N 177°51'W
	29 October 1990	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°49'N 173°33'W
	29 October 1990	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°49'N 173°35'W
	14 January 1993	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	59°04'N 175°48'W
	6 November 1998	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°34'N 172°25'W
	30 September 1999	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	58°53'N 172°00'W
	11 March 1998	<i>Histriophoca fasciata</i>	1	Unknown ²⁵	Yes	No	59°05'N 177°22'W
	15 March 2001	<i>Histriophoca fasciata</i>	1	Killed by gear	Yes	Yes	57°58'N 172°55'W
	9 October 1994	Unidentified pinniped	1	Carcass	Yes	Yes	56°59'N 171°16'W
	25 November 1991	Unidentified baleen whale	1	Skull only	No	Yes	58°23'N 174°14'W
	11 May 1999	<i>Orcinus orca</i>	1	Killed by gear	Yes	Yes	58°17'N 174°22'W
	4 February 1995	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	56°49'N 170°30'W
	29 October 1990	Unidentified whale	1	Skull only	Yes	Yes	57°49'N 173°35'W
	22 July 1991	Unidentified whale	1	Bones only	Yes	Yes	57°42'N 173°25'W
	25 April 1992	Unidentified whale	1	Bones only	No	Yes	58°42'N 175°14'W
	30 October 1996	Unidentified whale	1	Bones only	Yes	Yes	57°44'N 172°43'W
	14 January 1997	Unidentified whale	1	Bones only	Yes	Yes	56°51'N 170°06'W
	24 February 2000	Unidentified whale	1	Bones only	Yes	Yes	56°28'N 171°15'W
	23 August 2000	Unidentified whale	1	Bones only	Yes	Yes	56°44'N 172°18'W
	1 November 2000	Unidentified whale	1	Bones only	Yes	Yes	57°30'N 173°47'W
	18 February 1998	Unidentified marine mammal	1	Bones only	Yes	Yes	56°22'N 170°34'W
	12 May 1998	Unidentified marine mammal	1	Bones only	Yes	Yes	58°55'N 172°51'W
Area 523							
	27 October 2000	<i>Orcinus orca</i>	1	Bones only	Yes	Yes	57°02'N 173°16'W
	4 October 1996	Unidentified small whale	1	Bones only	No	Yes	56°42'N 173°13'W
	7 April 1994	Unidentified large whale	1	Bones only	Yes	No	56°40'N 173°00'W
Area 524							
	27 May 2001	Unidentified otariid	1	Minor injury	Yes	Yes	60°13'N 173°00'W
	25 April 1993	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	60°07'N 178°39'W
	30 May 2001	Unidentified pinniped	1	Killed by gear	Yes	Yes	60°06'N 172°37'W
Area 540							
	17 April 1992	<i>Eumetopias jubatus</i>	1	Minor injury ²⁶	Yes	Yes	51°18'N 179°06'W
	8 July 1992	Unidentified pinniped	1	Serious injury	Yes	Yes	51°35'N 178°37'E
	18 June 1992	Unidentified large whale	1	Bones only	Yes	Yes	52°21'N 173°44'W
Area 541							
	28 February 2000	<i>Callorhinus ursinus</i>	1	Minor injury	Yes	Yes	52°14'N 173°13'W
	16 August 1999	Unidentified marine mammal	1	Bones only	Yes	Yes	52°37'N 173°19'W
Area 542							
	6 April 1997	<i>Eumetopias jubatus</i>	1	Minor injury	Yes	Yes	51°35'N 178°28'E

Appendix 2.--Continued.

Area	Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Longline gear vessels (continued)							
Gulf of Alaska							
Area 610	21 June 1991	<i>Orcinus orca</i>	1	Killed by gear	No	Yes	53°34'N 165°32'W
	26 May 2000	Unidentified marine mammal	1	Bones only	Yes	Yes	53°26'N 165°50'W
Area 620	11 February 1990	<i>Eumetopias jubatus</i>	1	Unharm ²⁷	Yes	Yes	56°57'N 154°01'W
Area 630	4 April 1990	<i>Eumetopias jubatus</i>	1	Carcass	Yes	Yes	56°20'N 152°22'W
	6 April 1990	<i>Eumetopias jubatus</i>	1	Carcass	Yes	Yes	56°25'N 152°15'W
	5 March 1995	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°06'N 150°58'W
	9 May 1990	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	56°44'N 151°42'W
	11 May 1990	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	No	58°59'N 148°34'W
	17 May 1993	<i>Mirounga angustirostris</i>	1	Killed by gear	Yes	Yes	58°02'N 148°44'W
	2 September 1995	Unidentified phocid	1	Killed by gear	Yes	Yes	58°34'N 148°16'W
Area 640	9 November 1995	<i>Phoca vitulina</i>	1	Killed by gear	No	Yes	59°27'N 144°56'W
	21 June 1997	<i>Physeter macrocephalus</i>	1	Trailing gear	Yes	Yes	59°32'N 143°41'W
	25 April 2000	<i>Physeter macrocephalus</i>	1	Trailing gear	Yes	Yes	59°34'N 142°55'W
Area 650	16 April 1990	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	55°49'N 135°13'W
	12 April 2000	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	56°05'N 135°27'W
	26 September 1995	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	56°11'N 134°49'W
Pot gear vessels							
Bering Sea							
Area 512	26 June 1995	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	56°10'N 161°16'W
Area 513	14 July 1998	Unidentified baleen whale ²⁸	1	Trailing gear	No	Yes	56°50'N 169°13'W
Area 540	13 September 1992	<i>Phoca vitulina</i>	1	Killed by gear	No	Yes	52°47'N 173°38'E
	9 May 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	52°59'N 173°34'E
	15 May 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°01'N 172°46'E
	15 May 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°01'N 173°01'E
	21 June 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°00'N 173°00'E
	5 July 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°00'N 173°07'E
	10 July 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°01'N 172°52'E
	24 July 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°01'N 172°51'E
	2 August 1992	<i>Enhydra lutris</i>	1	Killed by gear	Yes	Yes	53°02'N 172°50'E
Area 542	21 September 1999	Unidentified phocid	1	Killed by gear	Yes	Yes	51°31'N 177°37'W

Appendix 2.--Continued.

Area Date	Marine mammal species	Number	Status ¹	Haul/set monitored by observer	Marine mammal seen by observer	Location
Pot gear vessels (continued)						
Gulf of Alaska						
Area 610 7 October 1998	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	53°52'N 165°53'W
Area 630 30 January 1995	<i>Phoca vitulina</i>	1	Killed by gear	No	Yes	57°48'N 151°19'W
Jig gear vessels						
Bering Sea						
Area 517 29 June 1995	<i>Phocoenoides dalli</i>	1	Trailing gear	Yes	Yes	55°05'N 166°34'W

¹ The following codes were used to indicate the various types of incidental take: 1) "Killed by gear" refers to a marine mammal which died as a direct result of being caught or entangled in the gear during fishing operations or retrieval; 2) "Hit propeller" indicates a marine mammal that was killed during fishing operations by collision with the ship's propeller and/or hull; 3) "Carcass" refers to a dead marine mammal caught or entangled in the gear, but the time or mode of death could not be determined; 4) "Decomposed" indicates a marine mammal which had died previously and was in the process of decomposition prior to being caught or entangled in the gear; 5) "Trailing gear" indicates that a marine mammal, which was caught or entangled in the gear, was subsequently returned to the sea with attached pieces of fishing gear (e.g., hook and line, net fragments, or buoy that will seriously restrict the animal's survivability) after the gear was broken either accidentally or intentionally by the crew; 6) "Serious injury" refers to a marine mammal which sustained either injuries to vital body parts, noticeable trauma, or gear impalement (e.g., hook still in the mouth after returning to sea) that will presumably restrict the ability of the animal to survive at sea; 7) "Minor injury" refers to a marine mammal that was wounded on the body or appendages by the gear, but will subsequently heal and survive at sea without serious impact from the incident; 8) "Unharmful" refers to a marine mammal which was caught or entangled in the gear and subsequently returned to the sea, without injury or trauma, either on its own volition or after being freed from the gear by the crew; 9) "Boarded ship" indicates a marine mammal that climbed onto the vessel (e.g., via the stern ramp or trawl alley) and subsequently returned to the sea, without injury or trauma, either on its own volition or after being deterred from the ship by the crew; 10) "Aborted fetus" indicates that only an isolated fetus (which was aborted at sea by its mother sometime prior to the interaction) was caught or entangled in the gear; 11) "Misc. flesh" indicates that miscellaneous mammalian remnants (e.g., isolated fragments of blubber, skin or tissue) were either found in the catch or caught/entangled in the gear; 12) "Baleen only" indicates that only an isolated piece of baleen was caught or entangled in the gear; 13) "Bones only" indicates a miscellaneous isolated bone specimen (not from a skull, and usually vertebrae) without flesh from a marine mammal which had died and decomposed long before the part was caught or entangled in gear; 14) "Skull only" indicates a miscellaneous complete skull (which may have attached bones or tusks) without flesh from a marine mammal which had died and decomposed long before the part was caught or entangled in the gear; 15) "Skull/bones" indicates a combination of a miscellaneous skull without flesh and unattached skeletal bones from a marine mammal which had died and decomposed long before the part was caught or entangled in the gear; 16) "Tusks only" indicates isolated walrus tusks were found caught or entangled in the gear; and 17) "Unknown" indicates that the status of the animal could not be determined as to whether it was dead or alive (or injured).

Appendix 2.--Continued.

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- ² This take occurred in the unmonitored portion of the fishery which has no observers at sea; the take was reported to an observer at the shoreside processing plant where the catcher vessel delivers its groundfish catch.
- ³ This whale may have been a humpback whale.
- ⁴ Only a 3-inch round plug of mammalian skin and blubber was found in the catch.
- ⁵ The animal was pulled from the front of the net well before the codend; the deck hand said it was alive and returned it to the sea before the observer could examine it.
- ⁶ This harbor seal was caught in the fish pump.
- ⁷ Large pieces of grooved throat were found in the net which were not decomposed, and the observer classified this take as an animal killed by the fishing operations during the haul; however, there were some circular bite marks noticed on the side.
- ⁸ The marine mammal boarded the ship by climbing up the stern ramp, but was subsequently injured with a minor back wound as the crew deterred the animal back to the sea.
- ⁹ This marine mammal may have been a Steller sea lion.
- ¹⁰ Many chunks of flesh were found in the catch along with many mud sharks; the observer assumed that these pinniped remnants were from the stomach contents of one or more of the mud sharks.
- ¹¹ Only an intestine of a minke whale was found in the catch.
- ¹² This whale may have been a minke whale.
- ¹³ This same whale was caught again in the next haul on the same date by the same vessel at 56°57'N 172°26'W.
- ¹⁴ This animal was presumably a baleen whale.
- ¹⁵ This take was considered a serious injury because the whale was presumably injured by impact with the ship's propeller.
- ¹⁶ This female northern fur seal was pregnant.
- ¹⁷ This unidentified phocid was either a harbor seal or spotted seal.
- ¹⁸ Based on the condition of the specimen, this take was originally coded by the observer as "Killed by gear".
- ¹⁹ This whale may have been a killer whale.
- ²⁰ The observer did not record the position of this killer whale take in the logbook.
- ²¹ This partially decomposed head of a baleen whale was dragged up off the sea bottom by the ground line.
- ²² The rollerman said the pinniped was hooked on its flipper with no wounds, and swam away vigorously upon hitting the water after its release.
- ²³ The sea lion was hit by line weights (chains thrown by the crew) while it was being deterred from interacting with the catch and/or gear; it is unknown if this sea lion sustained any injuries from the incident.
- ²⁴ The sea lion may have been struck by a pole gaff as the crew attempted to gaff a fish in the dark; shortly thereafter, when three sea lions appeared, one of the animals had an injury on its left cheek.
- ²⁵ The observer did not know if the ribbon seal was dead or alive before the interaction because only a piece of fur (with a 5 cm wide band) was found hooked on the line; this take could have been a serious injury or mortality since the piece of fur was apparently ripped off the animal.
- ²⁶ The sea lion was accidentally hooked by a pole gaff as the crew tried to deter the animal from the catch; a 6- to 8-inch cut was noticeable after the gaff hook fell out of the sea lion's back, but no blood was visible.
- ²⁷ One of several sea lions taking fish off the groundline apparently became hooked or entangled briefly because the groundline was pulled in the wrong direction and put under a great deal of stress before it snapped free.
- ²⁸ This unidentified baleen whale was not a humpback whale, but it may have been a fin whale or minke whale.

Appendix 3.--List of marine mammals incidentally taken by fishing vessels in the joint venture groundfish fisheries, by vessel class, nation and area, in the U.S. EEZ of the Bering Sea and North Pacific Ocean, 1989-1990.

Vessel class Area Nation Date	Marine mammal species	Number	Status ^a	Haul monitored by observer	Marine mammal seen by observer	Location
Large freezer trawler mothership						
Area 510 (Bering Sea)						
U.S.-Japan						
24 November 1989	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°23'N 167°29'W
2 December 1989	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°49'N 167°09'W
22 September 1989	Unidentified whale	1	Bones only	Yes	Yes	58°25'N 168°58'W
U.S.-Republic of Korea						
15 February 1990	<i>Callorhinus ursinus</i>	1	Decomposed	Yes	Yes	56°33'N 166°07'W
19 November 1989	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°09'N 165°54'W
26 June 1990	<i>Odobenus rosmarus</i>	1	Decomposed	No	Yes	58°18'N 159°33'W
30 June 1990	<i>Odobenus rosmarus</i>	1	Killed by gear	Yes	Yes	58°19'N 159°13'W
15 February 1990	<i>Phocoena phocoena</i>	1	Decomposed	Yes	Yes	56°33'N 166°09'W
2 March 1990	<i>Phocoenoides dalli</i>	1	Decomposed	Yes	Yes	56°48'N 167°28'W
9 February 1989	Unidentified whale	1	Decomposed	Yes	Yes	54°45'N 165°11'W
U.S.-U.S.S.R. (Russia)						
29 September 1989	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	57°51'N 167°35'W
9 February 1989	<i>Odobenus rosmarus</i>	1	Decomposed	Yes	Yes	54°57'N 165°15'W
4 October 1989	<i>Odobenus rosmarus</i>	1	Skull only	Yes	Yes	57°38'N 169°34'W
16 January 1989	<i>Balaenoptera acutorostrata</i>	1	Killed by gear ^b	Yes	Yes	54°47'N 165°04'W
14 October 1989	Unidentified baleen whale	1	Baleen only	Yes	Yes	58°06'N 168°11'W
10 September 1989	Unidentified whale ^c	1	Decomposed	Yes	Yes	57°57'N 167°19'W
Area 710 (Washington, Oregon, and California)						
U.S.-Poland						
28 May 1990	<i>Lagenorhynchus obliquidens</i>	8	Killed by gear	No	Yes	46°08'N 124°20'W
13 June 1990	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	43°16'N 124°43'W
28 May 1990	Unidentified dolphin/porpoise	2	Killed by gear	No	No	46°08'N 124°20'W
Area 720 (Washington, Oregon, and California)						
U.S.-U.S.S.R. (Russia)						
23 April 1989	<i>Phocoenoides dalli</i>	1	Killed by gear	Yes	Yes	41°05'N 124°23'W
Large surimi trawler mothership						
Area 510 (Bering Sea)						
U.S.-Japan						
7 September 1989	<i>Phoca vitulina</i>	1	Killed by gear	Yes	Yes	55°57'N 167°36'W
U.S.-Republic of Korea						
13 September 1989	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	55°14'N 167°36'W
15 October 1989	<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	No	54°50'N 166°49'W

Appendix 3.--Continued.

Vessel class	Area	Nation	Date	Marine mammal species	Number	Status ^a	Haul monitored by observer	Marine mammal seen by observer	Location
Large surimi trawler mothership (continued)									
Area 520 (Bering Sea)									
U.S.-Japan									
	18 October 1989			<i>Callorhinus ursinus</i>	1	Killed by gear	Yes	Yes	59°44'N 175°26'W
	17 October 1989			<i>Eumetopias jubatus</i>	1	Killed by gear	Yes	Yes	59°03'N 174°47'W
Area 720 (Washington, Oregon, and California)									
U.S.-Japan									
	22 May 1990			<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	41°22'N 124°34'W
	13 June 1990			<i>Phocoenoides dalli</i>	1	Killed by gear	No	Yes	40°43'N 124°30'W

^a The following codes were used to indicate the various types of incidental take: 1) "Killed by gear" refers to a marine mammal which died as a direct result of being caught or entangled in the gear during fishing operations or retrieval; 2) "Decomposed" indicates a marine mammal which had died previously and was in the process of decomposition prior to being caught or entangled in the gear; 3) "Baleen only" indicates that only an isolated piece of baleen was caught or entangled in the gear; 4) "Bones only" indicates a miscellaneous isolated bone specimen (not from a skull, and usually vertebrae) without flesh from a marine mammal which had died and decomposed long before the part was caught or entangled in gear; and 5) "Skull only" indicates a miscellaneous complete skull (which may have attached bones or tusks) without flesh from a marine mammal which had died and decomposed long before the part was caught or entangled in the gear.

^b This minke whale may have started to decompose as indicated by evidence of peeling of some of the black skin areas, but the observer was uncertain. The observer also noted that this skin peeling could have been due to entanglement in the net.

^c This whale may have been a killer whale.

Appendix 4.--Summary of comments (edited) recorded by observers on the condition of marine mammals with injuries and/or trailing gear caused by entrapment or entanglement in gear during fishing operations of the domestic groundfish fisheries in the U.S. EEZ of the Bering Sea and North Pacific Ocean, 1989-2001.^a

Species/Comments	Status	Fishing Gear	Area	Date
<i>Callorhinus ursinus</i>	Minor injury	Pelagic trawl	Area 517	4 June 1990
<p>A northern fur seal which was caught in the net jumped into the live catch tank. After several attempts to lasso the animal, it finally entered the processing area where a net was thrown over it and hauled up. The seal hit its mouth falling off the conveyor belt and it started to bleed from the mouth. That was the only sign of injury and it swam away with no apparent problem.</p>				
<i>Callorhinus ursinus</i>	Minor injury	Longline	Area 541	28 February 2000
<p>A northern fur seal became hooked by the gear as it fed off the catch. The roller man stopped the gear with the seal suspended in the air and went to cut the gangion (a line that serves to attach a hook, suspended at a specific target depth, to the mainline of a longline) to release it. However, the seal tore free before the gangion could be cut. The seal was hooked on its front left flipper and bled quite severely once it tore free. The same seal was observed during a subsequent haul feeding on the catch.</p>				
<i>Eumetopias jubatus</i>	Serious injury	Pelagic trawl	Area 521	13 September 1990
<p>A Steller sea lion was brought on board entrapped in the codend. It was unusually sluggish and appeared to be suffering from trauma. Liquid was seen from the mouth and nose (foaming), and weak eye movement was observed. The deck crew released it by lifting the hydraulic live tank hatch which sent the sea lion down the stern ramp.</p>				
<i>Eumetopias jubatus</i>	Minor injury	Pelagic trawl	Area 521	28 August 1991
<p>A Steller sea lion boarded the vessel and was deterred by a pressure hose. The observer noticed that the sea lion had several open wounds (which looked more like scrapes than punctures) which were still bleeding on its dorsal surface. The crew said that the animal attempted to get on top of the codend while it was still in the water, but the observer did not see that activity.</p>				
<i>Eumetopias jubatus</i>	Minor injury	Non-pelagic trawl	Area 610	30 September 1991
<p>A Steller sea lion was found in the intermediate just above the fish in the codend of the net. It was active and aggressive when first let out of the net, but it subsequently laid down on top of another net and rested for an hour. The animal had an abrasion on its snout. Eventually the crew was able to coax it to get up and go back to the water over the stern railing.</p>				

Appendix 4.--Continued.

Species/Comments	Status	Fishing Gear	Area	Date
<i>Eumetopias jubatus</i>	Minor injury	Non-pelagic trawl	Area 630	19 October 1996
<p>A Steller sea lion was caught in the codend of the net during the last moments before the net was brought aboard. The animal was inside the bag which was hoisted in the air and opened from the bottom allowing the contents to spill into the trawl alley; it jumped over the side rail after two minutes on deck. The sea lion seemed traumatized but strong and responsive. Visible injuries included bleeding from the nose which looked superficial and bleeding from its right eye which looked badly scraped.</p>				
<i>Eumetopias jubatus</i>	Minor injury	Longline	Area 521	19 March 1994
<p>Three Steller sea lions were deterred from taking fish off the groundline by the crew smacking a pole gaff on the rail of the vessel in full reverse (causing turbulence) under heavy seas. One sea lion was accidentally hooked by the pole gaff and dragged through the water by the vessel. The hook fell out of the sea lion's back within 5 minutes. The observer could see a 6- to 8-inch long cut, but no blood was visible.</p>				
<i>Eumetopias jubatus</i>	Minor injury	Longline	Area 521	24 March 1995
<p>The crew speculated that one Steller sea lion was struck by a pole gaff as the crew attempted to gaff a fish. The pole was thrown and hit something big in the dark, and the object swam to the stern with the pole gaff. Two deckhands pulled the pole gaff while one of the lines straightened and it came free. Shortly thereafter, three sea lions showed up, approaching from the stern, and one of the animals had an injury on its left cheek. The observer did not see the incident.</p>				
<i>Eumetopias jubatus</i>	Minor injury	Longline	Area 540	17 April 1992
<p>Seven Steller sea lions were taking fish off the groundline. The crew deterred these sea lions from the catch by throwing several line weights (chains). One male was hit by the chains, and may have been slightly injured. [Area 542]</p>				
<i>Eumetopias jubatus</i>	Minor injury	Longline	Area 542	6 April 1997
<p>A juvenile Steller sea lion freed itself from the hook. Some blood was apparent in the water. The animal looked a little dazed, but it swam away after a couple of seconds.</p>				
Unidentified otariid	Minor injury	Pelagic trawl	Area 521	11 May 1990
<p>A young otariid (presumably a Steller sea lion) came up in the catch while the haul was being dumped into the fish holding tanks below deck. The animal was injured but still showed signs of life and was returned to the sea. The observer did not see the incident.</p>				

Appendix 4.--Continued.

Species/Comments	Status	Fishing Gear	Area	Date
Unidentified otariid	Minor injury	Longline	Area 524	27 May 2001
An unidentified otariid was hooked on the cheek and brought up alive on the groundline. It fell off the line before it reached the roller, then it twisted around and disappeared.				
<i>Odobenus rosmarus</i>	Minor injury	Non-pelagic trawl	Area 514	9 May 1996
A juvenile male walrus came up in the wings of the trawl net. It was very tired and didn't move around the deck much. It stayed on the deck for about 7 hours, and after it regained strength, it seemed to enjoy resting on the deck until it left the vessel. The walrus had a few minor skin lacerations, but looked in good (tired) condition.				
Unidentified pinniped	Serious injury	Longline	Area 509	28 March 1995
This animal was probably a Steller sea lion which was hooked through the mouth, but still alive and agitated. The crew freed the animal by cutting the gangion. Thus the hook was still stuck in the mouth (some trailing gear). The observer did not see the incident.				
Unidentified pinniped	Serious injury	Longline	Area 540	8 July 1992
This animal was presumably a phocid which was hooked in the mouth and still alive. The crew tried to disengage the hook from the seal's mouth, but ended up cutting the gangion leaving some trailing gear. The observer was unable to examine the damage to the mouth, but it was suggested that the seal probably wouldn't survive. [Area 542]				
Unidentified baleen whale	Trailing gear	Pot	Area 513	14 July 1998
The observer saw a baleen whale as it was hanging by the block with the buoy line wrapped around the base of its tail. The crew dropped the line with the whale back in the water and cut the line. The whale was breathing hard and slowly swam away on the surface with the diver buoy still wrapped around its tail. The animal was probably a fin or minke whale (it was not a humpback whale).				
<i>Physeter macrocephalus</i>	Trailing gear	Longline	Area 640	21 June 1997
A sperm whale became entangled in the longline gear. The gear was cut to prevent injury to a crewman. At that time the whale had to support at least 350 fathoms of gear. The crew then started from the other end of the gear which was still attached to the animal to try to disentangle it. However, the whale struggled and broke the gear. The sperm whale got away with probably 60 or more fathoms of gear still attached.				

Appendix 4.--Continued.

Species/Comments	Status	Fishing Gear	Area	Date
<i>Physeter macrocephalus</i>	Trailing gear	Longline	Area 640	25 April 2000
<p>While the crew was retrieving the longline gear, the line acted as though it was hung up on the bottom. A sperm whale was entangled in the line which did not appear to be wrapped around the animal, but near the head as if caught like a fish. The crew tried to free the animal from the line, but ended up cutting the line and possibly leaving gear with the animal. The observer recorded that the whale was injured. The observer saw the animal later, but it was not feeding on the catch or diving on the gear at that time.</p>				
<i>Orcinus orca</i>	Serious injury	Non-pelagic trawl	Area 510	26 October 1989
<p>During the haul there was a loud thud in the engine, and the crew was unsure what happened. Presumably a killer whale hit the vessel or propeller, and it was assumed to have been wounded. This assumption was made because a similar accident involving a killer whale occurred a day earlier on the same vessel; and that whale was assumed to have hit the ship's propeller because pieces of flesh were seen floating behind the stern then. The observer did not see either incident. [Area 519]</p>				
<i>Phocoenoides dalli</i>	Minor injury	Non-pelagic trawl	Area 521	7 August 1992
<p>A Dall's porpoise was caught in the net in front of the excluder device before the codend. A small amount of blood was coming from its snout area, probably from thrashing about in the net trying to get free. As soon as the crew got the animal back in the water, the porpoise quickly swam away apparently uninjured. However, the event occurred too quickly for the observer to inspect the animal thoroughly or take photographs.</p>				
<i>Phocoenoides dalli</i>	Trailing gear	Jig	Area 517	29 June 1995
<p>A Dall's porpoise was caught in the line and injured (bleeding). The crew tried to maneuver close enough to the porpoise to disentangle it, but the line snapped.</p>				
Unidentified cetacean	Trailing gear	Pelagic trawl	Area 521	25 July 2001
<p>This animal was presumably a baleen whale that was entangled in the net. The vessel stopped hauling back and was going to cut the animal free, but the net rope snapped and the whale swam off. The crew only saw the tail of the animal, but a deckhand said it looked like the tail on the baleen whale that was killed in another haul by the same vessel. The observer did not see the incident.</p>				

^a Haul position data are listed in Appendix 2.

Appendix 5 -- Statistical formulae used to calculate bycatch rates and estimates.

Estimates of catch rates of incidental mortality of marine mammals were obtained by ratio estimates of pooled data within a single stratum. The data were compartmentalized into subgroups (subgroup = stratum, indexed by the letter h) by year, gear (and nation for JV vessels), statistical area, 4-week period, and vessel class. Sampling units (indexed by the letter i) were defined as individual hauls (sets). Catch rates and variance were based only on bycatch data from observed marine mammals in monitored hauls. Since the catch rates (incidental take ratios) calculated with the equations below were all decimals less than one, they were multiplied by 10,000 to facilitate readability. The phrase "marine mammals" below refers only to the marine mammal species for which catch rates were calculated in each analysis, unless specifically stated otherwise in the text or tables. Equations for ratio estimates were based on Cochran (1977) and Levy and Lemeshow (1999). The stratified random sampling ratio estimator for total incidental take was adjusted by the addition of the number of reported mortality takes from strata which had zero or unknown bycatch rates (i.e., from strata where no marine mammals were observed in monitored hauls). Confidence intervals were calculated using the adjusted ratio estimates with the standard errors based only on monitored hauls.

Given:

- J = number of strata analyzed (total for year, gear or area),
- L_1 = lower 95% confidence limit,
- L_2 = upper 95% confidence limit,
- $L_{95\%}$ = both 95% confidence interval limits expressed as a range,
- n_h = number of **observed** sampling units in stratum h ,
- N_h = total number of sampling units in the fishery in stratum h (including those not observed),
- x_i = metric tons of groundfish observed in sampling unit i ,
- \bar{x}_h = mean number of metric tons of groundfish observed in stratum h ,
- X_h = total metric tons of groundfish caught in the fishery in stratum h ,
- y_i = number of marine mammals observed in sampling unit i ,
- \bar{y}_h = mean number of marine mammals observed in stratum h ,
- f_h = the sampling fraction (n_h / N_h) (since N_h is unknown, f was approximated by the proportion of total groundfish catch observed),

Appendix 5 -- Continued.

- \hat{R} = observed incidental take ratio (catch rate) for stratum h ,
 $s(\hat{R})$ = standard error of observed incidental take ratio (catch rate) for stratum h ,
 $\hat{Y}_R =$ = ratio estimate of total incidental take for stratum h ,
 \hat{Y}_{R_s} = stratified random sampling ratio estimator for total incidental take obtained by summing the separate ratio estimates from J strata,
 $V(\hat{Y}_R)$ = variance of ratio estimate for stratum h , and
 $V(\hat{Y}_{R_s})$ = variance of stratified random sampling ratio estimator from J strata.
 A_s = number of marine mammals reported by observers which were unobserved (seen only by crew) and/or occurred in unmonitored hauls from J strata which had zero or unknown bycatch rates.
 \hat{Y}_A = adjusted stratified random sampling ratio estimator for total incidental take.

Catch rates and ratio estimates were obtained from:

$$f_h = \frac{\sum_{i=1}^{n_h} x_i}{X_h} \quad (1)$$

$$\hat{R} = \hat{R}_h = \frac{\sum_{i=1}^{n_h} y_i}{\sum_{i=1}^{n_h} x_i} = \frac{\bar{y}_h}{\bar{x}_h} \quad (2)$$

$$s(\hat{R}) = s(\hat{R}_h) = \frac{\sqrt{1 - f_h}}{\bar{x}_h \sqrt{n_h}} \cdot \sqrt{\frac{\sum y_i^2 - 2\hat{R}_h \sum y_i x_i + \hat{R}_h^2 \sum x_i^2}{n_h - 1}} \quad (3)$$

$$\hat{Y}_R = \hat{Y}_{R_h} = X_h \hat{R}_h \quad (4)$$

$$V(\hat{Y}_R) = V(\hat{Y}_{R_h}) = X_h^2 [s(\hat{R}_h)]^2 \quad (5)$$

Appendix 5 -- Continued.

$$\hat{Y}_{R_s} = \sum_I^J \hat{Y}_{R_h} \quad (6)$$

$$V(\hat{Y}_{R_s}) \approx \frac{I}{(\sum x_h)^2} \sum_I^J V(\hat{Y}_{R_h}) \quad (7)$$

$$\hat{Y}_A = \hat{Y}_{R_s} + A_s \quad (8)$$

Lower (L_1) and upper (L_2) 95% confidence interval (CI) limits were estimated using the following formulas and the appropriate values of Student's $t_{.05[n]}$ (where n = degrees of freedom):

$$95\% CI = \hat{R} \pm t_{.05[n]} (s(\hat{R})) \quad (9)$$

$$95\% CI = \hat{Y}_R \pm t_{.05[n]} (\sqrt{V(\hat{Y}_R)}) \quad (10)$$

$$95\% CI = \hat{Y}_{R_s} \pm t_{.05[n]} (\sqrt{V(\hat{Y}_{R_s})}) \quad (11)$$

When the calculated 95% lower confidence limit is less than the total number of observed marine mammals in the combined strata, then the calculated lower confidence limit is replaced by the observed number of marine mammals because:

$$L_1(\hat{Y}_{R_s}) \text{ must be } \geq \sum_I^J (\sum_I^{n_h} y_i) \quad (12)$$

When the calculated 95% upper confidence limit is less than the adjusted stratified random sampling ratio estimator for total incidental take, then the calculated upper confidence limit is replaced by the adjusted stratified random sampling ratio estimator because:

$$L_2(\hat{Y}_{R_s}) \text{ must be } \geq \hat{Y}_A \quad (13)$$

Appendix 6.--Average annual (1997-2001) number of marine mammals, by species and stock^a, incidentally caught by the domestic groundfish fisheries in the U.S. Exclusive Economic Zone in the Bering Sea, Gulf of Alaska and off Washington, Oregon, and California^b. Catch rates are the ratio (\hat{R}) and standard error ($s(\hat{R})$) of the average annual observed incidental take of marine mammals killed (or seriously injured) monitored during fishing operations to the average annual observed groundfish catch (per 10,000 metric tons [t] basis). The coefficient of variation (CV) of the catch rate is also listed. Estimated mortality of marine mammals as bycatch is the average annual adjusted ratio estimate (\hat{Y}_A) and its 95% confidence interval ($L_{95\%}$).

Average annual values (1997-2001)									
Region ^c	Fishery ^{c,d}	Percent of groundfish catch observed	Number of marine mammals monitored in hauls	Marine mammal bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
				\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Northern fur seal (<i>Callorhinus ursinus</i>): Eastern Pacific stock ^e									
Bering Sea	Trawl	70.3	0.4	0.0063	0.0040	0.6317	1.18	0.40 to 2.19	f,g
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0	-	-	-	-	-	
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Northern fur seal (<i>Callorhinus ursinus</i>): San Miguel Island stock									
WA, OR and CA	Trawl	76.3	0	-	-	-	-	-	
California sea lion (<i>Zalophus californianus</i>): U.S. stock									
WA, OR and CA	Trawl	76.3	0.4	0.0386	0.0132	0.3406	0.71	0.40 to 0.86	g,h
Steller sea lion (<i>Eumetopias jubatus</i>): western U.S. stock									
Bering Sea	Trawl	70.3	6.2	0.0541	0.0053	0.0982	10.08	6.75 to 10.08	g,i,j
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Gulf of Alaska ^k	Trawl	31.8	0.4	0.0778	0.0534	0.6856	1.41	0.40 to 3.30	f
Gulf of Alaska ^k	Longline	15.1	0	-	-	-	-	-	
Steller sea lion (<i>Eumetopias jubatus</i>): eastern U.S. stock									
Gulf of Alaska ^l	Trawl	50.4	0	-	-	-	-	-	
Gulf of Alaska ^l	Longline	5.2	0.2	1.6472	1.502	0.9119	1.20	0.20 to 3.37	f
WA, OR and CA	Trawl	76.3	0.2	0.0151	0	-	0.80	-	g
Walrus (<i>Odobenus rosmarus</i>): Alaska stock									
Bering Sea	Trawl	70.3	0.4	0.0040	0.0017	0.4234	1.22	0.40 to 1.22	g,h,i,j
Bearded seal (<i>Erignathus barbatus</i>): Alaska stock									
Bering Sea	Trawl	70.3	0.8	0.0084	0.0026	0.3106	1.50	0.80 to 2.09	g,h
Harbor seal (<i>Phoca vitulina</i>): Bering Sea stock									
Bering Sea ^m	Trawl	69.9	0.6	0.0068	0.0025	0.3702	0.99	0.60 to 1.71	h
Bering Sea ^m	Longline	32.5	0	-	-	-	-	-	
Bering Sea ^m	Pot	14.1	0	-	-	-	-	-	
Harbor seal (<i>Phoca vitulina</i>): Gulf of Alaska stock									
Bering Sea ⁿ	Trawl	76.5	0	-	-	-	-	-	
Bering Sea ⁿ	Longline	33.8	0	-	-	-	-	-	
Bering Sea ⁿ	Pot	19.2	0	-	-	-	-	-	
Gulf of Alaska ^k	Trawl	31.8	0	-	-	-	-	-	
Gulf of Alaska ^k	Longline	15.1	0	-	-	-	-	-	
Gulf of Alaska ^k	Pot	5.8	0.2	0.2325	0.1505	0.6474	0.31	0.20 to 0.71	f

Appendix 6.--Continued.

		Average annual values (1997-2001)							
Region ^c	Fishery ^{c,d}	Percent of groundfish catch observed	Number of marine mammals monitored in hauls	Marine mammal bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
				\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Harbor seal (<i>Phoca vitulina</i>): Southeast Alaska stock									
Gulf of Alaska ¹	Trawl	50.4	0	-	-	-	-	-	
Gulf of Alaska ¹	Longline	5.2	0	-	-	-	-	-	
Gulf of Alaska ¹	Pot	<0.1	0	-	-	-	-	-	
Harbor seal (<i>Phoca vitulina</i>): Oregon and Washington coast stock									
WA, OR and CA ^o	Trawl	76.3	0.4	0.0328	0.0069	0.2091	0.63	0.40 to 0.63	g,hj
Spotted seal (<i>Phoca largha</i>): Alaska stock									
Bering Sea	Trawl	70.3	0.2	0.0016	0.0007	0.4302	0.25	0.20 to 0.46	h
Ringed seal (<i>Pusa hispida</i>): Alaska stock									
Bering Sea	Trawl	70.3	0.6	0.0046	0.0011	0.2442	0.71	0.60 to 1.05	h
Ribbon seal (<i>Histiophoca fasciata</i>): Alaska stock									
Bering Sea	Trawl	70.3	0.2	0.0014	0.0004	0.2878	0.42	0.20 to 0.42	g,hj
Bering Sea	Longline	32.7	0.2	0.0427	0.0350	0.8185	0.60	0.20 to 1.57	f
Northern elephant seal (<i>Mirounga angustirostris</i>): California breeding stock									
Bering Sea	Trawl	70.3	0	-	-	-	-	-	
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0	-	-	-	-	-	
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
WA, OR and CA	Trawl	76.3	0.4	0.0538	0.0266	0.4947	0.91	0.40 to 1.41	g,h
Humpback whale (<i>Megaptera novaeangliae</i>): Central and Western North Pacific stocks ^P									
Bering Sea	Trawl	70.3	0.4	0.0041	0.0018	0.4384	0.64	0.40 to 1.19	h
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Bering Sea	Pot	14.6	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0	-	-	-	-	-	
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Gulf of Alaska	Pot	5.8	0	-	-	-	-	-	
Minke whale (<i>Balaenoptera acutorostrata</i>): Alaska stock									
Bering Sea	Trawl	70.3	0.2	0.0020	0.0012	0.6060	0.32	0.20 to 0.69	f
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Bering Sea	Pot	14.6	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0	-	-	-	-	-	
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Gulf of Alaska	Pot	5.8	0	-	-	-	-	-	
Fin whale (<i>Balaenoptera physalus</i>): Northeast Pacific stock									
Bering Sea	Trawl	70.3	0	-	-	-	-	-	
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Bering Sea	Pot	14.6	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0.2	0.0328	0.0268	0.8160	0.59	0.20 to 1.55	f
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Gulf of Alaska	Pot	5.8	0	-	-	-	-	-	

Appendix 6.--Continued.

		Average annual values (1997-2001)							
Region ^c	Fishery ^{c,d}	Percent of groundfish catch observed	Number of marine mammals monitored in hauls	Marine mammal bycatch rate (per 10,000 metric tons)			Estimated bycatch (number of marine mammals)		
				\hat{R}	$s(\hat{R})$	CV	\hat{Y}_A	$L_{95\%}$	
Sperm whale (<i>Physeter macrocephalus</i>): North Pacific stock									
Gulf of Alaska	Longline	12.8	0.4	0.3108	0.1749	0.5629	1.00	0.40 to 2.11	f
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>): North Pacific stock									
Bering Sea	Trawl	70.3	0	-	-	-	-	-	
Bering Sea	Longline	32.7	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0	-	-	-	-	-	
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>): California/Oregon/Washington stocks									
WA, OR and CA	Trawl	76.3	0.2	0.0151	0	-	0.20	-	
Killer whale (<i>Orcinus orca</i>): Eastern North Pacific northern resident and transient stocks ^p									
Bering Sea	Trawl	70.3	0.6	0.0054	0.0017	0.3196	1.23	0.60 to 1.35	g,h
Bering Sea	Longline	32.7	0.2	0.0336	0.0255	0.7587	0.47	0.20 to 1.18	f
Gulf of Alaska	Trawl	31.9	0	-	-	-	-	-	
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Killer whale (<i>Orcinus orca</i>): Eastern North Pacific offshore stock									
WA, OR and CA	Trawl	76.3	0	-	-	-	-	-	
Harbor porpoise (<i>Phocoena phocoena</i>): Bering Sea stock									
Bering Sea	Trawl	70.3	0.6	0.0070	0.0027	0.3874	1.09	0.60 to 1.92	h
Harbor porpoise (<i>Phocoena phocoena</i>): Gulf of Alaska stock									
Gulf of Alaska ^k	Trawl	31.8	0	-	-	-	-	-	
Harbor porpoise (<i>Phocoena phocoena</i>): Southeast Alaska stock									
Gulf of Alaska ^l	Trawl	50.4	0	-	-	-	-	-	
Harbor porpoise (<i>Phocoena phocoena</i>): Oregon/Washington coast stock									
WA, OR and CA ^q	Trawl	76.4	0	-	-	-	-	-	
Harbor porpoise (<i>Phocoena phocoena</i>): Northern California/Southern Oregon stock									
WA, OR and CA ^r	Trawl	72.8	0	-	-	-	-	-	
Dall's porpoise (<i>Phocoenoides dalli</i>): Alaska stock									
Bering Sea	Trawl	70.3	3.0	0.0324	0.0061	0.1882	5.41	3.16 to 6.87	g
Bering Sea	Longline	32.7	0	-	-	-	0.20	-	g
Bering Sea	Jig	<0.1	0	-	-	-	-	-	
Gulf of Alaska	Trawl	31.9	0.2	0.0175	0.0107	0.6125	0.32	0.20 to 0.70	f
Gulf of Alaska	Longline	12.8	0	-	-	-	-	-	
Gulf of Alaska	Jig	0	-	-	-	-	-	-	
Dall's porpoise (<i>Phocoenoides dalli</i>): California/Oregon/Washington stock									
WA, OR and CA	Trawl	76.3	1.2	0.1628	0.0761	0.4676	2.56	1.20 to 4.14	g,h
Sea otter (<i>Enhydra lutris</i>): Southwest Alaska stock									
Bering Sea	Pot	14.6	0	-	-	-	-	-	

Appendix 6.--Continued.

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- ^a The stock categories were taken from Angliss and Lodge (2002) and Carretta et al. (2002).
- ^b The data presented in this table was adapted from Perez (in prep^a) to be consistent with the format of Tables 3-7 in the current report.
- ^c Estimated average annual bycatch of marine mammals during 1997-2001 is listed for each identified species that was incidentally killed (or seriously injured) by any gear in the groundfish fisheries in each region during 1973-2001 based on the data in Tables 3-7, Appendices 2-3, and in Perez and Loughlin (1991).
- ^d Although not listed in this appendix, the pot fishery in the Bering Sea did have a minimum average annual bycatch of 0.2 cetaceans during 1997-2001 because there was one observed and unidentified baleen whale entangled in the fishing gear lines in 1998; the whale was released with trailing gear (see Table 5 and Appendix 2).
- ^e Although northern fur seals migrate annually from Alaska to waters where the at-sea Pacific whiting fishery occurs, trawl sets of this fishery occurred only in the months from May to November (1997-2001); this is a seasonal period when most northern fur seals of the Eastern Pacific stock are typically in Alaska (Angliss and Lodge 2002).
- ^f The estimated lower 95% confidence level was less than zero; the number of marine mammals monitored in hauls was used as a substitute.
- ^g Reported bycatch occurred in the nonsampled hauls of observed cruises.
- ^h The estimated lower 95% confidence level was less than the number of animals reported by U.S. observers; the number of marine mammals monitored in hauls was used as a substitute.
- ⁱ The number of animals reported killed (or with serious injuries or trailing gear) during fishing operations by observers from both sampled and unmonitored hauls exceeded the estimated bycatch in some component strata of some years; the number reported dead was used as a substitute in those particular strata.
- ^j The estimated upper 95% confidence level was less than the adjusted estimated bycatch; the latter was used as a substitute.
- ^k Includes only statistical areas 610, 620, 630, 640 and 649 (Fig. 2).
- ^l Includes only statistical areas 650 and 659 (Fig. 2). Although animals of this stock can be found at locations east of Cape Suckling (144°N) in statistical area 640 (Fig. 2), that area was excluded because the blend data for individual statistical areas could not be subdivided.
- ^m Excludes the Aleutian Islands area (statistical areas 541, 542 and 543 in Fig. 1) of the Bering Sea region.
- ⁿ Includes only statistical areas 541, 542 and 543 (Fig. 1).
- ^o Includes only statistical areas 670, 710 and 720 (Fig. 3).
- ^p The two stocks overlap in the same geographical areas (Angliss and Lodge 2002); it was not possible to determine how each stock was impacted by the different components of the groundfish fisheries.
- ^q Includes only statistical areas 670 and 710 (Fig. 3).
- ^r Includes only statistical area 720 (Fig. 3).

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