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Aerial and Land-Based Surveys of Steller Sea Lions (*Eumetopias jubatus*) in Alaska, June and July 1996

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U.S. DEPARTMENT OF COMMERCE
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Aerial and Land-Based Surveys of Steller Sea Lions (*Eumetopias jubatus*) in Alaska, June and July 1996

by

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ABSTRACT

The National Marine Fisheries Service and the Alaska Department of Fish and Game conducted aerial and land-based surveys of Steller sea lions (*Eumetopias jubatus*) during June and July 1996 from Southeast Alaska to the western Aleutian Islands. We counted a total of 41,529 adult and juvenile (non-pup) sea lions at 280 rookery and haul-out sites. Of these sea lions, 30,454 (73.3%) were at 95 trend sites (rookeries and haulouts) and 22,562 (54.3%) were at 33 trend rookeries. The 1996 count at the 95 trend sites was a decline of 18.0% since 1991, 12.6% since 1992, and 7.6% since 1994. Overall declines were slightly less for all surveyed sites. The average annual rate of decline from 1991 to 1996 was about 3.7% for trend sites and trend rookeries and 2.1% for all surveyed sites.

The western stock of Steller sea lions in Alaska includes animals from the eastern Gulf of Alaska through the western Aleutian Islands. In 1996 we counted 30,622 non-pups at 222 surveyed sites. Of these, 22,223 (72.6%) were on 82 trend sites and 16,358 (53.4%) were on 30 trend rookeries. For the 82 trend sites, the 1996 count represented declines of 27.2% from 1990, 24.5% from 1991, 18.6% from 1992, and 7.9% from 1994. The annual rates of decline were about 5.5% for trend sites and trend rookeries (1990 to 1996) and 3.8% for all surveyed sites (1991 to 1996). In the Kenai Peninsula to Kiska Island index area, a sub-area within the Alaska portion of the western stock, we counted 24,625 non-pup sea lions at 189 surveyed sites. Of these, 17,900 (72.7%) were at 69 trend sites, and 13,905 (56.5%) were at 26 trend rookeries. The 1996 count for the 69 trend sites was a decline of 21.3% from 1990, 17.7% from 1991, 13.4% from 1992, and 4.3% from 1994. The estimated annual rates of decline were 4-5% for trend sites and trend rookeries (1990 to 1996) and 2% for all surveyed sites (1991 to 1996).

The eastern stock is represented in Alaska only by Southeast Alaska. In 1996 we counted 10,907 non-pups at 58 surveyed sites: 8,231 (75.5%) at 13 trend sites and 6,204 (56.9%) at 3 trend rookeries. Non-pup numbers at the 13 trend sites increased by 6.7% to 8.9% compared to the 1990, 1991, and 1992 surveys but declined 6.7% since 1994. Overall, non-pup numbers in Southeast Alaska increased by an average of about 2% per year from 1990 to 1996.

Pup count trends were not consistent at all rookeries. The number of pups at the three rookeries in Southeast Alaska in 1996 (3,714) was an increase of 3.2% from 1990 but a decline of 1.5% from 1994. Pup counts at the two rookeries in the eastern Gulf of Alaska experienced greater declines from 1994 to 1996 of 24% at Seal Rocks (352 pups) and 41% at Fish Island (232). The 632 pups at Marmot Island was a decline of 61% from 1991 and 21% from 1994. The pup count at Outer Island (114) changed little from 1994, after a decline of 67% from 1990 to 1994. Pup counts at Atkins Island (366) in the western Gulf of Alaska and at Ugamak Island (706) in the eastern Aleutian Islands declined 15% to 17% from 1990 but increased 13% to 23% compared to 1994.

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INTRODUCTION

The National Marine Fisheries Service (NMFS) and the Alaska Department of Fish and Game (ADF&G) conducted aerial and land-based surveys of non-pup (adult and juvenile) and pup Steller sea lions (*Eumetopias jubatus*) from Southeast Alaska through the western Aleutian Islands during June and July 1996. The 1996 surveys continued a series of surveys conducted in Alaska since the mid-1970s (Braham et al. 1980, Calkins and Pitcher 1982, Loughlin et al. 1984, Met-rick et al. 1987, Loughlin et al. 1990, Merrick et al. 1991, Merrick et al. 1992, Sease et al. 1993, Strick et al. 1997). This report, like others in the recent years (Met-rick et al. 1991, Merrick et al. 1992, Sease et al. 1993, Strick et al. 1997), focuses primarily on counts of non-pup Steller sea lions at trend rookery and trend haul-out sites. Trend analyses concentrate on counts from 1990 or 1991 to 1996. Longer historical perspectives are included in Met-rick et al. (1991: for 1956-90) and Sease et al. (1993: for 1976-92).

In November 1990, the NMFS listed Steller sea lions as “threatened” range-wide under the U.S. Endangered Species Act (55 Federal Register 49204). Ongoing studies of mitochondrial DNA (Bickham et al. 1996) identified stock differences within the population that coincided with differing population trends, separated approximately at 144° W. long. (Loughlin 1997). An eastern stock occurs from Southeast Alaska to California whereas a western stock occurs from Prince William Sound, Alaska, westward to Russia and Japan. This two-stock model was incorporated into management actions in June 1997 with the listing of the western stock as “endangered” under the ESA. The eastern stock remains classified as threatened (62 Federal Register 24345).

METHODS

The 1996 survey adhered to protocols of earlier aerial and land-based surveys (Braham et al. 1980, Calkins and Pitcher 1982, Merrick et al. 1991, Merrick et al. 1992, Loughlin et al. 1992, Sease et al. 1993, Strick et al. 1997). Most of the analyses in this report focus on “trend sites.” Trend sites are those rookeries and major haul-out sites surveyed consistently from the 1970s to the present, thus allowing identification of population trends on a decadal scale. Trend sites include the majority of animals observed in each survey (73.3% in 1996). Most of the other areas are small haul-out sites. The only major rookeries that are not trend sites are located on Outer and Attu Islands. Rookeries are those sites where adult males actively defend territories, pups are born and mating takes place. Haul-out sites are those where sea lions predictably rest on land (haul out), but where few or no pups are born (Calkins and Pitcher 1982, Loughlin et al. 1984).

The list of trend sites was reduced from 103 to 95 in 1992 by combining some adjacent sites (e.g., Ugamak and Round Islands in the eastern Aleutian Islands) into single new trend sites (Sease et al. 1993). The number of trend sites increased to 96, and the number of trend rookeries increased to 33, beginning with this report to accommodate the separate listing for the rookeries at Cape Sabak and Gillon Point, Agattu Island, in the western Aleutian Islands. These are merely “book-keeping” changes that do not affect the total counts of sea lions on trend sites. Only one trend site, Sitkagi Bluffs in the eastern Gulf of Alaska, was not surveyed in 1996.

Aerial Surveys of Non-Pups

The NMFS and ADF&G counted and photographed adult and juvenile Steller sea lions from aircraft flying over rookery and haul-out sites from Forrester Island in Southeast Alaska to

Attu Island in the western Aleutian Islands (Fig. 1) from 10 June to 22 June 1996 (Table 1). Flight tracks included traditional sea lion rookeries and haul-out sites (Calkins and Pitcher 1982, Loughlin et al. 1984), but potential haul-out sites along the flight path also were examined en route. Under ideal conditions, we surveyed each site at 150-200 m (500-650 ft) altitude, 100-150 knots air speed, and 500 m (1/4 nautical mile) offshore, depending on the topography of the site. Strong winds occasionally required flying at higher altitudes or farther offshore, whereas fog or low cloud ceilings sometimes required flying at a lower altitude or closer inshore. The 1996 survey was divided into two regions, each with separate aircraft and personnel. ADF&G surveyed Southeast Alaska from Dixon Entrance to Yakutat and the NMFS surveyed the Gulf of Alaska and Aleutian Islands, from Prince William Sound to Attu Island.

We photographed sea lions using 35-mm manual-focus cameras with motor drives and zoom lenses (70-210 mm or equivalent) and moderately-fast (e.g., ISO 200) color transparency (slide) film. Where appropriate, sequential photographs overlapped slightly to guarantee complete coverage of a site. NMFS survey personnel also photographed each site using a high-resolution 8-mm (HI-8) video camera. Video recordings provided an overview of each site and served as a backup in case the slides were unusable. In the laboratory, we counted sea lions from projected images. For the NMFS portion of the survey, the final count of non-pup sea lions for each rookery or haulout was the mean for two independent counters. If the individual results for a particular site differed by 10% or more, each person re-counted the sea lion images for that site. For their portion of the survey, ADF&G had a second, independent counter to verify or detect errors in results from the original counter. Both survey teams used direct visual counts instead of photographs for sites with few animals (e.g., 20 or fewer sea lions).

Land-Based Pup Surveys

The ADF&G and NMFS counted sea lion pups at nine rookeries from For-rester Island to Ugamak Island between 27 June and 14 July. The ADF&G survey team counted pups at For-rester Island, Hazy Island, and White Sisters rookeries in Southeast Alaska, at Seal Rocks and Fish Island in the eastern Gulf of Alaska, and at Outer Island in the central Gulf of Alaska. NMFS personnel counted sea lion pups at Marmot and Atkins Islands in the Gulf of Alaska, and Ugamak Island in the eastern Aleutian Islands. Vessels delivered survey teams to within 2-4 km of a site; the survey team then went ashore in small boats. For several rookeries, transportation was by helicopter. After all sea lions other than pups were cleared from the beach, two or three biologists independently counted live pups on the beach and in the water. The final pup count for each rookery was the mean of several (typically two or three) independent counts.

Data Analysis

Geographical regions used for analyzing survey results were the same as those used in previous survey reports (Merrick et al. 1987, Loughlin et al. 1990, Merrick et al. 1991, Merrick et al. 1992, Sease et al. 1993, Strick et al. 1997) and those adopted by the Steller sea lion Recovery Plan (NMFS 1992): Southeast Alaska; eastern, central, and western Gulf of Alaska; eastern, central, and western Aleutian Islands; and the Bering Sea (Fig. 1). The Bering Sea region contains few haul-out sites and only one rookery (Walrus Island in the Pribilof Islands). We did not survey the Bering Sea region because of logistical limitations.

Another geographical region used during the analyses of survey data is the Kenai Peninsula (Outer Island) to Kiska Island index area, which includes four of the smaller regions

listed above: the central and western Gulf of Alaska, and the eastern and central Aleutian Islands. This index area was selected initially because it encompasses what historically has been the center of the Steller sea lions' range and includes the major component of the Alaska sea lion population (Merrick et al. 1987, NMFS 1992). The Kenai to Kiska index area included 59.3% of all non-pup sea lions counted in 1996 (58.8% on all trend sites and 61.6% on trend rookeries).

Analyses of population trends included subtotals of non-pups at rookery trend sites, all trend sites (rookeries and haul-out sites), and at all surveyed sites Alaska-wide, for the Kenai to Kiska index area, and for smaller geographical regions. The number of sites included in the "all surveyed sites" sub-totals varied slightly between surveys. Virtually all sites that account for these differences individually contained very few (1-10) sea lions during recent surveys (1991 and later) and the impact of these differences was negligible. Additional analyses compared trends for the eastern and western stocks. Overall changes in numbers of non-pups regionally and in numbers of non-pups and pups at selected rookeries from 1991 to 1996, 1992 to 1996, and from 1994 to 1996 were expressed as a percentage of the earlier count. We did not attempt to test the statistical significance of these overall changes, largely because of the difficulty in determining appropriate variances for the different counts and the resulting complexity of interpretation. We estimated average annual rate of change from 1990 or 1991 to 1996 from the slope of a simple linear regression of the natural log of counts on survey year. We tested the null hypothesis of no trend during the time interval using the significance of the slope for the regression.

It should be noted that, with the exception of the distinction between the eastern and western stocks, the geographical divisions between regions are somewhat arbitrary and may not

accurately reflect the underlying structure of stocks or other subunits of the population, if they exist. We present results for each region to identify and highlight varying population trends in the different regions. However, readers should not think that sea lion populations in one region are separate and independent of those in other regions.

RESULTS

Aerial Surveys of Non-pups

Alaska State-wide

We counted a total of 41,529 non-pup Steller sea lions on 280 rookery and haul-out sites from Southeast Alaska through the western Aleutian Islands in 1996 (Table 2). This included trend sites as well as all other sites. Of these sites, 149 (53%) were occupied by 20 or more non-pups, 26 (9%) included fewer than 20 non-pups, and 105 (38%) were unoccupied. There were 125 sites in the western stock with 20 or more non-pups in 1996 that also were surveyed in, 1994; 66 (53%) declined by 5% or more, 45 (36%) increased by 5% or more, and 14 (11%) changed by less than 5%. For the eastern stock, 18 sites with 20 or more non-pups in 1996 also were surveyed in 1994; 10 (55%) declined by 5% or more, 5 (28%) increased by 5% or more, and 3 (17%) changed by less than 5%.

The 1996 count for all surveyed sites was the lowest count for all survey years for which an equivalent comparison is available: 10.7% lower than the 46,497 non-pups counted in 1991, 9.2% lower than in 1992 (45,750), and 8.0% lower than in 1994 (45,148)(Fig. 2). The estimated average annual rate of decline for 1991 to 1996 was 2.1% (95% C.I.: +0.4% to -4.6%; $P = 0.067$). The non-pup count at 95 trend sites Alaska-wide was 30,454 (Table 2). This was a

decline of 18.0% from 1991 (37,133), a 12.6% decline from 1992 (34,844), and a 7.6% decline from 1994 (32,945)(Fig. 2). The average annual rate of decline was 3.8% (95% C.I.: 2.3% to 5.3%; $P = 0.009$) for 1991 to 1996. The subtotal for the 33 trend rookeries throughout Alaska was 22,562 non-pups (Table 2). This represented declines of 18.3% since 1990, 16.1% since 1991 (26,879) 12.7% since 1992 (25,849), and 3.8% since 1994 (23,452)(Fig. 2). The average annual rate of decline for the trend rookeries was 3.6% (95% C.I.: 2.6% to 4.6%; $P = 0.001$) for 1990 to 1996.

Comparison of Western and Eastern Stocks

The western stock of Steller sea lions in Alaska includes animals from the eastern Gulf of Alaska through the western Aleutian Islands. The 1996 western stock count for all surveyed sites (30,622: Table 3) indicated declines of 17.3% from 1991 (37,048), 14.3% from 1992 (35,747), and 8.2% from 1994 (33,361). The estimated average annual rate of decline was 3.8% (95% C.I.: 3.2% to 4.4%; $P = 0.001$) for 1991 to 1996. Overall declines generally were greater for all trend sites and for trend rookeries than for all surveyed sites (Table 3). The annual rates of decline from 1990 to 1996 were 5.5% (95% C.I.: 4.5% to 6.5%; $P < 0.001$) at all trend sites and 5.4% (95% C.I.: 3.3% to 7.5%; $P = 0.004$) at trend rookeries (Table 3).

The eastern stock is represented in Alaska only by Southeast Alaska, where we counted 10,907 non-pups at all surveyed sites. Of these, 8,231 were on trend sites (rookeries and haulouts), and 6,204 at the three trend rookeries (Table 3). Although these 1996 counts indicate declines of 4.5% (rookery trend sites) to 7.5% (all surveyed sites) from 1994, numbers of non-pups in Southeast Alaska increased during each survey interval from 1989 to 1994 (except at all

trend sites from 1991 to 1992). The average annual change in Southeast was positive for trend sites and for trend rookeries from 1990 to 1996 and for all surveyed sites from 1991 to 1996, although none of the regressions was significant ($P \geq 0.077$; Table 3).

Kenai to Kiska Index Area

We counted 24,625 non-pup sea lions at 189 surveyed sites from the Kenai Peninsula to Kiska Island in 1996, indicating declines of 9.8% from 1991 (27,313), 8.3% from 1992 (26,854), and 5.3% from 1994 (25,995)(Table 2, Fig. 2). The estimated annual rate of decline was 2.0% (95% C.I.: 1.2% to 2.9%; $P = 0.009$) over the 5-year period. In the Kenai to Kiska index area there are 69 trend sites (26 rookeries and 43 haulouts), where we counted 17,900 non-pup in 1996 (Table 2). This was a decline of 21.3% since 1990 (22,754), of 17.7% since 1991 (21,737), of 13.4% since 1992 (20,679), and 4.3% since 1994. The estimated average annual rate of decline at trend sites in the Kenai to Kiska index area was 4.1% (95% C.I.: 3.0% to 5.2%; $P = 0.001$) for 1990 to 1996. Similar rates of decline were apparent for the 26 trend rookeries in the Kenai to Kiska area, where we counted 13,905 non-pup sea lions. This was an overall decline of 25.6% from 1990 (18,694) of 19.1% from 1991 (17,186), of 16.2% from 1992 (16,589), and of 4.1% from 1994 (14,505). The average annual rate of decline at the Kenai to Kiska trend rookeries was 5.0% for 1990 to 1996 (95% C.I.: 3.1% to 6.8%; $P = 0.003$).

The eastern Aleutian Islands, one of the four subareas making up the Kenai to Kiska index area, is the only one in which numbers of non-pups increased (7% at trend sites) from 1994 to 1996 (Table 4, Fig. 3a). The greatest observed decline (10% at trend rookeries, 13% at trend sites, 15% at all surveyed sites) was in the central Gulf of Alaska (Tables 4, 5, and 6; Fig. 3a, 3b,

4a). Non-pup counts in the western Gulf of Alaska and central Aleutian Islands regions declined by 4% to 6% at all trend sites and trend rookeries, and by less than 3% at all surveyed sites.

Subareas Outside the Kenai to Kiska Index Area

One of the three regions outside of the Kenai to Kiska index area, the eastern Gulf of Alaska, has shown continuous decline during the 1990s for all trend sites (Table 4, Fig.5a), for trend rookeries (Table 5, Fig. 5b), and for all surveyed sites (Table 6, Fig. 4b). The decline in non-pup numbers was especially steep from 1994 to 1996: 37% and 35% at all trend sites and all surveyed sites, respectively. The western Aleutian Islands also have generally declined after showing an increase from 1990 to 1991. Trends in Southeast Alaska are presented as part of the comparison of western and eastern stocks, above.

Proportion of Non-pups on Rookeries

The proportion of non-pup sea lions on rookeries, compared to the numbers of non-pups on all surveyed sites, was 0.586 Alaska-wide in 1996 (Table 7). This was an increase of 3.0% from 1994 (0.569), but was a decline of 4.8% from 1992 (0.615), and a decline of 8.4% from 1991 (0.639). Regionally, the proportion ranged from a low of 0.404 in the eastern Gulf of Alaska to 0.771 in the western Aleutian Islands (Table 7, Fig. 6). The proportion of non-pups on rookeries consistently has been lowest in the eastern Gulf of Alaska, where there are only two rookeries: Seal Rocks and Fish (Wooded) Island. The most noteworthy change in 1996 was that the proportion of non-pups on rookeries in the eastern Gulf had increased by 25.8% from 1994 after declining from 1991 through 1994. The relative change from 1994 to 1996 in the other

regions ranged from -4.0% to +5.0%. Note that equivalent versions of this analysis in previous survey reports compared counts of non-pups on all trend rookeries and on all trend sites.

Included for the 1996 survey report were five non-trend rookeries (Table 7) and about 180 non-trend haul-out sites (Table 1), many of which had low or zero counts. Non-pup counts for individual rookeries are listed in Table 8.

Land-Based Pup Surveys

ADF&G and NMFS counted 6,116 live pups at nine rookeries from Southeast Alaska through the eastern Aleutian Islands in 1996 (Tables 1 and 9). For Southeast Alaska as a whole, the 1996 pup count (3,714) increased 3.2% from 1990 (3,600) but declined 1.5% from 1994 (3,770)(Table 9). Pup counts at the two rookeries in the eastern Gulf of Alaska (Seal Rocks and Fish Island) declined by 24% to 41% during the same period. We counted pups at only two of the five rookeries (Outer, Marmot, Sugarloaf, Chowiet, Chirikof Islands) in the central Gulf of Alaska in 1996. At Marmot Island the number of pups declined 61% from 1991 and 21% from 1994. Pup numbers at Outer Island changed little from 1994 to 1996 after dropping 67% from 1990 to 1994. The 1996 pup counts at Atkins Island in the western Gulf of Alaska and at Ugamak in the eastern Aleutian Islands declined by 15% to 17% from 1990 but increased by 13% to 23% compared to 1994.

DISCUSSION

Results of the most recent aerial and land-based surveys of Steller sea lions in Alaska indicate that declines observed during previous surveys continued through 1996. The population

decline was first identified in the eastern Aleutian Islands in the mid- to late 1970s (Braham et al. 1980). From the mid- 1970s through the late 1980s, Steller sea lions declined significantly throughout the Gulf of Alaska and Aleutian Islands (Met-rick et al. 1987, Loughlin et al. 1990, Met-rick et al. 1991, Merrick et al. 1992, Sease et al. 1993, Strick et al. 1997). Although the rate of decline was less severe in some regions of Alaska during the 1990s, the decline in sea lion numbers Alaska-wide continues at about 4% per year at trend sites.

Population trajectories are very different for the two stocks within the population. Numbers of non-pups in the eastern stock in Southeast Alaska, approximately one-half of the entire eastern stock, declined from 1994 to 1996 by about 4.5% at trend sites and 7.5% at all surveyed sites. Despite this recent decline, the overall trend since 1990 has been increasing by about 2% to 3% per year. Similarly, pup numbers in Southeast Alaska declined by 1.5% from 1994 but increased by 3.2% relative to 1990. Future surveys will clarify whether any trend is apparent for sea lions in Southeast Alaska and for the eastern stock in general, or if they remain relatively stable at the current population level.

The situation is very different for the western stock in Alaska, where the number of non-pups continued to decline at about 5.5% per year for trend sites and trend rookeries and almost 4% per year at all surveyed sites. The rates of decline have been slightly lower for the Kenai to Kiska index area, largely because the greatest relative declines have been observed in the eastern Gulf of Alaska, which is not within the index area., At a more regional level, the picture becomes confused as some regions increased while others decreased, and rates of change also varied. It is important to employ caution in the interpretation of regional trends, as the boundaries between the regions are arbitrary (except between the eastern and western stocks), and sea lions certainly

do travel between regions, particularly during the winter. That being said, however, it is noteworthy that the greatest declines from 1994 to 1996 took place in adjacent regions, the eastern and central Gulf of Alaska, encompassing a wide region from east of Prince William Sound to the Shumagin Islands. We do not have pup counts from enough rookeries in the western stock to corroborate or contradict these observed trends in non-pup numbers.

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Table 1.--Counts of adult and juvenile (non-pup) Steller sea lions at rookery (*) and haul-out sites in Alaska during June and July 1996. Trend sites (+) are those sites used for analyses of trends in survey counts. Count types are photographic (P) or visual (V). Sites are arranged approximately in geographical order from Dixon Entrance in Southeast Alaska to Attu Island in the western Aleutian Islands.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Southeast Alaska					
West Rock	21 June	P	733		
Point Marsh	21 June	V	0		
Point Islet	21 June	V	0		
Forrester+*	21 June	P	3,551	1 July	2,764
Wolf Rock	21 June	V	0		
Sakie Point	21 June	V	0		
Cape Bartolome	21 June	V	0		
Cape Addington	21 June	P	756		
Timbered	21 June	P	210		
Coronation+	21 June	P	64		
Hazy Islands+*	21 June	P	1,759	3 July	768
Cholmondeley Sound	21 June	V	0		
Grindall	21 June	V	0		
Easterly	21 June	P	61		
Etolin	21 June	V	0		
Liesnoi	21 June	V	0		
Cape Ommaney	21 June	P	332		
Larch Bay	21 June	V	0		
Sea lion Rock (Puffin Bay)	21 June	P	165		
Biali Rock+	21 June	P	342		
Jacob Rock+	21 June	P	52		
Kaiuchali (Biorka)	21 June	P	112		
St Lázaria	22 June	V	0		
Patterson Point	21 June	V	0		
Yasha	22 June	V	2		
Horn Cliff	21 June	V	0		
Sukoi Islets	21 June	V	0		
Pinta Rocks	21 June	V	0		
Turnabout+	21 June	V	1		

Table 1 --Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Round Rock	21 June	V	0		
The Brothers+	21 June	P	783		
Sail	21 June	V	2		
False Point Pypus	21 June	V	0		
Sunset	21 June	V	3		
Point League	21 June	V	0		
Point Lull	22 June	V	0		
Tenakee Cannery Point	22 June	V	0		
Sea Lion Island+	22 June	V	0		
Emmons	22 June	V	0		
White Sisters+*	22 June	P	894	3 July	182
Cape Cross+	22 June	P	67		
Cape Bingham	22 June	V	0		
Graves Rock+	22 June	P	475		
Venisa Point	22 June	V	0		
Inian	22 June	P	24		
Point Carolus	22 June	V	0		
South Marble	22 June	V	0		
Case Point	22 June	V	0		
The Sisters	22 June	V	0		
Dorothy	21 June	V	0		
Circle Point	21 June	V	0		
Mist	21 June	V	0		
Benjamin	22 June	V	0		
Met Point	22 June	V	0		
Eldred Rock	22 June	V	0		
Gran Point	22 June	P	276		
Harbor Point+	22 June	P	243		
Cape Fairweather+	22 June	V	0		
Subtotals for Southeast Alaska					
All 58 sites (pups at 3 rookeries)			10,907		3,714
13 trend rookery and haul-out sites			8,231		
3 trend rookery sites			6,204		3,714

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Eastern Gulf of Alaska					
Sitkagi Bluffs+			n.s.		
Cape St. Elias+	10 June	P	500		
Hook Point	10 June	P	30		
Middleton	10 June	V	0		
Cape Hinchinbrook	10 June	P	245		
Seal Rocks+*	10 June	P	544	14 July	352
Fish (Wooded)+	10 June	P	502	13 July	232
Glacier+	10 June	P	54		
Point Eleanor	10 June	V	0		
The Needle+	10 June	P	126		
Perry	10 June	V	0		
Pleiades	10 June	V	0		
Point Latouche	10 June	V	1		
Danger	10 June	V	0		
Point Elrington+	10 June	P	231		
Cape Puget	10 June	V	0		
Cape Junken	10 June	V	0		
Cape Fairfield	10 June	P	70		
Cape Resurrection	10 June	V	0		
Rugged+	10 June	P	30		
Aialik Cape	10 June	P	3		
Chiswell+	10 June	P	115		
Seal Rock (Kenai)+	10 June	P	31		
Granite Cape	10 June	P	37		
Steep Point	10 June	P	67		
Rabbit	10 June	V	0		
Subtotals for the Eastern Gulf of Alaska					
All 25 sites (pups at 2 rookeries)			2,586		584
9 trend rookery and haul-out sites'			2,133		
1 trend rookery site			544		352

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Central Gulf of Alaska					
Outer*	10 June	P	319	8 July	114
Nuka Point	10 June	V	0		
Gore Point	10 June	V	0		
East Chugach	10 June	V	0		
Perl	10 June	P	239		
Nagahut Rocks	10 June	V	0		
Cape Elizabeth	10 June	P	88		
West Amatuli	10 June	V	0		
Sugarloaf+*	10 June	P	741		
Ushagat+	10 June	P	111		
Rocks south of Ushagat+	10 June	P	27		
Sud	10 June	V	0		
Latax Rocks+	11 June	P	195		
Sea Otter	11 June	P	171		
Afognak/Tonki Cape	11 June	P	16		
Sea Lion Rocks (Marmot)+	11 June	V	4		
Marmot+*	11 June	P	1,102	10 July	632
Long+	11 June	P	128		
Kodiak/Cape Chiniak+	11 June	P	232		
Ugak	11 June	V	0		
Kodiak/Gull Point	11 June	P	40		
Kodiak/Cape Barnabas+	11 June	V	0		
Twoheaded+	11 June	P	216		
Cape Sitkinak+	11 June	P	62		
Sundstrom	11 June	V	0		
Cape Alitak	11 June	V	0		
Cape Ikolik	11 June	P	105		
Sturgeon Head	11 June	V	0		
Cape Uyak	11 June	V	0		
Cape Ugat	11 June	P	100		
Noisy	11 June	V	0		
Malina Point	11 June	V	0		

Table 1.--Non-pup and pup counts - 1996, continued

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Kodiak/Steep Cape	11 June	P	33		
Kodiak/Cape Paramanof	11 June	V	0		
Shaw	11 June	P	51		
Cape Douglas	11 June	V	0		
Shakun Rocks	11 June	P	107		
Cape Nukshak	11 June	V	0		
Cape Ugiak	11 June	V	6		
Cape Gull	11 June	V	0		
Cape Kuliak	11 June	V	2		
Takli	11 June	P	30		
Puale Bay	12 June	P	169		
Kilokak Rocks	12 June	P	120		
Aiugnak Columns	12 June	P	60		
Ugaiushak+	12 June	P	13		
Sutwik+	12 June	P	132		
Aghiyuk	12 June	V	0		
Chowiet+*	12 June	P	592		
Chirikof+*	11 June	P	360		
Nagai Rocks	11 June	P	180		
Subtotals for the Central Gulf of Alaska					
All 51 sites (pups at 2 rookeries)			5,751		746
15 trend rookery and haul-out sites			3,915		
4 trend rookery sites			2,795		
Western Gulf of Alaska					
Lighthouse Rocks	12 June	P	114		
Atkulik	12 June	V	0		
Kak	12 June	P	201		
Chankliut	12 June	V	0		
Seal Cape	12 June	V	0		
Mitrofanina	12 June	P	188		
Spitz+	12 June	P	110		
Kupreanof Point	12 June	P	52		

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Castle Rock+	12 June	P	98		
Atkins+*	12 June	P	624	2 July	366
Chernabura+*	12 June	P	422		
Twins	12 June	V	0		
The Whaleback	12 June	P	288		
Nagai Island					
Mountain Point+	12 June	P	120		
Rocks west of Cape Wedge	12 June	V	0		
Sea Lion Rocks (Shumagins)+	12 June	P	192		
Unga/Acheredin Pt.	12 June	P	74		
Jude	12 June	P	355		
Omega	12 June	P	0		
Wosnesenski	12 June	V	0		
Olga Rocks	13 June	P	262		
Sushilnoi rocks	13 June	P	102		
Pinnacle Rock+*	13 June	P	1,027		
Clubbing Rocks+*	13 June	P	957		
Cherni	13 June	P	0		
Hague	13 June	V	2		
South Rock	13 June	P	345		
Bird+	12 June	P	191		
Rock	13 June	P	0		
Subtotals for the Western Gulf of Alaska					
All 29 sites (pups at 1 rookery)			5,724		366
9 trend rookery and haul-out sites			3,741		
4 trend rookery sites			3,030		
Eastern Aleutian Islands					
Unimak					
Cape Lutke	13 June	V	0		
Sennett Point	13 June	V	0		
Cape Sarichef	13 June	P	227		
Cave Point	13 June	V	0		
Oksenof Point	24 June	V	0		

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Amak+	13 June	P	980		
Sea Lion Rocks (Amak)+*	13 June	P	590		
Ugamak and Round+*	13 June	P	854	27/29 June	706
Aiktak	13 June	P	52		
Kaligigan	13 June	V	0		
Tigalda	13 June	P	211		
Tigalda South side	13 June	P	118		
Basalt Rock	13 June	V	0		
Tanginak	13 June	P	59		
Rootok	13 June	P	68		
Akun					
Jackass Point	13 June	V	0		
Billings Head+*	13 June	P	346		
Akun Head	13 June	V	0		
Akutan					
North Head	13 June	V	0		
Reef Point/Lava Bight+	13 June	P	29		
Cape Morgan+*	13 June	P	934		
Battery Point	13 June	V	0		
Old Man Rocks	14 June	P	104		
Egg	14 June	P	50		
Outer Signal	14 June	P	34		
Inner Signal	14 June	V	0		
Unalaska					
Cape Sedanka	14 June	V	1		
Cape Wislow	14 June	V	0		
Bishop Point	14 June	P	57		
Makushin Bay	14 June	P	40		
Cape Starichikof	14 June	V	0		
Spray Cape	14 June	V	0		
Cape Izigan	14 June	P	104		
Bogoslof+*	14 June	P	382		

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Umnak					
Cape Idak	14 June	V	0		
Reindeer Point	14 June	V	0		
Cape Chagak	14 June	V	0		
Aguliuk Point	14 June	V	0		
Cape Aslik+	14 June	P	107		
Polivnoi Rock	14 June	P	128		
Pillars	14 June	V	0		
Ogchul+*	14 June	P	155		
Vsevidof+	14 June	P	62		
Samalga	14 June	V	0		
Adugak+*	14 June	P	277		
Subtotals for the Eastern Aleutian Islands					
All 45 sites (pups at 1 rookery)			5,969		706
11 trend rookery and haul-out sites			4,716		
7 trend rookery sites			3,538		
Central Aleutian Islands					
Uliaga	14 June	P	64		
Kagamil+	14 June	V	10		
Chuginadak+	18 June	P	36		
Carlisle+	14 June	V	0		
Herbert+	18 June	V/P	18		
Yunaska+*	14/18 June	P	340		
Chagulak+	14 June	P	43		
Amukta+	14 June	V	0		
Seguam					
Saddleridge+*	14 June	P	553		
Other+	14 June	P/V	228		
Agligadak+*	18 June	P	73		
Amlia					
Sviechnikof*	18 June	P	86		
East Cape+	18 June	V	0		

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Tanadak+ (Amlia)	18 June	P	13		
Sagigik+	18 June	P	10		
Atka					
North Cape+	18 June	P	59		
Cape Korovin+	18 June	V	0		
Salt+	18 June	V	0		
Koniuji	18 June	V	0		
Kasatochi+*	18 June	P	331		
Oglodak	18 June	P	83		
Ikiginak+	18 June	V	5		
Fenimore	18 June	V/P	15		
Tagalak	18 June	P	103		
Chagul	18 June	P	53		
Anagaksik+	18 June	V/P	32		
Igitkin	18 June	V	0		
Great Sitkin	18 June	P	62		
Little Tanaga+	19 June	P	76		
Kagalaska	20 June	P	60		
Adak					
Argonne Point/Cape Moffet +	18 June	P	141		
Cape Yakak/Lake Point+*	19 June	P	618		
Crone	19 June	P/V	8		
Kanaga					
North Cape/Cape Miga	18 June	P	69		
Ship Rock	18 June	P	146		
Tanaga					
Bumpy Point	18 June	V	0		
Cape Sasmik	20 June	P	101		
Ilak	20 June	P	28		
Gramp Rock+*	20 June	P	582		
Ugidak+	19 June	P	12		
Tag+*	19 June	P	321		
Skagul	19 June	V	0		

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Gareloi	19 June	V	0		
Kavalga+	19 June	P	12		
Unalga and Dinkum Rocks+	20 June	P	81		
Ulak/Hasgox Point+*	20 June	P	844		
Amatignak+	19/20 June	P	87		
Semisopchnoi*	20 June	P	167		
Amchitka					
Ivakin Point+	19 June	V	0		
East Cape+	19 June	P	123		
Cape St. Makarias	19 June	V	0		
Column Rocks*	19 June	P	137		
Bird	19 June	V	12		
Ayugadak+*	19 June	P	281		
Rat	19 June	P	39		
Little Sitkin	20 June	P	77		
Segula	19 June	V	15		
Sea Lion Rocks (Kiska)	19 June	V	1		
Tanadak (Kiska)	19 June	P	85		
Kiska					
Sobaka-Vega Pt.	19 June	P	147		
Cape St. Stephen+*	19 June	P	258		
Lief Cove+*	19 June	P	341		
Sirius Point	20 June	P	88		
Pillar Rock	20 June	P	7		
Subtotals for the Central Aleutian Islands					
All 64 sites			7,181		
34 trend rookery and haul-out sites			5,528		
11 trend rookery sites			4,542		
Western Aleutian Islands					
Buldir+*	19 June	P	313		
Shemya	19 June	P	326		
Nizki	19 June	V	0		

Table 1.--Non-pup and pup counts - 1996, continued.

Location	Non-pup count			Pup count	
	Date	Type	Count	Date	Count
Alaid+	19 June	P	281		
Agattu					
Cape Sabak+* ²	19 June	P	1,001		
Gillon Point+* ²	19 June	P	595		
Attu					
Cape Wrangell*	20 June	P	721		
Other	20 June	P	174		
Subtotals for the Western Aleutian Islands					
All 8 sites			3,411		
4 trend rookery and haul-out sites ²			2,190		
3 trend rookery sites ²			1,909		
Totals for Kenai to Kiska					
All 189 sites			24,625		
69 trend rookery and haul-out sites			17,900		
26 trend rookery sites			13,905		
Subtotals for All Alaska					
All 280 sites (pups at 9 rookeries)			41,529		6,116
95 trend rookery and haul-out sites ^{1,2}			30,454 ²		
33 trend rookery sites ²			22,562		

¹ Trend Site at Sitkagi Bluffs was not surveyed in 1996 in the eastern Gulf of Alaska

² Two Trend Rookeries on Agattu Island previously reported as one Trend Rookery site

Table 2.--Counts of adult and juvenile (non-pup) Steller sea lions observed at trend rookeries, at all trend sites (rookeries and haul-outs), and at all surveyed sites in the Kenai to Kiska index area and Alaska state-wide for June and July aerial surveys, 1990 to 1996, including number of sites (n), and estimated annual rate of change with upper and lower limits of the 95% confidence interval and significance (P) from linear regression (see text).

Year	Kenai to Kiska index area			All Alaska		
	Trend rookeries (n=26)	All trend sites (n=69)	All surv. sites (n=189)	Trend rookeries (n=33)	All trend sites (n=95)	All surv. sites (n=280)
1990	18,694	22,754	inc. ¹	27,604	inc.	inc.
1991	17,186	21,737	27,313	26,879	37,133	46,497
1992	16,589	20,679	26,854	25,849	34,844	45,750
1994	14,505	18,713	25,995	23,452	32,945	45,148
1996	13,905	17,900	24,625	22,562	30,454	41,529
Overall change						
1990-1996	-25.6%	-21.3%	--	-18.3%	--	--
1991-1996	-19.1%	-17.7%	-9.8%	-16.1%	-18.0%	-10.7%
1992-1996	-16.2%	-13.4%	-8.3%	-12.7%	-12.6%	-9.2%
1994-1996	-4.1%	-4.3%	-5.3%	-3.8%	-7.6%	-8.0%
Estimated annual rate of change						
1990-1996	- 5.0%	- 4.1%	--	- 3.6%	--	--
1991-1996	--	--	- 2.0%	--	- 3.8%	- 2.1%
Upper 95%	- 3.1%	- 3.0%	- 1.2%	- 2.6%	- 2.3%	+ 0.4%
Lower 95%	- 6.8%	- 5.2%	- 2.9%	- 4.6%	- 5.3%	- 4.6%
P	0.003	0.001	0.009	0.001	0.009	0.067

¹ "inc." indicates incomplete survey data.

Table 3.--Counts of adult and juvenile (non-pup) Steller sea lions from the eastern and western stocks in Alaska at trend rookeries, at all trend sites (rookeries and haul-outs), and at all surveyed sites during June and July aerial surveys from 1990 to 1996, including number of sites in each region (n) and estimated annual rate of change with upper and lower limits for the 95% confidence interval and significance (P) from linear regression (see text).

Year	Eastern Stock (Southeast Alaska)			Western Stock in Alaska		
	Trend rookeries (n=3)	All trend sites (n=13)	All surv. sites (n=58)	Trend rookeries (n=30)	All trend sites (n=82)	All surv. sites (n=222)
1990	5,491	7,629	inc. ¹	22,113	30,525	inc.
1991	5,786	7,715	9,449	21,093	29,418	37,048
1992	5,945	7,558	10,003	19,904	27,286	35,747
1994	6,496	8,826	11,787	16,956	24,119	33,361
1996	6,204	8,231	10,907	16,358	22,223	30,622
Overall change						
1990-1996	+13.0%	+ 7.9%	--	-26.0%	-27.2%	--
1991-1996	+ 7.2%	+ 6.7%	+ 15.4%	-22.4%	-24.5%	-17.3%
1992-1996	+ 4.4%	+ 8.9%	+ 9.0%	-17.8%	-18.6%	-14.3%
1994-1996	- 4.5%	- 6.7%	- 7.5%	- 3.5%	- 7.9%	- 8.2%
Estimated annual rate of change						
1990-1996	+ 2.2%	+ 1.9%	--	- 5.4%	- 5.5%	--
1991-1996	--	--	+ 3.3%	--	--	-3.8%
Lower 95%	+ 4.9%	+ 5.5%	+12.0%	- 3.3%	- 4.5%	- 3.2%
Upper 95%	-0.5%	- 1.6%	- 5.4%	- 7.5%	- 6.5%	- 4.4%
P	0.077	0.178	0.243	0.004	<0.001	0.001

¹ "inc." indicates incomplete survey data.

Table 4.--Counts of adult and juvenile (non-pup) Steller sea lions observed at ROOKERY AND HAUL-OUT TREND SITES in seven subareas of Alaska during June and July aerial surveys from 1990 to 1996, including number of trend sites in each region (n).

Year	Southeast Alaska (n=13)	Gulf of Alaska			Aleutian Islands			
		Eastern (n=9)	Central (n=15)	Western (n=9)	Eastern (n=11)	Central (n=34)	Western (n=4)	
1990	7,629	5,444	7,050	3,915	3,801	7,988	2,327	
1991	7,715	4,596	6,273	3,734	4,231	7,499	3,085	
1992	7,558	3,738	5,721	3,720	4,839	6,399	2,869	
1994	8,826	3,369	4,520	3,982	4,421	5,790	2,037	29
1996	8,231	2,133	3,915	3,741	4,716	5,528	2,190	
Overall change								
1990-1996	+ 8%	- 61%	- 44%	- 4%	+ 24%	- 31%	- 6%	
1991-1996	+ 7%	- 54%	- 38%	< 1%	+ 11%	- 26%	- 29%	
1992-1996	+ 9%	- 43%	- 32%	+ 1%	- 3%	- 14%	- 24%	
1994-1996	- 7%	- 37%	- 13%	- 6%	+ 7%	- 5%	+ 8%	

Table 5.--Counts of adult and juvenile (non-pup) Steller sea lions observed at ROOKERY TREND SITES in seven subareas of Alaska during June and July aerial surveys from 1990 to 1996, including number of trend rookeries in each region (n).

Year	Southeast Alaska (n=3)	Gulf of Alaska			Aleutian Islands			
		Eastern (n=1)	Central (n=4)	Western (n=4)	Eastern (n=7)	Central (n=11)	Western (n=3)	
1990	5,491	1,491	5,043	3,496	3,417	6,738	1,928	
1991	5,786	1,220	4,337	3,235	3,519	6,095	2,687	
1992	5,945	784	4,306	3,313	3,712	5,258	2,531	
1994	6,496	636	3,099	3,155	3,515	4,736	1,815	30
1996	6,204	544	2,795	3,030	3,538	4,542	1,909	
Overall change								
1990-1996	+ 13%	- 64%	- 45%	- 13%	+ 4%	- 33%	- 1%	
1991-1996	+ 7%	- 55%	- 36%	- 6%	+ 1%	- 25%	- 29%	
1992-1996	+ 4%	- 31%	- 35%	- 9%	- 5%	- 14%	- 25%	
1994-1996	- 4%	- 14%	- 10%	- 4%	+ 1%	- 4%	+ 5%	

Table 6.--Counts of adult and juvenile (non-pup) Steller sea lions observed at ALL SURVEYED ROOKERY AND HAUL-OUT SITES in seven subareas of Alaska during June and July aerial surveys from 1991 to 1996. The number of sites for each region (n) is for the 1996 survey (see text).

Year	Southeast Alaska (n=58)	Gulf of Alaska			Aleutian Islands		
		Eastern (n=25)	Central (n=51)	Western (n=29)	Eastern (n=45)	Central (n=64)	Western (n=8)
1991	9,449	4,812	7,715	5,341	5,291	8,966	4,923
1992	10,003	4,360	7,330	5,502	5,715	8,307	4,533
1994	11,787	3,997	6,795	5,719	6,055	7,426	3,369
1996	10,907	2,586	5,751	5,724	5,969	7,181	3,411
Overall change							
1991-1996	+ 15%	- 46%	- 25%	+ 7%	+ 13%	- 20%	- 31%
1992-1996	+ 9%	- 41%	- 22%	+ 4%	+ 4%	- 14%	- 25%
1994-1996	- 7%	- 35%	- 15%	< 1%	- 1%	- 3%	+ 1%

Table. 7--Proportion of adult and juvenile (non-pup) Steller sea lions on rookeries, compared to numbers of non-pups on all surveyed sites, in seven subareas of Alaska during June and July aerial surveys from 1991 to 1996. Subtotals include counts for five non-trend rookeries, as indicated in the footnotes, as well as all non-trend haul-out sites listed in Table 1 and in Merrick et al. (1992), Sease et al. (1993), and Strick et al. (1997). [Note: the equivalent versions of this table for survey reports from 1994 and earlier included only trend rookeries and haul-out sites.]

Year	Southeast	Gulf of Alaska			Aleutian Islands			Alaska-wide
	Alaska	Eastern ¹	Central ²	Western	Eastern	Central ³	Western ⁴	
1991	0.6123	0.5341	0.6054	0.6057	0.6651	0.7282	0.6953	0.6395
1992	0.5943	0.4103	0.6206	0.6021	0.6495	0.6687	0.7249	0.6153
1994	0.5511	0.3215	0.5158	0.5517	0.5805	0.6823	0.7878	0.5687
1996	0.5688	0.4045	0.5415	0.5294	0.5927	0.6635	0.7710	0.5858

¹ Includes non-trend rookery at Wooded (Fish) Island.

² Includes non-trend rookery at Outer (Pye) Island.

³ Includes non-trend rookeries at Amlia Island (Svechnikof Harbor) and Amchitka Island (Column Rocks).

⁴ Includes rookery at Attu Island (Cape Wrangell).

⁵ i.d. = incomplete data.

Table S.--Counts of adult and juvenile (non-pup) Steller sea lions at principal rookeries in Alaska for 1991 through 1996, including overall percent change (Δ 1996) between the count for each year and the count for 1996.

Rookery	1991 (Δ 1996)	1992 (Δ 1996)	1994 (Δ 1996)	1996
Southeast Alaska				
Forrester	3,648 (-3%)	3,508 (+1%)	4,013 (-12%)	3,551
Hazy	1,278 (+38%)	1,576 (+12%)	1,615 (+9%)	1,759
White Sisters	860 (+4%)	861 (+4%)	868 (+3%)	894
Eastern Gulf of Alaska				
Seal Rocks	1,220 (-55%)	784 (-31%)	636 (-14%)	544
Wooded (Fish)	1,350 (-63%)	1,005 (-50%)	649 (-23%)	502
Central Gulf of Alaska				
Outer	334 (-4%)	243 (+31%)	406 (-21%)	319
Sugarloaf	1,216 (-39%)	1,184 (-37%)	976 (-24%)	741
Marmot	1,459 (-24%)	1,581 (-30%)	1,091 (+1%)	1,102
Chowiet	716 (-17%)	771 (-23%)	599 (-1%)	592
Chirikof	946 (-62%)	770 (-53%)	433 (-17%)	360

Table S.--Non-pup counts at principal rookeries, 1991- 1996, continued.

Rookery	1991 (Δ1996)	1992 (Δ1996)	1994 (Δ1996)	1996
Western Gulf of Alaska				
Atkins	616 (+1%)	792 (-21%)	571 (+9%)	624
Chernabura	650 (-35%)	459 (-8%)	676 (-38%)	422
Pinnacle Rock	1,049 (-2%)	1,092 (-6%)	977 (+5%)	1,027
Clubbing Rocks	920 (+4%)	970 (-1%)	931 (+3%)	957
Eastern Aleutian Islands				
Sea Lion Rock	300 (+97%)	329 (+79%)	480 (+23%)	590
Ugamak (and Round)	1,063 (-20%)	954 (-10%)	971 (-12%)	854
Akun (Billings Head)	156 (+122%)	271 (+28%)	220 (+57%)	346
Akutan (Cape Morgan)	818 (+14%)	1,061 (-12%)	908 (+3%)	934
Bogoslof	558 (-32%)	540 (-29%)	413 (-8%)	382
Ogchul	229 (-32%)	235 (-34%)	209 (-26%)	155
Adugak	395 (-30%)	322 (-14%)	314 (-12%)	277

Table 8.--Non-pup counts at principal rookeries, 1991- 1996, continued.

Rookery	1991 (Δ 1996)	1992 (Δ 1996)	1994 (Δ 1996)	1996
Central Aleutian Islands				
Yunaska	398 (-15%)	393 (-13%)	426 (-20%)	340
Seguam (Saddleridge)	684 (-19%)	696 (-21%)	658 (-16%)	553
Kasatochi	466 (-29%)	376 (-12%)	288 (+15%)	331
Adak (Lake Point- and Cape Yakak)	847 (-27%)	614 (<1%)	766 (-19%)	618
Gramp Rock	773 (-25%)	691 (-16%)	537 (+8%)	582
Tag	440 (-27%)	370 (-13%)	310 (+4%)	321
Ulak (Hasgox Point)	1,046 (-19%)	1,059 (-20%)	866 (-3%)	844
Amchitka (Column Rocks)	233 (-41%)	194 (-29%)	188 (-27%)	137
Ayugadak	324 (-13%)	313 (-10%)	285 (-1%)	281
Kiska (Lief Cove)	506 (-33%)	357 (-4%)	359 (-5%)	341
Kiska (Cape St. Stephen)	380 (-32%)	248 (+4%)	233 (+11%)	258
Western Aleutian Islands				
Buldir	589 (-47%)	454 (-31%)	345 (-9%)	313

Table 8.--Non-pup counts at principal rookeries, 1991-1996, continued

Rookery	1991 (Δ 1996)	1992 (Δ 1996)	1994 (Δ 1996)	1996
Agattu (Cape Sabak)	1,429 (-30%)	1,304 (-23%)	961 (+4%)	1,001
Agattu (Gillon Point)	670 (-11%)	773 (-23%)	509 (+17%)	595
Attu (Cape Wrangell)	736 (-2%)	755 (-5%)	839 (-14%)	721
Eastern Stock (Southeast Alaska - 3 rookeries)	5,786 (+7.2)	5,945 (+4.4)	6,496 (-4.5)	6,204
Western Stock (33 rookeries)	23,516 (-23.6)	21,960 (-18.2)	19,030 (-5.6)	17,964
Kenai to Kiska (27 rookeries)	17,522 (-18.5%)	16,885 (-15.4%)	15,091 (-5.3%)	14,288
All 36 Rookeries	29,302 (-17.5%)	27,905 (-13.4%)	25,526 (- 5.3%)	24,168

Table 9.--Counts of Steller sea lion pups at rookeries in Alaska during June and July surveys from 1990, 1994, and 1996, including the percent change (Δ 1996) from the earlier counts to the 1996 counts.

Rookery	1990 (Δ 1996)	1994 (Δ 1996)	1996
Southeast Alaska			
Forrester	2,932 (-6%)	2,757 (<1%)	2,764
Hazy	638 (+20%)	862 (-11%)	768
White Sisters	30 (+507%)	151 (+21%)	182
Eastern Gulf of Alaska			
Seal Rocks	571 (-38%)	598 (-41%)	352
Fish (Wooded)	--	305 (-24%)	232
Central Gulf of Alaska			
Outer	363 (-69%)	119 (-4)	114
Marmot	1,611 ¹ (-61%)	804 (-21%)	632
Western Gulf of Alaska			
Atkins	433 (-15%)	324 (+13%)	366
Eastern Aleutian Islands			
Ugamak	847 (-17%)	574 (+23%)	706

¹1991 count.

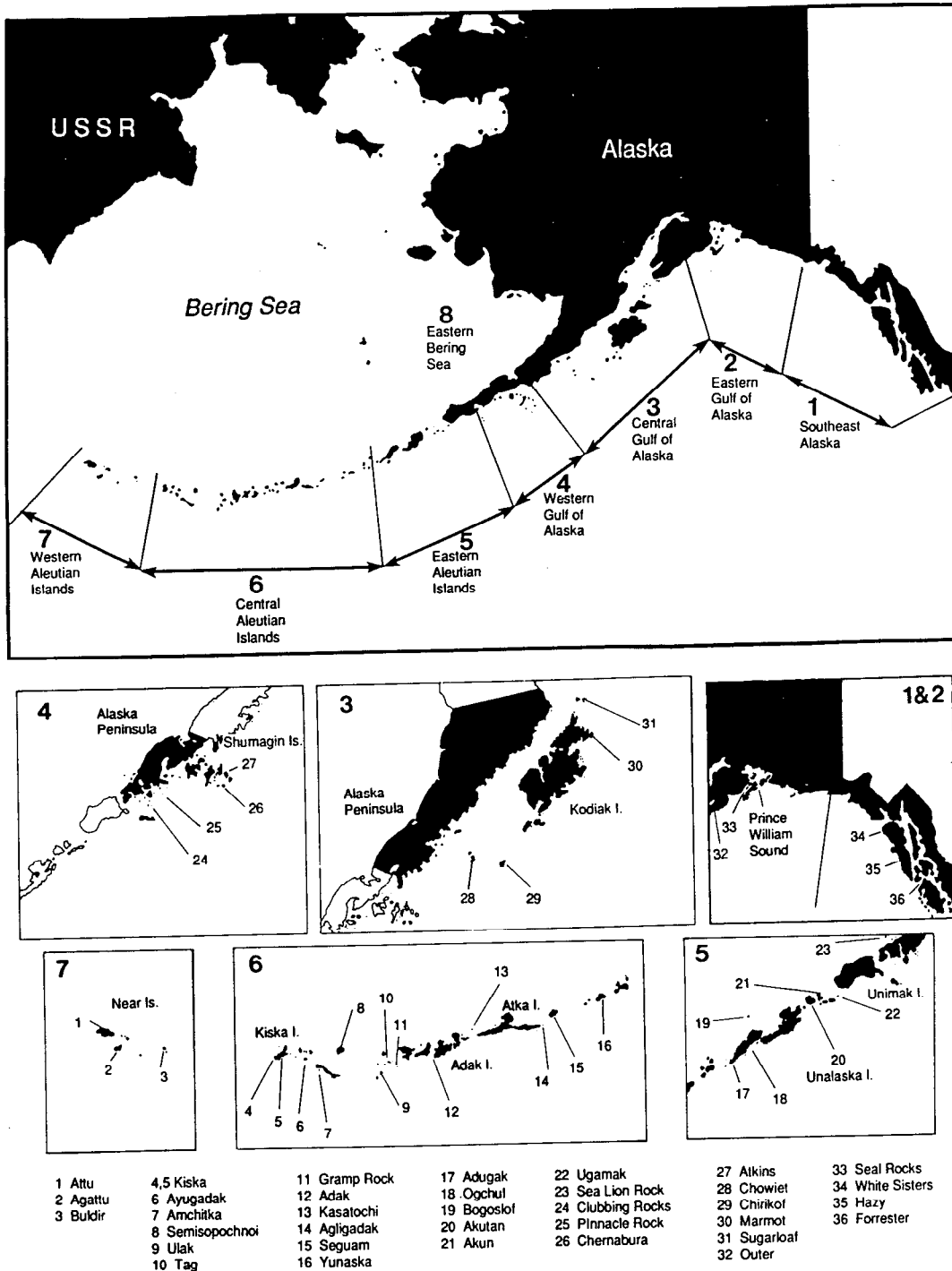


Figure 1.--Map of Alaska, showing seven geographical regions used for analyses of aerial survey results and major rookeries, as modified from Merrick et al. (1987).

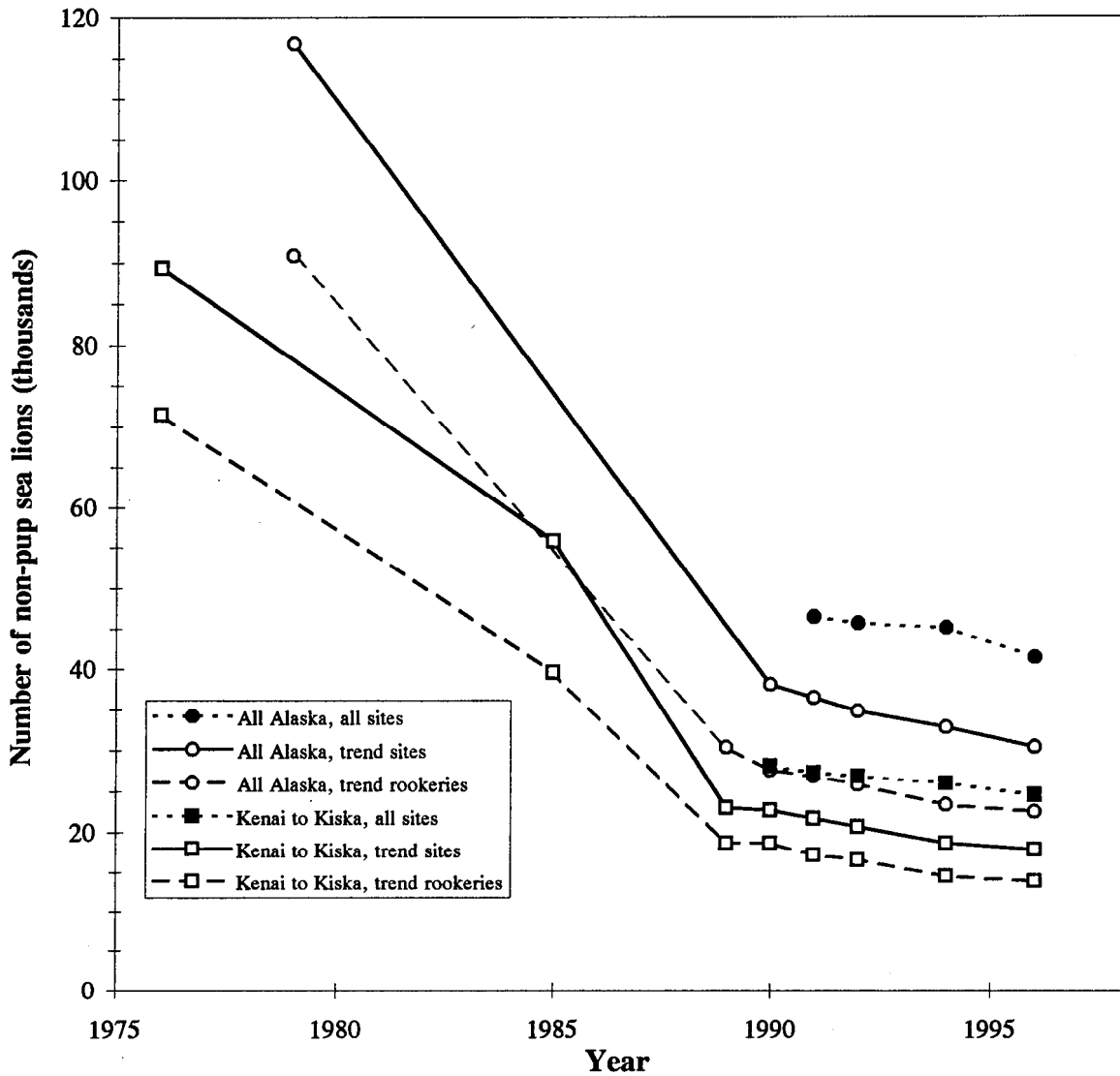


Figure 2.--Counts of non-pup (adult and juvenile) Steller sea lions at all surveyed sites, all trend sites (rookeries and major haulouts), and trend rookeries for Alaska state-wide and for the Kenai Peninsula to Kiska Island index area, 1970s to 1996. All counts are from aerial surveys.

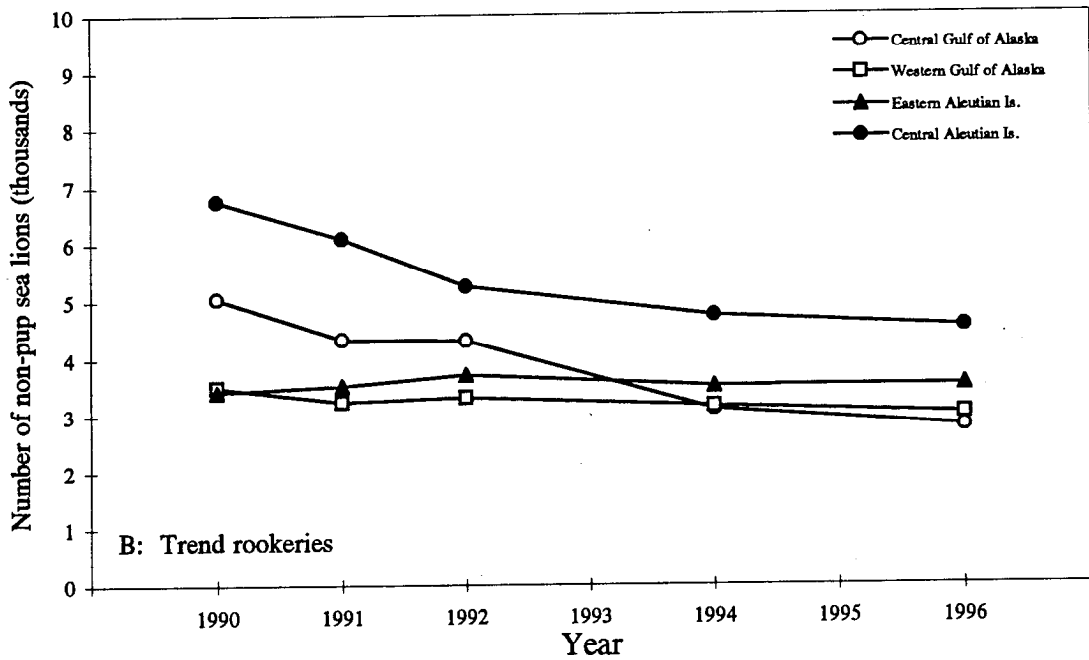
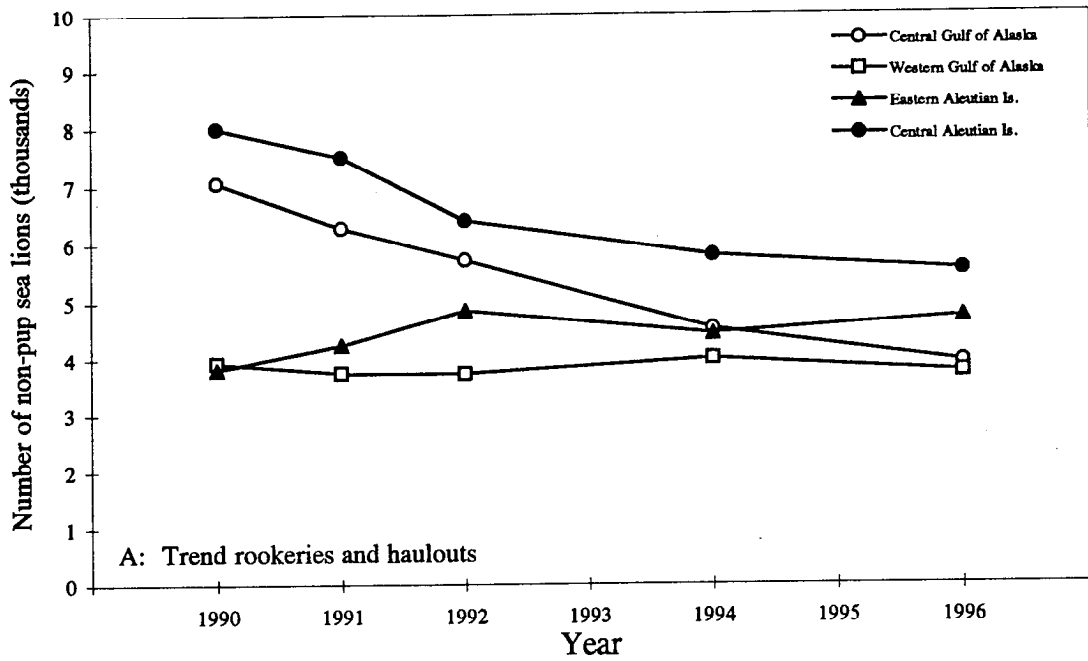


Figure 3.--Numbers of non-pup (adult and juvenile) Steller sea lions counted on trend rookery and haul-out sites (A) and on trend rookery sites (B) in the Kenai to Kiska index area, by region, 1990 to 1996.

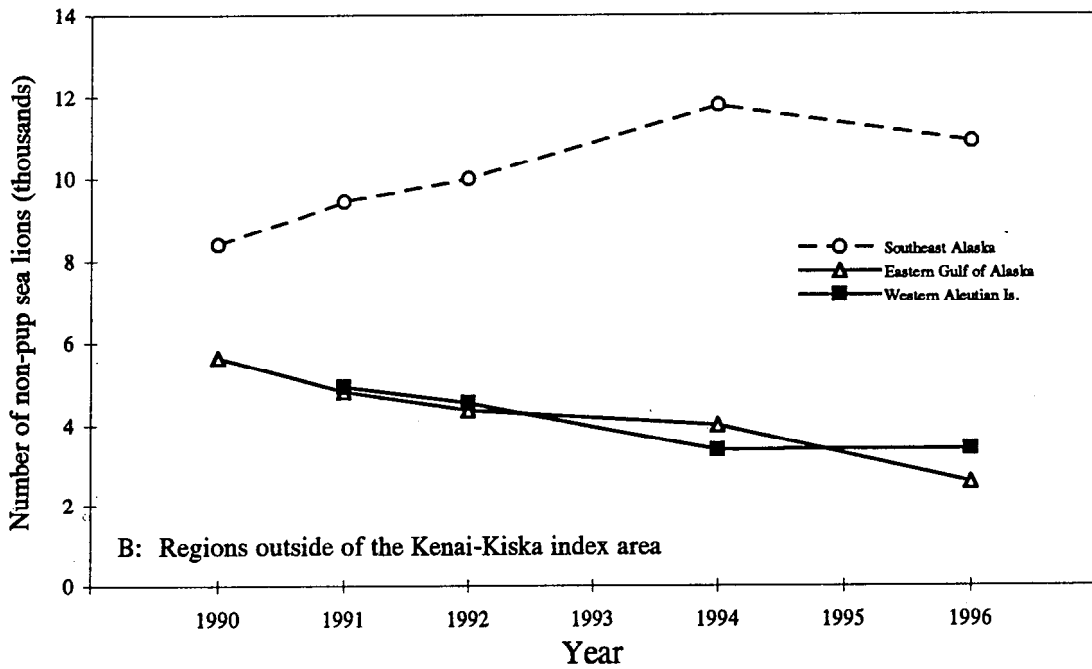
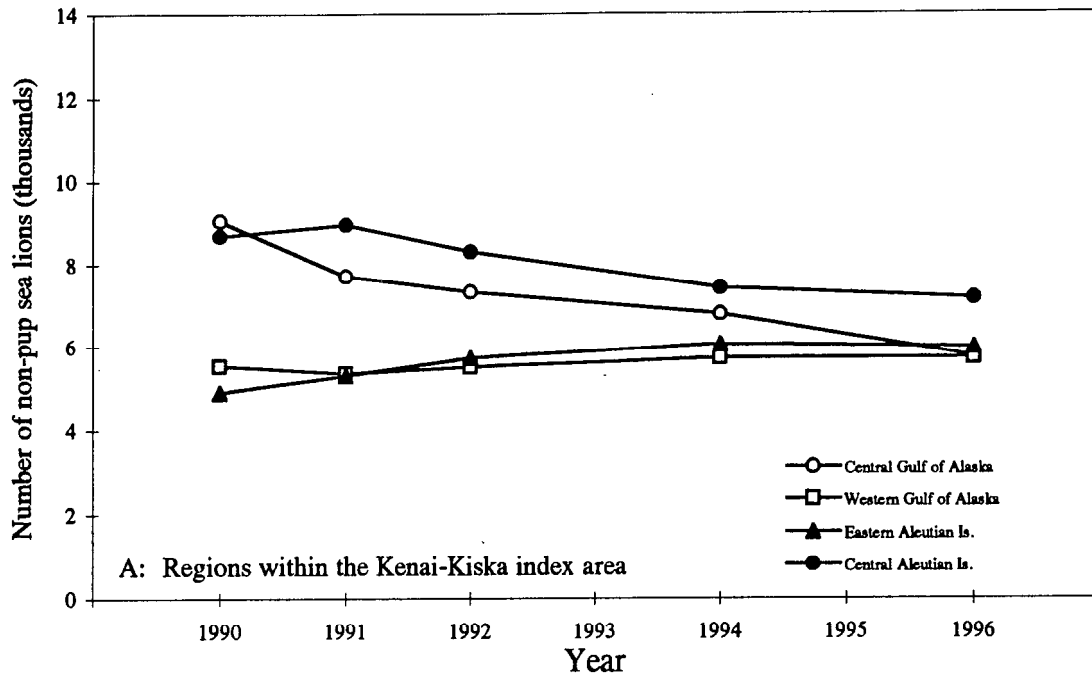


Figure 4.--Numbers of non-pup (adult and juvenile) Steller sea lions counted on all surveyed sites in the regions within (A) and outside of(B) the Kenai to Kiska index area, 1990 to 1996.

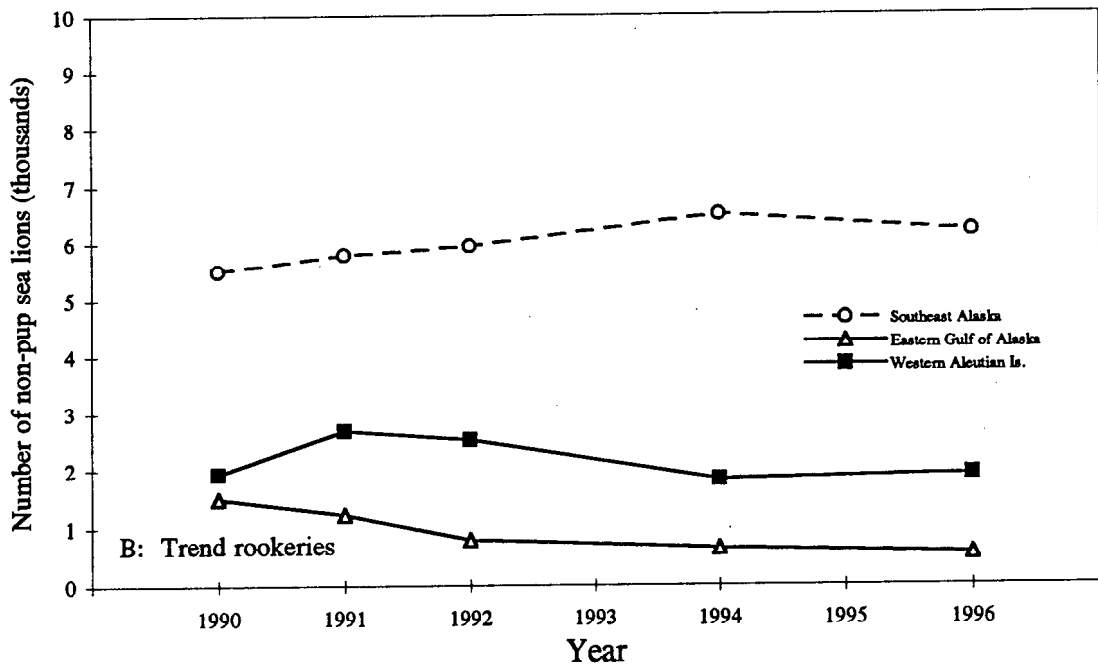
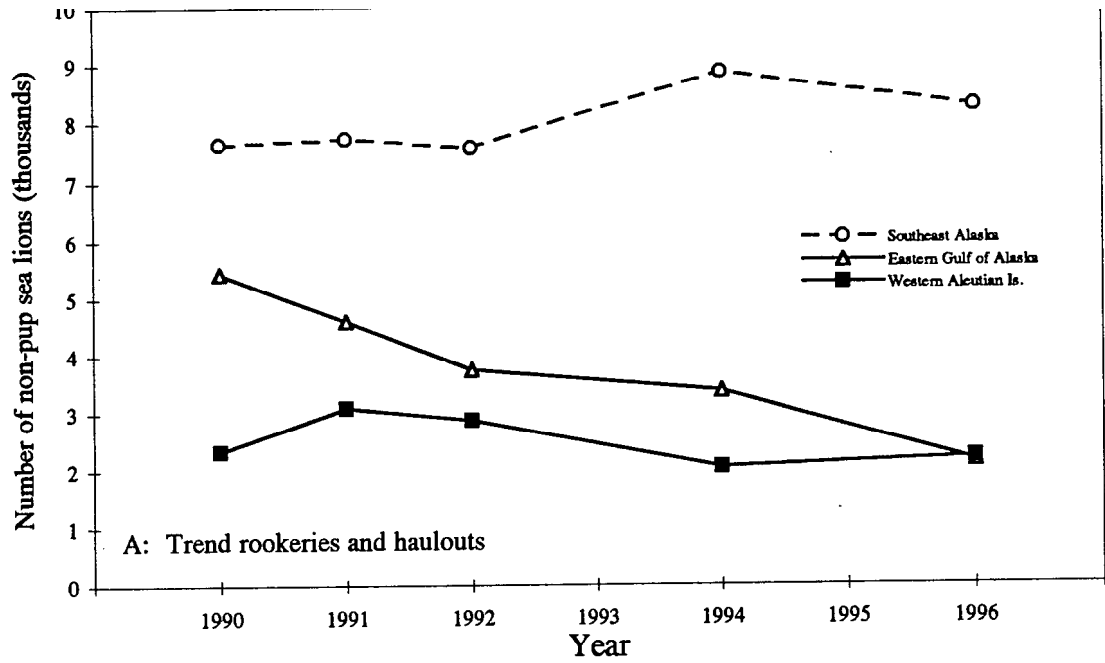


Figure 5.---Numbers of non-pup (adult and juvenile) Steller sea lions counted on trend rookery and haul-out sites (A) and on trend rookery sites (B) in regions outside of the Kenai to Kiska index area, 1990 to 1996.

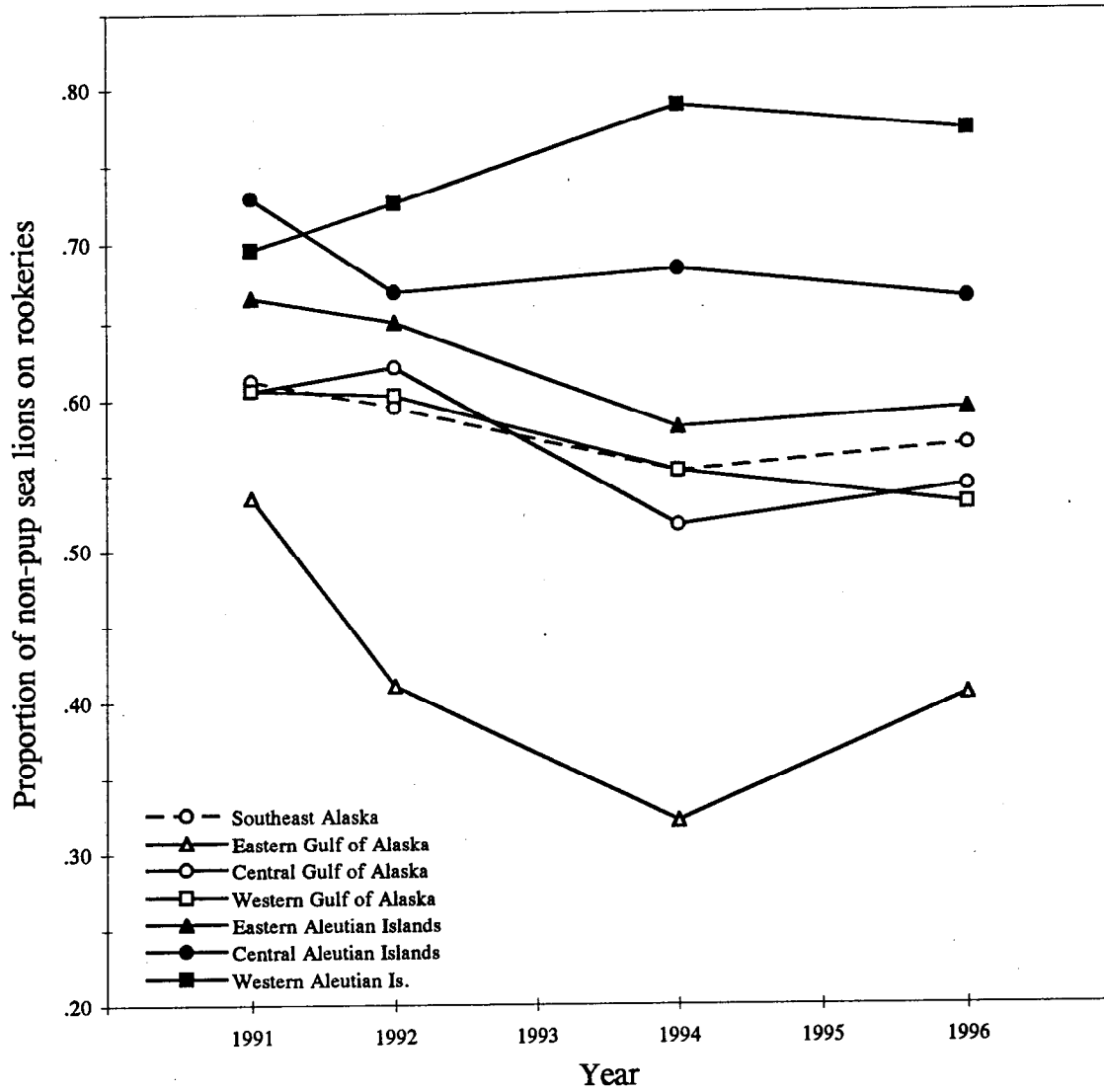


Figure 6.--Proportions of non-pup (adult and juvenile) Steller sea lions located on rookeries, compared to numbers of non-pups on all surveyed sites, by region, 1991 to 1996. Counts include five rookeries and about 180 haulouts that are not trend sites, as listed in Tables 1 and 7.

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