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Memorandum For: Douglas Mecum, Director, Alaska Region
Kaja Brix and Lisa Rotterman, Alaska Region Protected Resources

From: Douglas DeMaster, Director, Alaska Fisheries Science Center

Subject: Aerial Survey of Steller Sea Lions in Alaska, June-July 2009 and Update on the Status of the Western Stock in Alaska

Summary and Introduction: An aerial survey to assess Steller sea lion (*Eumetopias jubatus*) pup production in Alaska was conducted by the Alaska Fisheries Science Center (AFSC) from 24 June to 15 July 2009. A secondary objective was to survey adult and juvenile (non-pup) sea lions in southeast Alaska (part of the threatened eastern stock, or distinct population segment, DPS), and in the eastern and central Gulf of Alaska areas (part of the endangered western DPS) to further investigate seasonal movement of sea lions and ascertain its impact on determination of stock trends.

We counted 10,792 Steller sea lion pups within the range of the western DPS in AK on rookeries and major haul-outs in 2009. However, we were unable to survey sites in the western Aleutian or Pribilof Islands in 2009, two regions with declining pup production. To estimate total western DPS pup production in 2009, we included counts obtained in 2005 and 2008 at 5 rookeries and 1 haul-out in these two regions to obtain a total of 11,120, an increase of 1,170 from the 9,950 pups counted in 2005. Pup production at major rookeries (N=31) increased by 921 pups between 2005 and 2009 (+10%), or by approximately 7 pups per rookery per year. By region, rookery pup production declined in the western (-64) and central Aleutian Islands (-120), but increased in the eastern Aleutian Islands, (+378), and in the western (+355), central (+169) and eastern (+203) Gulf of Alaska between 2005 and 2009. Pup production on all major western DPS rookeries increased at a statistically non-significant rates of 0.6% (P=0.43) per year between 1998 and 2009 (N=4 counts), and 1.7% (P=0.17) between 2001/02 and 2009 (N=3 counts). Between 2001/02 and 2009, rookery pup production declined 43% in the western and 7% in the central Aleutian Islands, but increased 47% in the eastern Aleutian Islands, and 23%, 6%, and 57% in the western, central, and eastern Gulf of Alaska, respectively, for an overall western DPS change of +14%. This is equivalent to an increase of approximately 5 pups per rookery per year from 2001/02 through 2009.

Steller sea lion pup production in SE Alaska (eastern DPS) totaled 7,462 pups in 2009, with 7,443 counted at the 5 major rookeries where 5,510 were counted in 2005. The increase of 1,933 in rookery pup production since 2005 equates to approximately 97 more pups per year at each of the SE Alaska rookeries. Pup production in SE Alaska increased at the rates of +5.0% per year (P<0.001) since 1996 and +3.6% per year (P<0.001) since the late 1970s. Between 2001/02 and 2009, rookery pup production increased 50% (from 4969 to 7443) in SE Alaska, which is equivalent to an increase of approximately 62 pups per rookery per year.

Results of the non-pup survey from late June 2009 in SE Alaska, and in the eastern and central Gulf of Alaska support the hypothesis that movement of sea lions into the eastern Gulf of Alaska, primarily from SE Alaska, affected sub-area and western DPS counts obtained during the early June 2008 survey. Total non-pup counts in the eastern Gulf of Alaska were 812 lower in the 'late' 2009 than in the 'early' 2008 survey, while they were greater by 2,642 in SE Alaska. An additional 404 non-pups were also counted at trend sites in the central Gulf of Alaska in 2009 compared to 2008. Using the data collected in 2009 and calculating trends in each sub-area since 2000, we estimate that seasonal movement from SE Alaska may have contributed a minimum of 570 additional sea lions to the 2008 western DPS trend site counts. If these are subtracted from the 2008 western DPS total, the percent difference in non-pup counts between 2004 and 2008 is reduced from 3% to 1%.

Methods

Aerial surveys to assess Steller sea lion (SSL) pup production in Alaska are conducted in late June through mid-July, starting at least 10 days after the mean birth dates of pups in the survey area (4-14 June; Pitcher et al. 2001). The primary objective in 2009 was to survey all terrestrial rookery and major haul-out sites within the Alaskan SSL range. A secondary objective was to conduct a non-pup survey in SE Alaska, and in the eastern and central Gulf of Alaska approximately 2.5 weeks later than the 2008 survey (Fritz et al. 2008) to further investigate seasonal movement of SSLs in the stock boundary area.

A total of 172 of 178 known rookery and haul-out sites were successfully surveyed between 24 June-15 July 2009 in Alaska from Forrester Island in SE Alaska to Kiska Island in the central Aleutian Islands (Figure 1). We were unable to survey sites in the western Aleutian Islands region because of the limited access granted to us by the US Air Force to Eareckson Air Station on Shemya Island. Fortunately, for four (Alaid, Buldir, Agattu-Gillon Point, and Agattu-Cape Sabak) of the five rookeries and major haulouts in the western Aleutians, we were able to count pups in photographs taken during the proper time window in 2008. However, the most recent pup count available from Attu-Cape Wrangell was from 2005. We were also unable to survey Walrus Island in 2009 because of poor weather and low ceilings in the Pribilof Islands; the most recent pup count available from this site is from 2005.

We used a NOAA Twin Otter aircraft (N56RF) to conduct the survey. Sites with ten or more non-pups hauled out were photographed using three Canon EOS-1Ds Mark III digital cameras equipped with 85 mm telephoto lenses mounted in the belly of the plane. The center camera was mounted vertically while the port and starboard cameras were mounted obliquely at a 21° angle, pointing inward towards the center camera. The cameras were mounted in a forward motion compensator (FMC) to minimize blur. The desired survey altitude was 750 ft (which provided an approximate 1000 ft wide swath width with the three cameras), but due to low ceilings, wind speeds, and topography some sites were photographed at altitudes ranging from 500-1500 ft. The desired ground speed was 90 kts, but ranged from 85-110 kts depending on wind speed and direction. Cameras were set to aperture priority (f5.6) and ISO to 800. Lenses were focused manually and set to near infinity.

Four researchers working independently counted all SSLs at each terrestrial site photographed during the 2009 survey. One researcher analyzed all photographs, while the remaining three

researchers divided the sites to insure two independent counts per site. Sea lions were counted off digital photographs using high resolution monitors and Adobe Photoshop software (mention of specific products does not serve as an endorsement). A script within the software tallied the number of pups, juveniles, adult females, sub-adult males and adult males that were marked on the image. Initial total counts of pups and non-pups (juveniles, adult females, sub-adult males and adult males) at each site by each researcher were compared. If the difference in total pup or non-pup counts at a site was greater than 5% or greater than 20, then the photographs (with counted animals) were compared to reconcile the discrepancies. If sea lions were disturbed into the water by the survey aircraft, then every effort was made to count them, but animals that were in the water away from shore near undisturbed sites were not counted. Total counts of pups at all photographed sites differed by 70 (0.6%) for western DPS sites and 184 (2.4%) for SE Alaska sites between replicates. Total counts of non-pups at all photographed sites differed by 136 (0.5%) for western DPS sites and 69 (0.4%) for SE Alaska sites between replicates. Counts reported here are means of the replicate counts for the 106 photographed sites, or the visual count of non-pups recorded by the observer for the 66 sites with few or no sea lions.

To estimate the effect that seasonal movement of adult and juvenile sea lions may have had on regional and western DPS trends in the 2008 'early' survey, we compared the 2008 data to the predicted 2008 count based on the 2000-2009 regression calculated without using the 2008 data. Log-transformed trend site count totals in the eastern and central Gulf of Alaska and in SE Alaska from 2000 through 2009 were regressed against year to determine the overall trend in each region without considering the 2008 data. Trend site counts analyzed from the central Gulf of Alaska from 2000 through 2009 included only those trend sites surveyed in 2009 (28 of 33), and did not include Kodiak/Steep Cape, Shakun Rocks, Takli, Puale Bay, and Ugaiushak. These 5 trend sites, located on the Alaskan Peninsula west of Cook Inlet, accounted for only 4% of all non-pups counted on central Gulf trend sites in 2008. Non-pup SSL surveys conducted prior to 2004 used oblique 35 mm photography. Differences in resolution between oblique 35 mm and vertical high resolution photographs requires an adjustment factor of -3.64% be applied to all non-pup counts from vertical photographs in order to properly analyze regional time series that include counts from years prior to 2004 (Fritz and Stinchcomb 2005). To estimate the effect that seasonal movement may have had on the 2008 western DPS survey totals, we determined the differences between actual and predicted 2008 non-pup counts in the eastern and central Gulf of Alaska. The new eastern and central Gulf of Alaska totals were used to calculate a movement-adjusted total western DPS trend site non-pup count for 2008.

Results and Discussion

Pup production in the western DPS

Steller sea lion pup production within the range of the western DPS in AK is estimated at 11,120 on all rookeries and major haulouts in 2009, an increase of 1,170 from the 9,950 pups counted in 2005 (Tables 1 and 2; Figure 2). The 2009 total includes

- 92 pups counted on 13 sites that were not surveyed in 2005
- 252 pups counted on 4 western Aleutian sites most recently surveyed in 2008, and
- 76 pups counted on 2 sites (Walrus Island and Attu/Cape Wrangell) most recently surveyed in 2005.

Most of the increase (921 of 1170) observed between 2005 and 2009 occurred at the 31 major rookeries, and is equivalent to an increase of approximately 7 pups per rookery per year. By

region, rookery pup production declined in the western (-64) and central Aleutian Islands (-120), but increased in the eastern Aleutian Islands, (+378), and in the western (+355), central (+169) and eastern (+203) Gulf of Alaska between 2005 and 2009 (Tables 1-3; Figure 2). Between 2001/02 and 2009, rookery pup production declined 43% in the western and 7% in the central Aleutian Islands, but increased 47% in the eastern Aleutian Islands, and 23%, 6%, and 57% in the western, central, and eastern Gulf of Alaska, respectively, for an overall western DPS change of +14% (Table 3; Figure 3). This is equivalent to an increase of approximately 5 pups per rookery per year during the period 2001/02 through 2009.

Analysis of recent regional and overall trends (Table 3; Figure 4) within the western DPS in AK indicates that pup production:

- In the eastern Aleutian Islands and western Gulf of Alaska increased at rates of +4.2% (P=0.004) and +2.6% (P=0.046) per year from 1998 through 2009, respectively;
- In the western Aleutian Islands decreased at a rate of -10.4% (P=0.001) per year from 1997 through 2008; this includes the 2005 count from Attu/Cape Wrangell;
- In the central Aleutian Islands decreased at a rate of -1.6% (P=0.006) per year from 1994 through 2009;
- In the eastern and central Gulf of Alaska increased at non-significant rates of 5.5% (P=0.052) and 1.0% (P=0.393) per year from 2001/02 through 2009, and
- In the western DPS in AK overall increased at a non-significant rate of 0.6% per year (P=0.429) from 1998 through 2009 (4 data points). If only the last three data points are used (since 2001/02), pup production increased at a non-significant rate of 1.7% per year (P=0.172).

The western DPS of Steller sea lion continues to show significant improvement in pup production only in the core of its former range, the eastern Aleutian Islands and western Gulf of Alaska. For instance, at both Clubbing Rocks and Ugamak Island, pup counts in 2009 were the greatest in over 20 years. In addition, South Rocks produced 60 pups in 2009, for the first time surpassing the 50 pup threshold traditionally used for rookery designation. There were increases in pup production between 2005 and 2009 at all rookeries in the central Gulf of Alaska except Chowiet Island, but since 2001/02, the number of pups has increased only 6% in this area (Figure 3). While the number of pups produced on Chowiet decreased by 72 between 2005 and 2009, pup production in 2009 was similar to production in 2001-2004 (Table 2). Pup counts in the eastern Gulf of Alaska were virtually unchanged between 2003 and 2005, but between 2005 and 2009, increased by over 200 (+28%; Tables 1-3). This increase occurred almost entirely at one rookery, Seal Rocks, which is the easternmost rookery in the range of the western DPS. NMML and the Alaska Department of Fish and Game have proposed to obtain genetic samples from pups born on Seal Rocks and other rookeries at the eastern edge of the western DPS (as well as samples from pups born at northern rookeries in SE Alaska) to investigate potential recent developments in stock structure.

Pup production continues to decline in the western and central Aleutian Islands. Pup counts at four rookeries in these two sub-areas (Attu/Cape Wrangell and Buldir in the western, and Ayugadak and Amchitka/Column Rocks in the central) in 2005-2009 declined to less than 50. Buldir, with only 7 pups produced in 2008, may have ceased to function as a rookery. There is a boundary within the central Aleutian Islands at approximately 178°W (Tanaga Island) that separates declining rookeries to the west in the Near, Delarof and Rat Islands from stable or slightly increasing rookeries to the east in the Andreanof and Fox Islands (Figures 1 and 2). This

latter group includes the rookery on Kasatochi Island, which produced almost 400 pups in 2009 despite the volcanic eruption that occurred in August 2008. The 11 rookeries west of 178°W produced 268 fewer pups in 2009 than in 2005 (-17%) and now account for only 13% of rookery pup production within the AK western DPS, half the percentage that this region contributed in 1998.

Because we were unable to survey any sites in the western Aleutian or Pribilof Islands in 2009, the best available information on pup production in these areas was collected in 2005 and 2008 (Table 1). Consequently, the total pup production of 11,120 reported for 2009 includes counts from 2005 at Attu/Cape Wrangell in the western Aleutian Islands and at Walrus Island in the Pribilof Islands, and counts from 2008 at three other rookeries (Agattu/Cape Sabak, Agattu/Gillon Point, and Buldir) and one major haulout (Alaid) in the western Aleutian Islands. Pup production in the western Aleutians has declined steadily since the late 1990s. Consequently, data from 2005 and 2008 collected in this area likely over-estimate pup production in 2009.

Pup production in SE Alaska (eastern DPS)

Steller sea lion pup production in SE Alaska (eastern DPS) totaled 7,461 pups in 2009, with 7,443 counted at the 5 major rookeries where 5,510 were counted in 2005 (Tables 1 and 2; Figures 2 and 3). The increase of 1,933 in rookery pup production since 2005 equates to approximately 97 more pups per year at each of the SE Alaska rookeries. Pup counts at each SE Alaska rookery in 2009 are the largest within the records available at NMML which start in the early 1960s. Since 1996, rookery pup production in SE Alaska has increased at a rate of +5.0% per year ($P<0.001$), and a rate of +3.6% per year ($P<0.001$) since the late 1970s, which is slightly greater than the estimate of +3.2% per year ($P<0.001$) reported by Pitcher et al (2007) for the period 1979-2005. Between 2001/02 and 2009, rookery pup production increased 50% (from 4969 to 7443) in SE Alaska, which is equivalent to an increase of approximately 62 pups per rookery per year.

Adult and Juvenile Counts in SE Alaska, and eastern and central Gulf of AK Seasonal Movement and Initial Estimates of its Effect on 2008 Survey Results

In the 'late' 2009 compared with the 'early' 2008 survey (Tables 4-6; Figures 5-6), we counted:

- 3,048 more non-pups on trend sites and 2,636 more non-pups on all sites in SE Alaska;
- 501 fewer non-pups on trend sites and 812 fewer non-pups on all sites in the eastern Gulf of Alaska; and
- 404 more non-pups on the 28 of 33 trend sites surveyed in the central Gulf of Alaska.

These results are consistent with the hypothesis proposed in 2008 (Fritz et al. 2008) that seasonal movement into the eastern Gulf of Alaska may have affected non-pup trend analyses in this area as well as for the western DPS as a whole. One way to estimate this effect is to compare the actual counts to the predicted 2008 sub-area totals from the regression analyses. In SE Alaska (Figure 6A), the actual non-pup count in 2008 was 2,415 lower and well below the lower 95% confidence bound on the predicted count from the regression. This supports the hypothesis that many adults and juveniles had not yet returned for the breeding season by early June 2008 when the SE Alaska survey was conducted. The vast majority of the 'missing' animals in 2008 were counted on SE Alaska trend sites in 2009, which are dominated numerically by rookeries (Table 6).

In the eastern Gulf of Alaska, the actual non-pup count in 2008 was 752 greater and above the upper 95% confidence bound on the predicted count from the regression (Figure 6B). This also supports our hypothesis that we counted 'extra' sea lions in this area during the 'early' 2008 survey prior to their return to their breeding area. Some or all of these 'extra' animals counted in the eastern Gulf in 2008 could have been animals that returned to SE Alaska for the breeding season. In the central Gulf of Alaska, the actual non-pup count in 2008 was 182 lower, but within the 95% confidence bounds on the predicted count from the regression. This result suggests that the trend in non-pup counts between 2000 and 2009 (omitting 2008) in the central Gulf is too uncertain to support the hypothesis that a significant number of the 'extra' sea lions counted in the eastern Gulf in 2008 came from this sub-area.

An initial estimate of how seasonal movement from SE Alaska into the eastern Gulf may have affected the results of the 2008 non-pup survey was made by subtracting the estimated number of 'extra' animals counted on eastern Gulf of Alaska trend sites (752), and adding the estimated number of 'missed' central Gulf animals (182) to the actual 2008 sub-area totals (Table 7). This resulted in a net subtraction of 570 non-pups from the 2008 western DPS trend site total of 27,519, yielding an adjusted estimate that accounts for movement of 26,589 (Table 7; Figure 7). Use of this adjusted 2008 western DPS total reduced the percent change between 2000 and 2008 from 14% to 12%, and between 2004 and 2008 from 3% to 1%. The subtraction of 570 is a minimum adjustment since it could be argued that there is no need to add the 'missed' 182 central Gulf animals since the actual and predicted 2008 counts in this subarea were not significantly different from one another. If 182 is not added to the original central Gulf total, then the alternative adjusted 2008 western DPS total is 26,407; percent change between 2000 and 2008 is reduced to 11% while that between 2004 and 2008 is reduced to 0%. NMML will continue to study the issue of trans-boundary seasonal movement and its effect on trend analyses in both the eastern and western DPS. These initial data, however, support the hypothesis that SE Alaska was the source of most of the animals that moved into the eastern Gulf and were counted there in late spring 2008.

Implications of Ratios and Trends in Pups and Non-Pups on Rookeries for Natality

The ratio of pups to non-pups provides an estimate of relative natality. Holmes et al (2007) estimated that Steller sea lion natality rates in the central Gulf of Alaska declined 36% between the late 1970s and 2004 based on demographic modeling. They also showed that pup to non-pup ratios declined in the western Gulf of Alaska and the eastern Aleutian Islands during this same period as evidence to suggest that declines in natality rates may not be limited solely to the central Gulf sea lion population. Pup to non-pup ratios based on data collected in 2009 suggest that natality rates of western DPS sea lions are lower than those in SE Alaska (Figure 8). At the two largest and oldest rookeries in SE Alaska (Forrester Complex and Hazy Island), the pup:non-pup ratio was 0.85 in 2009; Pitcher et al. (2007) reported a ratio of 0.75 in 2002. Rookery pup:non-pup ratios within the western DPS in AK ranged from 0.44 to 0.63 by sub-area in 2009, and averaged 0.57, or 33% lower than in SE Alaska. While rookery pup:non-pup ratios are not estimates of actual female natality (since they include juveniles and males in the denominator), they do provide insight into the relative birth rates of females within each region since females dominate rookery populations. For example, pup:non-pup ratios can be reduced because there are few pups per female, and because dependent juveniles from births in previous years are present with their mothers on the rookery. Both of these factors, however, would suggest

reduced birth rates compared with rookeries with higher ratios. The extent to which sub-adult males and other weaned juveniles haul out on rookeries will also affect pup:non-pup ratios and can vary between rookeries independent of differences in natality. The two SE Alaska rookeries are likely near historical highs in pup production and density of animals on shore, which may inhibit juveniles and sub-adult males from hauling out on these rookeries compared to the smaller, less dense rookeries within the western DPS. This would tend to reduce pup:non-pup ratios independent of changes in female natality rates.

While the eastern Aleutians and western Gulf have shown significant positive increases in rates of pup production since 1998, pup increases lag behind increases in numbers of non-pups counted on rookeries. In the eastern Aleutians, the mean rate of increase in pup production (+4.2% per year) is 1.5% lower than that of non-pups on rookeries (+5.7% per year; significance of regression is $P<0.001$), while in the western Gulf of Alaska, the difference is over 2% (pup: +2.6% per year; rookery non-pup: +4.7% per year ($P=0.002$)). By contrast, since 1996, pup production in SE Alaska has increased at a rate of 5.0% per year ($P<0.001$), or 1.3% faster than the increase in numbers of non-pups on rookeries (+3.7% per year; $P=0.003$). This is another indication that overall natality rates within the western DPS of Steller sea lion, even in those areas with increasing numbers of pups, may be lower than those in the eastern DPS in SE Alaska.

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Table 1. Counts of Steller sea lion pups in 2005, 2008 and 2009 during high resolution aerial surveys. Rookeries are listed in **bold**. * 2005 counts listed for Akun/Billings Head and Yunaska were from 2004.

SITE NAME	REGION	2005	2008	2009
BIALI ROCK	SE AK	100		144
CAPE BINGHAM	SE AK			0
CAPE OMMANEY	SE AK			1
EASTERLY	SE AK			1
FORRESTER/C HORN RK	SE AK	303		441
FORRESTER/FORRESTER ISLAND	SE AK	134		0
FORRESTER/LOWRIE	SE AK	1,508		1,734
FORRESTER/NORTH RK	SE AK	951		1,223
FORRESTER/SEA LION RK	SE AK	533		638
GRAVES ROCK	SE AK	175		440
HAZY	SE AK	1,286		1,976
JACOB ROCK	SE AK			2
SUNSET	SE AK			1
THE BROTHERS/SW	SE AK			2
WEST ROCK	SE AK			2
WHITE SISTERS	SE AK	520		847
YASHA	SE AK			10
CAPE RESURRECTION	E GULF			1
CAPE ST. ELIAS	E GULF			18
CHISWELL ISLANDS	E GULF	44		64
GLACIER	E GULF			4
POINT ELRINGTON	E GULF			1
SEAL ROCKS	E GULF	556		740
THE NEEDLE	E GULF			20
Unnamed rock bn Rugged and Aialik Cape	E GULF			1
WOODED (FISH)	E GULF	159		178
CHIRIKOF	C GULF	123		216
CHOWIET	C GULF	432		360
KODIAK/CAPE UGAT	C GULF			1
LATAX ROCKS	C GULF	1		12
MARMOT	C GULF	433		509
NAGAI ROCKS	C GULF	31		18
OUTER (PYE)	C GULF	104		122
SEA OTTER	C GULF	1		0
SUGARLOAF	C GULF	559		613
SUTWIK	C GULF			12
TWOHEADED	C GULF	16		14
USHAGAT/ROCKS SOUTH	C GULF			1
USHAGAT/SW	C GULF	55		70

Table 1 (continued)

SITE NAME	REGION	2005	2008	2009
ATKINS	W GULF	328		338
CHERNABURA	W GULF	153		244
CLUBBING ROCKS NORTH	W GULF	192		244
CLUBBING ROCKS SOUTH	W GULF	391		534
JUDE	W GULF	206		270
LIGHTHOUSE ROCKS	W GULF	11		16
PINNACLE ROCK	W GULF	643		702
SOUTH ROCKS	W GULF	44		60
SUSHILNOI ROCKS	W GULF	12		34
THE WHALEBACK	W GULF	24		40
ADUGAK	E ALEU	185		276
AIKTAK	E ALEU	8		2
AKUN/BILLINGS HEAD	E ALEU	85*		144
AKUTAN/CAPE MORGAN	E ALEU	657		688
AKUTAN/REEF-LAVA	E ALEU			22
AMAK+ROCKS	E ALEU			1
BOGOSLOF/FIRE ISLAND	E ALEU	225		282
OGCHUL	E ALEU	78		90
SEA LION ROCK (AMAK)	E ALEU	158		185
UNIMAK/OKSENOF POINT	E ALEU			6
UGAMAK/NORTH	E ALEU	426		512
UGAMAK/ROUND	E ALEU	45		71
UGAMAK/UGAMAK BAY	E ALEU	298		326
UNALASKA/CAPE IZIGAN	E ALEU	21		29
ADAK/LAKE POINT	C ALEU	311		338
AMCHITKA/COLUMN ROCK	C ALEU	44		40
AMCHITKA/EAST CAPE	C ALEU	24		13
AMLIA/SVIECH. HARBOR	C ALEU	28		34
AYUGADAK	C ALEU	83		44
GRAMP ROCK	C ALEU	387		332
KANAGA/SHIP ROCK	C ALEU	221		214
KASATOCHI/NORTH POINT	C ALEU	372		394
KISKA/CAPE ST STEPHEN	C ALEU	82		91
KISKA/LIEF COVE	C ALEU	115		80
OGLODAK	C ALEU			4
SEGUAM/SADDLERIDGE	C ALEU	530		540
SEGUAM/TURF POINT	C ALEU	7		0
SEMISOPOCHNOI/POCHNOI	C ALEU	16		5
TAG	C ALEU	144		130
ULAK/HASGOX POINT	C ALEU	338		272
YUNASKA	C ALEU	145*		170

Table 1 (continued)

SITE NAME	REGION	2005	2008	2009
AGATTU/CAPE SABAK	W ALEU	113	83	
AGATTU/GILLON POINT	W ALEU	157	142	
ALAID	W ALEU	27	20	
ATTU/CAPE WRANGELL	W ALEU	47		
BULDIR/ROOKERY	W ALEU	26	7	
WALRUS	BERING	29		
TOTAL wDPS in AK		9,950	252	10,792
TOTAL wDPS Rookeries		8,888	232	9,530
TOTAL eDPS in AK		5,510		7,462
TOTAL eDPS Rookeries		5,376		7,443
TOTAL in AK		15,460	252	18,254

Table 2. Counts of Steller sea lion pups at trend rookeries (*italicized*), non-trend rookeries (non-italicized) and major haul-outs (*) in southeast Alaska (eastern distinct population segment - DPS) and in 7 sub-areas of the western DPS in Alaska. Counts collected from both onshore surveys and high resolution aerial photographs from June-July in 1978-1979, 1984-1989, 1990-1992, 1994, 1997, 1998, 2001-2002, 2003-2004, 2005, and 2009.

Sub-Area and Rookery/Haulout	1978-1979	1984-1989	1990-1992	1994	1997	1998	2001-2002	2003-2004	2005	2009
Southeast AK- Eastern DPS										
Forrester Island Complex	2,187		3,261	2,757	2,798	2,753	3,152		3,429	4,036
Hazy Island	32		808	862	1,157	1,199	1,257		1,286	1,976
White Sisters			95	151	205	282	403		520	847
Graves Rock						1	98		175	440
Biali Rocks							59		100	144
Eastern Gulf of Alaska										
Seal Rocks	545	553	657	598	491	542	500	543	556	740
Wooded (Fish)	29			305	120	147	86	173	159	178
Chiswell Islands							54		44	64
Central Gulf of Alaska										
Outer (Pye)	888	557	363	119	104	113	104	59	104	122
Sugarloaf	5,021	2,109	1,683	958	673	703	490	488	559	613
Ushagat							42	43	55	71
Marmot	6,741	4,381	1,611	804	762	642	515	505	433	509
Two-headed*							20	28	16	14
Chowiet	4,670	1,731	636	625		234	387	368	432	360
Chirikof	1,573	1,476	656	325		184	225	189	123	216
Nagai Rocks*							31	23	31	18
Western Gulf of Alaska										
Lighthouse Rocks	250						7		11	16
Atkins [1]	4,538	2,093	485	324	366	352	274	266	328	338
Chernabura	646	379	211	139		54	138	82	153	244
The Whaleback*							16	22	24	40
Jude							182	187	206	270
Pinnacle Rock	2,748	2,013	794	652		639	769	663	643	702
Clubbing Rocks	1,419	1,394	433	547		448	490	566	583	778
South Rocks*	44						36		44	60

Table 2 (continued)

Sub-Area and Rookery/Haulout	1978-1979	1984-1989	1990-1992	1994	1997	1998	2001-2002	2003-2004	2005	2009
Eastern Aleutian Islands										
Sea Lion Rock (Amak)						134	161	185	158	185
Amak*							3			1
Aiktak*							21	7	8	2
Ugamak (and Round)		1,635	847	574	589	558	570	686	769	909
Akun (Billings Head)		60	63	69		56	55	85		144
Akutan (Cape Morgan)		1,130	442	631		505	508	497	657	688
Bogoslof	914	1,109	501	302	281	220	256	278	225	282
Ogchul		172		94		42	57	69	78	90
Adugak		844	262	180		135	172	185	185	276
Central Aleutian Islands										
Yunaska	752	1,026	230	217	192	161	145	145		170
Seguam (Saddleridge)	2,475	2,635	684	444	463	479	468	517	530	540
Seguam (Turf Point)*							24	15	7	0
Agligadak**						0		2	0	0
Amlia (Sviechnikof Harbor)*						13	22	28	28	34
Kasatochi	213	892	178	215	268	247	302	354	372	394
Adak (Lake Point-Cape Yakak)		558	137	327		340	395		311	338
Kanaga (Ship Rock)							113		221	214
Gramp Rock		909	448	425		456	444	439	387	332
Tag		703	357	234		238	155	150	144	130
Ulak (Hasgox Point)	204	1,236	790	638		521	332	257	338	272
Semisopochnoi**	25			21		6	24	19	16	5
Amchitka (East Cape)**				6		9	16	23	24	13
Amchitka (Column Rocks)	135		148	114		70	52	45	44	40
Ayugadak	22	329	163	142		89	90	66	83	44
Kiska (Lief Cove)	476	882	221	233		179	158	101	115	80
Kiska (Cape St. Stephen)	137	258	212	120		54	71	75	82	91
Western Aleutian Islands [2]										
Buldir	1,142	494	381	120	120	122	42		26	7
Alaid*									27	20
Agattu (Cape Sabak)		907	1,127		379	314	212	159	113	83
Agattu (Gillon Point)					258	213	159	174	157	142
Attu (Cape Wrangell)[3]	642				222	154	75	47	47	

Table 2 (continued)

Sub-Area and Rookery/Haulout	1978-1979	1984-1989	1990-1992	1994	1997	1998	2001-2002	2003-2004	2005	2009
Eastern Bering Sea										
Walrus[4]		334	63	61	35		39		29	
TOTAL Western DPS	**36,249**	**32,799**	**14,783**	**10,563**	**5,323**	**9,373**	**9,507**	**8,813**	**9,685**	**10,879**
TOTAL Eastern DPS in AK	**2,219**		**4,164**	**3,770**	**4,160**	**4,235**	**4,969**		**5,510**	**7,443**
TOTAL Pup Count in AK	**38,468**		**18,947**	**14,333**	**9,483**	**13,608**	**14,476**		**15,195**	**18,322**

** Sites formerly identified as rookeries but without a minimum of 50 pups born since 1975

[1]1997 Atkins count from 1996

[2]2009 Western Aleutian Island counts are from 2008

[3]1979 Attu count for whole island

[4]1984-1989 Walrus count from 1982

Table 3. Summary of Steller sea lion pup counts at trend rookeries in the ranges of the western and eastern distinct population segments (DPSs) in Alaska. Kenai to Kiska includes the central and western Gulf of Alaska, and the eastern and central Aleutian Islands sub-areas. Counts collected from both onshore surveys and high resolution aerial photographs from June-July 1978-1979, 1984-1989, 1990-1992, 1994, 1997, 1998, 2001-2002, 2003-2004, 2005, and 2009.

	Western DPS								**Eastern DPS**
	Gulf of Alaska			**Aleutian Islands**			**Kenai to**		
	Eastern	**Central**	**Western**	**Eastern**	**Central**	**Western**	**Kiska**	**Total**	**SE AK**
# of Rookeries	2	5	4	5	11*	4	25	31	5
Year									
1978-1979	574	18,893	9,351						2,219
1984-1989		10,254	5,879	4,778	9,382		30,293		
1990-1992		4,904	1,923	2,115	3,568		12,510		4,164
1994	903	2,831	1,662	1,756	3,109		9,358		3,770
1997	611					979			
1998	689	1,876	1,493	1,474	2,834	803	7,677	9,169	4,235
2001-2002	586	1,721	1,671	1,561	2,612	488	7,565	8,639	4,877
2003-2004	716	1,609	1,577	1,731					
2005	715	1,651	1,707	1,921	2,551	343	7,830	8,888	5,510
2009	918	1,820	2,062	2,299	2,431	279	8,612	9,809	7,444

* 1984-89 CAI count does not include Amchitka/Column Rocks (n=10)

Table 4. Counts[1] of adult and juvenile (non-pup) Steller sea lions at trend rookeries and haul-outs in the range of the western DPS in Alaska from high resolution vertical aerial photographs taken in June-July 2004-2009. Trend sites have been surveyed regularly since 1991. Rookeries (**bold**) labeled with an asterisk are 'new' rookeries, which were not included as rookeries in the designation of critical habitat (CH) in 1993 but have produced at least 50 pups since 1975. Rookeries labeled with the superscript, ^{N*}, are listed CH rookeries, but have no record of at least 50 pups since 1975.

SITENAME	REGION	2004	2006	2007	2008	2009
CAPE ST. ELIAS	E GULF	318	414	728	1,400	714
CAPE HINCHINBROOK	E GULF	496	237	95	229	102
SEAL ROCKS	E GULF	841	1,119	803	1,024	1,006
WOODED (FISH)	E GULF	523	619	282	603	662
GLACIER	E GULF	620	466	531	509	724
THE NEEDLE	E GULF	123	127	145	88	112
POINT ELRINGTON	E GULF	132	58	37	169	162
CAPE PUGET	E GULF	0	0	0	0	10
CAPE FAIRFIELD	E GULF	0	0	10	47	32
RUGGED	E GULF	0	0	0	8	2
AIALIK CAPE	E GULF	1	103	161	77	88
CHISWELL ISLANDS*	E GULF	72	71	74	68	94
SEAL ROCKS (KENAI)	E GULF	3	4	2	0	13
OUTER (PYE)	C GULF	222	251	268	249	231
GORE POINT	C GULF	0	0	0	0	0
EAST CHUGACH	C GULF	0		0	0	0
PERL	C GULF	49		241	144	150
NAGAHUT ROCKS	C GULF	1		2	21	0
ELIZABETH/CAPE ELIZABETH	C GULF	28		0	0	0
SUGARLOAF	C GULF	667	733	662	849	844
USHAGAT/NW	C GULF	3	0	0	0	0
USHAGAT/SW*	C GULF	101	141	74	96	88
USHAGAT/ROCKS SOUTH	C GULF	8	9	0	45	28
LATAX ROCKS	C GULF	56		115	108	334
SEA OTTER	C GULF	127		100	1	7
RK NEAR SEA OTTER	C GULF	10		0	47	20
AFOGNAK/TONKI CAPE	C GULF	0		0	16	2
SEA LION ROCKS (MARMOT)	C GULF	2		1	13	2
MARMOT	C GULF	703	686	551	644	748
LONG ISLAND	C GULF	32			59	39
KODIAK/CAPE CHINIAK	C GULF	87		241	130	116
UGAK	C GULF	0		0	0	0
KODIAK/GULL POINT	C GULF	109		148	109	89
KODIAK/CAPE BARNABAS	C GULF	0		140	84	130
TWOHEADED	C GULF	266		228	204	251
SITKINAK/CAPE SITKINAK	C GULF	80		104	115	62
KODIAK/CAPE UGAT	C GULF	2	167	248	285	270
KODIAK/STEEP CAPE	C GULF	0	14	61	38	
SHAKUN ROCKS	C GULF	104	67	113	81	
TAKLI	C GULF	85	157	92	67	

Table 4 (continued)

SITENAME	REGION	2004	2006	2007	2008	2009
PUALE BAY	C GULF	58	2	1	2	
UGAIUSHAK	C GULF	0	0	2	0	
SUTWIK	C GULF	206	114	127	93	106
CHOWIET	C GULF	541		424	559	644
CHIRIKOF	C GULF	303		300	300	430
NAGAI ROCKS	C GULF	330		449	234	218
CHERNABURA	W GULF	828		1,228	1,281	1,162
LIGHTHOUSE ROCKS*	W GULF	111	153	152	164	123
KAK	W GULF	17	24		1	
MITROFANIA	W GULF	182	103	116	129	
SPITZ	W GULF	1	0	11	1	
KUPREANOF POINT	W GULF	53	116	53	72	
CASTLE ROCK	W GULF	70	15	38	28	
ATKINS	W GULF	651	663	585	558	630
THE HAYSTACKS	W GULF	38	1	41	3	
THE WHALEBACK	W GULF	102	99	83	102	103
NAGAI/MOUNTAIN POINT	W GULF	80	56	148	60	
SEA LION ROCKS (SHUMAGINS)	W GULF	36	142	44	54	
UNGA/ACHEREDIN POINT	W GULF	264	152	229	202	
JUDE*	W GULF	474	338	445	465	512
PINNACLE ROCK	W GULF	1,011	1,167	1,057	1,094	1,132
CLUBBING ROCKS	W GULF	911	1,037	1,063	952	1,023
CHERNI	W GULF	0	0	0	0	
SOUTH ROCKS	W GULF	528	320	457	451	434
BIRD	W GULF	57	62	97	155	
ROCK	W GULF	17	0	0	0	
UNIMAK/CAPE SARICHEF	E ALEU	250	6	0	167	1
AMAK+ROCKS	E ALEU	733	410	220	265	324
SEA LION ROCK (AMAK)	E ALEU	456	447	385	360	314
UGAMAK COMPLEX	E ALEU	1,304	1,319	1,493	1,619	1,875
AIKTAK	E ALEU	101	111	43	42	61
TIGALDA/ROCKS NE	E ALEU	141	202	236	359	228
TIGALDA/SOUTH SIDE	E ALEU	46	83	105	91	
ROOTOK	E ALEU	96	96	141	60	
TANGINAK	E ALEU	4	6	4	1	
AKUN/BILLINGS HEAD	E ALEU	307	338	523	386	350
AKUTAN/REEF-LAVA	E ALEU	119	103	57	128	166
AKUTAN/CAPE MORGAN	E ALEU	1,021	1,249	1,172	1,135	904
OLD MAN ROCKS	E ALEU	71	112	81	89	
EGG	E ALEU	5	0	0	0	
OUTER SIGNAL	E ALEU	0	0	0	10	
UNALASKA/CAPE SEDANKA	E ALEU	0	0	0	0	
UNALASKA/BISHOP POINT	E ALEU	265	285	196	204	195
UNALASKA/MAKUSHIN BAY	E ALEU	20	88	154	115	
UNALASKA/SPRAY CAPE	E ALEU	0	0	0	0	
UNALASKA/CAPE IZIGAN	E ALEU	238	329	304	188	456

Table 4 (continued)

SITENAME	REGION	2004	2006	2007	2008	2009
BOGOSLOF/FIRE ISLAND	E ALEU	380	358	405	390	398
UMNAK/CAPE ASLIK	E ALEU	119	73		63	
POLIVNOI ROCK	E ALEU	91	42	96	93	
THE PILLARS	E ALEU	4	0	0	0	
OGCHUL	E ALEU	139	132	152	200	224
VSEVIDOF	E ALEU	48	41	35	50	
ADUGAK	E ALEU	259	429	473	636	620
ULIAGA	C ALEU	0	99		66	
KAGAMIL	C ALEU	1	0		0	
CHUGINADAK	C ALEU	129	79		53	
CARLISLE	C ALEU	0	0		27	
HERBERT	C ALEU	38	66		105	
YUNASKA	C ALEU	260	255	279	282	298
CHAGULAK	C ALEU	0	13		59	
AMUKTA+ROCKS	C ALEU	2	18	56	35	
SEGUAM/FINCH POINT	C ALEU	2		0	0	
SEGUAM/SW RIP	C ALEU	40		31	39	
SEGUAM/SADDLERIDGE	C ALEU	923		668	835	856
SEGUAM/TURF POINT	C ALEU	58		8	3	13
SEGUAM/LAVA COVE	C ALEU	0		0	0	
SEGUAM/LAVA POINT	C ALEU	5		0	0	
SEGUAM/WHARF POINT	C ALEU	90		121	49	
AGLIGADAK[N*]	C ALEU	61		15	14	11
AMLIA/EAST CAPE	C ALEU	34		55	117	
AMLIA/SVIECH. HARBOR	C ALEU	144		113	100	192
TANADAK (AMLIA)	C ALEU	1		0	30	
SAGIGIK	C ALEU	30		10	14	
ATKA/NORTH CAPE	C ALEU	383	279	140	32	
ATKA/CAPE KOROVIN	C ALEU	4	0	30	39	
SALT	C ALEU	0		0	4	
KASATOCHI/NORTH POINT	C ALEU	667	610	613	550	609
OGLODAK	C ALEU	86	111	58	99	86
IKIGINAK	C ALEU	0	8	16	0	
FENIMORE	C ALEU	30	10	9	4	
ANAGAKSIK	C ALEU	2	52	14	20	
GREAT SITKIN	C ALEU	0	0	0	0	
LITTLE TANAGA STRAIT	C ALEU	49		15	36	
KAGALASKA	C ALEU	48	0	3	42	
ADAK	C ALEU	1,008		779	621	595
KANAGA/N CAPE	C ALEU	7	13	2	14	
KANAGA/CAPE MIGA	C ALEU	0	0	0	0	
KANAGA/SHIP ROCK*	C ALEU	229		331	322	420
TANAGA/BUMPY POINT	C ALEU	33		33	22	
TANAGA/CAPE SASMIK	C ALEU	122		63	95	
GRAMP ROCK	C ALEU	679			593	442
UGIDAK	C ALEU	25			16	
TAG	C ALEU	242			255	234

Table 4 (continued)

SITENAME	REGION	2004	2006	2007	2008	2009
KAVALGA	C ALEU	56			63	
UNALGA+DINKUM ROCKS	C ALEU	19			0	
ULAK/HASGOX POINT	C ALEU	531			537	514
AMATIGNAK/KNOB POINT	C ALEU	1		0	3	
AMATIGNAK/NITROF POINT	C ALEU	76	38		49	
SEMISOPOCHNOI/POCHNOI[N*]	C ALEU	55	41		32	36
AMCHITKA/CAPE IVAKIN	C ALEU	0	0	0	0	
AMCHITKA/EAST CAPE[N*]	C ALEU	178	103		103	71
AMCHITKA/ST. MAKARIUS	C ALEU	0	0	0	0	
AMCHITKA/COLUMN ROCK	C ALEU	85			71	69
AYUGADAK	C ALEU	152			152	112
RAT	C ALEU	45			0	
SEA LION ROCK (KISKA)	C ALEU	0			0	
TANADAK (KISKA)	C ALEU	34			1	
KISKA/SOBAKA-VEGA	C ALEU	101			52	
KISKA/CAPE ST STEPHEN	C ALEU	210			229	204
KISKA/LIEF COVE	C ALEU	170			162	152
KISKA/PILLAR ROCK	C ALEU	0			0	
BULDIR	W ALEU	108			43	
SHEMYA	W ALEU	17	18		4	
ALAID	W ALEU	125	86		86	
AGATTU/CAPE SABAK	W ALEU	325	282		202	
AGATTU/GILLON POINT	W ALEU	374	308		281	
ATTU/MASSACRE BAY	W ALEU	0	0		0	
ATTU/CHIRIKOF POINT	W ALEU	75	30		42	
ATTU/CHICHAGOF POINT	W ALEU	54	13		25	
ATTU/KRESTA POINT	W ALEU	0	0		0	
ATTU/CAPE WRANGELL	W ALEU	257	260		247	

[1] Counts are unadjusted for resolution differences with 35 mm oblique photographs taken prior to 2004 (Fritz and Stinchcomb 2005).

Table 5. Counts of adult and juvenile (non-pup) Steller sea lions at non-trend haul-outs in the eastern Gulf of Alaska from high resolution vertical aerial photographs taken in June-July 2004, 2006, 2007, 2008, and 2009. Counts are unadjusted for resolution differences with 35 mm oblique photographs taken prior to 2004 (Fritz and Stinchcomb 2005).

SITENAME	REGION	2004	2006	2007	2008	2009
HOOK POINT	E GULF	96	101	132	261	0
STEEP POINT	E GULF	1	63	90	92	88
MIDDLETON	E GULF	4	0	0	0	0
POINT ELEANOR	E GULF		0	0	0	0
PERRY	E GULF		218	437	227	0
PLEIADES	E GULF		0	0	0	0
POINT LaTOUCHE	E GULF	0	0	0	0	0
DANGER	E GULF	12	10	119	2	1
PROCESSION ROCKS	E GULF	36	67	77	102	113
CAPE JUNKEN	E GULF	0	0	0	0	1
CAPE RESURRECTION	E GULF	3	0	12	0	169
GRANITE CAPE	E GULF	1	89	25	4	5
RABBIT	E GULF	0	0	0	0	0
Total E GULF Non-Trend Sites		**153**	**548**	**892**	**688**	**377**

Table 6. Counts of adult and juvenile (non-pup) Steller sea lions at trend (1) and non-trend (0) haul-outs and rookeries (**bold**) in southeast Alaska (eastern DPS) from high resolution vertical aerial photographs taken in July 2002, early June 2008 and late June 2009.

SITENAME	REGION	TREND	2002	2008	2009
LITTLE ISLAND	SE AK	0		0	0
POINT MARSH	SE AK	0	104	4	0
WEST ROCK	SE AK	0	640	841	869
WOLF ROCK	SE AK	0	207	300	170
SAKIE POINT	SE AK	0		0	0
CAPE BARTOLOME	SE AK	0	41	0	0
CAPE ADDINGTON	SE AK	0	1,074	718	9
GRINDALL	SE AK	0	130	374	6
TIMBERED	SE AK	0	442	288	4
HAZY	SE AK	1	2,050	1,686	2,457
EASTERLY	SE AK	0		255	188
CORONATION	SE AK	1	46	279	5
South of Cape Ommaney	SE AK	0		102	113
CAPE OMMANEY	SE AK	0	344	117	160
LARCH BAY	SE AK	0		28	0
SEA LION ROCK (PUFFIN BAY)	SE AK	0	264	0	124
ETOLIN	SE AK	0		0	0
PATTERSON POINT	SE AK	0		0	
BIALI ROCK	SE AK	1	626	408	616
FORRESTER COMPLEX	SE AK	1	3,699	2,894	4,741
JACOB ROCK	SE AK	1	203	101	300
KAIUCHALI (BIORKA)	SE AK	0	46	31	5
HORN CLIFF	SE AK	0		0	0
YASHA	SE AK	0	920	379	612
ST. LAZARIA	SE AK	0		0	0
PINTA ROCKS	SE AK	0		0	0
TURNABOUT	SE AK	0		0	0
ROUND ROCK	SE AK	0		0	0
THE BROTHERS	SE AK	1	981	765	537
SEA LION ISLANDS	SE AK	0		137	298
POINT LULL	SE AK	0		153	162
SAIL	SE AK	0	0	3	496
FALSE POINT PYBUS	SE AK	0	0	0	0
SUNSET	SE AK	0	348	384	322
POINT LEAGUE (STEVENS PASSAGE)	SE AK	0	0	1	0
WHITE SISTERS	SE AK	1	1,156	1,132	1,435
TENAKEE CANNERY POINT	SE AK	0		0	0
CAPE CROSS	SE AK	1	1	1	0
MIST	SE AK	0		0	0
POINT MARSDEN	SE AK	0		0	0
CAPE BINGHAM	SE AK	0	0	0	0
CIRCLE POINT	SE AK	0		0	0

Table 6 (continued)

SITENAME	REGION	TREND	2002	2008	2009
THE SISTERS	SE AK	0		0	0
DOROTHY	SE AK	0		0	0
GRAVES ROCK	SE AK	1	1,001	1,305	1,442
INIAN	SE AK	0	206	116	2
VENISA	SE AK	0	0	0	0
POINT CAROLUS	SE AK	0	0	0	0
BENJAMIN	SE AK	0	0	0	0
HARBOR POINT	SE AK	1	186	178	264
SOUTH MARBLE	SE AK	0	238	786	1,010
CASE (TLINGIT) POINT	SE AK	0		0	0
CAPE FAIRWEATHER	SE AK	0		0	0
MET POINT	SE AK	0		0	0
ELDRED ROCK	SE AK	0		0	0
GRAN (LEDGE) POINT	SE AK	0	331	583	638
TOTAL Southeast Alaska Trend-Site			**9,949**	**8,749**	**11,797**
TOTAL Southeast Alaska Non-Trend			**5,335**	**5,600**	**5,188**
TOTAL			**15,284**	**14,349**	**16,985**

Table 7. Counts of adult and juvenile (non-pup) Steller sea lions observed at rookery and haul-out trend sites in eight sub-areas of Alaska (western stock) in June-July 1991 to 2008. Overall percent differences between various pairs of years are also shown. * For eastern Gulf of Alaska in 1998, counts made in 1999 were substituted for those sites not surveyed in 1998. Subarea count totals for 2004-2008 (**) have been adjusted to account for film format-count differences. Kenai-Kiska is comprised of the central and western Gulf of Alaska and eastern and central Aleutian Islands sub-areas. Kenai-Attu is comprised of the Kenai-Kiska plus the western Aleutian Islands sub-areas. "2008Adj" – counts in the eastern and central Gulf of Alaska were adjusted to account for seasonal movement of sea lions in the northern Gulf of Alaska. For calculations of percent difference, use of the 2008Adj counts is denoted by the use of 2008A.

	Gulf of Alaska			Aleutian Islands					Western Stock
Year	**Eastern**	**Central**	**Western**	**Eastern**	**Central**	**Western**	**Kenai-Kiska**	**Kenai-Attu**	**In Alaska**
1991	4,812	7,872	5,338	5,283	8,656	4,601	27,149	31,750	36,562
1992	3,981	7,358	5,112	5,707	7,633	4,199	25,811	30,010	33,991
1994	3,612	6,505	5,718	5,664	6,909	3,114	24,796	27,910	31,522
1996	2,450	5,400	5,356	5,967	6,368	3,334	23,091	26,425	28,875
1998*	2,158	4,806	5,367	5,774	7,017	2,786	22,964	25,750	27,908
2000	2,102	4,555	3,996	4,990	6,560	1,633	20,101	21,734	23,836
2002	2,615	4,594	4,617	5,261	6,547	1,196	21,018	22,214	24,829
2004**	3,015	4,028	5,233	5,991	6,885	1,286	22,137	23,423	26,438
2006**	3,101			6,031					
2007**	2,760								
2008**	4,065	4,420	5,558	6,405	5,817	894	22,199	23,094	27,159
2008Adj**	3,313	4,602	5,558	6,405	5,817	894	22,382	23,276	26,589
Percent difference									
2000-2008	+93%	-3%	+39%	+28%	-11%	-45%	+10%	+6%	+14%
2000-2008A	+58%	+1%	+39%	+28%	-11%	-45%	+11%	+7%	+12%
2004-2008	+35%	+10%	+6%	+7%	-16%	-30%	0%	-1%	+3%
2004-2008A	+10%	+14%	+6%	+7%	-16%	-30%	+1%	-1%	+1%

Figure 1. Terrestrial rookery and haul-out sites in the range of eastern and western distinct population segments (DPS or stock) of Steller sea lions in Alaska surveyed in 2009 and used in the analysis of population trends. Boundaries of the eastern, central, and western sub-areas of the Gulf of Alaska (GULF) and Aleutian Islands (ALEU) are shown. The eastern and western stocks breed on rookeries east and west of 144°W, respectively. The cross-hatched area extending from southeast Alaska west through most of the central Gulf of Alaska denotes the area in which all trend sites were surveyed to obtain non-pup (NP) count for comparison with 2008.

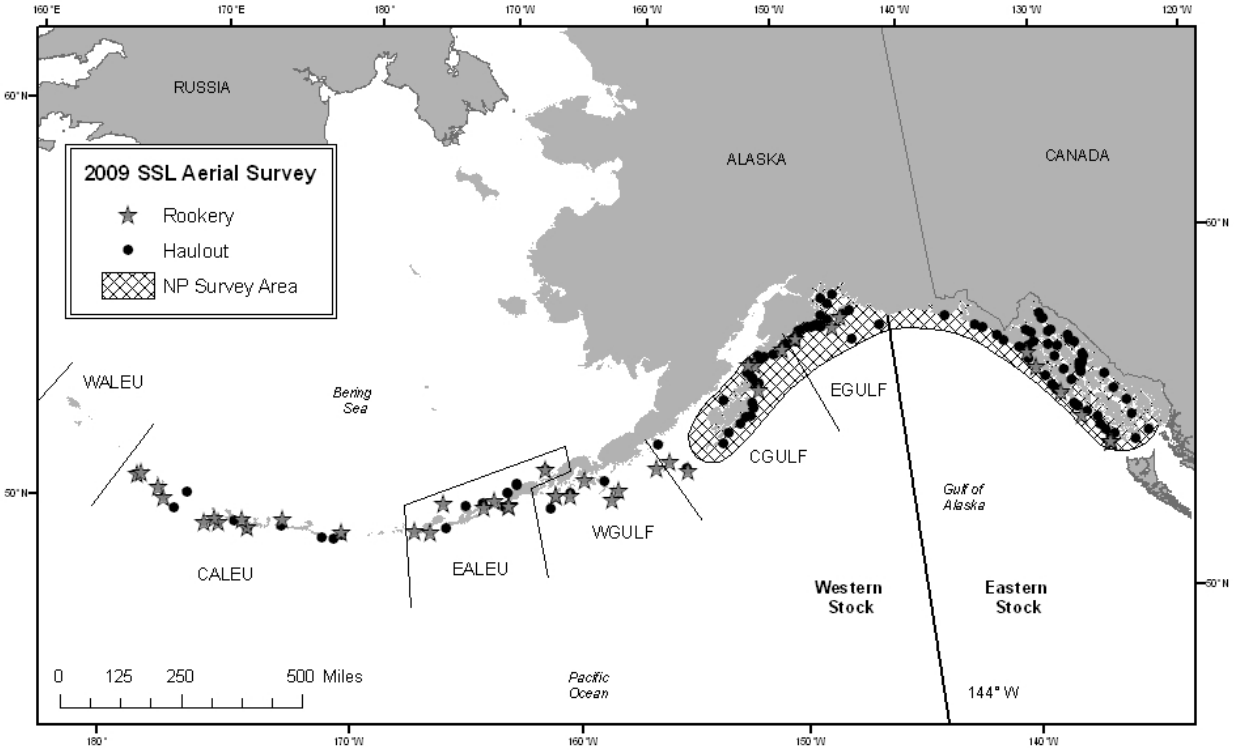

Figure 2. Change in the number of Steller sea lion pups counted at major haul-out and rookery sites between 2005 and 2009 across the range of the western and eastern stocks (distinct population segments) in Alaska. Sites are displayed from west to east in AK, and are grouped into the sub-areas noted in Figure 1. SE AK is part of the eastern stock; all other sub-areas are part of the western stock. 178°W (Tanaga Island) separates rookeries that have predominately declined between 2005 and 2009 from those that have predominately increased.

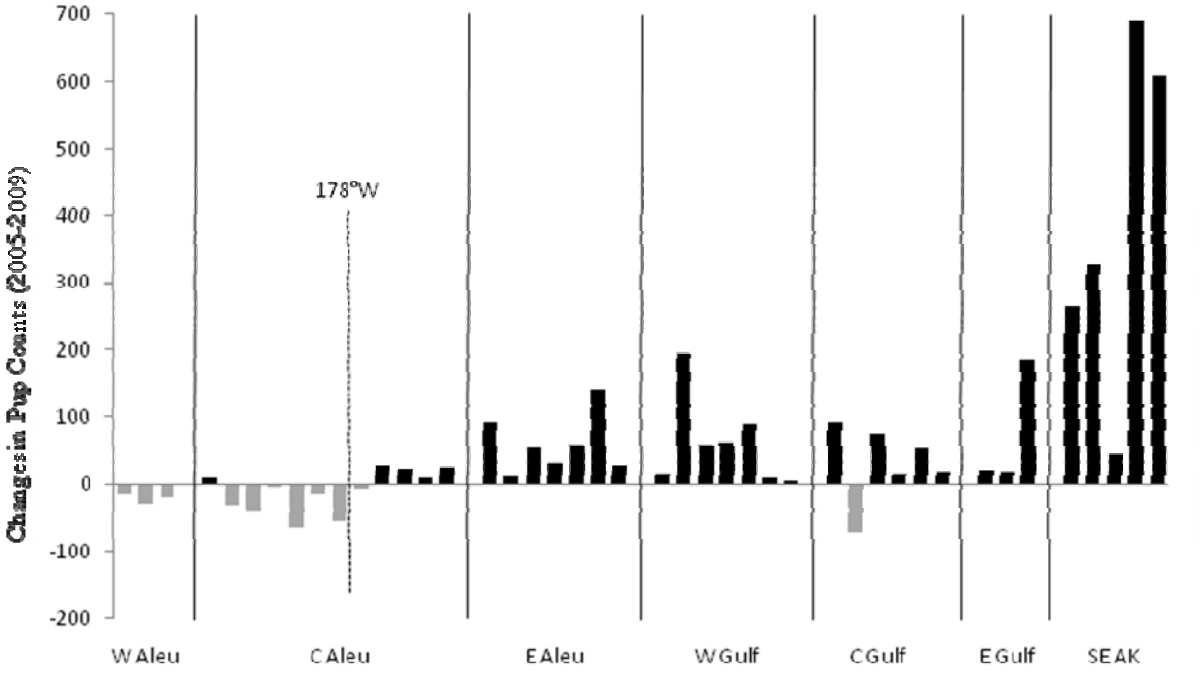

Figure 3. Percent difference in total Steller sea lion pup counts at major rookeries within each sub-area of Alaska between 2001/02 to 2009. DPS = distinct population segment (stck). Sub-areas shown in Figure 1.

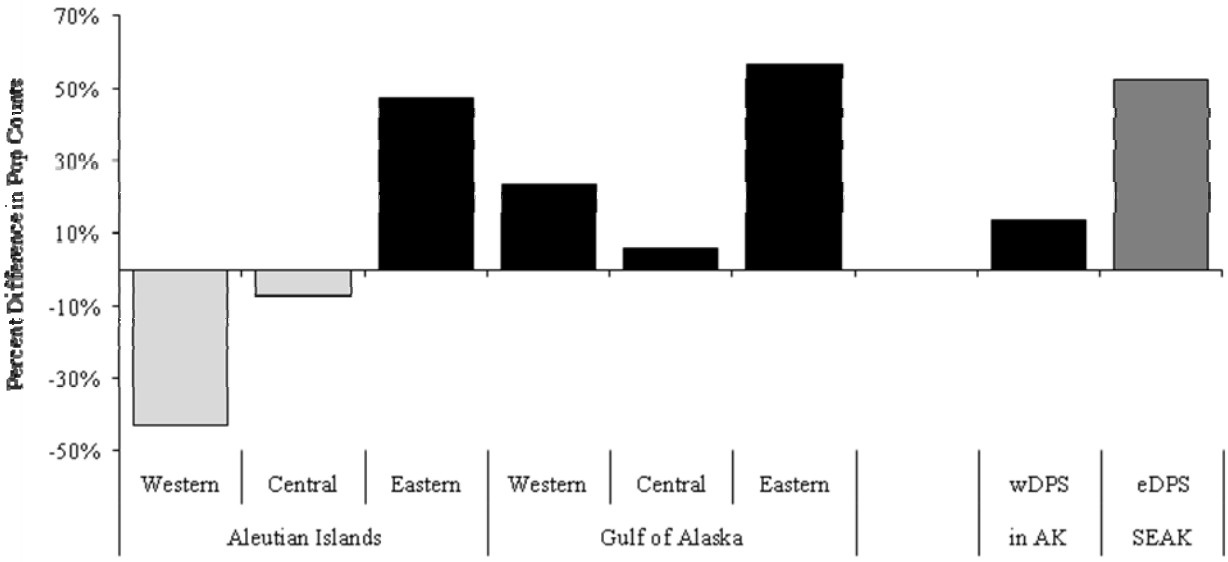

Figure 4. Steller sea lion pup counts at major rookeries within each sub-area of Alaska, 1990-2009 in Alaska (Figure 1). A) Gulf of Alaska and B) Aleutian Islands are part of the western stock, while C) SE Alaska is part of the eastern stock or distinct population segment (DPS).

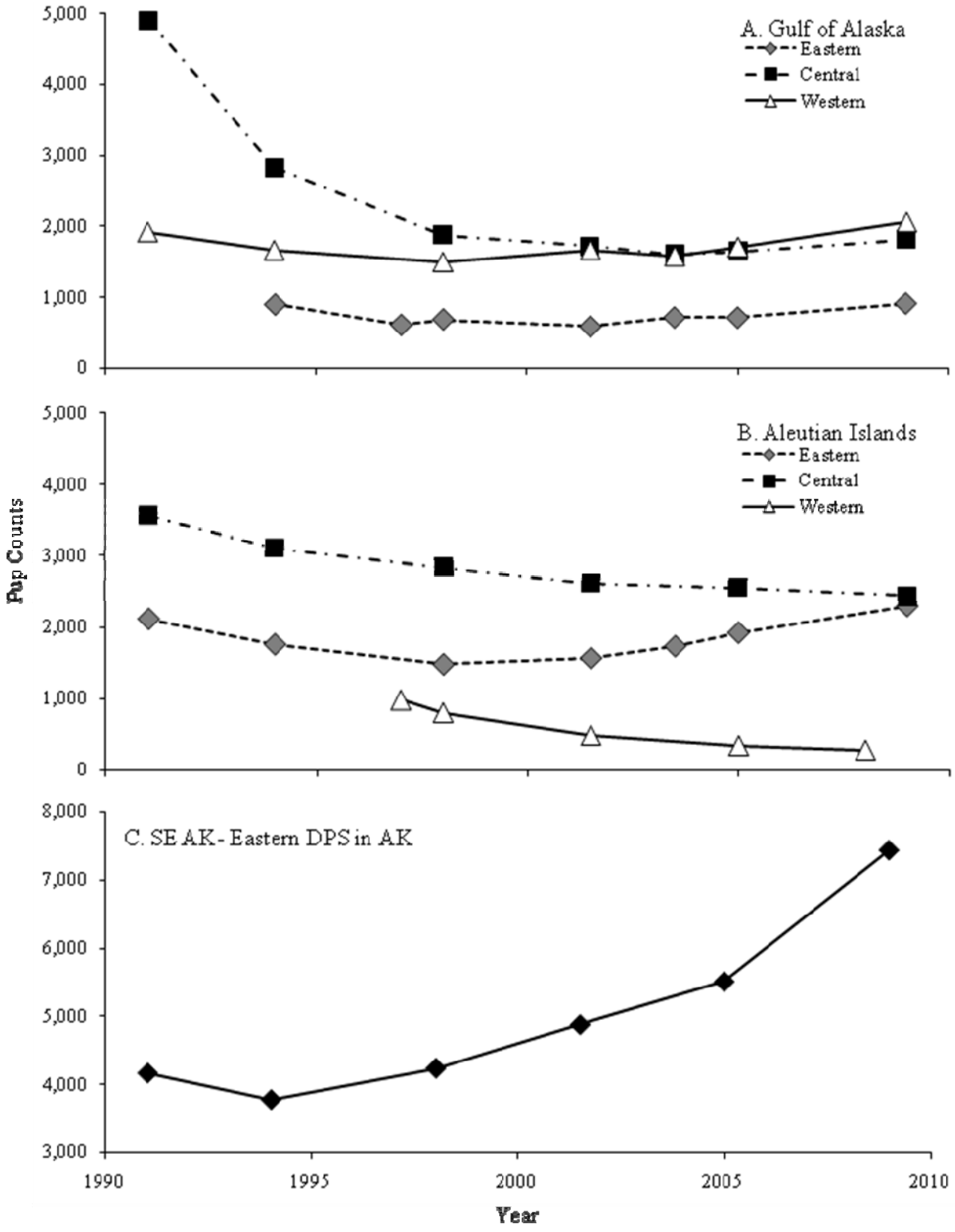

Figure 5. Haul-out and rookery sites surveyed in early June 2008 and late June 2009 to study movement of Steller sea lions in late spring in the northern Gulf of Alaska.

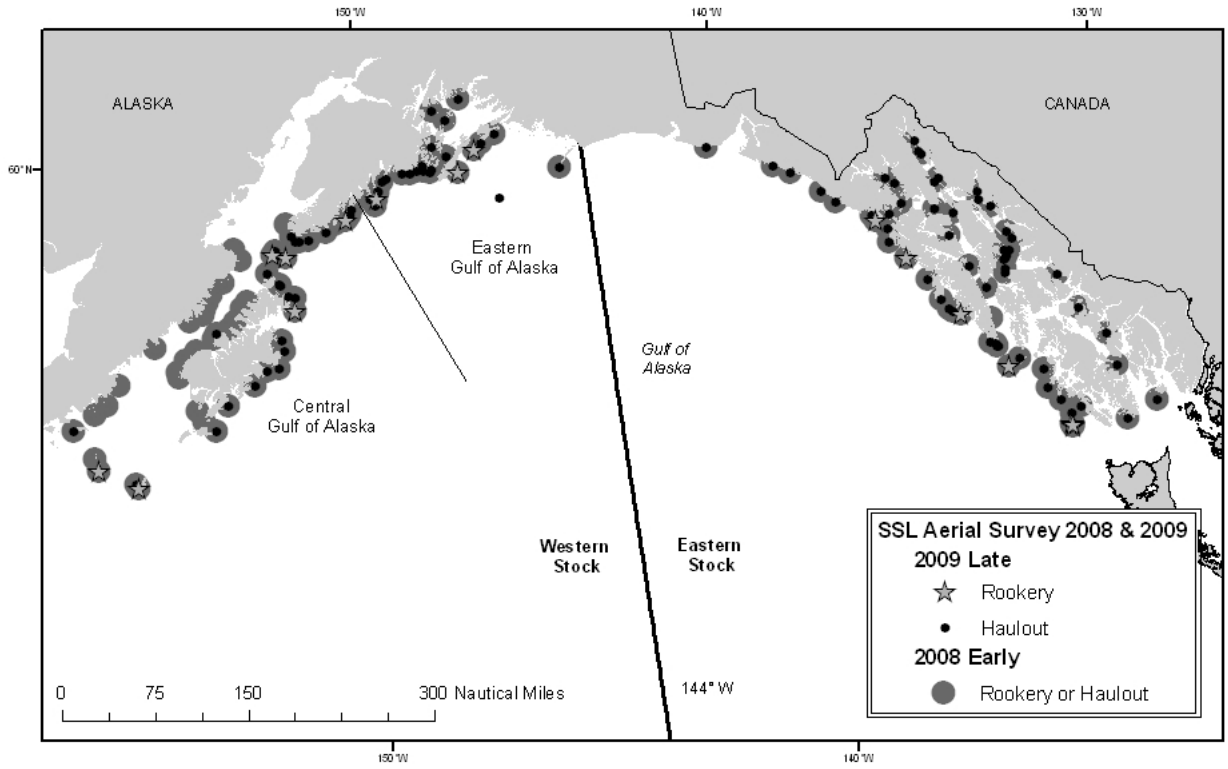

Figure 6. Counts of adult and juvenile (non-pup) Steller sea lions at trend sites from 1990 to 2009 in southeast Alaska (eastern DPS) and the eastern and central Gulf of Alaska (western DPS). The group of trend sites used in the central Gulf of Alaska is modified as explained in the text. The 2008 non-pup count (gray triangle) was counted during a survey early in the breeding season, June 7-13, while the 2009 count is from a survey later in the breeding season, June 24-28. Thick dashed lines show results of regression of log-transformed counts on year (1990-2009 for SE Alaska, 2000-2009 for eastern and central Gulf of Alaska) omitting the 2008 data; thin dashed lines are 95% confidence bounds on regression estimates.

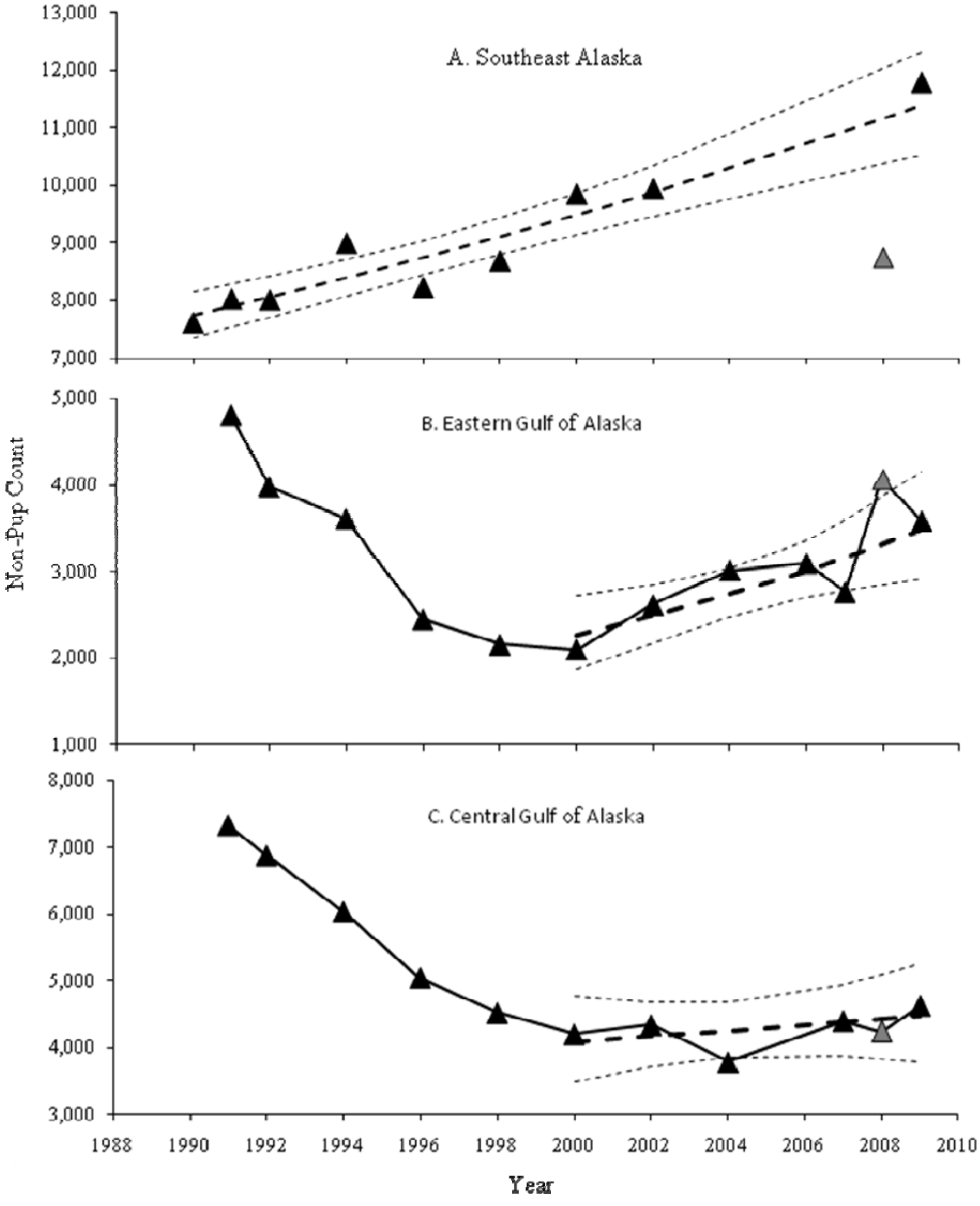

Figure 7. Total count of adult and juvenile Steller sea lions at trend sites within the range of the western stock (distinct population segment, DPS) in Alaska from 1991-2008. Non-pup count adjusted for movement of Steller sea lions primarily between southeast Alaska and the western DPS is shown in gray and with the dashed line.

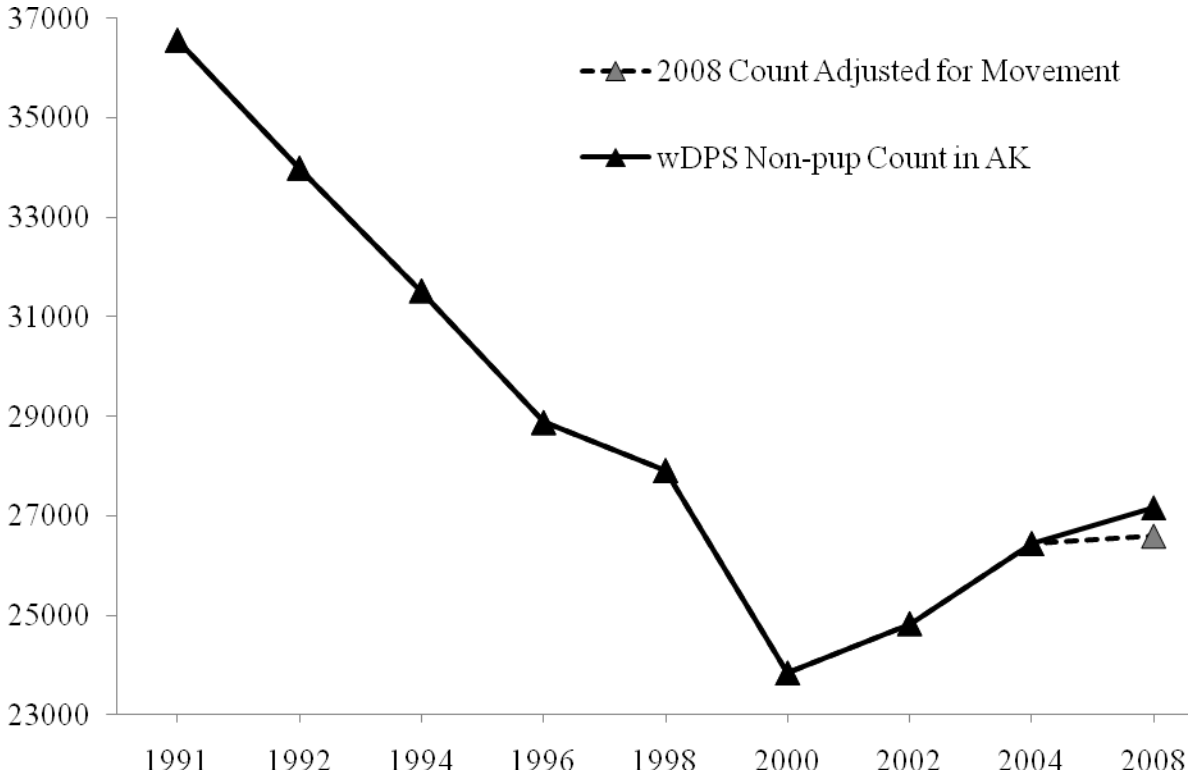

Figure 8. Ratio of Steller sea lion pups to non-pups (adults and juveniles) on major rookeries within each sub-area of Alaska in June-July 2009 (see Figure 1). Number of rookeries within each sub-area is shown. The 6 sub-areas in the Aleutian Islands (Aleu) and Gulf of Alaska (Gulf) form the western stock, or distinct population segment (DPS) in Alaska (AK wDPS). SE Alaska is part of the eastern DPS.