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U.S. DEPARTMENT OF COMMERCE
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ABSTRACT

Surveys conducted during June-July 2013 through 2015 provided strong evidence that both the western and eastern distinct population segments (DPSs) of Steller sea lion (*Eumetopias jubatus*) continued to increase in overall abundance in Alaska. Between 2003 and 2015, counts of western DPS non-pups (adults and juveniles) and pups in Alaska increased at average rates of 2.25% per year (95% credible interval of 1.16%-3.29% per year) and 2.26% per year (1.43%-3.03% per year), respectively. However, there was considerable regional variability in trends across the western DPS, with increases in each of the four NMFS survey regions east of Samalga Pass (~170° W in the Aleutian Islands; 3.80% per year for pups overall in the four regions) being offset somewhat by decreases in the two regions to the west (overall, -1.90% per year). Additionally, within the central Aleutian Islands, recent trends varied east and west of Tanaga Pass (~177°W): in two sub-regions to the east, trends were stable or weakly positive, while in three sub-regions to the west, trends were strongly negative. In southeast Alaska (eastern DPS of Steller sea lion), non-pup and pup counts increased at 2.29% per year (1.59%-2.97% per year) and 3.26% per year (2.66%-3.89% per year), respectively, between 1985 and 2015.

The distribution of marked animals during the breeding season (along with other demographic data) indicates that there is a small net annual inter-DPS movement from southeast Alaska (eastern DPS) to the western DPS (~80 sea lions total; ~30 to the central Gulf of Alaska and ~50 to the eastern Gulf of Alaska), but a much larger net inter-regional movement within the western DPS from the central to the eastern Gulf of Alaska (~1,200 sea lions). The estimated inter-regional movement within the western DPS represents between 11% and 13% of the non-pups counted in the two regions in 2015 (after accounting for sightability) and likely inflated the non-pup trend in the eastern and depressed it in the central Gulf of Alaska. Therefore, it may be

more appropriate to estimate non-pup trends in a single eastern/central Gulf of Alaska region. Average net inter-DPS movement represents a very small fraction (≤ 0.3%) of the total 2015 survey non-pup count in the combined eastern and central Gulf of Alaska, southeast Alaska, or the western DPS overall, and thus, had only a small influence on trends in these regions.

The recovery plan for the western DPS of Steller sea lion (NMFS 2008) refers to a start year of 2000 for the 15-year and 30-year periods used in the down-listing (to threatened status) and de-listing (to recovered status) criteria, respectively, since this was when the lowest survey non-pup count was obtained and when recovery of the overall stock was thought to have begun. However, modeling of all observed (survey) counts (including for the first time data collected at terrestrial sites in the eastern Bering Sea) indicates that the western DPS in Alaska likely had its lowest abundance in 2003, and not in 2000. If observed non-pup counts continue to increase in the western DPS (in both Alaska and Russia) through 2018, then the DPS-wide and the first of two regional demographic criteria for down-listing could be satisfied. However, persistent decreasing trends in the western Aleutians and the western half of the central Aleutian Islands may preclude it from satisfying the second regional demographic down-listing criterion. Furthermore, satisfying the demographic de-listing criteria by 2033 appears to be unlikely given the magnitude of the recent decline in the western Aleutians (-61% for non-pups between 2003 and 2015).

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INTRODUCTION

The Steller sea lion (*Eumetopias jubatus*) is the largest otariid pinniped species in the world (Loughlin et al. 1987, Hoover 1988). Steller sea lions inhabit coastal and continental shelf regions of the North Pacific Ocean extending from central California, north through British Columbia, Canada, and southeast Alaska, and west through the Gulf of Alaska, Bering Sea, and Aleutian Islands in the United States. Along the western Pacific coast, their breeding range continues into the Commander Islands, along the Kamchatka Peninsula, on various Kuril Islands, and on islands within the Sea of Okhotsk in Russia (Loughlin et al. 1987, Hoover 1988, Burkanov and Loughlin 2005).

The National Marine Fisheries Service (NMFS) listed the Steller sea lion as "threatened" range-wide under the U.S. Endangered Species Act (ESA) in November 1990 (U.S. Federal Register 1990) following a brief rapid population decline between 1985 and 1989 (Merrick et al. 1991, Merrick et al. 1992) which was preceded by a slower, longer decline during the 1970s and early 1980s (Merrick et al. 1987).

In 1997, two distinct population segments (DPSs) of Steller sea lion were identified based on differences in genetics, distribution, phenotypic traits, and population trends (Bickham et al. 1996, Loughlin 1997, U.S. Federal Register 1997a). The western DPS breeds on rookeries located west of 144°W in Alaska and Russia, whereas the eastern DPS breeds on rookeries in southeast Alaska through California. The ESA listing status of the western DPS was elevated to "endangered" in 1997 (U.S. Federal Register 1997b), while the eastern DPS retained a "threatened" classification. Between 1990 and 2000, the rate of population decline for the western DPS in Alaska (hereafter referred to as "western DPS") slowed (Sease et al. 2001, Sease and Gudmundson 2002), possibly in response to the enactment of management measures designed to reduce human-related direct mortality (e.g., prohibition of shooting at or near Steller

sea lions, reduction in the allowable incidental catch in fisheries, and establishment of 3 nautical mile (nmi) no-entry zones around rookeries; Fritz et al. 1995, Atkinson et al. 2008). Because of a 30+ year period of sustained abundance increase, the eastern DPS was declared recovered in 2013 and removed from the list of threatened and endangered species (Pitcher et al. 2007, NMFS 2013).

As part of National Marine Fisheries Service's responsibilities under the ESA and Marine Mammal Protection Act, the National Marine Mammal Laboratory (NMML) conducts aerial surveys of Steller sea lions in Alaska each year during the breeding season (June through mid-July). These efforts extend the series of surveys in Alaska that began in the mid-1970s (Braham et al. 1980; Calkins and Pitcher 1982; Loughlin et al. 1984, 1990, 1992; Merrick et al. 1987, 1991, 1992; Sease et al. 1993, 1999, 2001; Strick et al. 1997; Sease and Loughlin 1999; Sease and Gudmundson 2002; Fritz and Stinchcomb 2005; Fritz et al. 2008, 2013). This report focuses primarily on counts of Steller sea lion pups (~1 month old at the time of the surveys) and non-pups (juveniles and adults 1+ years old) at terrestrial rookery and haulout sites from breeding season surveys conducted in 2013 through 2015, as well as trends in counts observed since 1985. A longer historical perspective (back to the mid-1950s) is available in Merrick et al. (1991).

The revised Steller sea lion recovery plan (NMFS 2008) contains demographic recovery criteria that will guide NMFS in reclassifying the western DPS from endangered to threatened (down-listing) and removing it from ESA protection (de-listing). For the western DPS, there are two demographic **down-listing** criteria:

1. Western DPS: The population for the U.S. region [in Alaska] has increased (statistically significant) for 15 years on average, based on counts of non-pups.
2. Regional Western DPS trends.

a. The trends in non-pups in at least five of the seven regions are consistent with the trend observed under criterion #1.
b. The population trend in any two adjacent regions cannot be declining significantly.
c. The seven regions are as follows:
    i. Eastern Gulf of Alaska (US)
    ii. Central Gulf of Alaska (US)
    iii. Western Gulf of Alaska (US)
    iv. Eastern Aleutian Islands (including the eastern Bering Sea) (US)
    v. Central Aleutian Islands (US)
    vi. Western Aleutian Islands (US)
    vii. Russia/Asia

and two demographic **de-listing** criteria:

1. Western DPS: The population for the U.S. region [in Alaska] has increased (statistically significant) for 30 years (at an average annual growth rate of 3%), based on counts of non-pups.
2. Regional Western DPS trends[1]
    a. The trends in non-pups in at least five of the seven regions are stable or increasing, consistent with the trend observed under criterion #1.
    b. The population trend in any two adjacent regions cannot be declining significantly.

[1]The seven regions used for de-listing are the same as those used for down-listing.

c. The population trend in any region cannot have declined by more than 50%.

The initial year of the 15-year and 30-year periods proposed in the NMFS (2008) recovery plan was 2000.

Results of Steller sea lion surveys conducted in Alaska during the breeding seasons of 2013, 2014, and 2015 are reported here. Counts of pups and non-pups will be used to update the status of the western DPS relative to the demographic down-listing and de-listing criteria. In addition, we reassess whether the year 2000 should be used as the initial year in the trend estimation periods. The lowest recent total survey non-pup count in the western DPS occurred in 2000 (Sease et al. 2001, Sease and Gudmundson 2002). However, this was based on counts at 'trend' sites, or those that have been consistently surveyed and where the majority of the population resides in the breeding season. Johnson and Fritz (2014) developed a method to estimate regional and overall trends utilizing all survey counts at every site. The model uses Bayesian inference via Markov Chain Monte Carlo (MCMC) to "fill in" data for sites that were missed in a survey and for all sites in years when no data are available. Trends are calculated for each MCMC iteration, and the overall estimates are taken as the median trend value and credible intervals are calculated as the 95% highest probability density (HPD) interval (Chen et al. 2000, Ch. 7). Rates of change in pup and non-pup counts as well as count totals can be estimated for any time range or combination of sites.

The Bering Sea region has not been routinely surveyed during NMFS' annual breeding season aerial surveys. This was due to a number of factors, including: 1) the small number of terrestrial sites (only one rookery and 14 haulouts); 2) the vast area that these sites are spread across, from St. Lawrence and St. Matthew Islands in the north, to the Pribilof Islands in the south, and east to northern Bristol Bay, which makes them logistically difficult to include in a

survey of the Aleutian Islands and Gulf of Alaska; 3) most of the haulout sites are not utilized by sea lions during the breeding season. This is certainly true for the northernmost haulouts (Sheffield and Jemison 2012; Jemison et al. 2013); and 4) during the 1990s and early 2000s (following the listing of Steller sea lions under the ESA), counts during the summer at the only rookery (Walrus Island in the Pribilof Islands) and northern Bristol Bay breeding season haulouts were < 10% of the total in the combined Bering-eastern Aleutian Island region (NMFS 2008, Fritz et al. 2013; U.S. Fish and Wildlife Service (USFWS) and Alaska Department of Fish and Game (ADFG) data reported here). However, as counts of western DPS sea lions, particularly in the eastern Aleutian Islands, have increased since the early 2000s (Fritz et al. 2013), it has become clear that the Bering Sea region should be included as part of the regular NMFS breeding season survey. During 2015, haulouts in northern Bristol Bay and all sites in the Pribilof Islands, including the rookery at Walrus Island, were surveyed. In addition, historical non-pup count data from Cape Newenham and Round Island (Walrus Islands) in northern Bristol Bay, as well as from St. Paul and St. George (Pribilof) Islands, were added to the analysis here so that counts from the Bering Sea region are now included in population analyses.

Jemison et al. (2013) and Fritz et al. (2013) estimated seasonal rates and magnitudes of inter- and intra-DPS movement of Steller sea lions in the 'mixing' zone near the boundary of the two stocks. Three regions comprise the 'mixing' zone: southeast Alaska (eastern DPS), the eastern Gulf of Alaska, and the eastern portion of the central Gulf of Alaska (western Kenai Peninsula, Barren Islands, and the Kodiak archipelago), the latter two of which are in the western DPS. In this study, the magnitude of inter- and intra-DPS movements during the breeding season in Fritz et al. (2013) are re-estimated using additional sightings of marked animals, extended survival and transition probabilities for both sexes and 2015 pup production.

METHODS

Surveys to count Steller sea lions on land in Alaska are currently conducted in late June through mid-July (Fritz et al. 2013), and are timed to occur after the vast majority of pups are born and during the perinatal period of adult females, when the proportion of their time hauled-out is greatest (23 June through 10 July; Pitcher and Calkins 1981; Calkins and Pitcher 1982; Pitcher et al. 2001; Kuhn et al. in review). As a result, counts of both newborn pups and non-pups (adults and juveniles at least 1 year old) can be made during the same survey. In 2013-2015, > 94% of all rookery and haulout sites were surveyed in this preferred time window (Fig. 1). Median site survey dates ranged from 25 to 30 June, and mean dates from 28 to 30 June. The earliest and latest survey dates in 2013-2015 for non-pups were 20 June and 18 July, while those for pups (used in trend analysis) were 22 June and 18 July, respectively. While it would be optimal to survey the entire range during a short period of time, logistics, weather, cost, and the extensive range of Steller sea lions in Alaska make this logistically and economically infeasible. As a result, we alternate effort between the eastern and western halves of southern Alaska in order to complete a state-wide survey every 2 years.

Bering Sea Region Data

There are four known haulouts in northern Bristol Bay: Cape Newenham and Round Island (Walrus Islands) were known to be occupied during the breeding season, while Summit and The Twins were thought to be utilized only during the peak of the Pacific herring spawning period in May when abundance of Steller sea lions in northern Bristol Bay is at its peak (Jemison and Pendleton 2008, Jemison et al. 2014). ADFG and the U.S. Air Force counted Steller sea

lions during the breeding season (and at other times of the year) at Cape Newenham beginning in 1990, and data are available for 1990 (23 June aerial count), 1991 (24 June count from land), 1992 (3 July aerial count), 1993 (23 June count from land), 2004 (a mean of 25 and 30 June aerial counts), and 2005 (27 June aerial count). Round Island (Walrus Islands) is a major summer haulout for Pacific walrus (*Odobenus rosmarus divergens*) and the location of a field camp staffed by USFWS and ADFG personnel. In addition to collecting walrus abundance data, field camp personnel make daily counts from land of Steller sea lions (weather permitting) and photograph branded sea lions (see Fritz et al. 2014). Complete island counts of Steller sea lions at Round Island (Walrus Islands) were available for 1985 (4 July skiff count), 1988 (a mean of the 26 June and 1, 2, and 5 July skiff counts), 1991 (15 June), and 2008 through 2012. Counts on 20 June 2008 and 1-5 July 2011 (mean) were used because the dates most closely matched those of the NMFS aerial survey in the eastern Aleutian Islands. For 2009, 2010, and 2012, means of all daily counts from 23 June through 10 July were used either because there was no survey in the eastern Aleutian Islands (2009 and 2012) or sites in the region were surveyed by NMFS on many different days (2010). All counts at Round Island (Walrus Islands) and all counts prior to 2015 at Cape Newenham were provided by L. Jemison and E. Weiss (ADFG). Non-pup counts at sites in the Pribilof Islands made prior to 2013 were obtained from the Steller sea lion count database maintained by NMML.

Survey Effort from 2013 to 2015

In 2013 and 2015, survey effort was concentrated in the eastern portion of southern Alaska (southeast Alaska and the Gulf of Alaska), while in 2014, effort was focused in the west (Aleutian Islands) (Fig. 2). The NMML maintains a database of terrestrial rookeries and haulouts

used by Steller sea lions in Alaska (N = 389): 70 are east of 144°W in southeast Alaska and Yakutat within the range of the eastern DPS, while 319 are west of 144°W within the range of the western DPS (Table 1). We attempted to survey all known sites regardless of seasonality of use (Sease and York 2003, Womble et al. 2005).

A NOAA DeHavilland Twin Otter occupied aircraft equipped with three high-resolution digital cameras was used in 2013-2015 as described in Fritz et al. (2013) and was the primary survey platform each year. In addition, MML conducted ship-based operations in the Aleutian Islands from the USFWS RV *Tiĝlâx*, and in 2014 and 2015, included the use of an unoccupied aircraft system (UAS; APH-22 hexacopter; Sweeney et al. 2015) to supplement the occupied aircraft surveys in remote areas with few airfields and conditions generally unconducive to occupied aerial surveys.

In 2013, 207 sites were successfully surveyed. The Twin Otter aircraft worked from Dixon Entrance in southeast Alaska (54.5°N, 131°W; eastern DPS) through False Pass at the end of the Alaska Peninsula in the western Gulf of Alaska (54.5°N, 163°W; western DPS) and surveyed 178 of 199 sites. One site was missed due to fog in southeast Alaska, while in the western Gulf of Alaska, six sites could not be surveyed because of their close proximity (within 50 nmi) to an active volcano (Mt. Veniaminof) and 11 sites with recent histories of no sea lion presence during the breeding season were skipped due to a limited number of available flight hours. In addition, two sites in the western Gulf of Alaska (Bird-Shumagins and Simeonof) and one site in the eastern Gulf of Alaska (Dutch Group) were discovered in 2014 and 2015, respectively, and hence not known in 2013. The rookery at Atkins Island in the western Gulf of Alaska was only partially surveyed in 2013, with the cobble beach area mistakenly omitted. Counts of sea lions on the cobble beach area from 2011 (116 pup and 245 non-pups) were added

to the 2013 count to yield a total Atkins estimate that was used in the trend analyses and reported in Table 1. Steller sea lions were counted from cliff-side overlooks or on skiffs nearshore at an additional 28 sites in the eastern, central, and western Aleutian Islands by the RV *Tiĝlâx* crew, while a count at Round Island (Walrus Islands) in northern Bristol Bay (Bering region) was provided by the ADFG in coordination with USFWS field camp personnel.

In 2014, 195 sites were successfully surveyed. The Twin Otter aircraft surveyed 172 of 181 sites in the western Gulf of Alaska as far east as Mitrofania Island (56°N, 159°W), and the eastern and central Aleutian Islands as far west as Amchitka Pass (180°); five sites in the western Gulf of Alaska were not surveyed due to limited number of available flight hours (three were surveyed in 2013), while one site in the western Gulf of Alaska (South Rocks) and three in the central Aleutian Islands (Yunaska, Amukta, and Chagulak) could not be surveyed due to fog. The biologists on board the RV *Tiĝlâx* (including UAS team) surveyed 22 of 43 sites west of Amchitka Pass in the central and western Aleutian Islands: 12 sites were counted by observers from land-based overlooks, inflatable skiffs offshore, or from the research vessel, while the UAS was used to survey 10 sites (Semisopochnoi/Pochnoi, Amchitka/East Cape, Ayugadak, Kiska/Lief Cove and Kiska/Cape St. Stephen in the central Aleutian Islands, and Agattu/Gillon Point, Agattu/Cape Sabak, Alaid, Attu/Chichigof Point, and Attu/Cape Wrangell in the western Aleutian Islands). Of the 22 sites west of Amchitka Pass that were not surveyed in 2014, 17 had no recent (within the last 10 years) history of sea lion presence during the breeding season, Shemya was not surveyed due to vessel time constraints, and four were obscured by fog. The rookery at Akun/Billings Head in the eastern Aleutian Islands was surveyed by taking only oblique images from the Twin Otter; pup counts are not accurate from oblique images (Snyder et

al. 2001), thus only the non-pup count is reported. A count at Round Island (Walrus Islands) was provided by the ADFG in coordination with USFWS field camp personnel.

In 2015, 176 sites were successfully surveyed. The Twin Otter aircraft surveyed 158 of 164 sites between Dixon Entrance in southeast Alaska and Seal Cape (56°N, 158°W) in the western Gulf of Alaska, as well as in northern Bristol Bay. This was the first time northern Bristol Bay was surveyed during the breeding season by NMFS. Five sites with recent histories of no sea lion presence during the breeding season were not surveyed in southeast Alaska due to limited number of available flight hours, and one site in the western Gulf of Alaska could not be surveyed due to fog. Round Island (Walrus Islands) was not surveyed by the Twin Otter due to the presence of large numbers of Pacific walrus; a Steller sea lion count was provided by the ADFG in coordination with USFWS field camp personnel for the same day (3 July) that the region was surveyed with the Twin Otter. From the RV *Tiĝlâx*, the UAS was used to survey seven sites: Akun/Billings Head in the eastern Aleutian Islands; Yunaska and Amukta in the central Aleutian Islands; and Walrus Island (Pribilof Islands), Otter Island (Pribilof Islands), St. Paul/NE Point, and St. Paul/Sea Lion Rock (Pribilof Islands) in the Bering. In addition, the RV *Tiĝlâx* crew counted sea lions from cliff-side overlooks or skiffs nearshore at nine sites in the central and western Aleutian Islands and MML scientists provided counts on St. George Island (Pribilof Islands).

Data Processing and Analysis

Aerial photographs taken by the UAS and Twin Otter were analyzed using the methods of Fritz et al. (2013). For pups and non-pups counted directly from land-based overlooks, skiffs or the RV *Tiĝlâx*, mean counts of two or three observers are reported.

In this report, three types of "counts" are discussed. First, there are **observed counts** of non-pups and pups by site (e.g., Table 1; n_{ij}, in the notation of Johnson and Fritz 2014). To estimate regional and DPS-wide annual rates of change in pups and non-pups (trends), we used the agTrend model (Johnson and Fritz 2014) and all observed breeding season (June and July only) non-pup and pup counts between 1978 and 2015 for the western DPS and 1971 and 2015 for southeast Alaska. Only observed pup counts made after 23 June were used (except for the 22 June 2013 count at Hazy Island in southeast Alaska). The remaining count types are outputs of agTrend– **realized** and **predicted counts (**N^*_{ij} and N_{ij}, respectively, in the notation of Johnson and Fritz 2014). The agTrend model estimates missing counts to complete the entire site-year matrix based on a site-specific random walk of an order 2 model. As such, the sum of all realized counts in a region is an estimate of the observed count total had each site in the region been surveyed in a given year. Predicted counts are count values that would be predicted at a site in a given year if it were resurveyed. The prediction comes from the model fit. For trend analysis, predicted counts are more appropriate because they account for both measurement and process error. In Figures 4-7 where realized counts are plotted, there is a point plotted for each year if there is at least one site in the region with an observed count. Size of the credible intervals on realized counts is inversely related to the proportion of observed counts for that region and year: if most sites had observed counts, then the credible interval is small as there is little (or no) uncertainty, and vice versa. The blue envelope plotted in Figures 4-7 represents the credible interval range for the predicted counts; note that realized counts may fall outside of the predicted count envelope (e.g., Fig. 4A in the year 2000). This implies that the observed count was somewhat of an outlier with respect to the fitted model, suggesting there may have been anomalous measurement or process error in that year.

Pup (AFSC 2016a) and non-pup counts (AFSC 2016b) are available at NOAA National Centers for Environmental Information. The agTrend analytical software is available for download at github.com/NMML/agTrend.

Movement Analysis

Fritz et al. (2013) estimated the magnitude of inter-regional and inter-DPS non-pup movement during the breeding season, and thus, how movement could affect non-pup trend estimates. Here, we present an update of that analysis where 1) we extended the survival-at-age ranges of eastern (southeast Alaska; Hastings et al. 2011) and western DPS Steller sea lions (Fritz et al. 2014) to 15 years using the patterns of survival-at-age by sex for western DPS sea lions in the Kuril Islands, Russia (Altukhov et al. 2015). Female survival at 12-15 years of age was identical to age 11 years, while male survival at ages 12-15 years was decreased relative to age 11 years at the same rate observed in Russia. 2) We extended the breeding season transition probabilities in Jemison et al. (2013) to 15 years for each sex by assuming they were identical to age 11 years. 3) We included sightings through 2015 of western sea lions branded as pups. This included cohorts branded in 2010, 2012, and 2014 at Marmot and Sugarloaf, and in 2009 and 2011 at Ugamak. Only sightings in June and July, when the aerial survey occurs, were used for this analysis (Fritz et al. 2013 included May sightings).

4) Finally, we used 2015 pup counts in the eastern and central Gulf of Alaska and southeast Alaska to estimate numbers-at-age for both sexes (assuming a 50:50 sex ratio at birth and a stable age distribution; Calkins and Pitcher 1982). Only pup counts in the eastern portion of the central Gulf of Alaska (at Outer, Marmot, and Sugarloaf Island rookeries plus the small number counted at haulouts) were utilized instead of the entire central region utilized by Fritz et

al. (2013) since the "mixing" zone identified by Jemison et al. (2013) only extends into the western DPS through the Kodiak archipelago.

RESULTS

Steller sea lion non-pups and pups were counted at least once on 377 of the 389 identified terrestrial rookery and haulout sites in Alaska (Table 1; Fig. 2) during breeding season surveys conducted from 2013 to 2015. On the 12 sites that were not surveyed once in these 3 years, the number of non-pups totaled one (1) and pups totaled zero (0) during the most recent survey at each site prior to 2013. Thus, the observed counts in Table 1, and particularly those collected in 2014 and 2015, form the most comprehensive set of results for Steller sea lions, both non-pups and pups, conducted in Alaska.

Observed non-pup counts are not adult and juvenile abundance estimates because not all animals are hauled out on land to be photographed and counted. Haulout rates during the day when surveys are conducted vary by age, sex, and reproductive status (e.g., whether a female has a dependent pup, whether a male is holding a breeding territory; see review of haulout rates in Holmes et. al. 2007). Observed pup counts are considered to reasonably estimate the total abundance of ~1 month old pups each year. Thus, they do not account for pup mortality during the first month of life and are not estimates of the number of live pups born.

Results reported in this memorandum differ from previously published NMFS reports (e.g., Fritz et al. 2013, 2015; Johnson and Fritz 2014) for two reasons: observed non-pup counts from the Bering Sea region are included in the trend estimation, as are observed counts from years prior to 1985.

Bering Sea Region Data

Breeding season observed counts of non-pups at sites in the Bering region conducted in 1982 through 2012 were added to the time series for trend analysis (Table 2). The Bering region consists of only a single small rookery at Walrus Island in the Pribilof Islands (48 pups in 2015) and 14 haulouts, only 9 of which are likely to be occupied during the breeding season (a total of 604 non-pups in 2015; Table 1; Fig. 2). Based on the breeding season distribution of sightings of 1+ year-old sea lions branded as pups on Ugamak Island in the eastern Aleutian Islands, 11% of all individuals were observed in the Bering, and other than the eastern Aleutian region itself, the Bering had the highest proportion of Ugamak-branded animals (Table 3; Fig. 3).

Due to the small number of sites and sea lions that inhabit the Bering during the breeding season, and its use by animals born in the eastern Aleutian Islands, observed counts at sites in the Bering will be included with the eastern Aleutian Island region. Non-pup and pup trends, as well as predicted and realized counts are estimated for a single eastern Aleutian Island region that includes the Bering. This is a departure from previous trend analyses (e.g., Fritz et al. 2013, 2015; Johnson and Fritz 2014) that have not included observed non-pup counts from the Bering region, and have analyzed observed pup counts on Walrus Island (Pribilof Islands) as a separate Bering region rather than as an additional eastern Aleutian rookery.

agTrend Model Results

Predicted western DPS non-pup counts in Alaska totaled 39,611 in 2015, while predicted pup counts totaled 12,398 (Table 4; Fig. 4). Non-pup totals are 6% higher than the sum of the most recent observed counts of non-pups at each site listed in Table 1 and 5% higher for pups. Since the western DPS population was still increasing overall in 2015, predicted counts in 2015

would be expected to be greater than the sum of the most recent observed counts at each site since many sites were last observed in 2014 and 2013 (Table 1).

Previous methods for analyzing trends in observed counts involved a limited number of sites referred to as "trend sites." Based on the sum of observed trend site counts, NMFS concluded that the western DPS reached its lowest abundance in 2000 (NMFS 2008). However, use of a new analytical method and the inclusion of both pre-1985 observed counts and those from all years from Bering sites indicate that the western DPS likely had its lowest non-pup count in 2003 (Table 4). The observed, survey non-pup count total for the western DPS in Alaska in 2000 is smaller than the lower bound on the 95% credible interval of the realized 2000 total (Fig. 4). Reasons for the anomalously low observed non-pup counts in 2000 (and 1989) are not known, but could be related to process (e.g., differences in sightability (haulout rates) during the breeding season) and observation errors (e.g., survey timing), factors (along with trend) that are taken into account in the estimation of predicted counts. Predicted non-pup counts in the western DPS were highest in 1985 (n = 80,885) and lowest in 2003 (n = 30,431), and increased to 39,611 in 2015. Similarly, predicted pup counts range from a maximum of 32,911 in 1985 to a minimum of 9,484 in 2002, and increased to 12,398 in 2015.

Predicted counts of both non-pups and pups declined overall west of Samalga Pass each year between 1985 and 2015, while east of Samalga Pass, counts declined steeply between 1985 and the early 2000s followed by an increase through 2015 (Table 5; Fig. 5). Fine-scale examination of trends (Figs. 6-7) and counts by survey region and rookery cluster area (RCA; see Appendix Tables 1 and 2) reveals the variation and contrast in population dynamics across Alaska (the following discussion refers to predicted counts and trends).

Western Aleutian Islands (RCA 1) -- Counts were highest in 1985 and lowest in 2015, with rates of decline ranging between -7.6% and -10.4% per year. Counts in 2015 indicated 96% and 94% reductions in non-pups and pups, respectively, since 1985, and since 2003, 69% reduction for non-pups and 61% for pups.

Central Aleutian Islands (RCAs 2-5 and part of RCA 6) -- Counts were highest in 1985 and lowest in 2015, with overall rates of decline ranging between -5.1% and -6.2% per year between 1985 and the early 2000s. During this period, rates of decline were highest at the western (RCA 2) and eastern (RCA 5) ends of the central Aleutian region and lowest in the eastern-central (RCA 4). Between the early 2000s and 2015, trends were statistically stable (though negative, ranging between -0.8% and -1.3% per year) and improved in each RCA relative to the previous 15 years. Recent trends were significantly negative in the western half of the central Aleutians (RCAs 2-3) and essentially stable in the eastern half, though slightly negative in RCA 4 and positive in RCA 5. Highest counts occurred in 1985 in each RCA 2-5. In RCAs 2-3, lowest counts occurred in 2015, but in RCA 4, the lowest non-pup and pup counts occurred in 1994 and 1990, respectively. In RCA 5, the lowest non-pup count was in 1999, and in 2001 for pups. Non-pup and pup counts decreased 68% and 70%, respectively, between 1985 and 2015; between 2003 and 2015, counts decreased 11% and 13%, respectively.

Eastern Aleutian Islands (most of RCA 6 including the Bering Sea and part of RCA 7) -- Non-pup and pup counts were highest in 1985, and lowest in 1997 and 1999, respectively. Counts dropped steeply between 1985 and 1990, remained essentially stable between 1991 and 2003 (with overall 1985-early 2000s rates of decline ranging between -1.5% and -5.7% per year), and increased through 2015 at 1.7% to 3.4% per year. Counts in 2015 were 14% and 38% lower

than in 1985 for non-pups and pups, respectively, and since 2003, were 26% and 47% greater, respectively.

Western Gulf of Alaska (most of RCA 7 and part of RCA 8) -- Non-pup counts were highest in 2015 and lowest in 2001, while pup counts were highest in 1985 and lowest in 1999. Non-pup counts decreased slowly between 1985 and the early 2000s (-1.4% to -1.6% per year), then rose sharply through 2015 (3.4% to 3.8% per year). Pup counts decreased steeply between 1985 and the early 2000s (-4.9% to -6.3% per year), and increased through 2015 (3.7% to 3.8% per year). Counts in 2015 indicated a 16% increase in non-pups and a 38% reduction in pups since 1985, and 58% and 53% increases, respectively, since 2003.

Central Gulf of Alaska (most of RCA 8, RCA 9, and part of RCA 10) -- Non-pup and pup counts were highest in 1985, and lowest in 2005 and 2003, respectively. Counts dropped steeply between 1985 and the early 2000s (-7.6% to -12.0% per year), and increased through 2015 at rates ranging between 2.6% and 4.2% per year. Counts in 2015 indicated 63% and 77% reductions in non-pups and pups, respectively, since 1985, and 58% increases in both non-pups and pups since 2003.

Eastern Gulf of Alaska (most of RCA 10) -- Non-pup counts were highest in 1985 and lowest in 2000, while pup counts were highest in 2015 and lowest in 2000. Between 1985 and the early 2000s, non-pup counts dropped steeply (-7.0% and -8.6% per year) while pup counts declined more slowly (-2.2% to -2.3% per year). Between the early 2000s and 2015, counts increased at 4.3% to 5.6% per year. Between 1985 and 2015, there was a 39% reduction in non-pups and a 49% increase in pups, while between 2003 and 2015, counts increased by 90% and 71%, respectively.

Southeast Alaska (all of RCA 11 and part of RCA 10) -- Counts were highest in 2015 and lowest in 1985, and increased between 1985 and 2015 (non-pups at 2.3% per year and pups at 3.3% per year). Counts in southeast Alaska were more variable and resulted in wider credible intervals than in other Alaska regions. This could be the result of greater variability in survey timing here relative to the rest of Alaska. Non-pup and pup counts in 2015 were 112% and 165% greater, respectively, than in 1985.

Movement Analysis

Movements of Steller sea lions during the breeding season between the three "mixing" zone regions near the DPS boundary number in the 1,000s, with net overall movement toward the eastern Gulf of Alaska, presumably Prince William Sound (Fig. 8). We estimate that ~2,000 sea lions move to the eastern Gulf (2/3 from the central Gulf and 1/3 from southeast Alaska) each year during the breeding season, while ~1,000 move to southeast Alaska (2/3 from the eastern Gulf and 1/3 from the central Gulf). Only ~500 move to the central Gulf, with the majority (~80%) coming from southeast Alaska and the remainder from the eastern Gulf (Table 6). Net changes by DPS and region indicate small impacts to either eastern or western DPS abundance (76 fewer in southeast Alaska and 76 more in the western DPS), but much larger impacts regionally within the western DPS. We estimate a net increase of 1,052-1,440 sea lions in the eastern Gulf of Alaska and a net decrease of 975-1,367 in the central Gulf of Alaska which are almost entirely due to inter-regional movement within the western DPS.

DISCUSSION

The Steller sea lion trend analyses presented here are the first to include observed non-pup counts from the Bering region (northern Bristol Bay and the Pribilof Islands). Given the distribution of animals branded as pups in the eastern Aleutians, the Bering region appears to be most closely linked to the eastern Aleutian Islands during the breeding season. As such, we have combined the Bering region into the eastern Aleutian Island region for this and future analyses. The Fritz et al. (2015) summary of the 2015 survey results did not include any observed counts from the Bering in the non-pup trend analysis (nor did the models use pre-1985 observed counts). However, adding Bering non-pup data increased predicted non-pup counts in 2015 from 7,948 to 8,757 for the eastern Aleutian region and from 38,491 to 39,611 for the total western DPS. In the 1990s, observed non-pup counts in the Bering decreased while they stabilized in the eastern Aleutians, which suggests that the eastern Aleutian Islands may have been preferred habitat during the breeding season for sea lions born in the combined Aleutian-Bering region.

Western DPS Steller sea lions increased in abundance between 2012 and 2015 in Alaska, continuing a trend that began in the early 2000s (Sease et al. 2001; Sease and Gudmondson 2002; Fritz and Stinchcomb 2005; Fritz et al. 2008; 2013). Regional trends are similar to those described in Fritz et al. (2013) using data through 2012, but adding three more years of data slightly steepened rates of change east and west of Samalga Pass. These results support the conclusions that 1) regional western DPS populations east of Samalga Pass in Alaska are increasing (non-pup trend increased from 2.39% per year in 2000-2012 to 2.95% per year in 2000-2015), 2) the western DPS overall in Alaska is increasing at a statistically significant rate, and 3) both trends will likely continue in the future. However, populations west of Samalga Pass have starkly different trends. Here, the overall non-pup trend decreased from -1.53% per year

from 2000 to 2012 to -1.87% per year from 2000 to 2015. While this is largely due to worsening trends in the most rapidly declining region (western Aleutian Islands, RCA 1: -7.23% to -8.67% per year), non-pup trends in both RCA 4 (0.51% to -0.15% per year) and RCA 5 (2.25% to 1.68% per year) also declined when new data were included. Consequently, it appears less likely that trends in western DPS populations west of Samalga Pass (in the central and western Aleutian Islands) will improve in the near future.

An updated sea lion breeding season movement analysis indicates that the effect on DPS-wide non-pup trends is very small (and less than that described by Fritz et al. 2013), but is potentially large on regional trends within the western DPS. Fritz et al. (2013) estimated that there was a net movement of 176 sea lions from southeast Alaska to the western DPS, which given overall haulout rates of ~60% for non-pups during the day in the breeding season (see review of haulout rates in Holmes et al. 2007), would result in changes in observed counts of ~110 in both southeast Alaska (< 1% fewer) and the western DPS overall (< 0.5% more). The updated net movement estimate is ~80 in the same direction, which yields changes in observed counts of ~50 in southeast Alaska (0.2% fewer) and the western DPS overall (0.1% more) once sightability is taken into account. If only effects on observed counts in the combined eastern-central Gulf of Alaska are considered (since that is where the increase would occur), inter-DPS movement increased the super-regional count by only 0.3%. By contrast, a net inter-regional movement of ~1,200 western DPS sea lions from the central to the eastern Gulf of Alaska would decrease observed counts by 8% in the former and increase them by 14% in the latter region. Thus, movement of Steller sea lions during the breeding season has little impact on DPS-wide trend estimates, but significant impacts on non-pup trends in the eastern and central Gulf, which supports considering them as a single western DPS region.

Prior to the listing of Steller sea lions under the ESA in 1990, aerial or boat-based surveys west of 144°W were less frequent and comprehensive than they have been since. In the 12-year period from 1978 to 1989, there are only 422 observed counts of non-pups available for use in our trend analysis, and only 114 prior to 1985 (which averages to only 16 sites surveyed per year); by contrast, from 1990 to 2015, there are 3,531 observed counts (136 sites per year). In addition, there are only 13 counts in the western Aleutian Islands and only 15 in the eastern Gulf of Alaska (all in 1989) during the pre-listing period. The scarcity of 'early' counts in the eastern- and westernmost regions of the western DPS led the first Steller sea lion recovery team to only consider trends in the 'Kenai to Kiska' area, which consists of the four central Alaska regions (central and eastern Aleutian Islands, and western and central Gulf of Alaska), in its reclassification criteria (NMFS 1992). Scarcity of 'early' data also forced our trend analyses to start in 1985, though pre-1985 data are included in the estimation of site variances (Johnson and Fritz 2014). While our 1985-2015 analysis period captures the steep declines in abundance observed in the late 1980s in both the central Aleutian Islands and central Gulf of Alaska, it does not capture the substantial declines that occurred earlier throughout almost all of Alaska (Braham et al. 1980, Merrick et al. 1987, Fritz et al. 2008, NMFS 2008).

Model results indicate that the lowest recent abundance of western Steller sea lions in Alaska was likely in 2003, and that the observed count in 2000 was anomalously low. NMFS (2008) refers to a start year of 2000 for the 15-yr and 30-yr down-listing and de-listing periods, respectively, since that was the year with the lowest observed non-pup count. However the more detailed analysis of all count data presented here indicates that recovery of the stock overall began in 2003. Changing the lowest year from 2000 to 2003 generally improved recent trend estimates in western DPS regions east of Samalga Pass and overall since it removed the larger

2000-2002 predicted counts from the analysis (see Tables 4 and 5). Recent trend estimates for the declining regions west of Samalga Pass were essentially unchanged with an alternate 'start' year of 2003. If observed western DPS non-pup counts continue to increase in Alaska and Russia through 2018 (which appears likely), then the DPS-wide and the first of two regional demographic criteria for down-listing could be satisfied. However, persistent decreasing trends in the western Aleutians and the western half of the central Aleutian Islands may preclude it from satisfying the second regional demographic down-listing criterion. Furthermore, satisfying the demographic de-listing criteria by 2033 appears to be unlikely given the magnitude of the recent decline in non-pups in the western Aleutians (-61% between 2003 and 2015).

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Table 1. -- A. Observed counts of Steller sea lion pups and non-pups (NP) by site, region, distinct population segment (DPS) and date during the breeding season in Alaska, 2013-2015. For sites not surveyed at least once during the 3-year period, the most recent breeding season count and year are listed (Previous). RCA = rookery cluster area. B. Summary of total sites surveyed and number of sites with sea lions present.

		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
SE Alaska-Eastern DPS													
EST ROCK	11	23-Jun	302	0				27-Jun	769	1			
EASTERLY	11	23-Jun	184	2				27-Jun	280	0			
GRINDALL	11	23-Jun	350	0				27-Jun	186	0			
POINT MARSH	11	23-Jun	8	0				27-Jun	19	0			
ETOLIN	11	23-Jun	0	0				27-Jun	0	0			
POINT ISLET (POINT ROCK)	11	23-Jun	0	0				27-Jun	0	0			
HORN CLIFF	11	23-Jun	0	0				27-Jun	0	0			
SAKIE POINT	11							27-Jun	0	0			
WOLF ROCK	11	23-Jun	246	0				27-Jun	504	0			
FORRESTER/FORRESTER ISLAND	11	23-Jun	42	0				27-Jun	35	0			
FORRESTER/SEA LION RK	11	23-Jun	648	499				27-Jun	708	631			
FORRESTER/LOWRIE	11	23-Jun	2,058	1,718				27-Jun	1,870	1,552			
FORRESTER/EAST RK	11	23-Jun	236	153				27-Jun	268	208			
FORRESTER/C HORN RK	11	23-Jun	438	268				27-Jun	428	420			
FORRESTER/NORTH RK	11	23-Jun	923	577				27-Jun	1,084	1,143			
SUNSET	11	23-Jun	616	2				27-Jun	560	2			
CAPE BARTOLOME	11	23-Jun	214	0				27-Jun	61	0			
POINT LEAGUE (STEVENS PASSAGE)	11	23-Jun	0	0				27-Jun	0	0			
SAIL	11	23-Jun	416	0				27-Jun	518	0			
TIMBERED	11	23-Jun	420	4				27-Jun	514	5			
CAPE ADDINGTON	11	23-Jun	1,006	3				27-Jun	972	1			
THE BROTHERS/W+E	11	23-Jun	0	0				27-Jun	0	0			
MIST	11	23-Jun	0	0									
FALSE POINT PYBUS	11	23-Jun	0	0				27-Jun	0	0			
THE BROTHERS/SW	11	23-Jun	515	0				27-Jun	691	0			

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
ROUND ROCK	11	23-Jun	0	0				27-Jun	0	0			
TURNABOUT	11	23-Jun	0	0				27-Jun	0	0			
PINTA ROCKS	11	23-Jun	0	0				27-Jun	0	0			
DOROTHY	11	23-Jun	0	0									
CIRCLE POINT	11	23-Jun	0	0									
CORONATION	11	22-Jun	7	0				27-Jun	132	1			
YASHA	11	23-Jun	846	8				27-Jun	680	9			
HAZY	11	22-Jun	2,450	1,837				27-Jun	2,636	1,994			
PATTERSON POINT	11	23-Jun	0	0									
CAPE OMMANEY	11	22-Jun	502	2				27-Jun	472	0			
LARCH BAY	11	22-Jun	0	0				27-Jun	0	0			
POINT LULL	11	23-Jun	0	0				27-Jun	0	0			
POINT MARSDEN	11	23-Jun	0	0				24-Jun	0	0			
SEA LION ROCK (PUFFIN BAY)	11	22-Jun	218	0				27-Jun	136	0			
BENJAMIN	11	23-Jun	100	0				24-Jun	106	0			
LITTLE ISLAND	11	23-Jun	0	0				24-Jun	0	0			
TENAKEE CANNERY POINT	11	23-Jun	0	0				24-Jun	0	0			
MET POINT	11	23-Jun	0	0				24-Jun	0	0			
ELDRED ROCK	11	23-Jun	0	0				24-Jun	0	0			
GRAN (LEDGE) POINT	11	23-Jun	361	0				24-Jun	536	2			
THE SISTERS	11	23-Jun	0	0				24-Jun	0	0			
BIALI ROCK	11	23-Jun	832	185				27-Jun	896	204			
JACOB ROCK	11	23-Jun	314	0				27-Jun	257	1			
EMMONS	11	23-Jun	0	0									
KAIUCHALI (BIORKA)	11	23-Jun	22	0				27-Jun	76	1			
ST. LAZARIA	11	24-Jun	0	0				24-Jun	0	0			
SEA LION ISLANDS	11	24-Jun	542	2				24-Jun	556	4			
POINT CAROLUS	11	24-Jun	0	0				24-Jun	30	0			
SOUTH MARBLE	11	24-Jun	762	7				24-Jun	1,952	7			
CASE (TLINGIT) POINT	11	24-Jun	0	0				24-Jun	0	0			
WHITE SISTERS	11	24-Jun	1,666	924				24-Jun	1,446	910			
MIDDLE PASS ROCK	11	24-Jun	490	0				24-Jun	207	0			

Table 1A. -- Cont.				2013	2014					2015	Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
INIAN	11	24-Jun	10	0				24-Jun	158	1			
GAFF ROCK	11	24-Jun	0	0				24-Jun	1	0			
CAPE BINGHAM	11	24-Jun	0	0				24-Jun	0	0			
CAPE CROSS	11	24-Jun	0	0				24-Jun	38	0			
BLACK ROCK	11	24-Jun	0	0				24-Jun	0	0			
GRAVES ROCK	11	24-Jun	1,358	551				24-Jun	1,486	502			
VENISA	11	24-Jun	0	0				24-Jun	0	0			
HARBOR POINT	11	25-Jun	0	0				28-Jun	0	0			
CAPE FAIRWEATHER	11	25-Jun	0	0				28-Jun	0	0			
TARR INLET	11	24-Jun	0	0				24-Jun	0	0			
ALSEK	11	25-Jun	0	0				28-Jun	0	0			
AKWE	11	25-Jun	0	0				28-Jun	0	0			
SITKAGI BLUFFS	11	25-Jun	0	0				28-Jun	0	0			
SE Alaska-Eastern DPS in Alaska Total			19,101	6,742					21,268	7,599			
Eastern Gulf of Alaska – Western DPS													
CAPE ST. ELIAS	10	25-Jun	994	43				1-Jul	1,114	28			
HOOK POINT	10	25-Jun	9	0				1-Jul	19	0			
MIDDLETON	10	25-Jun	0	0				1-Jul	0	0			
CAPE HINCHINBROOK	10	25-Jun	270	0				1-Jul	17	0			
SEAL ROCKS	10	25-Jun	1,445	802				1-Jul	1,058	674			
GLACIER	10	25-Jun	962	6				1-Jul	1,366	14			
DUTCH GROUP	10							1-Jul	328	0			
WOODED (FISH)	10	25-Jun	863	276				1-Jul	830	340			
POINT ELEANOR	10	25-Jun	0	0				1-Jul	0	0			
THE NEEDLE	10	25-Jun	84	29				1-Jul	143	30			
PERRY	10	25-Jun	0	0				1-Jul	0	0			
PLEIADES	10	25-Jun	0	0				1-Jul	0	0			
POINT LaTOUCHE	10	25-Jun	0	0				1-Jul	0	0			
DANGER	10	25-Jun	0	0				1-Jul	24	0			
POINT ELRINGTON	10	25-Jun	98	1				1-Jul	178	0			
PROCESSION ROCKS	10	25-Jun	125	2				1-Jul	183	4			

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
CAPE PUGET	10	25-Jun	0	0				1-Jul	47	0			
CAPE JUNKEN	10	25-Jun	0	0				1-Jul	0	0			
CAPE FAIRFIELD	10	25-Jun	50	0				1-Jul	0	0			
CAPE RESURRECTION	10	25-Jun	90	0				1-Jul	146	1			
RUGGED	10	25-Jun	3	0				1-Jul	48	0			
AIALIK CAPE	10	25-Jun	164	0				1-Jul	182	0			
CHISWELL ISLANDS	10	25-Jun	152	76				1-Jul	204	102			
NATOA (GROTTO)	10	25-Jun	52	1				1-Jul	64	1			
SEAL ROCKS (KENAI)	10	25-Jun	7	0				1-Jul	51	0			
GRANITE CAPE	10	25-Jun	51	0				1-Jul	99	0			
STEEP POINT	10	25-Jun	1	0				30-Jun	1	0			
RAGGED/HOOF POINT	10	25-Jun	71	0				30-Jun	132	0			
RABBIT	10	25-Jun	0	0				30-Jun	0	0			
Eastern Gulf of Alaska Total			5,491	1,236					6,234	1,194			
Central Gulf of Alaska – Western DPS													
OUTER (PYE)	10	25-Jun	255	133				30-Jun	278	148			
NUKA POINT	10	25-Jun	0	0				30-Jun	0	0			
GORE POINT	10	25-Jun	0	0				30-Jun	0	0			
EAST CHUGACH	10	25-Jun	0	0				30-Jun	0	0			
PERL	10	25-Jun	95	0				30-Jun	44	0			
PERL ROCKS	10	25-Jun	0	0				30-Jun	0	0			
NAGAHUT ROCKS	10	25-Jun	0	0				30-Jun	22	0			
ELIZABETH/CAPE ELIZABETH	10	25-Jun	0	0				30-Jun	0	0			
FLAT	10	25-Jun	0	0				30-Jun	0	0			
SEA LION ROCKS (MARMOT)	9	28-Jun	12	0				2-Jul	12	0			
MARMOT	9	28-Jun	1,050	557				3-Jul	1,450	624			
AFOGNAK/TONKI CAPE	9	28-Jun	0	0				2-Jul	0	0			
WEST AMATULI	9	2-Jul	0	0				30-Jun	0	0			
SUGARLOAF	9	2-Jul	1,170	862				30-Jun	975	902			
KODIAK/CAPE CHINIAK	9	8-Jul	193	0				2-Jul	132	2			
SUD	9	2-Jul	0	0				30-Jun	0	0			

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
LONG ISLAND	9	28-Jun	146	0				2-Jul	64	0			
SEA OTTER	9	28-Jun	84	0				2-Jul	119	2			
UGAK	9	4-Jul	0	0				2-Jul	0	0			
USHAGAT/NW	9	2-Jul	28	0				30-Jun	2	0			
USHAGAT/ROCKS SOUTH	9	2-Jul	38	0				30-Jun	62	0			
USHAGAT/SW	9	2-Jul	268	100				30-Jun	220	126			
LATAX ROCKS	9	28-Jun	348	15				2-Jul	394	16			
KODIAK/GULL POINT	9	8-Jul	36	0				2-Jul	44	0			
KODIAK/CAPE BARNABAS	9	8-Jul	60	0				2-Jul	0	0			
KODIAK/CAPE PARAMANOF	9	28-Jun	0	0				2-Jul	0	0			
KODIAK/STEEP CAPE	9	28-Jun	21	0				2-Jul	38	0			
CAPE DOUGLAS	9	2-Jul	0	0				30-Jun	0	0			
KODIAK/MALINA POINT	9	28-Jun	0	0				2-Jul	0	0			
SHAW	9	2-Jul	0	0				30-Jun	0	0			
TWOHEADED	9	8-Jul	421	48				2-Jul	540	45			
NOISY	9	28-Jun	0	0				2-Jul	0	0			
SHAKUN ROCKS	9	28-Jun	224	4				3-Jul	98	7			
KODIAK/CAPE UGAT	9	28-Jun	220	0				2-Jul	150	1			
SITKINAK/CAPE SITKINAK	9	8-Jul	156	1				2-Jul	186	1			
KODIAK/BIRD ROCK	9	28-Jun	0	0				2-Jul	0	0			
KODIAK/CAPE KULIUK	9	28-Jun	0	0				2-Jul	0	0			
CAPE NUKSHAK	9	28-Jun	0	0				3-Jul	0	0			
CAPE UGYAK	8	28-Jun	0	0				3-Jul	0	0			
KODIAK/SUNDSTROM	8	8-Jul	0	0				2-Jul	0	0			
CAPE GULL	8	28-Jun	49	0				3-Jul	87	0			
CAPE KULIAK	8	28-Jun	0	0				3-Jul	0	0			
KODIAK/CAPE ALITAK	8	8-Jul	0	0				2-Jul	0	0			
KODIAK/CAPE UYAK	8	4-Jul	0	0				2-Jul	0	0			
TAKLI	8	28-Jun	0	0				3-Jul	24	0			
KODIAK/STURGEON HEAD	8	4-Jul	0	0				2-Jul	0	0			
KODIAK/CAPE IKOLIK	8	8-Jul	70	0				2-Jul	210	0			
KODIAK/TOMBSTONE ROCKS	8	4-Jul	0	0				2-Jul	0	0			

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
PUALE BAY	8	8-Jul	100	0				3-Jul	124	0			
CHIRIKOF	8	8-Jul	584	196				8-Jul	781	250			
NAGAI ROCKS	8	8-Jul	220	7				8-Jul	251	5			
KILOKAK ROCKS	8	8-Jul	116	0				8-Jul	200	0			
AIUGNAK COLUMNS	8	8-Jul	19	0				8-Jul	1	0			
CHOWIET	8	8-Jul	877	612				8-Jul	1,014	542			
AGHIYUK	8	8-Jul	4	0				8-Jul	47	0			
UGAIUSHAK	8	8-Jul	2	0				8-Jul	5	0			
SUTWIK	8	8-Jul	298	19				8-Jul	262	36			
Central Gulf of Alaska Total			7,164	2,554					7,836	2,707			
Western Gulf of Alaska – Western DPS													
LIGHTHOUSE ROCKS	8	9-Jul	172	8				8-Jul	178	24			
ATKULIK	8	9-Jul	0	0				8-Jul	0	0			
KAK	8	9-Jul	210	0				8-Jul	194	0			
CHANKLIUT	8										2010	0	0
SEAL CAPE	8							8-Jul	0	0			
MITROFANIA	8				23-Jun	288	4						
SPITZ	8				23-Jun	90	0						
SIMEONOF	7				23-Jun	2	0						
ATKINS	7	9-Jul	*724*	*371*	23-Jun	671	315						
PAUL	7				23-Jun	0	0						
CASTLE ROCK	7	9-Jul	178	0	23-Jun	129	4						
BIG KONIUJI	7	9-Jul	0	0	23-Jun	0	0						
CHERNABURA	7	9-Jul	927	248	23-Jun	798	266						
KUPREANOF POINT	7				23-Jun	212	0						
BIRD (SHUMAGINS)	7				23-Jun	66	0						
TWINS	7				23-Jun	0	0						
NAGAI/RK W OF CAPE WEDGE	7				23-Jun	0	0						
THE HAYSTACKS	7	9-Jul	72	0	23-Jun	136	1						
THE WHALEBACK	7	9-Jul	186	61	23-Jun	190	58						
NAGAI/MOUNTAIN POINT	7	9-Jul	120	0	23-Jun	6	0						

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
EGG (SAND POINT)	7				23-Jun	0	0						
SEA LION ROCKS (SHUMAGINS)	7	9-Jul	46	0	23-Jun	97	0						
UNGA/CAPE UNGA	7				23-Jun	0	0						
UNGA/ACHEREDIN POINT	7	9-Jul	78	0	23-Jun	107	0						
JUDE	7	9-Jul	759	340	23-Jun	572	304						
OMEGA	7	9-Jul	0	0	23-Jun	1	0						
WOSNESENSKI	7	9-Jul	16	0	23-Jun	102	0						
OLGA ROCKS NE	7	9-Jul	78	0	23-Jun	94	0						
OLGA ROCKS SW	7	9-Jul	153	1	23-Jun	238	5						
SUSHILNOI ROCKS	7	9-Jul	355	12	23-Jun	341	62						
PINNACLE ROCK	7	9-Jul	1,130	742	23-Jun	1,152	714						
HUNT	7				23-Jun	0	0						
CATON	7	9-Jul	688	0	23-Jun	410	1						
CHERNI	7				23-Jun	0	0						
HAGUE ROCK	7				23-Jun	0	0						
CLUBBING ROCKS NORTH	7	9-Jul	378	292	23-Jun	426	232						
CLUBBING ROCKS SOUTH	7	9-Jul	638	601	23-Jun	907	487						
SOZAVARIKA	7				23-Jun	0	0						
SANAK	7				23-Jun	0	0						
SOUTH ROCKS	7	9-Jul	551	64									
UMGA	7				23-Jun	0	0						
BIRD	7	9-Jul	444	0	23-Jun	214	4						
ROCK	7				23-Jun	0	0						
Western Gulf of Alaska Total			7,903	2,740		7,249	2,457		372	24			
Eastern Aleutian Islands – Western DPS													
AMAK+ROCKS	6				23-Jun	592	4						
SEA LION ROCK (AMAK)	6				23-Jun	504	185						
UNIMAK/CAPE LAZAREF	6				23-Jun	0	0						
UNIMAK/CAPE LUTKE	6				23-Jun	0	0						
UNIMAK/OKSENOF POINT	6				23-Jun	0	0						
UNIMAK/S OF OKSENOF POINT	6				23-Jun	594	1						

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
UNIMAK/CAVE POINT	6				23-Jun	0	0						
UNIMAK/SCOTCH CAP	6				23-Jun	1	0						
UGAMAK/UGAMAK BAY	6				23-Jun	392	242						
UGAMAK/NORTH	6				23-Jun	580	402						
UGAMAK/ROUND	6				23-Jun	244	160						
AIKTAK	6				23-Jun	62	7						
UGAMAK/SW	6				23-Jun	1	0						
KALIGAGAN	6				23-Jun	1	0						
UNIMAK/SENNETT POINT	6				23-Jun	0	0						
UNIMAK/CAPE SARICHEF N	6				23-Jun	0	0						
UNIMAK/CAPE SARICHEF	6				23-Jun	2	0						
TIGALDA/ROCKS NE	6				23-Jun	114	0						
TIGALDA/SOUTH SIDE	6				23-Jun	93	1						
AVATANAK/NE	6				28-Jun	0	0						
AVATANAK/SE	6				28-Jun	16	0						
AVATANAK/S	6				23-Jun	15	0						
TANGINAK	6				28-Jun	2	0						
BASALT ROCK	6				28-Jun	0	0						
AKUN/AKUN BAY	6				28-Jun	0	0						
ROOTOK/EAST	6				23-Jun	24	0						
AKUN/BILLINGS HEAD	6				28-Jun	558		1-Jul	562	138			
ROOTOK/NORTH	6				23-Jun	6	0						
AKUN/JACKASS POINT	6				28-Jun	0	0						
AKUN/AKUN HEAD	6				28-Jun	0	0						
AKUTAN/BATTERY POINT	6				23-Jun	0	0						
AKUTAN/NORTH HEAD	6				28-Jun	0	0						
AKUTAN/CAPE MORGAN	6				23-Jun	1,127	748						
EGG	6	8-Jul	35	0	28-Jun	0	0						
EGG/SE Tip	6				28-Jun	10	0						
EGG/West	6				28-Jun	0	0						
OUTER SIGNAL	6	8-Jul	2	0	28-Jun	1	0						
BABY	6				28-Jun	0	0						

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
OLD MAN ROCKS	6	8-Jul	35	3	28-Jun	15	0						
UNALASKA/CAPE SEDANKA	6				28-Jun	0	0						
INNER SIGNAL	6	8-Jul	91	0	28-Jun	49	0						
AKUTAN/REEF-LAVA	6				28-Jun	352	21						
UNALASKA/BRUNDAGE HEAD	6				28-Jun	0	0						
UNALASKA/PRIEST ROCK	6				23-Jun	105	0						
UNALASKA/WHALEBONE CAPE	6				28-Jun	11	0						
UNALASKA/CAPE WISLOW	6				28-Jun	0	0						
UNALASKA/BISHOP POINT	6				28-Jun	208	3						
UNALASKA/MAKUSHIN BAY	6				28-Jun	47	0						
UNALASKA/CAPE STARICHKOF	6				28-Jun	0	0						
UNALASKA/SPRAY CAPE	6				28-Jun	78	1						
UNALASKA/KOVRIZHKA	6				28-Jun	1	0						
UNALASKA/CAPE IZIGAN	6				28-Jun	197	42						
UMNAK/CAPE IDAK	6				28-Jun	0	0						
EMERALD	6				28-Jun	0	0						
POLIVNOI ROCK	6				28-Jun	126	0						
BOGOSLOF/FIRE ISLAND	6				28-Jun	347	337						
UMNAK/REINDEER POINT	6				28-Jun	0	0						
UMNAK/CAPE CHAGAK	6				28-Jun	0	0						
THE PILLARS	6	6-Jul	25	1	28-Jun	26	1						
UMNAK/AGULIUK POINT	6				28-Jun	0	0						
OGCHUL	6				28-Jun	272	130						
UMNAK/CAPE ASLIK	6				28-Jun	181	2						
VSEVIDOF	6	6-Jul	72	0	28-Jun	113	0						
UMNAK/CAPE UDAK	6				28-Jun	13	0						
ADUGAK	6				28-Jun	510	294						
SAMALGA	6				28-Jun	0	0						
Eastern Aleutian Islands Total			260	4		7,590	2,581		562	138			
Central Aleutian Islands – Western DPS													
KAGAMIL	6				28-Jun	13	0						

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
CHUGINADAK	6				28-Jun	112	1						
ULIAGA	6				28-Jun	164	1						
HERBERT	5				28-Jun	114	0						
CARLISLE	5				28-Jun	20	0						
YUNASKA	5							29-Jun	348	167			
CHAGULAK	5							29-Jun	66	0			
AMUKTA + ROCKS	5							29-Jun	36	0			
SEGUAM/WHARF POINT	5				9-Jul	2	0						
SEGUAM/MOUNDHILL POINT	5				9-Jul	33	0						
SEGUAM/LAVA POINT	5				9-Jul	0	0						
SEGUAM/FINCH POINT	5				9-Jul	112	2						
SEGUAM/LAVA COVE	5				9-Jul	20	0						
SEGUAM/TURF POINT	5				9-Jul	32	0						
SEGUAM/SADDLERIDGE	5				9-Jul	694	530						
SEGUAM/SW RIP	5				9-Jul	64	0						
AGLIGADAK	5				9-Jul	45	0						
TANADAK (AMLIA)	5				9-Jul	0	0						
AMLIA/EAST CAPE	5				9-Jul	19	2						
SAGIGIK	5				9-Jul	52	0						
AMLIA/SVIECH. HARBOR	5				9-Jul	147	34						
AMLIA/CAPE MISTY	5				9-Jul	32	0						
ATKA/NORTH CAPE	4				9-Jul	113	0						
ATKA/SW OF NORTH CAPE	4				9-Jul	0	0						
AMTAGIS	4				9-Jul	0	0						
ATKA/CAPE KOROVIN	4				9-Jul	7	0						
SAGCHUDAK	4				9-Jul	0	0						
SALT	4				9-Jul	14	0						
KONIUJI/NORTH POINT	4				9-Jul	0	0						
OGLODAK	4				9-Jul	65	0						
IKIGINAK	4				9-Jul	0	0						
KASATOCHI/NORTH POINT	4				9-Jul	587	376						
FENIMORE	4				9-Jul	58	0						

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
TAGALAK	4				9-Jul	121	0						
TAGALAK/PASS	4				9-Jul	62	12						
CHUGUL	4				9-Jul	29	0						
ANAGAKSIK	4				9-Jul	29	0						
IGITKIN/SW POINT	4				9-Jul	0	0						
GREAT SITKIN	4				9-Jul	0	0						
LITTLE TANAGA STRAIT	4				30-Jun	5	0						
SILAK	4				30-Jun	44	0						
KAGALASKA	4				30-Jun	15	0						
ADAK/HEAD ROCK (KULUK BAY)	4				30-Jun	0	0						
ADAK/CRONE ISLAND	4				30-Jun	21	0						
ADAK/CAPE MOFFET	4				30-Jun	0	0						
ADAK/CAPE KAGIGIKAK	4				30-Jun	36	4						
ADAK/ARGONNE POINT	4				30-Jun	0	0						
ADAK/CAPE YAKAK	4				30-Jun	62	0						
ADAK/LAKE POINT	4				30-Jun	466	250						
KANAGA/N CAPE	3				30-Jun	0	0						
KANAGA/CAPE MIGA	3				30-Jun	0	0						
KANAGA/CAPE MIGA S	3				30-Jun	0	0						
KANAGA/SHIP ROCK	3				30-Jun	350	207						
BOBROF	3				30-Jun	0	0						
TANAGA/CAPE SUDAK	3				30-Jun	0	0						
KANAGA/CAPE CHUNU	3				30-Jun	0	0						
TANAGA/CAPE SASMIK	3				30-Jun	12	0						
TANAGA/BUMPY POINT	3				30-Jun	0	0						
ILAK	3				9-Jul	8	0						
GRAMP ROCK	3				9-Jul	448	236						
UGIDAK	3				9-Jul	4	0						
SKAGUL/S. POINT	3				30-Jun	9	0						
TAG	3				9-Jul	174	104						
OGLIUGA	3				30-Jun	22	0						
GARELOI	3				30-Jun	0	0						

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
KAVALGA	3				30-Jun	9	0						
ULAK/HASGOX POINT	3				29-Jun	391	176						
ULAK/HASGOX POINT	3				9-Jul	409	173						
AMATIGNAK/KNOB POINT	3				9-Jul	4	0						
UNALGA+DINKUM ROCKS	3				30-Jun	0	0						
AMATIGNAK/NITROF POINT	3				9-Jul	29	0						
AMATIGNAK/WEST	3				9-Jul	9	0						
SEMISOPOCHNOI/POCHNOI	2				21-Jun	49	8						
SEMISOPOCHNOI/PETREL	2				21-Jun	6	0						
SEMISOPOCHNOI/SW KNOB	2				21-Jun	0	0						
SEMISOPOCHNOI/TUMAN POINT	2				21-Jun	0	0						
AMCHITKA/EAST CAPE	2				28-Jun	146	9						
AMCHITKA/CAPE IVAKIN	2										2008	0	0
AMCHITKA/OMEGA POINT	2										2006	0	0
AMCHITKA/ST. MAKARIUS	2										2008	0	0
AMCHITKA/CHITKA POINT	2										2007	0	0
AMCHITKA/COLUMN ROCK	2				28-Jun	37	7						
AMCHITKA/BIRD	2										2007	0	0
LITTLE SITKIN	2	21-Jun	0	0									
AYUGADAK	2	28-Jun	112	50	28-Jun	102	42						
HAWADAX (RAT)	2	28-Jun	14	0									
SEGULA/GULA POINT	2	21-Jun	0	0									
SEGULA/CHUGUL POINT	2										2008	0	0
SEA LION ROCK (KISKA)	2										2008	0	0
TANADAK (KISKA)	2										2008	1	0
TWIN ROCKS (KISKA)	2	28-Jun	0	0									
KISKA/SIRIUS POINT	2	21-Jun	0	0	21-Jun	0	0						
KISKA/SOUTH HEAD	2										2008	0	0
KISKA/WOLF POINT	2	21-Jun	11	0	21-Jun	7	0						
KISKA/WITCHCRAFT POINT	2	21-Jun	0	0									
KISKA/GERTRUDE-BUKHTI	2	28-Jun	11	0	27-Jun	13	0						
KISKA/PILLAR ROCK	2	21-Jun	0	0									

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
KISKA/LIEF COVE	2				26-Jun	128	84						
KISKA/SOBAKA-VEGA	2				27-Jun	30	0						
KISKA/CAPE ST STEPHEN	2				27-Jun	182	71	20-Jun	82	28			
Central Aleutian Islands Total			148	50		5,987	2,329		532	195		1	0
Western Aleutian Islands – Western DPS													
BULDIR/EAST CAPE	1	27-Jun	0	0				25-Jun	5	0			
BULDIR/ROOKERY	1	27-Jun	0	0	22-Jun	0	0						
BULDIR/NW ROCKS	1	27-Jun	11	0	22-Jun	7	0	25-Jun	21	0			
INGENSTREM ROCKS	1				22-Jun	0	0						
SHEMYA	1	26-Jun	18	0									
NIZKI	1	26-Jun	0	0									
ALAID	1	26-Jun	76	13	22-Jun	91	16	22-Jun	59	7			
AGATTU/CAPE SABAK	1	26-Jun		58	25-Jun	137	44	23-Jun	95	43			
ATTU/CHIRIKOF POINT	1	23-Jun	0	0	25-Jun	5	1	22-Jun	1				
AGATTU/GILLON POINT	1	24-Jun	186	100	24-Jun	158	80						
DAN'S ROCKS	1										2012	0	0
ATTU/CHICHAGOF POINT	1	23-Jun	58	0	25-Jun	64	0	21-Jun	51				
ATTU/MASSACRE BAY	1										2012	0	0
ATTU/KRESTA POINT	1	23-Jun	0	0									
ATTU/CAPE WRANGELL	1	23-Jun	178	32	23-Jun	141	34	21-Jun	88	24			
Western Aleutian Islands Total			527	203		603	175		319	74		0	0
Bering Sea – Western DPS													
CAPE NEWENHAM	6							3-Jul	194	0			
ROUND (WALRUS IS)	6	#1	97	0	#2	100	0	3-Jul	73	0			
SUMMIT	6							3-Jul	0	0			
THE TWINS	6							3-Jul	0	0			
WALRUS	6							18-Jul	260	48			
ST. PAUL/NE POINT	6							13-Jul	29	0			
ST. PAUL/SEA LION ROCK	6							15-Jul	12	0			
OTTER ISLAND	6							18-Jul	13	0			

Table 1A. -- Cont.		2013			2014			2015			Previous		
Site	RCA	Date	NP	Pup	Date	NP	Pup	Date	NP	Pup	Year	NP	Pup
ST. GEORGE	6							14-Jul	23	0			
Bering Sea Total			97	0		100	0		604	48			
Western DPS in Alaska Total			21,590	6,787		21,529	7,542		16,459	4,380		1	0

#1: Round (Walrus Is) non-pup count in 2013 is mean of daily counts during 23 June-10 July

#2: Round (Walrus Is) non-pup count in 2014 is mean of daily counts during 23-28 June, when manned aerial survey occurred in Eastern Aleutian Islands

Table 1B		2013				2014				2015				Previous			
		Total Surveyed		SSLs Present		Total Surveyed		SSLs present		Total Surveyed		SSLs Present		Total Surveyed		SSLs Present	
Region	Sites	NP	Pup	NP	Pup	NP	Pup	NP	Pup	NP	Pup	NP	Pup	NP	Pup	NP	Pup
SE Alaska-Eastern DPS	70	69	69	33	17	0	0			65	65	35	20	0	0		
Eastern Gulf of Alaska	29	28	28	19	9	0	0			29	29	21	9	0	0		
Central Gulf of Alaska	57	57	57	30	12	0	0			57	57	31	15	0	0		
Western Gulf of Alaska	43	24	24	21	11	37	37	24	14	4	4	2	1	1	1	0	0
Eastern Aleutian Islands	66	6	6	6	2	66	65	40	18	1	1	1	1	0	0		
Central Aleutian Islands	100	10	10	4	1	82	82	58	21	4	4	4	2	9	9	1	0
Western Aleutian Islands	15	11	12	6	4	9	9	7	5	7	7	7	3	2	2	0	0
Bering Sea	9	1	1	1	0	1	1	1	0	9	9	7	1	0	0		
Western DPS in Alaska	319	137	138	87	39	195	194	130	58	111	111	73	32	12	12	1	0

Table 2. -- Observed counts of Steller sea lion non-pups at sites in northern Bristol Bay and the Pribilof Islands during the breeding season (1982-2012; see Table 1 for 2013-2015 counts).

Year	CAPE NEWENHAM	WALRUS	ROUND (WALRUS IS)	ST. GEORGE	ST. PAUL/ SEA LION ROCK
1982		599			
1983		525			
1985			670		
1988			218		
1990	489				
1991	649	192	63		
1992	575				
1993	404				
1994		130			
1999				35	
2001				51	
2004	288				
2005	111	111			51
2008			98		
2009			139		
2010			79		
2011			195		
2012			132		

Table 3. -- Number of individually-branded western Steller sea lions observed (at 1+ years of age) by region—Russia; western (W), central (C), and eastern (E) Aleutian Islands (ALEU); Bering Sea; western, central and eastern Gulf of Alaska (GULF); southeast Alaska (SE AK); British Coumbia; and Washington—and natal region during June-July 2001-2015, and the average annual distribution. All sea lions were branded as pups on natal rookeries in each of the three regions. Branding began in 2000 in the central Gulf of Alaska, and in 2001 in the eastern Gulf of Alaska and eastern Aleutian Islands. Bold cells indicated proportions of branded individuals observed within their natal region during the breeding season. Proportions in shaded cells were used to estimate numbers of sea lions that moved between regions in Table 6.

	Natal Region					
	# of Individuals			Average Annual Distribution		
Region Seen	E ALEU	C GULF	E GULF	E ALEU	C GULF	E GULF
RUSSIA	1	1		0.003	0.002	0.000
W ALEU	1			0.001	0.000	0.000
C ALEU				0.000	0.000	0.000
BERING	49	7		0.113	0.011	0.000
E ALEU	368	4		**0.854**	0.006	0.000
W GULF	10	2		0.024	0.004	0.000
C GULF	2	441	3	0.005	**0.695**	0.024
E GULF		145	103	0.000	0.228	**0.809**
SE AK		35	20	0.000	0.056	0.159
BRITISH COLUMBIA				0.000	0.000	0.000
WASHINGTON			1	0.000	0.000	0.008
TOTAL	431	635	127			
# Branded	912	1,184	287			
# Years	14	15	14			
# Sightings	14,355	18,401	1,686			

Table 4. -- Predicted counts of Steller sea lion non-pups and pups ± 95% credible intervals by year (1985-2015) for the western DPS in Alaska. The lowest non-pup count (2003) is in bold.

	Non-pups			Pups		
Year	Count	-95%	+95%	Count	-95%	+95%
1985	80885	73020	89681	32911	29330	36899
1986	72846	66072	80514	29204	26233	32563
1987	64831	58888	72077	25627	23117	28305
1988	57748	51914	63602	22435	20309	24767
1989	51798	46689	57069	19748	17918	21699
1990	47212	42610	52187	17549	16038	19303
1991	43675	39641	48388	15835	14468	17318
1992	41027	36985	45602	14481	13258	15892
1993	38943	35074	43382	13414	12368	14657
1994	37018	33410	41091	12560	11607	13691
1995	35406	31664	39307	11835	10989	12877
1996	34079	30581	38130	11195	10404	12173
1997	33022	29725	37107	10669	9923	11574
1998	32282	28899	35992	10202	9451	10980
1999	31646	28447	35813	9871	9099	10578
2000	30976	27517	34828	9648	8974	10424
2001	30773	27551	34613	9510	8885	10316
2002	30488	27143	34323	9484	8842	10239
2003	**30431**	**26907**	**34388**	9532	8854	10295
2004	30563	27143	34504	9681	8969	10386
2005	30938	27471	35208	9894	9204	10686
2006	31269	27762	35510	10155	9415	10964
2007	31818	28214	36156	10408	9605	11236
2008	32659	28887	37018	10669	9939	11587
2009	33326	29384	37388	10921	10114	11786
2010	34072	30121	38455	11146	10324	12036
2011	35034	31193	39731	11400	10512	12311
2012	36055	31801	40690	11669	10704	12623
2013	37031	32609	41714	11882	10990	12986
2014	38182	33711	43159	12089	11072	13198
2015	39611	35014	45309	12398	11202	13603

Table 5. -- Annual rates of change (trends) and ± 95% credible intervals of predicted Steller sea lion non-pup and pup counts by region (eastern [E], central [C], western [W] portions of the Gulf of Alaska [GULF] and Aleutian Islands [ALEU]), E and C GULF combined, the western DPS east and west of Samalga Pass, rookery cluster areas (RCAs), and for the total western DPS for the following periods: (A) 1985 to 2000, (B) 1985 to 2003 (C) 2000 to 2015, (D) and 2003 to 2015.

	A. 1985 - 2000						B. 1985-2003					
	Non-pups			Pups			Non-pups			Pups		
	Trend	-95%	+95%	Trend	-95%	+95%	Trend	-95%	+95%	Trend	-95%	+95%
W ALEU	-9.87	-12.20	-7.55	-10.07	-12.37	-7.88	-10.11	-11.95	-8.31	-10.36	-12.22	-8.61
C ALEU	-6.15	-7.27	-5.13	-6.11	-7.20	-4.98	-5.09	-5.96	-4.23	-5.12	-5.93	-4.19
W of Samalga Pass	-7.21	-8.33	-6.15	-7.15	-8.28	-6.11	-6.43	-7.30	-5.59	-6.38	-7.23	-5.53
E ALEU & BERING	-2.05	-3.63	-0.58	-5.74	-6.77	-4.70	-1.48	-2.67	-0.28	-4.50	-5.31	-3.67
W GULF	-1.63	-3.23	-0.06	-6.29	-7.80	-4.71	-1.39	-2.61	-0.07	-4.87	-5.98	-3.51
C GULF	-9.07	-10.28	-7.75	-12.04	-13.42	-10.67	-7.58	-8.57	-6.53	-10.51	-11.63	-9.36
E GULF	-8.57	-11.03	-6.25	-2.30	-6.62	0.89	-6.96	-8.91	-4.95	-2.18	-5.52	0.54
E + C GULF	-8.88	-10.00	-7.67	-10.52	-11.86	-9.27	-7.33	-8.25	-6.32	-9.11	-10.18	-8.08
E of Samalga Pass	-5.49	-6.34	-4.67	-8.30	-9.17	-7.49	-4.45	-5.10	-3.77	-6.88	-7.63	-6.27
RCA 1	-9.87	-12.20	-7.55	-10.07	-12.37	-7.88	-10.11	-11.95	-8.31	-10.36	-12.22	-8.61
RCA 2	-8.88	-10.48	-7.35	-8.07	-10.50	-5.68	-8.10	-9.42	-6.79	-7.41	-9.15	-5.35
RCA 3	-5.65	-7.12	-4.17	-5.55	-7.01	-3.96	-4.98	-6.12	-3.78	-5.13	-6.27	-3.94
RCA 4	-2.93	-5.03	-0.81	-2.11	-3.84	-0.56	-1.92	-3.60	-0.25	-0.61	-2.19	0.62
RCA 5	-7.28	-9.79	-4.18	-8.00	-10.80	-4.88	-5.81	-8.08	-3.70	-6.36	-8.61	-4.00
RCA 6	-2.25	-3.78	-0.80	-5.74	-6.77	-4.70	-1.64	-2.82	-0.47	-4.50	-5.31	-3.67
RCA 7	-1.60	-3.31	-0.02	-6.27	-7.75	-4.62	-1.26	-2.67	-0.04	-4.83	-6.07	-3.58
RCA 8	-7.39	-9.23	-5.32	-10.19	-13.38	-6.81	-6.42	-7.90	-4.87	-8.87	-11.24	-5.90
RCA 9	-9.43	-11.04	-7.67	-12.75	-14.20	-11.53	-7.94	-9.19	-6.51	-11.23	-12.48	-10.27
RCA 10	-8.64	-10.64	-6.53	-4.55	-8.38	-1.33	-6.98	-8.53	-5.16	-4.03	-6.93	-1.36
Western DPS Total	-6.10	-6.75	-5.40	-7.91	-8.58	-7.26	-5.12	-5.64	-4.56	-6.71	-7.24	-6.18

Table 5. -- Cont.

	C. 2000 - 2015						D. 2003 - 2015					
	Non-pups			Pups			Non-pups			Pups		
	Trend	-95%	+95%	Trend	-95%	+95%	Trend	-95%	+95%	Trend	-95%	+95%
W ALEU	-8.67	-10.59	-6.73	-8.21	-9.17	-7.19	-8.71	-11.14	-6.2	-7.61	-8.91	-6.38
C ALEU	-0.88	-2.22	0.54	-1.05	-2.23	0.01	-0.85	-2.58	1.04	-1.27	-2.63	0.26
W of Samalga Pass	-1.87	-3.07	-0.56	-1.86	-2.92	-0.91	-1.73	-3.30	0.01	-1.90	-3.11	-0.48
E ALEU & BERING	1.73	0.03	3.56	3.36	2.24	4.49	1.81	-0.38	4.17	3.20	1.69	4.70
W GULF	3.37	1.54	5.01	3.68	2.18	5.26	3.84	1.52	6.19	3.79	1.73	5.78
C GULF	2.61	1.12	4.10	3.08	1.54	4.56	3.91	1.82	5.97	4.17	2.09	6.18
E GULF	5.11	2.09	8.00	4.27	2.47	5.91	5.55	1.85	9.71	4.54	2.41	7.02
E + C GULF	3.58	2.08	5.10	3.44	2.16	4.51	4.56	2.5	6.66	4.27	2.67	5.81
E of Samalga Pass	2.95	1.95	3.92	3.48	2.73	4.21	3.51	2.15	4.77	3.80	2.92	4.88
RCA 1	-8.67	-10.59	-6.73	-8.21	-9.17	-7.19	-8.71	-11.14	-6.20	-7.61	-8.91	-6.38
RCA 2	-4.27	-6.62	-1.68	-3.59	-6.02	-1.35	-4.22	-7.20	-0.70	-3.61	-6.36	-0.53
RCA 3	-3.69	-5.22	-1.95	-2.45	-3.91	-1.16	-3.88	-5.97	-1.57	-2.60	-4.33	-0.77
RCA 4	-0.15	-2.40	2.15	-0.15	-1.11	1.45	-0.47	-3.32	2.45	-0.82	-2.44	0.88
RCA 5	1.68	-1.56	4.91	0.97	-2.53	4.08	2.03	-1.95	6.51	0.72	-3.48	4.93
RCA 6	1.78	0.05	3.52	3.36	2.24	4.49	1.86	-0.33	4.19	3.20	1.69	4.70
RCA 7	3.33	1.48	5.11	3.77	2.27	5.31	3.65	1.09	6.01	3.87	1.89	5.95
RCA 8	2.99	0.95	4.94	2.38	-1.72	6.22	4.46	1.69	6.99	3.07	-2.54	8.01
RCA 9	3.13	1.03	5.18	3.34	2.13	4.35	4.58	1.77	7.54	4.61	3.14	6.11
RCA 10	4.36	1.76	7.04	4.08	2.42	5.68	4.93	1.37	8.49	4.50	2.31	6.66
Western DPS Total	1.74	0.97	2.57	1.95	1.35	2.55	2.25	1.16	3.29	2.26	1.43	3.03

Table 6. -- Estimated number of Steller sea lions (1-15 years old) moving per year between southeast Alaska (SEAK), and the eastern (E) and central (C) Gulf of Alaska regions (GULF). Non-pup abundance in each region is estimated by multiplying the 2015 pup count by 3.5 (Calkins and Pitcher 1982). Regional movement rates are based on regional distribution of sightings of western DPS (distinct population segment; wDPS) branded animals (Table 5) and movement probabilities in Jemison et al (2013).

			TO Region FROM:				FROM Region TO:				Net Change
Region	Non-Pups	Method	C GULF	E GULF	SE AK	Total	C GULF	E GULF	SE AK	Total	
SE AK	26,597	Jemison et al.	385	654	-	1,039	-413	-702	-	-1,115	-76
E GULF	4,179	wDPS Brand	1,496	-	-	1,827 - 2,198	-102	-	-	-756 to -775	1,052 - 1,440
		Jemison et al.	1.125	-	702		-121	-	-654		
C GULF RCA 9 only	6,559	wDPS Brand	-	102	-	515 - 534	-	-1,496		--1,510 to -1,879	-975 to -1,367
		Jemison et al.	-	121	413		-	-1,125	-385		

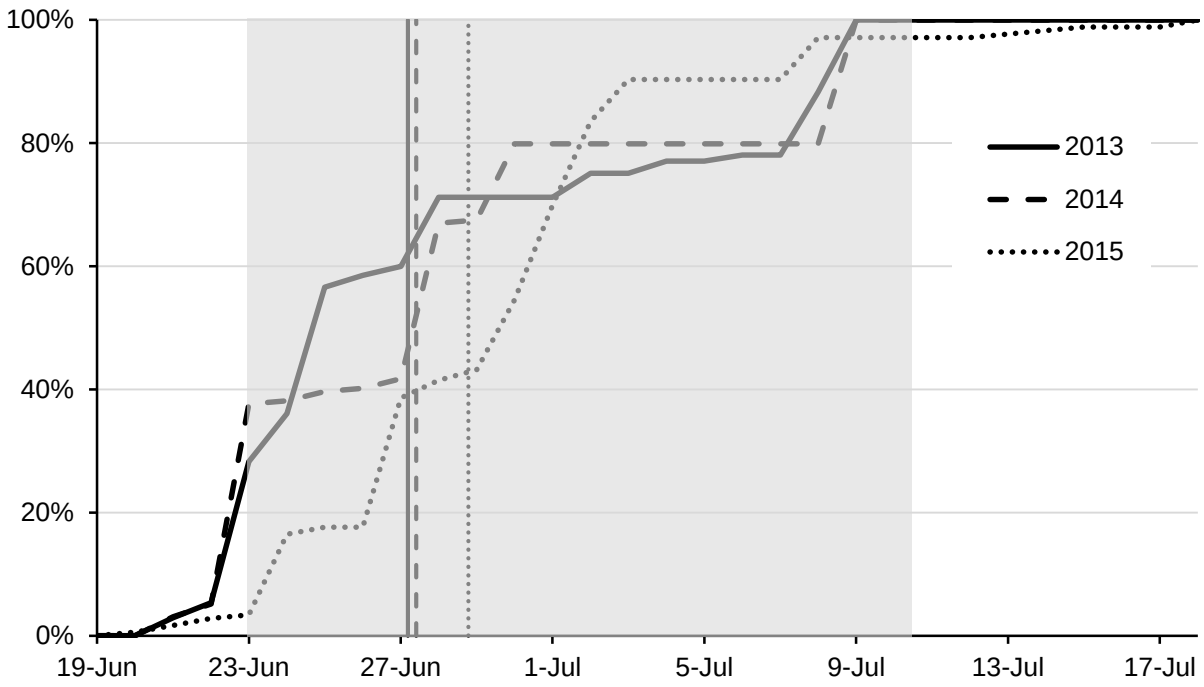

Figure 1. -- Cumulative percent of terrestrial sites surveyed by day during breeding season Steller sea lion surveys conducted in 2013-2015. Shaded area is the preferred survey time window from 23 June through 10 July. Vertical lines are plotted at the mean date for each survey (same legend).

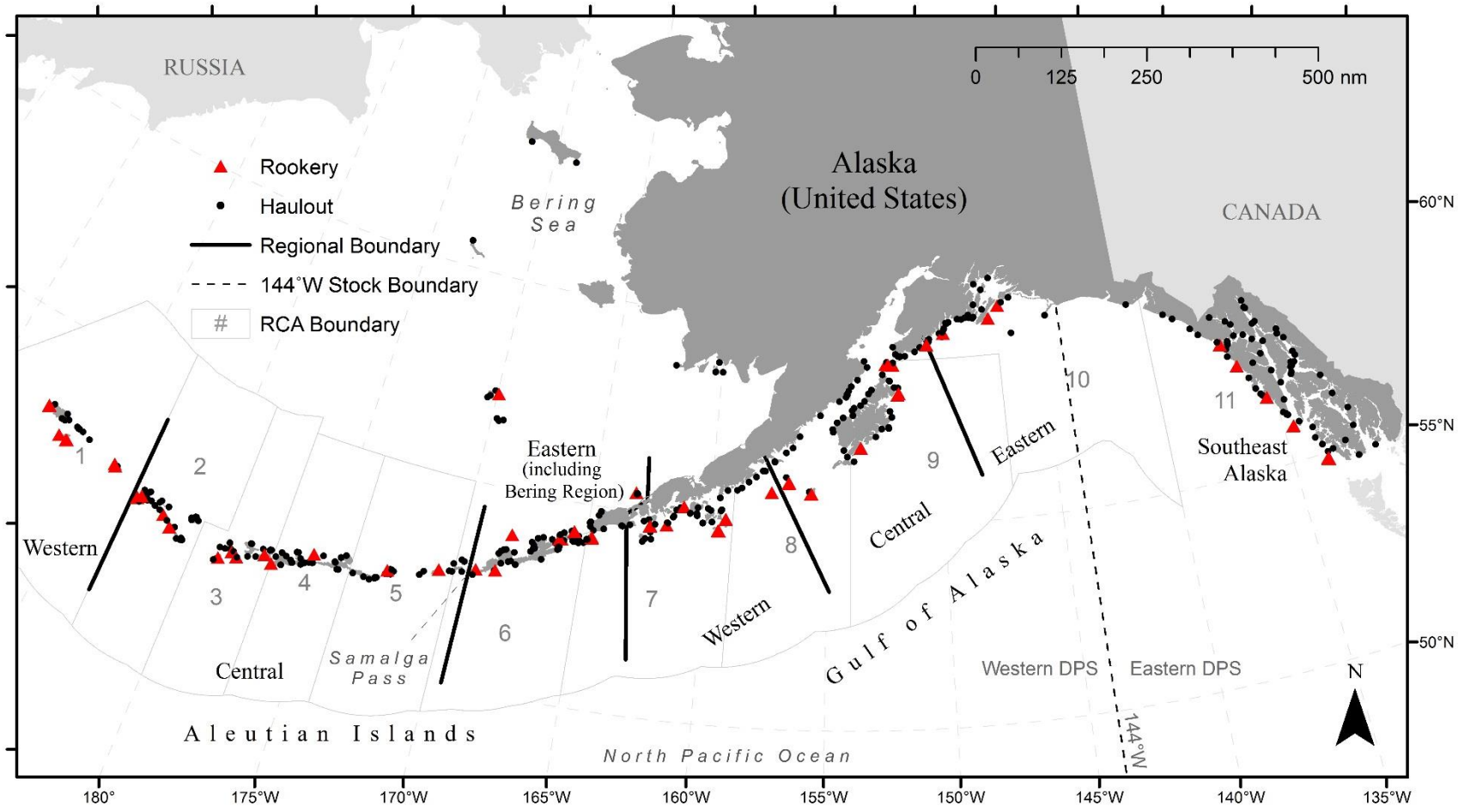

Figure 2. -- Map of Alaska showing the NMFS Steller sea lion survey regions, rookery cluster areas (RCAs), and rookery and haulout locations. The line (144°W) separating primary breeding rookeries of the eastern and western distinct population segments (DPSs) is also shown.

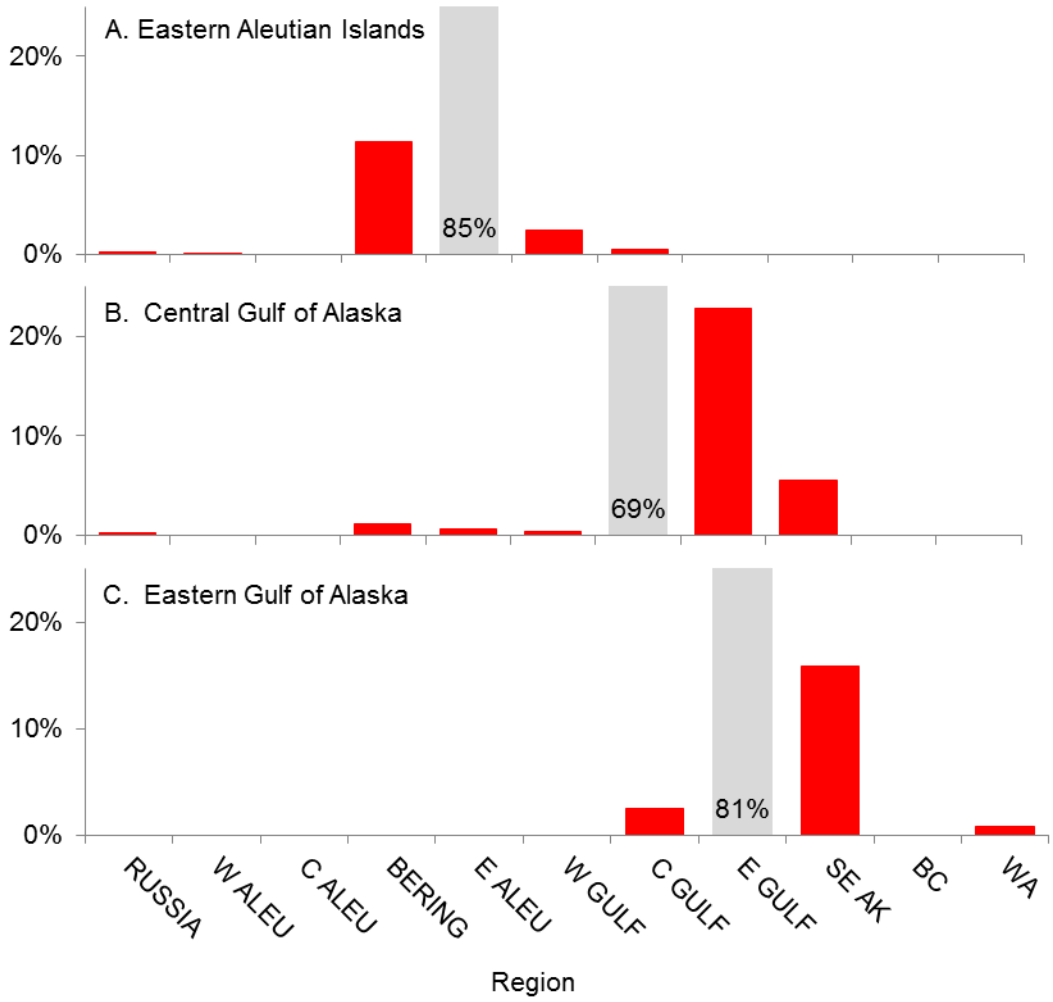

Figure 3. -- Average annual distribution of sightings (June-July 2001-2015) of individually-branded western DPS Steller sea lions by natal rookery region—A. Eastern Aleutian Islands: natal rookery Ugamak Island; B. Central Gulf of Alaska: natal rookeries Marmot and Sugarloaf Islands; C. Eastern Gulf of Alaska: natal rookeries Wooded (Fish) Island and Seal Rocks—and region sighted: Russia; western (W), central (C), and eastern (E) Aleutian Islands (ALEU); western, central and eastern Gulf of Alaska (GULF); southeast Alaska (SE AK); British Coumbia (BC); and Washington (WA). The percent observed within each natal region is shown at the bottom of the gray bar which extends vertically off each chart (data in Table 5).

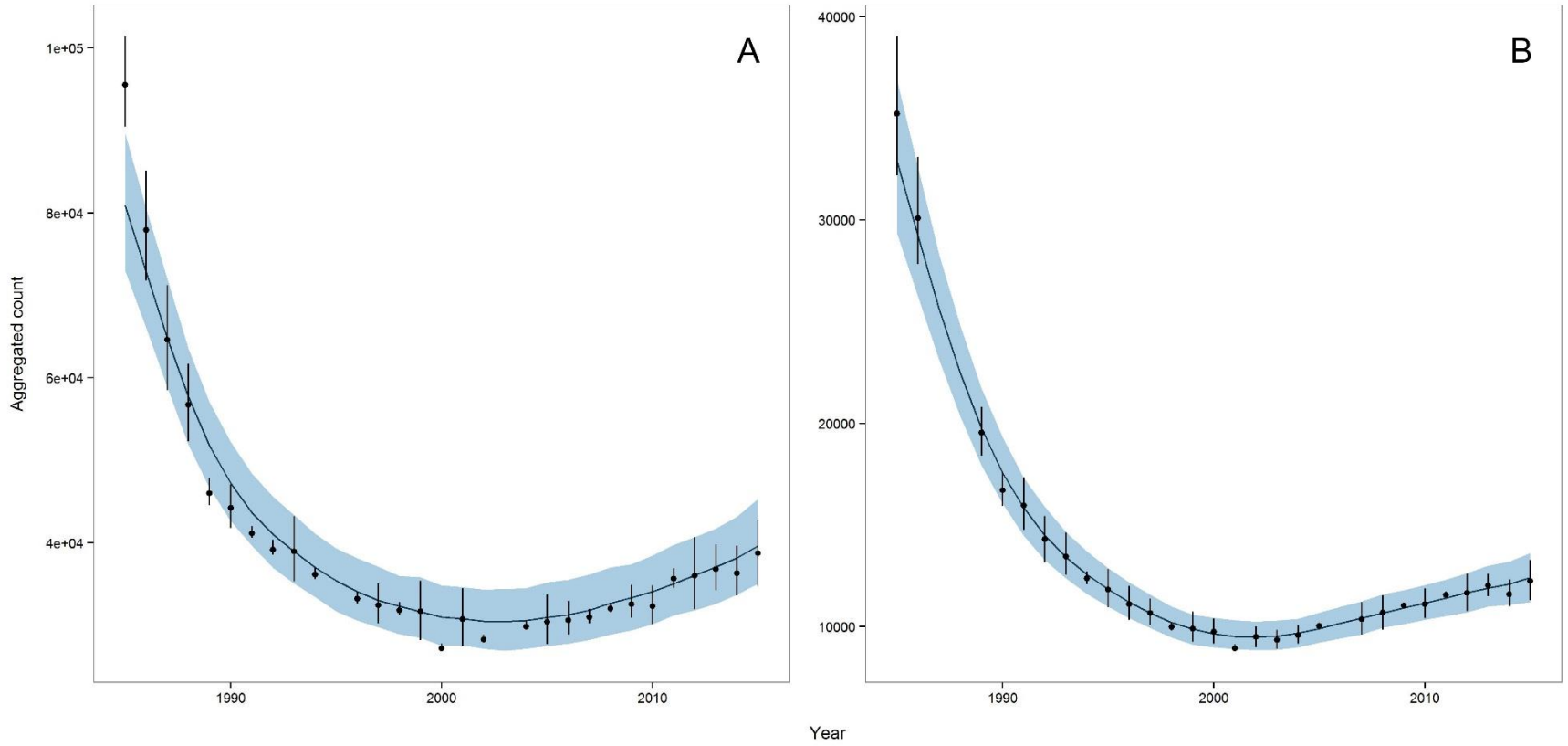

Figure 4. -- Realized and predicted counts of Steller sea lion (A) non-pups and (B) pups in all NMFS survey regions west of 144°W in Alaska. Realized counts are represented by black points and vertical black lines representing ± 95% credible intervals. Predicted counts are represented by the black line surrounded by the blue ± 95% credible interval.

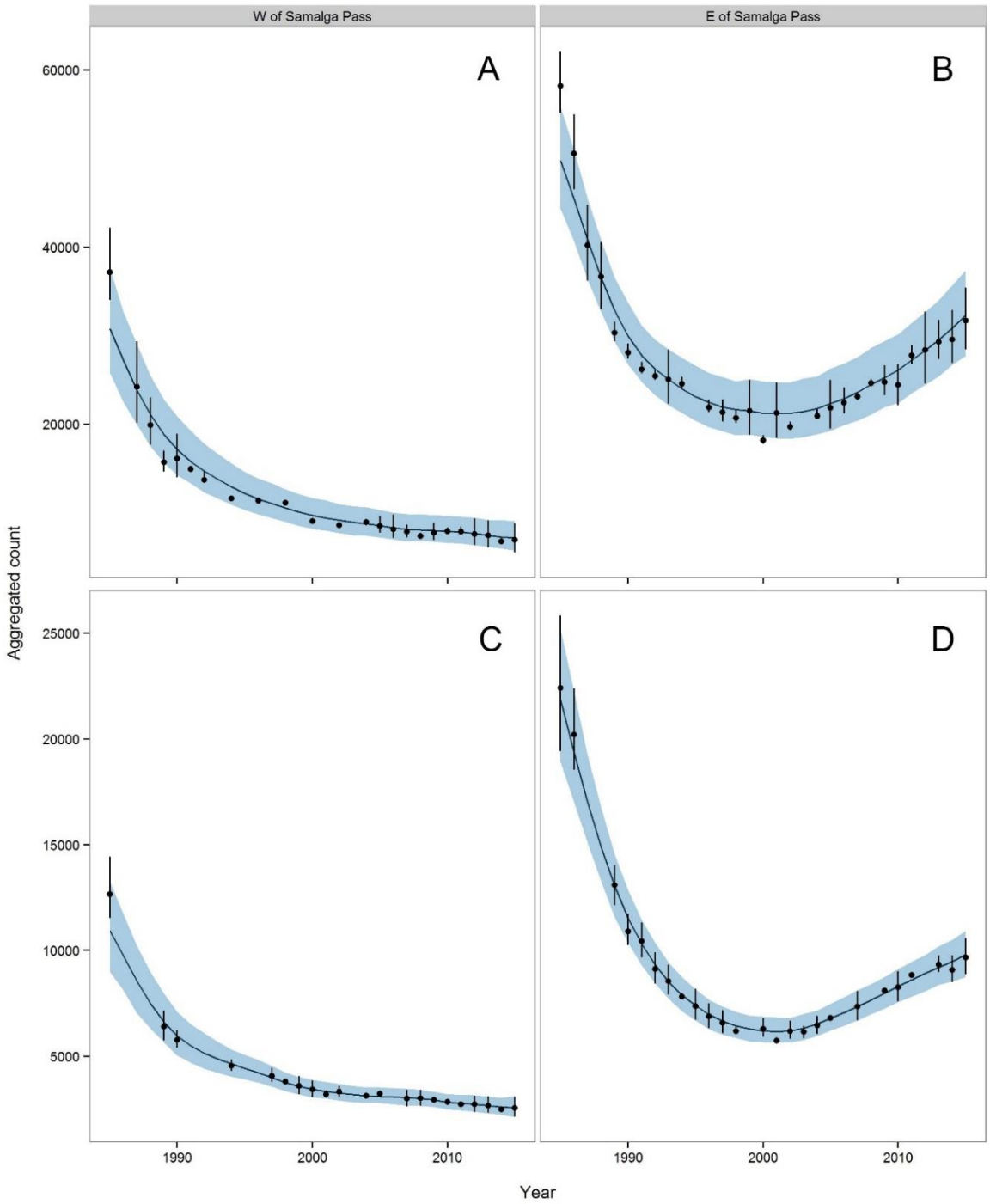

Figure 5. -- Realized and predicted counts of Steller sea lion (A & B) non-pups and (C & D) pups in all NMFS survey regions west (A & C) and east (B & D, not including southeast Alaska) of Samalga Pass in Alaska. Realized counts are represented by black points and vertical black lines representing ± 95% credible intervals. Predicted counts are represented by the black line surrounded by the blue ± 95% credible interval.

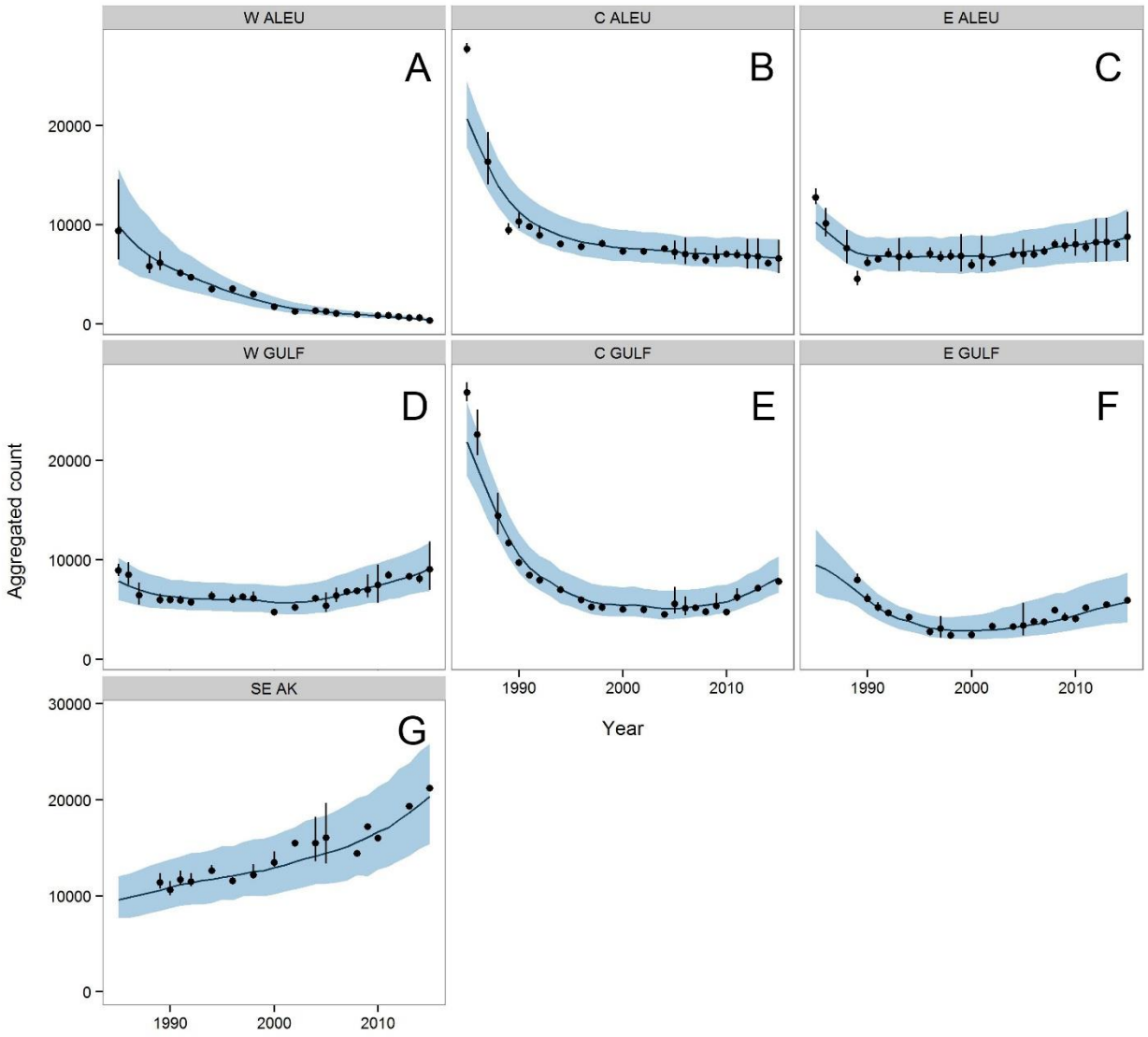

Figure 6. -- Realized and predicted counts of Steller sea lion non-pups in Alaska by NMFS survey region: (A) western Aleutian Islands (W ALEU), (B) central Aleutian Islands (C ALEU), (C) eastern Aleutian Islands (E ALEU) and Bering Sea, (D) western Gulf of Alaska (W GULF), (E) central Gulf of Alaska (C GULF), (F) eastern Gulf of Alaska (E GULF), and (G) southeast Alaska (SE AK). Realized counts are represented by black points and vertical black lines representing ± 95% credible intervals. Predicted counts are represented by the black line surrounded by the blue ± 95% credible interval.

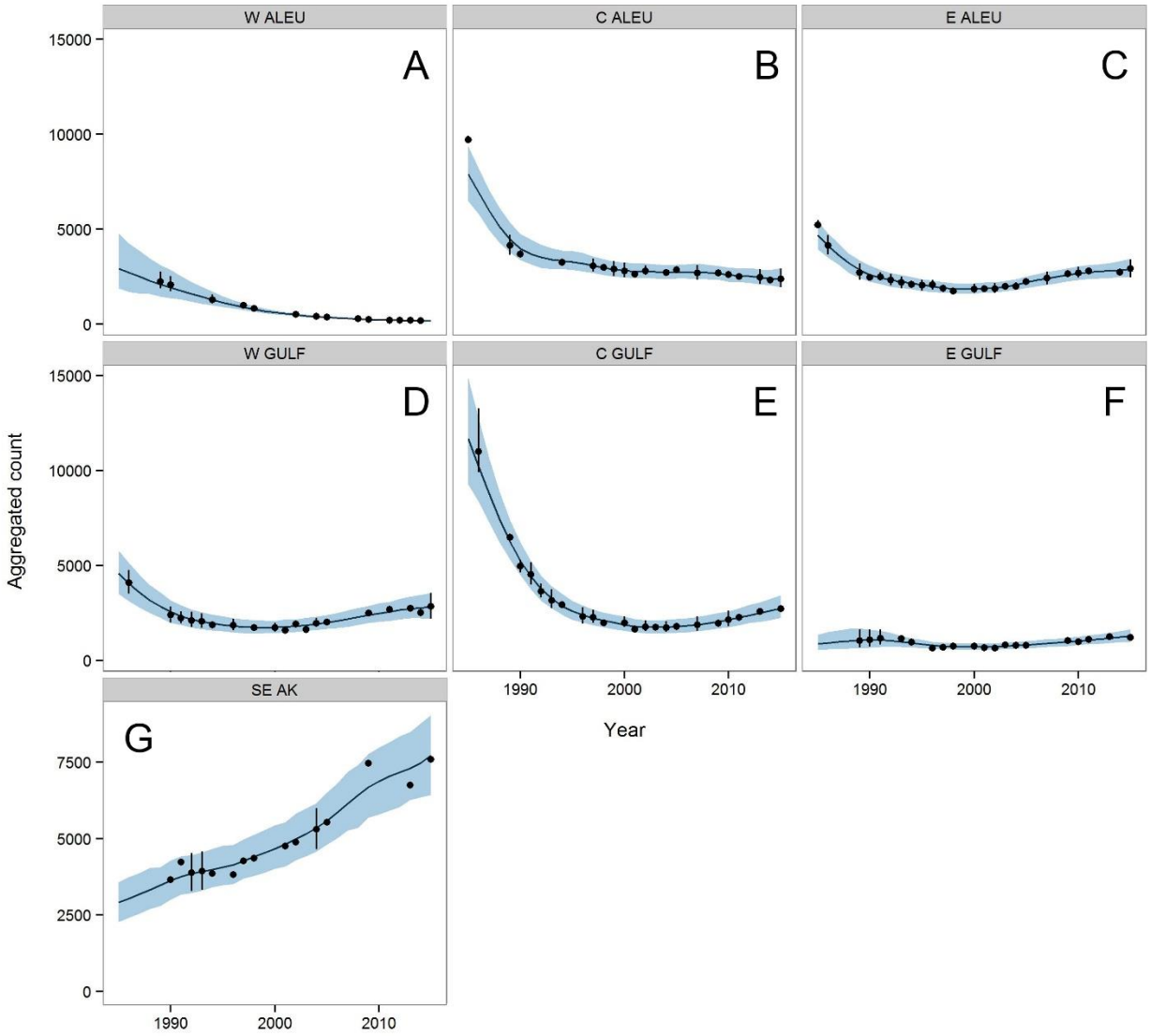

Figure 7. -- Realized and predicted counts of Steller sea lion pups in Alaska by NMFS survey region: (A) western Aleutian Islands (W ALEU), (B) central Aleutian Islands (C ALEU), (C) eastern Aleutian Islands (E ALEU) and Bering Sea, (D) western Gulf of Alaska (W GULF), (E) central Gulf of Alaska (C GULF), (F) eastern Gulf of Alaska (E GULF), and (G) southeast Alaska (SE AK; note change in scale for aggregated count). Realized counts are represented by black points and vertical black lines representing ± 95% credible intervals. Predicted counts are represented by the black line surrounded by the blue ± 95% credible interval.

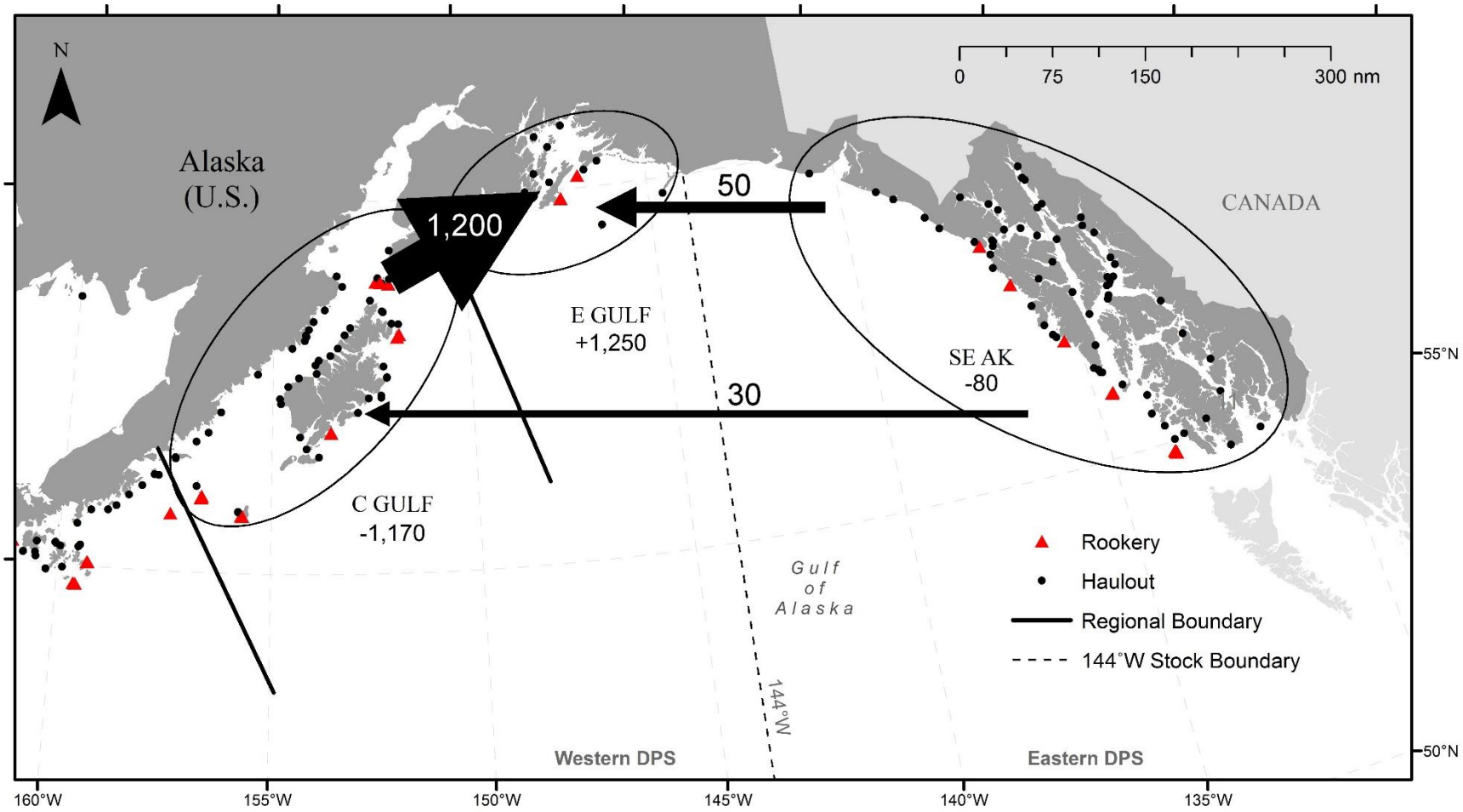

Figure 8. -- Approximate net movement (proportional width arrows and associated numbers) of Steller sea lions between southeast Alaska (SE AK), the eastern Gulf of Alaska (E GULF), and the central Gulf of Alaska (C GULF) during the breeding season. The approximate net change in abundance in each region is listed under the region name.

APPENDIX

Table 1. -- Predicted counts of Steller sea lion non-pups and pups ± 95% credible intervals by year (1985-2015) for all regions (in bold) in Alaska.

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
Southeast Alaska - Eastern DPS						
1985	9584	7728	12037	2911	2269	3572
1986	9831	7698	12289	3041	2416	3744
1987	10104	7929	12722	3175	2537	3864
1988	10332	8210	13136	3323	2691	4037
1989	10595	8434	13469	3473	2791	4064
1990	10923	8736	13797	3630	2996	4276
1991	11199	8985	14088	3755	3164	4421
1992	11362	9087	14452	3864	3214	4457
1993	11586	9108	14529	3920	3299	4546
1994	11729	9275	14779	3984	3409	4663
1995	11948	9621	15193	4057	3479	4765
1996	12089	9550	15175	4141	3512	4785
1997	12313	9944	15601	4270	3694	4968
1998	12539	10042	15896	4411	3775	5116
1999	12627	9958	15973	4540	3878	5278
2000	12965	10174	16324	4666	4015	5424
2001	13177	10454	16744	4814	4082	5530
2002	13564	10702	17158	4984	4290	5813
2003	13897	10934	17802	5147	4425	5975
2004	14141	11230	18113	5353	4571	6162
2005	14467	11288	18405	5580	4805	6497
2006	14771	11409	18866	5847	5006	6796
2007	15109	11615	19520	6146	5264	7184
2008	15599	12164	20178	6427	5353	7406
2009	16089	12050	20517	6678	5684	7765
2010	16657	12749	21377	6877	5790	7975
2011	17137	13083	21987	7036	5917	8147
2012	17923	13662	23231	7164	6035	8347
2013	18693	14172	23821	7291	6262	8485
2014	19496	14906	25084	7480	6351	8761
2015	20341	15425	25838	7719	6432	9039
Eastern Gulf of Alaska						
1985	9500	6732	13073	853	527	1348
1986	9037	6251	11927	903	563	1490
1987	8393	6026	10849	957	590	1564
1988	7634	5833	9705	1003	619	1650
1989	6785	5311	8549	1043	636	1678
1990	5951	4552	7518	1065	650	1615
1991	5172	3942	6572	1064	697	1557
1992	4529	3449	5939	1035	712	1436
1993	4072	3027	5346	977	696	1282
1994	3803	2803	5026	901	673	1154

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
1995	3422	2540	4613	834	643	1061
1996	3118	2247	4419	777	607	977
1997	3031	2159	4268	736	572	917
1998	2922	2056	4219	715	564	904
1999	2883	2046	4355	703	542	878
2000	2878	2017	4407	702	558	881
2001	2901	2017	4526	703	552	881
2002	2940	2085	4765	722	561	891
2003	3039	2075	5189	745	593	938
2004	3177	2171	5379	778	612	963
2005	3342	2274	5777	807	635	1001
2006	3519	2385	5982	845	654	1040
2007	3668	2457	6259	880	693	1104
2008	3854	2621	6650	919	718	1134
2009	4081	2795	6713	962	747	1193
2010	4411	2991	7159	1006	795	1242
2011	4717	3204	7554	1056	835	1315
2012	5033	3364	7876	1107	858	1361
2013	5295	3541	8130	1157	910	1446
2014	5511	3643	8340	1215	945	1534
2015	5778	3691	8721	1274	955	1625
Central Gulf of Alaska						
1985	21861	18420	25840	11642	9253	14816
1986	19303	16437	22956	10202	8353	12752
1987	16737	14016	19693	8764	7263	10636
1988	14299	12157	17055	7430	6211	8901
1989	12160	10207	14561	6241	5294	7378
1990	10459	8697	12695	5248	4486	6209
1991	9187	7630	11304	4417	3717	5228
1992	8367	6930	10384	3743	3120	4458
1993	7792	6370	9861	3242	2727	3897
1994	7056	5604	8959	2862	2403	3493
1995	6562	5327	8520	2584	2129	3118
1996	6118	4872	8055	2373	1975	2878
1997	5756	4535	7619	2220	1840	2670
1998	5568	4386	7423	2093	1727	2508
1999	5534	4291	7328	1975	1623	2406
2000	5423	4298	7233	1865	1549	2293
2001	5478	4352	7333	1775	1456	2171
2002	5357	4214	7126	1738	1418	2110
2003	5193	4093	7001	1730	1402	2096
2004	5098	3981	6860	1739	1422	2125
2005	5084	4046	6948	1767	1439	2162
2006	5186	4144	6975	1811	1461	2214
2007	5315	4288	7082	1861	1526	2282
2008	5449	4309	7206	1934	1587	2377
2009	5615	4533	7429	2019	1668	2485
2010	5743	4635	7510	2136	1733	2567
2011	6149	4951	7903	2245	1847	2727
2012	6593	5389	8559	2364	1955	2911

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
2013	7057	5745	9002	2485	2026	3033
2014	7656	6310	9811	2599	2111	3227
2015	8185	6697	10360	2731	2223	3409
Western Gulf of Alaska						
1985	7864	5953	10211	4581	3484	5750
1986	7400	5678	9592	4026	3096	5110
1987	6981	5403	8984	3553	2762	4501
1988	6673	5216	8571	3147	2471	3959
1989	6437	5132	8351	2828	2228	3552
1990	6326	5099	8028	2534	1969	3143
1991	6226	4997	7992	2313	1851	2888
1992	6097	4918	7805	2152	1708	2660
1993	6065	4872	7778	2029	1640	2517
1994	6049	4873	7688	1938	1560	2396
1995	6009	4860	7750	1863	1527	2314
1996	6024	4808	7637	1796	1461	2218
1997	6033	4786	7601	1757	1430	2142
1998	5980	4807	7622	1729	1398	2098
1999	5859	4730	7485	1716	1414	2091
2000	5722	4554	7428	1728	1416	2077
2001	5691	4537	7362	1753	1470	2140
2002	5715	4494	7490	1794	1489	2156
2003	5781	4547	7581	1844	1540	2230
2004	5922	4641	7752	1906	1590	2294
2005	6118	4676	7980	1987	1643	2381
2006	6338	4959	8416	2074	1696	2491
2007	6633	5203	8673	2166	1765	2621
2008	6898	5381	9070	2271	1862	2753
2009	7173	5628	9451	2371	1955	2864
2010	7423	5729	9662	2470	2025	3007
2011	7709	6055	10052	2553	2066	3063
2012	8004	6177	10341	2638	2157	3221
2013	8294	6524	10737	2711	2214	3343
2014	8670	6709	11187	2757	2221	3435
2015	9133	6852	11786	2821	2169	3543
Eastern Aleutian Islands						
1985	10222	8493	12394	4675	3928	5407
1986	9378	7627	11258	4126	3501	4771
1987	8443	6903	10425	3623	3120	4256
1988	7682	6104	9594	3201	2690	3716
1989	7160	5690	9031	2849	2425	3356
1990	6917	5303	8702	2599	2230	3086
1991	6869	5540	8830	2434	2110	2859
1992	6846	5308	8618	2322	1972	2693
1993	6817	5269	8729	2232	1910	2583
1994	6759	5392	8802	2145	1842	2487
1995	6789	5264	8764	2064	1729	2358
1996	6805	5223	8862	1982	1703	2301
1997	6753	5122	8628	1910	1665	2224

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
1998	6794	5193	8849	1864	1624	2152
1999	6851	5046	8804	1850	1601	2142
2000	6844	5203	8956	1863	1616	2148
2001	6828	5099	8843	1887	1654	2195
2002	6778	5217	8848	1912	1667	2202
2003	6949	5323	9104	1969	1737	2282
2004	7111	5545	9220	2075	1805	2365
2005	7281	5712	9485	2197	1908	2506
2006	7373	5699	9575	2309	1984	2622
2007	7472	5825	9676	2407	2069	2752
2008	7737	6013	9966	2497	2160	2841
2009	7886	6097	10140	2587	2262	2951
2010	7997	6160	10208	2671	2322	3043
2011	8085	6202	10464	2726	2378	3102
2012	8191	6310	10669	2767	2406	3154
2013	8320	6267	10731	2807	2430	3206
2014	8477	6373	11075	2845	2476	3314
2015	8757	6457	11607	2901	2461	3442
Central Aleutian Islands						
1985	20659	17748	24373	7885	6471	9352
1986	18255	15592	21499	6941	5802	8218
1987	15965	13429	18942	5973	4947	7059
1988	13938	11792	16642	5132	4298	6136
1989	12415	10451	14928	4452	3773	5348
1990	11310	9430	13634	3978	3379	4749
1991	10391	8802	12754	3694	3138	4461
1992	9808	8158	11968	3522	2960	4178
1993	9312	7815	11408	3388	2905	3993
1994	8904	7340	10897	3330	2898	3878
1995	8566	7140	10559	3263	2848	3845
1996	8271	6853	10214	3192	2774	3753
1997	8086	6723	10080	3082	2692	3566
1998	7937	6543	9772	2961	2599	3424
1999	7761	6377	9560	2876	2505	3302
2000	7650	6334	9498	2814	2458	3247
2001	7577	6307	9417	2778	2425	3184
2002	7548	6201	9249	2767	2443	3192
2003	7481	6164	9251	2744	2401	3140
2004	7384	6037	9118	2730	2389	3112
2005	7296	6065	9029	2737	2411	3129
2006	7145	5872	8791	2742	2394	3151
2007	7066	5814	8816	2742	2388	3183
2008	7069	5841	8835	2720	2367	3128
2009	7040	5727	8668	2677	2350	3064
2010	7045	5746	8757	2590	2246	2975
2011	7014	5806	8802	2557	2207	2944
2012	6962	5618	8655	2521	2175	2955
2013	6801	5590	8638	2465	2086	2883
2014	6706	5402	8579	2410	2047	2850
2015	6688	5186	8544	2389	1944	2934

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
Western Aleutian Islands						
1985	9902	5974	15611	2929	1873	4760
1986	8694	5403	13436	2706	1695	4257
1987	7673	4762	11812	2497	1620	3853
1988	6894	4545	10745	2287	1594	3465
1989	6198	4129	9371	2097	1441	3109
1990	5672	3797	8551	1928	1366	2858
1991	5201	3512	7382	1755	1301	2528
1992	4784	3248	6858	1585	1179	2214
1993	4350	3052	6150	1439	1068	1960
1994	3935	2743	5506	1283	1001	1711
1995	3522	2462	4915	1143	910	1458
1996	3149	2250	4399	1007	819	1251
1997	2832	2018	3949	886	746	1086
1998	2530	1748	3466	775	664	941
1999	2237	1589	3098	687	582	819
2000	1956	1396	2747	611	520	731
2001	1733	1233	2453	547	466	640
2002	1550	1068	2181	487	416	570
2003	1415	1022	1990	438	377	509
2004	1306	930	1798	396	342	458
2005	1202	862	1638	359	312	417
2006	1099	795	1496	327	284	380
2007	1024	727	1361	300	259	345
2008	951	697	1292	275	238	317
2009	888	637	1176	252	220	289
2010	813	592	1101	233	202	267
2011	746	554	994	216	188	248
2012	668	494	895	203	175	232
2013	599	446	799	191	167	219
2014	520	396	704	180	157	209
2015	443	314	615	170	145	200

Table 2. -- Predicted counts of Steller sea lion non-pups and pups ± 95% credible intervals by year (1985-2015) for all rookery cluster areas (in bold) in Alaska.

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
Rookery Cluster Area 1						
1985	9902	5974	15611	2929	1873	4760
1986	8694	5403	13436	2706	1695	4257
1987	7673	4762	11812	2497	1620	3853
1988	6894	4545	10745	2287	1594	3465
1989	6198	4129	9371	2097	1441	3109
1990	5672	3797	8551	1928	1366	2858
1991	5201	3512	7382	1755	1301	2528
1992	4784	3248	6858	1585	1179	2214
1993	4350	3052	6150	1439	1068	1960
1994	3935	2743	5506	1283	1001	1711
1995	3522	2462	4915	1143	910	1458
1996	3149	2250	4399	1007	819	1251
1997	2832	2018	3949	886	746	1086
1998	2530	1748	3466	775	664	941
1999	2237	1589	3098	687	582	819
2000	1956	1396	2747	611	520	731
2001	1733	1233	2453	547	466	640
2002	1550	1068	2181	487	416	570
2003	1415	1022	1990	438	377	509
2004	1306	930	1798	396	342	458
2005	1202	862	1638	359	312	417
2006	1099	795	1496	327	284	380
2007	1024	727	1361	300	259	345
2008	951	697	1292	275	238	317
2009	888	637	1176	252	220	289
2010	813	592	1101	233	202	267
2011	746	554	994	216	188	248
2012	668	494	895	203	175	232
2013	599	446	799	191	167	219
2014	520	396	704	180	157	209
2015	443	314	615	170	145	200
Rookery Cluster Area 2						
1985	5585	4425	6880	1209	775	1723
1986	4804	3737	5967	1171	761	1667
1987	4085	3238	5113	1104	737	1585
1988	3500	2776	4413	1027	680	1473
1989	3024	2389	3887	930	634	1287
1990	2680	2068	3423	835	583	1199
1991	2401	1853	3116	763	531	1101
1992	2210	1719	2900	711	492	1043
1993	2050	1562	2680	655	447	956
1994	1892	1448	2481	595	400	866
1995	1760	1345	2344	535	361	799
1996	1653	1262	2207	488	311	718
1997	1555	1167	2104	444	284	664
1998	1467	1101	2002	414	268	628

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
1999	1385	1039	1921	393	261	590
2000	1303	971	1817	383	254	570
2001	1224	889	1690	376	255	547
2002	1165	857	1641	362	248	515
2003	1112	826	1583	340	239	491
2004	1062	776	1509	330	226	470
2005	1021	732	1469	331	239	464
2006	975	684	1410	318	231	449
2007	933	668	1359	303	216	420
2008	902	651	1340	286	209	396
2009	862	605	1291	278	204	389
2010	826	576	1224	272	198	379
2011	783	528	1191	264	182	360
2012	746	512	1128	256	176	353
2013	716	480	1118	242	172	342
2014	693	452	1084	230	165	326
2015	659	427	1063	219	151	322
Rookery Cluster Area 3						
1985	5073	4113	6332	2744	2206	3224
1986	4624	3638	5729	2588	2018	3123
1987	4178	3362	5202	2387	1828	2975
1988	3763	2994	4580	2147	1686	2702
1989	3404	2791	4190	1925	1523	2366
1990	3119	2548	3812	1731	1414	2112
1991	2840	2339	3513	1609	1328	2011
1992	2659	2183	3305	1523	1242	1873
1993	2540	2074	3174	1451	1174	1748
1994	2441	2013	3052	1408	1177	1676
1995	2341	1908	2895	1376	1143	1662
1996	2251	1845	2811	1344	1099	1641
1997	2242	1821	2780	1315	1070	1539
1998	2233	1819	2752	1264	1054	1460
1999	2160	1772	2710	1197	1018	1405
2000	2053	1702	2608	1130	973	1312
2001	1993	1630	2527	1077	937	1246
2002	1936	1569	2429	1052	914	1207
2003	1898	1541	2425	1027	890	1182
2004	1807	1452	2259	1011	887	1166
2005	1748	1381	2217	1002	860	1149
2006	1673	1342	2118	989	836	1153
2007	1620	1306	2056	971	822	1151
2008	1598	1275	2047	948	804	1102
2009	1577	1258	1999	922	776	1077
2010	1485	1186	1914	894	751	1063
2011	1366	1065	1768	864	708	1021
2012	1303	1016	1720	834	689	1024
2013	1264	979	1666	803	651	984
2014	1215	933	1646	777	622	977
2015	1194	906	1622	760	584	977

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
Rookery Cluster Area 4						
1985	3546	2459	4884	1449	1155	1554
1986	3303	2333	4586	1108	895	1348
1987	3036	2181	4290	787	593	1022
1988	2811	1972	3977	545	408	736
1989	2612	1844	3697	395	313	586
1990	2457	1716	3510	321	292	528
1991	2339	1593	3342	324	261	517
1992	2267	1559	3249	372	271	517
1993	2163	1485	3146	451	356	585
1994	2115	1425	3058	544	434	620
1995	2118	1444	3038	603	481	750
1996	2142	1493	3100	625	481	763
1997	2185	1546	3135	615	508	734
1998	2191	1486	3107	592	484	704
1999	2219	1537	3130	602	489	720
2000	2261	1589	3216	628	506	766
2001	2315	1677	3328	656	518	741
2002	2352	1670	3280	675	538	752
2003	2389	1684	3339	682	581	800
2004	2435	1749	3378	683	562	793
2005	2437	1749	3396	688	606	801
2006	2404	1716	3308	708	570	840
2007	2346	1695	3279	729	569	916
2008	2364	1710	3284	745	607	893
2009	2347	1720	3302	734	633	830
2010	2370	1727	3329	680	579	772
2011	2339	1718	3295	686	575	772
2012	2308	1657	3269	679	567	822
2013	2288	1623	3219	657	542	799
2014	2283	1569	3229	630	527	721
2015	2337	1531	3284	612	471	862
Rookery Cluster Area 5						
1985	5660	3633	8402	2455	1303	3801
1986	4810	3121	7278	2051	1145	3002
1987	3987	2620	6426	1648	1013	2397
1988	3284	2198	5485	1353	845	2007
1989	2823	1762	4816	1142	736	1766
1990	2510	1523	4368	1011	648	1550
1991	2323	1427	4152	932	568	1405
1992	2186	1402	3928	857	533	1326
1993	2110	1379	3770	784	498	1206
1994	2039	1273	3639	740	494	1146
1995	1950	1280	3552	712	458	1105
1996	1844	1132	3369	694	457	1061
1997	1730	1047	3222	681	436	1002
1998	1653	1014	3210	668	417	987
1999	1634	990	3076	661	421	958
2000	1661	989	3043	657	391	956
2001	1689	1097	3139	650	417	958

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
2002	1719	1088	3104	659	396	964
2003	1717	1074	2992	671	421	983
2004	1710	1034	3075	687	420	976
2005	1713	1081	2958	702	443	998
2006	1705	1059	2978	715	439	1021
2007	1775	1151	3137	723	454	1043
2008	1799	1127	3144	730	456	1056
2009	1847	1206	3147	731	477	1052
2010	1948	1270	3293	727	461	1055
2011	2098	1423	3470	725	449	1042
2012	2143	1417	3595	732	447	1067
2013	2096	1359	3439	740	471	1117
2014	2044	1290	3476	746	454	1133
2015	2025	1169	3499	756	420	1189
Rookery Cluster Area 6						
1985	10794	8900	13005	4675	3928	5407
1986	9875	8119	11885	4126	3501	4771
1987	8886	7224	10922	3623	3120	4256
1988	8082	6472	10099	3201	2690	3716
1989	7511	5944	9350	2849	2425	3356
1990	7222	5813	9318	2599	2230	3086
1991	7145	5696	9099	2434	2110	2859
1992	7119	5690	9122	2322	1972	2693
1993	7042	5521	9077	2232	1910	2583
1994	6989	5466	8911	2145	1842	2487
1995	6999	5422	9009	2064	1729	2358
1996	7016	5383	9083	1982	1703	2301
1997	6956	5317	8878	1910	1665	2224
1998	6986	5308	9053	1864	1624	2152
1999	7040	5319	9124	1850	1601	2142
2000	7034	5412	9206	1863	1616	2148
2001	7021	5297	9093	1887	1654	2195
2002	6971	5379	9111	1912	1667	2202
2003	7146	5372	9236	1969	1737	2282
2004	7315	5656	9367	2075	1805	2365
2005	7511	5785	9619	2197	1908	2506
2006	7597	5758	9698	2309	1984	2622
2007	7698	6002	9925	2407	2069	2752
2008	7979	6121	10136	2497	2160	2841
2009	8132	6219	10317	2587	2262	2951
2010	8242	6406	10553	2671	2322	3043
2011	8351	6429	10702	2726	2378	3102
2012	8467	6539	10996	2767	2406	3154
2013	8632	6491	11059	2807	2430	3206
2014	8787	6574	11389	2845	2476	3314
2015	9088	6648	11928	2901	2461	3442
Rookery Cluster Area 7						
1985	7128	5476	9446	4499	3406	5664
1986	6694	5127	8651	3947	3035	5017
1987	6332	4906	8197	3483	2739	4446

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
1988	6052	4704	7846	3081	2416	3881
1989	5842	4645	7566	2763	2165	3462
1990	5736	4602	7346	2477	1954	3088
1991	5641	4432	7206	2259	1820	2814
1992	5542	4413	7129	2101	1676	2591
1993	5474	4293	6990	1983	1604	2448
1994	5448	4324	7000	1895	1531	2331
1995	5421	4343	7098	1821	1501	2260
1996	5411	4261	6980	1760	1435	2156
1997	5422	4313	7007	1720	1409	2102
1998	5422	4264	6974	1697	1371	2050
1999	5352	4199	6919	1685	1377	2036
2000	5270	4145	6935	1699	1414	2061
2001	5274	4123	6886	1728	1428	2079
2002	5322	4092	7045	1769	1479	2138
2003	5413	4192	7149	1822	1536	2210
2004	5573	4284	7366	1886	1565	2260
2005	5781	4486	7734	1966	1625	2352
2006	6008	4626	8047	2053	1669	2454
2007	6299	4945	8378	2150	1745	2593
2008	6558	5028	8725	2254	1817	2703
2009	6813	5255	9084	2356	1940	2846
2010	7033	5390	9279	2455	1998	2976
2011	7263	5545	9481	2539	2058	3048
2012	7476	5742	9890	2626	2154	3214
2013	7708	5949	10128	2698	2194	3322
2014	8003	6126	10580	2746	2217	3430
2015	8352	6258	11112	2810	2163	3538
Rookery Cluster Area 8						
1985	6706	5096	8860	2861	1492	4434
1986	5930	4501	7943	2507	1369	3944
1987	5255	3902	7145	2198	1286	3399
1988	4632	3452	6375	1912	1070	2927
1989	4115	3094	5797	1667	1010	2561
1990	3720	2763	5340	1456	876	2229
1991	3369	2473	4890	1279	744	1944
1992	3083	2247	4502	1135	694	1767
1993	2861	2125	4377	1019	591	1568
1994	2668	1965	4174	910	537	1452
1995	2536	1806	3879	827	474	1317
1996	2410	1761	3779	757	445	1197
1997	2333	1719	3629	699	395	1103
1998	2216	1599	3373	653	378	1042
1999	2127	1569	3222	624	353	1019
2000	2041	1541	3176	603	348	997
2001	2012	1510	3102	593	334	985
2002	1979	1491	2891	589	325	934
2003	1956	1486	2928	587	328	938
2004	1950	1491	2846	591	331	947
2005	1948	1511	2892	600	320	957

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
2006	1941	1489	2756	612	346	1004
2007	1958	1479	2737	622	343	997
2008	1984	1558	2770	638	368	1043
2009	2055	1590	2791	656	363	1069
2010	2164	1713	2852	682	372	1088
2011	2321	1849	3034	707	389	1138
2012	2538	1998	3270	739	401	1200
2013	2773	2216	3562	770	423	1274
2014	3060	2407	3963	800	386	1320
2015	3379	2599	4449	833	415	1435
Rookery Cluster Area 9						
1985	13971	10853	17137	8136	6482	11086
1986	12252	9756	15342	7109	5687	9156
1987	10456	8253	12852	6073	4992	7496
1988	8792	6986	10980	5121	4244	6025
1989	7382	5853	9314	4265	3614	4903
1990	6287	4917	8048	3534	3051	4063
1991	5467	4258	7112	2912	2511	3367
1992	4965	3882	6504	2419	2076	2826
1993	4671	3596	6302	2067	1779	2410
1994	4176	3162	5767	1815	1556	2099
1995	3875	2893	5372	1638	1392	1886
1996	3617	2668	5135	1502	1286	1730
1997	3424	2551	4991	1417	1226	1629
1998	3317	2386	4824	1343	1145	1530
1999	3324	2348	4805	1252	1057	1433
2000	3220	2288	4639	1169	1003	1333
2001	3230	2317	4764	1090	949	1244
2002	3089	2179	4637	1060	919	1222
2003	2997	2118	4533	1053	912	1208
2004	2970	2101	4501	1059	928	1222
2005	2960	2151	4533	1077	931	1233
2006	3078	2214	4593	1104	941	1269
2007	3197	2266	4663	1141	979	1332
2008	3314	2419	4900	1190	1013	1376
2009	3414	2475	5037	1252	1074	1454
2010	3481	2521	4996	1328	1139	1528
2011	3779	2716	5416	1413	1207	1629
2012	4082	2927	5775	1491	1266	1721
2013	4380	3220	6139	1572	1348	1822
2014	4774	3574	6695	1652	1411	1931
2015	5087	3789	7061	1741	1474	2050
Rookery Cluster Area 10						
1985	11335	8484	14959	1433	882	2417
1986	10721	8055	13905	1438	871	2382
1987	9969	7709	12635	1441	883	2294
1988	9005	7102	11091	1433	909	2190
1989	7933	6367	9665	1409	918	2129
1990	6859	5426	8473	1371	930	1992

	Non-pups			Pups		
Year	Predicted Count	-95%	+95%	Predicted Count	-95%	+95%
1991	5985	4708	7406	1323	882	1817
1992	5317	4187	6717	1251	883	1657
1993	4827	3758	6135	1164	872	1504
1994	4477	3438	5736	1067	823	1361
1995	4062	3134	5276	984	768	1236
1996	3696	2771	4972	917	716	1136
1997	3529	2630	4822	865	677	1072
1998	3411	2455	4688	839	661	1035
1999	3375	2501	4839	821	646	1020
2000	3380	2475	4879	816	649	1012
2001	3470	2517	5107	813	645	1014
2002	3530	2596	5322	827	655	1021
2003	3555	2555	5731	845	680	1052
2004	3628	2554	5808	877	697	1073
2005	3776	2601	6174	907	724	1117
2006	3946	2771	6375	949	759	1173
2007	4099	2851	6675	990	797	1240
2008	4282	3018	7063	1033	834	1287
2009	4511	3180	7108	1080	854	1328
2010	4839	3413	7607	1132	914	1388
2011	5142	3567	7933	1185	940	1453
2012	5457	3669	8204	1245	999	1535
2013	5722	4045	8641	1299	1022	1598
2014	5935	4116	8812	1361	1078	1702
2015	6196	4184	9243	1428	1106	1820

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