



Point Blue Report

Status of seabirds on Southeast Farallon Island during the 2014 breeding season



Report to the U.S. Fish and Wildlife Service
Farallon National Wildlife Refuge

December 2014

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Acknowledgements

We are indebted to our research assistants: Anna Lashko, Anna Stunkel, Jenn Wiggins, Lucy Brooks Marchant, Katherine Jackson, Annie Schmidt, Robert Snowden, Julie Howar and Kiah Walker for their invaluable assistance in the field. Point Blue staff biologist Pete Warzybok and seasonal biologist Mike Johns trained staff and supervised research assistants. Jim Tietz supervised data collection during the fall. We are also very grateful for the continued financial and logistical support provided by the U.S. Fish and Wildlife Service, Marisla Foundation, Mead Foundation, Moore Foundation, Farallon Patrol, Friends of the Farallones, and Point Blue colleagues on the mainland. This is Point Blue contribution no. 2010.

Suggested Citation

Warzybok, P.M., M. Johns, and R.W. Bradley. 2014. Status of seabirds on Southeast Farallon Island during the 2014 breeding season. Unpublished report to the U.S. Fish and Wildlife Service. Point Blue Conservation Science, Petaluma, California. Point Blue Conservation Science Contribution Number 2013.

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Cover photo credit/caption: *Rhinoceros auklet in nest box by P. Warzybok*

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Warzybok, P., R.W. Berger and R.W. Bradley. 2014. Status of seabirds on Southeast Farallon Island during the 2014 breeding season. Unpublished report to the US Fish and Wildlife Service. Point Blue Conservation Science, Petaluma, California. Point Blue Contribution Number 2013.

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INTRODUCTION

Point Blue (formerly PRBO Conservation Science) biologists, in partnership with USFWS and the Farallon National Wildlife Refuge, have monitored the population size and reproductive success of seabirds on Southeast Farallon Island (SEFI) continuously since 1971. We also collect information on survival, phenology (timing of breeding), chick growth, environmental conditions (weather and sea surface temperature) and prey use (diet composition). These long-term data give us a unique ability to examine trends over multiple time scales and look at variability in the context of long-term patterns and trends.

This status report contains general information on the reproductive performance and population trends of seabirds on Southeast Farallon Island (SEFI; Farallon National Wildlife Refuge) and West End Island (WEI), California, during 2014. We monitored twelve species: Ashy Storm-petrel, Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Western Gull, California Gull, Black Oystercatcher, Common Murre, Pigeon Guillemot, Tufted Puffin, Rhinoceros Auklet, and Cassin's Auklet. We determined reproductive performance for nine of these species by monitoring nest sites from initiation until chick fledging. Productivity (number of chicks fledged per pair) was determined for first attempts and for all attempts (including first attempts, relays, and second-broods). We compared productivity for all attempts to values from the previous season as well as to the long-term average for each species. Due to inaccessibility of puffin crevices and California Gull nest sites and poor visibility of Double-crested Cormorant nesting areas, no reproductive data were collected for these species.

WEATHER AND OCEAN

Oceanic conditions were highly variable during 2014. Generally cool and productive conditions persisted through the winter but sea-surface temperatures began to rise during spring and became very warm in summer. The mean seasonal SST from March to August was 1.86°C warmer than 2013 and 1.23°C warmer than the long-term mean for these months. Likewise, monthly values were above the mean for all months, with temperatures being among the highest observed during July and August. Moderate northwest winds throughout the winter and early spring drove upwelling and high productivity early in the season. However, by mid-July the Gulf of the Farallones had become inundated with warm, nutrient poor water leading to a reduction in prey resources available for seabirds.

Juvenile rockfish were abundant in chick diet throughout much of the chick rearing period (Fig. 8). Overall, rockfish comprised almost 90% of the diet for Common Murres and over 75% for Pigeon Guillemots and Rhinoceros Auklets. For all three species, this represents the greatest proportion of rockfish in the diet since the middle 1980's. As during 2013, the majority

of the juvenile rockfish encountered were Shortbelly Rockfish (*Sebastes jordanii*). This was the main species encountered in seabird diet during the 70's and 80's but has generally been less dominant over the past two decades when a more varied species assemblage (including Yellowtail, Widow, Blue and Black Rockfish) has been more common. In addition, feeding rates were higher this year for all species studied. This suggests that it was easy for foraging adults to locate prey and they were able to make shorter foraging trips when provisioning dependent offspring. However, as sea surface temperature rose in July, juvenile rockfish disappeared from the diet, virtually eliminating that important food source for later breeding individuals.

Anchovies were the most important component of chick feedings for murre and auklets between 2002 and 2008 and were also a major component of Brandt's cormorant diet during years of high reproductive success (Fig. 12). This important prey has all but disappeared from the diet of Farallon seabirds since 2009. During 2014, anchovies accounted for less than 3% of the diet for Common Murres and Rhinoceros Auklets. Sculpins, lingcod, saury, smelt, octopus and squid were other important components of the diet this season. Cormorant pellets were collected from breeding colonies in August and preliminary analysis indicates that rockfish were also the dominant prey item for cormorants.

PRODUCTIVITY

The 2014 seabird breeding season was a productive year for most species (Fig. 1). Brandt's Cormorants, Pelagic Cormorants and Cassin's Auklets all exhibited high breeding success during 2014. Rhinoceros Auklets and Pigeon Guillemots also had productive years with higher productivity than last season and also above the long-term mean. Western Gulls and Common Murres saw a decline in productivity both relative to last year and to the long-term mean. Black Oystercatchers had very poor reproductive success in 2014 with only 4 chicks fledged despite an increase in the number of breeding sites. We have included the 80% prediction interval (dashed horizontal lines) on the long-term productivity graphs (Fig. 1) to help illustrate the signals in the annual mean productivity and to highlight the extreme years (i.e. those years that fall into the upper or lower 10% of the distribution). Note that strong El Niño years (1983, 1992, and 1998) fall below this range for most species. During 2014, Brandt's Cormorant and Pelagic Cormorant exceeded the upper confidence interval, indicating especially high productivity for these species. Cassin's Auklets productivity, while remaining high, fell back within the prediction interval for the first time in five years. No species were below the lower prediction interval for average productivity this season (Fig. 1).

Cassin's Auklets continued to exhibit high productivity despite a 14% decline relative to 2013. Unlike previous high productivity years, 2014 reproductive success was driven entirely by exceptionally high first brood success rates. All other high productivity years are driven by high rates of successful second broods. Cassin's Auklets are the only alcid capable of successfully

fledging multiple broods in the same season, and they only do this in the southern portion of their range. The overall rate of double brooding remained high this season with 48% of all birds that successfully fledged a chick attempting a second brood. However, unlike the previous four years, zero chicks fledged from these second brood attempts. All second brood attempts were abandoned in late July or early August, corresponding to the increase in sea surface temperature and reduction in prey resources. Furthermore, post fledging chick survival will likely be very low this season. During November, large numbers of hatch year birds were washing up on mainland beaches with preliminary analysis indicating that they were emaciated and dying of starvation.

Reproductive success of common murres was much lower than 2013 and below the long-term mean for this species. The majority of this decline was due to low hatching success. Approximately 1 out of every 3 eggs laid in the USP study plot failed to hatch this season. This is well below the long term mean hatching success for this colony and comparable to the hatching success observed during low productivity years of 1998, 2006 and 2009 (Fig 1). However, in contrast to those years, fledging success was high. Therefore the decline in overall productivity was not as great as during other seasons with low hatching success. Once chicks hatched, murres seemed to thrive once again on a high abundance of juvenile rockfish available during the chick rearing period.

Rhinoceros Auklets and Pigeon Guillemots both exhibited high breeding success this season. Rhinoceros auklets equaled last season's high productivity while guillemot productivity increased. Both species also exceeded their respective long-term mean productivity values. The high success was likely due to the greater abundance of juvenile rockfish available for chick diet. Guillemots in particular seemed to thrive with many sites able to fledge two chicks. As with the Cassin's Auklets, those sites where chicks hatched later in the season had much reduced success compared to the rest of the population. After mid-July, when warm water inundated the region, rockfish disappeared from the diet, chicks began losing weight and several died. Most chicks, however, had already fledged by that point, resulting in the overall high productivity observed.

Brandt's Cormorants achieved high reproductive success again in 2014 with greater than two chicks fledged per breeding pair. The overall breeding success was slightly lower, but similar to, last season. However, unlike 2013, Brandt's Cormorants struggled early in the season and there was a high rate of nest abandonment. Birds were observed setting up nests and laying eggs in early May but abandoned those attempts a short time after. A second pulse of breeding activity occurred in late May, with many of those nests also abandoned. Finally in early June, the colony seemed to settle in and breeding success for these birds was very high,

leading to an overall productive season. Reasons for this unusual pattern of colony attendance are as yet unclear.

Pelagic Cormorants also experienced high breeding success in 2014. Fledging success was high and there was a low rate of abandonment. Unlike the Brandt's, Pelagic Cormorants were more stable, establishing nests in April and continuing to attend them throughout the season. Pelagic Cormorants are more reliant on rockfishes and other nearshore species and likely benefited from the overall abundance of these prey items this season.

Western Gull productivity declined below the long term mean again this season after a productive year in 2013 (Fig. 1). Clutch size, brood size and hatching success were all similar to last season, but fledging success declined by 26%. Intraspecific predation continued to be the single greatest cause of mortality, but starvation also played a role later in the season. Many large, close to fledging chicks were discovered dead without any obvious injuries. As with other species, warmer, less productive water and a decline in prey availability late in the season likely contributed to the poor fledging success.

POPULATIONS

Breeding population sizes were higher than the 2013 estimates for Cassin's Auklets, Pigeon Guillemots, Pelagic Cormorants and Black Oystercatcher while slightly lower for Brandt's Cormorants, Western Gulls and California Gulls. Estimates were essentially unchanged from last season for Tufted Puffin and Double-crested Cormorant. Population increases ranged from approximately 15% for guillemots to 28% for oystercatchers when compared to last season, while declines ranged from 2% for California Gulls to 12% for Western Gulls.

Pigeon Guillemots are censused by counting the number of birds rafting on the water in the early season prior to the initiation of breeding. These raft counts most likely reflect the total population attending the colony during the pre-breeding period, but may not represent the proportion of the population that breeds. During 2014, Guillemot numbers increased by approximately 15% relative to 2013, continuing the positive growth trend observed in this population since 2002. Occupancy of monitored guillemot crevices was also high with approximately 72% of followed sites used by breeding guillemots during 2014. This is equal to the occupancy rate observed during 2013 despite a greater number of birds present at the island.

Historically, the Common Murre population on the Farallones was estimated to be between 400,000 and 1 million birds, but egg collecting, oiling, gill net entanglement and human disturbance drastically reduced these numbers. Murre populations were beginning to recover in the late 1970's and early 1980's (Fig. 2), but were then decimated by a series of oil

spills and high adult mortality in gill net fisheries. Favorable oceanographic conditions and abundant prey, relatively strong reproductive success, and elevated juvenile survival, coupled with likely immigration from northern murre colonies, led to rapid population growth over the last decade. While we no longer census the entire island, we have continued to track murre population trends using our index plots. Index plot counts indicated a slight decrease (<1%) in murre numbers this year when compared to 2013, though overall numbers remain approximately 25% higher than the last full island census in 2006. There were a fewer new breeding sites established in the study plots and several historic sites which did not breed this year, likely contributing to the small decrease observed.

Farallon Cassin's Auklets declined considerably since the early 1970's (Fig. 2), and remain at less than one-third of the population estimate made in 1972. Unfortunately, no information is available on population numbers between 1972 and 1989. This population suffered substantial mortality during the strong 1997/1998 El Niño event and reached its lowest abundance in 1998. Between 2001 and 2004, the population was increasing rapidly. However, the breeding population declined again following poor seasons in 2005 and 2006, coinciding with reduced breeding effort, lower reproductive success and higher adult mortality. Since 2010, the population has resumed the growth observed in the early part of the last decade. The burrow counts for 2014 were 26% higher than in 2013 and the highest ever recorded since the index plots were established in 1991. This is the fourth consecutive year of increasing population (Fig. 2), coinciding with greater reproductive success and higher ocean productivity. It is worth noting that there have been varying periods of growth and decline throughout this period and while this was the highest number of individual burrows counted, the overall population estimate remains lower than the peak count in 1991. Estimates are now made in comparison to the most recent (2009) all island burrow census and occupancy survey which produced a lower population estimate than if we still used the 1989 survey as the baseline.

Tufted Puffins are surveyed during two surveys, one week long survey in May/June during the pre-breeding and early egg laying period and a second two week survey during August when puffins are feeding chicks. Population estimates are based on the overall number of active sites observed during these surveys. The Farallon population was exhibiting an increasing trend during the early part of the decade, but declined substantially following the 2004 season. Since 2008, we have seen rapid growth and though only slightly higher than last season, 2014 set a new high for the number of active nest sites observed for this species on the Farallones (Fig. 2).

Approximately 50% of the world population of Ashy Storm-petrels breeds on the Farallones, but little is known about their true population status. Ashy Storm-petrels are difficult to census but appear to have gone through alternating periods of growth and decline over the last 20

years based on a number of birds banded each season and capture rates during our mist netting effort. The mean standardized capture rate (number of birds caught per hour of effort) for 2014 was approximately 8% lower than the capture rate for 2013 and continues the general declining trend observed since 2007. Evaluating catch per unit effort is useful for determining a coarse trend but does not consider the proportion of birds caught that are non-breeders, or potential changes in recapture probabilities through time and as such cannot be used to estimate the true population. However, knowing if a population is increasing, decreasing or stable is still extremely important for management. The declining trend observed over the last several years appears to be associated with observations of high Burrowing Owl abundance and high predation on storm-petrels in the most recent years, suggesting further evidence of the impacts of increased Burrowing Owl abundance and predation on storm-petrels.

The Brandt's Cormorant breeding population expanded rapidly from 1999 to 2007, but crashed following the 2007 season (Fig. 2). It is likely that some of the apparent decline was a result of birds either skipping breeding due to unfavorable conditions or moving to a different colony. However, the continued low breeding population, despite a return to more favorable ocean conditions during the last few years, indicates that there was likely significant adult mortality during this period. After a large increase in the breeding population during 2013, the Brandt's population again declined during 2014. The 11% decline relative to last season was likely the result of poor foraging conditions during the winter and early spring which led some individuals to skip or abandon breeding attempts. Brandt's numbers remain less than one-third of the population observed before the crash but are equivalent to population estimates made during the early 2000's. The Pelagic Cormorant breeding population peaked in 2004. However, the population crashed following that season and has been slow to recover. Breeding populations were extremely low through 2007 but have been slowly increasing over the past seven years. During 2014, the population was almost 20% greater than last season and is now approximately equivalent to the population observed during the early 2000's (Fig. 2).

SUMMARY

In summary, 2014 was a mixed year for Farallon seabirds with higher breeding populations and increased productivity for some species while declines were observed for others. Cassin's Auklets were again able to take advantage of high zooplankton production in the early part of the season and fledge most of the chicks from their first broods. Likewise, murre, guillemots, auklets, and cormorants were able to capitalize on a high abundance of rockfish throughout the early season to achieve high fledging success. During mid-July, ocean conditions deteriorated, leading to a reduction in prey availability and poor success for later breeding individuals of all species. This was most notable with auklets. Chick growth rates and fledging success declined late in the season and there were no successful second broods for Cassin's for the first time since 2008. Anchovies and other larger forage fishes continue to be largely absent from seabird diet, but it would appear that the birds were able to compensate this season with other prey items. The high productivity of cormorants in 2014 is encouraging after several years of very poor productivity, but we remain concerned about the long term outlook for these species in the face of changing ocean climate and increasing unpredictability of prey resources.

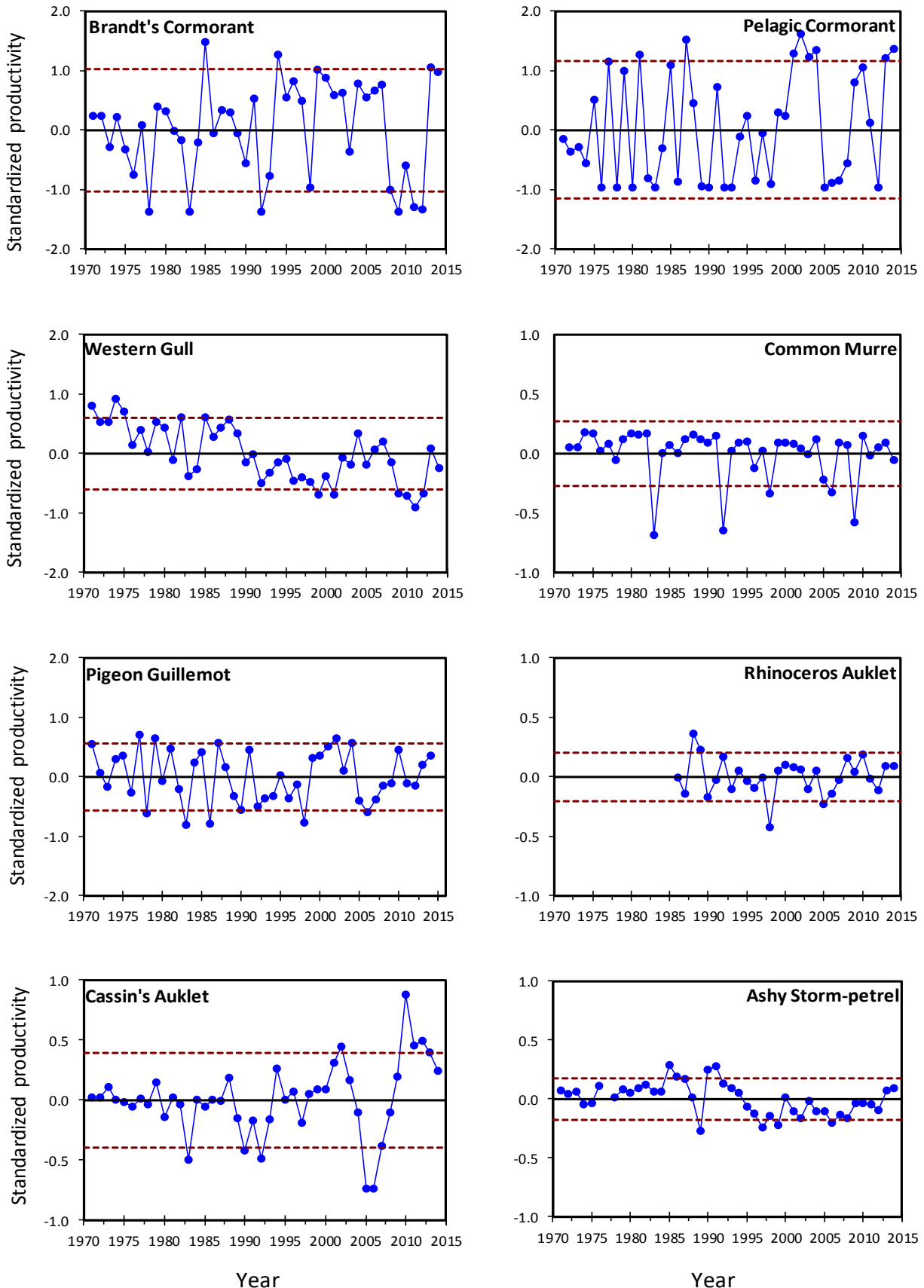
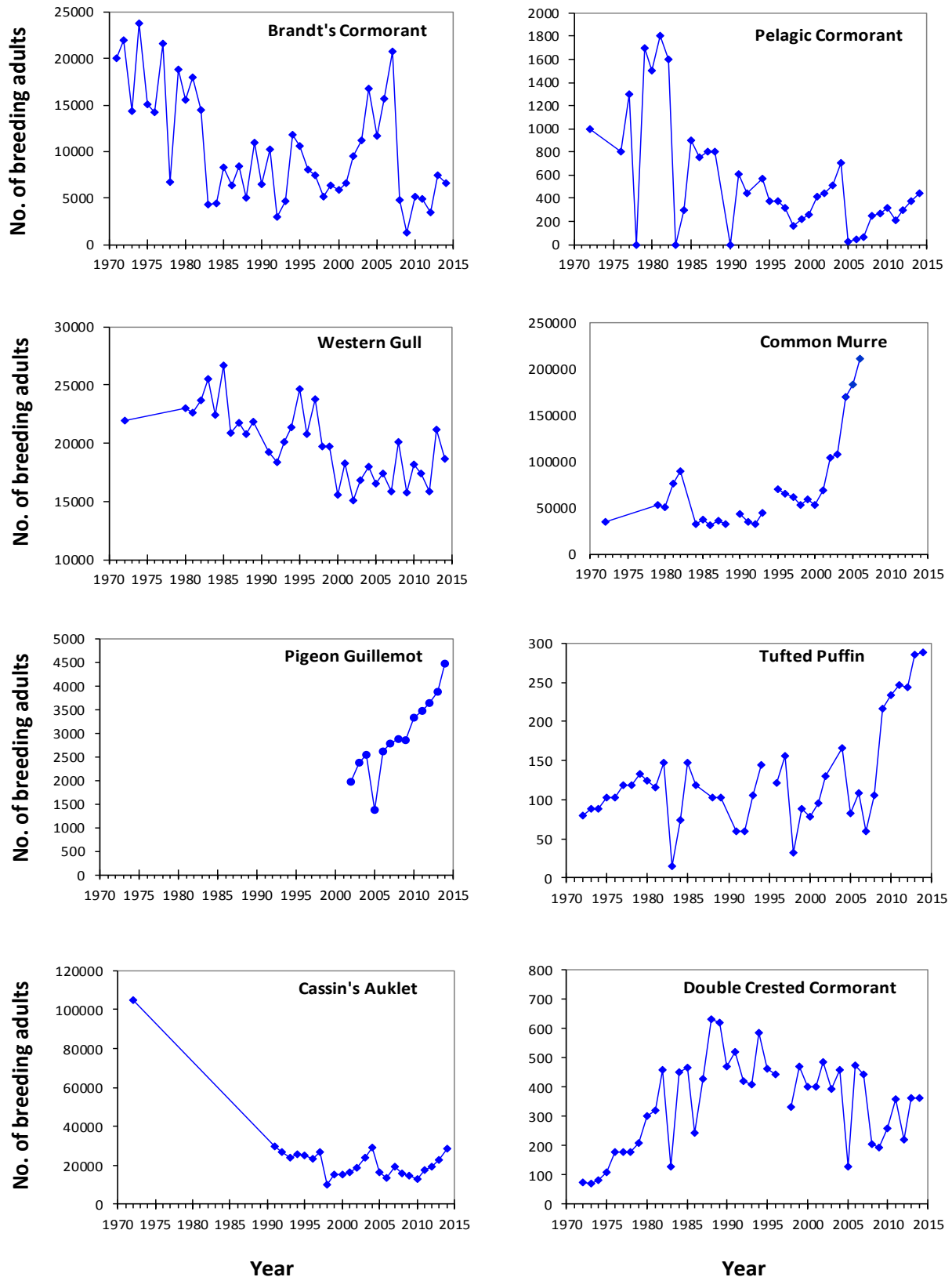


Fig. 1 Standardized productivity anomalies (annual productivity - long term mean) for 8 species of seabirds on SEFI, 1971-2014. The dashed lines represent the 80% prediction interval around the long term mean.

**Fig. 2**

Population trends for 8 species of seabirds on Southeast Farallon Island, 1972-2014. Populations were determined by counting either individuals or nests on all visible areas on SEFI and West End. Please note the different scales on the Y-axis. PIGU evening raft counts done prior to 2002 are not comparable to current methods and are not displayed. COMU whole colony estimates not made after 2006 (see text).