Nest Population Size and Potential Production of Geese and Spectacled Eiders on the Yukon-Kuskokwim Delta, Alaska, 2006

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SUMMARY: In 2006, potential production was fair for emperor geese, good for cackling and white-fronted geese, and very good for spectacled eiders. Depredation and nest abandonment rates were low for all species. We estimated 6,127 spectacled eider nests (corrected for nest detection rate) on the Yukon-Kuskokwim Delta coastal zone in 2006, a decrease of 5% from 2005, but 28% higher than the 1985-2005 average. Egg production was down 22% from 2005, but 14% higher than the 1985-2005 average. Late advent of spring pushed nesting chronology approximately a week later than 2005 and several days later than the long-term average. Due to improvements in analysis techniques in 2006, historical estimates reported herein differ from previous annual reports.

INTRODUCTION:

Annual assessment of nest population size and egg production of geese and eiders on the Yukon-Kuskokwim Delta (YKD) provides information for the Spectacled and Steller's Eider Recovery Team, the Pacific Flyway Technical Committee, participants in cooperative goose management plans, and biologists interested in waterfowl status and trends in western Alaska. A ground-based sampling procedure has been used since 1985 to estimate the number of nests and eggs for cackling geese (*Branta hutchinsii minima*), emperor geese (*Chen canagica*), greater white-fronted geese (*Anser albifrons frontalis*), spectacled eiders (*Somateria fischeri*), and other nesting waterbirds on the YKD. The ground-based nest survey provides an estimate of nest population size and potential production. The ground survey is conducted coincident with an aerial breeding pair survey (Eldridge et al. 2006, Platte and Stehn 2006) that provides an index to population size. Together, these surveys contribute long-term data needed to understand goose and eider population status.

We improved analysis methods in 2006 by incorporating nest detection rates (Bowman and Stehn *manuscipt in prep.*), reducing sampling error in expansion factors, and restricting analyses of historical data to plots within the current survey area. These changes resulted population estimates that differ from those reported in previous annual reports (Fischer et al. 2005).

METHODS:

We used a ground-based sampling procedure to monitor goose and eider nest populations and potential production on the YKD coastal zone from 1985 to 2006 (Fig. 1). Boundaries of the survey area included all lands on the Yukon Delta National Wildlife Refuge (YDNWR) containing medium and high nest densities of spectacled eiders (based on aerial and ground observations 1985-1993, USFWS unpubl. data). We excluded privately owned high density nesting habitat near Kokechik Bay, two patches on south Nelson Island, and several tracts near Hazen Bay because annual access could not be assured. From 1994-1997, and 2000-2006, the ground sampled area included 716 km^2, or 5.6% of the total coastal zone. In 1998, 1999, and prior to 1994, the size of the ground sampled area varied. In this report, estimates of nest population size and egg production are based only on plots within the core 716 km^2, whereas estimates of clutch size and hatch date use data from ground plots within and beyond the core area.

We used GIS and custom-written TrueBASIC computer programs to randomly select 85 plots within the core 716 km^2 ground sampled area in 2006 (Fig. 2). Areas sampled during the preceding five years were excluded from the random selection process. We transferred plot boundaries to digital color infrared aerial photographs (1:15,000 or 1:10,000) for field use. We included plots regardless of juxtaposition to lakes and rivers. Plot size was 402 m by 805 m (0.32 km^2) in 1986-1994 and 1997-2006. Plot size was variable in 1985, 0.45 km^2 in 1995, and 0.36 km^2 in 1996.

Plots were searched by 2-4 biologists who were transported either by Cessna 185 float-equipped aircraft or by motorboat. One boat crew originated from the YDNWR Kanaryarmiut field station and worked plots accessible from the Aphrewn River. A

second boat crew worked plots on the Naskonat Peninsula, north of Kigigak Island. A third boat crew accessed plots along the Aknerkochik River. Research biologists on Kigigak Island and the Manokinak River searched plots near their camps. Plots were generally within 2 km of a river or lake suitable for landing a float-equipped aircraft. All sites dry enough for a nest were examined for active and destroyed waterfowl, crane, loon, and gull nests. Nests of other species were recorded as encountered, but most shorebird and passerine nests were likely missed.

At each nest we recorded species, nest status, nest habitat, and stage of incubation. Species was determined by visual confirmation of an adult at the nest or by comparing down and contour feathers in the nest bowl with a photographic field guide (Bowman 2004). Red-throated (*Gavia stellata*) and Pacific loon (*Gavia pacifica*) nests are essentially indistinguishable from each other (Bowman 2004), so we applied the 2006 ratio of aerial observations of each species (Platte and Stehn 2006) to determine the relative numbers of loon nests for the two species. We determined stage of incubation for all species by measuring float angles of eggs from active nests (Westerskov 1950). Hatch dates were estimated from incubation stage of eggs found on plots. Hatch date estimates prior to 1985 were derived from plots established by Butler (1983).

The mean and variance of the number of nests and eggs per plot was based on a simple random sample of plots. The estimates of nests and eggs were expanded to the ground sampled area (716 km^2) based on the size (0.32 km^2) and number of plots (75). Nest population estimates were corrected for detection rate using a model that considers species, nest activity status, observer experience, and nest site (Bowman and Stehn *manuscript in prep.*).

The corrected estimates for nests and eggs in the ground sampled area were expanded to the entire coastal zone of the YKD based on a stratified analysis of an aerial survey of the entire coastal zone of the YKD (12,832 km^2; Butler et al. 1988, Eldridge et al. 2006, Platte and Stehn 2006). To expand the ground-based estimates, we annually calculated the ratio of the aerial breeding population index outside the ground-sampled area ("OUT") to the aerial index within the ground-sampled area ("IN"). We used the localized 7-year average of 1+ Out/In ratio as an expansion factor for a given year (localized average is the mean of the Out/In ratios of the given year, the three years prior, and the three years post). Variance estimates of nest populations expanded to the entire coastal zone incorporate the variance of the Out/In ratio. The aerial breeding population index for most species was based on twice the number of singles plus the number of birds in pairs observed, because single geese, cranes, and ducks observed are assumed to be the mates of unobserved females on nests. For brant, loons, and gulls, the total number of birds observed was used, and for swans, the number of singles plus the number of birds in pairs observed was used as the aerial index to breeding population size.

The estimated total number of nests is a direct measure of effective breeding population size and an index to the size of the population of adults that are potential nesters. The proportion of birds that actually nest in a given year is unknown. The estimated total number of eggs is a measure of the number of young that could potentially augment the fall population if they survive through summer. The proportion of nests that are active when the plots were searched is an index to nest success; the actual proportion of nests that produced young is lower because some nests are lost after plots are searched.

Data were tabulated, edited, and sorted using Excel, and nest population, hatch date, and clutch size estimates were calculated using customized TrueBASIC programs.

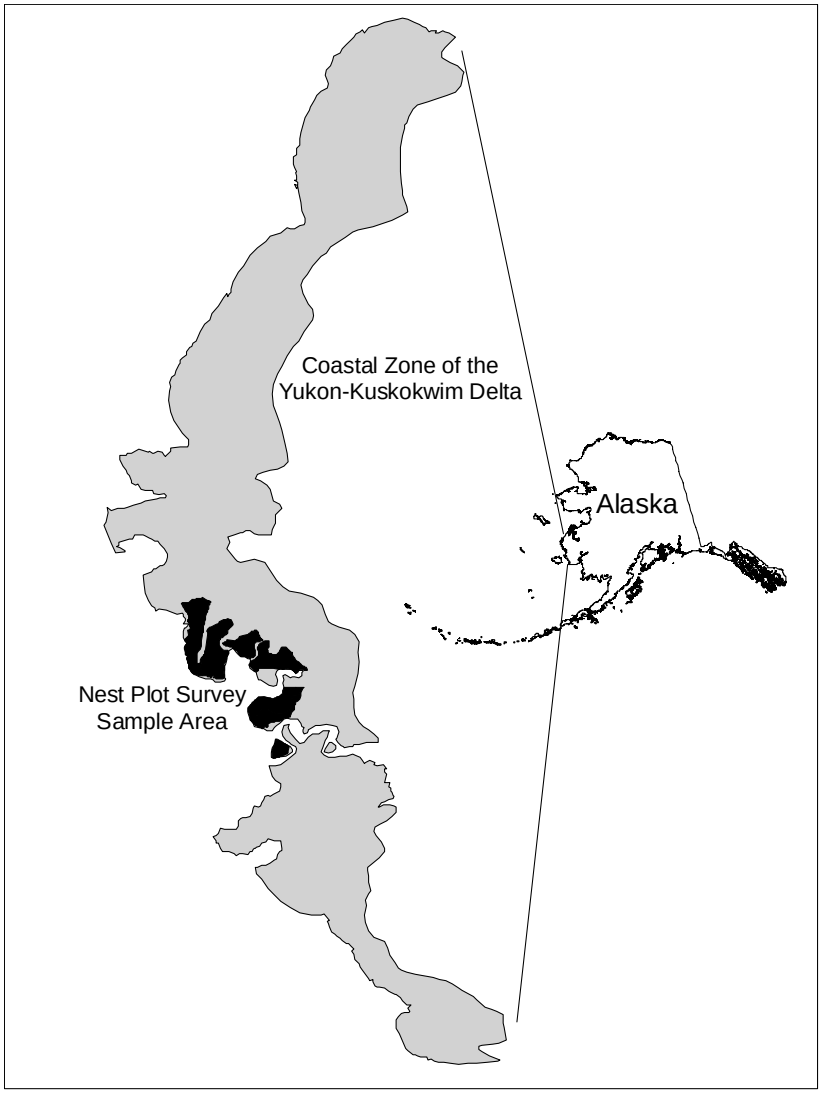

Figure 1. Location of the ground nest plot survey area relative to the coastal zone of the Yukon-Kuskokwim Delta, Alaska, 2006.

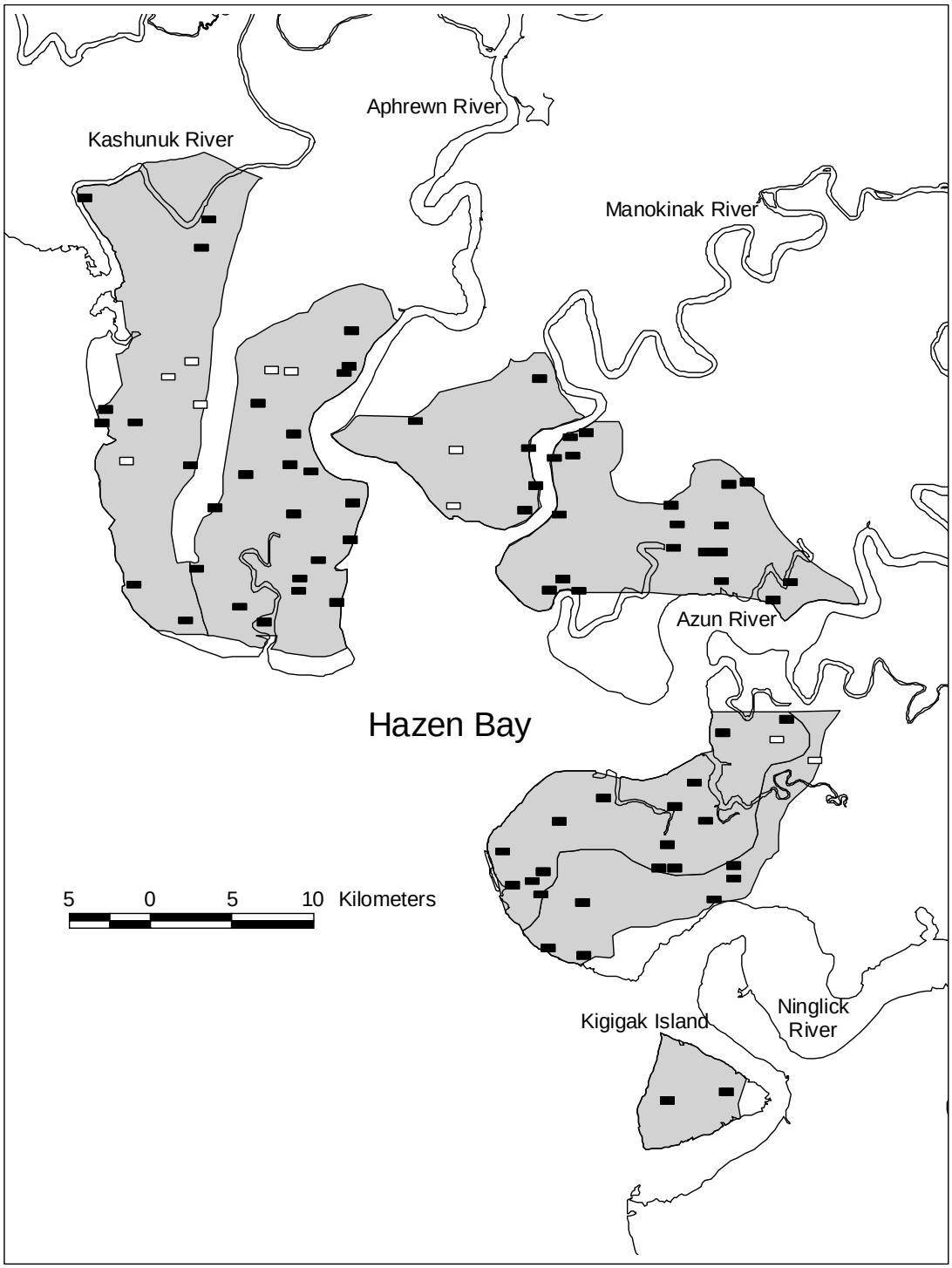

Figure 2. Locations of 75 sampled plots in 2006 (solid rectangles). Ten additional plots were selected but not sampled (open rectangles).

RESULTS:

We searched 75 plots from 8 June to 22 June, 2006 (Fig. 2). Crews based at the Kanaryarmiut field station searched 32 plots, boat-based crews searched 35 plots, a Yukon Delta NWR crew at Kigigak Island searched 2 plots, and a USGS-BRD crew at the Manokinak River searched 6 plots. Ten of the 85 randomly selected plots were not sampled due to poor access and weather delays that prevented completion of plots prior to onset of hatch. Crews located 3,031 nests in 2006, comprised of 1,218 cackling goose, 317 emperor goose, 601 greater white-fronted goose, 112 spectacled eider, and 783 nests of other species. We present nest population, egg production, and nest success estimates in figures with accompanying tabulated data for each species (Fig. 3). Estimated hatch date for each species is presented in Table 1. The following section presents general descriptive results for each species.

Cackling Geese (*Branta hutchinsii minima*)

Potential production of cackling geese was good in 2006. Total numbers of nests and eggs were nearly the same as 2005 (Fig. 3) and were 22% and 24%, above the long-term average (1985-2005), respectively. Nest success was above average resulting in little egg loss. Despite strong growth in the 1990s, the nest population declined 2.8% per year over the last decade. Average hatch date for cacklers in 2006 was a week later than 2005, but 3 days later than the long-term average (1982-2005; Table 1).

Emperor Geese (*Chen canagica*)

Potential production of emperor geese was fair in 2006. The number of nests and eggs were down 19% and 20% from 2005, respectfully (Fig. 3). The 2006 nest population and egg production were similar to the long-term average. Nest success was high and egg loss low. Nest population growth rates have been variable over the course of this survey. The number of emperor goose nests has increased 2.7% per year since 1997. Similar to other waterfowl species, estimated hatch date for emperors in 2006 was a week later than 2005 and two days later than the long-term average (Table 1).

Greater White-fronted Geese (*Anser albifrons frontalis*)

Potential production of greater white-fronted geese was good in 2006. The number of nests was down 7% from 2005, but remained 90% above the long-term average (Fig. 3). Similarly, egg production was down 9% from 2005, but was 80% above the long-term average. Nest success was nearly the same as 2005 (Table 2) reflecting good conditions on the nesting grounds with little egg loss. Growth in the nest population of white-fronts has been high throughout the duration of the survey and with an estimated growth of 5.5% per year during the last decade. Estimated mean hatch of white-fronts was six days later than 2005 and three days later than the long-term average (Table 1).


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Black Brant (*Branta bernicla nigricans*)

The nest plot survey was not designed to monitor colonial nesting birds such as black brant, and we excluded primary colonies from the sample area. The primary brant

colonies are monitored annually by digital photographic surveys (see Anthony 2006). The nest plot survey, however, does provide an estimate of nests from non-colonial brant and small satellite colonies on the YKD. In these areas, potential production of brant in 2006 was poor. The number of brant nests was down 44% from 2005 and 52% below the long-term average (Fig. 3). Similarly, the number of eggs was down 48% from 2005 and 57% below the long-term average. Nest success was also down from 2005 and below the long-term average. The nest population of brant declined 4.4% annually during the last ten years. As with other goose species, estimated hatch was six days later than in 2005 and two days later than the long-term average (Table 1).

Tundra Swans (*Cygnus columbianus*)

Potential production of tundra swans was fair in 2006. The number of tundra swan nests decreased 16% from 2005 (Fig. 3) but was nearly the same as the long-term average. Similarly, egg production was down 19% from 2005 and 15% below the long-term average. Nest success was also down slightly from 2005 and below the long-term average (Table 2). Growth of the tundra swan nest population has fluctuated over the course of the survey but has generally been positive. Over the last decade our best estimate of nest population growth is 1.1% per year. Estimated mean hatch date was one week later than 2005 and four days later than the long-term average (Table 1).

Sandhill Cranes (*Grus canadensis*)

Potential production of sandhill cranes was poor in 2006. The population of crane nests decreased 49% from 2005 (Fig. 3) and was 36% below the long-term average. Further, egg production was down 53% from 2005 and 34% below the long-term average. Nest success was nearly the same as in 2005 and the long-term average. Sandhill crane nest populations have been highly variable among years and no obvious trend is apparent over the last decade (Fig. 3). The estimated hatch date of sandhill cranes was eight days later than 2005 and three days later than the long-term average (Table 1).

Spectacled Eiders (*Somateria fischeri*)

Potential production of spectacled eiders was very good in 2006. For the second year in a row, the nest population of spectacled eiders was above 6,000, a level that hasn't been observed since the late 1980s. While the nest population was down slightly from 2005, it remained 28% above the long-term average (Fig. 3). Egg production, on the other hand was down 22% from 2005 and just 14% above the long-term average. The lower than expected potential production resulted from below average nest success. Starting in the early 1990s there has been positive growth in the spectacled eider nest population. The annual growth rate within the last 10 years is 3.9%. Like other waterfowl species, spectacled eiders initiated nests nine days later than in 2005, and three days later than the long-term mean (Table 1).

Common Eiders (*Somateria mollissima*)

Potential production of common eiders was excellent in 2006. The nests population in 2006 was the highest estimate in the 22 years of data collection, 49% higher than 2005 and 193% higher than the long-term average (Fig. 3). Similarly, egg production was up 46% from 2005 and up 191% from the long-term average. Common eider nest success in 2006 was similar to 2005 and the long-term average. During the most recent 10 years the

common eider nest population has grown 4.8% per year. Estimated hatch date of common eiders was 12 days later than 2005 and five days later than the long-term average (Table 1).


E. Lance

Loons

Potential production of Pacific loons (*Gavia pacifica*) and red-throated loons (*Gavia stellata*) was fair in 2006. Estimates of nests and eggs for both species were substantially lower than in 2005 (Fig. 3). The numbers of Pacific loon nests and eggs were 13% and 18% below the long-term averages, respectfully. The number of red-throated loon nests and eggs were 6% above and 1% below the long-term averages, respectfully. Nest success for both species was down from 2005 and below the long-term average. Nest population indices for both species have been highly variable among years. Within the most recent decade, the Pacific loon nest population declined 5.5% per year. The red-throated loon nest population declined 1.1% annually during the same period. Estimated hatch date of loons was five days later than in 2005 and three days later than the long-term average (Table 1).

Gulls and Terns

Colonial nesting species such as gulls and terns are not monitored with precision by the nest plot survey. Nonetheless, the survey does provide a measure of potential production for these species. In 2006 potential production was fair for gulls and good for terns (Fig. 3). Numbers of nests and eggs was lower in 2006 than 2005 for glaucous gulls (*Larus hyperboreus*; -37% nests, -29% eggs), Sabine's gulls (*Xema sabini*; -31% nests, -28% eggs), and mew gulls (*Larus canus*; -27% nests, -27% eggs). Despite the drop from 2005, numbers of mew gull nests were 40% above the long-term average, and Sabine's gull nest populations virtually the same as the long-term average. The glaucous gulls nest population was 7% below the long-term average. Arctic terns (*Sterna paradisaea*) faired better than the gulls in 2006 with a 4% and 20% increase from 2005 in nests and eggs, respectively. The number of tern nests in 2006 was 75% above the long-term mean. Nest success for all gulls and terns was higher than the long-term average. Trends in nest populations of gulls and terns are highly variable over the course of the survey; however, significant growth in the nest populations of mew gulls and arctic terns is apparent during the most recent decade. Estimated hatch date of gulls and terns in 2005 was up to nine days later than 2005 and up to four days later than the long-term average (Table 1).

DISCUSSION:

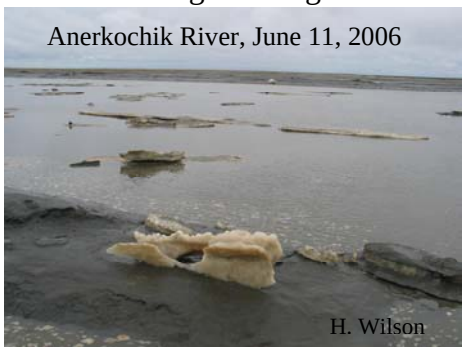
The nest plot survey was designed to provide estimates of nest population size and trend, and potential production (active eggs) for nesting geese (cackling geese, emperor geese, greater white-fronted geese) and eiders on the Yukon-Kuskokwim Delta coastal zone. In general, 2006 was a year of good potential production for geese and eiders. Incidence of nest desertion and depredation was low, and similar to long-term averages. Potential production of other species was generally fair.

Spring weather conditions on the YKD in 2006 were different than recent years. After several years of early river breakup and snow melt, spring 2006 came late to western Alaska. In 2006, breakup of the Kuskokwim River at Bethel was May 23, two weeks later than 2005, and 13 days later than the previous 21-year average (mean 1985-2005 = May 10; NOAA 2006). Similarly, significant amounts of snow remained on the nesting grounds well into May. By June 1, 2006, nesting habitat was virtually snow-free, but Kanaryaraq Lake remained covered with 2-3 feet of ice, and the Aphewn River was frozen and unmoving. Within a week, most rivers in the region were flowing free of ice and lakes were broken up. Ice in sloughs precluded boat access in some cases into mid-June.


Kanaryamiut Field Station, May 6, 2006

Timing of waterfowl nest initiation is correlated with spring breakup (Raveling 1978). Coinciding with a late breakup in 2006, waterfowl nests hatched approximately a week later than in 2005. Despite the late breakup relative to the 21-year average, hatch dates were less than a week later than the long-term average for waterfowl.

Although nesting was relatively late in 2006, waterfowl on average, are initiating nests earlier each year (Fig. 4). Based on nesting data for cackling geese, for which we have the most data, we estimate that hatch has occurred nearly one half a day earlier per year since 1982.


Anerkochik River, June 11, 2006

H. Wilson

In general, waterfowl nest population trends parallel total bird population trends observed in the aerial breeding pair survey (Eldridge et al. 2006, Platte and Stehn 2006). Estimates of cackling goose nests were at record lows in the mid 1980s prior to adoption of the cooperative Yukon-Kuskokwim Delta Goose Management Plan that provided much needed protection for nesting and wintering populations of geese (Pamplin 1986). Data from this nest plot survey show that by the late 1980s, the population of nests began to increase rapidly, peaking in the late 1990s. Since 1999, the trend in cackling goose nests has been negative with an average loss of over 2.8% per year (Fig. 3). Aerial surveys on the breeding grounds reveal a similar trend (Eldridge et al. 2006), whereby indicated breeding pairs increased rapidly between the mid-1980s and mid-1990s, after which time the population leveled off or declined slightly. Unlike the other goose species, populations of emperor geese did not show a marked change associated with the Yukon Delta Goose Management Plan. Nonetheless, a slow annual increase in the long-term trends from ground and air surveys is apparent (Eldridge et al. 2006). The population of greater white-fronted goose nests has increased dramatically on the coastal zone of the YKD since the mid-1980s. Similar to cacklers, increases in the nest population of white-fronts began to slow in the late 1990s, but the nest population continues to grow. A similar pattern is apparent in aerial estimates of white-front breeding populations (Eldridge et al. 2006). The number of spectacled eider nests has varied widely since the

beginning of the survey in the mid-1980s. Since 1992, the nest population has grown steadily. Within the last decade the nest population increased an average of 3.9% per year. Aerial surveys in the coastal zone of the YKD show a similar trend, with population estimates growing 5.4% annually since 2000 (Platte and Stehn 2006). This rate is based on aerial estimates that are not corrected for survey timing. When aerial estimates of breeding eiders are adjusted for survey timing the growth rate is similar to the rate of change in nest populations (Fischer et al. 2004).

The reliability of the nest population estimate for brant is limited by accuracy of the aerial Out:In ratio because brant are difficult to count, particularly over colonies. Sampling error for both the aerial transect and ground plot survey was larger than for other species due to the clumped distribution of brant. A separate survey effort was initiated in the 1990s to monitor the nest population of brant in major colonies on the coastal zone of the YKD using aerial videographic methods (Anthony 2006). Estimates of brant nests derived from ground plot and videographic surveys indicate a slow decline in nest populations. A comparison of estimates from these surveys suggests that a large portion of brant nest outside of the primary colonies (Fig. 5).

Spectacled eider nest success is variable among years and generally reflects varying levels of nest predation. Plots are visited one time, so the measure of nest success is an overestimation of actual success because some nests will fail after the plot is searched. Nonetheless, the pattern in nest success measured from the nest plot survey (active nests at time of search/total nests) generally matches nest success at Kigigak Island (successful hatched nests/total nests) where nests are visited every seven days until hatch (Fig. 6; Lake 2006). The largest difference between these measures of nest success was noted in 2001 and 2003, years of very poor production, where perhaps many nest failures occurred late in nesting. Alternatively, a localized factor may have caused low success on Kigigak Island during those years.

The population sizes of goose and eider nests should not be interpreted as a direct estimate of population size. For example, a year of poor nesting conditions may result in a decline of nests due to a reduction in the proportion of pairs initiating nests, but does not represent a loss of adults from the breeding population. Instead, the lower number of nests and eggs in a poor nesting year will likely contribute to a reduction in total population size in future years as a result of lower recruitment; although, additional biological factors affect fledgling, juvenile, and 1st year survival rates.

This nest plot survey does not have enough plots to overcome the greater sampling error associated with species that occur in low densities, such as loons, cranes, and swans, or those with clumped distributions, such as brant, common eiders, and gulls. Consequently, poor precision in annual estimates of population size and trend for these species is more likely, although long-term averages should be accurate.

A primary advantage of the random nest plot sampling procedure over intensive local studies is that it assures applicability of estimates to the entire coastal zone not just the immediate areas around intensive biological study camps. Moreover, the single brief visit to scattered plots ensures that the monitoring of populations occurs with minimum disturbance. The expansion of estimated nests and eggs from the ground sampled area to the entire coastal zone is based the assumption that breeding indices obtained from aerial surveys provide an accurate linear relationship of nesting within versus outside of the ground sampled area. By using a 7-year localized average ratio, we believe that variation in aerial estimates due to sampling error is moderated.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Annual changes in nest population size are less informative than long-term trends because of sampling error, changes in observers, distribution of plots, and small sample size for less common species. Only several years of consistent declines or increases are likely to indicate a true change in the number of nests and eggs produced on the Yukon-Kuskokwim coastal zone. We believe that a graphical presentation (Fig. 3) enables better interpretation of data than analysis of year-to-year changes in population size. Large annual changes in nest population size probably reflect sampling error or result from extremes in nesting effort and success, rather than real population change.

ACKNOWLEDGMENTS

The nest plot survey is a cooperative project between Migratory Bird Management (MBM) and the Yukon Delta National Wildlife Refuge (YDNWR). Special thanks go to Mike Rearden (YDNWR) and Fred Broerman (YDNWR) for aerial support and logistical coordination, and Michael Swaim (YDNWR) and Stephanie Clemens (YDNWR) for preparation of photomaps. We are particularly indebted to George Walters (YDNWR) for safe and superb flying during the course of the survey. We thank Tuula Hollmen (Alaska SeaLife Center), Greg Balogh (Anchorage Fish and Wildlife Field Office), Fred Broerman (YDNWR), Bryce Lake (YDNWR), and Joel Schmutz (USGS-BRD), for providing personnel. We also thank Paul Anderson (MBM-Anchorage) for air support of personnel and supplies, and Bill Eldridge (MBM-Anchorage), Karen Bollinger (MBM-Fairbanks), and Bob Platte (MBM-Anchorage) for aerial survey data. Bob Platte also provided invaluable GIS data processing and plot delineation. We thank Jim Sedinger, Patrick Lemons, and Chris Nicolai (University of Nevada-Reno) for boat transportation and logistical support. The following individuals collected data in 2006: Anna Anderson, Stephanie Clemens, Chris Dau, Mike Denega, Tyrone Donnely, Rebekka Federer, Julian Fischer, Debbie Groves, Bryce Lake, Ellen Lance, Meg Laws, Dennis Marks, Danielle Mason, Chris Norment, Russ Oates, Beth Pattinson, Dan Rizzolo, Heather Wilson, and Ken Wright.

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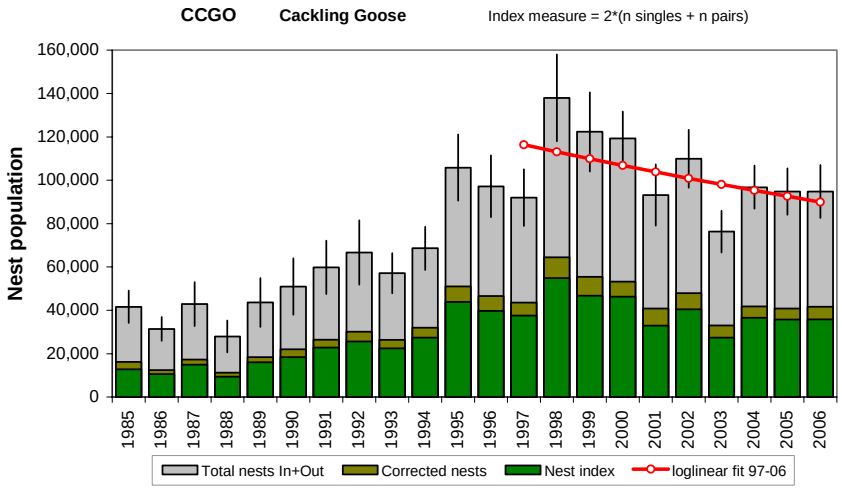
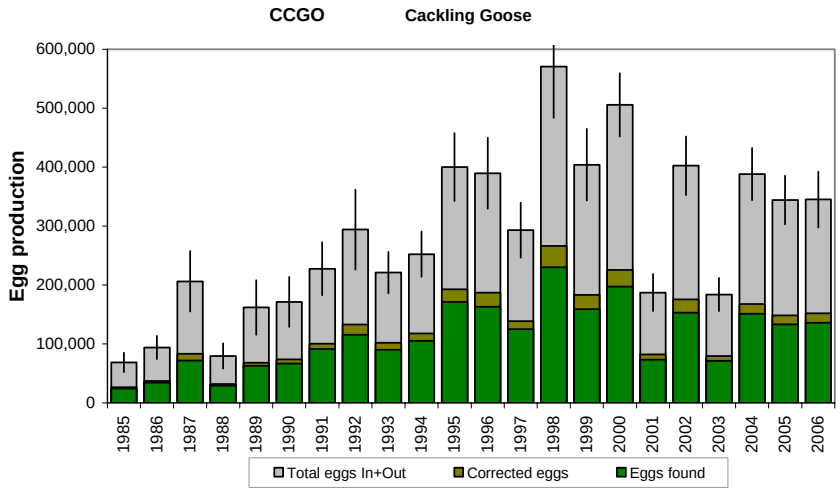
Figure 3 (Subsequent pages). Population size (± 90% CI) and trends of waterbird nests and egg production on the Yukon-Kuskokwim Delta Alaska, 1985-2006, with accompanying tabulated data. Column heading definitions follow:

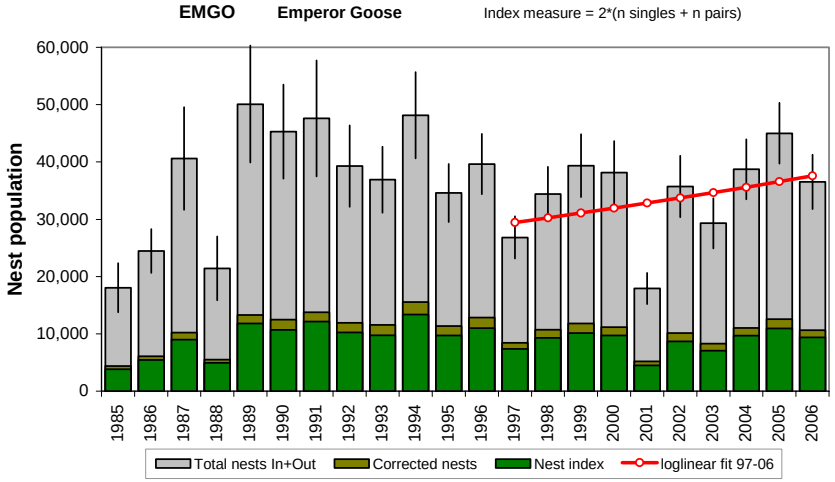
Year = survey year;
N plots = number of ground sampled plots used in the analysis;
Ground plot sampled area km^2 = total area searched (N plots*plot size);
Nest index = number of nests within the core 716 km^2 ground sampled area uncorrected for nest detection;
SE nest index = standard error for nest index;
Corrected nest IN = Nest index corrected for nest detection;
Avg of nest detection rates = annual proportion of nests detected based on predictive model (Bowman and Stehn *manuscript in prep*);
7 yr avg aerial Out:In = the seven-year localized average ratio of aerial observations seen out of the ground sampled area vs. within the ground sampled area (seven years are based on current year estimate and estimates of three years prior and post of the current year);
Corrected nests OUT = number of nests extrapolated beyond the ground sampled area based on the 7-yr floating average Out:In ratio, corrected for nest detection rate;
Total nests In+Out = total number of nests in the YKD coastal zone, corrected for nest detection rate;
SE total nests = standard error for total nest estimate;
Total eggs In+Out = total number of viable eggs at time of plot search in the YKD coastal zone, corrected for detection rate;
SE total eggs = standard error for total egg estimate;
Active eggs/total nests = total eggs in+out divided by the total nests in+out, corrected for detection rate ;
Apparent nest success = number of active nests divided by total nests times 100%, uncorrected for detection rate;
Corrected nest success = number of active nests divided by total nests times 100%, corrected for detection rate.

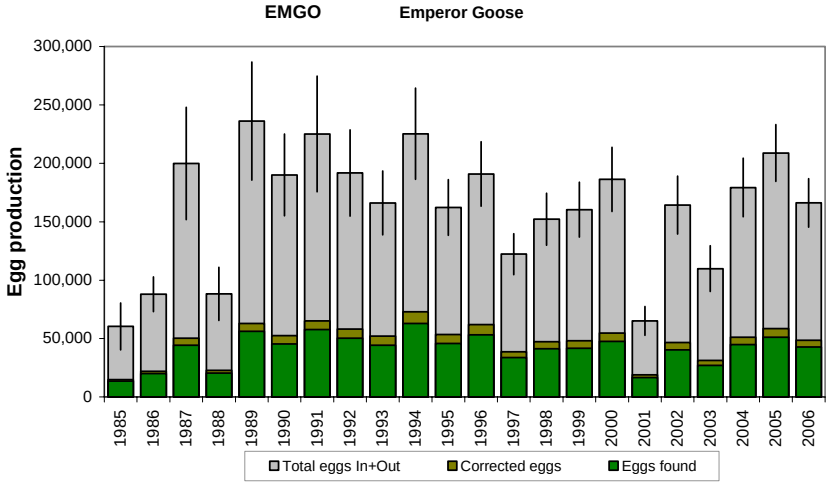




1997-2006 average annual growth rate = 0.972 (90%c.i. = 0.940 - 1.004)

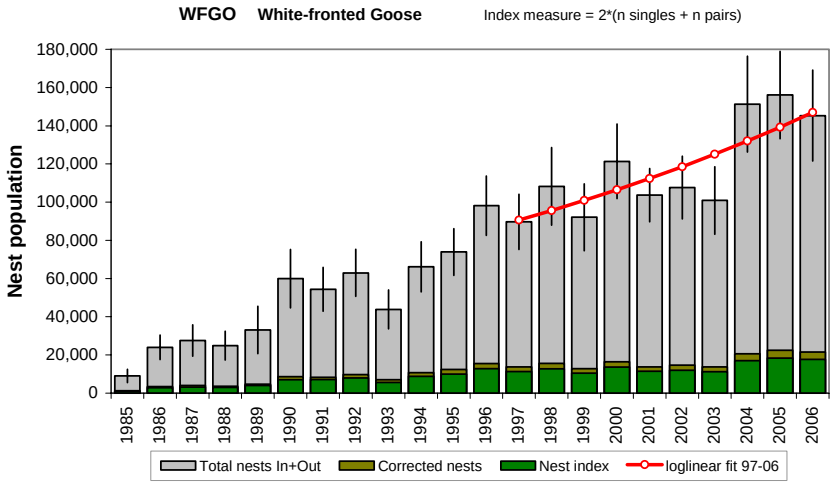
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
CCGO	**Cackling Goose**						Aerial index measure =2*(n singles + n pairs)								
1985	49	24.57	**12788**	1625	16149	0.792	1.575	25429	**41578**	4527	**68577**	10128	1.65	48.7%	42.2%
1986	46	22.16	**10594**	1406	12467	0.850	1.519	18932	**31399**	3347	**93836**	12022	2.99	66.5%	61.1%
1987	37	12.67	**14909**	2693	17319	0.861	1.476	25566	**42885**	6150	**206057**	31176	4.80	94.7%	93.8%
1988	31	10.04	**9342**	1957	11224	0.832	1.487	16692	**27916**	4463	**79497**	13055	2.85	68.7%	62.9%
1989	23	7.45	**16053**	3536	18390	0.873	1.370	25187	**43577**	6870	**161833**	28106	3.71	80.2%	76.6%
1990	33	10.70	**18465**	3890	21997	0.839	1.317	28975	**50972**	7912	**171067**	25823	3.36	79.0%	73.7%
1991	36	11.66	**22840**	3763	26414	0.865	1.264	33386	**59801**	7483	**227526**	27305	3.80	85.8%	82.1%
1992	42	13.39	**25662**	4554	30098	0.853	1.216	36586	**66684**	8983	**293973**	41285	4.41	92.9%	91.4%
1993	47	15.23	**22469**	2877	26323	0.854	1.168	30757	**57080**	5622	**221079**	21489	3.87	88.7%	85.9%
1994	41	13.27	**27391**	3099	32051	0.855	1.141	36560	**68611**	6024	**252251**	23308	3.68	83.7%	80.3%
1995	50	22.56	**43839**	5413	51015	0.859	1.074	54804	**105819**	9303	**399944**	35055	3.78	87.3%	84.8%
1996	54	19.44	**39761**	4827	46617	0.853	1.084	50554	**97171**	8675	**389599**	36568	4.01	91.2%	89.2%
1997	72	23.31	**37516**	4527	43550	0.861	1.112	48439	**91990**	7947	**293019**	28270	3.19	82.6%	79.0%
1998	64	20.71	**54802**	6330	64403	0.851	1.142	73561	**137963**	12199	**570310**	52641	4.13	93.7%	92.4%
1999	53	16.97	**46698**	5561	55508	0.841	1.204	66831	**122339**	11092	**404092**	36942	3.30	86.9%	84.9%
2000	80	25.86	**46279**	3884	53165	0.870	1.243	66058	**119223**	7594	**505614**	32675	4.24	95.0%	94.2%
2001	81	26.23	**32937**	3999	40799	0.807	1.283	52358	**93157**	8606	**187188**	19151	2.01	60.6%	55.2%
2002	84	27.15	**40438**	3989	47948	0.843	1.293	61973	**109922**	8121	**402248**	30175	3.66	85.3%	82.8%
2003	83	26.87	**27323**	2905	33071	0.826	1.307	43232	**76303**	5831	**183772**	17127	2.41	65.9%	60.8%
2004	81	26.22	**36574**	3024	41818	0.875	1.313	54923	**96742**	6044	**388067**	26924	4.01	87.5%	85.0%
2005	83	26.87	**35666**	3192	40898	0.872	1.316	53829	**94728**	6492	**344049**	25039	3.63	87.8%	85.1%
2006	75	24.28	**35842**	3708	41706	0.859	1.272	53064	**94770**	7408	**345205**	28871	3.64	85.4%	82.2%

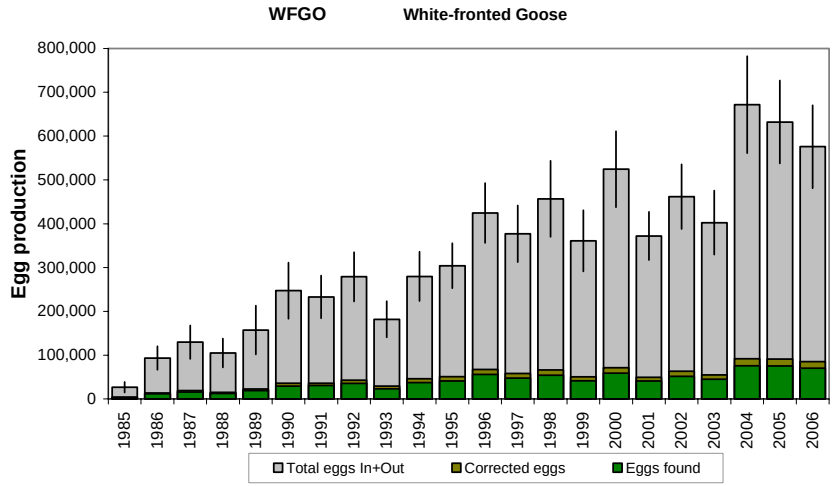




1997-2006 average annual growth rate = 1.027 (90%c.i. = 0.972 - 1.083)

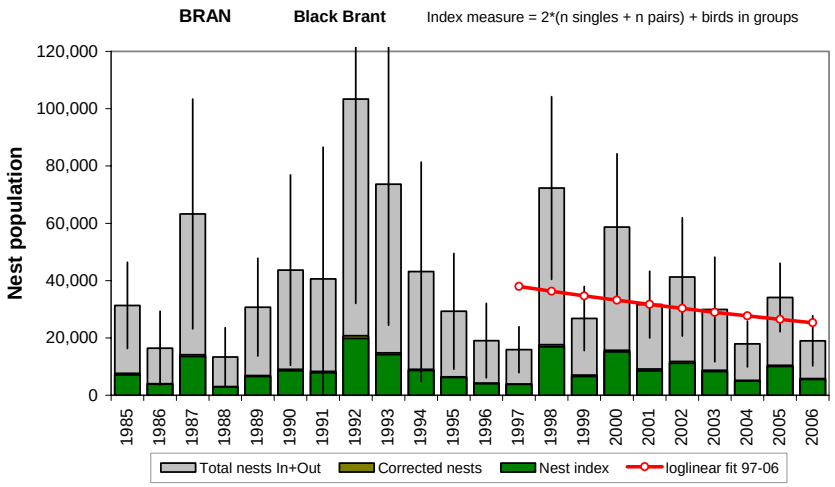
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
EMGO	**Emperor Goose**						Aerial index measure =2*(n singles + n pairs)								
1985	49	24.57	**3816**	685	4411	0.865	3.093	13643	**18054**	2595	**60315**	12180	3.34	62.6%	58.9%
1986	46	22.16	**5426**	620	6096	0.890	3.010	18350	**24445**	2320	**87932**	8978	3.60	75.0%	73.0%
1987	37	12.67	**8979**	1477	10218	0.879	2.974	30387	**40605**	5446	**199872**	29186	4.92	96.2%	96.1%
1988	31	10.04	**4920**	965	5530	0.890	2.874	15894	**21424**	3390	**88202**	13819	4.12	89.9%	88.9%
1989	23	7.45	**11824**	1769	13306	0.889	2.765	36793	**50099**	6197	**236242**	30659	4.72	92.7%	92.1%
1990	33	10.70	**10704**	1299	12490	0.857	2.628	32818	**45307**	4995	**190013**	21296	4.19	86.9%	85.3%
1991	36	11.66	**12157**	1812	13758	0.884	2.460	33839	**47597**	6156	**225117**	30056	4.73	97.0%	96.7%
1992	42	13.39	**10265**	1372	11906	0.862	2.298	27362	**39267**	4316	**191712**	22376	4.88	96.4%	96.3%
1993	47	15.23	**9777**	1116	11571	0.845	2.190	25336	**36907**	3504	**166039**	16626	4.50	94.7%	94.2%
1994	41	13.27	**13372**	1647	15561	0.859	2.094	32589	**48150**	4574	**225310**	23773	4.68	94.4%	93.9%
1995	50	22.56	**9738**	1127	11389	0.855	2.038	23207	**34597**	3090	**162246**	14475	4.69	96.7%	96.4%
1996	54	19.44	**11008**	1105	12866	0.856	2.081	26774	**39640**	3202	**190865**	16769	4.81	94.3%	93.7%
1997	72	23.31	**7368**	736	8461	0.871	2.171	18371	**26832**	2229	**122179**	10597	4.55	95.8%	95.2%
1998	64	20.71	**9295**	964	10719	0.867	2.211	23702	**34422**	2886	**152110**	13528	4.42	95.5%	95.2%
1999	53	16.97	**10166**	875	11794	0.862	2.338	27576	**39370**	3326	**160278**	14290	4.07	92.1%	91.6%
2000	80	25.86	**9715**	929	11185	0.869	2.411	26970	**38155**	3342	**186307**	16656	4.88	98.3%	98.1%
2001	81	26.23	**4503**	478	5209	0.864	2.442	12722	**17931**	1655	**65042**	7473	3.63	77.0%	75.4%
2002	84	27.15	**8699**	942	10142	0.858	2.523	25589	**35731**	3263	**164282**	15043	4.60	93.0%	92.4%
2003	83	26.87	**7057**	768	8311	0.849	2.526	20997	**29308**	2650	**109844**	11887	3.75	80.0%	78.3%
2004	81	26.22	**9690**	909	11051	0.877	2.504	27675	**38727**	3181	**179329**	15230	4.63	95.2%	94.9%
2005	83	26.87	**10948**	812	12588	0.870	2.575	32416	**45004**	3214	**208835**	14769	4.64	94.2%	93.4%
2006	75	24.28	**9373**	957	10648	0.880	2.431	25883	**36531**	2880	**166101**	12541	4.55	95.6%	95.1%

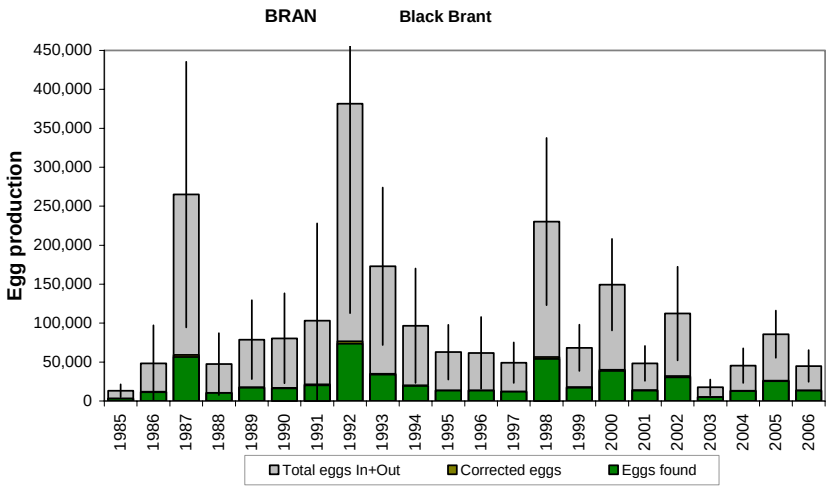




1997-2006 average annual growth rate = 1.055 (90%c.i. = 1.027 - 1.083)

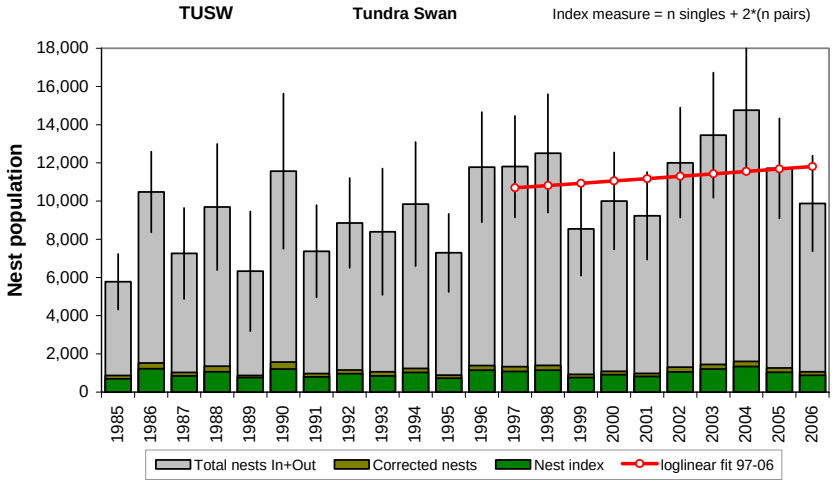
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Corrected nests IN	Avg nest detection rates	7yr avg aerial Out:In	Corrected nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
WFGO	**White-fronted Goose**						Aerial index measure =2*(n singles + n pairs)								
1985	49	24.57	**1078**	257	1331	0.810	5.784	7700	**9031**	2136	**26681**	7380	2.95	73.0%	70.3%
1986	46	22.16	**2907**	463	3493	0.832	5.870	20501	**23994**	3911	**93393**	16363	3.89	90.0%	89.1%
1987	37	12.67	**3275**	629	4026	0.814	5.839	23509	**27535**	5010	**129611**	23117	4.71	96.6%	96.1%
1988	31	10.04	**2995**	599	3568	0.839	5.987	21361	**24929**	4574	**105053**	19841	4.21	97.6%	97.5%
1989	23	7.45	**4037**	1004	4753	0.849	5.964	28346	**33099**	7540	**157063**	33869	4.75	95.2%	94.8%
1990	33	10.70	**7025**	1108	8674	0.810	5.910	51265	**59939**	9288	**247409**	38908	4.13	93.3%	92.8%
1991	36	11.66	**7184**	1009	8345	0.861	5.521	46070	**54416**	6975	**232854**	29675	4.28	94.9%	94.5%
1992	42	13.39	**8019**	1001	9710	0.826	5.490	53313	**63023**	7475	**278878**	34278	4.42	98.0%	97.8%
1993	47	15.23	**5641**	853	7015	0.804	5.251	36835	**43849**	6203	**181952**	24958	4.15	97.5%	97.1%
1994	41	13.27	**8789**	1097	10813	0.813	5.120	55365	**66177**	7962	**279850**	34085	4.23	97.5%	97.3%
1995	50	22.56	**9992**	1093	12340	0.810	4.990	61572	**73912**	7412	**303893**	31092	4.11	96.8%	96.5%
1996	54	19.44	**12849**	1303	15558	0.826	5.309	82601	**98159**	9388	**424407**	41485	4.32	96.6%	96.2%
1997	72	23.31	**11298**	1145	13823	0.817	5.494	75942	**89764**	8789	**377195**	39288	4.20	98.4%	98.2%
1998	64	20.71	**12785**	1320	15657	0.817	5.915	92609	**108266**	12325	**456670**	52666	4.22	97.6%	97.4%
1999	53	16.97	**10588**	1157	12853	0.824	6.164	79231	**92084**	10685	**360879**	42209	3.92	94.4%	94.1%
2000	80	25.86	**13646**	1258	16461	0.829	6.373	104898	**121359**	11869	**524426**	52674	4.32	97.4%	97.1%
2001	81	26.23	**11407**	935	13775	0.828	6.525	89887	**103663**	8496	**371949**	33434	3.59	93.5%	93.1%
2002	84	27.15	**11994**	1001	14694	0.816	6.328	92976	**107670**	9961	**461774**	44779	4.29	97.8%	97.7%
2003	83	26.87	**11265**	1151	13773	0.818	6.326	87124	**100897**	10708	**402506**	44277	3.99	94.1%	93.8%
2004	81	26.22	**17059**	1465	20638	0.827	6.331	130667	**151305**	15216	**671949**	67143	4.44	97.1%	96.8%
2005	83	26.87	**18432**	1472	22421	0.822	5.963	133704	**156125**	13898	**632143**	57399	4.05	96.0%	95.6%
2006	75	24.28	**17685**	1571	21537	0.821	5.748	123784	**145321**	14447	**575825**	57437	3.96	96.0%	95.5%

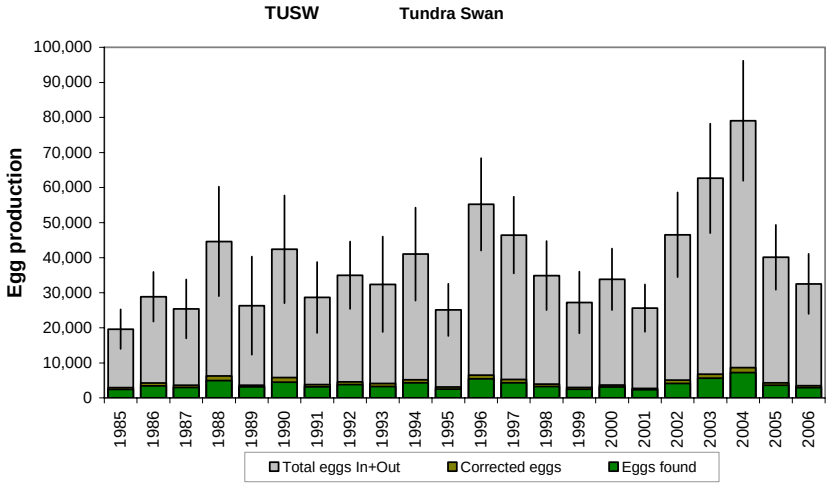




1997-2006 average annual growth rate = 0.956 (90%c.i. = 0.857 - 1.055)

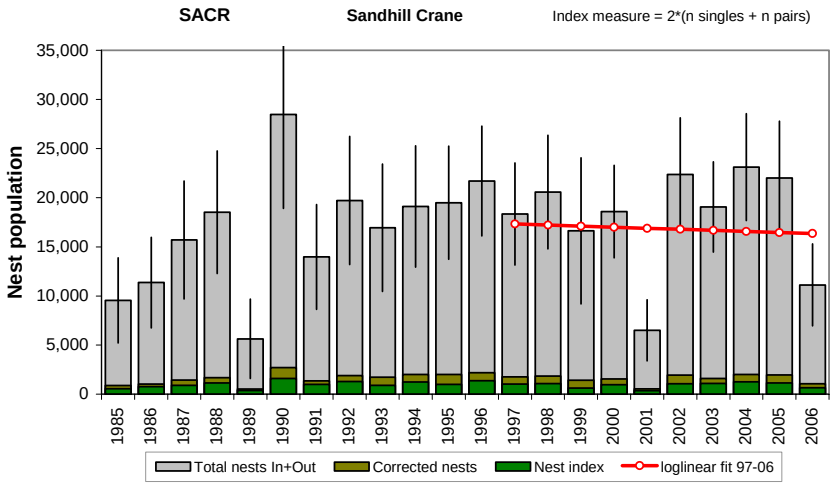
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
BRAN	**Black Brant**						Aerial index measure =2*(n singles + n pairs) + birds in groups								
1985	49	24.57	**7107**	2569	7675	0.926	3.084	23670	**31345**	9153	**13099**	4950	0.42	14.3%	13.5%
1986	46	22.16	**3844**	2304	4017	0.957	3.084	12390	**16407**	7825	**48256**	29740	2.94	74.8%	73.7%
1987	37	12.67	**13497**	6158	14117	0.956	3.480	49133	**63250**	24343	**265053**	103584	4.19	98.3%	98.3%
1988	31	10.04	**2852**	1620	2973	0.959	3.480	10349	**13322**	6217	**47430**	24113	3.56	90.0%	89.5%
1989	23	7.45	**6537**	2701	6893	0.948	3.453	23798	**30691**	10355	**78692**	30758	2.56	75.0%	73.5%
1990	33	10.70	**8563**	4710	9047	0.947	3.825	34609	**43656**	20191	**80384**	35076	1.84	60.2%	58.4%
1991	36	11.66	**7859**	6513	8335	0.943	3.870	32254	**40589**	27913	**103071**	75839	2.54	70.3%	69.5%
1992	42	13.39	**19835**	9859	20742	0.956	3.980	82559	**103301**	43294	**381497**	163325	3.69	95.7%	95.5%
1993	47	15.23	**14196**	6832	14838	0.957	3.961	58769	**73607**	29844	**172956**	61407	2.35	73.8%	72.8%
1994	41	13.27	**8681**	5693	9047	0.960	3.765	34062	**43109**	23222	**96655**	44584	2.24	93.2%	92.7%
1995	50	22.56	**6186**	3119	6410	0.965	3.571	22891	**29301**	12261	**62618**	21257	2.14	72.3%	71.7%
1996	54	19.44	**4050**	2022	4235	0.956	3.499	14820	**19055**	7894	**61747**	28054	3.24	87.3%	86.5%
1997	72	23.31	**3807**	1423	3938	0.967	3.039	11968	**15906**	4864	**49223**	15802	3.09	93.5%	93.1%
1998	64	20.71	**16862**	5452	17702	0.953	3.084	54599	**72301**	19342	**230196**	65161	3.18	87.3%	86.8%
1999	53	16.97	**6581**	2064	6991	0.941	2.828	19768	**26759**	6803	**68238**	18042	2.55	81.4%	80.7%
2000	80	25.86	**15140**	5069	15679	0.966	2.739	42942	**58620**	15574	**149356**	35717	2.55	89.2%	88.7%
2001	81	26.23	**8487**	2391	9156	0.927	2.454	22467	**31622**	7066	**48359**	13634	1.53	53.1%	51.8%
2002	84	27.15	**11177**	4344	11792	0.948	2.501	29490	**41282**	12518	**112299**	36501	2.72	87.7%	87.2%
2003	83	26.87	**8229**	4048	8741	0.941	2.423	21181	**29922**	11083	**17478**	6095	0.58	48.5%	46.8%
2004	81	26.22	**4968**	1710	5192	0.957	2.443	12685	**17877**	4839	**45420**	13390	2.54	78.6%	77.5%
2005	83	26.87	**10015**	2732	10385	0.964	2.284	23713	**34098**	7253	**85780**	18468	2.52	84.0%	83.3%
2006	75	24.28	**5541**	1993	5810	0.954	2.268	13177	**18987**	5308	**44983**	12394	2.37	70.2%	68.8%

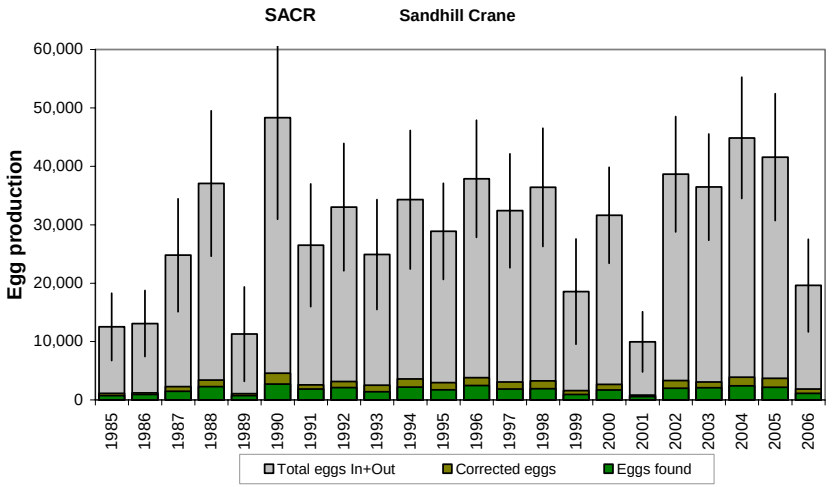




1997-2006 average annual growth rate = 1.011 (90%c.i. = 0.974 - 1.048)

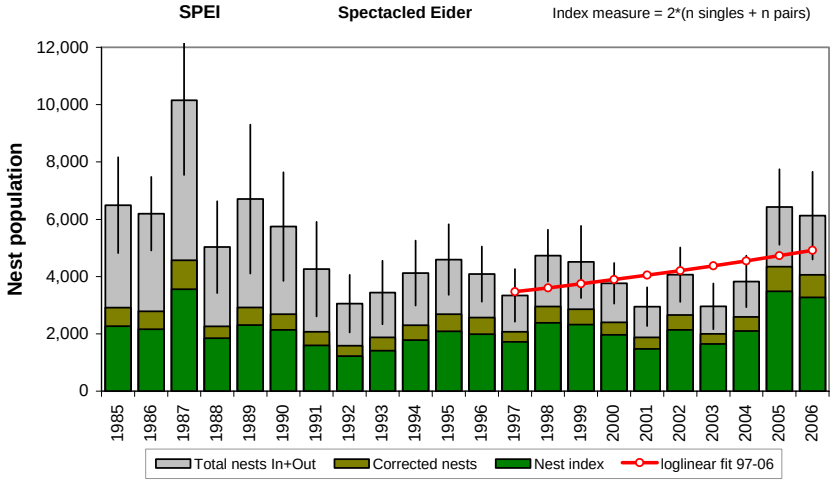
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
TUSW	**Tundra Swan**						Aerial index measure =n singles + 2*(n pairs)								
1985	49	24.57	**699**	119	863	0.810	5.694	4911	**5774**	883	**19589**	3412	3.39	87.5%	86.2%
1986	46	22.16	**1227**	166	1527	0.804	5.861	8948	**10475**	1280	**28825**	4298	2.75	86.8%	85.7%
1987	37	12.67	**847**	189	1027	0.825	6.064	6228	**7255**	1449	**25369**	5101	3.50	100.0%	100.0%
1988	31	10.04	**1070**	247	1355	0.789	6.149	8333	**9689**	2006	**44632**	9484	4.61	100.0%	100.0%
1989	23	7.45	**769**	263	869	0.885	6.278	5458	**6327**	1902	**26286**	8502	4.15	100.0%	100.0%
1990	33	10.70	**1204**	288	1579	0.763	6.323	9985	**11564**	2466	**42385**	9332	3.67	94.4%	93.5%
1991	36	11.66	**798**	178	976	0.818	6.554	6398	**7374**	1469	**28670**	6132	3.89	92.3%	91.6%
1992	42	13.39	**962**	174	1152	0.835	6.684	7701	**8854**	1429	**34975**	5842	3.95	100.0%	100.0%
1993	47	15.23	**846**	226	1063	0.796	6.899	7331	**8393**	2008	**32384**	8268	3.86	94.4%	94.9%
1994	41	13.27	**1024**	231	1237	0.828	6.959	8608	**9845**	1973	**40996**	8055	4.16	100.0%	100.0%
1995	50	22.56	**730**	135	889	0.821	7.203	6401	**7290**	1240	**25107**	4510	3.44	91.3%	90.9%
1996	54	19.44	**1141**	177	1389	0.822	7.474	10378	**11767**	1751	**55202**	8003	4.69	96.8%	95.9%
1997	72	23.31	**1074**	155	1326	0.810	7.901	10476	**11802**	1612	**46434**	6633	3.93	94.3%	93.7%
1998	64	20.71	**1140**	182	1396	0.817	7.952	11103	**12499**	1881	**34919**	5978	2.79	90.9%	90.0%
1999	53	16.97	**759**	145	924	0.822	8.249	7621	**8545**	1488	**27202**	5348	3.18	88.9%	87.8%
2000	80	25.86	**913**	153	1085	0.842	8.225	8922	**10007**	1541	**33823**	5336	3.38	93.9%	93.4%
2001	81	26.23	**819**	134	986	0.831	8.359	8238	**9224**	1394	**25613**	4083	2.78	83.3%	82.2%
2002	84	27.15	**1054**	166	1303	0.809	8.212	10704	**12007**	1747	**46525**	7331	3.87	90.0%	89.1%
2003	83	26.87	**1198**	187	1449	0.827	8.285	12001	**13450**	1990	**62622**	9480	4.66	97.8%	97.2%
2004	81	26.22	**1337**	189	1608	0.832	8.177	13147	**14755**	1962	**79064**	10392	5.36	98.0%	97.8%
2005	83	26.87	**1039**	150	1259	0.825	8.305	10455	**11714**	1590	**40113**	5620	3.42	94.9%	94.4%
2006	75	24.28	**884**	143	1062	0.833	8.299	8811	**9873**	1521	**32497**	5190	3.29	93.3%	92.9%

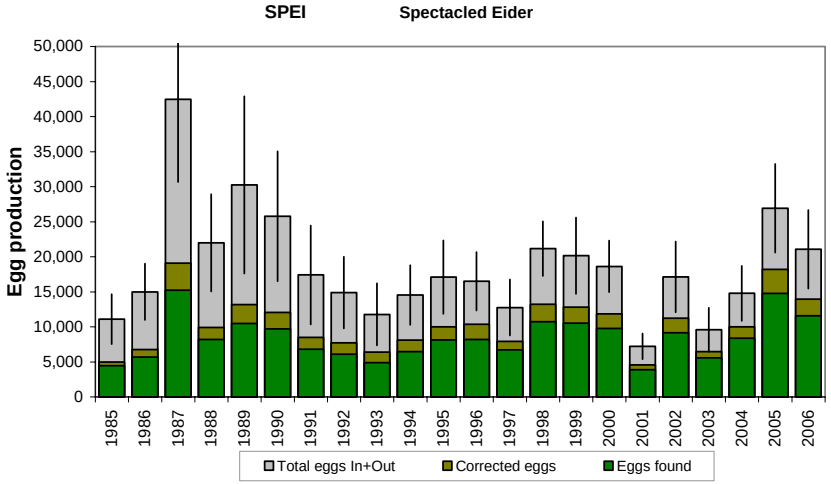




1997-2006 average annual growth rate = 0.994 (90%c.i. = 0.909 - 1.079)

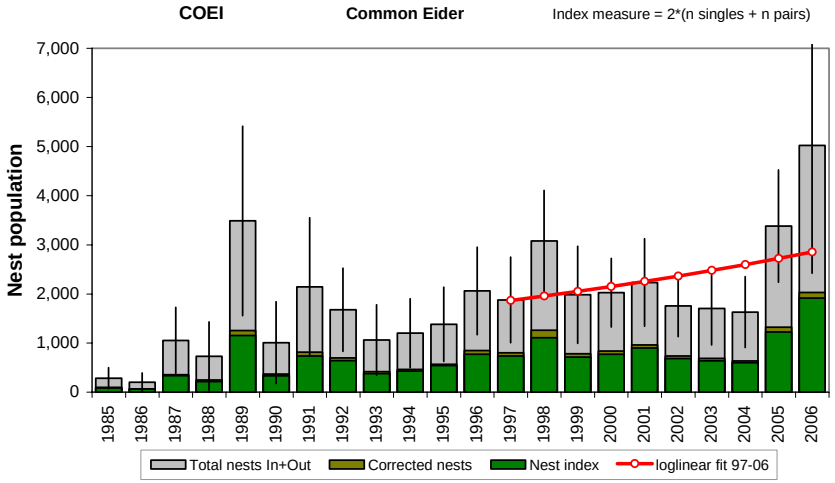
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
SACR	**Sandhill Crane**						Aerial index measure =2*(n singles + n pairs)								
1985	49	24.57	**553**	145	875	0.633	9.918	8676	**9551**	2628	**12521**	3510	1.31	84.2%	80.2%
1986	46	22.16	**775**	188	1040	0.745	9.918	10317	**11357**	2790	**13063**	3439	1.15	83.3%	77.6%
1987	37	12.67	**904**	192	1439	0.628	9.918	14269	**15708**	3643	**24792**	5873	1.58	100.0%	100.0%
1988	31	10.04	**1141**	225	1699	0.672	9.902	16823	**18522**	3783	**37044**	7566	2.00	93.7%	93.6%
1989	23	7.45	**385**	178	526	0.732	9.722	5110	**5635**	2455	**11271**	4909	2.00	100.0%	100.0%
1990	33	10.70	**1606**	305	2696	0.595	9.557	25770	**28466**	5813	**48348**	10584	1.70	95.8%	94.8%
1991	36	11.66	**982**	222	1350	0.728	9.354	12630	**13980**	3239	**26481**	6379	1.89	100.0%	100.0%
1992	42	13.39	**1283**	267	1881	0.682	9.484	17842	**19723**	3962	**33003**	6616	1.67	95.8%	95.5%
1993	47	15.23	**893**	227	1723	0.518	8.837	15226	**16949**	3934	**24894**	5706	1.47	94.7%	87.9%
1994	41	13.27	**1240**	254	2001	0.620	8.549	17109	**19110**	3747	**34285**	7207	1.79	100.0%	100.0%
1995	50	22.56	**983**	154	2003	0.491	8.728	17479	**19482**	3500	**28874**	5006	1.48	93.5%	77.3%
1996	54	19.44	**1362**	213	2191	0.622	8.905	19511	**21702**	3393	**37858**	6089	1.74	97.3%	92.8%
1997	72	23.31	**1044**	187	1746	0.598	9.505	16597	**18343**	3159	**32386**	5913	1.77	100.0%	100.0%
1998	64	20.71	**1071**	175	1839	0.582	10.181	18724	**20563**	3514	**36412**	6150	1.77	100.0%	100.0%
1999	53	16.97	**633**	162	1416	0.447	10.744	15212	**16628**	4517	**18551**	5482	1.12	86.7%	66.0%
2000	80	25.86	**969**	139	1563	0.620	10.893	17025	**18588**	2854	**31598**	4989	1.70	97.1%	92.4%
2001	81	26.23	**355**	111	542	0.654	11.000	5964	**6506**	1882	**9964**	3123	1.53	92.3%	90.0%
2002	84	27.15	**1054**	149	1933	0.546	10.577	20441	**22373**	3493	**38644**	6001	1.73	95.0%	86.4%
2003	83	26.87	**1092**	155	1608	0.679	10.856	17455	**19062**	2793	**36446**	5525	1.91	97.6%	97.5%
2004	81	26.22	**1256**	161	2003	0.627	10.537	21104	**23107**	3308	**44873**	6319	1.94	100.0%	100.0%
2005	83	26.87	**1145**	164	1962	0.584	10.214	20042	**22004**	3518	**41563**	6597	1.89	100.0%	100.0%
2006	75	24.28	**648**	141	1052	0.616	9.579	10075	**11127**	2534	**19594**	4809	1.76	100.0%	100.0%

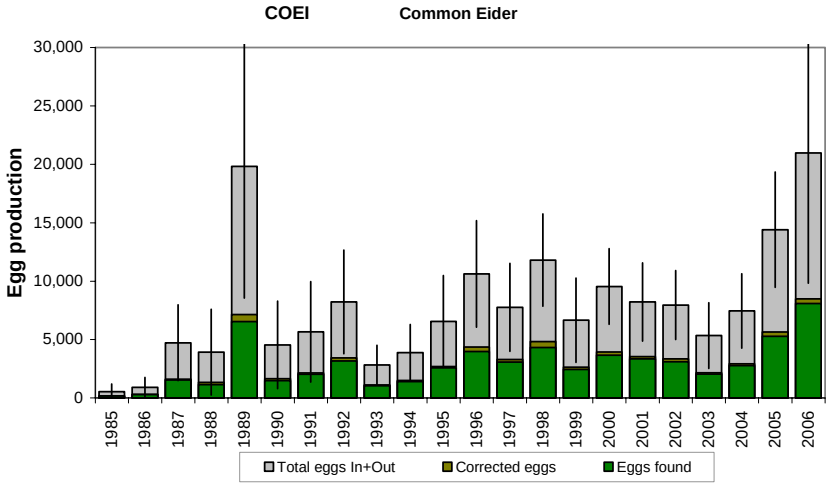




1997-2006 average annual growth rate = 1.039 (90%c.i. = 0.984 - 1.095)

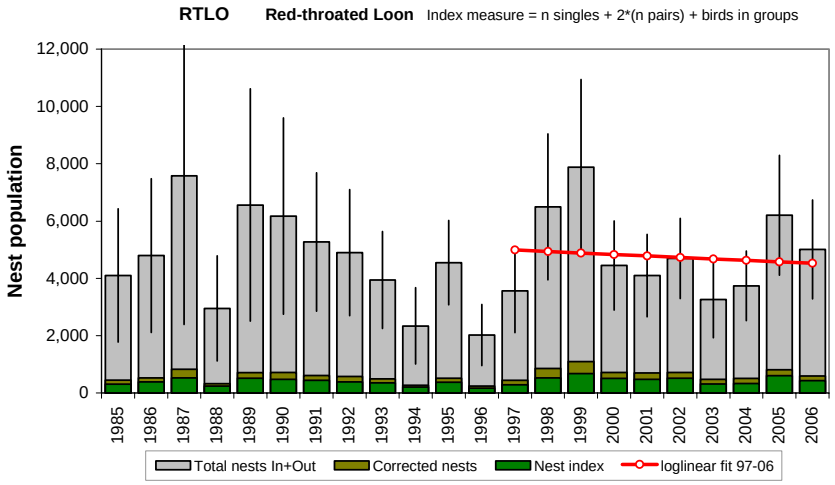
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
SPEI	**Spectacled Eider**						Aerial index measure =2*(n singles + n pairs)								
1985	49	24.57	**2272**	489	2919	0.778	1.224	3572	**6491**	1015	**11107**	2171	1.71	51.3%	44.6%
1986	46	22.16	**2164**	366	2786	0.777	1.224	3409	**6194**	782	**14988**	2444	2.42	59.7%	54.9%
1987	37	12.67	**3558**	758	4568	0.779	1.224	5589	**10157**	1585	**42468**	7174	4.18	84.1%	82.6%
1988	31	10.04	**1854**	500	2261	0.820	1.224	2767	**5028**	974	**21990**	4208	4.37	92.3%	90.9%
1989	23	7.45	**2307**	751	2927	0.788	1.291	3778	**6705**	1580	**30242**	7684	4.51	91.7%	90.3%
1990	33	10.70	**2141**	552	2689	0.796	1.138	3060	**5749**	1151	**25781**	5633	4.48	90.6%	89.2%
1991	36	11.66	**1596**	491	2075	0.769	1.052	2184	**4259**	1002	**17400**	4282	4.09	80.8%	77.5%
1992	42	13.39	**1230**	308	1587	0.775	0.926	1470	**3057**	609	**14877**	3105	4.87	91.3%	89.6%
1993	47	15.23	**1410**	348	1874	0.753	0.838	1571	**3445**	673	**11769**	2691	3.42	83.3%	80.0%
1994	41	13.27	**1779**	344	2300	0.774	0.792	1823	**4123**	689	**14529**	2586	3.52	78.8%	75.8%
1995	50	22.56	**2094**	417	2684	0.780	0.712	1910	**4594**	748	**17097**	3175	3.72	80.3%	76.2%
1996	54	19.44	**1988**	377	2573	0.773	0.589	1516	**4088**	583	**16489**	2529	4.03	81.5%	79.6%
1997	72	23.31	**1719**	404	2079	0.827	0.608	1265	**3344**	558	**12760**	2430	3.82	89.3%	87.2%
1998	64	20.71	**2384**	374	2956	0.806	0.599	1772	**4728**	549	**21161**	2365	4.48	92.8%	91.9%
1999	53	16.97	**2320**	532	2864	0.810	0.575	1647	**4511**	765	**20154**	3303	4.47	90.9%	90.1%
2000	80	25.86	**1965**	295	2398	0.820	0.569	1366	**3763**	431	**18627**	2233	4.95	93.0%	92.6%
2001	81	26.23	**1474**	275	1873	0.787	0.576	1078	**2952**	409	**7231**	1107	2.45	63.0%	58.7%
2002	84	27.15	**2135**	407	2664	0.801	0.527	1404	**4068**	577	**17126**	3063	4.21	81.5%	80.0%
2003	83	26.87	**1651**	350	1998	0.827	0.482	964	**2961**	486	**9582**	1911	3.24	77.4%	73.4%
2004	81	26.22	**2102**	387	2590	0.811	0.478	1239	**3829**	546	**14789**	2389	3.86	80.5%	77.7%
2005	83	26.87	**3489**	538	4346	0.803	0.479	2082	**6427**	800	**26920**	3848	4.19	90.8%	89.3%
2006	75	24.28	**3272**	641	4061	0.806	0.509	2066	**6127**	929	**21057**	3404	3.44	78.4%	76.3%

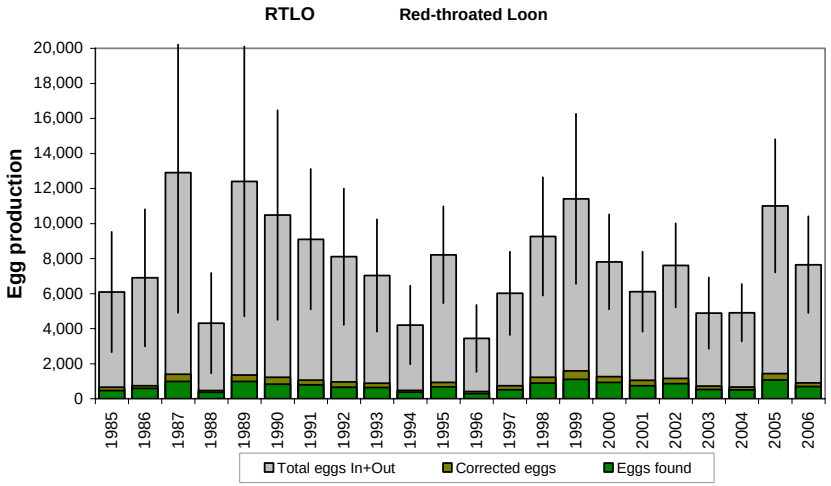




1997-2006 average annual growth rate = 1.048 (90%c.i. = 0.972 - 1.125)

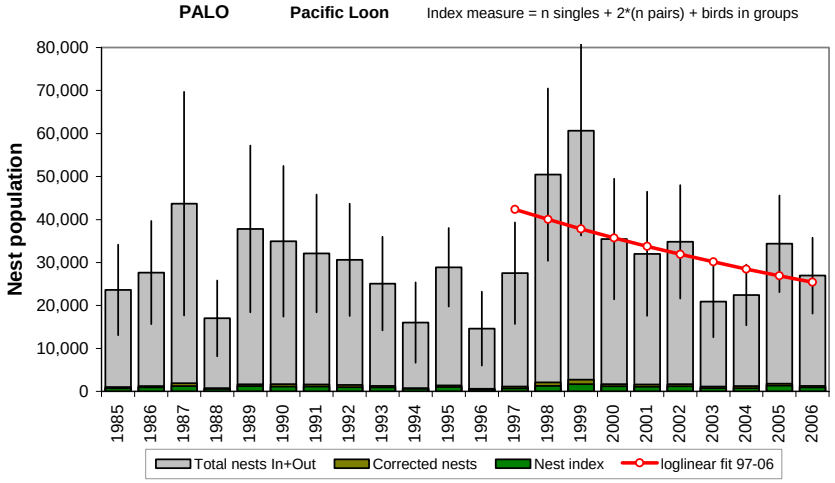
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
COEI	**Common Eider**						Aerial index measure =2*(n singles + n pairs)								
1985	49	24.57	**87**	47	97	0.902	1.950	189	**286**	129	**525**	404	1.84	33.3%	30.6%
1986	46	22.16	**65**	45	69	0.942	1.950	134	**202**	114	**914**	518	4.52	100.0%	100.0%
1987	37	12.67	**339**	152	358	0.947	1.950	697	**1055**	408	**4721**	1969	4.47	83.3%	82.8%
1988	31	10.04	**214**	156	248	0.863	1.950	483	**731**	424	**3912**	2228	5.35	100.0%	100.0%
1989	23	7.45	**1154**	456	1256	0.919	1.778	2233	**3488**	1172	**19823**	6839	5.68	100.0%	100.0%
1990	33	10.70	**335**	216	367	0.912	1.747	641	**1008**	505	**4540**	2277	4.50	100.0%	100.0%
1991	36	11.66	**737**	381	814	0.906	1.634	1329	**2143**	857	**5652**	2610	2.64	58.3%	55.5%
1992	42	13.39	**642**	254	698	0.919	1.403	980	**1679**	514	**8220**	2694	4.90	91.7%	91.1%
1993	47	15.23	**376**	203	420	0.895	1.525	641	**1061**	435	**2824**	1026	2.66	62.5%	60.0%
1994	41	13.27	**431**	205	465	0.927	1.581	736	**1201**	428	**3871**	1462	3.22	87.5%	86.4%
1995	50	22.56	**539**	247	567	0.951	1.435	814	**1381**	460	**6551**	2389	4.75	94.1%	93.5%
1996	54	19.44	**773**	271	846	0.914	1.437	1216	**2062**	542	**10621**	2773	5.15	95.2%	94.7%
1997	72	23.31	**737**	285	800	0.921	1.349	1079	**1879**	529	**7755**	2290	4.13	91.7%	91.2%
1998	64	20.71	**1106**	299	1261	0.877	1.444	1820	**3081**	624	**11798**	2398	3.83	78.1%	76.4%
1999	53	16.97	**717**	296	782	0.917	1.536	1201	**1983**	600	**6653**	2195	3.35	76.5%	75.1%
2000	80	25.86	**775**	212	837	0.926	1.422	1190	**2027**	424	**9533**	1965	4.70	96.4%	96.0%
2001	81	26.23	**900**	292	962	0.936	1.323	1272	**2234**	542	**8214**	2039	3.68	90.9%	89.8%
2002	84	27.15	**685**	191	740	0.926	1.371	1015	**1755**	381	**7949**	1795	4.53	96.2%	96.0%
2003	83	26.87	**639**	225	688	0.929	1.480	1018	**1706**	451	**5339**	1714	3.13	75.0%	73.2%
2004	81	26.22	**600**	212	637	0.943	1.563	995	**1632**	440	**7453**	1939	4.57	95.5%	95.2%
2005	83	26.87	**1225**	298	1325	0.924	1.552	2057	**3383**	695	**14406**	3003	4.26	87.0%	86.3%
2006	75	24.28	**1916**	751	2030	0.944	1.475	2995	**5025**	1580	**20967**	6774	4.17	87.7%	86.8%

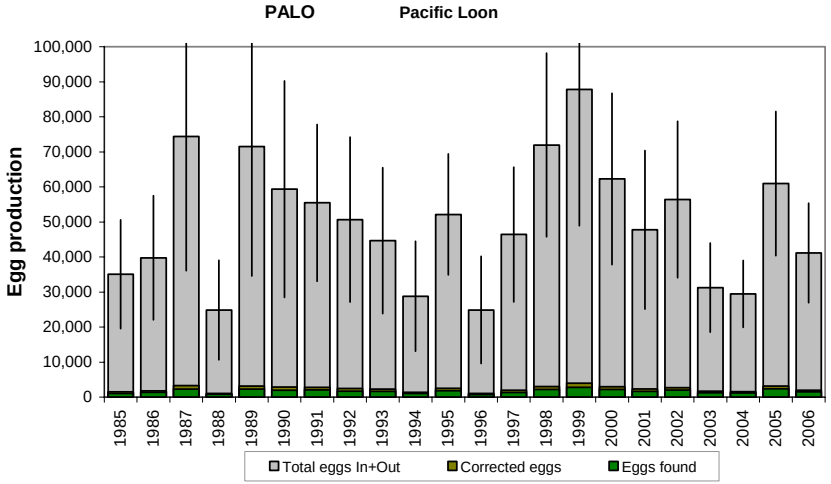




1997-2006 average annual growth rate = 0.989 (90%c.i. = 0.928 - 1.050)

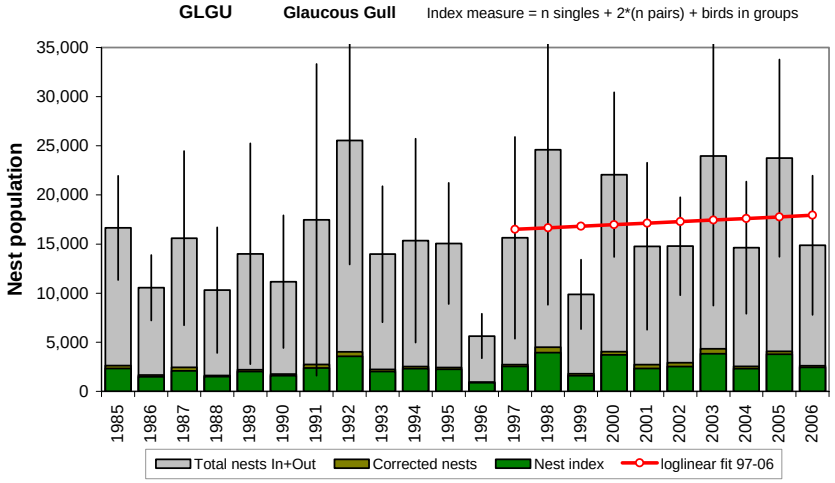
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
RTLO	**Red-throated Loon**						Aerial index measure =n singles + 2*(n pairs) + birds in groups								
1985	49	24.57	**306**	68	446	0.687	8.201	3655	**4101**	1413	**6091**	2086	1.49	94.3%	90.4%
1986	46	22.16	**388**	86	522	0.744	8.201	4277	**4799**	1629	**6904**	2374	1.44	92.5%	87.6%
1987	37	12.67	**526**	145	824	0.639	8.201	6755	**7579**	3150	**12913**	4859	1.70	96.8%	87.5%
1988	31	10.04	**236**	68	321	0.735	8.201	2631	**2952**	1115	**4315**	1743	1.46	90.9%	88.2%
1989	23	7.45	**520**	155	713	0.729	8.201	5850	**6563**	2462	**12403**	4673	1.89	100.0%	100.0%
1990	33	10.70	**479**	128	719	0.666	7.587	5454	**6173**	2083	**10483**	3635	1.70	95.8%	93.2%
1991	36	11.66	**439**	105	611	0.719	7.631	4660	**5271**	1468	**9104**	2431	1.73	96.2%	92.8%
1992	42	13.39	**387**	96	580	0.668	7.453	4320	**4900**	1334	**8109**	2366	1.65	92.3%	89.2%
1993	47	15.23	**356**	96	496	0.718	6.950	3446	**3942**	1026	**7029**	1950	1.78	96.3%	93.1%
1994	41	13.27	**209**	78	270	0.772	7.669	2072	**2342**	808	**4207**	1362	1.80	100.0%	100.0%
1995	50	22.56	**380**	76	520	0.730	7.744	4028	**4548**	894	**8215**	1679	1.81	100.0%	100.0%
1996	54	19.44	**173**	57	242	0.716	7.369	1781	**2022**	646	**3448**	1156	1.71	100.0%	100.0%
1997	72	23.31	**282**	67	442	0.637	7.066	3126	**3568**	886	**6018**	1444	1.69	97.0%	88.3%
1998	64	20.71	**529**	100	859	0.615	6.563	5639	**6498**	1549	**9267**	2052	1.43	90.6%	76.3%
1999	53	16.97	**676**	131	1094	0.618	6.199	6782	**7876**	1861	**11410**	2947	1.45	92.9%	80.2%
2000	80	25.86	**511**	89	718	0.712	5.200	3733	**4450**	943	**7814**	1643	1.76	96.8%	92.8%
2001	81	26.23	**478**	98	699	0.684	4.863	3397	**4096**	872	**6109**	1385	1.49	94.7%	91.8%
2002	84	27.15	**514**	79	717	0.717	5.548	3980	**4697**	850	**7610**	1455	1.62	96.9%	94.4%
2003	83	26.87	**318**	71	479	0.664	5.818	2784	**3263**	809	**4885**	1239	1.50	95.0%	86.5%
2004	81	26.22	**333**	57	513	0.649	6.286	3226	**3739**	740	**4911**	994	1.31	87.8%	76.3%
2005	83	26.87	**604**	104	808	0.748	6.678	5395	**6203**	1269	**11007**	2311	1.77	98.6%	98.1%
2006	75	24.28	**430**	84	597	0.720	7.388	4414	**5011**	1049	**7652**	1673	1.53	93.5%	88.7%

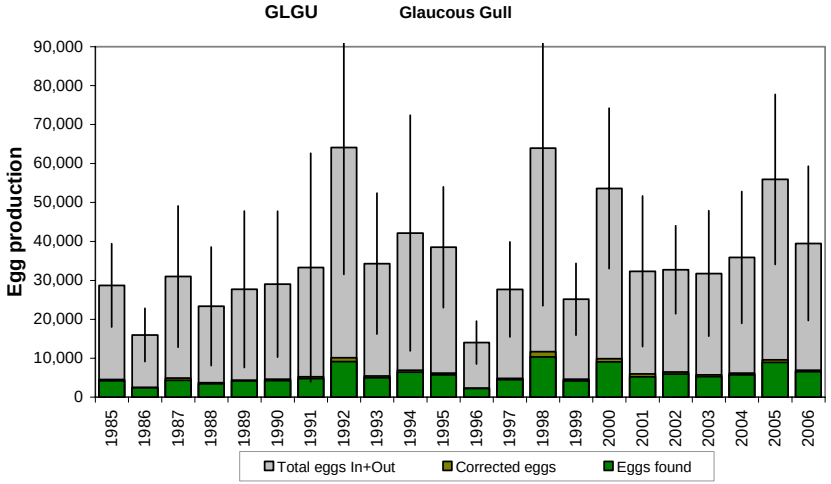




1997-2006 average annual growth rate = 0.945 (90%c.i. = 0.886 - 1.003)

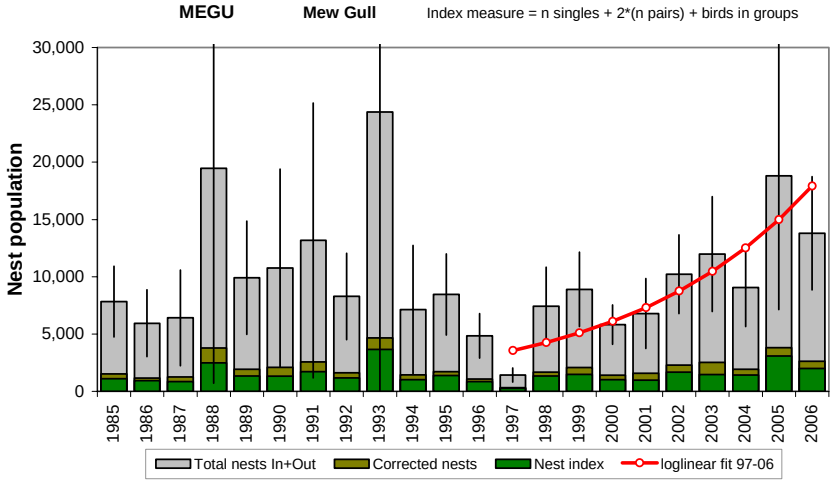
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
PALO	**Pacific Loon**						Aerial index measure =n singles + 2*(n pairs) + birds in groups								
1985	49	24.57	**713**	151	1038	0.687	21.771	22589	**23627**	6409	**35093**	9421	1.49	94.3%	90.4%
1986	46	22.16	**904**	190	1214	0.744	21.771	26434	**27648**	7305	**39778**	10748	1.44	92.5%	87.6%
1987	37	12.67	**1225**	326	1917	0.639	21.771	41745	**43663**	15811	**74397**	23277	1.70	96.8%	87.5%
1988	31	10.04	**549**	153	747	0.735	21.771	16258	**17005**	5351	**24858**	8638	1.46	90.9%	88.2%
1989	23	7.45	**1210**	350	1661	0.729	21.771	36152	**37812**	11768	**71459**	22393	1.89	100.0%	100.0%
1990	33	10.70	**1127**	295	1693	0.666	19.649	33260	**34953**	10656	**59356**	18765	1.70	95.8%	93.2%
1991	36	11.66	**1157**	254	1610	0.719	18.946	30493	**32103**	8306	**55450**	13588	1.73	96.2%	92.8%
1992	42	13.39	**1003**	236	1500	0.668	19.411	29118	**30618**	7941	**50666**	14286	1.65	92.3%	89.2%
1993	47	15.23	**913**	235	1272	0.718	18.705	23792	**25064**	6611	**44687**	12643	1.78	96.3%	93.1%
1994	41	13.27	**600**	219	778	0.772	19.608	15247	**16024**	5678	**28791**	9529	1.80	100.0%	100.0%
1995	50	22.56	**1016**	178	1392	0.730	19.737	27477	**28869**	5548	**52141**	10483	1.81	100.0%	100.0%
1996	54	19.44	**453**	141	632	0.716	22.082	13956	**14589**	5217	**24875**	9299	1.71	100.0%	100.0%
1997	72	23.31	**731**	158	1147	0.637	22.983	26372	**27519**	7170	**46413**	11660	1.69	97.0%	88.3%
1998	64	20.71	**1303**	225	2117	0.615	22.829	48341	**50459**	12165	**71954**	15926	1.43	90.6%	76.3%
1999	53	16.97	**1686**	298	2727	0.618	21.236	57906	**60633**	14802	**87841**	23640	1.45	92.9%	80.2%
2000	80	25.86	**1205**	187	1692	0.712	19.960	33767	**35459**	8528	**62256**	14855	1.76	96.8%	92.8%
2001	81	26.23	**1077**	211	1574	0.684	19.333	30430	**32004**	8765	**47731**	13736	1.49	94.7%	91.8%
2002	84	27.15	**1199**	172	1674	0.717	19.802	33145	**34818**	8022	**56404**	13558	1.62	96.9%	94.4%
2003	83	26.87	**748**	163	1127	0.664	17.527	19748	**20875**	5016	**31257**	7722	1.50	95.0%	86.5%
2004	81	26.22	**786**	125	1210	0.649	17.536	21225	**22435**	4270	**29467**	5772	1.31	87.8%	76.3%
2005	83	26.87	**1340**	221	1792	0.748	18.173	32563	**34355**	6826	**60962**	12499	1.77	98.6%	98.1%
2006	75	24.28	**926**	171	1285	0.720	19.956	25650	**26935**	5357	**41132**	8633	1.53	93.5%	88.7%

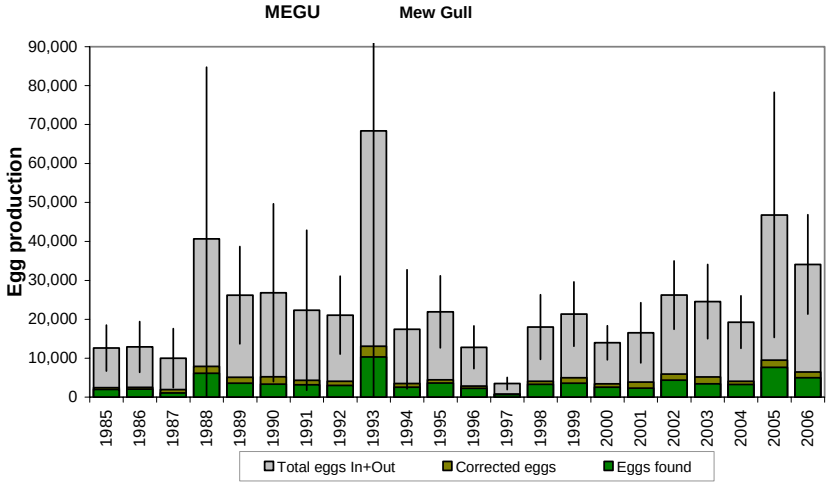




1997-2006 average annual growth rate = 1.009 (90%c.i. = 0.944 - 1.075)

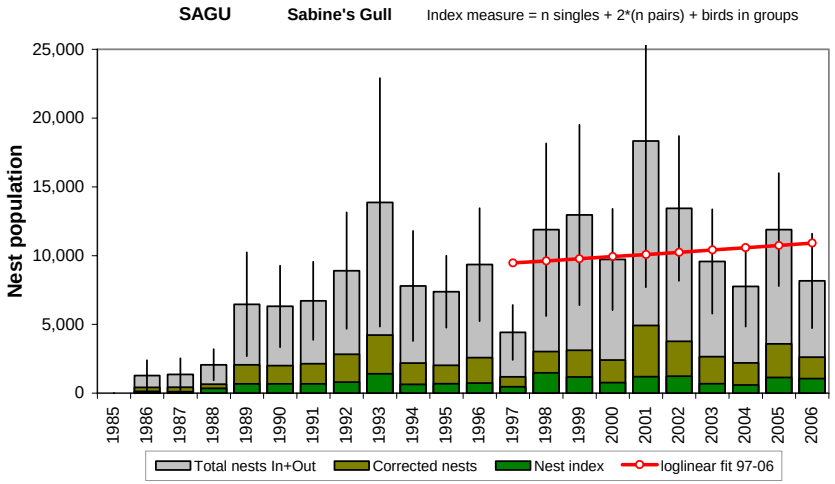
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
GLGU	**Glaucous Gull**						Aerial index measure =n singles + 2*(n pairs) + birds in groups								
1985	49	24.57	**2330**	487	2625	0.888	5.344	14029	**16654**	3219	**28702**	6489	1.72	86.3%	82.9%
1986	46	22.16	**1486**	316	1663	0.893	5.344	8890	**10553**	2021	**15983**	4147	1.51	73.9%	70.4%
1987	37	12.67	**2089**	766	2457	0.850	5.344	13131	**15589**	5386	**30983**	11015	1.99	97.3%	92.6%
1988	31	10.04	**1498**	647	1624	0.922	5.344	8682	**10306**	3878	**23350**	9236	2.27	90.5%	89.5%
1989	23	7.45	**2019**	1106	2208	0.914	5.344	11798	**14006**	6832	**27713**	12207	1.98	90.5%	87.2%
1990	33	10.70	**1606**	689	1758	0.913	5.344	9395	**11153**	4101	**29032**	11383	2.60	91.7%	89.6%
1991	36	11.66	**2395**	1501	2754	0.869	5.344	14719	**17473**	9635	**33293**	17835	1.91	66.7%	63.8%
1992	42	13.39	**3582**	1211	4027	0.889	5.344	21521	**25548**	7673	**64115**	19801	2.51	94.0%	92.5%
1993	47	15.23	**2021**	703	2228	0.907	5.268	11740	**13968**	4201	**34290**	11006	2.45	97.7%	97.2%
1994	41	13.27	**2319**	1103	2532	0.916	5.061	12815	**15347**	6301	**42130**	18380	2.75	97.7%	97.1%
1995	50	22.56	**2252**	643	2428	0.928	5.204	12633	**15061**	3744	**38488**	9425	2.56	100.0%	100.0%
1996	54	19.44	**884**	241	940	0.940	4.990	4689	**5629**	1373	**14030**	3345	2.49	100.0%	100.0%
1997	72	23.31	**2548**	1188	2716	0.938	4.757	12918	**15633**	6235	**27652**	7407	1.77	98.8%	98.6%
1998	64	20.71	**3939**	1749	4495	0.876	4.474	20109	**24604**	9579	**63911**	24558	2.60	98.2%	97.3%
1999	53	16.97	**1603**	387	1804	0.889	4.479	8080	**9884**	2143	**25127**	5607	2.54	94.7%	93.5%
2000	80	25.86	**3709**	974	4054	0.915	4.442	18008	**22061**	5092	**53618**	12513	2.43	97.8%	97.1%
2001	81	26.23	**2347**	955	2718	0.863	4.436	12058	**14776**	5165	**32336**	11744	2.19	94.2%	92.6%
2002	84	27.15	**2531**	580	2917	0.867	4.066	11862	**14779**	3029	**32705**	6860	2.21	89.6%	85.3%
2003	83	26.87	**3835**	1748	4338	0.884	4.528	19643	**23981**	9259	**31764**	9790	1.32	84.7%	80.9%
2004	81	26.22	**2320**	717	2534	0.915	4.772	12094	**14628**	4083	**35885**	10264	2.45	98.8%	98.5%
2005	83	26.87	**3782**	1049	4084	0.926	4.815	19667	**23751**	6100	**55916**	13266	2.35	97.9%	97.5%
2006	75	24.28	**2446**	742	2600	0.941	4.722	12276	**14876**	4303	**39483**	12026	2.65	98.8%	98.6%

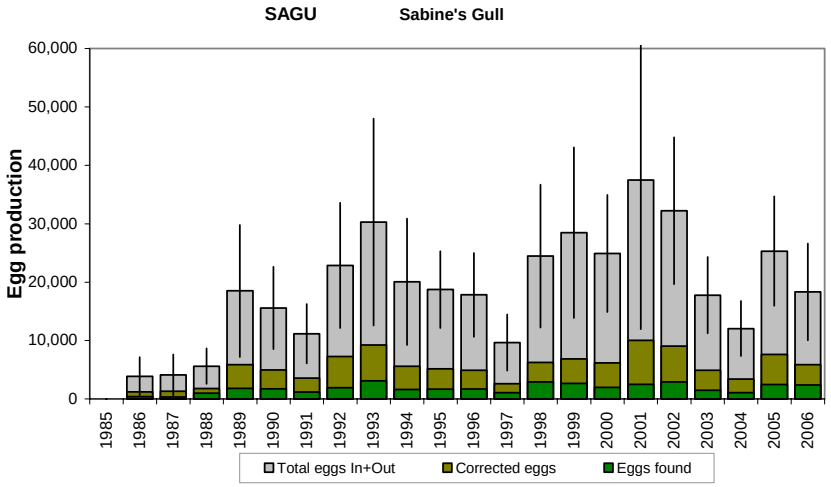




1997-2006 average annual growth rate = 1.196 (90%c.i. = 1.082 - 1.310)

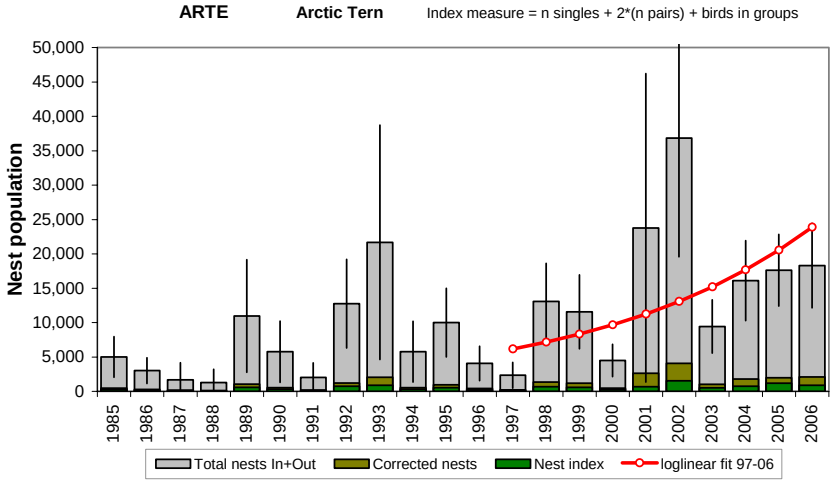
Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Corrected nests IN	Avg nest detection rates	7yr avg aerial Out:In	Corrected nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
MEGU Mew Gull							Aerial index measure =n singles + 2*(n pairs) + birds in groups								
1985	49	24.57	**1107**	270	1525	0.726	4.140	6311	**7836**	1875	**12602**	3585	1.61	92.1%	82.3%
1986	46	22.16	**937**	286	1157	0.809	4.140	4791	**5949**	1773	**12891**	3979	2.17	96.5%	94.8%
1987	37	12.67	**847**	385	1249	0.678	4.140	5170	**6419**	2536	**10022**	4620	1.56	100.0%	100.0%
1988	31	10.04	**2496**	1871	3789	0.659	4.140	15686	**19476**	11391	**40663**	26755	2.09	97.1%	84.6%
1989	23	7.45	**1346**	385	1930	0.697	4.140	7987	**9917**	3004	**26168**	7581	2.64	100.0%	100.0%
1990	33	10.70	**1338**	814	2095	0.639	4.140	8670	**10765**	5233	**26798**	13878	2.49	95.0%	92.8%
1991	36	11.66	**1719**	1037	2562	0.671	4.140	10607	**13170**	7281	**22310**	12487	1.69	78.6%	71.6%
1992	42	13.39	**1176**	323	1612	0.729	4.140	6675	**8287**	2294	**21067**	6056	2.54	95.5%	94.7%
1993	47	15.23	**3667**	2931	4661	0.787	4.231	19720	**24380**	15551	**68392**	44018	2.81	100.0%	100.0%
1994	41	13.27	**1024**	547	1450	0.707	3.928	5694	**7144**	3396	**17438**	9288	2.44	94.7%	92.0%
1995	50	22.56	**1396**	403	1719	0.812	3.923	6746	**8465**	2152	**21906**	5627	2.59	100.0%	100.0%
1996	54	19.44	**847**	241	1083	0.782	3.473	3763	**4846**	1177	**12787**	3331	2.64	100.0%	100.0%
1997	72	23.31	**276**	85	323	0.856	3.418	1104	**1427**	372	**3501**	955	2.45	100.0%	100.0%
1998	64	20.71	**1348**	446	1685	0.800	3.405	5739	**7424**	2071	**18011**	5040	2.43	100.0%	100.0%
1999	53	16.97	**1476**	399	2089	0.707	3.261	6813	**8903**	1970	**21335**	5018	2.40	97.1%	96.8%
2000	80	25.86	**1024**	189	1414	0.724	3.120	4412	**5826**	1043	**13968**	2656	2.40	94.6%	92.7%
2001	81	26.23	**982**	300	1588	0.618	3.275	5202	**6791**	1855	**16526**	4684	2.43	100.0%	100.0%
2002	84	27.15	**1687**	378	2305	0.732	3.438	7926	**10231**	2086	**26215**	5332	2.56	96.9%	95.5%
2003	83	26.87	**1465**	387	2535	0.578	3.725	9443	**11978**	3048	**24543**	5785	2.05	90.9%	79.5%
2004	81	26.22	**1419**	326	1934	0.734	3.684	7124	**9058**	2066	**19269**	4090	2.13	94.2%	86.9%
2005	83	26.87	**3090**	1366	3813	0.810	3.935	15006	**18819**	7100	**46814**	19110	2.49	100.0%	100.0%
2006	75	24.28	**2004**	507	2623	0.764	4.258	11171	**13794**	2994	**34096**	7747	2.47	100.0%	100.0%

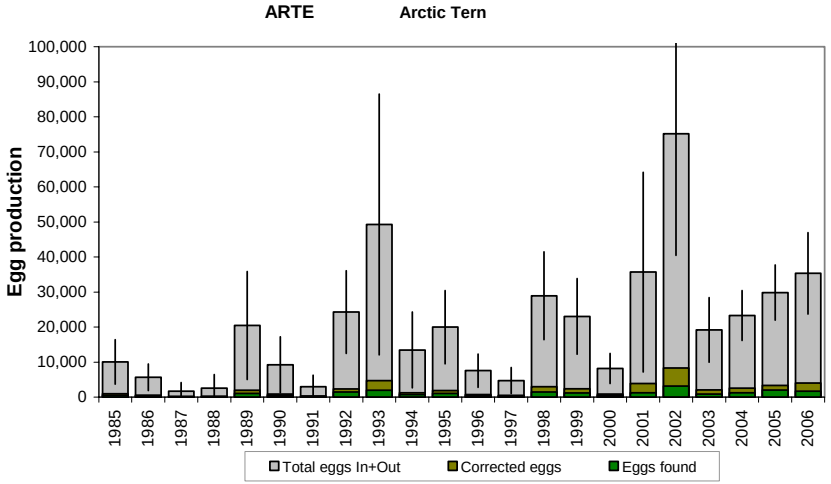




1997-2006 average annual growth rate = 1.016 (90%c.i. = 0.931 - 1.101)

Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
SAGU	**Sabine's Gull**						Aerial index measure =n singles + 2*(n pairs) + birds in groups								
1985	49	24.57	**0**	0	0		2.146	0	**0**	0	**0**	0			
1986	46	22.16	**129**	78	410	0.315	2.146	880	**1290**	669	**3869**	2006	3.00	100.0%	100.0%
1987	37	12.67	**113**	76	436	0.259	2.146	935	**1371**	709	**4112**	2129	3.00	100.0%	100.0%
1988	31	10.04	**357**	147	656	0.543	2.146	1408	**2064**	689	**5619**	1842	2.72	100.0%	100.0%
1989	23	7.45	**673**	291	2053	0.328	2.146	4406	**6459**	2294	**18503**	6861	2.86	100.0%	100.0%
1990	33	10.70	**669**	223	2007	0.333	2.146	4306	**6313**	1802	**15569**	4293	2.47	100.0%	100.0%
1991	36	11.66	**675**	192	2134	0.316	2.146	4579	**6714**	1722	**11176**	3084	1.66	100.0%	100.0%
1992	42	13.39	**802**	291	2833	0.283	2.146	6078	**8911**	2574	**22854**	6510	2.56	100.0%	100.0%
1993	47	15.23	**1410**	724	4225	0.334	2.286	9656	**13880**	5487	**30295**	10759	2.18	96.7%	90.6%
1994	41	13.27	**647**	220	2179	0.297	2.580	5622	**7800**	2430	**20062**	6577	2.57	100.0%	100.0%
1995	50	22.56	**698**	185	2024	0.345	2.646	5356	**7380**	1590	**18731**	3988	2.54	100.0%	100.0%
1996	54	19.44	**736**	216	2591	0.284	2.609	6760	**9351**	2496	**17811**	4359	1.90	95.0%	78.7%
1997	72	23.31	**460**	136	1196	0.385	2.694	3223	**4419**	1209	**9656**	2913	2.18	100.0%	100.0%
1998	64	20.71	**1486**	720	3026	0.491	2.930	8866	**11893**	3812	**24471**	7427	2.06	100.0%	100.0%
1999	53	16.97	**1181**	560	3113	0.379	3.163	9846	**12958**	3988	**28470**	8882	2.20	100.0%	100.0%
2000	80	25.86	**775**	182	2408	0.322	3.040	7322	**9730**	2237	**24903**	6086	2.56	100.0%	100.0%
2001	81	26.23	**1201**	423	4915	0.244	2.732	13430	**18345**	6462	**37461**	15477	2.04	97.7%	88.7%
2002	84	27.15	**1239**	404	3774	0.328	2.560	9661	**13434**	3199	**32217**	7632	2.40	100.0%	100.0%
2003	83	26.87	**692**	186	2656	0.261	2.607	6924	**9580**	2301	**17757**	3966	1.85	96.2%	84.9%
2004	81	26.22	**600**	148	2199	0.273	2.528	5560	**7759**	1778	**12043**	2865	1.55	90.9%	78.2%
2005	83	26.87	**1145**	256	3579	0.320	2.323	8315	**11893**	2493	**25292**	5692	2.13	100.0%	100.0%
2006	75	24.28	**1061**	372	2616	0.406	2.123	5554	**8170**	2092	**18335**	5033	2.24	100.0%	100.0%





1997-2006 average annual growth rate = 1.162 (90%c.i. = 0.995 - 1.330)

Year	N plots	Ground sampled area km2	**Nest index**	SE nest index	Correc-ted nests IN	Avg nest detect-ion rates	7yr avg aerial Out:In	Correc-ted nests OUT	**Total nests In+Out**	SE total nests	**Total eggs In+Out**	SE total eggs	Active eggs / total nests	Apparent nest success	Corrected nest success
ARTE	**Arctic Tern**						Aerial index measure =n singles + 2*(n pairs) + birds in groups								
1985	49	24.57	**291**	110	483	0.603	9.414	4544	**5027**	1797	**10053**	3859	2.00	100.0%	100.0%
1986	46	22.16	**194**	77	291	0.666	9.414	2741	**3032**	1131	**5662**	2297	1.87	100.0%	100.0%
1987	37	12.67	**113**	112	161	0.701	9.414	1516	**1677**	1529	**1677**	1529	1.00	100.0%	100.0%
1988	31	10.04	**71**	71	123	0.579	9.414	1159	**1282**	1169	**2564**	2339	2.00	100.0%	100.0%
1989	23	7.45	**577**	284	1054	0.547	9.414	9919	**10972**	4981	**20442**	9350	1.86	100.0%	100.0%
1990	33	10.70	**335**	168	554	0.603	9.414	5218	**5773**	2711	**9236**	4840	1.60	100.0%	100.0%
1991	36	11.66	**123**	85	194	0.633	9.414	1826	**2020**	1291	**2980**	1983	1.48	100.0%	100.0%
1992	42	13.39	**748**	235	1225	0.611	9.414	11530	**12754**	3917	**24272**	7162	1.90	100.0%	100.0%
1993	47	15.23	**893**	482	2066	0.432	9.484	19592	**21658**	10350	**49280**	22614	2.28	100.0%	100.0%
1994	41	13.27	**323**	163	544	0.595	9.638	5238	**5782**	2683	**13464**	6568	2.33	100.0%	100.0%
1995	50	22.56	**539**	165	961	0.561	9.406	9035	**9996**	3030	**19991**	6342	2.00	100.0%	100.0%
1996	54	19.44	**221**	85	421	0.525	8.673	3647	**4068**	1508	**7546**	2892	1.86	100.0%	100.0%
1997	72	23.31	**154**	78	238	0.646	8.915	2118	**2355**	1131	**4710**	2261	2.00	100.0%	100.0%
1998	64	20.71	**691**	193	1348	0.513	8.717	11747	**13095**	3353	**28925**	7621	2.21	100.0%	100.0%
1999	53	16.97	**591**	170	1190	0.496	8.732	10390	**11580**	3267	**23034**	6548	1.99	100.0%	100.0%
2000	80	25.86	**277**	90	473	0.586	8.524	4028	**4500**	1431	**8198**	2591	1.82	100.0%	100.0%
2001	81	26.23	**682**	269	2623	0.260	8.064	21149	**23772**	13624	**35683**	17294	1.50	96.0%	78.3%
2002	84	27.15	**1529**	434	4091	0.374	8.011	32773	**36864**	10503	**75133**	21057	2.04	100.0%	100.0%
2003	83	26.87	**506**	136	1028	0.492	8.180	8408	**9436**	2351	**19178**	5604	2.03	100.0%	100.0%
2004	81	26.22	**737**	137	1789	0.412	8.001	14316	**16105**	3539	**23269**	4319	1.44	96.3%	81.7%
2005	83	26.87	**1199**	258	1985	0.604	7.881	15645	**17630**	3164	**29855**	4798	1.69	100.0%	100.0%
2006	75	24.28	**884**	175	2087	0.424	7.769	16211	**18298**	3723	**35317**	7049	1.93	100.0%	100.0%

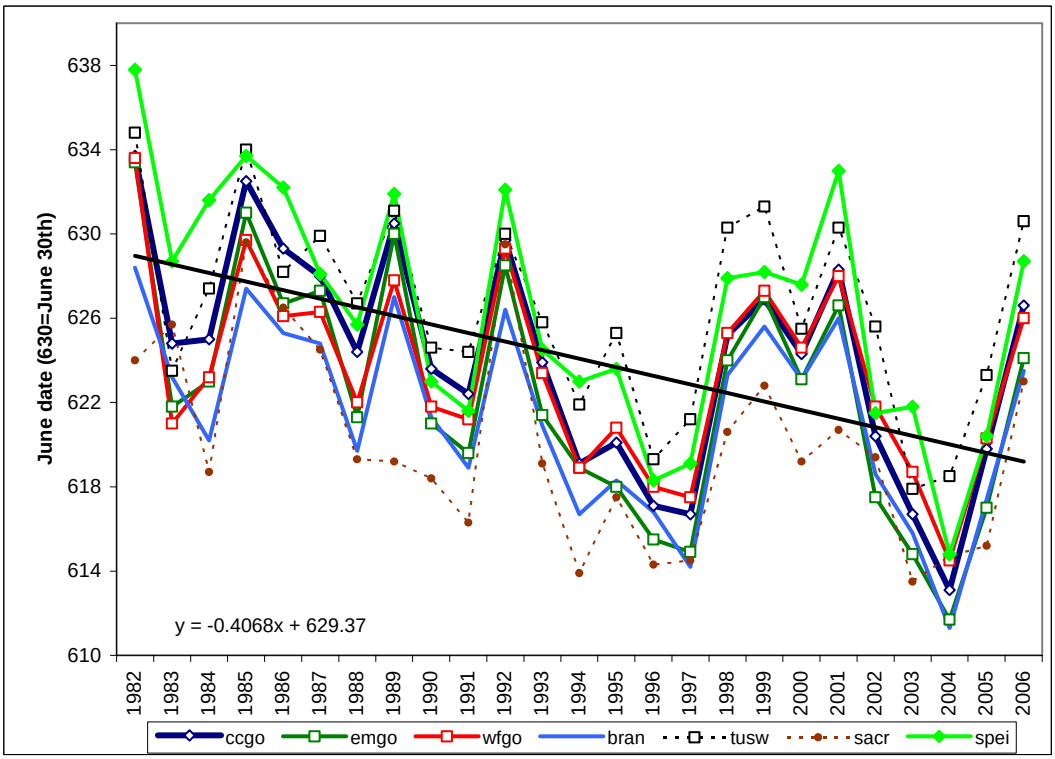


Figure 4. Estimated average hatch date based on egg float angles, 1982-2006. Linear regression on cackling goose hatch date indicate an average change of 0.4 days earlier per year.

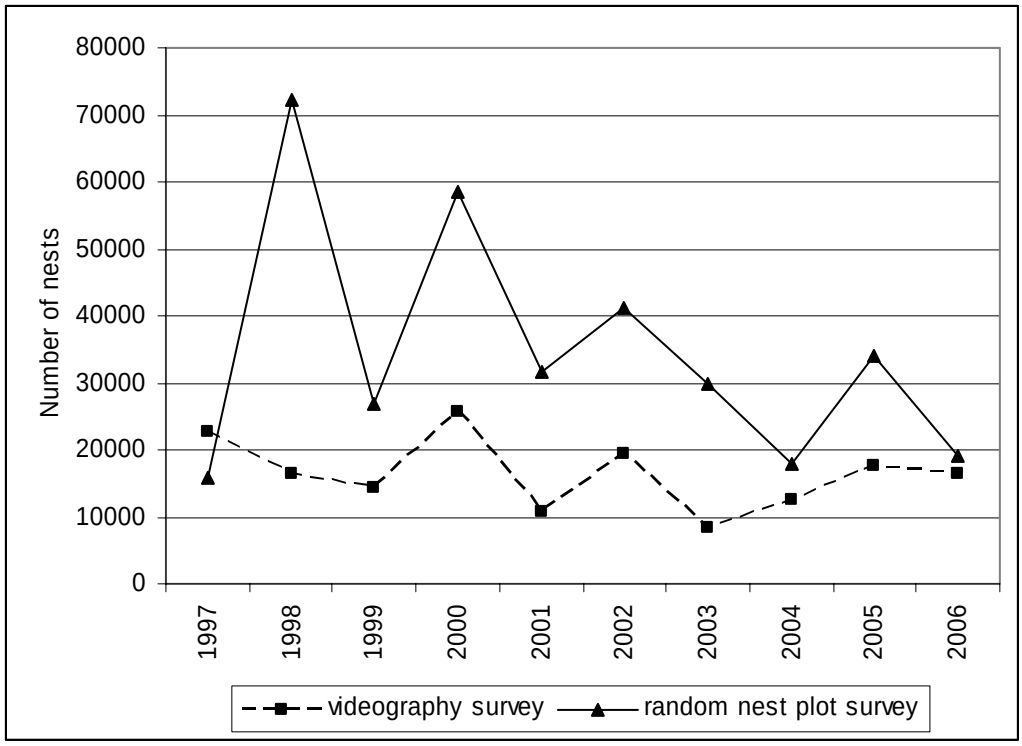


Figure 5. Comparison of black brant nest population estimates within major colonies (videography survey, Anthony 2006) and satellite colonies (random nest plot survey).

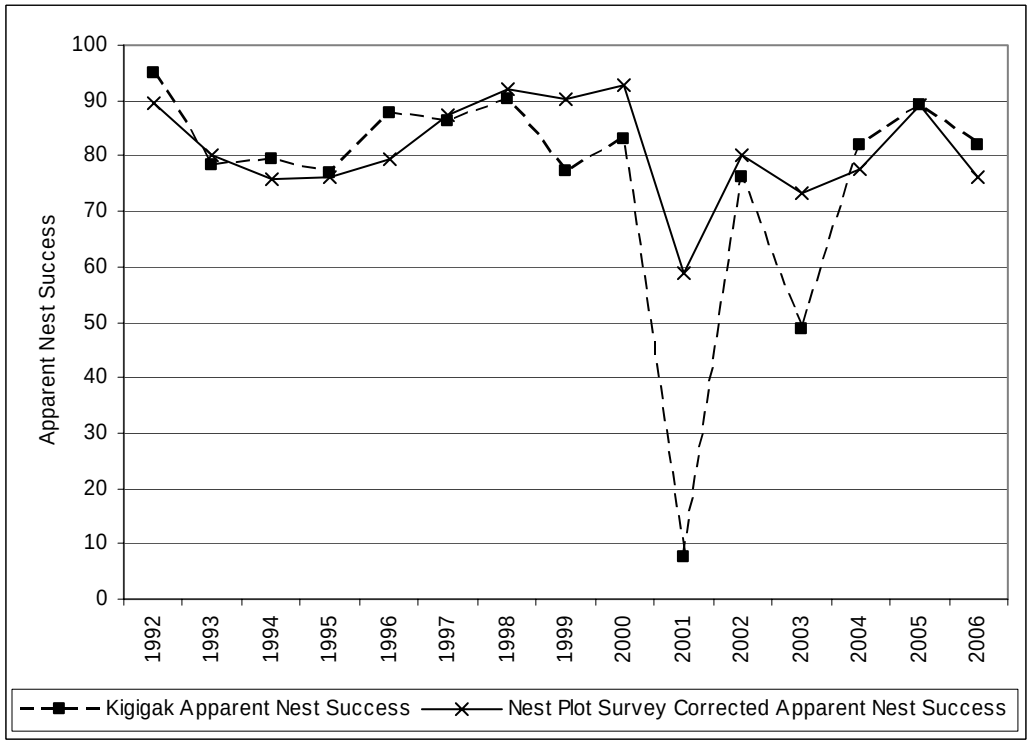


Figure 6. Comparison of spectacled eider apparent nest success measures at Kigigak Island (successful hatched nests/total nests; Lake 2006) and the Yukon Delta nest plot survey (active nests at time of search/total nests).

Table 2. Estimated hatch date based on egg float angles. Means are calculated considering each nest as a sample unit.

Year	Average	Min	Max	N
Cackling Goose				
1982	4-Jul	25-Jun	18-Jul	170
1983	25-Jun	15-Jun	14-Jul	284
1984	25-Jun	16-Jun	11-Jul	92
1985	3-Jul	24-Jun	15-Jul	278
1986	29-Jun	13-Jun	15-Jul	346
1987	28-Jun	20-Jun	18-Jul	204
1988	24-Jun	15-Jun	8-Jul	66
1989	1-Jul	22-Jun	10-Jul	55
1990	24-Jun	13-Jun	6-Jul	194
1991	22-Jun	12-Jun	3-Jul	352
1992	30-Jun	20-Jun	21-Jul	391
1993	24-Jun	9-Jun	6-Jul	358
1994	19-Jun	8-Jun	9-Jul	409
1995	20-Jun	11-Jun	5-Jul	725
1996	17-Jun	7-Jun	5-Jul	755
1997	17-Jun	3-Jun	4-Jul	812
1998	25-Jun	12-Jun	9-Jul	889
1999	27-Jun	17-Jun	16-Jul	772
2000	24-Jun	14-Jun	10-Jul	1014
2001	28-Jun	15-Jun	9-Jul	522
2002	20-Jun	10-Jun	4-Jul	930
2003	17-Jun	3-Jun	4-Jul	562
2004	13-Jun	4-Jun	1-Jul	964
2005	20-Jun	9-Jun	7-Jul	957
2006	27-Jun	15-Jun	8-Jul	849

Year	Average	Min	Max	N
Emperor Goose				
1982	3-Jul	16-Jun	11-Jul	71
1983	22-Jun	14-Jun	6-Jul	100
1984	23-Jun	16-Jun	2-Jul	43
1985	1-Jul	23-Jun	11-Jul	107
1986	27-Jun	18-Jun	9-Jul	196
1987	27-Jun	18-Jun	7-Jul	141
1988	21-Jun	16-Jun	4-Jul	67
1989	30-Jun	18-Jun	7-Jul	63
1990	21-Jun	11-Jun	6-Jul	99
1991	20-Jun	10-Jun	2-Jul	256
1992	29-Jun	21-Jun	9-Jul	182
1993	21-Jun	11-Jun	4-Jul	139
1994	19-Jun	12-Jun	30-Jun	192
1995	18-Jun	10-Jun	6-Jul	188
1996	16-Jun	4-Jun	23-Jun	185
1997	15-Jun	6-Jun	30-Jun	153
1998	24-Jun	16-Jun	3-Jul	215
1999	27-Jun	17-Jun	6-Jul	188
2000	23-Jun	13-Jun	8-Jul	280
2001	27-Jun	19-Jun	2-Jul	104
2002	18-Jun	9-Jun	29-Jun	249
2003	15-Jun	5-Jun	26-Jun	153
2004	12-Jun	4-Jun	24-Jun	253
2005	17-Jun	7-Jun	29-Jun	303
2006	24-Jun	16-Jun	4-Jul	253

Year	Average	Min	Max	N
White-fronted Goose				
1982	4-Jul	26-Jun	12-Jul	14
1983	21-Jun	13-Jun	19-Jul	25
1984	23-Jun	16-Jun	1-Jul	25
1985	30-Jun	23-Jun	7-Jul	42
1986	26-Jun	17-Jun	12-Jul	102
1987	26-Jun	19-Jun	3-Jul	60
1988	22-Jun	15-Jun	3-Jul	32
1989	28-Jun	22-Jun	4-Jul	21
1990	22-Jun	11-Jun	29-Jun	52
1991	21-Jun	12-Jun	3-Jul	138
1992	29-Jun	19-Jun	24-Jul	110
1993	23-Jun	17-Jun	5-Jul	84
1994	19-Jun	11-Jun	28-Jun	129
1995	21-Jun	9-Jun	1-Jul	178
1996	18-Jun	7-Jun	30-Jun	144
1997	18-Jun	7-Jun	29-Jun	184
1998	25-Jun	17-Jun	6-Jul	261
1999	27-Jun	19-Jun	10-Jul	208
2000	25-Jun	14-Jun	9-Jul	334
2001	28-Jun	19-Jun	7-Jul	311
2002	22-Jun	14-Jun	30-Jun	306
2003	19-Jun	6-Jun	1-Jul	272
2004	15-Jun	4-Jun	27-Jun	364
2005	20-Jun	12-Jun	1-Jul	438
2006	26-Jun	16-Jun	10-Jul	370

Year	Average	Min	Max	N
Black Brant				
1982	28-Jun	28-Jun	28-Jun	1
1983	23-Jun	15-Jun	3-Jul	11
1984	20-Jun	19-Jun	20-Jun	4
1985	27-Jun	23-Jun	8-Jul	29
1986	25-Jun	19-Jun	6-Jul	126
1987	25-Jun	22-Jun	3-Jul	167
1988	20-Jun	14-Jun	3-Jul	38
1989	27-Jun	19-Jun	6-Jul	40
1990	21-Jun	15-Jun	1-Jul	119
1991	19-Jun	12-Jun	1-Jul	183
1992	26-Jun	19-Jun	6-Jul	152
1993	21-Jun	12-Jun	27-Jun	107
1994	17-Jun	10-Jun	27-Jun	93
1995	18-Jun	12-Jun	1-Jul	41
1996	17-Jun	11-Jun	26-Jun	44
1997	14-Jun	3-Jun	24-Jun	100
1998	23-Jun	16-Jun	4-Jul	260
1999	26-Jun	17-Jun	7-Jul	108
2000	23-Jun	16-Jun	3-Jul	216
2001	26-Jun	19-Jun	5-Jul	77
2002	19-Jun	6-Jun	3-Jul	163
2003	16-Jun	7-Jun	26-Jun	56
2004	11-Jun	4-Jun	24-Jun	101
2005	17-Jun	6-Jun	26-Jun	148
2006	24-Jun	16-Jun	9-Jul	123

Table 2. Estimated hatch date continued.

Year	Average	Min	Max	N
Tundra Swan				
1982	5-Jul	23-Jun	14-Jul	11
1983	24-Jun	15-Jun	30-Jun	6
1984	27-Jun	20-Jun	5-Jul	6
1985	4-Jul	26-Jun	10-Jul	14
1986	28-Jun	19-Jun	10-Jul	23
1987	30-Jun	23-Jun	6-Jul	12
1988	27-Jun	17-Jun	4-Jul	4
1989	1-Jul	29-Jun	3-Jul	4
1990	25-Jun	21-Jun	27-Jun	4
1991	24-Jun	17-Jun	8-Jul	12
1992	30-Jun	24-Jun	7-Jul	8
1993	26-Jun	19-Jun	1-Jul	6
1994	22-Jun	13-Jun	30-Jun	9
1995	25-Jun	21-Jun	2-Jul	9
1996	19-Jun	10-Jun	28-Jun	9
1997	21-Jun	14-Jun	25-Jun	13
1998	30-Jun	23-Jun	12-Jul	20
1999	1-Jul	24-Jun	9-Jul	14
2000	26-Jun	18-Jun	5-Jul	22
2001	30-Jun	19-Jun	9-Jul	16
2002	26-Jun	20-Jun	1-Jul	10
2003	18-Jun	11-Jun	24-Jun	21
2004	19-Jun	10-Jun	27-Jun	16
2005	23-Jun	16-Jun	29-Jun	18
2006	1-Jul	22-Jun	8-Jul	14

Year	Average	Min	Max	N
Sandhill Crane				
1982	24-Jun	22-Jun	25-Jun	4
1983	26-Jun	17-Jun	11-Jul	14
1984	19-Jun	15-Jun	21-Jun	6
1985	30-Jun	19-Jun	4-Jul	13
1986	27-Jun	16-Jun	9-Jul	25
1987	25-Jun	18-Jun	10-Jul	16
1988	19-Jun	17-Jun	25-Jun	6
1989	19-Jun	17-Jun	21-Jun	2
1990	18-Jun	15-Jun	22-Jun	9
1991	16-Jun	10-Jun	26-Jun	25
1992	30-Jun	24-Jun	5-Jul	9
1993	19-Jun	15-Jun	27-Jun	14
1994	14-Jun	11-Jun	16-Jun	5
1995	18-Jun	12-Jun	30-Jun	10
1996	14-Jun	10-Jun	25-Jun	14
1997	15-Jun	11-Jun	24-Jun	8
1998	21-Jun	15-Jun	26-Jun	19
1999	23-Jun	19-Jun	28-Jun	12
2000	19-Jun	13-Jun	29-Jun	22
2001	21-Jun	19-Jun	23-Jun	7
2002	19-Jun	8-Jun	3-Jul	12
2003	14-Jun	7-Jun	25-Jun	13
2004	15-Jun	9-Jun	22-Jun	10
2005	15-Jun	10-Jun	26-Jun	23
2006	23-Jun	17-Jun	8-Jul	19

Year	Average	Min	Max	N
Spectacled Eider				
1982	8-Jul	30-Jun	22-Jul	18
1983	29-Jun	20-Jun	6-Jul	22
1984	2-Jul	25-Jun	5-Jul	3
1985	4-Jul	26-Jun	18-Jul	20
1986	2-Jul	22-Jun	20-Jul	38
1987	28-Jun	17-Jun	9-Jul	27
1988	26-Jun	20-Jun	2-Jul	19
1989	2-Jul	22-Jun	7-Jul	5
1990	23-Jun	18-Jun	27-Jun	15
1991	22-Jun	16-Jun	10-Jul	25
1992	2-Jul	26-Jun	14-Jul	17
1993	25-Jun	17-Jun	9-Jul	18
1994	23-Jun	12-Jun	6-Jul	15
1995	24-Jun	14-Jun	4-Jul	44
1996	18-Jun	12-Jun	2-Jul	33
1997	19-Jun	11-Jun	30-Jun	39
1998	28-Jun	17-Jun	7-Jul	52
1999	28-Jun	18-Jun	9-Jul	51
2000	28-Jun	18-Jun	9-Jul	52
2001	3-Jul	25-Jun	16-Jul	32
2002	22-Jun	15-Jun	2-Jul	59
2003	22-Jun	9-Jun	2-Jul	36
2004	15-Jun	5-Jun	30-Jun	57
2005	20-Jun	9-Jun	4-Jul	101
2006	29-Jun	19-Jun	12-Jul	79

Year	Average	Min	Max	N
Common Eider				
1982	9-Jul	8-Jul	10-Jul	4
1983	26-Jun	21-Jun	30-Jun	3
1984	--	--	--	0
1985	--	--	--	0
1986	--	--	--	0
1987	29-Jun	25-Jun	8-Jul	10
1988	10-Jul	13-Jul	13-Jul	1
1989	2-Jul	29-Jun	8-Jul	4
1990	22-Jun	21-Jun	24-Jun	3
1991	26-Jun	19-Jun	5-Jul	27
1992	2-Jul	26-Jun	6-Jul	12
1993	24-Jun	18-Jun	27-Jun	5
1994	24-Jun	16-Jun	4-Jul	9
1995	23-Jun	14-Jun	2-Jul	13
1996	19-Jun	10-Jun	2-Jul	14
1997	19-Jun	10-Jun	1-Jul	15
1998	28-Jun	20-Jun	4-Jul	18
1999	30-Jun	22-Jun	9-Jul	12
2000	29-Jun	24-Jun	5-Jul	23
2001	30-Jun	20-Jun	8-Jul	23
2002	24-Jun	15-Jun	30-Jun	17
2003	22-Jun	14-Jun	4-Jul	16
2004	17-Jun	6-Jun	26-Jun	18
2005	19-Jun	5-Jun	1-Jul	34
2006	1-Jul	24-Jun	11-Jul	52

Table 2. Estimated hatch date continued.

combined Loon species

Year	Average	Min	Max	N
1982	8-Jul	3-Jul	24-Jul	25
1983	29-Jun	21-Jun	29-Jul	15
1984	2-Jul	26-Jun	8-Jul	5
1985	7-Jul	25-Jun	21-Jul	15
1986	5-Jul	26-Jun	25-Jul	37
1987	3-Jul	27-Jun	12-Jul	34
1988	27-Jun	16-Jun	5-Jul	5
1989	2-Jul	22-Jun	15-Jul	5
1990	1-Jul	25-Jun	9-Jul	11
1991	26-Jun	18-Jun	5-Jul	21
1992	5-Jul	29-Jun	18-Jul	12
1993	26-Jun	18-Jun	5-Jul	12
1994	24-Jun	19-Jun	29-Jun	6
1995	26-Jun	21-Jun	1-Jul	10
1996	22-Jun	15-Jun	1-Jul	9
1997	22-Jun	15-Jun	29-Jun	17
1998	1-Jul	20-Jun	14-Jul	37
1999	3-Jul	22-Jun	14-Jul	48
2000	30-Jun	15-Jun	9-Jul	40
2001	4-Jul	27-Jun	15-Jul	27
2002	25-Jun	12-Jun	3-Jul	42
2003	24-Jun	12-Jun	3-Jul	14
2004	23-Jun	13-Jun	30-Jun	10
2005	27-Jun	11-Jun	7-Jul	42
2006	2-Jul	27-Jun	7-Jul	22

Glaucous Gull

Year	Average	Min	Max	N
1982	5-Jul	29-Jun	22-Jul	23
1983	22-Jun	13-Jun	4-Jul	14
1984	23-Jun	18-Jun	26-Jun	5
1985	3-Jul	23-Jun	12-Jul	23
1986	27-Jun	22-Jun	5-Jul	18
1987	28-Jun	20-Jun	10-Jul	19
1988	22-Jun	15-Jun	3-Jul	9
1989	22-Jun	22-Jun	22-Jun	3
1990	17-Jun	16-Jun	18-Jun	2
1991	18-Jun	12-Jun	3-Jul	26
1992	27-Jun	22-Jun	4-Jul	23
1993	20-Jun	15-Jun	7-Jul	11
1994	17-Jun	10-Jun	27-Jun	17
1995	17-Jun	14-Jun	26-Jun	17
1996	14-Jun	11-Jun	20-Jun	15
1997	17-Jun	10-Jun	29-Jun	19
1998	22-Jun	15-Jun	9-Jul	64
1999	27-Jun	19-Jun	7-Jul	25
2000	22-Jun	12-Jun	9-Jul	72
2001	24-Jun	17-Jun	7-Jul	50
2002	17-Jun	6-Jun	4-Jul	56
2003	13-Jun	4-Jun	26-Jun	58
2004	10-Jun	3-Jun	19-Jun	21
2005	14-Jun	6-Jun	27-Jun	69
2006	25-Jun	17-Jun	9-Jul	46

Mew Gull

Year	Average	Min	Max	N
1982	10-Jul	7-Jul	22-Jul	11
1983	26-Jun	17-Jun	3-Jul	6
1984	--	--	--	0
1985	4-Jul	27-Jun	12-Jul	8
1986	2-Jul	21-Jun	12-Jul	18
1987	26-Jun	21-Jun	4-Jul	8
1988	18-Jun	14-Jun	24-Jun	4
1989	22-Jun	22-Jun	22-Jun	1
1990	21-Jun	17-Jun	26-Jun	2
1991	20-Jun	14-Jun	2-Jul	8
1992	27-Jun	23-Jun	4-Jul	10
1993	24-Jun	17-Jun	2-Jul	7
1994	15-Jun	11-Jun	21-Jun	8
1995	18-Jun	15-Jun	22-Jun	16
1996	14-Jun	8-Jun	20-Jun	10
1997	19-Jun	16-Jun	27-Jun	8
1998	24-Jun	19-Jun	4-Jul	19
1999	25-Jun	21-Jun	9-Jul	25
2000	25-Jun	17-Jun	5-Jul	17
2001	26-Jun	19-Jun	7-Jul	18
2002	16-Jun	6-Jun	3-Jul	40
2003	17-Jun	8-Jun	27-Jun	20
2004	13-Jun	9-Jun	19-Jun	19
2005	19-Jun	10-Jun	1-Jul	32
2006	26-Jun	18-Jun	9-Jul	45

Sabine's Gull

Year	Average	Min	Max	N
1982	29-Jun	29-Jun	29-Jun	1
1983	21-Jun	14-Jun	2-Jul	3
1984	--	--	--	0
1985	2-Jul	26-Jun	18-Jul	3
1986	24-Jun	15-Jun	7-Jul	7
1987	21-Jun	15-Jun	4-Jul	7
1988	24-Jun	18-Jun	8-Jul	7
1989	1-Jul	21-Jun	11-Jul	2
1990	--	--	--	0
1991	15-Jun	9-Jun	22-Jun	9
1992	--	--	--	0
1993	17-Jun	14-Jun	23-Jun	8
1994	11-Jun	9-Jun	16-Jun	6
1995	18-Jun	12-Jun	28-Jun	6
1996	11-Jun	7-Jun	14-Jun	3
1997	14-Jun	8-Jun	22-Jun	8
1998	21-Jun	15-Jun	6-Jul	11
1999	21-Jun	16-Jun	3-Jul	20
2000	22-Jun	14-Jun	2-Jul	7
2001	27-Jun	19-Jun	4-Jul	10
2002	14-Jun	8-Jun	26-Jun	28
2003	12-Jun	6-Jun	17-Jun	5
2004	9-Jun	3-Jun	19-Jun	3
2005	16-Jun	8-Jun	29-Jun	30
2006	22-Jun	18-Jun	27-Jun	23

Table 2. Estimated hatch date continued.

Year	Average	Min	Max	N
Arctic Tern				
1982	--	--	--	0
1983	--	--	--	0
1984	--	--	--	0
1985	29-Jun	22-Jun	4-Jul	8
1986	26-Jun	16-Jun	24-Jul	6
1987	24-Jun	20-Jun	26-Jun	3
1988	24-Jun	24-Jun	24-Jun	2
1989	22-Jun	22-Jun	22-Jun	1
1990	24-Jun	24-Jun	24-Jun	1
1991	17-Jun	12-Jun	20-Jun	4
1992	1-Jul	25-Jun	10-Jul	6
1993	17-Jun	15-Jun	20-Jun	3
1994	15-Jun	15-Jun	15-Jun	1
1995	16-Jun	13-Jun	20-Jun	3
1996	11-Jun	11-Jun	11-Jun	1
1997	--	--	--	0
1998	26-Jun	19-Jun	5-Jul	5
1999	25-Jun	21-Jun	2-Jul	8
2000	26-Jun	23-Jun	1-Jul	5
2001	22-Jun	15-Jun	29-Jun	5
2002	18-Jun	8-Jun	26-Jun	37
2003	13-Jun	8-Jun	21-Jun	5
2004	17-Jun	9-Jun	29-Jun	9
2005	21-Jun	14-Jun	29-Jun	15
2006	23-Jun	17-Jun	29-Jun	17

Year	Average	Min	Max	N
Diving Ducks				
1982	10-Jul	13-Jul	22-Jul	5
1983	24-Jun	24-Jun	24-Jun	1
1984	--	--	--	0
1985	10-Jul	25-Jul	25-Jul	1
1986	8-Jul	1-Jul	11-Jul	4
1987	7-Jul	2-Jul	11-Jul	4
1988	8-Jul	8-Jul	8-Jul	1
1989	8-Jul	8-Jul	8-Jul	1
1990	7-Jul	6-Jul	8-Jul	2
1991	28-Jun	23-Jun	2-Jul	2
1992	6-Jul	30-Jun	22-Jul	19
1993	2-Jul	29-Jun	8-Jul	18
1994	2-Jul	30-Jun	3-Jul	7
1995	3-Jul	20-Jun	10-Jul	14
1996	28-Jun	17-Jun	5-Jul	7
1997	27-Jun	17-Jun	4-Jul	10
1998	4-Jul	26-Jun	10-Jul	14
1999	8-Jul	1-Jul	13-Jul	10
2000	6-Jul	28-Jun	11-Jul	26
2001	7-Jul	4-Jul	17-Jul	6
2002	1-Jul	29-Jun	4-Jul	8
2003	30-Jun	29-Jun	1-Jul	3
2004	20-Jun	18-Jun	22-Jun	2
2005	1-Jul	24-Jun	8-Jul	9
2006	5-Jul	29-Jun	8-Jul	5

Year	Average	Min	Max	N
Dabbling Ducks				
1982	10-Jul	12-Jul	12-Jul	1
1983	23-Jun	23-Jun	23-Jun	1
1984	3-Jul	3-Jul	3-Jul	1
1985	8-Jul	6-Jul	15-Jul	2
1986	3-Jul	22-Jun	17-Jul	13
1987	3-Jul	18-Jun	14-Jul	12
1988	1-Jul	28-Jun	3-Jul	2
1989	6-Jul	3-Jul	11-Jul	4
1990	28-Jun	24-Jun	3-Jul	4
1991	24-Jun	12-Jun	4-Jul	13
1992	4-Jul	21-Jun	13-Jul	16
1993	28-Jun	24-Jun	1-Jul	16
1994	28-Jun	26-Jun	29-Jun	5
1995	27-Jun	18-Jun	6-Jul	11
1996	25-Jun	13-Jun	2-Jul	10
1997	17-Jun	13-Jun	21-Jun	4
1998	1-Jul	18-Jun	10-Jul	39
1999	2-Jul	20-Jun	12-Jul	17
2000	30-Jun	21-Jun	8-Jul	28
2001	2-Jul	27-Jun	8-Jul	13
2002	24-Jun	13-Jun	3-Jul	21
2003	20-Jun	10-Jun	29-Jun	8
2004	18-Jun	5-Jun	28-Jun	19
2005	23-Jun	11-Jun	4-Jul	24
2006	1-Jul	23-Jun	8-Jul	15

Year	Average	Min	Max	N
Small Shorebirds				
1982	30-Jun	30-Jun	30-Jun	1
1983	--	--	--	0
1984	--	--	--	0
1985	3-Jul	22-Jun	17-Jul	4
1986	27-Jun	16-Jun	11-Jul	23
1987	21-Jun	15-Jun	25-Jun	7
1988	17-Jun	16-Jun	18-Jun	2
1989	24-Jun	18-Jun	4-Jul	3
1990	25-Jun	21-Jun	30-Jun	2
1991	22-Jun	8-Jun	6-Jul	21
1992	26-Jun	22-Jun	29-Jun	8
1993	21-Jun	14-Jun	29-Jun	15
1994	18-Jun	13-Jun	24-Jun	2
1995	19-Jun	10-Jun	25-Jun	6
1996	20-Jun	8-Jun	2-Jul	10
1997	12-Jun	9-Jun	14-Jun	3
1998	22-Jun	14-Jun	28-Jun	8
1999	25-Jun	16-Jun	5-Jul	17
2000	23-Jun	14-Jun	27-Jun	13
2001	27-Jun	18-Jun	4-Jul	22
2002	19-Jun	12-Jun	25-Jun	21
2003	16-Jun	13-Jun	17-Jun	3
2004	12-Jun	8-Jun	20-Jun	10
2005	20-Jun	9-Jun	29-Jun	30
2006	27-Jun	19-Jun	8-Jul	29