Nest Population Size and Potential Production of Geese and Spectacled Eiders on the Yukon-Kuskokwim Delta, Alaska, 2005

Julian B. Fischer[1], Robert A. Stehn[1], Timothy D. Bowman[1], and George Walters[2]

[1] U.S. Fish and Wildlife Service, Migratory Bird Management, Waterfowl Management Branch, 1011 E. Tudor Rd., Anchorage, AK 99503
[2] U.S. Fish and Wildlife Service, Yukon Delta National Wildlife Refuge, P.O. Box 346, Bethel, AK 99559

SUMMARY: In 2005 potential production of geese was good and potential production of eiders was excellent. Numbers of nests and eggs for geese were similar to 2004 and up substantially for eiders. Depredation and nest abandonment rates were low for most species. We estimated 4,541 spectacled eider nests on the Yukon-Kuskokwim Delta coastal zone, an increase of 29% from 2004 and 51% higher than the 1988-2004 average. After a record early breakup and nest initiation in 2004, nesting chronology in 2005 was closer to the long-term average for most species.

INTRODUCTION:

Annual assessment of nest population size and egg production of geese and eiders on the Yukon-Kuskokwim Delta (YKD) provides information for biologists, participants in cooperative goose management plans, Pacific Flyway technical committees, and the spectacled eider recovery team. A ground-based sampling procedure has been used since 1985 to estimate the number of nests and eggs for cackling geese (*Branta hutchinsii*), emperor geese (*Chen canagica*), greater white-fronted geese (*Anser albifrons frontalis*), and spectacled eiders (*Somateria fischeri*). The ground-based nest survey provides an estimate of potential production and size of the nesting population and is conducted coincident with an aerial breeding pair survey (Eldridge and Hodges 2005, Platte and Stehn 2005) that provides an index to population size. Together, these surveys contribute long-term data needed to understand goose and eider population ecology and population status.

METHODS:


Eddy Edwards. Photo J.S. Edwards

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 2005 (Fig. 1). Boundaries of the survey area included all lands on the Yukon Delta National Wildlife Refuge containing medium and high nest densities of breeding spectacled eiders (based on aerial and ground observations 1985-1993, USFWS unpubl. data). We excluded high density nesting habitat near Kokechik Bay, two patches on south Nelson Island, and several tracts near Hazen Bay because the land was owned by native corporations and in those areas permission to sample plots every year was not assured. From 1994-1997, and 2000-2005, the ground sampled area included 716 km^2, or 5.6% of the total coastal zone. In other years, the size of the ground sampled area varied as study objective evolved (Table 1).

We used GIS and custom-written TrueBASIC computer programs to randomly select 85 plots within the nest plot survey area in 2005 (Fig. 2). Areas sampled during the preceding five years were excluded from the random selection process. We transferred plot boundaries to 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 1997-2005. Plots were 0.2-2.0 km^2 in 1985, 0.45 km^2 in 1995 and 0.36 km^2 in 1996.


Heather Wilson. Photo J. Fischer

Most plots were searched by field crews of two 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 Aphrewn river. A second boat crew worked plots on the Naskonat Peninsula, north of Kigigak Island. Eight of the plots in 2005 were completed by waterfowl biologists in long-term research camps on

Kigigak Island, the Tutakoke River, and the Manokinak River. Plots were generally within 2 km walking distance 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 goose, brant, eider, swan, crane, loon, and gull nests. Nests of other species were recorded as encountered but most shorebird, passerine, and duck nests were likely missed.

At each nest we recorded species, clutch size, nest status, and stage of incubation. We determined stage of incubation by float angle of eggs from active nests (Westerskov 1950). 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).

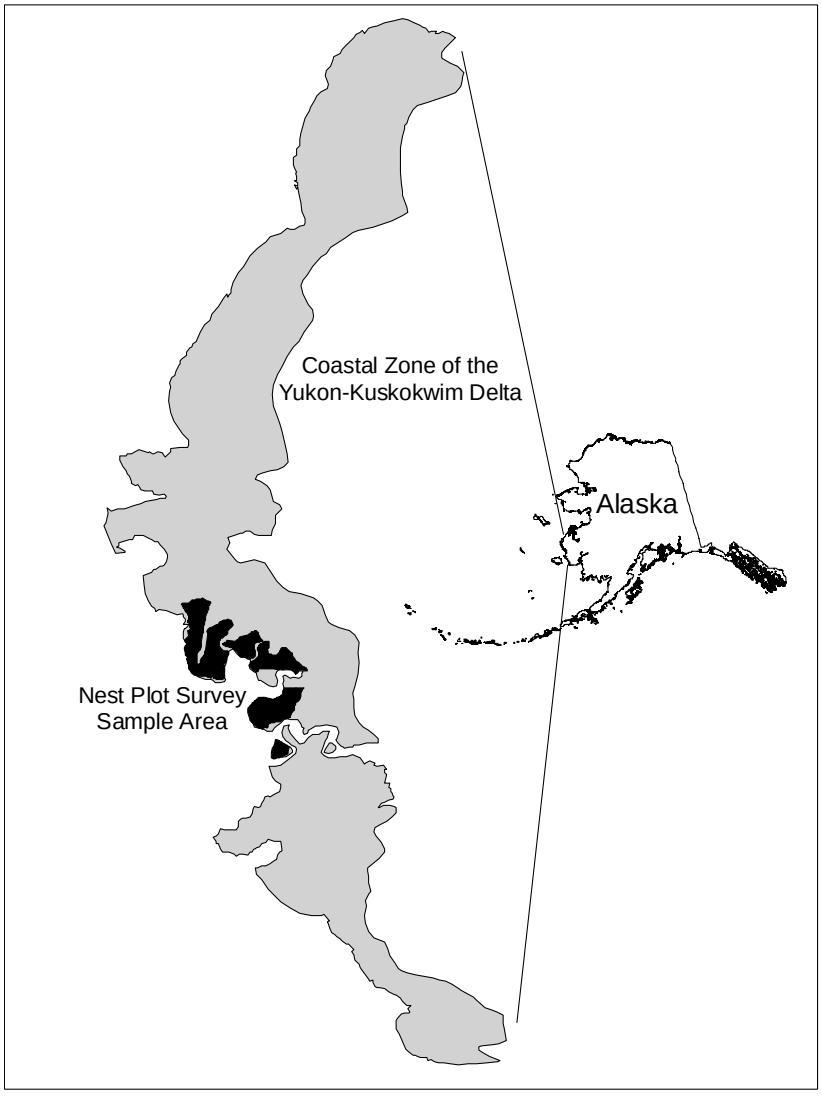

Figure 1. Location of the nest plot survey sample area relative to the coastal zone of the Yukon-Kuskokwim Delta, Alaska, 2005.

We linked the nest plot survey to a stratified analysis of an aerial survey of the entire coastal zone of the YKD (12,832 km^2; Butler et al. 1988, Eldridge and Hodges 2005, Platte and Stehn 2005). A pilot and an observer recorded singles, pairs, and flocks of geese, swans and cranes along approximately 100 systematic transects. Beginning in 1988, a rear-seat observer recorded eiders, other ducks, loons, and in 1992, gulls. We used aerial survey data to expand our estimates of nests and eggs from the 716 km^2 ground-sampled area to the 12,832 km^2 air-sampled area comprising the entire YKD coastal zone. To expand the ground-based estimates, we calculated the ratio of the aerial breeding population index outside the ground-sampled area to the aerial index within the ground-sampled area (Table 1). 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 an indirect measure of effective breeding population size (i.e., the number of pairs with nests). The estimated total number of viable eggs found at mid- to late-incubation directly measured the number of young that could potentially augment the fall population if they survived. The mean and variance of the number of nests or eggs per plot was based on a simple random sample of plots. The proportion of nests that were active when the plots were searched was an index to nesting success; the actual proportion of nests that produced young is lower because of nest loss that may occur after the plot search. Nest detection rate is lower for nests that fail during laying or early incubation; thus the nest success index is an overestimate of the proportion surviving to mid-incubation. Clutch size and average predicted hatch date were based on all active nests found on random plots. Clutch size and hatch date data prior to 1985 were derived from plots established by Butler (1983). All nests are likely not detected, even with a slow careful search of each plot; therefore, the estimated numbers of nests and eggs are underestimates. The rate of detection of active nests is above 80% for geese, eiders, and swans, and further analysis of a subset of doubly-searched plots will allow for bias correction (Bowman and Stehn, in prep).

Red-throated loon (*Gavia stellata*) and Pacific loon (*Gavia pacifica*) nests are essentially indistinguishable from each other (Bowman 2004) and adult birds were usually not seen at the nest site. Thus, we estimated the combined number of loon nests, and then estimated species-specific nest population size by using the ratio of aerially observed populations of each loon species in the ground sampled area (Platte and Stehn 2005).

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

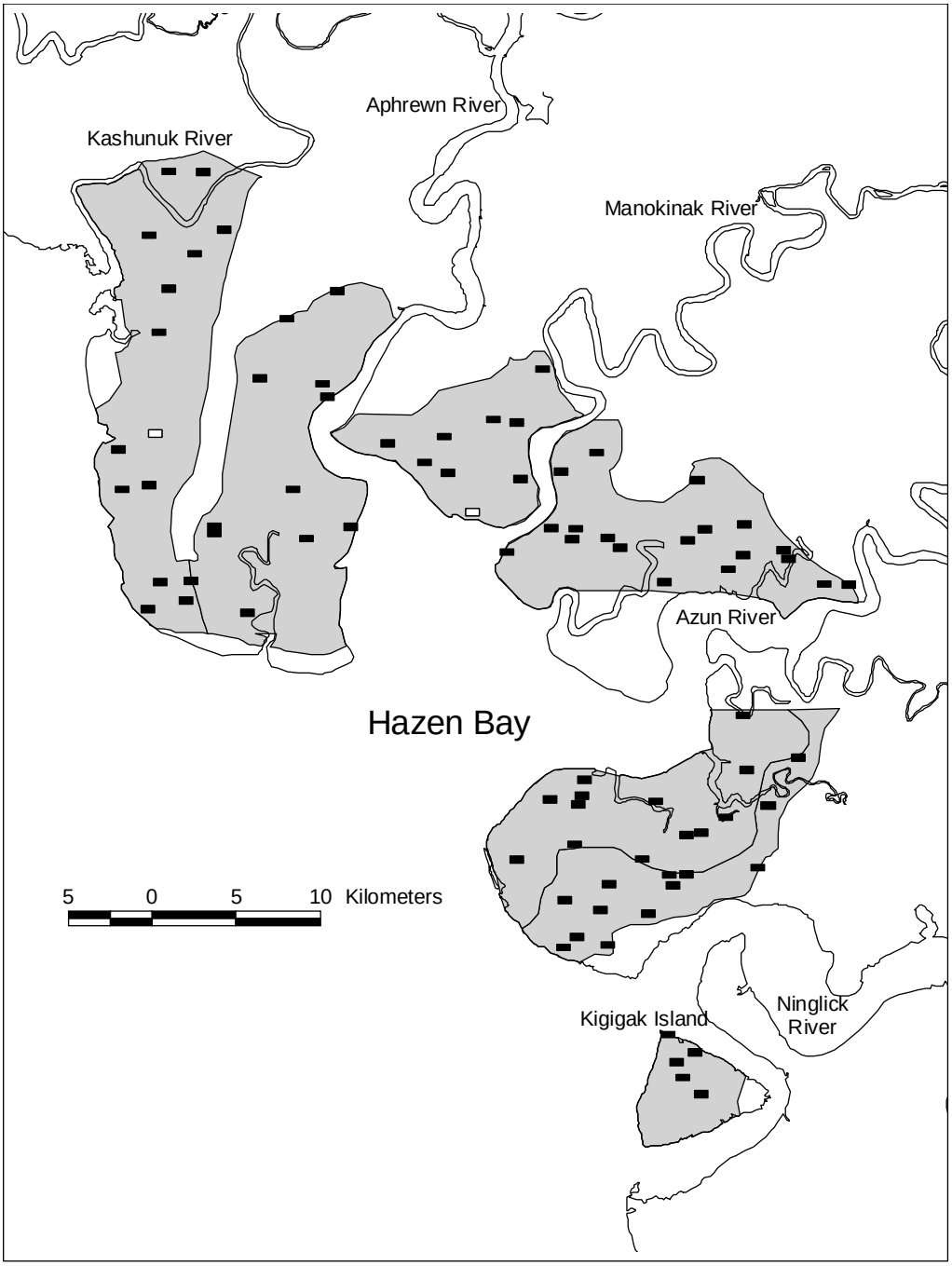

Figure 2. Locations of 83 sampled plots in 2005 (solid rectangles). Two additional plots were selected but not sampled (open rectangles).

RESULTS:

We searched 83 plots from 31 May to 15 June, 2005 (Fig. 2). Crews based at the Kanaryarmiut field station searched 52 plots, boat-based crews searched 23 plots, a Yukon Delta NWR crew at Kigigak Island searched 5 plots, personnel from the University of Nevada-Reno searched 1 plot on the Tutakoke River, and a USGS-BRD

crew searched 2 plots near the mouth of the Manokinak River. Two of the 85 randomly selected plots were not sampled due to poor access.

Crews located 3,754 nests in 2005, comprised of 1,339 cackling goose, 411 emperor goose, 692 greater white-fronted goose, 131 spectacled eider, and 1,181 from other species. Estimates of total nests, active nests, and viable eggs are presented in Table 1. Proportion of nests that were active at the time of visit, average clutch size, and estimated hatch date are presented in Table 2.

Cackling Geese (*Branta hutchinsii*)

Potential production of cackling geese was good in 2005. The numbers of nests was down 11% from 2004 (Table 1, Fig. 3) but remained above the long-term average (1985-2004). The proportion of nests that were active and clutch size were also down somewhat from 2004 (Table 2) resulting in an 18% drop in viable eggs from 2004. The number of eggs produced in 2005 was above the long-term average. The long-term (1985-2005) trend in the nest population is positive, but the annual rate of growth slowed in the late 1990s (Table 3). In the most recent 7 years, nest populations have declined at an average of 4% annually. Average hatch date for cacklers in 2005 was a week later than 2004, but 4 days earlier than the long-term average (1982-2004; Table 2).

Emperor Geese (*Chen canagica*)

Potential production of emperor geese was very good in 2005. The number of nests was up 17% from 2004 (Table 1, Fig. 3) and was above the long-term average. Clutch size and proportion of nests that were active in 2005 were both up slightly from 2004 (Table 2) and resulted in the second highest egg production recorded during the history of this survey (Table 1). Nest population growth rates have been variable over the course of this survey. The long-term (1985-2005) trend in the nest population is positive and the growth rate has increased in the last seven years (Table 3). Similar to other waterfowl species, estimated hatch date for emperors in 2005 was later than 2004 but six days earlier than the long-term average (Table 2).

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

Potential production of greater white-fronted geese was good in 2005. Number of nests was down 12% from 2004 but was above the long-term average. Similarly, the proportion of nests active and clutch sized decreased from 2004 (Table 2). As a result, egg production decreased 20% from last year, but remained well above the long-term average. The long-term (1985-2005) growth rate in the nest population is the highest of the goose species monitored by this survey. The growth rate, however, has slowed considerably in recent years (Table 3). Estimated mean hatch of white-fronts was later than 2004 but four days earlier than the long-term average (Table 2).


White-fronted gosling. Photo H. Wilson

Black Brant (*Branta bernicla nigricans*)

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

provide an estimate, albeit imprecise, of brant nests in satellite colonies on the YKD. In these areas, the number of brant nests was up substantially from 2004 and was above the long-term average (Table 1). Similarly, both the proportion of nests that were active and clutch size were up from 2004. Consequently, egg production was up from last year and was above the long-term average. As with other goose species, estimated hatch was six days later than in 2004 but four days earlier than the long-term average (Table 2).

Tundra Swans (*Cynus columbianus*)

Potential production of tundra swans was fair in 2005. The number of tundra swan nests decreased substantially from 2004 (Table 1) but remained slightly higher than the long-term average. The proportion of nests active and clutch size were both down from 2004 (Table 2). This resulted in egg production slightly lower than the long-term mean. Growth of the tundra swan nest population has been positive and relatively consistent over the course of the survey (Table 3). Estimated mean hatch date was four days later than 2004 and three days earlier than the long-term mean (Table 2).

Sandhill Cranes (*Grus canadensis*)

Potential production of sandhill cranes was good in 2005. The population of crane nests decreased from 2004 (Table 1) but was slightly above the long-term average. The proportion of crane nests active, and clutch size were the same as in 2004 (Table 2) and egg production was very close to the long-term average. Growth rates of sandhill crane nest construction and egg production has been highly variable among years and no obvious trend in nest population is apparent (Table 3, Fig. 3). The estimated hatch date of sandhill cranes was the same as 2004, and five days earlier than the long-term average.

Spectacled Eiders (*Somateria fischeri*)

Potential production of spectacled eiders was excellent in 2005. The nest population of spectacled eiders was the highest in 17 years (Table 1)**.** Total spectacled eider nests were up 29% from 2004. Additionally the proportion of nests that were active was high in 2005, suggesting that the rate of nest depredation was low and nesting conditions were very good (Table 2). As a result, the number of eggs produced was up substantially from 2004 and was 50% above the long term mean. The long-term (1988-2005) trend in spectacled eider nest population is nearly flat, but there are encouraging signs of growth in recent years (Table 3, Fig. 3). A sharp decline of nest populations in the late 1980s and early 1990s was followed by slow and steady growth that has persisted since the mid 1990s. Like other waterfowl species, spectacled eiders initiated nests later than in 2004, but nearly a week earlier than the long-term mean (Table 2).


Spectacled Eider. Photo E. Edwards

Common Eiders (*Somateria mollissima*)

Potential production of common eiders was excellent in 2005. The total number of nests and clutch size were very high in 2005 and resulted in the second highest year of nest

construction and egg production since 1988 (Tables 1, 2). Although the proportion of nests active was down somewhat from 2004 (Table 2), it remained above the long-term mean. Growth rate of the common eider nest population is variable by remains positive (Table 3, Fig. 3). Estimated hatch date of common eiders was essentially the same as 2004, and approximately a week earlier than the long-term average.

Loons

Potential production of Pacific loons (*Gavia pacifica*) and red-throated loons (*Gavia stellata*) was excellent in 2005. Estimates of nests and eggs for both species were up from 2004 were above the long-term average (Table 1). The proportion of nests active and average clutch size were up from 2004 and were above the long-term average (Table 2). A record high nesting year in 1999 negatively influenced the short-term nest population growth rate for both species (Table 3), but long-term growth rates of loon populations are positive. Estimated hatch date for loons was four days later than in 2004 and 2 days earlier than the long-term average (Table 2).

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 2005, nest and egg production were higher than 2004 and the long-term average for glaucous gulls (*Larus hyperboreus*), Sabine's gulls (*Xema sabini*), mew gulls (*Larus canus*) and arctic terns (*Sterna paradisaea*; Table 1). Estimated hatch date in 2005 was 4-7 days later than 2004 and up to a week earlier than the long-term average (Table 2).


Sabine's Gull. Photo M. Laws

DISCUSSION:

The nest plot survey was designed to provide estimates of nest and egg populations for non-colonial nesting geese (cackling geese, emperor geese, greater white-fronted geese) and eiders on the Yukon-Kuskokwim Delta coastal zone. In general, 2005 was a year of good potential production for geese and excellent potential production for eiders. With low incidence of nest desertion and depredation, the proportion of nests active at the time of nest searches was high.


Judy S. Edwards. Photo E. Edwards

The population sizes of goose and eider nests should not be interpreted as a direct index of population size. For example, a year of poor nesting conditions may result in a decline of nests but does not necessarily 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, 1st year and 2nd year survival rates.

In general, over periods of five or more years, the nest population size and trend parallels change in the aerial breeding pair indices. Estimates of cackling goose nests were at record lows in the mid 1980s prior to passage of the cooperative Yukon-Kuskokwim Delta Goose Management Plan that provided much needed protection for nesting and wintering populations of geese (Pamplin 1986). By the late 1980s, the population of nests began to increase rapidly with a peak in 2000. Since 1999, the trend in nests has been negative with an average loss of over 4% a year (Table 3). Aerial surveys on the breeding grounds reveal a similar trend (Eldridge and Hodges 2005), whereby indicated breeding pairs increased rapidly between the mid-1980s and mid-1990s, after which time the population leveled off or declined slightly. Emperor goose nest populations have shown slightly more variability among years. 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 trend is apparent. Patterns in nest populations of emperor geese also correspond well with indicated breeding pairs as estimated by aerial surveys (Eldridge and Hodges 2005), with slow and variable long-term growth. 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 and appears to be leveling off in recent years. A similar pattern is apparent in aerial estimates of breeding populations (Eldridge and Hodges 2005). The long-term annual growth rate of spectacled eider nests is 0.4%, but the last 14 years indicates significant gains with an average annual growth rate of 3.7%. Aerial surveys in the coastal zone of the YKD show a similar trend, with population estimates increasing at 5-9% annually since the early 1990s (Platte and Stehn 2005).


Patrick Gower. Photo T. Bowman

Timing of nest initiation is correlated with spring breakup. In 2005, breakup of the Kuskokwim River at Bethel was May 9, two days earlier than the previous 20-year average (1985-2004; NOAA 2005), and a week later than 2004. Waterfowl initiated nests approximately a week later in 2005 than the previous year. In 2004, average hatch date of geese and eiders, as estimated by float angles, was 9-12 days earlier than the long-term average; whereas in 2005, hatch for these species occurred 4-8 days earlier than long-term average.

This nest plot survey does not have enough plots to overcome the greater sampling error associated with species having clumped or colonial distributions, such as brant, common eiders, and gulls. Consequently, fluctuations and poor precision in annual estimates of population size for these species are likely, although long-term averages should be accurate. Similarly, estimates of loon and crane populations are highly variable because few nests are found and detection rates are relatively low.

A primary advantage of the random sampling procedure over intensive local studies is that it assures applicability of estimates to the entire population within the

sampled area, 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 a minimum amount of 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 ratio of nesting within versus outside of the ground sampled area. These resulting expansion factors do not require that the ratios are the same among years, only that they are constant among strata within a given year.


Emperor Goose. Photo J. Fischer

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 Patrick Gower (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), Michael Wege (YDNWR), Joel Schmutz (USGS-BRD), Jim Sedinger (University of Nevada-Reno), and Patrick Lemons (University of Nevada-Reno) for providing personnel. We also thank Paul Anderson (MBM-Anchorage) for air support of personnel and supplies, and Bill Eldridge (MBM-Anchorage), Jack Hodges (MBM-Juneau), and Bob Platte (MBM-Anchorage) for aerial survey data. Bob Platte also provided invaluable GIS data processing and plot delineation. The following individuals collected data in 2005: Terri Barnett, Tim Bowman, Mary Bozza, Chris Dau, J. Eddy Edwards, Judy Sefchick-Edwards, Julian Fischer, Paul Flint, Patrick Gower, Thomas Jones, Bryce Lake, Ellen Lance, Meg Laws, Mike Lelevier, Dennis Marks, Russ Oates, Thomas Olson, Cortney Pylant, Dan Rizzolo, Wade Schock, Michael Swaim, Declan Troy, Patrick Tuluk, Michael Wege, Heather Wilson, Kala Wolfe, and Ken Wright. Photos for this report were contributed by Tim Bowman, Eddy Edwards, Judy Sefchick-Edwards, Julian Fischer, Meg Laws, and Heather Wilson.

Kanaryarmiut crew. Photo J. Fischer

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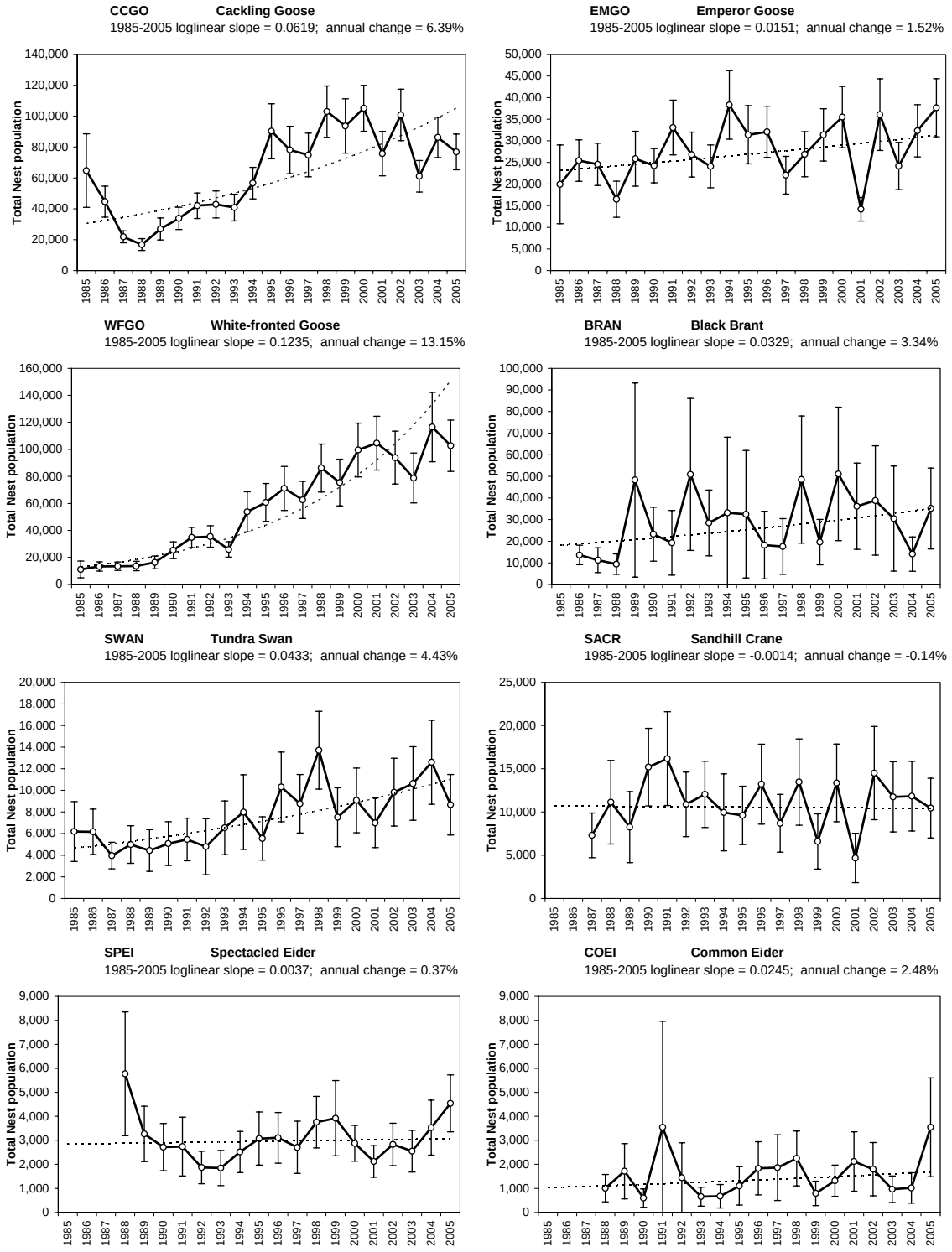

Figure 3. Estimated total nest population sizes on the Yukon-Kuskokwim Delta, Alaska, 1985-2005. Vertical lines indicate 95% confidence intervals of annual nest population size. Log-linear regression estimated average annual growth rates.

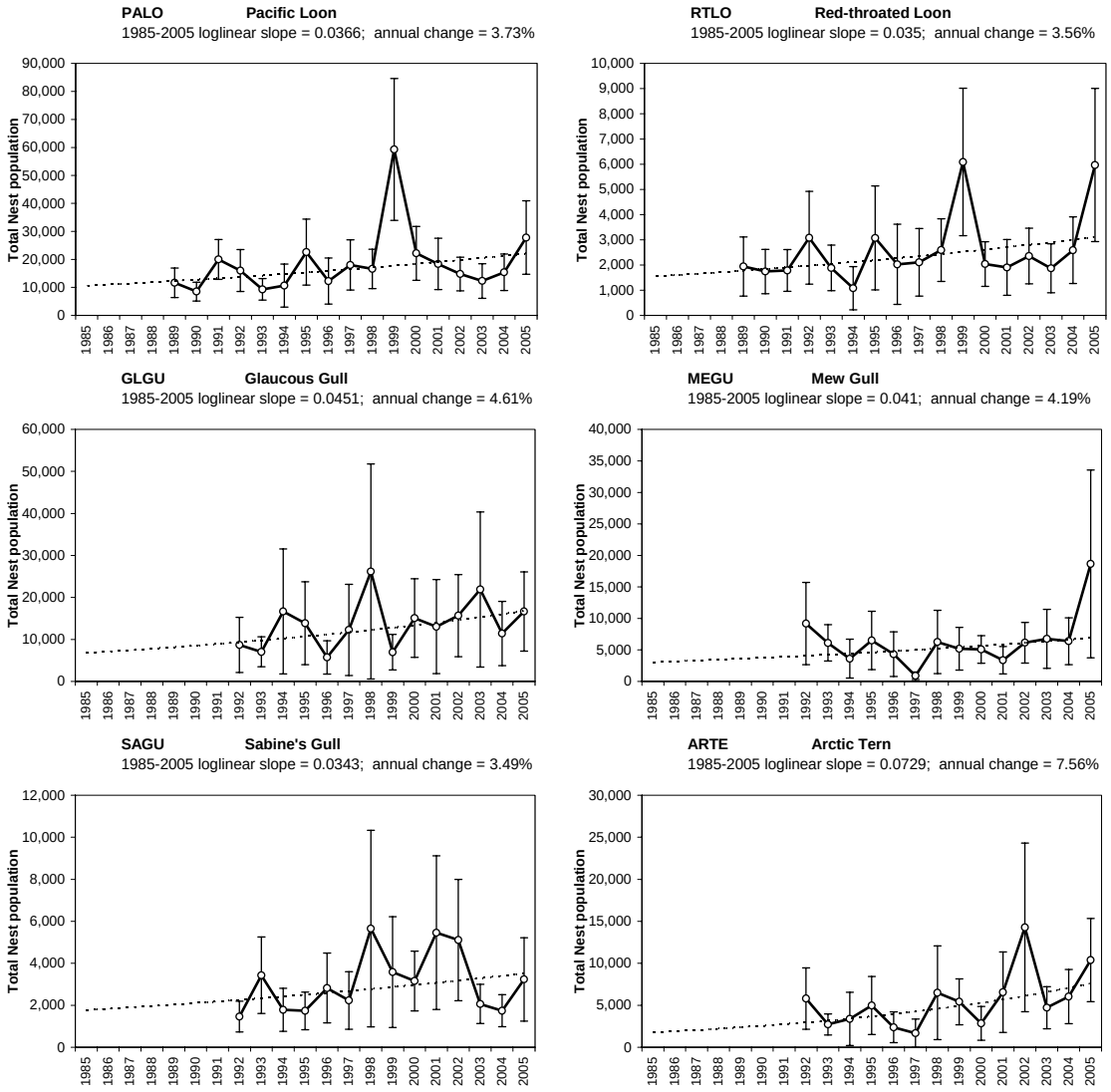

Figure 3 (continued). Estimated total nest population sizes on the Yukon-Kuskokwim Delta, Alaska, 1985-2005. Vertical lines indicate 95% confidence intervals of annual nest population size. Log-linear regression estimated average annual growth rates.

Table 1. Population size estimates of nests and eggs on the Yukon-Kuskokwim Delta (YKD), Alaska 1985-2005. The number of nests and eggs outside the ground sampled area was calculated by multiplying the ground sampled estimate by the ratio of indicated breeding pairs outside/inside the ground sampled area, as determined by aerial surveys. Indicated breeding pairs were based on twice the number of singles plus the number of birds in pairs observed, except for brant, loons, and gulls where the total number of birds observed was used, and for swans, where the number of singles plus the number of birds in pairs observed was used.

	Ground plot sampled area						Expanded to YKD coastal zone (12,832 km^2)					
Year	No. plots	Area (km2)	Total nests[1]	SE	Aerial obs out/in sampled area	Estimated nests out of sampled area	**Total nests**	SE	**Active nests**	SE	**Active eggs**	SE
Cackling Goose												
1985	48	1421.6	14794	2768	3.371	49872	**64666**	12144	**22411**	6051	**92689**	28038
1986	101	3961.3	35844	4771	0.243	8715	**44559**	5128	**28496**	3121	**136847**	15606
1987	125	4536.1	19840	1906	0.101	2011	**21851**	1967	**20352**	1910	**104416**	10122
1988	95	3961.3	13640	1855	0.231	3152	**16792**	1948	**12375**	1421	**57442**	7193
1989	89	4137.4	22351	3497	0.205	4577	**26928**	3630	**21596**	3115	**103234**	14953
1990	101	3961.3	27430	3424	0.232	6361	**33791**	3690	**24428**	2956	**113853**	14770
1991	97	2661.9	37017	4066	0.134	4966	**41983**	4212	**35252**	3461	**170854**	17617
1992	66	1974.4	28088	3514	0.524	14705	**42793**	4424	**37375**	3832	**178452**	18552
1993	99	2263.2	33852	4216	0.205	6926	**40778**	4419	**36392**	4209	**166089**	19465
1994	43	715.7	27094	3039	1.090	29526	**56620**	5190	**47381**	4589	**216920**	20700
1995	50	715.7	43841	5413	1.058	46380	**90221**	9092	**78795**	7932	**353310**	35459
1996	54	715.7	39763	4828	0.964	38312	**78075**	7826	**71279**	7368	**323286**	33546
1997	75	715.7	36136	4411	1.070	38680	**74816**	7205	**61818**	6405	**249772**	26224
1998	72	856.6	50713	5149	1.030	52229	**102942**	8485	**96028**	8120	**437407**	37037
1999	59	856.6	43427	5389	1.155	50165	**93592**	8987	**81217**	8093	**332514**	32917
2000	80	715.7	46281	3884	1.270	58796	**105077**	7592	**99859**	7330	**470706**	35033
2001	81	715.7	32939	3999	1.299	42802	**75741**	7323	**45995**	4934	**168486**	17500
2002	84	715.7	40440	3989	1.492	60319	**100759**	8500	**86176**	7443	**386482**	32722
2003	83	715.7	27324	2905	1.233	33701	**61025**	5174	**40268**	4089	**166243**	16815
2004	81	715.7	36576	3024	1.356	49589	**86165**	6651	**75491**	6131	**358999**	29402
2005	83	715.7	35668	3192	1.153	41109	**76777**	5896	**67545**	5470	**294089**	23528
Emperor Goose												
1985	48	1421.6	5023	1268	2.970	14918	**19941**	4653	**9452**	2967	**49422**	15312
1986	101	3961.3	19633	2129	0.295	5799	**25432**	2447	**17830**	1752	**90482**	8933
1987	125	4536.1	20749	2273	0.184	3820	**24569**	2491	**22728**	2320	**114672**	12048
1988	95	3961.3	14430	2055	0.142	2050	**16480**	2133	**15033**	2081	**77714**	11937
1989	89	4137.4	22980	3163	0.125	2882	**25862**	3236	**23089**	2816	**116311**	14387
1990	101	3961.3	19754	1837	0.227	4485	**24239**	2015	**21438**	1957	**107902**	9741
1991	97	2661.9	22857	2470	0.447	10209	**33066**	3232	**31432**	3076	**155655**	16039
1992	66	1974.4	15071	1798	0.779	11736	**26807**	2645	**25548**	2608	**127809**	13305
1993	99	2263.2	16545	1736	0.456	7540	**24085**	2524	**22851**	2428	**108142**	11652
1994	43	715.7	13367	1629	1.865	24927	**38294**	4053	**36231**	3949	**179393**	20344
1995	50	715.7	9739	1127	2.223	21649	**31388**	3431	**30367**	3363	**147737**	16140
1996	54	715.7	11008	1105	1.915	21078	**32086**	3031	**30264**	2947	**155068**	15507
1997	75	715.7	7074	725	2.119	14988	**22062**	2227	**21142**	2184	**101024**	10497
1998	72	856.6	9996	1042	1.690	16894	**26890**	2653	**25515**	2583	**119215**	12226
1999	59	856.6	9822	807	2.196	21569	**31391**	3087	**28971**	2878	**128247**	12718
2000	80	715.7	9716	929	2.653	25774	**35490**	3607	**34982**	3549	**174409**	17979
2001	81	715.7	4503	478	2.148	9671	**14174**	1390	**10995**	1207	**52486**	6179
2002	84	715.7	8700	942	3.145	27362	**36062**	4226	**33546**	3952	**168609**	19806
2003	83	715.7	7057	768	2.424	17109	**24166**	2784	**19334**	2407	**92930**	12085
2004	81	715.7	9690	909	2.336	22634	**32324**	3085	**30866**	2991	**150507**	14764
2005	83	715.7	10948	812	2.439	26697	**37645**	3438	**35448**	3228	**178427**	16361

Table 1 (continued)

	Ground plot sampled area						Expanded to entire coast					
Year	No. plots	Area (km2)	Total nests	SE	Aerial obs out/in sampled area	Estimated nests out of sampled area	**Total nests**	SE	**Active nests**	SE	**Active eggs**	SE
White-fronted Goose												
1985	48	1421.6	2009	633	4.545	9131	**11140**	3180	**6138**	2228	**21619**	7836
1986	101	3961.3	6697	1019	0.991	6638	**13335**	1738	**12045**	1667	**52336**	7561
1987	125	4536.1	9115	1226	0.482	4397	**13512**	1569	**12887**	1526	**58456**	6824
1988	95	3961.3	7721	1266	0.767	5923	**13644**	1778	**13071**	1665	**56037**	6925
1989	89	4137.4	9308	1751	0.753	7007	**16315**	2397	**16197**	2384	**71062**	9738
1990	101	3961.3	14270	2216	0.780	11128	**25398**	3174	**22771**	3073	**104493**	14656
1991	97	2661.9	17394	2378	1.001	17414	**34808**	3854	**32539**	3567	**156609**	19495
1992	66	1974.4	13784	1739	1.575	21708	**35492**	4052	**34223**	3996	**156391**	19294
1993	99	2263.2	11974	1544	1.167	13973	**25947**	2937	**25082**	2771	**109240**	12070
1994	43	715.7	8637	1066	5.228	45154	**53791**	7562	**52514**	7364	**230857**	32617
1995	50	715.7	9993	1093	5.074	50705	**60698**	7143	**58961**	6968	**249724**	29842
1996	54	715.7	12849	1303	4.534	58260	**71109**	8320	**68663**	8117	**308892**	36740
1997	75	715.7	10847	1127	4.772	51761	**62608**	7011	**61586**	6997	**264711**	30918
1998	72	856.6	14538	1339	4.931	71686	**86224**	9089	**83947**	8843	**361604**	38520
1999	59	856.6	11881	1236	5.350	63567	**75448**	8815	**71390**	8393	**298427**	35270
2000	80	715.7	13646	1258	6.294	85884	**99530**	10178	**97312**	10076	**433252**	45263
2001	81	715.7	11407	935	8.172	93222	**104629**	10163	**97869**	9848	**377719**	39187
2002	84	715.7	11995	1002	6.825	81861	**93856**	9993	**91790**	9830	**402850**	44260
2003	83	715.7	11265	1151	5.993	67506	**78771**	9408	**74121**	9024	**314351**	38626
2004	81	715.7	17032	1465	5.840	99475	**116507**	13106	**113148**	12749	**521120**	58237
2005	83	715.7	18433	1472	4.571	84259	**102692**	9685	**98687**	9240	**418786**	40242
Black Brant												
1985	48	1421.6	3424	1534	--	--	--	--	--	--	--	--
1986	101	3961.3	9586	1623	0.422	4048	**13634**	2296	**9754**	1647	**37109**	6417
1987	125	4536.1	8965	2626	0.254	2274	**11239**	2930	**9972**	2635	**42111**	11823
1988	95	3961.3	6394	2003	0.473	3024	**9418**	2422	**6996**	1752	**24586**	6019
1989	89	4137.4	37201	21808	0.300	11143	**48344**	22908	**44448**	21662	**171083**	85834
1990	101	3961.3	15524	5381	0.499	7739	**23263**	6364	**16081**	4414	**52199**	14519
1991	97	2661.9	14546	7119	0.327	4751	**19297**	7637	**16558**	7350	**59840**	26785
1992	66	1974.4	19026	8566	1.676	31885	**50911**	17941	**48869**	17634	**183820**	65280
1993	99	2263.2	18303	6205	0.556	10176	**28479**	7767	**24521**	7384	**86144**	26732
1994	43	715.7	8277	5430	3.007	24890	**33167**	17840	**30903**	17423	**117017**	66421
1995	50	715.7	6186	3119	4.255	26320	**32506**	15042	**23505**	10395	**86683**	38166
1996	54	715.7	4050	2022	3.505	14196	**18246**	7989	**15921**	7362	**59710**	28191
1997	75	715.7	3655	1368	3.801	13893	**17548**	6579	**16559**	6288	**57877**	21950
1998	72	856.6	15213	5499	2.190	33310	**48523**	15026	**41545**	13455	**151532**	49292
1999	59	856.6	5012	1491	2.908	14575	**19587**	5363	**15546**	4243	**49851**	13548
2000	80	715.7	15141	5069	2.377	35987	**51128**	15754	**45614**	14796	**169088**	54444
2001	81	715.7	8487	2391	3.266	27714	**36201**	10194	**19208**	6539	**56804**	18729
2002	84	715.7	11178	4344	2.474	27660	**38838**	12904	**34074**	12233	**121729**	42653
2003	83	715.7	8229	4048	2.705	22260	**30489**	12392	**14802**	8688	**49436**	29943
2004	81	715.7	4968	1710	1.833	9105	**14073**	4054	**11212**	3305	**39124**	11461
2005	83	715.7	10016	2732	2.512	25160	**35176**	9549	**29656**	8365	**106836**	29951
Tundra Swan												
1985	48	1421.6	1447	379	3.280	4746	**6193**	1411	**5255**	1218	**20448**	4903
1986	101	3961.3	3021	706	1.041	3145	**6166**	1073	**5358**	1007	**20506**	3991
1987	125	4536.1	2196	468	0.806	1770	**3966**	625	**3863**	624	**15008**	2543
1988	95	3961.3	2208	520	1.260	2781	**4989**	888	**4989**	888	**22817**	4077
1989	89	4137.4	2398	734	0.850	2038	**4436**	989	**4436**	989	**18972**	4215
1990	101	3961.3	2422	673	1.096	2655	**5077**	1030	**5014**	1029	**21391**	4617
1991	97	2661.9	2150	520	1.539	3310	**5460**	1005	**5241**	994	**22823**	4753
1992	66	1974.4	1366	477	2.502	3418	**4784**	1321	**4784**	1321	**17697**	4720
1993	99	2263.2	2166	538	2.017	4369	**6535**	1271	**6481**	1270	**25944**	5004
1994	43	715.7	977	222	7.178	7013	**7990**	1763	**7990**	1763	**33218**	7205
1995	50	715.7	730	135	6.609	4825	**5555**	1021	**5068**	954	**19068**	3633
1996	54	715.7	1141	177	8.038	9171	**10312**	1645	**9987**	1576	**48914**	7657
1997	75	715.7	1032	151	7.491	7730	**8762**	1380	**8261**	1312	**34786**	5639
1998	72	856.6	1697	207	7.082	12017	**13714**	1837	**12389**	1746	**42606**	5954
1999	59	856.6	907	172	7.283	6606	**7513**	1387	**6759**	1337	**25024**	5111
2000	80	715.7	913	153	8.938	8160	**9073**	1525	**8527**	1460	**31910**	5372
2001	81	715.7	819	134	7.535	6171	**6990**	1170	**5821**	977	**19802**	3510
2002	84	715.7	1054	166	8.330	8780	**9834**	1602	**8854**	1534	**38375**	6700
2003	83	715.7	1198	187	7.876	9435	**10633**	1735	**10403**	1698	**49643**	8230
2004	81	715.7	1337	189	8.427	11267	**12604**	1983	**12350**	1949	**67679**	10603
2005	83	715.7	1039	150	7.345	7632	**8671**	1428	**8229**	1370	**29785**	5017

Table 1 (continued)

	Ground plot sampled area						Expanded to entire coast					
Year	No. plots	Area (km2)	Total nests	SE	Aerial obs out/in sampled area	Estimated nests out of sampled area	**Total nests**	SE	**Active nests**	SE	**Active eggs**	SE
Sandhill Crane												
1985	48	1421.6	1024	253	--	--	--	--	--	--	--	--
1986	101	3961.3	3309	916	--	--	--	--	--	--	--	--
1987	125	4536.1	3330	784	1.193	3972	**7302**	1318	**7131**	1303	**11030**	2247
1988	95	3961.3	4091	1131	1.722	7045	**11136**	2465	**11136**	2465	**21888**	4891
1989	89	4137.4	2609	849	2.167	5654	**8263**	2099	**7734**	2082	**15107**	4139
1990	101	3961.3	5257	893	1.889	9932	**15189**	2286	**15036**	2274	**25299**	3929
1991	97	2661.9	4560	902	2.547	11614	**16174**	2763	**15628**	2678	**29673**	4912
1992	66	1974.4	2683	522	3.058	8206	**10889**	1904	**10706**	1883	**20926**	3886
1993	99	2263.2	3062	557	2.930	8972	**12034**	1955	**11220**	1917	**19006**	3312
1994	43	715.7	1182	245	7.423	8775	**9957**	2267	**9957**	2267	**17757**	4218
1995	50	715.7	983	154	8.768	8619	**9602**	1722	**8987**	1687	**17046**	3242
1996	54	715.7	1362	213	8.705	11857	**13219**	2361	**12860**	2344	**24303**	4412
1997	75	715.7	1002	181	7.671	7686	**8688**	1709	**8688**	1709	**16102**	3258
1998	72	856.6	1287	205	9.463	12179	**13466**	2545	**13466**	2545	**23720**	4475
1999	59	856.6	728	183	8.052	5862	**6590**	1633	**5757**	1560	**9866**	2919
2000	80	715.7	969	139	12.790	12394	**13363**	2298	**12977**	2261	**23664**	4197
2001	81	715.7	355	111	12.171	4321	**4676**	1458	**4307**	1419	**7547**	2554
2002	84	715.7	1054	149	12.752	13440	**14494**	2748	**13779**	2677	**27558**	5354
2003	83	715.7	1092	155	9.759	10656	**11748**	2070	**11458**	2046	**22346**	4025
2004	81	715.7	1256	161	8.415	10569	**11825**	2052	**11825**	2052	**22869**	3918
2005	83	715.7	1145	164	8.123	9301	**10446**	1765	**10446**	1765	**19688**	3325
Spectacled Eider												
1985	48	1421.6	2051	513	--	--	--	--	--	--	--	--
1986	101	3961.3	5060	846	--	--	--	--	--	--	--	--
1987	125	4536.1	4357	802	--	--	--	--	--	--	--	--
1988	95	3961.3	3344	725	0.726	2428	**5772**	1315	**5190**	1208	**26786**	6274
1989	89	4137.4	2359	433	0.385	908	**3267**	589	**2940**	541	**14529**	2459
1990	101	3961.3	2078	414	0.307	637	**2715**	501	**2476**	478	**13237**	2597
1991	97	2661.9	1905	398	0.439	836	**2741**	624	**2458**	556	**12891**	2923
1992	66	1974.4	1324	263	0.412	546	**1870**	344	**1613**	315	**8787**	1700
1993	99	2263.2	1696	367	0.089	151	**1847**	375	**1618**	349	**7419**	1670
1994	43	715.7	1697	333	0.483	819	**2516**	439	**1982**	357	**9223**	1743
1995	50	715.7	2094	417	0.468	981	**3075**	563	**2468**	498	**12437**	2593
1996	54	715.7	1988	377	0.563	1119	**3107**	539	**2532**	458	**12830**	2360
1997	75	715.7	1680	389	0.612	1029	**2709**	555	**2423**	525	**10645**	2352
1998	72	856.6	2330	372	0.614	1431	**3761**	547	**3500**	498	**16980**	2401
1999	59	856.6	2401	577	0.633	1521	**3922**	799	**3549**	731	**17483**	3528
2000	80	715.7	1965	295	0.465	913	**2878**	382	**2676**	369	**14310**	1967
2001	81	715.7	1474	275	0.440	649	**2123**	336	**1336**	213	**5580**	956
2002	84	715.7	2135	407	0.326	696	**2831**	450	**2341**	428	**12163**	2402
2003	83	715.7	1651	350	0.540	892	**2543**	442	**1969**	374	**8574**	1748
2004	81	715.7	2102	387	0.679	1427	**3529**	584	**2840**	507	**14113**	2542
2005	83	715.7	3490	538	0.301	1051	**4541**	604	**4124**	596	**19200**	2866
Common Eider												
1985	48	1421.6	35	23	--	--	--	--	--	--	--	--
1986	101	3961.3	178	57	--	--	--	--	--	--	--	--
1987	125	4536.1	746	237	--	--	--	--	--	--	--	--
1988	95	3961.3	651	200	0.550	358	**1009**	292	**806**	227	**3806**	1083
1989	89	4137.4	1446	549	0.186	269	**1715**	588	**1715**	588	**9434**	3183
1990	101	3961.3	448	150	0.329	148	**596**	194	**526**	181	**2686**	997
1991	97	2661.9	2970	2191	0.193	575	**3545**	2252	**3455**	2250	**17808**	11644
1992	66	1974.4	1169	710	0.238	278	**1447**	739	**1425**	739	**7232**	3697
1993	99	2263.2	506	176	0.297	150	**656**	201	**429**	133	**2293**	742
1994	43	715.7	411	196	0.635	261	**672**	250	**589**	225	**2607**	918
1995	50	715.7	539	247	1.048	565	**1104**	405	**1040**	398	**5262**	2058
1996	54	715.7	773	271	1.375	1063	**1836**	565	**1748**	522	**9270**	2822
1997	75	715.7	707	274	1.641	1160	**1867**	698	**1711**	647	**7782**	2984
1998	72	856.6	868	229	1.590	1380	**2248**	582	**1754**	455	**8652**	2225
1999	59	856.6	470	177	0.690	324	**794**	259	**537**	192	**2614**	920
2000	80	715.7	775	212	0.705	546	**1321**	332	**1273**	313	**6229**	1551
2001	81	715.7	901	292	1.352	1218	**2119**	632	**1926**	581	**7767**	2343
2002	84	715.7	685	191	1.625	1113	**1798**	565	**1730**	551	**8167**	2617
2003	83	715.7	639	225	0.513	328	**967**	281	**725**	238	**3102**	1064
2004	81	715.7	600	212	0.698	419	**1019**	324	**973**	314	**4683**	1453
2005	83	715.7	1225	298	1.893	2319	**3544**	1049	**3084**	909	**15259**	4546

Table 1 (continued)

	Ground plot sampled area						Expanded to entire coast					
Year	No. plots	Area (km2)	Total nests	SE	Aerial obs out/in sampled area	Estimated nests out of sampled area	**Total nests**	SE	**Active nests**	SE	**Active eggs**	SE
Pacific Loon												
1985	48	1421.6	--	--	--	--	--	--	--	--	--	--
1986	101	3961.3	--	--	--	--	--	--	--	--	--	--
1987	125	4536.1	--	--	--	--	--	--	--	--	--	--
1988	96	3961.3	--	--	--	--	--	--	--	--	--	--
1989	89	4137.4	4169	1067	1.795	7481	**11650**	2688	**11553**	2680	**20978**	4936
1990	101	3961.3	4109	1018	1.071	4401	**8511**	1710	**6884**	1471	**12452**	2730
1991	97	2661.9	5608	1101	2.567	14396	**20005**	3642	**18830**	3517	**33628**	6202
1992	69	1974.4	2861	712	4.595	13147	**16008**	3816	**14429**	3474	**25514**	6053
1993	99	2263.2	2487	586	2.731	6792	**9279**	1962	**9165**	1956	**17522**	3844
1994	43	715.7	648	236	15.430	9995	**10643**	3927	**10643**	3927	**19160**	6673
1995	50	715.7	976	167	22.195	21665	**22642**	6012	**22642**	6012	**40644**	11034
1996	54	715.7	462	142	25.535	11797	**12259**	4206	**12259**	4206	**20914**	7458
1997	75	715.7	789	168	21.845	17238	**18027**	4584	**17471**	4475	**33312**	8616
1998	72	856.6	1240	205	12.401	15374	**16613**	3575	**15127**	3206	**27224**	5904
1999	59	856.6	1929	305	29.738	57349	**59278**	12940	**56624**	12641	**100003**	23137
2000	80	715.7	1202	181	17.468	20989	**22190**	4906	**21479**	4735	**40449**	9057
2001	81	715.7	1195	231	14.381	17183	**18377**	4664	**17728**	4573	**28688**	7498
2002	84	715.7	1227	173	11.046	13551	**14778**	3056	**14321**	3008	**25228**	5359
2003	83	715.7	698	151	16.596	11590	**12288**	3159	**11677**	3023	**20284**	5491
2004	81	715.7	836	131	17.429	14564	**15399**	3324	**13528**	3074	**23285**	5215
2005	83	715.7	1322	215	20.020	26467	**27789**	6701	**27404**	6637	**49478**	12226
Red-throated Loon												
1985	48	1421.6	--	--	--	--	--	--	--	--	--	--
1986	101	3961.3	--	--	--	--	--	--	--	--	--	--
1987	125	4536.1	--	--	--	--	--	--	--	--	--	--
1988	96	3961.3	--	--	--	--	--	--	--	--	--	--
1989	89	4137.4	769	197	1.519	1169	**1938**	600	**1922**	596	**3489**	1090
1990	101	3961.3	735	182	1.369	1006	**1741**	448	**1408**	376	**2547**	691
1991	97	2661.9	931	183	0.917	853	**1784**	424	**1679**	404	**2998**	716
1992	69	1974.4	625	156	3.926	2454	**3079**	940	**2775**	852	**4907**	1495
1993	99	2263.2	594	140	2.171	1289	**1883**	461	**1860**	458	**3556**	893
1994	43	715.7	123	45	7.761	956	**1079**	435	**1079**	435	**1943**	753
1995	50	715.7	420	72	6.324	2655	**3075**	1052	**3075**	1052	**5520**	1908
1996	54	715.7	164	51	11.344	1861	**2025**	812	**2025**	812	**3454**	1419
1997	75	715.7	184	39	10.454	1922	**2106**	684	**2041**	666	**3892**	1276
1998	72	856.6	559	93	3.632	2031	**2591**	634	**2359**	572	**4245**	1043
1999	59	856.6	774	122	6.861	5314	**6089**	1493	**5816**	1446	**10271**	2615
2000	80	715.7	514	78	2.961	1523	**2038**	451	**1972**	436	**3714**	829
2001	81	715.7	361	70	4.270	1542	**1904**	565	**1836**	550	**2972**	896
2002	84	715.7	487	69	3.835	1868	**2356**	564	**2283**	551	**4021**	977
2003	83	715.7	367	79	4.102	1504	**1871**	494	**1778**	472	**3088**	846
2004	81	715.7	283	44	8.132	2305	**2588**	675	**2274**	612	**3913**	1044
2005	83	715.7	623	101	8.574	5341	**5964**	1551	**5881**	1534	**10619**	2813
Glaucous Gull												
1985	48	1421.6	2520	684	--	--	--	--	--	--	--	--
1986	101	3961.3	3375	637	--	--	--	--	--	--	--	--
1987	125	4536.1	2516	439	--	--	--	--	--	--	--	--
1988	95	3961.3	3253	735	--	--	--	--	--	--	--	--
1989	89	4137.4	2412	574	--	--	--	--	--	--	--	--
1990	101	3961.3	3227	1065	--	--	--	--	--	--	--	--
1991	97	2661.9	7121	2373	--	--	--	--	--	--	--	--
1992	66	1974.4	4035	1756	1.156	4663	**8698**	3352	**7957**	3012	**21493**	8126
1993	99	2263.2	2463	574	1.860	4582	**7045**	1814	**6839**	1782	**17643**	4560
1994	43	715.7	2211	1053	6.538	14455	**16666**	7593	**16274**	7534	**46117**	21964
1995	50	715.7	2252	643	5.154	11607	**13859**	5034	**13859**	5034	**36118**	13130
1996	54	715.7	957	278	4.965	4751	**5708**	2020	**5708**	2020	**14273**	4967
1997	75	715.7	2446	1141	4.023	9840	**12286**	5541	**12140**	5429	**31092**	13951
1998	72	856.6	3760	1821	5.964	22424	**26184**	13068	**25676**	12820	**67974**	33901
1999	59	856.6	1564	398	3.446	5390	**6954**	2167	**6544**	2034	**17744**	5647
2000	80	715.7	3709	974	3.064	11366	**15075**	4781	**14738**	4670	**38701**	12332
2001	81	715.7	2347	955	4.557	10696	**13043**	5711	**12281**	5551	**30025**	13130
2002	84	715.7	2531	579	5.189	13134	**15665**	4985	**14031**	4478	**38014**	12113
2003	83	715.7	3835	1748	4.709	18058	**21893**	9411	**18548**	8575	**45762**	21420
2004	81	715.7	2293	716	3.980	9127	**11420**	3908	**11286**	3886	**28139**	9774
2005	83	715.7	3783	1049	3.406	12885	**16668**	4815	**16430**	4780	**44363**	13023

Table 1 (continued)

	Ground plot sampled area						Expanded to entire coast					
Year	No. plots	Area (km2)	Total nests	SE	Aerial obs out/in sampled area	Estimated nests out of sampled area	**Total nests**	SE	**Active nests**	SE	**Active eggs**	SE
Mew Gull												
1985	48	1421.6	1174	407	--	--	--	--	--	--	--	--
1986	101	3961.3	2310	732	--	--	--	--	--	--	--	--
1987	125	4536.1	1845	505	--	--	--	--	--	--	--	--
1988	95	3961.3	2528	1917	--	--	--	--	--	--	--	--
1989	89	4137.4	2444	687	--	--	--	--	--	--	--	--
1990	101	3961.3	1365	648	--	--	--	--	--	--	--	--
1991	97	2661.9	1559	334	--	--	--	--	--	--	--	--
1992	66	1974.4	2031	752	3.521	7152	**9183**	3334	**8717**	3259	**21386**	7784
1993	99	2263.2	2366	282	1.586	3751	**6117**	1474	**6117**	1474	**16480**	3959
1994	43	715.7	1028	522	2.515	2585	**3613**	1576	**3434**	1556	**9036**	4181
1995	50	715.7	1396	403	3.655	5103	**6499**	2368	**6499**	2368	**16834**	6173
1996	54	715.7	773	234	4.599	3555	**4328**	1803	**4328**	1803	**11546**	4921
1997	75	715.7	265	82	2.416	640	**905**	302	**905**	302	**2214**	752
1998	72	856.6	1308	455	3.795	4964	**6272**	2565	**6272**	2565	**15008**	6174
1999	59	856.6	1365	396	2.800	3822	**5187**	1732	**5016**	1699	**12841**	4314
2000	80	715.7	1024	189	3.967	4063	**5087**	1113	**4813**	1071	**12652**	2847
2001	81	715.7	982	300	2.429	2385	**3367**	1110	**3367**	1110	**7954**	2593
2002	84	715.7	1687	378	2.645	4463	**6150**	1641	**5956**	1600	**15952**	4232
2003	83	715.7	1465	387	3.612	5292	**6757**	2387	**6144**	2217	**15599**	5462
2004	81	715.7	1419	326	3.498	4964	**6383**	1897	**6140**	1823	**14489**	4268
2005	83	715.7	3090	1366	5.035	15559	**18649**	7607	**18649**	7607	**47263**	20331
Sabine's Gull												
1985	48	1421.6			--	--	--	--	--	--	--	--
1986	101	3961.3	664	233	--	--	--	--	--	--	--	--
1987	125	4536.1	875	326	--	--	--	--	--	--	--	--
1988	95	3961.3	747	301	--	--	--	--	--	--	--	--
1989	89	4137.4	1559	986	--	--	--	--	--	--	--	--
1990	101	3961.3	2406	1350	--	--	--	--	--	--	--	--
1991	97	2661.9	1304	387	--	--	--	--	--	--	--	--
1992	66	1974.4	840	282	0.738	620	**1460**	374	**1460**	374	**3186**	801
1993	99	2263.2	2388	813	0.436	1041	**3429**	928	**3359**	898	**8011**	2031
1994	43	715.7	617	210	1.892	1168	**1785**	524	**1785**	524	**4460**	1342
1995	50	715.7	698	185	1.486	1038	**1736**	457	**1736**	457	**4180**	1077
1996	54	715.7	736	216	2.834	2086	**2822**	849	**2684**	813	**6495**	1951
1997	75	715.7	442	130	4.048	1789	**2231**	699	**2231**	699	**5210**	1787
1998	72	856.6	1454	741	2.890	4202	**5656**	2388	**5656**	2388	**11199**	4484
1999	59	856.6	1248	604	1.870	2334	**3582**	1348	**3582**	1348	**8079**	3026
2000	80	715.7	775	182	3.074	2382	**3157**	727	**3157**	727	**8005**	1959
2001	81	715.7	1201	423	3.544	4257	**5458**	1866	**5330**	1851	**11411**	4131
2002	84	715.7	1239	404	3.120	3866	**5105**	1474	**5105**	1474	**12056**	3418
2003	83	715.7	692	186	1.979	1370	**2062**	477	**1984**	471	**4365**	970
2004	81	715.7	600	148	1.897	1138	**1738**	388	**1582**	371	**3085**	730
2005	83	715.7	1145	256	1.824	2089	**3234**	1013	**3234**	1013	**6923**	2197
Arctic Tern												
1985	48	1421.6	340	172	--	--	--	--	--	--	--	--
1986	101	3961.3	911	588	--	--	--	--	--	--	--	--
1987	125	4536.1	760	318	--	--	--	--	--	--	--	--
1988	95	3961.3	200	99	--	--	--	--	--	--	--	--
1989	89	4137.4	414	175	--	--	--	--	--	--	--	--
1990	101	3961.3	1047	387	--	--	--	--	--	--	--	--
1991	97	2661.9	652	290	--	--	--	--	--	--	--	--
1992	66	1974.4	1024	323	4.669	4781	**5805**	1863	**5805**	1863	**11282**	3611
1993	99	2263.2	1068	304	1.542	1647	**2715**	637	**2715**	637	**6083**	1407
1994	43	715.7	308	156	9.989	3077	**3385**	1614	**3385**	1614	**7912**	3959
1995	50	715.7	539	165	8.226	4434	**4973**	1762	**4973**	1762	**9955**	3538
1996	54	715.7	221	85	9.758	2157	**2378**	928	**2378**	928	**4357**	1728
1997	75	715.7	147	75	10.408	1530	**1677**	856	**1677**	856	**3365**	1721
1998	72	856.6	764	208	7.499	5729	**6493**	2848	**6493**	2848	**13615**	5965
1999	59	856.6	755	199	6.179	4665	**5420**	1392	**5420**	1392	**10847**	2812
2000	80	715.7	277	90	9.252	2563	**2840**	1024	**2840**	1024	**5106**	1820
2001	81	715.7	682	269	8.605	5868	**6550**	2446	**6291**	2242	**12054**	4332
2002	84	715.7	1529	434	8.330	12737	**14266**	5127	**14266**	5127	**29269**	10436
2003	83	715.7	506	136	8.307	4203	**4709**	1272	**4709**	1272	**8422**	2340
2004	81	715.7	737	137	7.182	5293	**6030**	1644	**5809**	1605	**10277**	2834
2005	83	715.7	1199	258	7.655	9179	**10378**	2527	**10378**	2527	**20288**	4843

[1] Estimate of total nests in ground plot sampled area is not directly comparable among years because area has varied. In contrast, the size of the expansion area has been constant, thus the estimate of total nests in the coastal zone expansion is directly comparable among years.

Table 2. Annual proportion of nests active at time of plot visit, mean clutch size of apparently viable eggs found in actively incubated nests, and predicted mean date of hatch based on egg float angles. Means are calculated considering each nest as a sample unit.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Cackling Goose								
1982	0.307	584	4.5	168	04 July	25 June	18 July	170
1983	0.693	518	5.2	355	25 June	15 June	14 July	284
1984	0.477	214	4.6	102	25 June	16 June	11 July	92
1985	0.472	667	4.1	284	03 July	24 June	15 July	278
1986	0.642	648	4.7	404	29 June	13 June	15 July	346
1987	0.906	575	5.0	504	28 June	20 June	18 July	204
1988	0.742	306	4.6	223	24 June	15 June	08 July	66
1989	0.844	443	4.8	373	01 July	22 June	10 July	55
1990	0.745	514	4.6	377	24 June	13 June	06 July	194
1991	0.852	675	4.7	571	22 June	12 June	03 July	352
1992	0.890	674	4.8	590	30 June	20 June	21 July	391
1993	0.885	705	4.5	616	24 June	09 June	06 July	358
1994	0.814	625	4.6	501	19 June	08 June	09 July	409
1995	0.873	1382	4.5	1189	20 June	11 June	05 July	725
1996	0.913	1080	4.5	978	17 June	07 June	05 July	755
1997	0.826	1226	4.0	1010	17 June	03 June	04 July	812
1998	0.937	1602	4.5	1483	25 June	12 June	09 July	889
1999	0.869	1113	4.1	931	27 June	17 June	16 July	772
2000	0.950	1672	4.7	1509	24 June	14 June	10 July	1014
2001	0.607	1207	3.7	729	28 June	15 June	09 July	522
2002	0.855	1534	4.5	1293	20 June	10 June	04 July	930
2003	0.660	1026	4.1	648	17 June	03 June	04 July	562
2004	0.876	1340	4.8	1151	13 June	04 June	01 July	964
2005	0.880	1339	4.4	1147	20 June	09 June	07 July	957
Emperor Goose								
1982	0.699	133	4.9	78	03 July	16 June	11 July	71
1983	0.831	177	5.4	141	22 June	14 June	06 July	100
1984	0.728	81	5.5	58	23 June	16 June	02 July	43
1985	0.618	191	5.2	113	01 July	23 June	11 July	107
1986	0.696	335	5.2	218	27 June	18 June	09 July	196
1987	0.934	395	5.1	361	27 June	18 June	07 July	141
1988	0.894	217	5.1	192	21 June	16 June	04 July	67
1989	0.916	322	5.1	292	30 June	18 June	07 July	63
1990	0.875	336	4.9	288	21 June	11 June	06 July	99
1991	0.947	380	5.0	356	20 June	10 June	02 July	256
1992	0.959	270	5.0	259	29 June	21 June	09 July	182
1993	0.954	306	4.9	285	21 June	11 June	04 July	139
1994	0.939	328	4.9	308	19 June	12 June	30 June	192
1995	0.967	307	4.9	297	18 June	10 June	06 July	188
1996	0.943	299	5.1	280	16 June	04 June	23 June	185
1997	0.958	240	4.8	230	15 June	06 June	30 June	153
1998	0.954	281	4.7	266	24 June	16 June	03 July	215
1999	0.919	247	4.5	224	27 June	17 June	06 July	188
2000	0.986	351	5.0	344	23 June	13 June	08 July	280
2001	0.776	165	4.8	127	27 June	19 June	02 July	104
2002	0.930	330	5.0	303	18 June	09 June	29 June	249
2003	0.800	265	4.8	211	15 June	05 June	26 June	153
2004	0.955	355	4.9	338	12 June	04 June	24 June	253
2005	0.942	411	5.0	380	17 June	07 June	29 June	303

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
White-fronted Goose								
1982	0.643	28	3.7	15	04 July	26 June	12 July	14
1983	0.922	51	4.3	38	21 June	13 June	19 July	25
1984	0.903	31	4.6	28	23 June	16 June	01 July	25
1985	0.741	58	4.1	42	30 June	23 June	07 July	42
1986	0.878	123	4.3	104	26 June	17 June	12 July	102
1987	0.944	144	4.7	133	26 June	19 June	03 July	60
1988	0.963	81	4.5	78	22 June	15 June	03 July	32
1989	0.991	112	4.5	111	28 June	22 June	04 July	21
1990	0.936	173	4.6	161	22 June	11 June	29 June	52
1991	0.935	214	4.7	198	21 June	12 June	03 July	138
1992	0.971	204	4.5	197	29 June	19 June	24 July	110
1993	0.970	199	4.3	191	23 June	17 June	05 July	84
1994	0.973	222	4.4	214	19 June	11 June	28 June	129
1995	0.971	315	4.2	306	21 June	09 June	01 July	178
1996	0.966	349	4.5	337	18 June	07 June	30 June	144
1997	0.984	368	4.3	360	18 June	07 June	29 June	184
1998	0.974	392	4.3	380	25 June	17 June	06 July	261
1999	0.947	263	4.2	246	27 June	19 June	10 July	208
2000	0.978	493	4.5	478	25 June	14 June	09 July	334
2001	0.935	418	3.9	390	28 June	19 June	07 July	311
2002	0.978	455	4.4	444	22 June	14 June	30 June	306
2003	0.941	423	4.2	397	19 June	06 June	01 July	272
2004	0.971	624	4.6	602	15 June	04 June	27 June	364
2005	0.961	692	4.2	664	20 June	12 June	01 July	438
Black Brant								
1982	0.043	47	2.0	1	28 June	28 June	28 June	1
1983	0.462	52	3.4	24	23 June	15 June	03 July	11
1984	0.294	17	4.2	5	20 June	19 June	20 June	4
1985	0.129	271	3.6	21	27 June	23 June	08 July	29
1986	0.735	298	3.8	215	25 June	19 June	06 July	126
1987	0.952	652	4.2	615	25 June	22 June	03 July	167
1988	0.698	222	3.4	155	20 June	14 June	03 July	38
1989	0.929	1011	3.8	939	27 June	19 June	06 July	40
1990	0.727	428	3.2	310	21 June	15 June	01 July	119
1991	0.867	542	3.6	373	19 June	12 June	01 July	183
1992	0.963	898	3.9	551	26 June	19 June	06 July	152
1993	0.852	562	3.3	328	21 June	12 June	27 June	107
1994	0.883	274	3.7	119	17 June	10 June	27 June	93
1995	0.723	195	3.7	103	18 June	12 June	01 July	41
1996	0.873	110	3.8	96	17 June	11 June	26 June	44
1997	0.944	124	3.5	110	14 June	03 June	24 June	100
1998	0.875	488	3.7	427	23 June	16 June	04 July	260
1999	0.821	156	3.2	126	26 June	17 June	07 July	108
2000	0.892	547	3.7	372	23 June	16 June	03 July	216
2001	0.531	311	3.0	165	26 June	19 June	05 July	77
2002	0.877	424	3.6	324	19 June	06 June	03 July	163
2003	0.485	309	3.0	62	16 June	07 June	26 June	56
2004	0.797	182	3.5	135	11 June	04 June	24 June	101
2005	0.843	376	3.6	265	17 June	06 June	26 June	148

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Tundra Swan								
1982	0.824	17	3.7	13	05 July	23 June	14 July	11
1983	0.933	15	4.8	14	24 June	15 June	30 June	6
1984	0.933	15	4.6	14	27 June	20 June	05 July	6
1985	0.839	31	3.8	24	04 July	26 June	10 July	14
1986	0.872	47	3.6	38	28 June	19 June	10 July	23
1987	0.962	26	3.8	24	30 June	23 June	06 July	12
1988	1.000	24	4.6	23	27 June	17 June	04 July	4
1989	1.000	24	4.3	24	01 July	29 June	03 July	4
1990	0.964	28	4.1	26	25 June	21 June	27 June	4
1991	0.926	27	4.2	25	24 June	17 June	08 July	12
1992	1.000	20	3.8	20	30 June	24 June	07 July	8
1993	0.964	28	4.0	26	26 June	19 June	01 July	6
1994	1.000	27	4.3	27	22 June	13 June	30 June	9
1995	0.913	23	3.8	21	25 June	21 June	02 July	9
1996	0.968	31	4.9	30	19 June	10 June	28 June	9
1997	0.943	35	4.2	33	21 June	14 June	25 June	13
1998	0.905	42	3.4	36	30 June	23 June	12 July	20
1999	0.900	20	3.7	18	01 July	24 June	09 July	14
2000	0.939	33	3.7	30	26 June	18 June	05 July	22
2001	0.833	30	3.4	25	30 June	19 June	09 July	16
2002	0.900	40	4.3	36	26 June	20 June	01 July	10
2003	0.978	45	4.8	44	18 June	11 June	24 June	21
2004	0.980	49	5.5	48	19 June	10 June	27 June	16
2005	0.949	39	3.6	37	23 June	16 June	29 June	18
Sandhill Crane								
1982	0.889	9	2.0	6	24 June	22 June	25 June	4
1983	1.000	27	1.8	24	26 June	17 June	11 July	14
1984	0.929	14	1.9	13	19 June	15 June	21 June	6
1985	0.958	24	1.5	20	30 June	19 June	04 July	13
1986	0.805	41	1.6	30	27 June	16 June	09 July	25
1987	0.973	37	1.6	34	25 June	18 June	10 July	16
1988	1.000	34	1.9	34	19 June	17 June	25 June	6
1989	0.850	20	1.9	17	19 June	17 June	21 June	2
1990	0.979	47	1.8	45	18 June	15 June	22 June	9
1991	0.980	50	2.0	48	16 June	10 June	26 June	25
1992	0.967	30	1.8	29	30 June	24 June	05 July	9
1993	0.943	35	1.7	33	19 June	15 June	27 June	14
1994	1.000	32	1.8	31	14 June	11 June	16 June	5
1995	0.935	31	1.9	29	18 June	12 June	30 June	10
1996	0.973	37	1.9	35	14 June	10 June	25 June	14
1997	1.000	34	1.8	32	15 June	11 June	24 June	8
1998	1.000	35	1.8	35	21 June	15 June	26 June	19
1999	0.875	16	1.7	14	23 June	19 June	28 June	12
2000	0.971	35	1.8	34	19 June	13 June	29 June	22
2001	0.923	13	1.8	12	21 June	19 June	23 June	7
2002	0.950	40	2.0	38	19 June	08 June	03 July	12
2003	0.976	41	2.0	40	14 June	07 June	25 June	13
2004	1.000	46	1.9	46	15 June	09 June	22 June	10
2005	1.000	43	1.9	43	15 June	10 June	26 June	23

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Spectacled Eider								
1982	0.287	87	3.6	21	08 July	30 June	22 July	18
1983	0.550	111	4.5	61	29 June	20 June	06 July	22
1984	0.500	18	3.9	8	02 July	25 June	05 July	3
1985	0.545	99	4.2	50	04 July	26 June	18 July	20
1986	0.683	101	4.6	66	02 July	22 June	20 July	38
1987	0.848	105	5.0	87	28 June	17 June	09 July	27
1988	0.806	67	5.0	52	26 June	20 June	02 July	19
1989	0.927	41	5.1	37	02 July	22 June	07 July	5
1990	0.927	41	5.3	36	23 June	18 June	27 June	15
1991	0.875	40	5.4	35	22 June	16 June	10 July	25
1992	0.889	27	5.6	24	02 July	26 June	14 July	17
1993	0.868	38	4.4	31	25 June	17 June	09 July	18
1994	0.743	35	4.6	25	23 June	12 June	06 July	15
1995	0.803	66	5.0	51	24 June	14 June	04 July	44
1996	0.815	54	5.1	44	18 June	12 June	02 July	33
1997	0.895	57	4.4	50	19 June	11 June	30 June	39
1998	0.928	69	4.8	64	28 June	17 June	07 July	52
1999	0.911	56	4.9	51	28 June	18 June	09 July	51
2000	0.930	71	5.4	66	28 June	18 June	09 July	52
2001	0.630	54	4.2	34	03 July	25 June	16 July	32
2002	0.827	81	5.2	67	22 June	15 June	02 July	59
2003	0.774	62	4.4	48	22 June	09 June	02 July	36
2004	0.805	77	5.0	62	15 June	05 June	30 June	57
2005	0.908	131	4.7	119	20 June	09 June	04 July	101
Common Eider								
1982	1.000	4	4.8	4	09 July	08 July	10 July	4
1983	0.600	5	4.3	3	26 June	21 June	30 June	3
1984	0.000	0	0.0	0	--	--	--	0
1985	0.333	3	6.0	1	--	--	--	0
1986	0.667	6	3.7	3	--	--	--	0
1987	0.941	34	5.4	31	29 June	25 June	08 July	10
1988	0.704	27	4.5	19	10 July	13 July	13 July	1
1989	1.000	31	5.5	31	02 July	29 June	08 July	4
1990	0.929	14	5.3	13	22 June	21 June	24 June	3
1991	0.865	37	5.0	32	26 June	19 June	05 July	27
1992	0.941	17	5.3	16	02 July	26 June	06 July	12
1993	0.600	15	5.1	9	24 June	18 June	27 June	5
1994	0.857	14	4.2	11	24 June	16 June	04 July	9
1995	0.941	17	5.1	16	23 June	14 June	02 July	13
1996	0.952	21	5.3	20	19 June	10 June	02 July	14
1997	0.917	24	4.6	22	19 June	10 June	01 July	15
1998	0.781	32	5.0	25	28 June	20 June	04 July	18
1999	0.765	17	4.5	13	30 June	22 June	09 July	12
2000	0.964	28	4.9	27	29 June	24 June	05 July	23
2001	0.909	33	4.0	30	30 June	20 June	08 July	23
2002	0.962	26	4.7	25	24 June	15 June	30 June	17
2003	0.750	24	4.3	18	22 June	14 June	04 July	16
2004	0.955	22	4.8	21	17 June	06 June	26 June	18
2005	0.870	46	5.0	40	19 June	05 June	01 July	34

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Red-throated and Pacific Loons (combined)								
1982	0.886	35	1.7	31	08 July	03 July	24 July	25
1983	0.947	38	1.8	36	29 June	21 June	29 July	15
1984	0.909	11	2.0	10	02 July	26 June	08 July	5
1985	0.898	59	1.7	53	07 July	25 June	21 July	15
1986	0.867	75	1.6	64	05 July	26 June	25 July	37
1987	0.938	81	1.9	76	03 July	27 June	12 July	34
1988	0.846	52	1.7	42	27 June	16 June	05 July	5
1989	0.956	45	1.8	43	02 July	22 June	15 July	5
1990	0.915	47	1.8	43	01 July	25 June	09 July	11
1991	0.925	67	1.8	62	26 June	18 June	05 July	21
1992	0.927	41	1.8	38	05 July	29 June	18 July	12
1993	0.979	47	1.9	45	26 June	18 June	05 July	12
1994	1.000	29	1.9	29	24 June	19 June	29 June	6
1995	1.000	44	1.8	44	26 June	21 June	01 July	10
1996	1.000	17	1.7	17	22 June	15 June	01 July	9
1997	0.970	33	1.9	32	22 June	15 June	29 June	17
1998	0.911	56	1.8	51	01 July	20 June	14 July	37
1999	0.937	63	1.8	58	03 July	22 June	14 July	48
2000	0.968	62	1.9	60	30 June	15 June	09 July	40
2001	0.965	57	1.6	55	04 July	27 June	15 July	27
2002	0.969	65	1.8	62	25 June	12 June	03 July	42
2003	0.950	40	1.7	38	24 June	12 June	03 July	14
2004	0.878	41	1.7	36	23 June	13 June	30 June	10
2005	0.986	73	1.8	72	27 June	11 June	07 July	42
Glaucous Gull								
1982	0.797	59	2.5	45	05 July	29 June	22 July	23
1983	0.945	55	2.4	52	22 June	13 June	04 July	14
1984	0.875	8	2.3	7	23 June	18 June	26 June	5
1985	0.835	115	2.2	92	03 July	23 June	12 July	23
1986	0.768	69	2.3	51	27 June	22 June	05 July	18
1987	0.987	77	2.4	67	28 June	20 June	10 July	19
1988	0.932	74	2.4	66	22 June	15 June	03 July	9
1989	0.894	47	2.5	38	22 June	22 June	22 June	3
1990	0.839	56	2.6	47	17 June	16 June	18 June	2
1991	0.826	92	2.8	61	18 June	12 June	03 July	26
1992	0.947	75	2.8	71	27 June	22 June	04 July	23
1993	0.983	59	2.7	54	20 June	15 June	07 July	11
1994	0.981	54	2.8	53	17 June	10 June	27 June	17
1995	1.000	71	2.6	65	17 June	14 June	26 June	17
1996	1.000	26	2.5	26	14 June	11 June	20 June	15
1997	0.988	83	2.5	58	17 June	10 June	29 June	19
1998	0.983	116	2.7	114	22 June	15 June	09 July	64
1999	0.949	39	2.7	37	27 June	19 June	07 July	25
2000	0.978	134	2.6	124	22 June	12 June	09 July	72
2001	0.942	86	2.4	79	24 June	17 June	07 July	50
2002	0.896	96	2.7	83	17 June	06 June	04 July	56
2003	0.847	144	2.4	83	13 June	04 June	26 June	58
2004	0.988	84	2.5	83	10 June	03 June	19 June	21
2005	0.986	142	2.7	124	14 June	06 June	27 June	69

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Mew Gull								
1982	0.800	20	2.1	16	10 July	07 July	22 July	11
1983	0.946	37	2.6	35	26 June	17 June	03 July	6
1984	1.000	2	2.0	2	--	--	--	0
1985	0.909	44	1.9	38	04 July	27 June	12 July	8
1986	0.919	37	2.3	34	02 July	21 June	12 July	18
1987	1.000	29	2.4	23	26 June	21 June	04 July	8
1988	0.977	43	2.7	41	18 June	14 June	24 June	4
1989	0.918	49	2.6	45	22 June	22 June	22 June	1
1990	0.960	25	2.5	24	21 June	17 June	26 June	2
1991	0.857	42	2.6	36	20 June	14 June	02 July	8
1992	0.941	34	2.6	32	27 June	23 June	04 July	10
1993	1.000	92	2.8	92	24 June	17 June	02 July	7
1994	0.963	27	2.5	26	15 June	11 June	21 June	8
1995	1.000	44	2.6	44	18 June	15 June	22 June	16
1996	1.000	21	2.7	21	14 June	08 June	20 June	10
1997	1.000	9	2.4	9	19 June	16 June	27 June	8
1998	1.000	40	2.4	40	24 June	19 June	04 July	19
1999	0.972	36	2.5	35	25 June	21 June	09 July	25
2000	0.946	37	2.6	35	25 June	17 June	05 July	17
2001	1.000	36	2.4	36	26 June	19 June	07 July	18
2002	0.969	64	2.7	62	16 June	06 June	03 July	40
2003	0.909	55	2.5	50	17 June	08 June	27 June	20
2004	0.962	52	2.4	50	13 June	09 June	19 June	19
2005	1.000	116	2.5	114	19 June	10 June	01 July	32
Sabine's Gull								
1982	1.000	2	1.0	2	29 June	29 June	29 June	1
1983	1.000	5	2.4	5	21 June	14 June	02 July	3
1984	1.000	1	0.0	0	--	--	--	0
1985	1.000	5	1.6	5	02 July	26 June	18 July	3
1986	1.000	11	1.9	10	24 June	15 June	07 July	7
1987	1.000	17	2.2	17	21 June	15 June	04 July	7
1988	1.000	14	2.4	14	24 June	18 June	08 July	7
1989	1.000	15	2.7	15	01 July	21 June	11 July	2
1990	1.000	20	2.5	14	--	--	--	0
1991	1.000	20	2.0	19	15 June	09 June	22 June	9
1992	1.000	18	2.2	18	--	--	--	0
1993	0.967	60	2.3	57	17 June	14 June	23 June	8
1994	1.000	38	2.7	38	11 June	09 June	16 June	6
1995	1.000	22	2.4	22	18 June	12 June	28 June	6
1996	0.950	20	2.4	19	11 June	07 June	14 June	3
1997	1.000	15	2.3	15	14 June	08 June	22 June	8
1998	1.000	44	2.0	44	21 June	15 June	06 July	11
1999	1.000	28	2.3	28	21 June	16 June	03 July	20
2000	1.000	28	2.5	28	22 June	14 June	02 July	7
2001	0.977	44	2.1	43	27 June	19 June	04 July	10
2002	1.000	47	2.4	47	14 June	08 June	26 June	28
2003	0.962	26	2.2	25	12 June	06 June	17 June	5
2004	0.909	22	2.0	20	09 June	03 June	19 June	3
2005	1.000	43	2.1	43	16 June	08 June	29 June	30

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Arctic Tern								
1982	0.857	7	1.5	6	--	--	--	0
1983	1.000	4	2.5	4	--	--	--	0
1984	1.000	2	1.5	2	--	--	--	0
1985	1.000	17	1.9	16	29 June	22 June	04 July	8
1986	1.000	8	2.1	8	26 June	16 June	24 July	6
1987	1.000	9	1.3	9	24 June	20 June	26 June	3
1988	0.857	7	1.7	6	24 June	24 June	24 June	2
1989	1.000	7	1.9	7	22 June	22 June	22 June	1
1990	1.000	10	1.6	8	24 June	24 June	24 June	1
1991	1.000	8	1.9	8	17 June	12 June	20 June	4
1992	1.000	15	1.9	15	01 July	25 June	10 July	6
1993	1.000	28	2.2	28	17 June	15 June	20 June	3
1994	1.000	8	2.1	8	15 June	15 June	15 June	1
1995	1.000	17	2.0	17	16 June	13 June	20 June	3
1996	1.000	6	1.8	6	11 June	11 June	11 June	1
1997	1.000	5	2.0	5	--	--	--	0
1998	1.000	21	2.1	21	26 June	19 June	05 July	5
1999	1.000	16	2.0	15	25 June	21 June	02 July	8
2000	1.000	10	1.8	10	26 June	23 June	01 July	5
2001	0.960	25	1.9	24	22 June	15 June	29 June	5
2002	1.000	58	2.1	58	18 June	08 June	26 June	37
2003	1.000	19	1.8	19	13 June	08 June	21 June	5
2004	0.963	27	1.8	26	17 June	09 June	29 June	9
2005	1.000	45	2.0	39	21 June	14 June	29 June	15
Diving Ducks								
1982	0.500	14	4.7	6	10 July	13 July	22 July	5
1983	0.714	7	6.6	5	24 June	24 June	24 June	1
1984	0.727	11	5.0	8	--	--	--	0
1985	0.556	9	5.4	5	10 July	25 July	25 July	1
1986	0.929	14	6.9	13	08 July	01 July	11 July	4
1987	0.824	17	7.1	14	07 July	02 July	11 July	4
1988	0.824	17	6.7	14	08 July	08 July	08 July	1
1989	1.000	18	7.3	18	08 July	08 July	08 July	1
1990	1.000	9	6.3	9	07 July	06 July	08 July	2
1991	0.571	7	6.5	4	28 June	23 June	02 July	2
1992	0.967	30	7.4	29	06 July	30 June	22 July	19
1993	0.909	33	6.1	30	02 July	29 June	08 July	18
1994	0.941	17	5.6	16	02 July	30 June	03 July	7
1995	0.857	28	6.8	24	03 July	20 June	10 July	14
1996	0.917	12	6.3	11	28 June	17 June	05 July	7
1997	0.917	12	6.4	11	27 June	17 June	04 July	10
1998	0.960	25	6.9	24	04 July	26 June	10 July	14
1999	0.800	15	7.0	12	08 July	01 July	13 July	10
2000	0.935	31	7.8	29	06 July	28 June	11 July	26
2001	1.000	7	3.3	7	07 July	04 July	17 July	6
2002	0.833	12	6.9	10	01 July	29 June	04 July	8
2003	1.000	3	7.0	3	30 June	29 June	01 July	3
2004	0.600	5	5.7	3	20 June	18 June	22 June	2
2005	0.833	12	6.1	10	01 July	24 June	08 July	9

Table 2. (Continued) Annual proportion of active nests, mean clutch size, and predicted mean date of hatch.

	Proportion of Nests Active		Clutch Size (Active nests)		Predicted Hatch Date			
Year	Prop	n	Eggs	n	Mean	Min	Max	n
Dabbling Ducks								
1982	0.190	21	6.7	3	10 July	12 July	12 July	1
1983	1.000	4	4.0	4	23 June	23 June	23 June	1
1984	0.500	6	5.0	3	03 July	03 July	03 July	1
1985	0.500	10	5.8	5	08 July	06 July	15 July	2
1986	0.773	22	6.1	17	03 July	22 June	17 July	13
1987	0.833	36	6.3	30	03 July	18 June	14 July	12
1988	0.811	37	6.7	30	01 July	28 June	03 July	2
1989	0.722	36	6.4	25	06 July	03 July	11 July	4
1990	0.700	20	5.6	14	28 June	24 June	03 July	4
1991	0.929	28	6.8	26	24 June	12 June	04 July	13
1992	0.831	59	6.8	49	04 July	21 June	13 July	16
1993	0.852	54	6.5	46	28 June	24 June	01 July	16
1994	0.762	21	6.8	16	28 June	26 June	29 June	5
1995	0.722	36	5.3	26	27 June	18 June	06 July	11
1996	0.762	21	7.6	15	25 June	13 June	02 July	10
1997	0.900	10	7.4	9	17 June	13 June	21 June	4
1998	0.720	82	6.8	59	01 July	18 June	10 July	39
1999	0.794	34	7.2	27	02 July	20 June	12 July	17
2000	0.898	49	6.3	44	30 June	21 June	08 July	28
2001	0.667	30	6.7	20	02 July	27 June	08 July	13
2002	0.750	40	6.0	30	24 June	13 June	03 July	21
2003	0.647	17	8.2	11	20 June	10 June	29 June	8
2004	0.719	32	7.2	23	18 June	05 June	28 June	19
2005	0.868	38	6.6	33	23 June	11 June	04 July	24
Small Shorebirds (sandpipers, dunlin, phalaropes, turnstones)								
1982	1.000	5	3.4	5	30 June	30 June	30 June	1
1983	1.000	17	3.9	17	--	--	--	0
1984	1.000	2	4.0	2	--	--	--	0
1985	1.000	19	3.3	19	03 July	22 June	17 July	4
1986	0.943	53	3.5	50	27 June	16 June	11 July	23
1987	0.969	32	3.6	31	21 June	15 June	25 June	7
1988	0.930	43	3.8	40	17 June	16 June	18 June	2
1989	1.000	71	3.5	71	24 June	18 June	04 July	3
1990	0.952	83	3.8	79	25 June	21 June	30 June	2
1991	1.000	90	3.9	90	22 June	08 June	06 July	21
1992	0.975	81	3.8	79	26 June	22 June	29 June	8
1993	0.989	91	3.6	90	21 June	14 June	29 June	15
1994	1.000	55	3.8	55	18 June	13 June	24 June	2
1995	1.000	72	3.8	72	19 June	10 June	25 June	6
1996	0.986	71	3.7	69	20 June	08 June	02 July	10
1997	1.000	76	3.5	75	12 June	09 June	14 June	3
1998	0.955	67	3.6	64	22 June	14 June	28 June	8
1999	0.977	88	3.8	83	25 June	16 June	05 July	17
2000	1.000	92	3.7	92	23 June	14 June	27 June	13
2001	0.965	113	3.7	109	27 June	18 June	04 July	22
2002	0.980	98	3.9	96	19 June	12 June	25 June	21
2003	0.989	88	3.8	87	16 June	13 June	17 June	3
2004	1.000	120	3.9	120	12 June	08 June	20 June	10
2005	1.000	153	3.8	153	20 June	09 June	29 June	30

Table 3. Annual growth rates of waterbird nest populations in 7-year, 14-year, and 21-year increments, as estimated through log-linear regression, Yukon Kuskokwim Delta, AK.

	1985-2005		1985-1991		1992-1998		1999-2005		1992-2005	
Species	loglinear slope	%annual change	loglinear slope	%annual change	loglinear slope	%annual change	loglinear slope	%annual change	loglinear slope	%annual change
Cackling Goose	0.062	6.39	-0.059	-5.69	0.149	16.05	-0.043	-4.22	0.040	4.05
Emperor Goose	0.015	1.52	0.053	5.40	-0.012	-1.22	0.032	3.24	0.004	0.43
White-fronted Goose	0.124	13.15	0.175	19.10	0.168	18.29	0.034	3.47	0.088	9.19
Black Brant[1]	0.033	3.34	0.159	17.20	-0.061	-5.93	-0.036	-3.49	-0.014	-1.38
Tundra Swan	0.043	4.43	-0.023	-2.31	0.143	15.36	0.054	5.53	0.042	4.28
Sandhill Crane[2]	-0.001	-0.14	0.190	20.93	0.010	0.97	0.074	7.63	-0.002	-0.21
Spectacled Eider[3]	0.004	0.37	-0.242	-21.49	0.110	11.60	0.037	3.75	0.036	3.70
Common Eider[3]	0.024	2.48	0.271	31.16	0.158	17.09	0.114	12.04	0.048	4.91
Pacific Loon[4]	0.037	3.73	0.270	31.04	0.056	5.81	-0.122	-11.45	0.033	3.34
Red-throated Loon[4]	0.035	3.56	-0.041	-4.06	0.012	1.20	0.014	1.44	0.034	3.49
Glaucous Gull[5]	0.045	4.61	--	--	0.120	12.70	0.092	9.67	0.045	4.61
Mew Gull[5]	0.041	4.19	--	--	-0.171	-15.71	0.178	19.51	0.041	4.19
Sabine's Gull[5]	0.034	3.49	--	--	0.131	13.97	-0.088	-8.46	0.034	3.49
Arctic Tern[5]	0.073	7.56	--	--	-0.035	-3.44	0.112	11.81	0.073	7.56

[1] Data series started in 1986

[2] Data series started in 1987

[3] Data series started in 1988

[4] Data series started in 1989

[5] Data series started in 1992