Fall 1987 Productivity Estimates of Emperor Geese from Aerial Photographs on the Alaska Peninsula

by

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Abstract

Production estimates for emperor geese (Anser canagicus) were obtained from aerial photographs taken from seven locations on the northside of the Alaska Peninsula in fall 1987. A total of 10,178 emperor geese were classified from 703 photographs of which 23.7 percent (2,417) were young of the year. This is slightly lower than the percentage young from 1986 aerial photographs of 26.0 percent, but above the 1985 photographic estimate of 16.8 percent young.

Introduction

In 1987 The U.S. Fish and Wildlife Service continued an evaluation of the use of aerial photography as a means of obtaining annual productivity information on emperor geese (Anser canagicus). The study was begun in 1985 and continued in 1986 with results reported in two progress reports (Butler et al. 1985 and 1987). This report presents the results of the work completed in 1987 and a summary of prior years data. The objectives this year were to:

1) obtain a series of photographs of emperor geese from different locations along the north side of the Alaska Peninsula throughout the migration period, and develop sampling procedures that will provide the best estimate of production,

2) compare the proportion of young in the population early and late in the migration season,

3) evaluate the validity of production estimates from aerial photographs obtained from a single location and time,

4) compare production estimates from photographs with production estimates from ground observations from a single location throughout the migration period.

Methods

The survey area included the 330 mile reach on the north side of the Alaska Peninsula from King Salmon to Cold Bay (Figure 1). Specific areas sampled in 1987 were Egegik Bay, Ugashik Bay, Cinder River, Port Heiden, Seal Islands, Nelson Lagoon, and Izembek Lagoon.

Photographs were taken from 16 September to 10 October. A super cub was used to obtain photographs on 16 September and 6 October. The aircraft was flown at 90 mph and 500 feet while searching for flocked birds. A Cessna 206 was used on all other days. The 206 was flown at 500 feet and 110 mph while searching for flocked birds. When flocks of emperors were encountered each aircraft was maneuvered to place the birds in clear view of the observer/photographer.

A Canon F-1 with 135mm lens, motor drive, and databack was used for all photographs taken from the Cessna 206. A Pentax SLR camera with 200mm lens was used for photographs taken from the Super Cub. Extachrome color slide (ASA 200) and TRI-X black and white (ASA 400) films were used. Shutter speeds ranged from 1/125 to 1/1000.

The number of young and adults on color slides were counted from images projected on 24x36 inch white paper. Counts from black and white film were made by viewing negatives with a binocular dissecting scope. Appropriate statistical analysis and determination of the best overall estimate turned out to be quite complicated. Work is in progress, with the help of Bob Stehn

(Research Division), to develop a program to obtain appropriate variance estimates and statistical tests for comparing production between years. For this progress report, comparisons of the percentage of young in various subsets of photos were made using chi-square tests and Cochran's method of combined contingency table analysis from B.S. Everitt (1977).

Results

A total of 10,178 emperor geese were classified from 703 photographs (slides and negatives) of which 23.7 percent (2,417) were young of the year (Table 1). The percent young varied considerably again this year among areas and times (Table 2). The proportion of young observed late in the sampling period from five locations was lower in all areas except Nelson Lagoon ($Y=3.67$, $DF=4$, $P < .01$, Table 3). There were differences in proportions of young observed at each location during the survey period ($X^2=31.51$, $DF=4$, $P < .01$, Table 4). The sampling effort in each year was roughly proportional to the numbers of emperors in each lagoon during the fall population survey (King and Eldridge 1985, 1986, and 1987; Table 5). Sampling in proportion to an estimate of size of the stratum is appropriate and will simplify analysis and comparisons between years.

Discussion

The proportion of young in the population from aerial photographs this year (23.7 percent) is slightly lower than last years photographic estimate of 26.0 percent (Butler et al. 1987). The actual numbers of young produced could be as high or higher than last year, with the lower percent young in the population in 1987 the result of good production and survival of the 1986 cohort that are still too young to breed. Although the proportion of young in the population is lower than the long-term average of 28 percent (Conant 1987), production was above the 1985 photographic estimate of 16.8 percent.

The estimate of percent young from specific locations and times varied this year as in 1985 and 1986 (Butler et al. 1985 and 1987). The variation could be the result of one or more of the following factors: 1) Each lagoon is a very large area and the number of birds sampled at any location and time is small relative to the number of birds present. Therefore, each estimate has a large amount of variation simply due to sampling error. 2) The distribution of birds varies with tide stage. Flocks are more dispersed at low tide and clumped at high tide. 3) The proportion of young in flocks varies with tide stage (Wilk et al. 1987). 4) The flushing response of flocks to the airplane seems to vary, with early flushing resulting in photographs of dispersed small flocks and late flushing resulting in photographs of larger flocks. The flushing response and distribution of birds may also be affected by the number of over flights by other aircraft, which is high particularly during years with bear hunting seasons (Wilk et al. 1987).

The current survey is flown from King Salmon to Cold Bay and back with photographs obtained at each lagoon on the route. This procedure results in obtaining photographs of birds from a variety of tide stages, flocks sizes, and flushing responses. As long as the number of birds sampled in each lagoon is roughly proportional to the numbers of birds present in the lagoon, the best estimate of percent young may simply be the combined total for all areas.

The progression of molt during the survey period (from grey to fully white heads) could affect the proportion of young in photographs. A tendency for proportions of young to be lower in lagoons during later surveys was observed in 1987, supporting 1986 results (Butler et al. 1987). It is not possible to determine if the timing of molt or other variability factors caused this result. However, ground observations at Cinder River indicate an increasing percentage of young of the year with mostly white heads after 6 October (pers. com. Bob Gill, Division of Research). Thus, the possibility of misidentifying young of the year was greater during the later photo periods.

Actual differences in age composition of emperors using lagoons could also be a factor in the variability observed. Although sample size is small, collar resightings at Cinder River (Wilk et al. 1986 and 1987) suggest that birds use the lagoon for extended periods each year and may return to the area in successive years. The proportions of young observed in aerial photographs this year and 1986 (Butler et al. 1987) suggest there may be differences in age composition between lagoons. If there is fidelity to each lagoon system by subpopulations of emperors, then real differences in percent young present could occur. Studies designed specifically to assess use of lagoons and determine differences in age composition between lagoons would be required to fully answer this question.

Age composition estimates from the ground (Wilk et al. 1987) were higher than aerial estimates at Cinder Lagoon in 1987, paralleling 1986 results (Butler et al. 1987). Several factors could have accounted for the observed differences: use of different areas by flocks with young and flocks without young, repeated ground counts of areas used by the same birds, number and timing of aerial surveys relative to tide stage, potential to misidentify young of the year as adults on aerial photographs, and potential to classify some second year birds as young of the year from the ground. More intensive aerial surveys designed to assess proportions of young at single locations would be needed to fully evaluate differences between methods. The differences observed illustrate the need to use age composition estimates obtained from consistent techniques when comparing trends in production between years.

Conclusions

As the survey is currently flown the best estimate of percent young in the population is obtained from the combined total from all areas. The data are not as good for determining differences between lagoons or estimating the percent young in a specific lagoon. Surveys in the future should be completed no later than the 1st week in October to reduce the possibility of misidentifying birds in advanced molt. Trends in production between years should be made using estimates obtained from consistent methods.

Recommendations

1. Continue to conduct the survey on an annual basis to develop a consistent means of evaluating trends in production of emperor geese. All lagoons should continue to be sampled with an effort roughly proportional to the number of birds at each lagoon.

2. Complete the survey by the end of the 1st week in October to reduce the possibility of misidentifying young of the year late in the season. Begin the survey no earlier than the last week in September to ensure that most birds have arrived on the Alaska Peninsula.

3. Monitor tide levels and responses of birds to the aircraft to obtain a better understanding of the the affects of these variables on production estimates.

Literature Cited

Butler Jr., W.I., M.R. Petersen, J. Sarvis, and C.P. Dau. 1985. Fall 1985 productivity estimate of emperor geese from aerial photographs on the Alaska Peninsula. U.S. Fish and Wildl. Serv. Unpubl. Prog. Rep. Migratory Bird Management Project, Anchorage. Anchorage, Alaska. 5pp.

_____1987. Fall 1986 productivity estimate of emperor geese from aerial photographs on the Alaska Peninsula. U.S. Fish and Wildl. Serv. Unpubl. Prog. Rep. Migratory Bird Management Project, Anchorage. Anchorage, Alaska. 5pp.

Conant, B. 1987. Alaska productivity surveys of geese swans and brant. U.S. Fish and Wildl. Serv. Migratory Bird Management Project, Juneau. Unpubl. Rep. Juneau, Alaska.

Everitt, B.S. 1977. The analysis of contingency tables. Chapman and Hall Ltd. London. 128pp.

King, R.J. and W.D. Eldridge. 1985. Fall survey of emperor geese (Chen canagica) southwest coastal Alaska. U.S. Fish and Wildl. Serv. Migratory Bird Management Project, North. Unpubl. Rep. Fairbanks, Alaska. (Mimeo) 4pp.

_____1986. 1986 fall emperor goose study. U.S. Fish and Wildl. Serv. Migratory Bird Project, Fairbanks. October 16, 1986, Memorandum. Fairbanks, Alaska. (Mimeo) 4pp.

_____1987. Fall population survey of emperor geese (Chen canagica) southwest coastal Alaska. U.S. Fish and Wildl. Serv. Migratory Bird Management Project, North. Unpubl. Rep. Fairbanks, Alaska. (Mimeo) 8pp.

Wilk, R.J., K.I. Wilk, and R.C. Knutz. 1986. Abundance, age composition and observations of emperor geese in Cinder Lagoon, Alaska Peninsula 17 September - 10 October 1986. U.S. Fish and Wildl. Serv. Unpubl. Rep. King Salmon, Alaska. 41pp.

Wilk, R.J., K.I. Wilk, and K.M. Sowl. 1987. Emperor geese at Cinder River Lagoon, Alaska Peninsula during fall staging and Migration - 1987. U.S. Fish and Wildl Serv. Unpubl. Rep. King Salmon, Alaska. 41pp.

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Table 1. Annual emperor goose productivity estimates from photographs taken on the north side of the Alaska Peninsula from 1985-1987.

Year	Adults	Immature	Total	Percent Immature
1985	2,657	536	3,193	16.8 (155)[1]
1986	4,721	1,659	6,380	26.0 (311)
1987	7.760	2,417	10,178	23.7 (703)
TOTAL		4,612	19,751	23.3

1. The number of photographs are in parenthesis.

Table 2. Estimates of percent young of the year from aerial photographs on the Alaska Peninsula in fall of 1987.

	Location						
Date	Eggegik	Ugashik	Cinder River	Port Heiden	Seal Islands	Nelson Lagoon	Izembek Lagoon
9/16						33.5(892)	42.8(272)
9/24	0.0(28)[1]	0.0(27)	30.2(792)	16.9(462)	29.2(360)	14.0(650)	11.1 (72)
9/26			34.8 (69)	22.5(631)	5.2 (58)	10.9(175)	
10/6						35.0(972)	
10/7		6.1(82)	24.3(853)	17.8(225)	14.4(118)		9.5 (95)
10/8							11.9(344)
10/10			21.5(1131)	18.9(403)	20.2(376)	21.0(970)	20.7(121)

1. The number of emperors classified from photographs at each location are in parentheses.

Table 3. Percent young observed in photographic samples of emperor geese early and late in the survey period during fall 1987 at five locations on the Alaska Peninsula.

	Location				
Date	Cinder River	Port Heiden	Seal Islands	Nelson Lagoon	Izembek Lagoon
Early 9/16-9/26	30.5(861)[1]	20.1(1093)	25.8(418)	23.5(1717)	38.8(344)
Late 10/6-10/10	22.7(1984)	18.5 (628)	18.8(494)	28.6(1942)	15.5(560)

1. The number of emperors classified from photographs at each location are in parenthesis.

Table 4. Percent young observed in photographic samples of emperor geese from five locations on the northside of the Alaska Peninsula in fall 1987.

Location				
Cinder River	Port Heiden	Seal Islands	Nelson Lagoon	Izembek Lagoon
25.0(2845)[1]	19.5(1721)	22.0(912)	26.1(3659)	23.0(904)

1. The number of emperor classified from photographs taken at each location are in parenthesis.

Table 5. Comparison of photographic sampling effort and proportion of emperor geese in Lagoons on the north side of the Alaska Peninsula.

	Egegik	Ugashik	Cinder River	Port Heiden	Seal Island	Port Heiden Seal Island	Nelson Lagoon	Izembek Lagoon	Morzhovoi Bay
1985									
Photographic[1] Sample			10.5	12.9	4.9		34.6	24.5	12.6
Fall Survey[2]			13.9	18.5	9.9		49.9	5.3	2.5
1986									
Photographic Sample	5.7	4.2	31.9			24.6	20.6	12.8	
Fall Survey	0.1	1.0	18.7			40.6	34.5	5.0	
1987									
Photographic Sample	0.3	1.0	27.9	16.9	8.9		35.9	8.9	
Fall Survey	3.1	2.1	23.7	18.2	12.3		36.1	4.4	

1. Percent of the total number of emperors classified from aerial photographs in each lagoon.

2. Percent of the total number of emperors on the north side of the Alaska Peninsula in each lagoon from fall population surveys (King and Eldridge, 1985, 1986, and 1987).

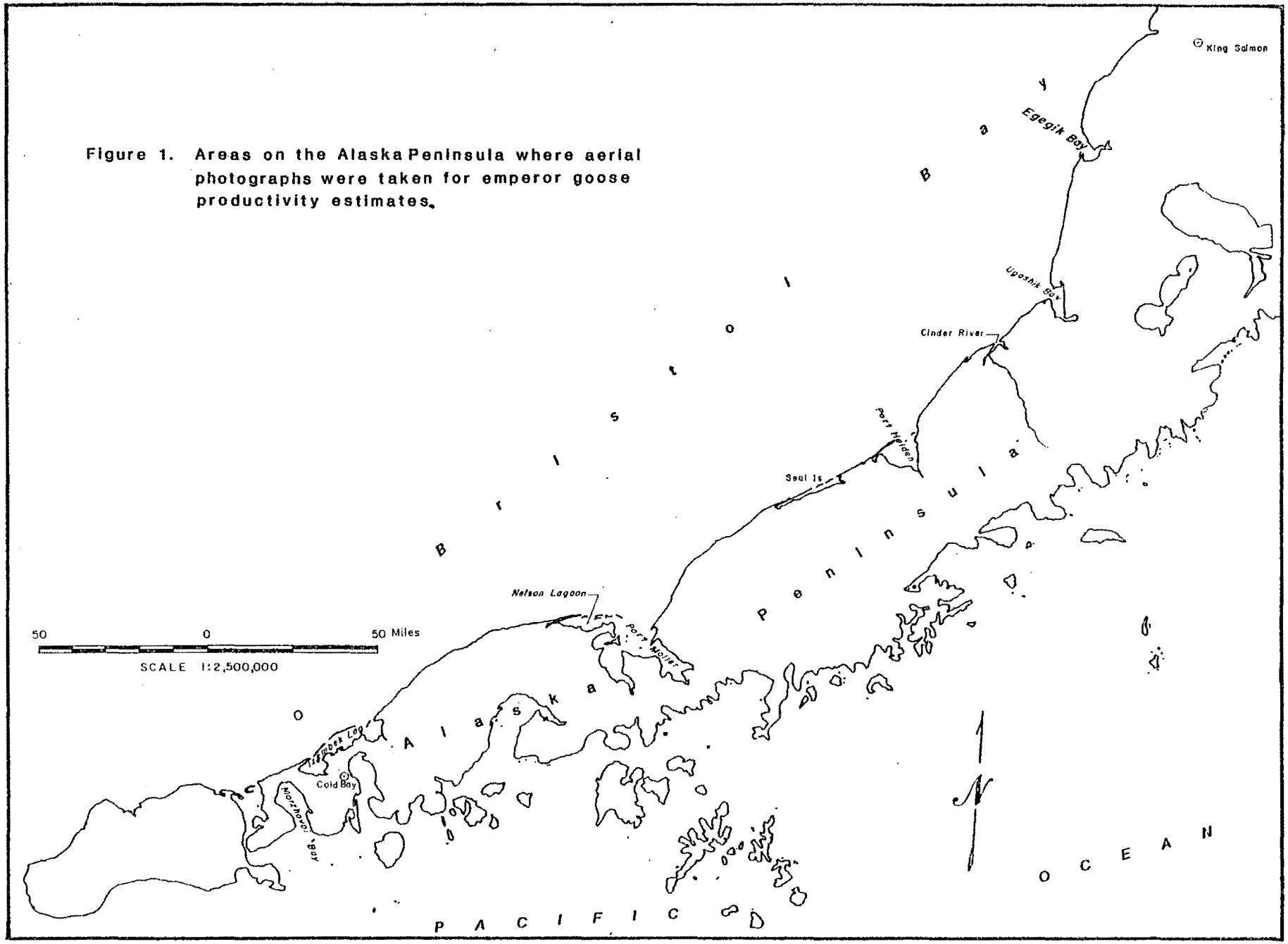

Figure 1. Areas on the Alaska Peninsula where aerial photographs were taken for emperor goose productivity estimates.