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BIOLOGY OF NESTING ALEUTIAN CANADA GOOSE SUMMER 1975.

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By:

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Abstract

In 1974 and 1975 breeding Aleutian Canada geese, Branta canadensis leucopareia, were studied at Buldir Island, western Aleutian Islands. Buldir is the only known breeding station for this endangered subspecies.

In 1974 geese arrived from an unknown wintering area during the first week in May, and some were laying by May 20. Due to the late spring, involving cooler than normal temperatures and lingering snow from the deepest snowfall on record, geese nested about one week later in 1975.

Nests were searched for each year. Incomplete coverage of the island revealed 30 nests in 1974 and 45 in 1975. The 1975 count may represent only about 25% of the total nests actually on Buldir. Clutch size averaged 5.4 and 5.9 in the two years.

Geese nest primarily on densely vegetated sea slopes. Elymus arenarius is the most important nest cover plant, although Heracleum lanatum and Angelica lucida are also important. Water did not seem to play a dominant part in nest site selection. Only one sizeable lake occurs on Buldir, and no geese nested near it.

Hatching occurred in late June and early July. Family groups tended to remain on the sea slopes until the adults were flightless at which time they moved inland.

Non-breeding geese were present on Buldir throughout the season. They do not congrate in molting flocks, but remain in small isolated groups,

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often apparently with family groups.

Flightless geese were encountered from mid-July through mid-August. A total of 119 were banded with plastic leg bands and FWS bands in 1974 and 77 were marked in a similar fashion in 1975.

At least some geese departed Buldir during the first week of September but most remained when investigators left on September 6, 1974 and September 5, 1975.

Study Area

Buldir Island was described in the 1974 report.

Methods

In 1975, investigators arrived on Buldir May 17 and departed September 5. Goose nests were located by two biologists systematically searching vegetated areas that could be reached without the aid of climbing paraphenalia. Since Mickelson (M.S. thesis) found that B. c. minima abandoned their nests readily if disturbed during nest site selection and laying, no nest searching was done until geese were incubating. Young goslings scattered by investigators may be readily taken by gulls or jaegers so nest searching was terminated when it was suspected that some clutches were near hatching. Extremely high winds and heavy rain kept investigators from searching for nests on some days. All the above factors combined, allowed only 12 days for searching. It is estimated that only 25-30% of the area where geese may nest was searched throughly.

Nests were discovered either by observing a goose on a nest or by flushing unseen hens from nests. Hens observed on nests were not disturbed. If the hen was flushed, the clutch size was recorded, nest material was noted, and at least one egg in a sample of nests was floated to determine the stage of incubation. Then the eggs were covered with down to prevent cooling before the hen returned and investigators departed. A hand-held silva compass and a Thoman pocket altimeter were used to locate each nest accurately, and the location was plotted on a 1:25,000 scale topographic map. To facilitate relocation of nests, a six-foot-long wooden stake with a strand of red, plastic flagging tape affixed to its top was pushed into the ground approximately 10 methers up slope from each nest. Nests were

revisited from two weeks to one month after hatching.

The number of whole membranes present indicated hatching success. Some membranes may have blown out of nests before investigators revisited the area so hatching success estiamtes may be conservative. Whole eggs left in the nest were opened to determine if they were addled or whether dead embryos were present. Indications of predation were noted. The plants around each nest were placed into three vertical catagories; overstory, included the tallest plants which were not covered; middle story, included the plants that were covered by more dominant plants but which were taller than ground cover; ground cover, including the moss, lichen and short plants that were present. The percent cover of each species was recorded in each story. If a story was bare partially, it was recorded as such.

All plants that made up at least 5% of a layer were recorded (often a species was given the benefit of the doubt and included so the results are probably biased toward the less common plants). Two sample plots were established at each nest, First a one-meter, square plot with the nest as its center, was evaluated, then vegetation in a five-meter square (25 m^2) with the nest as its center was recorded. The percent composition of the important plants in each plot was then compared to determine if geese selected a particular vegetation type for the nest site.

In addition to the nests located by the methods described above, pairs were noted on steep sea slopes, inaccessable to investigators, by moving along the base of cliffs in a Avon sport boat and recording locations of

pairs of geese apparently on territory. In a few cases pairs were noted from land through 20X spotting scopes on inaccessable areas. All locations of fairly certain nests were recorded on 1:25,000 scale maps.

In addition to vegetation analysis at nest sites, average slope was measured with a Gen-Jim distance-height measurer and with the same device the distance to the nearest gull nesting colony was measured. Physical surroundings at the nest site e.g. nest 1 meter from the base of a 10 meter high rock face, were noted.

About two weeks after most goslings were suspected of hatching an effort began to capture goslings and flightless adults to measure and band. Since non-breeding adults tend to remain either with families or in small (3 or 4) well dispersed groups, conventional banding drives were not possible. The technique employed involved having biologists comb through the tall vegetation looking for geese. Generally, birds were run down one at a time and captured by hand, however long handled nets were successfully employed occasionally in capturing several goslings at once. Captured birds, when more than one was involved, were held in small mesh net bags until they could be banded and measured. Broods of goslings were held until all were banded and then they were released together. Fish and Wildlife Service bands were placed on the left tarsus of male geese (sex determined by cloacal examination) and the right tarsus of females. Color plastic leg bands, dark green with white 2 number codes on adults and yellow with black 2 number codes on goslings, were placed on the opposite tarsus.

The overlapping edges of the plastic bands were glued together with contact cement and masking tape was used to keep the plastic surfaces in contact until the glue dried. The tape was usually removed before release. Measurements were taken on each goose captured.

At various times during the summer geese (e.g. on territory pairs, fall flocks) were observed for extended periods through 20-30X spotting scopes from thermos pop tents used as blinds.

Spring migration

Most Aleutian Canada geese left Castle Rock (near Crescent City) California during the last week in April 1975 (Paul F. Springer pers. comm.). A flock of 70 birds was observed by Mr. Joe Walsh on May 3 at Sand Island, near Willipa NWR, Washington. In the Aleutians, refuge personnel aboard the R/V Aleutian Tern recorded a flock of 28 geese flying west near Kanaga Island (350 miles east of Buldir) on May 7 (John L. Trapp pers. comm.). Geese were numerous on Buldir when investigators arrived on May 17. But some geese had not yet arrived by that date, since Haruo Ogi aboard the R/V Habomai Maru saw five birds 45 miles southwest of Buldir flying in the direction of the island on May 25.

Nesting

Far below average temperatures coupled with record deep snow fall in the central and western Aleutians during the winter of 1974-1975 caused a late spring. As a result, egg laying began about May 24 or May 25, several days later than in 1974, and the peak of laying probably occurred around the end of May.

To estimate hatching dates of clutches, at least one egg in 22 nests was floated to determine its incubation stage. Based on the sample, hatching occurred approximately June 23 through July 8, with the peak occurring June 27-29.

The fate of 45 nests was determined in 1975 compared to only 22 in 1974.

Clutch size was 5.9 versus 5.4 in 1974. Nesting success was 89% (40 of 45) and hatching success was 78% (203 of 260 eggs). In 1974 nesting and hatching successes were 77 and 49% respectively. Perhaps the small sample size in 1974 coupled with the relative inexperience of investigators in dealing with this population of geese contributed greatly to this disparity. A comparison of the fate of eggs in unsuccessful nests in 1974 and 1975 is interesting. There were five unsuccessful nests in both years. In 1974, 85% of the eggs that did not hatch were still present when the nest was checked to determine success, compared to 17% in 1975. This suggests that investigators may have been responsible for most abandoned nests in 1974, but that predation may have played the major role in 1975.

A comparison of the nest sites used in 1974 and 1975 revealed that of 19 locations where geese nested in 1974, at least 14 were also occupied in 1975. Perhaps because of lingering snow, 3 territories in higher elevations were occupied in 1974 but not 1975. Also a severe earthquake (7.6 on the richter scale) which occurred February 5, 1975 near Buldir, caused rubble to cover at least two nest cups that were used in 1974. These territories were not occupied in 1975.

Like the nests found in 1974, most of the 45 nests examined in 1975 were on steep, densely vegetated sea slopes. However, two nests were on inshore facing slopes. One of these was about 1150 meters from the sea, but all other nests were within 500 meters of the sea.

Like those nests found in 1974 those discovered this year ranged from just over 1000 feet elevation to about 200 feet above sea level. Nearly 70%

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GOOSE NEST VEGETATION

1 M^2 PLOT

OVERSTORY

SPECIES	Number of nests where species occurs	Percentage of Nests where species occurs	Percentage of a plot that species occupies (of nest where species occur)		Percentage of a plot that a species occupies (of total number of nests)	
			Max.	Min.	Average	Standard Deviation
Elymus Arenarius	45	100.0	90	15	54.0	22.8
Angelica Lucida	36	80.0	50	5	15.2	11.7
Neracleum Lanatum	24	53.3	40	5	10.0	11.6
Athyrium Spp	6	13.3	85	10	5.2	23.0
Carex Macrochaeta	4	8.9	40	15	2.8	13.9
Conioselinium Chinense	1	2.2	5	5	0.1	.7
Bare Rock	1	2.2	50	50	1.1	7.5
Open Area	18	40.0	65	5	11.3	17.5

TABLE 2

GOOSE NEST VEGETATION

1 M^2 PLOT

MIDDLE STORY

SPECIES	Number of nests where species occurs	Percentage of Nests where species occurs	Percentage of a plot that species occupies (of nest where species occur)		Percentage of a plot that a species occupies (of total number of nests)	
			Max.	Min.	Average	Standard Deviation
Festuca Rubra	44	97.8	85	20	47.9	27.6
Claytonia Sibierica	27	60.0	25	5	8.7	12.8
Achillia Borealis	18	40.0	30	5	6.2	12.4
Fritillaria Camschatcensis	15	33.3	10	5	2.7	6.1
Saxipraga Spp	15	33.3	20	5	2.7	6.5
Ranoncolus occidentalus	14	31.1	20	5	2.6	6.7
Angelica Lucida	13	28.9	25	5	3.2	6.2
Athyrium Spp	12	26.7	40	10	5.8	15.1
Carex Macrochaeta	11	24.4	60	5	5.3	13.5
Epilobium Behringianum	11	24.4	20	5	1.8	5.5
Geranium Eriathum	10	22.2	25	5	1.8	4.3
Geum Macrophyllum	3	6.7	10	5	0.4	1.8
Stellaria Spp	3	6.7	.5	5	0.3	1.3
Conioselinium Chinense	3	6.7	10	5	0.4	1.8
Artemisia Unalaskensis	2	4.4	20	5	0.6	3.1
Cacalia Auriculata	2	4.4	10	5	0.3	2.3
Chrysanthenum Articum	1	2.2	10	10	0.2	1.5
Open Area	16	35.6	35	15	8.2	16.8

TABLE 3

GOOSE NEST VEGETATION

1 M^2 PLOT

GROUND STORY

SPECIES	Number of Nests where species occurs	Percentage of Nests where species occurs	Percentage of a Plot that species occupies (of nests where species occurs)			Percentage of plot that species occupies (of total number of nests)
			Max.	Min.	Average	Standard Deviation
Moss	44	97.8	90	5	40.4	40.0
Cardamine Umbellata	42	93.3	40	5	10.5	11.4
Coptis Trifolia	40	88.9	15	5	6.8	5.5
Lichen	3	6.7	10	5	.6	6.1
Liverwort	2	4.4	50	30	1.8	8.6
Stellaria Spp	1	2.2	20	20	0.4	4.2
Bare Ground/Dead Grass	33	73.3	95	5	39.4	44.5

were below 600 feet. The slope of hills on which nests were located varied from nearly flat to 46 degrees, averaging about 28 degrees.

Analysis of the vegetation surrounding each nest site showed little difference from results obtained in 1974 (Byrd et al. 1974). Tables 1-3 show results. In the oversotry, Elymus arenarius was found in the one-meter square quadrates around every nest. Heracleum lanatum and Angelica lucida also occurred as dominate cover species. Festuca rubra, Claytonia siberica and Achillia borealis were the predominant plant species of the middle story. In the ground story, Cardamine umbellata, Coptis trifolia, and moss were the major plant species. To determine if the geese were selecting Elymus clumps as nest sites, a five-meter square quadrate was sampled around each nest in addition to the one-meter square plot. A comparison of the percent cover provided by Elymus in the two plots provides evidence that Elymus clumps were selected, because: 60% of the nests had at least 10% higher values for Elymus within the one-meter square quadrate than within the five-meter plot; 27% had the same (within 5%); and only 13% of the nests had less Elymus near the nest than in the general area. Overall Elymus provided 54% of the cover immediately beside the nest and only 45% of the area within 5 meters.

Brood Raising

The remarks in the 1974 report on this subject still seem valid. The fact that some families move inland from nest sites on sea slopes was again recognized. It appears that broods may be held near the nest sites on the sea slopes until the adults are flightless at which time the family moves inland to dense vegetative cover, often at the edge of upland areas where

shorter, succulent plants like Carex and Festuca are available for food.

Non-breeding geese

Non-breeding geese, at least yearlings, were present throughout the nesting season at Buldir. This was confirmed by the observation of know-age birds marked with orange or blue plastic leg bands in 1974. Unfortunately tall vegetation often made it impossible to see bands.

In 1974 we suspected that breeding pairs were tolerating non-breeders in their territories or at least near them during nesting and the capture of flightless adult-plumaged birds with goslings after a pair of flight-capable birds were flused indicated that family groups included yearlings or non-breeding two-year-olds after hatching at least.

The fact that no flocks of non-breeding birds were encountered further weakens the chances of disproving the hypothesis that they were with family groups.

In 1975 up to three or four adults were seen with one brood of goslings on several occasions. Also hens flushed from nests were sometimes joined by several adults in flight.

On at least two occasions, known pairs allowed single adults to feed with them near nests and once the male fed with a third bird while the female was on the nest 20 meters away.

The first flightless adults, non-breeders, were encountered July 23. The

molt started a week or more later than in 1974. Odd-sized flocks of adults probably indicating non-breeding birds, were still seen in flight as late as July 30. A flock of five geese was seen four miles west of Buldir, flying westerly, on July 26, and this may indicate some birds molt on islands other than Buldir. More evidence of such a phenomena is needed however, since observers were on most of the islands west of Buldir and no geese were seen.

Gosling capture

It was desired that about 30 goslings of approximately equal sex ratios be captured and sent ot Patuxent Wildlife Research Center, Laurel, Maryland where they would become a part of the captive breeding stock used to produce birds for release to the wild.

Capturing goslings proved difficult because adults, at least in some cases, kept broods on steep sea slopes (inaccessable to workers without risking loss of goslings by scaring them over the edges of cliffs) until adults were flightless at which time the families moved inland. Also, perhaps because of previous experience with banders (1974) geese were apparently very wary. Only one goose that was banded in 1974 was re-captured in 1975 although many banded birds were seen before and after the flightless period. Because of the difficulties encountered in capturing goslings, those captured had to be held for up to 7 days before enough birds were accumulated to ship to Patuxent. Birds were held in 4 feet by 3 feet by 1 foot turkey crates and fed as much purina game bird food and lettuce as they would take. Water was always available. Cages were cleaned twice daily by replacing burlap on the floor of each cage.

In spite of the precautions, three of the goslings died at Buldir and the other 20 were sent to Patuxent. Shortly after the goslings arrived at Patuxent listless birds were noticed and birds began to die. Scientists at Patuxent determined the problem to be internal bleeding caused by severe infestation by coccidia. Apparently the birds were infected in the wild, but under normal conditions were not detrimentally affected by the protozoa. The stress involved in handling and shipping the birds allowed the parasitic infection to overwhelm them. A total of 9 birds died before the disease was brought under control. Biologists at Buldir carefully searched areas where goslings had been banded and released for weak or dead birds but discovered none.

Banding and measuring geese

Catching birds to band was difficult because of the conditions mentioned above. Up to eight workers walked abreast from 10 feet to nearly 100 feet apart (it was discovered late in 1975 that only the sweeps where distance between workers was 10 feet or less were efficient through the tall vegetation). Flightless birds were detected as they ran ahead of searchers by noting the movement of the vegetation. Wind moved the vegetation vigorously often making detection of geese more difficult. Most birds discovered were almost directly in front of a particular searcher, so workers may have passed very near geese that never moved.

Banding activities began on July 21 and terminated on August 17, on which date most of the geese were flight capable. Eighteen banding efforts were made during this period. Up to eight banders participated in each effort, but the average banding party size was 5.3. The mean duration of

each banding effort was 7.2 hours. A total of 474.5 manhours was expended during the banding activities. There were 101 geese captured; 77 of these were banded, 23 were for shipment to Patuxent, and 1 was captured from 1974.

A total of 77 Aleutian Canada geese was banded at Buldir between July 21 and August 17. There were 33 males, 32 females and 12 of unknown sex. Twenty-one were adults and 56 were locals. Sixty-five of the 77 birds were marked with numbered color leg bands; green for adults and yellow for goslings. Twelve goslings were too young to carry plastic leg bands at the time of capture.

The lateness of the breeding season is illustrated by the distribution of goslings age classes. Thirty percent of the goslings captured this year were size class IB, no goslings of this size class were captured in 1974, all were older. Banding was conducted during the same period.

The various measurements summarized in Table 4 were taken on each goose before it was released. A comparison of selected measurements of adults withmeasurements from the two most similar subspecies B. c. minima and B. c. tavernerii will be made to determine which characteristics are useful in separating the races.

Brood sizes

It was generally not possible to determine if we were capturing complete broods. Observations of pairs with broods were rare and it was difficult to know if the full brood was seen. Sample sizes are far too small to provide a reliable indication of production.

MEASUREMENTS OF ALEUTIAN CANADA GEESE
BULDIR 1975
$\bar{x}$/s (in mm)

Age	Sex	Cul.	Dia. Tar.	Mid. Toe w/o Nail	Neck Band Width	Weight (g)	Tail
AHY	M	37.8/0.98	77.7/2.8	64.5/5.1	19.1/4.1	2027.5/128.4	
AHY	F	35.4/1.5	71.2/5.8	60.4/4.1	20.5/5.4	1802.5/190.6	
IIC	M	31.3/2.4	76.8/3.7	65.0/2.1		1275/210.0	96.2/14.4
IIC	F	31.0	73.8	60.3		1125	83.5
IIB	M	30.3/1.6	72.1/7.9	59.7/4.1		1220/140	77.4/5.8
IIB	F	28.7/1.3	69.1/2.7	57.6/5.8		1105/112	
IIA	M	26.1/1.8	65.5/3.7	50.4/2.4		835/110	
IIA	F	23.6/1.0	60.0/3.9	45.0/2.3		696/103	
IC	M	23.4/1.9	59.2/3.1			556/72	
IC	F	24.2/1.4	58.5/3.6			601/125	
IB	U	18.9/1.1	43.3/1.9			297.7/63.8	

Food items used by geese

Data collected in 1975 included mostly subjective records of plants that appeared to have been cropped by geese. The comments in the 1974 report apply. Festuca and Carex were the chief food item taken except in late August when Empetrum berries also became important.

Goslings probably try to eat anything that looks edible. Two class IB goslings were seen eating Clytonia and adult beetles.

Mortality

One gosling was found dead. A swelling and discoloration was noted in the area of the distal articulation of the ulna and radius with the two carpals.

The remains of one gosling were the only goose remains found in the one active eagle eyrie we found.

Fall migration

Adult geese were flying again by August 14 and by August 19 flocks of up to 24 birds were seen in flight.

During the first few days of September flocks of up to 150 geese circled the island at high elevations.

The observation of a flock of 17 geese 10 miles east of Buldir on September 5 (George Putney pers. comm.) indicates some geese, probably non-breeding adults, depart at least that early, but many geese were still on the island when investigators departed September 5.

Feather Analysis

Molted feathers were collected from various locations on Buldir for trace metal analysis.

Dr. H. C. Hanson, Illinois Natural History Survey, will conduct the analysis. Results may provide a technique for identifying individual birds taken away from the Aleutians based on comparison of trace metals in feathers.

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