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DISTRIBUTION AND ABUNDANCE OF CACKLING CANADA GEESE DURING WINTER 1982-83

by

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ABSTRACT

From July 30, 1982 to January 14, 1983, 931 cackling geese were color-marked with yellow plastic neck collars on Yukon Delta National Wildlife Refuge (NWR), Alaska, and Tule Lake and Sacramento NWR's in California. Marked cackling geese were observed from October 1982 to June 1983 in California, Oregon and Alaska, resulting in resighting 49% of 225 individuals marked on Yukon Delta NWR, 85% of 516 marked on Tule Lake NWR, and 54% of 190 marked on Sacramento NWR. Marked individuals were observed during the non-breeding season from the Willamette Valley in Oregon south to the San Joaquin Valley grasslands. The extreme ranges of estimates of cackling goose population size are 38,000 to 144,000; the most reasonable estimate is 50,000 to 65,000. It is recommended that color-marking be continued on Yukon Delta NWR, and aerial survey and ground observation be intensified during the non-breeding season.

In recent years, estimates of the population size of cackling Canada geese (Branta canadensis minima) have declined dramatically (O'Neill 1979). Peak counts during aerial surveys of the Klamath Basin, the major fall cackling goose concentration area, dropped from 275,000 in November 1973 to 98,900 in November 1981 (USFWS survey data). Nesting surveys conducted on the Yukon-Kuskokwim Delta breeding grounds in June 1982 (USFWS, Yukon Delta NWR data) indicated cackling goose nesting density and hatching success were lower than those reported in previous studies on the Yukon-Kuskokwim Delta (Mickelson 1975, Raveling unpubl. data). Concern about the status and winter distributions of cackling geese resulted in the initiation of a cooperative study involving the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and the University of California, Davis.

The objectives of this study are to determine during the non-breeding season the:

1. present size of the cackling goose population;
2. distribution of cackling geese throughout California and southern Oregon;
3. social organization of cackling geese;
4. daily activity patterns of cackling geese;
5. nutritive content of cackling goose foods.

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METHODS

Color Marking

Cackling geese were captured while flightless at Kokechik Bay and Kigigak Island on Yukon Delta NWR, Alaska by U.S. Fish and Wildlife Service personnel between July 30 and August 9, 1982. Geese were captured by land and water drives, banded with aluminum leg bands, and marked with yellow plastic neck collars with black alpha-numeric codes. Cackling geese were captured by cannon-netting at Tule Lake NWR, California between November 1 and November 9, 1982, and at Sacramento NWR, California on January 10 and January 14, 1983 by California Department of Fish and Game personnel. Cackling geese captured in California were banded and collared in the same manner as those captured in Alaska.

Population Estimation

Cackling geese were observed from a ground vehicle, using a spotting scope almost daily from October 20, 1982 to April 27, 1983. Because cackling geese are distributed over such a large geographical area during winter and spring months, our census efforts focused on obtaining weekly counts in the Klamath basin during fall when the geese were concentrated in a smaller area. Counts in the Klamath Basin were made at mid-day when geese were roosting on open water. Cackling geese were censused by Sacramento NWR personnel on Sacramento Valley NWR at or near the same time when aerial censuses of the Klamath Basin NWR were conducted by Tule Lake NWR personnel. Our minimum estimate of the cackling goose population is the sum of the peak

Klamath Basin ground count and Sacramento Valley NWR censuses at that time.

We attempted to identify as many color-marked cackling geese as possible throughout the study period. Based on observations of marked individuals at various locations and dates, we estimated the number of cackling geese marked in Alaska that were present in the Klamath Basin during the peak count there. A maximum population estimate was calculated by dividing the Klamath Basin peak count by the number of Alaska-marked birds in the Klamath Basin during the peak count and multiplying by the total number of cackling geese marked in Alaska. We derived a third population estimate by dividing the Klamath Basin peak count by the number of Alaska-marked birds in the Klamath Basin during the peak count and multiplying by the total number of Alaska-marked birds observed throughout the study period.

A fourth population estimate was obtained by dividing the number of cackling geese observed in northern California and southern Oregon during spring 1983 by the number of California-marked individuals seen at that time and multiplying by the total number of California-marked birds that were known to be alive by spring.

Distribution

Cackling goose flocks were located during the non-breeding season by ground and aerial reconnaissance aided by personal contacts with agency personnel (refuge personnel, other land managers, unit biologists, wardens), ranchers and local residents from the Klamath Basin south to Los Banos, California. Extensive ground reconnaissance was conducted throughout the study period; aerial reconnaissance was limited to two February surveys of areas on the Sacramento Valley edge, and normal agency surveys of the

Sacramento Valley refuges, Yolo Bypass, Sacramento-San Joaquin River Delta, and San Joaquin Valley grasslands in mid November, early December and mid-January. We attempted to reach all flocks of cackling geese on the ground to observe marked birds and obtain ground counts.

Behavioral Observation and Vegetation Sampling

Daily activity patterns of cackling geese were obtained by instantaneous flock scans and focal animal sampling. The latter method was also used to quantify social interactions, and consisted of recording the activity of a color-marked individual at 5-second intervals for periods of up to an hour. Vegetation samples were collected at sites where cackling geese were observed foraging. Grazed vegetation was examined to determine to what height each plant species was cropped, and 10 grams of similar material was collected from adjacent ungrazed areas. Vegetation samples will be analyzed for caloric and protein content using bomb calorimetry and Kjeldahl analysis.

RESULTS

Color-Marking and Population Estimates

Trapping efforts in Alaska and California resulted in color-marking 931 cackling geese, 27% of which were immatures (Table 1). This is not an index of productivity as only brood-flocks were banded in Alaska as the goal was to build up a sample of birds of known age. The lower proportions of immature geese captured in California are more indicative of the poor reproductive success of cackling geese in 1982. Of the 931 marked geese, 647 were resighted during the study period. Only 110 (49%) Alaska-marked geese were observed, including 43 of 74 adults (58%) and 67 of 150 immatures (45%).

Table 1. Numbers of cackling geese color-marked from July 1982 to January 1983.

Banding Location	Total	Adults	Immatures	% Immatures
Yukon Delta NWR	225	74	150	67
Tule Lake NWR	516	435	81	16
Sacramento NWR	190	173	17	9
TOTAL	931	682	248	27

The peak ground count of cackling geese in the Klamath Basin was 32,100 on November 21-23, 1982. An aerial estimate of 35,500 cackling geese was made by Tule Lake NWR on November 22. At this time, censuses of Sacramento Valley NWR's indicated 6,000 to 10,000 cackling geese present. Our minimum population estimate is therefore 38,000 cackling geese.

Approximately 50 Alaska-marked cackling geese were present in the Klamath Basin during the peak count. Assuming (unrealistically) all 225 Alaska-marked cackling geese were still alive and had retained their collar at that time and that marked individuals were homogenously distributed throughout the population, the maximum population estimate is 144,000. Assuming all living Alaska-marked cackling geese present in the Klamath basin were observed during the study period yields a population estimate of 69,500.

From April 11 to April 27, 1983, 14,000 cackling geese were observed in northern California and southern Oregon. Conditions were especially favorable for identifying marked individuals, and 144 California-marked geese were observed. Of the 706 cackling geese marked in California, 57 were known to be dead at the time, so 22% of the remaining 649 were observed among the 14,000 geese. Assuming 14,000 was 22% of the total cackling goose population results in a population estimate of 63,000.

Distribution

Observations of color-marked cackling geese are summarized by geographical location in Table 2. Of the 110 Alaska-marked geese seen during the study period, 73% were observed during fall in the Klamath Basin, 63% in the Sacramento Valley from October through March, 18% in the San Joaquin Valley from December through April, and 20% in northern California

Table 2. Numbers of color-marked cackling geese observed at various locations from October 1982 through June 1983, including individuals shot or found dead. (Percent of total in parentheses).

Banding Location	Yukon Delta NWR	Tule Lake NWR	Sacramento NWR
Total color-marked	225	516	190
Total resighted	110 (49)	435 (85)	102 (54)
Observed in Klamath Basin ¹	80 (36)	403 (78)	-
Observed in Sacramento Valley ²	69 (31)	235 (46)	69 (36)
Observed in San Joaquin Valley	20 (9)	63 (12)	13 (7)
Observed in Willamette Valley	2 (1)	0	0
Observed in N. Calif./S. Ore. ³	22 (10)	101 (20)	43 (23)
Observed in Alaska ⁴	13 (6)	16 (3)	6 (3)
Shot ⁵	7 (3)	31 (6)	-
Found Dead	2 (1)	23 (4)	3 (2)

¹Fall 1982

²Includes Sacramento-San Joaquin River Delta

³Spring 1983

⁴May and June 1983

⁵Data from hunter check stations, complete band returns unavailable as of this report date.

and southern Oregon in April. Of the 389 Tule Lake-marked geese known to be alive in fall in the Klamath Basin, 60% were subsequently seen in the Sacramento Valley, 16% in the San Joaquin Valley and 25% in northern California and southern Oregon during spring.

Large cackling goose flocks were observed on both Tule Lake and Lower Klamath NWRs during fall but not during spring. Fall observation in the Klamath Basin of 73% of the total observed Alaska-marked cackling geese indicates that a sizeable segment of the population may have bypassed the Klamath Basin during fall migration. In addition, observation of Alaska-marked individuals at various locations during fall suggest that some turnover of the population occurred in the Klamath Basin; i.e., flocks migrated into and out of the basin throughout fall so that all cackling geese that passed through the Klamath Basin were never present at the same time. In the spring, the largest flock observed in the Klamath Basin was 3,000 cackling geese at Klamath Wildlife Area just south of Klamath Falls, Oregon. Small flocks of less than 300 were observed throughout the rest of the basin in spring.

Approximately 5,000 cackling geese arrived at Sacramento NWR on October 25, 1982 (D. Mauser, pers. comm.). Cackling geese were observed on Sacramento, Delevan and Colusa NWRs and nearby private lands through January 25, 1983. Cackling goose flocks were also observed on two large ranches west of Chico and two ranches south of Colusa. In February and March, up to 8,000 cackling geese were observed in the Hastings Slough area west of Butte City. Approximately 3,000 cackling geese were observed in late December and early January on the Vina Plains (D. Wurlitzer, pers. comm.). Cackling geese reportedly used Bouldin and Staten Islands in the Sacramento-San Joaquin River Delta during mid-winter (T. Leathers, pers.

comm.), and were observed throughout March and early April on Bradford Island, Webb Tract and Little Frank's Tract.

Cackling geese were observed in the San Joaquin Valley from November 1982 through April 1983; the largest number observed in the area was 5,000 on March 4, 1983. Almost all cackling geese observed in the San Joaquin Valley were present on two private cattle ranches in the east grasslands area north of Merced NWR.

Up to 1,200 cackling geese were observed at Modoc NWR in Modoc County from January through April 1983 (B. Radke, pers. comm.). Cackling geese were first seen along the Pit River in Big Valley near Bieber and Warm Springs Valley near Canby in late January (D. Bright, pers. comm.). In mid-April 6,000 cackling geese were observed in Big Valley and 1,200 in Warm Springs Valley, and 10,000 were observed in Big Valley on April 27, 1983, the last day of our surveys in California.

Behavioral observation and vegetation nutritional data await later analysis.

DISCUSSION

Based on known mortalities after banding at Tule Lake NWR, the large number of marked individuals never resighted, and our past experience capturing and handling cackling geese, we believe that cackling geese are very susceptible to injury and mortality during capture and handling. It appears that banding mortalities are chiefly caused by stress during capture and handling, and not the presence of plastic neck collars.

The high proportion of Alaska-marked cackling geese not seen after banding indicates either excessive mortality or a great number of cackling geese evaded observation during the non-breeding season. Four neck collars

placed on immature cackling geese at Kokechik Bay in August 1982 were found near banding sites in May and June 1983. Thirteen individuals marked at Kokechik Bay in 1982 were resighted at Kokechik Bay in 1983, and only one of these birds had not been observed during the non-breeding season. In addition, 10 of 13 adults marked at Kigigak Island were observed during the non-breeding season, while only 32 of 61 adults marked at Kokechick Bay have been resighted. This evidence suggests that mortality and/or collar loss may have been quite high after banding at Kokechik Bay in 1982.

In light of the probability that many Alaska-marked birds did not survive the summer, at least with their neck-band, and migrate to California and Oregon, we believe that our population estimates of 69,500 cackling geese is the more reasonable of the estimates based on peak counts in the Klamath Basin. However, the assumptions this figure is based on are not precise. Probably more than 50 Alaska-marked individuals were present in the Klamath Basin during the peak count, as we were unable to identify marked individuals among at least 4,000 cackling geese on Lower Klamath NWR, and we undoubtedly overlooked other marked individuals. Also, there were probably more than 110 surviving Alaska-marked birds alive during the study period. However, the fact that only one of the 13 Alaska-marked geese that were reobserved in Alaska during the 1983 breeding seasons had not been seen repeatedly during winter lends confidence to our judgement, at this time, that most marked geese that were alive and retaining their neck-band were seen. Continuing study will help to further resolve this issue. It is also unlikely that the Alaska-marked individuals were evenly distributed throughout the population, and observations in the Klamath Basin and Sacramento Valley suggest that a greater proportion of individuals marked at Kokechik bay may have left the Klamath Basin earlier than the rest of the population did.

The population estimate based on California-marked birds observed during spring is probably the most accurate of all the estimates because it is based on a larger sample of marked individuals and more precise data on the number of marked individuals present in the observed flocks and the entire population. Our estimate of 63,000 is a maximum based on the data, as it is possible that fewer but not more than 649 California-marked geese were still alive, and it is probable that some marked individuals were not seen.

Therefore, our best estimate of the cackling goose population during the 1982-83 non-breeding season is 50,000 to 65,000 birds.

At no time during the study did we know the location of more than 40,000 cackling geese (Table 3). Our efforts to locate cackling geese were hampered by California's record-setting rains, which prevented many aerial surveys, closed ground access to parts of the Central Valley, and probably dispersed the geese more than usual.

The apparent fall population turnover in the Klamath Basin and the possibility that some proportion of the population bypassed the area in Fall 1982 cast some uncertainty on the accuracy of fall surveys of the Klamath Basin as estimates of total cackling goose population size. Yearly variation in the proportion of the population stopping in the Klamath Basin during fall migration, migrating out of the basin prior to peak counts, and migrating to the basin after peak counts could also lead to inaccurate population trend data if figures are based solely on Klamath Basin fall counts. Fall surveys of the Klamath Basin still appear to be the best method of monitoring cackling goose populations, but the possibility that **great numbers** of cackling geese may be absent from the basin during peak counts should be kept in mind.

Table 3. Locations of known cackling goose flocks at three dates, November 1982 to April 1983. Data from various sources.

	Nov. 22	Dec. 25	April 10
Klamath Basin	32,000	8,000	3,500
Sacramento Valley	6-10,000	21,000	
Vina Plains		3,000	
Sacramento-San Joaquin River Delta			3-5,000
San Joaquin Valley		3,000	2,500
Modoc and Lassen Counties		<u>700</u>	<u>7,500</u>
TOTAL	38-42,000	35,700	16-18,500

In light of our findings to date, we would like to make the following recommendations.

1. Continuation of color-marking, with emphasis on marking of cackling geese at as many widespread locations on the Yukon-Kuskokwim Delta breeding grounds as possible, preferably 100-200 individuals at each of 4 to 6 locations.
2. Banding drives on the Yukon-Kuskokwim Delta be as short as possible (water drives with the tide preferable); captured cackling geese be handled in small groups as quickly and efficiently as possible (no measurements, etc.) and released in groups. If cannon-netting in California is to be continued, captured birds should be removed from nets as quickly as possible, placed in holding pens or cages, processed quickly, and released in groups of ten birds or more.
3. Selected portions of the non-breeding grounds be surveyed from the air weekly throughout the non-breeding season.
4. Increased effort to identify marked cackling geese simultaneously at different locations. This would require that one or two additional observers be assigned to observing cackling geese regularly, at least part-time.
5. Radio instrumentation of twenty cackling geese early during fall migration if an agency has the ability to relocate instrumented birds weekly or every two weeks throughout the non-breeding season. Such a program is beyond our capacity at present and would require additional personnel and travel.

Literature Cited

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