BREEDING DENSITIES AND MIGRATION PERIODS OF COMMON SNIPE IN COLORADO

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Common Snipe (*Capella gallinago*) occur seasonally throughout most of North America (Bent 1927). Despite their widespread occurrence, little is known about their breeding status and timing of migration outside of northern and southern localities. Knowledge of snipe in Colorado is limited with published records pertaining to distribution and seasonal occurrences (Anon. 1886, Bailey and Niedrach 1965, Niedrach and Rockwell 1939). Because of the paucity of data on this common wetland species in the central portion of its range, this investigation was initiated in late 1973. Primary objectives were to estimate densities of breeding snipe and timing of migration in representative habitat types in Colorado.

METHODS AND STUDY AREAS

Three study sites were selected in each of 4 locations in Colorado. These locations were the Fort Collins (sites 1–3) and North Park (sites 4–6) areas in north central Colorado; Yampa Valley (sites 7–9) in the northwest, and San Luis Valley (sites 10–12) in south central Colorado. Total area studied was 245.1 ha. Size of sites studied in each location ranged from 25.2 ha near Fort Collins, 63.5 ha in the Yampa Valley, 63.6 ha in the San Luis Valley to 92.8 ha in North Park. Elevation extremes were from 1480 to 2510 m above sea level.

Vegetation of each site was described as to dominant species based on frequency of occurrence and percent coverage. All sites were seasonally wet through either irrigation flow or proximity to permanent water sources such as streams or ponds. Seven sites were dominated by species of *Carex*. Other important species on these sites were *Typha* spp., *Scirpus americanus*, *Hordeum jubatum*, *Trifolium* spp., *S. lacustris*, *Lemna* spp., and *Taraxacum* spp. in decreasing frequency of occurrence. The other 5 sites varied in composition of dominant vegetation from *Carex* spp. and *Salix* spp. to *Eleocharis* spp. and *Juncus arcticus*. Ten of the sites were seasonally grazed by livestock varying from late March to early July into October. One of the remaining sites was mowed for hay in late summer.

Climatic conditions varied with location depending upon elevation and proximity to mountains. All locations are semi-arid ($<$ 60 cm of moisture per year; range 18–59 cm) and relatively cool (mean annual temp. = 2–9°C) with short (56 days, North Park; 81 days, Yampa Valley) to average (103 days, San Luis Valley; 139 days, near Fort Collins) frost-free seasons (Colorado State Planning Division 1964).

Soils on study sites in 3 of the 4 locations are similar (unpublished data from U.S.D.A. Soil Conservation Service). They are deep, poorly drained, often alluvial in origin with excellent moisture holding capacity and slow to fair air, water, and root penetration. Surface layers ranged from clay loam to fine sandy loam often covered with a thin organic mat. Soils in the Yampa Valley were more variable ranging from deep, well-drained loam or clay loam to saline-alkali rich media with silty clay loam textures.

Measurements of soil compaction on each site were made with a Soiltest penetrometer following standard procedures. Selected water characteristics were measured on each study site using a Hach Model AL-36-B test kit and ranged from 50 to 510 mg/l (as $CaCO_3$) for total alkalinity, 30 to 2100 mg/l (as $CaCO_3$) for hardness, and 7.2 to 9.5 for pH.

Systematic strip censuses were used to estimate snipe numbers on each study site. Censuses consisted of walking linear transects at 20 to 25 m intervals with census routes and locations of snipe flushed, alighting, or displaying recorded on field maps of each site. Censuses were conducted at 2-week intervals from early May to mid-October in 1974 and from late March to late June in 1975 on all sites except near Fort Collins where censuses were conducted on a weekly basis.

Nests encountered during field investigations were inconspicuously marked for later relocation to record nesting progress. Dates of onset of incubation were estimated using the water flotation technique (Westerskov 1950) based on a 19-day incubation period. Egg measurements were taken with vernier calipers graduated to the nearest 0.1 mm.

RESULTS AND DISCUSSION

Breeding density.—The relation between numbers of snipe recorded during censuses and actual number breeding on a given area proved difficult to evaluate. Censuses prior to early May may have overestimated breeding densities due to the possible presence of migrants. Censuses after early May possibly underestimated breeding densities by excluding nesting snipe which were difficult to flush. In order to minimize these problems, the estimated breeding density for each site was derived by using the mean value for all censuses conducted on the site during May.

Densities of snipe using study sites during May varied from 0.2 to 2.1 per ha (Table 1). Of the 4 locations studied, highest densities were recorded near Fort Collins. This appeared to be the result of smaller sites (average = 8.4 ha) and uniformly suitable habitat on these sites. Sites studied in the other locations were generally larger (average size = 24.4 ha), and contained more diverse habitats, some of which were not suitable for snipe. The slightly lower densities recorded in 1974 may be an artifact resulting from conducting more censuses later in May.

Numbers of snipe varied with water depth and coverage, vegetation height and density, and soil conditions. Areas providing most suitable habitats for snipe contained shallow, stable, discontinuous water levels. Vegetation was low (10–30 cm in late May), often grazed or mowed, and sparse. Soils were moist to saturated and frequently characterized by hummocks. Areas with highest densities of snipe generally had ground compactions from less than 0.1 to 0.75 kg/cm^2 and occasionally to 1.5 kg/cm^2 in areas of dense vegetation. Areas having ground compactions of 2.5 kg/cm^2 and greater were slightly moist or dry and seldom provided feeding sites for snipe.

Seven study sites were partially flooded pastures and had densities from 0.4

TABLE 1

ESTIMATED SNIPE BREEDING DENSITIES ON SELECTED STUDY SITES, COLORADO, 1974–1975

Location	Size (Ha)	Snipe/ha (range)[1] 1974	1975
Fort Collins	25.2	1.3 (0.8–1.7)	1.7 (1.2–2.1)
North Park	92.8	0.6 (0.4–0.9)	0.6 (0.3–1.2)
Yampa Valley	63.5	0.5 (0.4–1.1)	0.7 (0.5–1.2)
San Luis Valley	63.6	0.5 (0.2–0.7)	0.5 (0.3–0.8)
Total	245.1		
Averages		0.6	0.7

[1] Estimated densities are averages of the 3 sites studied per location.

to 1.9 snipe/ha (average = 0.8). Of the 5 remaining sites, 2 in the Yampa Valley had relatively high densities (1.2 and 1.0 snipe/ha). These sites had stable water levels through May and were ungrazed. Vegetation heights on these 2 sites ranged from 5 to 30 cm in late May. Three study sites (1 in North Park, 2 in the San Luis Valley) provided few suitable habitats for snipe and had low breeding densities (0.3 to 0.5 snipe/ha). None of the 3 sites were grazed prior to late June. Heights of vegetation in early June at these sites ranged from 20 to 70 cm. Water levels on 2 of these sites were relatively stable but decreased on the third throughout May into June.

Nesting.—During the course of field investigations, 28 snipe nests (18 in 1974, 10 in 1975) were located. Nest sites were typically in grasses or sedges 20 to 40 cm in height on moist but unflooded ground near water. One atypical site was at the base of 3-m high willow (*Salix* spp.) in the center of a stand of willows approximately 30 m wide.

Estimated onset of incubation ranged from 2 May through 4 July, with the bulk of nesting activity occurring in May. Incubation of 12 of the 18 nests located in 1974 (67%) had begun in May. Additional nesting records for Colorado are limited, ranging from 1 May to 1 July with most nests located in May and early June (Niedrach and Rockwell 1939, Bailey and Niedrach 1965). In Utah, nesting dates range from 29 April to 24 July (Johnson 1899, Bent 1927). In California, a late nest was located on 1 September (Bryant 1915).

Complete clutches of 4 eggs were found in 26 nests (93%) and 3 eggs in 2 nests (7%). Forty-nine eggs were measured and had a mean length of 38.5 mm (SD = ± 1.3 mm, range = 36.6–41.6 mm) and width of 28.4 mm (SD = ± 0.7 mm, range = 27.2–29.7 mm). Nesting success and chick survival rates were not determined.

TABLE 2

MAXIMUM DENSITIES OF SNIPE AND DATES OF OCCURRENCE DURING SPRING (1975) AND FALL (1974) MIGRATION IN COLORADO

Location	Spring 1975 (Snipe/ha)	Dates	Fall 1974 (Snipe/ha)	Dates
Fort Collins	5.6	10–13 April	2.9	17 September
North Park	1.2	21–23 April	3.4	21 September
Yampa Valley	1.1	22–23 April	NC[1]	NC[1]
San Luis Valley	1.0	14–16 April	0.3	15–16 September

[1] Censuses were not conducted.

Spring migration.—From data collected on the 12 study sites, the extent and peak of the 1975 spring migration appeared indistinct. During censuses in late March and early April, a few snipe, probably migrants, were observed on most study sites which were snow and ice-free. Previously published arrival dates for snipe in Colorado include 10 March for Denver, 19 March for Boulder, 26 March for Sweetwater Lake (Bent 1927) and 17 April for Rocky Mountain National Park (Packard 1945). By mid-April, highest numbers of snipe were recorded in all locations with Fort Collins having a peak of 5.6 snipe/ha on 10–13 April, North Park with 1.2 snipe/ha on 21–23 April, Yampa Valley with 1.1 snipe/ha on 22–23 April (omitting one site which was snow covered until late May), and the San Luis Valley with 1.0 snipe/ha on 14–16 April (Table 2).

Numbers of snipe declined slightly through early May probably because of continued northward migration. A second decline occurred from early to late May which may have been caused in part, by a continuing northward migration. Although migrating snipe begin arriving in Canada during April and early May (Tuck 1972), breeding populations may not peak until late May (Arnold 1976). Local movements to areas such as irrigated haylands and pasture which had been dry previously and the onset of nesting and incubation making snipe more difficult to flush probably added to the apparent decrease. After late May, numbers of snipe stabilized on most study sites.

Fall migration.—Numbers of snipe were monitored during September and October 1974 to document timing of the fall migration. Data collected indicated that the fall migration was in progress by early September. During fall censuses, highest numbers of snipe were observed in the San Luis Valley with 0.3 snipe/ha on 15–16 September, near Fort Collins with 2.9 snipe/ha on 17 September, and in North Park with 3.4 snipe/ha on 21 September (Table 2). Study sites in the Yampa Valley were omitted because of unfavorable habitat conditions. These data indicate that the peak fall migra-

tion period for 1974 occurred about the third week of September. Numbers of snipe declined markedly after late September and by mid-October the fall migration was near completion.

In Colorado, the majority of fall migrants evidently passed through during September; however, substantial increases in numbers of snipe were observed in August. Censuses near Fort Collins and in the San Luis Valley during early August indicated increases on 4 study sites. Censuses in late July in North Park and the Yampa Valley did not reveal increases. Densities of snipe in the San Luis Valley reached 0.9 snipe/ha on 9–10 August, exceeding the September maximum of 0.3 snipe/ha. This increase may indicate that the fall migration was underway by early August or that juvenile snipe had concentrated on favorable feeding grounds. Tuck (1972) reported that in Newfoundland juveniles aggregated in groups of a few birds in late July to flocks of 100 or more in mid-August and were likely to migrate together prior to adults.

SUMMARY

Breeding densities and migration periods of Common Snipe in Colorado were investigated in 1974–75. Sites studied were near Fort Collins and in North Park, both in north central Colorado; in the Yampa Valley in northwestern Colorado; and in the San Luis Valley in south central Colorado.

Estimated densities of breeding snipe based on censuses conducted during May 1974 and 1975 were, by region: 1.3–1.7 snipe/ha near Fort Collins; 0.6 snipe/ha in North Park; 0.5–0.7 snipe/ha in the Yampa Valley; and 0.5 snipe/ha in the San Luis Valley. Overall mean densities were 0.6 and 0.7 snipe/ha in 1974 and 1975 respectively. On individual study sites, densities of snipe ranged from 0.2 to 2.1 snipe/ha. Areas with shallow, stable, discontinuous water levels, sparse, short vegetation, and soft organic soils had the highest densities.

Twenty-eight nests were located having a mean clutch size of 3.9 eggs. Estimated onset of incubation ranged from 2 May through 4 July. Most nests were initiated in May.

Spring migration extended from late March through early May. Highest densities of snipe were recorded in all regions during 10–23 April. Fall migration was underway by early September and was completed by mid-October with highest densities occurring about the third week in September. High numbers of snipe noted in early August may have been early migrants or locally produced juveniles concentrating on favorable feeding areas.

ACKNOWLEDGMENTS

Financial support of this investigation was provided by the Accelerated Research Program of the U.S. Fish and Wildlife Service funded through the Colorado Division of Wildlife and Colorado Federal Aid in Wildlife Restoration Project W-88-R. During the course of this study helpful suggestions and assistance were received from many individuals. We are particularly indebted to D. Hein, R. Hopper, M. Szymczak and R. Walter. C. Bryant and C. Donner and their staffs of the Monte Vista and Arapaho National Wildlife refuges, respectively, are acknowledged for their many courtesies. C. E. Braun of the Colorado Division of Wildlife helped direct this study and critically reviewed the manuscript. His interest and attention to detail are sincerely appreciated.

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