

SOME ASPECTS OF THE BREEDING BIOLOGY OF THE UPLAND SANDPIPER IN NORTH DAKOTA

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The general nesting range of the Upland Sandpiper (*Bartramia longicauda*), formerly called Upland Plover, extends from northwestern Alaska, northern Yukon, southern Mackenzie, central Manitoba, southern Ontario, and southern Quebec south into the United States as far as Maryland, Virginia, Kentucky, Oklahoma, and Colorado then north-northwest to northern Oregon. Elliott Coues (1874:504) stated, "Its breeding habits may be studied with perfect success in Northern Dakota, where it is the most abundant of all the waders." As late as 1914, North Dakota was still one of the principal breeding areas for the Upland Sandpiper in the U.S., and only in southern Manitoba and eastern Saskatchewan could breeding pairs of this species be found in greater abundance (Cooke 1914:283). In 1967, Stewart and Kantrud (1972) surveyed the breeding birds of North Dakota and found that the Upland Sandpiper was still a major breeding species there.

The purpose of this paper is to provide a better understanding of certain aspects of the breeding biology of Upland Sandpipers in North Dakota.

STUDY SITE

Data on Upland Sandpipers were collected from 1966 to 1973 at the Woodworth Study Area, a field station of the Northern Prairie Wildlife Research Center located on the Missouri Coteau in northwestern Stutsman Co., North Dakota. The area was about 85% grasslands and 15% croplands and Upland Sandpipers nested mainly on the grasslands. We found nests by searching fields with a 53.35 m cable-chain device similar to that described by Higgins et al. (1969b).

The unplowed grassland is mixed-grass prairie with native dominants of *Agropyron trachycaulum*, *Koeleria cristata*, *Stipa comata* and *S. viridula*. This grassland is heavily infested with two shrubs, *Symphoricarpus occidentalis* and *Elaeagnus argentea* and invaded by exotic cool-season grasses such as *Poa pratensis*, *Bromus inermis* and *Agropyron repens*. The plowed grassland has been seeded with various grasses such as *Agropyron intermedium*, *A. elongatum*, *A. cristatum*, plus alfalfa (*Medicago sativa*) and sweet clover (*Melilotus* sp.). Vegetation commonly used as nesting cover by Upland Sandpipers in this area was reported by Higgins et al. (1969a).

TIME OF NESTING

Arrival on the nesting grounds.—Upland Sandpipers usually arrived at Woodworth during the first 10 days of May although in 1971, they were recorded as early as 22 April. May 5 was the most common arrival date. Lindmeier (1960) reported that Upland Sandpipers arrived in Mahanomen

Co., Minnesota between 1 and 6 May. Mahnomon Co., Minnesota lies about 241 km due east of Woodworth. Roberts (1932) reported arrival dates from 20 April to 10 May in northern Minnesota, averaging 4 May, and from 7 to 25 April in southern Minnesota, averaging 20 April. Upland Sandpipers arrived at the Faville Grove study area in Wisconsin (Buss and Hawkins 1939) approximately 20 days earlier on the average than at the Mahnomon Co. and Woodworth areas. The Faville Grove area lies at a latitude about 515 km south of the other two areas.

Most Upland Sandpipers were segregated into definite pairs upon arrival at Woodworth; some were observed in trios. We did not determine the sex composition of these trios or the length of time they remained intact. Rowan (1926) observed trios of Upland Sandpipers in Alberta, and collected all members of two of these groups, both of which included two males. He stated that groups of three were more common than pairs during 1924 at Sullivan Lake, Alberta, and that no sign of quarreling was noted among members of the trios.

The nesting period.—Nesting activities began at Woodworth as early as 14 days after we saw the first Upland Sandpipers on the area. The earliest clutch recorded was initiated on 17 May, and the latest on 25 June; the mean initiation date of first clutches was 25 May. Buss and Hawkins (1939) noted that nesting began 15 to 20 days after the first sandpipers arrived at Faville Grove. Coues (1874:504) reported that the eggs are mostly laid by the second week of June in northern Dakota.

The earliest hatching of Upland Sandpipers observed at Woodworth was on 14 June and the latest on 22 July. The first major period of hatching was 16 June to 1 July, the peak being around 23 June (Fig. 1). Renesting by Upland Sandpipers may explain the second period of hatching from 7 to 21 July (Fig. 1).

The maximum period between the earliest initiated and the latest hatched nest at Woodworth was 67 days. This agrees closely with the period of not more than 2 months reported by Buss and Hawkins (1939).

The initial nesting effort of Upland Sandpipers appeared to occur almost simultaneously at Woodworth. This is indicated by the sharp rise and peak in initial hatching shown in Figure 1. Further evidence of almost synchronized nesting was observed during 1971 when seven nests hatched between 23 and 25 June. Buss and Hawkins (1939) concluded from their 1937 and 1938 hatching data that Upland Sandpipers begin nesting almost in unison. Goodpaster and Maslowski (1948) found two nests on the same day that were about 180 m apart and both contained two eggs, indicating that these nests were initiated at about the same time.

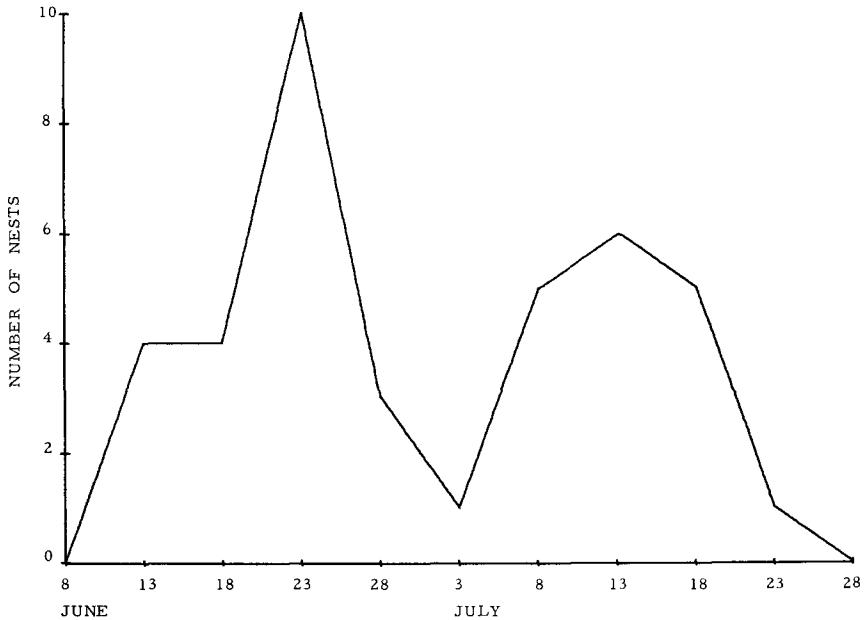


FIG. 1. Distribution of hatching dates for Upland Sandpiper clutches at Woodworth.

EGG LAYING, INCUBATION, AND HATCHING

Egg laying and clutch size.—We determined that the time period between successive laying of individual eggs on three occasions was 24, 29, and 33 hours. A fourth clutch increased from one to four eggs in 79 hours, averaging 26.3 hours between eggs.

According to Bent (1929), this species lays four eggs, rarely five, and perhaps sometimes only three. All of 189 completed clutches at Woodworth consisted of four eggs. Two nests had three-egg clutches for a short time, but neither clutch was confirmed as complete. One of the nests, contained three Upland Sandpiper eggs and one Brown-headed Cowbird (*Molothrus ater*) egg, and was destroyed by a predator before it was again inspected. Higgins (1971) reported a nest near Woodworth with three Upland Sandpiper eggs and one Cowbird egg in which the Upland Sandpiper eggs hatched. The other nest contained three eggs at 11:55 on 1 June and at 17:30 on 3 June, an interval of 53.5 hours; it had been destroyed before a third inspection on 5 June. During three visits to this nest before it was destroyed, an adult bird was flushed from the nest each time, indicating possible incubation of the three eggs and suggesting that the clutch was completed. However, we lacked evidence to confirm that the clutch was previously unaltered and did not record it as a completed three-egg clutch.

One nest of four eggs at Woodworth on 23 June 1970 had only three eggs on 10 July. This clutch had hatched by 15 July. Another nest contained two eggs on 1 June, three eggs on 3 June, four eggs on 5 June, and only three eggs on 22 June. This nest was destroyed by a predator. The disappearance of eggs from these two nests could not be explained. In 1938, Buss and Hawkins (1939) observed a nest that contained four eggs from 26 May to 4 June but only three eggs on 5 June. Incubation was continued on this nest, but no explanation was found for the disappearance of the egg.

Incubation period.—Published reports on Upland Sandpipers show incubation periods as follows: 17 days (Forbush 1929:448; Bent 1929:59), 21 days (Grant 1931:10; Buss and Hawkins 1939:210), 24 days (Bailey 1930:181), 23–24 days (Lindmeier 1960:7), 26 days (Goodpaster and Maslowski 1948:188).

By defining the incubation period as the time from the laying of the last egg in a clutch to the hatching of the last young when all eggs in the clutch hatch (Nice 1954:173; Kendeigh 1963:453) we found that incubation periods for nine clutches ranged from 22 to 27 days (mean = 24 days). Likewise and in accordance with the definition, incubation periods for 12 clutches in the published records cited above ranged from 21 to 28 days (mean = 24 days).

Five clutches at Woodworth did not meet the terms of the definition because one egg in each clutch did not hatch. The incubation period range for these clutches was from 24 to 26 days, and the mean was 25 days, 1 day longer than the normal incubation period, indicating a prolonged effort to hatch all of the eggs. Further evidence of prolonged incubating behavior was noted in 1973 when a four-egg clutch found on 7 June was still being incubated on 8 July, a period of at least 32 days. All four of these eggs contained dead embryos, about two-thirds developed.

Hatching.—At Woodworth, the combined pipping and hatching period for 12 clutches was less than 24 hours at one nest, between 24 and 48 hours at seven nests, and between 48 and 72 hours at four nests. Buss and Hawkins (1939) found the pipping period varied from 18 hours to 3 days and averaged about 24 hours. They also found that the eggs of a given clutch did not pip or hatch simultaneously. Other records for pipping and hatching are as follows: one clutch, less than 24 hours (Bailey 1930), one clutch, nearly 3 days (Grant 1931), two clutches, 2 and 3 days (Goodpaster and Maslowski 1948).

Egg hatching success was determined from 100 clutches containing four eggs each that did not suffer losses from predation and were incubated long enough to have hatched. Of 400 eggs observed, 377 (94%) hatched and of the 23 eggs that did not hatch, 15 were rotten and 8 had dead embryos. Four of the rotten eggs were in one clutch and four of the dead embryos were in another clutch; both clutches were found in 1973, an extremely dry year

for nesting. In 10 other clutches only three eggs hatched per clutch and in one clutch only two hatched. Of 104 eggs that Buss and Hawkins (1939) observed, 101 (97%) hatched. They determined that the three unhatched eggs were infertile.

Characteristics of a hatched clutch.—Because the shells of hatched eggs are usually carried away by the attending adult as the chicks hatch, it is difficult to determine whether or not an Upland Sandpiper clutch hatched from the appearance of the nest remains. We found in at least 75% of the 98 hatched clutches we inspected, the nest remains were shallow bowl-shaped depressions, containing few to very many minute egg shell chips and very little vegetative litter. Pipped egg shells with attached membranes were found at eight nests. Two other nest bowls contained no discernible shells or shell chips, although the eggs were known to have hatched. A newly hatched chick was present in one of these nests, and two pipped egg shells with membranes attached were found within 16 m of the other. Buss and Hawkins (1939) found that shells had disappeared from 54% of the hatched nests in their study, evidently carried away by the incubating bird.

FALL DEPARTURE

Coues (1874:505) reported that Upland Sandpipers left the northern regions early and that he saw none after early September. During most years, a majority of Upland Sandpipers have left the Woodworth area by 25 August. We have only two records for latest departures: 22 August 1972 and 3 September 1973.

During 1972 and 1973, Upland Sandpipers were present at Woodworth for periods of 110 and 122 days, respectively. Between their arrival and departure, we surmised, conservatively, that at least 110 days are required to complete their breeding ground activities. During 1935–1938, Buss and Hawkins (1939) found that Upland Sandpipers were present at Faville Grove for periods ranging from 114 to 165 days and a mean of 138 days. Their data showing a longer period than for Woodworth, are reasonable because of the longer growing season at Faville Grove. The average period free of killing frost at Pettibone, the nearest long-term weather station to Woodworth, was 109 days, extending, on the average, from 27 May to 13 September (Kincer 1941:1045). The average period free of killing frost at Lake Mills, the nearest long-term weather station to Faville Grove, was 152 days, and, on the average, this period extended from 8 May to 7 October (Kincer 1941:1192). These dates nearly coincide with the dates for first nest initiation and final departure dates for Upland Sandpipers on the two study areas, indicating that some of their breeding ground activities may be directly or indirectly correlated with temperature at these northern latitudes.

SUMMARY

Observations of certain aspects of the breeding biology of Upland Sandpipers were made from 1966 to 1973 on the Woodworth Study Area in east-central North Dakota. After arriving on the area Upland Sandpipers completed their breeding ground activities and departed after a period of 110 to 122 days, first arrivals were usually seen around 5 May, and in most years no birds were seen after 25 August. The maximum period from the earliest clutch initiation until the latest hatch was 67 days. The average time lapse between the laying of any two eggs is probably between 24 and 36 hours. All clutches known to be complete contained four eggs. The mean incubation period was 24 days, and all eggs in any one clutch completed pipping and hatched within a period of 1 to 3 days. Egg hatching success for 400 fully incubated eggs was 94%. The appearance of a completely hatched clutch was most commonly a shallow, bowl-shaped depression containing few to many minute egg shell chips and very little vegetative litter.

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LITERATURE CITED

- BAILEY, A. M. 1930. The Upland Plover. *Nat. Hist.* 30:177-181.
- BENT, A. C. 1929. Life histories of North American shore birds. *U.S. Natl. Mus. Bull.* 146:55-69.
- BUSS, I. O. AND A. S. HAWKINS. 1939. The Upland Plover at Faville Grove, Wisconsin. *Wilson Bull.* 51:202-220.
- COOKE, W. W. 1914. Our shorebirds and their future, p. 275-294. *In* Yearbook of Agriculture. U.S. Gov't. Print. Off. Washington, D.C.
- COUES, E. 1874. Birds of the northwest: a handbook of the ornithology of the region drained by the Missouri River and its tributaries. U.S. Gov't. Print. Off. Washington, D.C.
- FORBUSH, E. H. 1929. Birds of Massachusetts and other New England states, Part I. Norwood Press, Norwood, Mass.
- GOODPASTER, W. AND K. MASLOWSKI. 1948. Incubation of the Upland Plover. *Wilson Bull.* 60:188.
- GRANT, C. P. 1931. Prairie plover. *Outdoor Amer.* 9:8-10.
- HIGGINS, K. F. 1971. Cowbird parasitism of an Upland Plover nest. *Prairie Nat.* 3:79.
- , H. F. DUEBBERT, AND R. B. OETTING. 1969a. Nesting of the Upland Plover on the Missouri Coteau. *Prairie Nat.* 1:45-48.
- , L. M. KIRSCH, AND I. J. BALL, JR. 1969b. A cable-chain device for locating duck nests. *J. Wildl. Manage.* 33:1009-1011.
- KENDEIGH, S. C. 1963. New ways of measuring the incubation period of birds. *Auk* 80:453-461.
- KINCER, J. B. 1941. Climate and weather data for the United States, p. 685-1228. *In* Climate and Man: Yearbook of Agriculture. U.S. Gov't. Print. Off. Washington, D.C.
- LINDMEIER, J. P. 1960. Plover, rail, and godwit nesting on a study area in Mahanomen County, Minnesota. *Flicker* 32:5-9.

- NICE, M. M. 1954. Problems of incubation periods in North American birds. *Condor* 56:173-197.
- ROBERTS, T. S. 1932. The birds of Minnesota. Vol. I. Univ. of Minnesota Press, Minneapolis, Minn.
- ROWAN, W. 1926. Notes on Alberta waders included in the British list. *Br. Birds* 20:82-90.
- STEWART, R. E. AND H. A. KANTRUD. 1972. Population estimates of breeding birds in North Dakota. *Auk* 89:766-788.
- NORTHERN PRAIRIE WILDLIFE RESEARCH CENTER, U.S. FISH AND WILDLIFE SERVICE, JAMESTOWN, ND 58401. ACCEPTED 20 AUG. 1974.

NEW LIFE MEMBER

Mr. Frank B. Smithe has recently become a life member of the Wilson Ornithological Society. Mr. Smithe has a degree in mechanical engineering from Columbia University and he is presently retired from his profession, though he is quite busy with his avocation—bird conservation. Mr. Smithe is the author of "Birds of Tikal" and (soon to be published) "A Naturalist's Color Guide." For several years Mr. Smithe served as treasurer of the International Committee for Bird Preservation; he is an elective member of the AOU, and is active in many other conservation and ornithological organizations. Mr. Smithe has one son and three granddaughters.

