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NEST SITE PREFERENCE AND NESTING SUCCESS OF UPLAND SANDPIPER ON GRAZING SYSTEMS IN EAST CENTRAL NORTH DAKOTA-

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NOTES

NEST SITE PREFERENCE AND NESTING SUCCESS OF UPLAND SANDPIPER ON GRAZING SYSTEMS IN EAST CENTRAL NORTH DAKOTA -- The upland sandpiper (*Bartramia longicauda*) breeds and nests throughout North Dakota's Prairie Pothole Region (PPR). It nests in mixed and tallgrass prairies, wet meadows, former croplands, hay fields, and sometimes in grain fields (Johnsgard 1979). However, as with many species of grassland nesting birds, the population of upland sandpipers has declined as native prairies have been reduced drastically (Johnsgard 1979). In 1986 the North American Waterfowl Management Plan (NAWMP), a cooperative venture between Canada and the United States, set forth an international habitat and species management strategy to help restore waterfowl populations. The plan includes private and public partnerships to help finance research and management projects on both public and private lands. The 2.2 million-ha Chase Lake Prairie Project (CLPP) and the 24.6 km^2 Northern Coteau Project are two such ventures. Some of the goals of NAWMP include promoting conservation practices on farms, and ranches, protecting unique prairie ecological systems, increasing duck populations, and increasing all prairie wildlife species. The plan has provided incentives for farmers and ranchers to alter the timing of grazing and harvesting grass.

Rotational grazing systems (RGS), one strategy for managing grasslands, require ranchers to move their cattle throughout the range from one paddock to another, thereby allowing formerly grazed paddocks to regenerate. This is beneficial in a number of ways: overgrazing is reduced, cattle weight-gains are improved, suitable nesting cover for ground nesting birds is produced, and the overall health of the grassland is enhanced (Sedivec and Barker 1991). The objectives of my study were to investigate nesting success of the upland sandpiper as a function of grazing regime. Specifically, I was interested in comparing nesting success between RGS and non-rotational grazing systems (NRGS) and to examine relationships between nest site locations and vegetative cover heights and densities. Therefore, I hypothesized that no differences existed between nest site preference and nesting success of the upland sandpiper within RGS and NRGS.

During the summer of 1997, three pairs of treatment/control grazing systems were evaluated within the CLPP in Stutsman County, North Dakota. Study sites were located in the Missouri Coteau, a glacial moraine that bisects North Dakota from the southeast to the northwest corners of the state. The area was within the PPR and was characterized by rolling topography and abundant wetlands. Each treatment/control pair included an RGS (treatment) and a NRGS (control) area. These systems were paired based on soil and wetland types, vegetative composition, topography, and surrounding land use. They differed in grazing scheme in that RGS allowed for controlled livestock grazing while NRGS were grazed continuously.

Nests were located during three nest searches beginning the first week of May and ending the first week of July on 462 upland ha of RGS and 398 upland ha of NRGS. All grazing systems contained randomly located 16.2 ha (40-acre) plots from which nest searches were conducted. Each RGS contained as many as eight plots while NRGS contained four. Two people, each operating a four-wheel drive all-terrain vehicle and dragging a 30-m chain between the vehicles, searched each plot. Searches were conducted between 0800 and 1400 CDT. Each located nest was marked with a one-m long, white fiberglass rod placed into the ground eight m north of nest-bowl center. Incubation stages were determined by floating eggs in water and referring to a float chart (Westerkov 1950). Nests were monitored every 10 days until it was determined that the nest was successful (hatched) or unsuccessful (destroyed, abandoned, or non-viable). At such times, nests were recorded as completed. Methodology used for nest searches, data collection, and analyzing nest site data are reviewed by Klett et al. (1986).

Visual obstruction readings (VORs) were obtained at each nest site (Robel et al. 1970). Included with the data was a determination of dominant nest site vegetation (site name), plant community type, and litter depth. Site names were determined by classifying it to one of 13 types. Plant community types were determined by classifying it to one of 25 types within three different categories: shrub, grass, or wetland types (modified from Stewart and Kantrud 1971, Hegstad 1973). To identify nesting cover densities of nest sites, individual means of nest site VORs were used to set up arbitrary classes: Cover Class I = nests located in cover from 0 - 4.9 cm in height; Cover Class II = 5.0 - 9.9 cm; and Cover Class III = ≥ 10 cm.

Available cover was evaluated from transect measurements. Transect measurements were obtained by recording VORs, site names, and community types from each 16.2 ha (40-acre) plot. These measurements were collected in May (before nest searching began) and in late June. A plot corner was selected randomly and 25 paces (50 steps) were counted at a 45-degree angle from each plot-corner to get fully inside the plot. Visual obstruction readings were collected and site names and plant community types were assigned at the location of the 25th pace. A compass bearing was selected from a table of random numbers and, at that azimuth, 11 additional sets of aforementioned measurements were collected at every 10th pace (20 steps) for a total of 12 stops. Proportions of identified cover classes to total available cover were calculated for each grazing system (Table 1). Additionally, the percentage of upland sandpiper nesting in the identified cover classes also was calculated.

Mayfield nest success estimates were calculated for both grazing systems (Mayfield 1961, Klett et al. 1986). Apparent nest success and densities also were

Table 1. Percent of total available cover by cover class, and number of upland sandpiper (*Bartramia longicauda*) nests in rotational grazing systems (RGS) and non-rotational grazing systems (NRGS), east central North Dakota.

Cover Class	RGS		NRGS	
	% Cover	# Nests	% Cover	# Nests
Cover Class I (0 - 4.9 cm)	24.7%	1	44.8%	0
Cover Class II (5.0 - 9.9 cm)	36.1%	10	25.1%	2
Cover Class III ($\geq$ 10 cm)	39.2%	6	30.1%	2

calculated. Using SYSTAT (1998), Pearson chi-square tests were performed to see if significant differences in nesting success of birds in each cover class could be detected between RGS and NRGS. As a result of an overall low sample size of nests (N = 21), computed significance tests were suspect. To compensate for this, Yate's corrected chi-square tests were performed. Furthermore, as a result of a small sample size of nests in Cover Class I from RGS (N = 1) and from NRGS (N= 0), significance tests were not perfo**r**med. A total of 21 upland sandpiper nests were located (17 nests on RGS, 4 on NRGS). Mean clutch size was four and mean number of eggs hatched was three. Dates nests were located ranged from 28 May to 4 July. Mean initiation date was 3 May. The earliest successful nest occurred on 17 June and the latest occurred on 22 July. Nest densities on RGS were approximately 0.04 nests per ha and were about 0.01 nests per ha on NRGS.

A total of 17 nests were located on RGS. Eleven nests hatched for an apparent nesting success of 64.7%. Mayfield nesting success on RGS was 41.2%. Five nests were depredated accounting for 29.4% of the nests. One nest was abandoned accounting for 5.9% of total nests located on RGS. A total of four nests were found on NRGS. No nests hatched for an apparent nesting success of 0%. Mayfield nesting success on NRGS was 0.09%. Two nests were depredated and two were not relocated for 50% each of total nests found on NRGS. In RGS, one bird (5.9%) chose to nest in Cover Class I, 10 birds (58.8%) nested in Cover Class II, and six birds (35.3%) nested in Cover Class III (Table 1). In NRGS, zero birds nested in Cover Class I, two birds (50%) nested in Cover Class II, and two birds (50%) nested in Cover Class III (Table 1). Pearson chi-square and Yate's corrected chi-square results comparing nesting success in Cover Class II between RGS and NRGS were insignificant ($p = 0.12$, $p = 0.44$, respectively). Similar results were obtained when successfully and unsuccessfully hatched nests in Cover Class III were compared between each grazing system ($p = 0.10$, $p = 0.41$, respectively).

Results of my study suggested that the upland sandpiper is more successful at hatching clutches of eggs on RGS. Indeed, of 21 nests located, only four were found on NRGS. Admittedly, my sample size of 21 nests is small and, as a consequence, a significant difference of nesting success between the two grazing systems could not be statistically shown. However, my study indicated that upland sandpipers might favor specific cover types for nest sites and also appeared to select nesting sites on less disturbed grasslands. Cover Class II, the cover class most preferred by nesting upland sandpiper on RGS, was the second most abundant cover type (36.1% of total available cover) and represented 58.8% (10 nests) of 17 total nests located. Conversely, Cover Class II was the least represented cover type in NRGS (25.1% of total available cover), yet 50% of located nests were found there. This might give credence to the less disturbed cover types characteristic of RGS and perhaps is a reason for overall low nest density within the more disturbed NRGS. Furthermore, in both RGS and NRGS, Cover Class III seemed to be a significant cover class as well, suggesting its importance as secondary nest site habitat.

While I cannot statistically show that the upland sandpiper is more successful at hatching clutches of eggs on RGS, field observations provide insights to the validity of these grazing systems as conservation and wildlife habitat management tools for managing range grasslands. RGS might be more suitable and beneficial for nesting upland sandpiper and waterfowl during some years. RGS VORs, for example, were shown to be greater than NRGS VORs obtained during a dry spring (Murphy et al. 2004).

This adaptive resource management approach appeared valuable to not only prairie ecological system diversity, but for ranchers and livestock as well. Moreover, from a wildlife management perspective in which improving conditions for grassland-nesting avifauna is a goal, results from my study suggested that grazing system grasslands be managed for not only species-specific habitat, but nest site preferences as well.

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