time. I thank L. B. Blem, J. A. Gessaman, J. F. Pagels, and J. H. Zar for their comments on the manuscript.

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Polygynous breeding of Short-billed Marsh Wrens.[1]—Although Verner and Willson (1969) suspected the Short-billed Marsh Wren (*Cistothorus platensis*) to be polygynous, this has not been definitely established. This paper provides evidence to suggest that, at least occasionally, Short-billed Marsh Wrens do breed polygynously. Because little is known of its breeding biology, this paper also presents limited data on basic breeding characteristics. Fieldwork was conducted from 4 June to 1 August 1974 on Dewey's Pasture, a glacial marsh complex in northwestern Iowa described by Bennett (1938).

Nests were located by searching the vegetation in the vicinity of singing territorial males systematically. As with many other wrens, male Short-billed Marsh Wrens build several nests during the breeding season, only a few of which are used by females (Mousley 1934). Searches were made periodically throughout the summer to locate all active nests. All territories were mapped, and most males and females were caught with mist nets and banded. The date the first egg was laid was used as an indicator of nesting chronology. When unknown, this date was estimated by backdating from the day of hatching, assuming that Short-billed Marsh Wren females lay one egg per day and require 14 days for incubation (Mousley 1934). Clutch size and fledging success were determined by checking each nest every 1–3 days. Fledglings from seven nests were weighed daily with a triple-beam balance.

Pair bond terminology for polygynous females is the same as used by Martin (1974); the first females to nest in a male's territory were called primary females, and all those nesting subsequently were termed secondary females.

All statistical comparisons were made with a Student's *t*-test (Steel and Torrie 1960).

Pair bonds.—Definite proof of polygyny requires observation of a male copulating and maintaining pair bonds with two or more females (Price and Bock 1973). Copulation was never seen in this study. I considered males to be polygynous if they defended territories that included the subterritories of two or more females.

A total of 26 male territories was searched for nests. Of these 21 (81%) of the males mated monogamously, and 5 (19%) mated bigamously. No males mated with more than two females. Some males occupied territories during June and July, but remained mateless. Because the exact number of these males was not determined, they are not included in the totals just given. Whether these bachelor males attracted females in August was not determined.

[1] Journal Paper No. J-8264 of the Iowa Agriculture and Home Economics Experiment Station, Ames. Project No. 1969.

TABLE 1

NEST INITIATION DATES FOR SHORT-BILLED MARSH WRENS (DEWEY'S PASTURE, 1974)

Female status	Mean (± 2 SE in days)	Range
Monogamous	11 June ± 2.62	1 June–21 June
Primary	10 June ± 1.84	6 June–14 June
Secondary	24 June ± 6.16	14 June–30 June

TABLE 2

DISTRIBUTION OF CLUTCH SIZES OF SHORT-BILLED MARSH WRENS (DEWEY'S PASTURE, 1974)

	Clutch size				
Pair bond	5	6	7	8	Mean
Monogamous	1[1]	3	10	7	7.1
Primary			2	3	7.6
Secondary	4	1			5.2

[1] Number of clutches.

Nesting.—No significant difference was found between nest initiation dates of monogamous and primary nests ($P > 0.05$), but secondary nests were begun significantly later than either primary or monogamous nests ($P < 0.01$) (Table 1). Within a given territory, secondary nests were begun an average of 14 days later than primary nests (range 5–21). No cases of renesting or second broods were found.

Of the 31 total nests 21 (68%) were successful. A nest was considered successful if at least one egg in the clutch hatched. Of the 10 unsuccessful nests, 7 were by monogamous, 1 by primary, and 2 by secondary females. Causes of nest destruction were not always determined. Three nests were abandoned after heavy rains. Two nests contained broken eggs and were heavily infested with ants. The eggs in these two nests possibly were broken before the ants took over. Meadow Jumping Mice (*Zapus hudsonius*) were found in two nests, and a bumblebee (*Bombus* sp.) was found in one nest. Whether the nests were abandoned before the mice and the bee took over is not known. Two nests were heavily damaged, and the eggs broken by unknown causes.

Most nests were found in the drier sites around marshes, an observation also made by Walkinshaw (1935) and Trautman (1940). Of all nests found, 17 were in vegetation dominated by *Phalaris arundinacea*, and 14 were in *Scirpus fluviatilis* stands. All five polygynous males nested in the *Scirpus*.

Eggs and young.—Secondary females laid significantly smaller clutches than either monogamous or primary females ($P < 0.01$) (Table 2). Clutch sizes of monogamous and primary females did not differ significantly ($P > 0.05$). The mean incubation period of 21 nests was 13.8 days (range 13–16), which is similar to 14 days found by Mousley (1934) and 12–14 days reported by Walkinshaw (1935).

The average egg size for all females was 16.7 × 12.1 mm (N = 204). No difference in egg size between monogamous, primary, or secondary females was found ($P > 0.05$).

Young were recorded as successfully fledged if they were absent from the nest between the ages of 11–16 days, and no signs of disturbance around the nest lead me to a different conclusion. Secondary females fledged fewer young than monogamous or primary females, but the differences were not significant ($P > 0.05$) (Table 3). Secondary females not only laid smaller clutches than did primary or monogamous females (Table 2), but they also showed poorer success in rearing fledglings (Table 3). Polygynous males fledged an average of 5.6 young each, whereas monogamous males fledged 3.0. Irrespective of parent mating status, the average nestling period of 67 young was 13.6 days (range 11–16), which is similar to 13 days reported by Mousley (1934) and Walkinshaw (1935).

TABLE 3

FLEDGING SUCCESS OF SHORT-BILLED MARSH WREN FEMALES (DEWEY'S PASTURE, 1974)

Pair bond	N[1]	Mean	Range	% of young fledged
Monogamous	21	3.0	0–7	42.3
Primary	5	4.0	0–7	52.6
Secondary	5	1.6	0–3	30.8

[1] Includes nests destroyed before hatching had begun.

TABLE 4

MEAN GROWTH IN WEIGHT (IN GRAMS) OF FLEDGLING SHORT-BILLED MARSH WRENS (DEWEY'S PASTURE, 1974)

Age (days)	Female pairing status		
	Monogamous	Primary	Secondary
1	1.38 (18)[1]	1.34 (14)	1.28 (10)
2	1.35 (18)	1.35 (14)	1.28 (10)
3	1.48 (12)	1.50 (12)	1.41 (7)
4	2.06 (11)	2.03 (12)	1.94 (7)
5	2.75 (11)	2.70 (12)	2.63 (6)
6	3.71 (9)	3.65 (10)	3.41 (6)
7	5.21 (6)	4.90 (10)	4.71 (6)
8	5.82 (6)	5.81 (10)	5.69 (6)
9	6.64 (6)	6.46 (9)	6.26 (6)
10	6.91 (6)	6.83 (9)	6.69 (6)
11	7.57 (6)	7.53 (9)	7.12 (5)

[1] Sample size in parentheses.

The weights of fledglings reared by secondary females averaged lower than those reared by primary or monogamous females (Table 4), but the differences at 11 days of age were not significant ($P > 0.05$). Weights were recorded only through 11 days of age because the young are easily disturbed after that time (Mousley 1934, Walkinshaw 1935).

Verner and Willson (1966, 1969) analyzed nest site selection in polygynous species and found that most polygynous birds nest in habitats with narrow vertical dimensions, such as marshes and savannahs. Based on comparative behavioral analyses of male passerine birds, they hypothesized that Short-billed Marsh Wrens might be polygynous. This study has shown that they do breed polygynously, at least occasionally.

Orians (1961) hypothesized that polygyny will be selected for if it results in greater offspring production per male. Orians (1969) also stated that for polygyny to be adaptive in species with equal sex ratios, females pairing with males that are already mated must gain more advantages than if they mated with bachelor males. Polygynous males produced more offspring than monogamous males in this study. Monogamous females fledged more young than secondary females. It is possible, however, that the secondary females might have produced even less had they mated with bachelor males.

Verner (1964), Willson (1966), and Martin (1974) commented that polygyny evolves in places where some males hold territories with adequate food resources while others hold marginal or submarginal territories. In this study, all polygynous Short-billed Marsh Wren males held territories consisting primarily of *Scirpus fluviatilis*, suggesting that this vegetation may offer conditions more conducive to polygyny than other vegetation growing on the study site. Further study is needed on the preferred habitat and available food resources before a better understanding of polygyny in Short-billed Marsh Wrens can be attained.

Primary females began nesting earlier, laid larger clutches, and reared more and slightly heavier young than did secondary females in this study. Similar observations were made by Martin (1974) for the Bobolink (*Dolichonyx oryzivorus*) and by Crawford (MS) for the Red-winged Blackbird (*Agelaius phoeniceus*) and Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). Both authors suggested that age, pairing status, and food may be important factors affecting nesting chronology, clutch size, and fledging success. These factors should be further investigated for the Short-billed Marsh Wren.

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Effects of a late spring storm on a local Dusky Flycatcher population.—Few investigators regard the breeding season as a time of significant adult mortality, but in regions of highly variable and unpredictable weather conditions, high adult mortality can occur in local breeding populations. The effects of juvenile mortality on population size are well documented (Lack 1966, Population studies of birds, London, Oxford Univ. Press), as are those of inclement weather on nestlings and juveniles (Jehl and Hussell 1966, Arctic 19: 185; Stewart 1972, California Birds 3: 69). While severe winter weather contributes to high mortality in both adults and juveniles, only rarely is significant weather-related adult mortality reported in the breeding season.

In the course of a study on the foraging strategies of insectivorous birds in Kawuneeche Valley, Rocky Mountain National Park, Colorado, I observed the elimination of a local population of Dusky Flycatchers (*Empidonax oberholseri*). The spring of 1974 at this elevation (2900 m) was relatively warm and dry. Dusky Flycatchers had arrived and were singing by 30 May (one week earlier than in 1973), as were the several warbler species that also nest there. By 1 June at least five male Dusky Flycatchers were singing in the 35-ha study tract of willow thickets, beaver ponds and channels, and small stands of lodgepole pine, where seven pairs bred in 1973.

Although other species of flycatchers had begun to take up residence in similar habitats nearby, only Dusky Flycatchers were present in the study area when it began to rain on 5 June. Rain continued almost without interruption, through 6 and 7 June. On 8 June the rain turned to snow, and by the end of the day, lower Kawuneeche Valley was covered with 14 inches of snow. The wet snow bent willows double, often pressing them to the ground. Warm temperatures on 9 June began to melt the snow but patches of open ground did not appear until the following day, and many birds found it impossible to survive such difficult conditions. I saw a number of ground-feeding birds actively gleaning from the trunks of lodgepole pines. Park Service Naturalist Jerry Spangler found dead Hermit Thrushes, *Catharus guttatus* (12), Gray-headed Juncos, *Junco caniceps* (9), and Chipping Sparrows, *Spizella passerina* (5), at the Green Mountain residential area, about half a mile from the study tract. Around four houses in Sun Valley, a private residential area one mile to the south, on 10 June my assistant and I found the following dead birds: Hermit Thrush (about 10); Savannah Sparrow, *Passerculus sandwichensis* (1); Gray-headed Junco (3); American Robin, *Turdus migratorius* (1); Lincoln's Sparrow, *Melospiza lincolnii* (2); Yellow-rumped Warbler, *Dendroica coronata* (1); Water Pipit, *Anthus spinoletta* (1). For the only time in 3 years' work, I found dead adult birds in the study tract: a Brewer's Sparrow (*Spizella breweri*), a Lincoln's Sparrow, and two Gray-headed Juncos.

On our first working day after the storm, 10 June, even with the ground still covered by snow, the first Western Wood Pewees (*Contopus sordidulus*) and Willow Flycatchers (*Empidonax traillii*) of the season were singing in the study tract. Previously abundant Dusky Flycatchers were now absent, nor did any appear during the following weeks. Both Western Wood Pewees and Willow Flycatchers completed a successful breeding season in the study tract, as well as in nearby areas of similar habitat, where some Dusky Flycatchers also nested successfully. Though no Dusky Flycatchers appeared in the study tract after the June storm, three pairs nested there in 1975.—ROBERT C. ECKHARDT, *Department of Entomology, Comstock Hall, Cornell University, Ithaca, New York 14853.* Accepted 21 Nov. 75.