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RENESTING OF MISSISSIPPI SANDHILL CRANES IN JACKSON COUNTY, MISSISSIPPI 1965-1989

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Abstract: Among 118 active nests of Mississippi sandhill cranes (*Grus canadensis pulla*) in Jackson County, Mississippi, 1965-1989, 13 were renests. Three chicks from 19 wild and 3 from 3 Patuxent Wildlife Research Center (PWRC) switched eggs hatched in 13 first nests, but 5 died early and 1 after 2 weeks. Ten eggs were dead (infertile or the embryos died) in or at the nest. Two clutches (3 eggs) were destroyed by mammalian predators, 2 eggs were taken for captive propagation, and 1 was pecked and destroyed by the crane pair. Three chicks hatched from 22 wild eggs and 1 from a PWRC switch in 13 renests. Three died early and 1 wild chick fledged. Seventeen eggs from 11 clutches failed to hatch. One nest was deserted after 1 of 2 eggs was destroyed by predation; another was deserted (1 egg gone and 1 cracked). One second clutch was laid 17 days after a 1-egg clutch was removed for captive propagation. The time between first and second sets of other matings has been much longer. Mean clutch size for 13 completed first clutches was 1.46 eggs; for 13 renests was 1.69 eggs.

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Littlefield & Ryder (1968) found 4 second clutches and 3 other "possible attempts" among 108 greater sandhill crane (*G. c. tabida*) nests. Boise (1978), studying lesser sandhill cranes (*G. c. canadensis*) in Alaska, did not report any renesting. Bennett (1978) found no renesting among 53 nests in Wisconsin in 1976-1978. Walkinshaw (1973, 1978), however, noted 3 instances of renesting in southern Michigan, and found 2 second clutches among 46 nests in Michigan's Upper Peninsula. McMillan (1987) reported renesting was rarely observed at Seney National Wildlife Refuge, Michigan, but in 1987 1 pair renested. Another pair was believed to have laid a third clutch after the first 2 were flooded. Although renesting of Florida sandhill cranes (*G. c. pratensis*) was not reported by Thompson (1970) or Walkinshaw (1976), Nesbitt (1988) reported renesting to be frequent in Florida. Renesting is probably more common than the literature indicates.

METHODS

In this study, renesting data were collected 1966-1989 from Mississippi sandhill crane nests in southern Jackson County, Mississippi. Most of the breeding range of the cranes is within the Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR), but a few pairs nest outside the refuge. In Mississippi, early evidence for renesting was circumstantial, but in the course of investigat-

ing nesting habitats in summer, I had found egg shells and membranes indicating that eggs had been laid and hatched in territories where I knew first clutches had failed. From 1 year to the next, a pair usually built their nest within a few hundred meters of their previous nest. If I found a second nest near an unsuccessful first nest during the same season, I assumed it was a second clutch.

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RESULTS

Among 78 active nests found in Mississippi 1965-1980 only 2 (2%) were considered renests, but during 1981-1989, when nest searches continued later in the season, 11 (18%) among 61 were renests. No third clutches were confirmed.

On 3 May 1966, I took the only egg in Nest 4-1966 (Composite Nesting Area [CNA] So Sav 2) for captive propagation. The egg hatched at John Lynch's aviary, Lafayette, Louisiana, on 17 May.

On 25 May, I found Renest 6 -1966 (2 eggs) 68 m from Nest 4 -1966 , and removed 1 egg. This egg hatched on 19 June, also at Lynch's. The nest egg hatched 20 June . The second clutch was begun 17 days after the first egg was taken.

Nest 4-1977 (2 eggs) was found on 21 April 1977 in CNA No Sav IB. The egg removed on 3 May for captive propagation did not hatch at PWRC, nor did the egg left in the nest. On 24 June, I flushed a crane from a "start" nest (Renest 7-1977) built earlier that spring, 63 m from Nest 4-1977. I removed an addled egg on 18 July, but the cranes continued to incubate the other egg (also dead) until 27 July. The cranes incubated the second clutch for 34 days after I found the nest.

In Nest 3 - 1981 (CNA Eglin Rd), the single egg had been pecked and destroyed by the pair about 6 May 1981. I searched the area on 27 May and found Renest 5-1981 (21 days after abandonment of the first), 300 m from Nest 3-1981. The second clutch did not hatch.

A dead egg in Nest 2-1982 (CNA BWS 4) was removed and replaced with an egg from PWRC on 11 May 1982. The chick hatched 17-18 May, but survived only a few days. On 13 June 1982, Jim Kurth (pers. comm.) found Renest 5-1982 (2 eggs) 100 m from the first nest. The second nest was found 26 days after the replacement egg chick had died. On 30 June 1982, Loyd Mitchell and I observed Renest 5-1982 The cardboard roof of the blind we were in was full of water and sagging so I pushed up on the roof. The water cascaded down the front of the blind, and moments later the incubating crane rose from the nest, walked away and never returned. The eggs were not viable but the cranes had incubated for 17 days after the nest was found.

Nest 1-1983 (2 eggs) was found 3 April in CNA Ben Wma 4. By 20 April, the nest was abandoned; the eggs were dead. I found Renest 6-1983 (CNA Ben Wms 6) with 1 egg on 23 May, 1.2 km from the first nest. A PWRC switch egg hatched 20-21 June, but the chick did not survive long.

No renests were found in 1984. Nest 1-1985 (CNA Weber 19A) with 1 egg was found 12 March 1985. A chick hatched 10 April, but was not seen after 19 April. On 4 June, Renest 6-1985 (2 eggs) was found 21 m from the first nest. The next day George Chandler (pers. comm.) found the nest abandoned with 1 cold egg and the other destroyed by a mammalian predator. The time between the death of the chick and the finding of the second nest was 46 days.

Nest 2-1985 (CNA Per 14B) with 2 eggs was

found 11 April 1985. One egg was determined (floatation method) to be dead; the embryo of the other egg had died during the last week of incubation. The latter egg was replaced by a viable PWRC egg on 10 May. A chick hatched 18 May but was not seen after 23 May. Renest 7-1985 (2 eggs) was found 26 July 700 m from the first nest. The nest was deserted by 6 August 1985 (aerial observation), and upon inspection, 1 egg was gone and the other was cracked. The interval between the death of the egg-switch chick and the finding of the renest was at least 64 days.

A 2-week old chick and parents (from Nest 5-1987) were seen in CNA Valentine South 26 April 1987. The chick was not seen after 27 April. On 27 May, Renest 10-1987 (2 eggs) was found 21 m from Nest 5-1987. The eggs were not viable and the nest was abandoned in late June.

Nest 4-1987 (2 eggs) was found 9 April 1987 in CNA Per 14B. On 7 May, 1 egg was gone and the nest abandoned. Renest 9-1987 (Per 14C) with 2 eggs was found 800 m from Nest 4-1987 on 27 May, 20 days after the first nest was deserted. On 5 June, 1 egg was found lying outside the nest. The other egg (dead) was incubated until about 4 July (at least 38 days), then abandoned.

A 2-week old chick, hatched in Nest 5-1987 (CNA Valentine South), was seen on 26 April 1987. By 1 May, the chick was no longer with its parents. On 16 June, Renest 10-1987 (1 egg) was found 20 m from the first nest. When the nest was visited on 29 June, 1 egg was found buried in nesting material and another egg was lying on top. On 17 July, a crane was incubating, but the egg was rotten and was removed. The second nest was found 47 days, or more, after the chick had died.

In 1988, only 6 nests (8 eggs) were found. Four among 6 chicks died within 24 hours of hatching. Poor reproduction was blamed on bad weather conditions (drought, high humidity, and high temperatures).

Nest 1-1989 (Weber CNA) was found with 1 egg on 30 March. On 21 April, the pair behaved as though they had a chick but by 17 May were without a chick. Renest 8-1989 (2 eggs) was found in the Weber CNA on 6 June. One egg was removed and taken to PWRC where it hatched on 29 June indicating the second clutch was begun about 30 May. The renest, containing a rotten egg (dead embryo), was abandoned by 23 June.

Nest 3-1989 (2 eggs) was found 12 April (CNA Per 14B). On 10 May, a viable egg from PWRC replaced the 2 dead eggs. On 16 May 1 chick, with an external yolk sac, was dead. Renest 10-1989 (1

egg) was found 46 m from the first nest on 7 June. By 22 June, the egg was dead and abandoned.

Nest 6-1989 (1 egg) was found 26 April (CNA Valentine South). The egg was destroyed by predators by 12 May. Renest 9-1989 (1 egg) was found near the first nest on 6 June. On 23 June, a 4-5 day old chick was seen 15m from the nest. The chick probably died. The second clutch must have been laid 20-21 May, about 9 days after the first egg was found destroyed.

Nest 5-1989 (2 eggs) was found in CNA Ben Williams on 14 April. Two dead eggs were removed from the nest on 26 April. The renest (12-1989) was not found but the pair was seen on 31 October with a fledged juvenile.

Mean clutch size for 99 nests (including renests) during Nesbitt's (1988) study was 1.72 eggs. He found that 19 renesting pairs averaged 1.79 eggs for the first clutch and 1.83 for second clutches; 9 pairs laying 3 clutches averaged 2.00 eggs. Mean clutch size for 130 nests (including renests) in Jackson County, Mississippi, 1966-1989, was 1.78 eggs. I determined the mean for 13 first clutches was 1.46 eggs and 1.69 for second clutches.

Among 19 wild eggs from 13 first clutches, 2 were removed for captive propagation from 2 nests. Fourteen eggs in 11 nests did not hatch: 1 pair destroyed their first single egg, 3 eggs in 2 nests were destroyed by predators, and 10 were dead in 8 nests. Three first clutch chicks hatched in the wild, but soon died (1 after 2 weeks). Three viable eggs from PWRC switched into first nests hatched but soon died. Among 22 wild eggs from 13 second clutches, 17 did not hatch (1 egg was gone and 1 cracked in 1 nest, 1 egg gone and 1 dead in 1 nest, 2 eggs in 1 nest destroyed by predators, and 11 were dead in 8 nests). Two eggs were removed for captive propagation. One PWRC switch chick hatched but died. Three wild eggs hatched (2 died and 1 fledged).

DISCUSSION

Nesbitt (1988) found renesting to be common among Florida sandhill cranes in northcentral Florida, but northern migratory subspecies may renest less frequently because they have less time to bring off young. Nesbitt thought that the long laying period (120 days) in Florida might contribute to the high (78%) renesting rate among pairs that lost first or second clutches. The laying period in Mississippi is about 90 days (21 March to 7 June), with the peak of laying during 1-20 April.

Rainfall of 5 cm in a 24-hour period in the

Florida prairies raises water levels rapidly, flooding many nests and causing desertion (Nesbitt 1988). Nests were not started or were abandoned during low water stages or drops in water levels. Nesbitt found that among 53 clutches, 29 (55%) were abandoned after water levels changed. If conditions improved, pairs usually renested. In Mississippi, where cranes are less prone to nest in water, only 3 or 4 among 139 nests (1966-1989) were considered flooded out. None of the 13 pairs laying 2 clutches deserted because of flooding. In 1990, a flash flood almost drowned 2 second clutches, but were saved by human intervention. To test renesting in Idaho, Drewien (1973) removed all eggs from 7 clutches that had been incubated less than 15 days and from 6 clutches that had been incubated 15 days or more. Four pairs that incubated less than 15 days renested, but pairs incubating longer than 15 days did not renest. Drewien determined the interval between the loss of the first clutch and laying of the second to be 15 days. In the only instance where I have laying and hatching dates, the interval between removal of an egg and the laying of the second clutch was 17 days. The pair (Nest 4-1966 & Renest 6-1966) had incubated the first egg for 15-16 days.

Nesbitt (1988) found the interval between clutches ranged from 14 to 39 days. My data show that some Mississippi cranes incubated the full 30 days or lost their chicks, and still laid a second clutch. The longest time between 2 clutches was when the Per 14 pair whose nest (4-1977), found 20 April 1977, was deserted by 10 May. Renest 7-1977 was found 46 days later, on 24 June. The pair incubated the second clutch until 27 July (at least 34 days) when they abandoned the nest. Sixty-five days elapsed between finding the first nest (4-1977) and finding Renest 7-1977, and 99 days passed between finding the first nest and the end of incubation of the second clutch. In 1990, the North Valentine pair laid a second clutch 30 days after 2 eggs were removed.

Nesbitt (1988) found 1 pair in 1987 had laid a second 1-egg clutch, 27 days after losing 2 chicks and another that laid a 2-egg clutch, 21 days after losing their 2 chicks. In Mississippi, 5 second clutches were laid after chicks died. Sandhill cranes usually renest near their first nests. At Grays Lake National Wildlife Refuge, Idaho, the distance between 4 first and second nests ranged between 33 and 351 m (Drewien 1973). In Mississippi the shortest distance between the initial nest and the renest was 21 m and the longest 1.2 km. The mean for 6 shorter distances was 93 m (range 21-300 m). Pairs

that nest in water built their nests closest together. The distances between first and second nests for 3 pairs with large CNA's were 700, 800, and 1,200 m. Mississippi sandhill cranes sometimes reuse previous year's nests. Two pairs laid their second clutch in "dummy nests", which had been built but not used earlier that season. In 1990, a second clutch (Valentine North CNA) was laid in the first nest. Also in 1990, the Weber pair not only laid 3 clutches but also used the same nest each time.

The propensity of cranes to remain bonded and renest after losing their first clutch is an adaption that gives "established" pairs a reasonable chance of successful reproduction. Nesbitt (1988) inferred that experienced pairs were more prone to renest than novice pairs. Although young pairs may lay viable eggs, their nests are often deserted. If the young hatch, they usually die early, and the pairs break up to form new pairs (Nesbitt & Wenner 1987). My evidence bears this out; all of the renesting pairs had been occupying the same CNA for at least 3 years. Among pairs that renested, 3 pairs renested 3 times, and 1 twice.

Beginning in 1966, I collected 1 egg from 2-egg clutches (Mississippi Game and Fish Commission ruling) for captive propagation to assemble a breeding flock of Mississippi sandhill cranes. In retrospect, perhaps we should have taken both eggs, thus speeding the process of captive flock building, and allowing the pairs to renest. We were not able to determine the viability of eggs (floatation method) until 1982. Previously, only chance determined whether eggs taken or remained in the nest were alive. A reason why full clutches were not removed was that an informal consensus was that young pairs should be given the opportunity to lay eggs and perhaps raise a chick.

Clutch removal can prolong nesting to synchronize disparate laying periods of other crane species, in cross-fostering of other species (e.g. whooping crane), provided the difference in phenology is not too great (Nesbitt 1988). Just as aviculturists utilize multiple clutching to increase production, wildlife managers can use the method to collect eggs for captive propagation (for later releases) and allow pairs to renest.

In the past 3 years, chick mortality in Mississippi has been high, usually because the yolk sac was extruded at hatching. In 1990, first clutches from 5 nests were taken for incubation at PWRC to compare hatching under controlled conditions with that in the field. Valentine North pair laid a second set (2 eggs) about 20 April after their first clutch was removed on 30 March. CNA Weber pair

renested (2 eggs) by 14 May after 2 eggs were taken on 13 April. Another pair may have renested but the nest was not found. Two pairs have not renested (refuge files).

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