

outside their normal wintering range may have prompted this association.—STEPHEN A. NESBITT, *Florida Game and Fresh Water Fish Commission, Wildlife Research Office, 4005 S. Main, Gainesville, FL 32601. Accepted 26 Aug. 1974.*

Renesting and second broods of wild Mallards.—During 1968–71, nesting Mallard (*Anas platyrhynchos*) hens were captured on nest baskets in prairie marshes of Western Stutsman Co., North Dakota (Doty and Lee, *J. Wildl. Manage.*, In press). Each duck was marked with an identifying nasal saddle (Doty and Greenwood, *J. Wildl. Manage.*, In press). Eight of the marked hens were subsequently observed nesting twice in a breeding season on baskets. Five of the hens renested in the same previously used baskets and three were in different baskets but in the same marshes. The time between termination of the first nests and initiation of egg laying in renests averaged 23 days (9 to 66 days). The long delay for some of the ducks indicates that other nesting attempts could have taken place, but periodic checking of all nest baskets precluded the possibility that interim nesting occurred in them.

Three of the eight renesting hens had hatched clutches of eggs earlier in the season. The successful hatch of the first and second observed clutches of two hens was deduced from the appearance of egg membranes and shells, and the absence of any sign of duckling mortality. These hens laid the first egg of their second clutch approximately 22 and 25 days after termination of the first nests. There were 11 and 10 hatched ducklings in the first broods and 6 and 3 in the second broods. The third hen hatched five of six eggs in its first observed clutch but the ducklings died of exposure soon after they left the nest. A temporary confinement pen set around the nest basket (for capture and marking of young) had apparently prevented the hen from properly brooding the ducklings during a rainstorm in the evening of the day of hatching. That hen laid the first egg of its second clutch in the same basket 11 days after the earlier hatch, but the hen died after laying four eggs in the second clutch. The apparent cause of death was peritonitis possibly brought on by oviduct necrosis due to an impacted, thin-shelled egg.

Instances of individuals renesting after hatching eggs in earlier clutches have been reported for the Wood Duck (*Aix sponsa*) by Barnes (*Auk* 65:449, 1948), Hester (*Proc. S.E. Assoc. Game and Fish Comm.* 16:67–70, 1965), Grice and Rogers (*Massachusetts Div. Fish and Game, Final Rep., Proj. W-19-R*, 1965), McGilvrey (*Auk* 83:303, 1966), Rogers and Hansen (*Bird-Banding* 38:234–235, 1967), and L. Fredrickson (pers. comm.); the Black Duck (*Anas rubripes*) by Stotts and Davis (*Chesapeake Sci.* 1:127–154, 1960), and Benson and Foley (*N.Y. Fish Game J.* 9:73–92, 1962), the Pintail (*A. acuta*) by Sowls (*Stackpole Co., Harrisburg, Pa. and Wildl. Manage. Inst., Washington, D.C.*, 1955), the Mallard on managed areas (Burger, *Proc. N.E. Fish and Wildl. Conf.*, 1964; Bjarvall, *Wilson Bull.* 81:94–96, 1969), and released Mallards (Benson and Foley, *N.Y. Fish Game J.* 9:73–92, 1962).

I thank Charles W. Dane for his review of the manuscript.—HAROLD A. DOTY, *Northern Prairie Wildlife Research Center, U.S. Fish and Wildlife Service, Jamestown, ND 58401. Accepted 8 Aug. 1974.*

Artifactual clutch size in Sooty Terns and Brown Noddies.—Certain seabirds including Procellariiformes and some Laridae usually incubate single-egg clutches, but have been found occasionally with more than one egg. Several investigators have con-

cluded that "two-egg" clutches reported in albatrosses occur only when the eggs are laid by different females (Tickell and Pinder, *Ibis* 108:126-129, 1966; Fisher, *Auk* 85:134-136, 1968).

Sooty Terns (*Sterna fuscata*) and Brown Noddies (*Anous stolidus*) sometimes incubate two eggs but usually just one (Watson, *Papers Tortugas Lab. Carnegie Inst. Washington* 2:187-255, 1908; Murphy, *Oceanic Birds of South America*, Macmillan, New York, 1936; Shallenberger, *Elepaio* 30:61-64, 1970; Berger, *Hawaiian Birdlife*, Univ. Press of Hawaii, Honolulu, 1972). However, there has been no quantitative investigation of the frequency of two-egg clutches in these species, nor have there been attempts to determine if both eggs in two-egg clutches were laid by the same female. In 1971 and 1972 I studied both of these problems in the Sooty Terns and Brown Noddies breeding on Manana Island, Hawaii. Approximately 100,000 Sooty Terns and 30,000 Brown Noddies breed on Manana annually (Brown, MS). The Sooty Tern eggs are laid directly on rock, mud, or sand, whereas Brown Noddy eggs are only laid upon rocky substrate.

In 1971 I hammered a stake into the ground in the Sooty Tern colony before egg-laying began. I attached one end of a graduated wire cord to the stake, and, by also using a compass, was able to record the precise distance and compass bearing from the stake of any egg within the radius of the cord. On 31 March, when the Sooty Terns first laid in the area, and on 1, 4, 9, 13, 16, and 21 April I located and numbered 91 eggs laid within 3.05 m of the stake. I could determine that a "two-egg" clutch was artifactual if at least one of the eggs had been found at a different location and therefore had rolled to the present site. The number of eggs in the plot increased from 77 to 91 between 9 April and 21 April, whereas the number of "two-egg" clutches increased from 4 to 10. Only three of the "two-egg" clutches could possibly have resulted from eggs laid at the same site.

In 1971 I counted all Brown Noddy eggs on Manana during the first week in June, about 3 weeks after laying had begun. Only 179 of 11,932 nest sites, about 1.5%, contained clutches of two eggs. In July 1971 I marked 31 clutches of two eggs and checked them every 3 days. In six instances both eggs hatched (19%); in 17 instances one egg hatched (55%), and in eight instances neither egg hatched (26%). Considering the six cases where both eggs hatched, the eggs of one clutch hatched 12 to 15 days apart; the eggs of two clutches hatched 9 to 12 days apart; the eggs of one clutch hatched 3 to 6 days apart, and the eggs of two clutches hatched on the same day.

At most a few percent of the female Sooty Terns and Brown Noddies on Manana lay clutches of two eggs. However, for both species doubt exists that any females lay two eggs. The high percentage of clutches of two eggs in the Sooty Tern that are known to be artifactual suggests that those clutches for which this information is lacking may be artifactual also. The separation in time of hatching of up to two weeks in the Brown Noddy clutches of two eggs indicates that at least some of these clutches were probably laid by more than one female. Lacking a convincing demonstration that the birds sometimes lay two eggs, it may be best to assume females of these two species lay a single egg.

This paper is based upon a dissertation I submitted to the University of Hawaii in partial fulfillment of the requirements for the Ph.D. in Zoology. I thank Dr. Andrew J. Berger for guidance and criticism during this study. The Hawaii State Division of Fish and Game kindly granted me permission to work on Manana. This study was supported by the Dept. of Zoology, University of Hawaii; an NFS Graduate Fellowship; and a Mount Holyoke College Faculty Grant.—WILLIAM Y. BROWN, 23 Hudson Street, Cambridge, MA 02138. Accepted 7 Oct. 1974.