division of labor by the sexes in feeding the fledglings occurred. Young fed by one parent were not fed by the other, although numerous opportunities existed, and on four occasions young solicited care from the "wrong" adult. I cannot show that stable family units (sensu Nolan 1978; Smith and Merkt, Can. J. Zool. 58:1869–1875, 1980) had been formed because the young birds were not color-marked. However, my four observations of unsuccessful solicitation of food by young from the wrong parent, and the identical number of young tended by parents over 2 days, could be construed as weak evidence for family units.

Finally, these observations suggest that male American Redstarts breeding for the first time can assume a large share of parental care during the fledgling period.

Parental division of labor during the fledgling stage has been documented for the Ovenbird (*Seiurus aurocapillus*) (Hann, Wilson Bull. 49:145–237, 1937), the Prairie Warbler (Nolan 1978), the Song Sparrow (Smith 1978), and the Eurasian Blackbird (*Turdus merula*) (Snow, A Study of Blackbirds, George Allen and Unwin, London, England, 1958). In these studies the breeding season was long enough to permit the birds to be double-brooded. Therefore, the division of labor may release the female from feeding all the fledged young in order to lay a second clutch. However, the redstarts in the Bridge Lake area are probably single-brooded. Evidence for this comes from the late migration of this species into the area (mid- to end of May, pers. obs.) and the closeness of the beginning of the fall migratory period at the time these observations took place. Using 19–20 days as the period of incubation and nestling stages combined (Sturm, Auk 62:189–206, 1945), and assuming the redstart's fledgling period is similar in duration to that of Prairie Warblers (approx. 30 days, Nolan [1978]), the fledglings observed were about 40 days old. Thus, they were likely the first and only successful brood.

Division of labor by birds with a very short breeding season may facilitate the production of a single brood during a period when prebasic molt and other physiological preparations must occur prior to migration.

Acknowledgments.—I thank J. N. M. Smith, V. Nolan Jr., M. Ficken, and G. Holton for their comments on this manuscript.—PETER C. BOXALL, *Fish and Wildlife Division, Energy and Natural Resources, South Tower, Petroleum Plaza, 9915-108 St., Edmonton, Alberta T5K 2C9, Canada.* *Accepted 12 Apr. 1983.*

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Violation of ideal nest placement: Cliff Swallows entombed by their own excrement.—Cliff Swallows (*Hirundo pyrrhonota*) construct globular mud nests with entrance tubes pointing downwards. Nests are constructed under overhanging cliff ledges or man-made structures, often touching one another. Nest placement by Cliff Swallows approaches the hexagonal, maximum density packing pattern (e.g., see Emlen, Auk 71:16–35, 1954, plate 5 for good photographs; Barlow, Anim. Behav. 22:876–878, 1974). The hexagonal pattern confers several advantages to the builders. Both the strength of the nest and the inside volume are maximized relative to the quantity of mud used in nest construction. Since the first nests to be built in a colony are generally placed in a horizontal row (Emlen 1954, pers. obs.), subsequent nests built below should be diagonally offset relative to those above. Violations of this last principle are infrequent, particularly on the regular surfaces afforded by man-made structures, but they do occur on occasion.

Observations were made in a 50-pair Cliff Swallow colony located beneath a concrete irrigation structure in north-central Washington during the months of June and July 1982. My attention was called to a pair of nests, one built directly beneath the other instead of offset to one side as usual. Ordinarily, Cliff Swallow nestlings defecate out the nest hole and

the feces fall free to the ground. In this case, however, the lower nest protruded beyond the upper nest and accumulated a hard layer of urate left by droppings from above. By the time the chicks in the upper nest were 18 days old, their accumulated excrement had partially obstructed their own nest opening. The parents were apparently no longer able to enter the upper nest although they continued feeding their chicks through the opening as usual. At 23 days, the mature chicks tried to leave the nest but were able to fit only their heads through the reduced opening, a semicircle of 2-cm radius. The brood in the lower nest fledged normally.

The following day, parental feeding had ceased at the upper nest so I chipped away the solidified guano and freed the young. All four chicks were of normal weight and wing length; however, one had died the previous day. The three live chicks had dried excrement on their throat feathers but flew away readily. Without my intervention the remaining chicks presumably would have died shortly.

Suboptimal nest placement often confers fitness costs to the builders, directly through early nest collapse or indirectly through the energetic costs of collecting extra mud. The surprising result of this incident was the much greater cost to the pair nesting above. Although this outcome was predictable to human observers when the nestlings were only half grown, the parent swallows made no attempt to renest, extend the existing entrance tube, or scrape away the accumulating guano. I can only guess that this problem is sufficiently new, i.e., a side effect of nesting on man-made structures, or rare, that selection has been insufficient to render a solution.—PHILIP K. STODDARD, *Animal Behavior Program, Psychology Dept., NI-25, Univ. Washington, Seattle, Washington 98195.* *Accepted 15 Feb. 1983.*

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Reproductive behavior and pairing chronology in wintering dabbling ducks.—In dabbling ducks (Anatini), pair bond formation generally occurs prior to spring migration. Autumn and winter pairing chronology has been reported for some species (Weller, Auk 82: 227–235, 1965; Soutiere et al., J. Wildl. Manage. 36:752–758, 1972; Armbruster, Auk 99: 116–122, 1982), but until recently quantitative descriptions of reproductive behavior in wintering waterfowl were lacking (Paulus, The winter ecology of the Gadwall in Louisiana, M.S. thesis, Univ. North Dakota, Grand Forks, North Dakota, 1980; Afton and Sayler, Can. Field-Nat. 96:295–300, 1982), with the exception of Johnsgard's (Wilson Bull. 72:133–155, 1960) comparative study of Mallards (*Anas platyrhynchos*) and Black Ducks (*A. rubripes*).

The objective of this study was to quantitatively describe courtship behavior of dabbling ducks during autumn and winter. Emphasis was placed on determining chronology of pair bond formation, estimating proportion of time allocated to reproductive behavior and describing the pattern of courtship activity.

Study area and methods.—The study was conducted from October through February in 1978–79 and 1979–80 on Bodie Island, part of the Cape Hatteras National Seashore, Dare Co., North Carolina. Six species were studied: Gadwall (*Anas strepera*), Black Duck, American Wigeon (*A. americana*), Northern Shoveler (*A. clypeata*), Pintail (*A. acuta*), and Green-winged Teal (*A. crecca carolinensis*).

Data on reproductive behavior were compiled using both focal individual and ad libitum sampling (Altmann, Behaviour 49:227–265, 1974). With focal individual sampling, we attempted to observe each species once during each hour from sunrise to sunset every month from November through February. During 1-h sample periods, 10 focal individuals were selected and observed for 5 min each. Observations of behavior were recorded continuously with a cassette tape recorder. Each sample provided a record of the frequency of all behav-