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Received 3 June 1981, accepted 1 October 1981.

### Differential Occurrence of Yearling and Adult Male Gadwalls in Pair Bonds

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Most age-specific information on breeding waterfowl has been concerned with the reproductive characteristics of females, and few data are available on the effects of age on male breeding biology. Weller (1964) and Lack (1968) have extensively reviewed the literature on breeding age in the Anatidae. Lack, in particular, noted that males of the Anatini, especially of the genus *Anas*, probably breed as yearlings. In the Athyini, a group in which a large excess of males compete for smaller numbers of females, drakes may not breed until the second breeding season. In the Mergini, most males take part in the breeding activities at the age of 3 (Lack 1968). As part of my research on the breeding ecology of the Gadwall (*Anas strepera*) in southern Manitoba, I obtained information on the age of paired males in order to evaluate the relationship of age to breeding activity.

During 1972-1975 at Delta and Marshy Point, Manitoba, I gathered data on 79 Gadwall pairs from observations following banding or directly from birds collected. All ducks were aged as yearlings (1 yr old) or adults (2 yr old or older) at the time of capture or collection (Blohm 1977).

In 39 cases, the ages of both pair members were known. Adult males were involved in 29 (74%) pair situations, while yearling males were involved in 10 (26%). In the 40 cases in which only the ages of males were available, adult drakes were present in 31 (78%) pair bonds, and yearling males were involved in the remaining 9 (22%). Adult male/adult female pairs (20 of 39, 51%) predominated over all possible sex-age combinations. Next in order of frequency were adult male/yearling female (9 of 39, 23%) and yearling male/yearling female (7 of 39, 18%) pair bonds. The

most infrequent combination was the yearling male/adult female category (3 of 39, 8%).

The importance of the observed frequencies cannot be evaluated without a consideration of the relative availability of young and adult males during pairing. In southern Manitoba, I found that most Gadwalls arrived already paired, and Paulus (1980), working on the ecology of Gadwalls on their wintering grounds, stated that most birds were already paired upon departure from Louisiana during late March-early April. Although the age structure of the Gadwall on wintering areas is unknown and not readily determined, a conservative approach is to determine the proportion of yearling males present during the breeding season, using general population projection models (see Martin et al. 1979: 214). For example, I used the following values [e.g. see Anderson 1975, Mallard (*Anas platyrhynchos*); Blandin in prep., Black Duck (*Anas rubripes*)] as reasonable mean parameter estimates for a dabbling duck population:

$S_{AM} = 0.60$  = average annual survival rate for adult males;

$S_{AF} = 0.55$  = average annual survival rate for adult females;

$S_{YM} = 0.45$  = average annual survival rate for young males;

$S_{YF} = 0.45$  = average annual survival rate for young females;

$R = 0.50$  = sex ratio of young birds expressed as proportion male;

$P = 2.0$  = average annual recruitment rate or pre-season age ratio (young/adult female in the fall population).

Accordingly, this modelling effort predicted a value of 0.40 as the asymptotic proportion of yearling males in a breeding-season population. Then, as-

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suming this value to be representative of Gadwalls in southern Manitoba, I evaluated the observed frequencies of males in pairing situations. In both samples the observed number of yearling males participating in pair bonds was significantly less than expected in a situation in which 40% of the breeding population was comprised of first-year drakes (one-tailed Binomial test: 10 of 39 pairs,  $P < 0.05$ ; 9 of 40 pairs,  $P < 0.02$ , Snedecor and Cochran 1967).

The participation of a yearling or adult male in a pair bond is dependent upon several factors that influence courtship activity. Recent studies of the Anatini have indicated that first-year males may be less competitive during pair bonding due to plumage and behavioral immaturity. Stotts and Davis (1960) obtained information on 20 pairs of Black Ducks in Maryland and found no juvenile males in pair bonds during early pairing periods. This lack of participation in pairing was attributed to sexual immaturity in the first-year cohort (p. 132). McKinney (1965) found that plumage development and pairing occurred later in young captive Northern Shovelers (*Anas clypeata*) than among adults. In addition, young birds tended to be less competitive in mating situations. Definite differences between the displays of young and adult males were also documented in the Common Goldeneye (*Bucephala clangula*, Dane and Van der Kloot 1964) and, more recently, in the Gadwall (Kaltenhauser 1971) and the Wood Duck (*Aix sponsa*, Korschgen and Fredrickson 1976). Oring (1969) described differences in wing plumage between yearling and adult male Gadwalls. In addition, he suggested that yearling males were less likely to breed than adults and that some drakes did not attempt to mate.

In southern Manitoba, the observed frequencies suggest that age-related differences in neuroendocrine development, plumage growth, or courtship behavior may bestow a competitive advantage to older, more experienced males during early courtship, thereby explaining the preponderance of adult drakes selected by females in pair situations.

The field work was supported by the Delta Waterfowl Research Station and the College of Agriculture and Life Sciences, University of Wisconsin. I thank R. A. McCabe, W. W. Blandin, T. J. Dwyer, R. S. Pospahala, R. I. Smith, and V. D. Stotts for their reviews of this manuscript. J. D. Nichols provided valuable technical support and statistical assistance. I am especially indebted to the owners of East Meadows Ranch, the Peter Curry and Arthur Vincent families, and to Lawrence King, manager, for their generosity during my stay at Marshy Point, Manitoba. Finally, special thanks must go to A. Afton, R. Car-

stairs, R. Gatti, P. Herzog, C. Madson, R. Rodgers, L. Sopuck, R. Wishart, and D. Young for their valuable advice and assistance in the field.

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Received 12 March 1981, accepted 2 October 1981.