

# MORTALITY RATES FOR BLACK-BELLIED WHISTLING DUCKS

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Mortality estimates for nongame waterfowl in North America are virtually nonexistent because of the lack of large-scale banding operations for nongame waterfowl, their limited distribution, and the general disinterest of agencies responsible for obtaining demographic data for wildlife populations. Each of these limitations applies to the Black-bellied Whistling Duck (*Dendrocygna autumnalis*) as well as the difficulties of obtaining data from banded birds recovered in Mexico, where this species is legally hunted. In contrast, intensive banding has yielded an immense volume of data for many species of important game ducks (e.g., Moisan et al., 1967).

## DESCRIPTION OF DATA

Banding data were analyzed in two ways. First, 48 band recoveries from Texas and Mexico were analyzed using the dynamic life table technique for adult birds described by Hickey (1950:10). A sample of 100 or more band recoveries is usually regarded as necessary for life table calculations. However, as these were the only recoveries stemming from 1,414 Black-bellied Whistling Ducks banded between 1962-75 (3.4 percent recovery rate), and the probability of many additional recoveries becoming available appears remote, it seems best to proceed using the sample now available. The last band recovery occurred on 15 February 1976. No correction was necessary to discount the availability of birds caught and banded after hunting began because all of the birds in this study were handled prior to the Mexican hunting season (cf. Bellrose and Chase, 1950).

The second technique employed the recapture of banded birds in nest boxes in years subsequent to their initial capture and banding; more data are available for a dynamic life table analysis with this method. Cohorts were formed by combining all recaptured birds into groups based on the "age-class" of their recapture. Thus, all birds caught the year following banding were assigned to the 0-1 group regardless of their actual age at banding (an unknown quantity); those caught two years after banding were placed in the 1-2 group and so on. These data were adjusted so that any birds caught, for example, three years after banding without recapture in the intervening years, were added to the 0-1 and 1-2 groups. The declining rate of recapture over time is assumed to reflect the decreasing availability of the birds because of mortality, thereby providing another measure of year-to-year losses in the population in simulation of actual mortality as determined by band recovery data.

The 1,414 banded Black-bellied Whistling Ducks consisted of 492 banded as breeding adults in nest boxes or natural cavities (banded in all years, 1962-75), 535 adults caught with a cannon net in April and May (1963, 1964, and 1965), 339 young-of-the-year

(317 hand-reared and 22 wild birds), and 48 adults caught in other ways (e.g., walk-in trap).

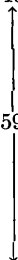
All birds banded in nest boxes were at least 1-year old (i.e., at the minimum, the nesting birds were hatched the calendar year before their banding date), because no method is currently known to assign adult Black-bellied Whistling Ducks to more refined age classes. That the species does breed in the year following hatching is confirmed by one case of a banded juvenile caught the following year incubating in a nest box and by numerous records of breeding in captive birds of known age. It is not known, however, whether or not all 1-year-old birds in a wild population undertake breeding, only that at least some 1-year-old birds do so.

#### RESULTS AND DISCUSSION

The dynamic life table analysis based on band recoveries of 19 males and 29 females yielded a mortality rate of 46 percent during the first year of banding (Table 1). The mortality rate for all age groups is 52 percent. That the overall mortality rate is higher than the first-year mortality rate suggests some bias in the data, likely a reflection of the small sample size. The mortality rate in a dynamic life table for the 0-1 interval using adult but otherwise unaged birds approximates the mortality rate suffered by birds in their first year of life. Accordingly, we suspect that the first-year mortality rate of 46 percent is too low by 5-10 percent rather than an overestimation of the overall mortality rate of 52 percent.

TABLE 1.

Dynamic life table for adult Black-bellied Whistling Ducks banded in Texas.

Interval in years $x$	Alive at start $l_x$	Number of deaths $d_x$	Mortality rate per year $q_x$
0-1	48	22	46
1-2	26	16	
2-3	10	5	
3-4	5	3	
4-5	2	1	
5-6	1	—	
6-7	1	1	
Totals	93	48	52

Calculations of the data from recaptured birds in the dynamic life table format yielded 45 percent mortality for the first year following banding and an overall mortality rate of 46 percent (Table 2). Once again, the first-year mortality rate, as estimated

by "recoveries" the first year after banding, is likely too low and, in this instance, may reflect a lesser rate of homing in younger birds than exists in the older, more experienced age classes.

Information concerning the sex ratio of Black-bellied Whistling Ducks provides some additional demographic data. Although males slightly outnumbered females in the spring population and in other samples, there was no statistical difference in the frequency of each sex; this suggested that there was no sex-specific mortality from disease or other decimating factors operating in the Texas popu-

TABLE 2.

Dynamic life table for adult Black-bellied Whistling Ducks captured and recaptured in nest boxes. Capture data have been transformed to simulate band recovery data (see text). The last banding used in this analysis occurred in 1975; the "recovery period" (i.e., last box inspection for previously banded birds) terminated in 1976.

Interval in years $x$	Alive at start $l_x$	Number of deaths $d_x$	Mortality rate per year $q_x$
0-1	194	87	45
1-2	107	45	↑ 47 ↓
2-3	62	28	
3-4	34	18	
4-5	16	8	
5-6	8	6	
6-7	2	2	
Totals	423	194	

lation of Black-bellied Whistling Ducks (Bolen, 1970). Our data from the homing of 124 males and 153 females trapped in nest boxes (both sexes incubate) show that 33 males (27 percent) and 36 females (23 percent) were caught a second time. The difference in the rates of return between the sexes is thus small but further suggests that adult females may suffer a slightly higher annual mortality rate than do males, as indicated in the sex ratio data published elsewhere (Bolen, 1970).

## SUMMARY

Dynamic life table analyses of band recoveries and recaptured birds indicated that the Texas population of Black-bellied Whistling Ducks experiences an annual mortality rate of 46-52 percent. The data available are few but suggest that females may suffer slightly higher, but statistically insignificant, annual mortality than do males.

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