the gel-dye mixture to failed, but researchers interested in egg survival are cautioned that further experiments should be conducted to verify that the gel mixture does not adversely affect hatchability. We noted no instances of abnormal behavior in marked birds, although no intensive behavior observations were taken.—PETER W. C. PATON, *Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, Colorado 80523.* (Present address: *Redwood Science Lab, U.S. Forest Service, 1700 Bayview Dr., Arcata, California 95521.*) LARRY PANK, *Denver Wildlife Research Center, U.S. Fish and Wildlife Service, 101 12th St., Box 20, Fairbanks, Alaska 99701.* Received 16 Dec. 1985; accepted 4 Apr. 1986.

Brood Mortality Rates of Black-bellied Whistling-ducks in South Texas.—Mortality rates of ducklings are often used as estimates of waterfowl fledging success (Keith 1961, McGilvrey 1969, Reed 1975) and as an index to productivity (Grice and Rogers 1965, Hines and Mitchell 1983, Reed 1975, Smith and Hawkins 1948). I obtained mortality data for 10 Black-bellied Whistling-duck (*Dendrocygna autumnalis*) broods in south Texas as part of a broad study of brood ecology (Heins 1984).

The study was conducted at the Rob and Bessie Welder Wildlife Refuge (WWR) (1 brood), 12 km north of Sinton, San Patricio County, Texas, during July and August 1980; at the Frank Rooke Ranch (RR) (3 broods), which adjoins the WWR to the north in Refugio County, Texas, during September–November 1981; at Celanese Chemical Corporation (CCC) property (3 broods) in Corpus Christi, Nueces County, Texas, July–September 1981; and at Santa Ana National Wildlife Refuge (SA NWR) (3 broods), 12 km south of Alamo, Hidalgo County, Texas, in June 1981. All study wetlands were classified as the Persistent Emergent wetland type (Cowardin et al. 1979). They varied in size from 0.2 to 36 ha, and all had maximum water depths of about 1 m. Heins (1984) presents a detailed description of the vegetation at the study wetlands.

At the WWR, SA NWR, and CCC wetlands I observed broods from blinds positioned on the dikes of the ponds. At the RR study area I followed the movements of two female parents (both male and female Black-bellied Whistling-ducks attend their broods) fitted with backpack radio transmitters (Telonics Company, Mesa, Arizona) similar to those used by Dwyer (1972). After locating the radioed female, I observed the brood by either wading into the pond, or watching it from the shore or from a tree.

I identified individual broods either by the presence of a radioed parent, or by a combination of age-class and number of ducklings. Two broods were of known age, whereas I aged other broods using criteria developed by Cain (1970) and Gollop and Marshall (1954). Class I broods (n = 10) were neonates–3 wk, Class II broods (n = 7) were 3–7 wk, and Class III broods (n = 4) were 7–9 wk; fledging occurred between 59–63 d (Cain 1970).

The 10 broods in this study averaged 9.5 ducklings (Table 1). Bolen (1967) found an average of 9.9 ducklings for 53 broods of Black-bellied Whistling-ducks. No statistical comparison between these means is possible because they are based on different age classification systems.

Mean brood size ranged from 10.5 in age-class I to 8.7 in age-class III (Table 1). However, this decrease was not significant ($P > 0.25$; one-way ANOVA, GLM procedure for unbalanced data, SAS Institute, Inc. 1982). The non-significant decline in mean brood size may have been due to small sample sizes, as well as to the lack of independent samples because some of the same broods were counted in more than one age-class. Bolen's (1967) data showed a decrease (1.9 ducklings) in mean brood size after the first week of life, but an increase (1.5 ducklings) after the fourth week. However, he did no statistical test to determine if this change in mean brood size was significant.

The average of 9.5 ducklings per brood represents a loss of about four ducklings from an estimated mean clutch of 13.4 eggs per hen (Bolen 1967). Dump nesting is common among Black-bellied Whistling-ducks, but whether larger than normal clutch size affects duckling survival is unknown. Studies of Wood Ducks (*Aix sponsa*) (Heusmann 1972,

TABLE 1. Average brood size for pre-fledging Black-bellied Whistling-ducks. Data are from 10 broods observed 1980–1981 in south Texas.

Age-class[1]	No. of broods[2]	No. of ducklings[2]	Ducklings/brood
I	7.3	76.7	10.5
II	5.7	53.0	9.3
III	4.0	35.0	8.7
Totals/means	17.0	164.7	9.5

[1] Age-classes adapted from Gollop and Marshall (1954).
[2] Data for these two variables were collected at the sub-class level; figures for sub-classes were summed and averaged at the class level because of small sample sizes.

Clawson et al. 1979) and Blue-winged Teal (*Anas discors*) (Rohwer 1985) have shown no significant differences in duckling survival rates between normal-sized and large nests.

Mortality rates for ducklings of other species of *Dendrocygna* are not available. However, numerous studies of other waterfowl have found that, in general, the greatest mortality occurs within the first 2 wks of life (Ball et al. 1975, Hines and Mitchell 1983, Jenkins et al. 1975, Keith 1961, Low 1945, Mendenhall 1976, Reed 1975). It seems logical to assume that younger, smaller Black-bellied Whistling-duck ducklings would succumb more easily to predation, parasites, and disease than older, larger ducklings, thereby suffering higher mortality, but no such trend is indicated in these data.

Further study is needed to clarify rates and causes of attrition among age-classes of Black-bellied Whistling-duck broods, and to formulate management recommendations that would optimize duckling survival.

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Status and Seasonal Patterns of Abundance of Turkey Vultures in Puerto Rico.—Turkey Vultures (*Cathartes aura*) are resident on all major islands of the Greater Antilles (Bond 1979), but seasonal migrants also visit the islands (Darrow 1983). In most cases, it is not known whether migrants overwinter or merely pass through on their way to Central or South America (Smith 1980). We describe the range and seasonal abundance of Turkey Vultures in Puerto Rico and discuss conflicting reports of the general history of this species in the Greater Antilles.

Study area and methods.—Since they were first reported in Puerto Rico, Turkey Vultures have been restricted to the southern region of the island (Biaggi 1974, Perez Rivera and Cotte Santana 1977, Wetmore 1927). Southern Puerto Rico is in the subtropical dry-forest life-zone, whereas the rest of the island is mostly within subtropical moist- and subtropical wet-forest life-zones (Ewel and Whitmore 1973).

We conducted 22 road censuses between December 1981 and July 1983 in the range of the Turkey Vulture in Puerto Rico. The census route was divided into 4 sections: (1) along highways 116, 305, and 303 between Lajas and Guanica (22.6 km), (2) along highways 2 and 116 between Guanica and Tallaboa (26.0 km), (3) along highway 52 between Ponce and Coamo (25.6 km), and (4) along highway 52 between the municipalities of Coamo and Salinas (33.4 km). During 15 censuses the total 108-km route was covered, and during 7 censuses only some sections were covered. Twelve of the censuses were conducted driving east and 10 driving west. We conducted all censuses between 0900 and 1800 when no rain was falling, and while driving at 65–80 km/h. The driver recorded the number of Turkey Vultures observed flying and perched along the route.

The habitat within 1 km of the transect route was subjectively classified into 3 categories: agricultural fields, open woods/scrub/pasture mixture, or urban/scrub mixture. Habitat along section 1 was 100% open woods/scrub/pasture mixture; along section 2 it was 70% open woods/scrub/pasture mixture and 30% urban/scrub, and along sections 3 and 4 it was 92% open woods/scrub/pasture mixture and 8% agricultural fields.

History of Turkey Vultures in the Greater Antilles.—There have been doubts as to whether or not Turkey Vultures were present in the Greater Antilles at the arrival of Europeans (Garrido and Garcia Montana 1975); however, Turkey Vultures were present in Cuba and the Bahamas as far back as the Pleistocene (Arredondo 1984, S. L. Olson and W.