FOODS OF THE BLACK-BELLIED TREE DUCK IN SOUTH TEXAS[1]

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THE abundance and economic importance of many North American waterfowl have lead to comprehensive studies of their food habits (see Cottam, 1939, Martin and Uhler, 1951, and others). Similar information for protected and less common species is often scattered and derived from infrequent samples, and moreoften, entirely wanting. However, food habits data from a limited series of samples gain value when these stem from local populations of an uncommon species. Presented here are the results of food analyses from a restricted population of the Black-bellied Tree Duck (*Dendrocygna autumnalis*) nesting in South Texas.

METHODS

Tree ducks collected for food habits studies and other analyses (Bolen, 1964) were taken at Lake Corpus Christi in Live Oak and San Patricio Counties, Texas. The data reported were obtained from 22 stomachs and 11 crops analysed in the following manner:

> The contents of the entire stomach, including grit, or crop were immersed in water to measure the total volume by displacement. The materials were next oven dried and separated. A visual estimate of volume by per cent of each item was made using a grid system; the relative volume in milliliters was then calculated from the total volume. Grit and food items were next weighed and filed in a reference collection. Data were kept on separate file cards for each stomach and crop studied. This proved an accurate yet rapid method for handling the materials (Forsyth, 1965).
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> U.S. Standard Sieves were used to separate grit materials. Each size class was then weighed and this figure expressed as a percentage of the total sample from all stomachs.

Both stomach and crop contents were used to compute the volumes of each food item. However, these data are separated into the larger categories of plant and animal foods (Table 1) for comparisons with other studies where foods were analysed from stomach or crop samples alone. Differences in the contents of these organs result from the retention of the harder animal parts in the stomach well after the softer plant materials have passed into the lower digestive tract; foods found in the crop are more likely retained without a selection favoring either plant or animal items. Computation of each food's frequency of occurrence was based only on stomach contents.

In this study all but 1 of the 22 birds collected were adults in fully matured plumage. The remaining bird was a young-of-the-year capable of flight yet

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TABLE 1

PERCENTAGE OF PLANT AND ANIMAL ITEMS FOUND IN THE STOMACHS AND CROPS OF BLACK-BELLIED TREE DUCKS

Type of food	Stomachs (22)		Crops (11)		Total	
	ml	%	ml	%	ml	%
Plant	56.7	86.8	134.7	94.4	191.4	92.0
Animal	8.6	13.2	8.0	5.6	16.6	8.0
Total	65.3	100.0	142.7	100.0	208.0	100.0

still in drab juvenal plumage. The food items in this bird were enough like those of adults collected during the same month (September) to be included in the tabulations.

PLANT FOODS

Plant foods made up 92 per cent of the diet. Of these, the cultivated grain, *Sorghum vulgare*, constituted nearly half of the total food volume (Table 2). Wild and cultivated strains of Bermudagrass (*Cynodon dactylon*) collectively ranked secondmost in volume. Seeds of cultivated Bermudagrass, while inseparable from the wild strain, are likely less important since this hybrid produces few inflorescences (Gould and Box, 1965). Tree ducks ingest both sorghum and Bermudagrass in large quantities, often to the point that the crop is distended and visible immediately after feeding.

The incidence of corn (*Zea mays*) in our samples resulted from birds feeding in stockyards rather than feeding directly in cornfields. Corn is not a common field crop in South Texas. However, the importance of corn as a tree duck food no doubt increases elsewhere in the bird's range where this crop is widely cultivated. Bent (1925) accordingly mentions that the Black-bellied Tree Duck has earned the name, "pato maizal," or cornfield duck because of the depredation it supposedly inflicts on corn crops in Mexico.

Two species of millet, *Echinochloa colonum* and *E. crusgalli*, were found. These constituted about 6 per cent of the total food volume. Both plants are often associated with Bermudagrass in moist pasture habitats; grazing tree ducks alternately strip seeds from the millets and Bermudagrass where these grasses are both available.

Smartweeds, *Polygonum lapathifolium* and *P. longistylum*, together made up less than 1 per cent of the total food volume.

At Lake Corpus Christi, shoreline beds of water stargrass (*Heteranthera liebmanni*) are favored feeding and loafing places for Black-bellied Tree Ducks in late summer. Two growth forms of this plant are evident. One

occupies mudflats and lake margins in dense, carpet-like stands. Its aquatic counterpart exhibits longer stems and leaves and grows in deeper water. These differences are likely adaptive responses to changing water levels. Seeds of water stargrass (6 per cent of the total volume) presumably came from the shallow-water stands since these are more apt to flower than aquatic beds of the same plant. Moreover, Black-bellied Tree Ducks typically wade in shallow areas rather than venture into deeper water for food. Elsewhere, Martin and Uhler (1951) reported that water stargrass may become a noxious weed detrimental to other, more desirable plants; they considered it of slight importance as a waterfowl food.

All plant foods found in either crops or stomachs consisted of seeds only. There was little or no suggestion of leaves, stems, or root systems in the samples. However, hand-reared tree ducks readily accept the leafy parts of common vegetables as food items.

ANIMAL FOODS

Earlier references to Black-bellied Tree Duck foods appear as observational data only (see Phillips, 1922; Bent, 1925; Kortright, 1942; Delacour, 1954; and Bolen et al., 1964). Only plant foods are mentioned in these reports. However, animal foods made up at least 8 per cent of our sample. Mollusks and insects were represented, both groups often occurred in volumes so small as to be immeasurable.

A single gastropod species, *Physa anatina*, was identified from crop materials; 16 individual snails of this species were found in the crop of a single bird. Only small, unidentifiable bits of shell were usually present in stomach contents. Thus, in Table 2, the mollusk foods are lumped without further classification. We believe, however, that these are gastropod forms, and probably *Physa*.

Insects composed the balance of the animal food volume. About one-half of the insects, by volume, could not be identified. The remainder included the following orders and families: Hemiptera (unidentified immature forms), Neuroptera (larva of Myrmeleontidae), Coleoptera (Cicindelidae, Carabidae, and Tenebrionidae), and Diptera (larva of Stratiomyidae). A flour beetle, *Tribolium castanatus*, was identified from a crop filled with Bermudagrass seeds. Insects are undoubtedly taken, perhaps passively, by birds feeding in stands of water stargrass or when grazing in pastures.

FREQUENCY OF OCCURRENCE

Plant foods occurred in all (100 per cent) of the stomachs. Ten (45.5 per cent) stomachs contained some form of animal materials.

The frequency of individual food items is shown in Table 2. Bermudagrass

TABLE 2
VOLUME AND FREQUENCY OF FOOD ITEMS FOR THE BLACK-BELLIED TREE DUCK IN SOUTH TEXAS. SAMPLE SIZE IN PARENTHESIS; T = TRACE

Item	Volume (ml)				Occurrence—22 stomachs	
	Stomachs (22)	Crops (11)	Total	%	No.	%
Cynodon dactylon	13.2	48.0	61.2	29.5	10	45.5
Sorghum vulgare	17.9	82.5	100.4	48.3	7	31.8
Echinochloa spp.	9.8	2.0	11.8	5.7	4	18.2
Polygonum spp.	0.6	–	0.6	0.2	6	27.3
Heteranthera liebmanni	12.2	1.0	13.2	6.3	5	22.7
Zea mays	3.0	1.2	4.2	2.0	1	4.5
Mollusca (*Physa anatina*)	2.3	8.0	10.3	5.0	8	36.4
Insecta	6.3	T	6.3	3.0	5	22.7
Total	65.3	142.7	208.0	100.0	–	–

and sorghum again showed prominence as tree duck foods in South Texas. Other plants appeared 18 to 27 per cent of the time. Corn, for reasons already mentioned, was found in only 1 (4.5 per cent) of the 22 stomachs.

Animal foods were found as often as most of the individual plant foods. Mollusks occurred in 36 per cent of the stomachs and insects in nearly 23 per cent.

SEASONAL FOOD TRENDS

The Black-bellied Tree Duck population near Lake Corpus Christi represents an expansion of their northern range (Bolen, et al., 1964). Here the birds arrive irregularly in March or April and remain in large flocks near cattle feedlots. They loaf on the shores of nearby farm ponds, but fly to the stockyards at dawn and dusk for food. No stomach collections were taken during this period for this reason. Instead, birds were collected following their spring dispersal to the lake proper. The distribution of these collections was as follows: 5 birds taken in May, 6 in June, 4 each in July and August, and 3 in September. These are inadequate for steadfast conclusions, but they indicated with field observations, a shifting trend in foods well geared to plant phenology (Table 3).

Bermudagrass is the staple food in May. Stockyards receive further utilization but native grasses begin drawing flocks of tree duck to pastures near Lake Corpus Christi. In June, as the field crops ripen, sorghum enters the diet. By late June and early July the sorghum harvest is underway and field wastes lead to an abundance of this tree duck food. Stubble flights are initiated; the birds embark on a daily schedule to the grain fields that lasts into fall. Birds collected in July showed the most varied diet because

TABLE 3

SUMMARY OF SEASONAL FOOD TRENDS FOR THE BLACK-BELLIED TREE DUCK IN SOUTH TEXAS. DATA COMBINED FROM CROP AND STOMACH ANALYSES (1963) AND FIELD OBSERVATIONS (1962–1965)

Month	Major food	Comment
March and/or April	Stock foods	Arriving birds congregate at stockyards; foods exclusively grains until birds disperse
May	Bermudagrass	Flocks graze in pastures stripping seed heads; some millets taken and some continued use of stockyards
June	Sorghum	Grain harvest begins; birds start flights to fields
July	Sorghum & variety of native food plants	Smartweeds, etc., but mainly sorghum
August	Sorghum & water stargrass	Stubble flights continue; pairs with young broods in beds of water stargrass
September	Sorghum & water stargrass	Stubble flights prominent in entire tree duck population, including flying young-of-the-year; large groups loafing in water stargrass during mid-day hours; similar pattern continues into fall

of the addition of smartweeds and the continued use of various grasses. Water stargrass is late in setting seed and accordingly showed a distinctive seasonal occurrence in the tree duck diet; it was found in birds taken during late August and September.

No seasonal trend was shown in the occurrence of animal foods; these prevailed with equal frequency throughout the sampling period.

GRIT

Grit varied from 0.8 to 2.4 grams per stomach. The mean weight was 1.4 grams for the 22 stomachs analysed. Grit was of both opaque and translucent materials of considerable size variation (Table 4). Well over one-half of the grit, by weight, passed through a No. 10 U.S. Standard Sieve (less than 2000 microns). About 5 per cent was large enough to catch in a No. 4 sieve (4760 microns). Besides the mineral contents, 1 stomach contained 2 pieces of worn, smooth glass and another held a single No. 6 lead shot.

SUMMARY

The foods of the Black-bellied Tree Duck in South Texas were, by volume, 92 per cent plant materials. Of these, sorghum and Bermudagrass predominated in both

TABLE 4
SIZE AND WEIGHT DISTRIBUTION OF 30.5 GRAMS OF GRIT MATERIALS FROM 22 BLACK-BELLIED TREE DUCK STOMACHS

U. S. standard sieve number	Mesh size (microns)	Weight (g)	Per Cent
4	4760 and larger	1.5	4.9
8	2380	4.3	14.1
10	2000	1.2	3.9
16	1190	11.8	38.7
20	840	6.4	21.0
–	less than 840	5.3	17.4
	Total	30.5	100.0

volume and percentage frequency. Other food plants included smartweeds, millets, water stargrass, and a single incidence of corn. Plant foods consisted only of seeds and did not include vegetative structures.

Animal foods (8 per cent by volume) consisted of insects and mollusks. Each of these occurred about as often as the major plant foods. The snail, *Physa anatina*, seemed singularly important.

Tree duck food habits change with the advance of the growing season. There is an initial period of "artificial" feeding on stockyard grains after the spring migration. This changes to Bermudagrass in May, then to sorghum in mid-summer. Daily stubble flights to sorghum fields continue into fall but the late summer diet is supplemented by water stargrass.

Grit from tree duck stomachs averaged 1.4 grams per bird and showed considerable size variation.

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