

there manipulated it. Within 45 sec, 3 of 8 adult pelicans that were fishing over the pond circled in a 7 m radius, 8–10 m above the heron. Each stooped several times within 3–4 m of the fish. After 8–10 circuits 1 of the pelicans landed on the heron's head forcing it to release the fish from its bill, whereupon the pelican dropped to the ground next to the heron, picked up the fish and swallowed it. Simultaneously, the other 2 pelicans landed within 1 m of the first and watched it as it consumed the fish. Neither attempted piracy and all 3 took wing as soon as the fish was eaten and recommenced flying over the pond. The heron did not attempt to recover its dropped prey.

Although they themselves are sometimes victims of piracy (Findley, *Condor* 9:35, 1907; Meinertzhagen, *Pirates and Predators*, Oliver and Boyd, Edinburgh, Scotland, 1959; Palmer, *Handbook of North American Birds*, Vol. 1, 1962), and are known to scavenge and fight with gulls for offal thrown overboard (Gifford, *Proc. Cal. Acad. Sci.* 4th Ser., Vol. 2, Pt. 1, 1913; Sefton, *Condor* 52:136–137, 1950), piracy of Great Blue Herons by Brown Pelicans is previously unreported.—KEITH L. BILDSTEIN, *Dept. Biology, Winthrop College, Rock Hill, South Carolina 29733. Accepted 28 Nov. 1978.*

Wilson Bull., 92(1), 1980, pp. 123–125

Food habits of White Pelicans during 1976 and 1977 at Chase Lake National Wildlife Refuge, North Dakota.—Quantitative studies of White Pelican (*Pelecanus erythrorhynchos*) food are lacking; however, lists of prey species taken in North Dakota have been reported by Coues (Govt. Printing Office, Washington, D.C., 1874), Kolstoe (North Dakota Outdoors 29:16–20, 1966) and Anderson et al. (*Can. Field-Nat.* 83:91–112, 1969). During the summers of 1976 and 1977, we studied prey species consumed by White Pelican chicks at Chase Lake National Wildlife Refuge, North Dakota.

The 1774.6 ha Chase Lake N.W.R. is 13 km north of Crystal Springs, Stutsman Co., North Dakota. Most of the refuge is covered by water (50%) and native and cultivated grasses (45%); the remainder is brush and marsh. It lies in the Missouri Coteau of the glaciated Prairie Pothole region (U.S.D.I., Bur. Sport Fisheries and Wildl., Washington, D.C., 1971) and supports the largest breeding population of White Pelicans in North America, ranging from 8000–10,000 nesting birds (Sloan, *I.B.B. News* 45:83–86, 1973).

Methods and materials.—Disgorged food samples were collected from chicks of varying ages, and analyzed. From 2 June through 3 August 1976, 84 regurgitated boli were collected and analyzed volumetrically with water displacement recorded as the volume per sample. When several prey species were present in the sample, each item was measured independently and a percent of the total volume was recorded. In addition, 458 boli were qualitatively analyzed, i.e., prey species noted and percent composition per sample calculated.

From 6 June–8 August 1977, 60 boli were volumetrically analyzed and 489 were qualitatively analyzed; 1091 samples were studied during both years. Relative frequency by number (RFN), frequency of occurrence (FO) and relative frequency by volume (RFV) of each prey species were computed (see Table 1 for definitions). RFN and FO were based on both volumetric and qualitative analysis, while RFV was based only on volumetric measurements.

To determine the distance traveled by White Pelicans in search of food 130 adults were marked in June 1977 with picric acid using a modification of the color-marking device described by Moseley and Mueller (*Bird-Banding* 46:341–342, 1975). A request for information on sightings of marked individuals was sent to all state and federal personnel in North and South Dakota.

TABLE 1
WHITE PELICAN FOOD HABITS ANALYSIS AT CHASE LAKE NATIONAL WILDLIFE REFUGE
DURING 1976-1977

Prey species	Relative frequency by numbers ¹		Frequency of occurrence ²		Relative frequency by volume ³	
	1976	1977	1976	1977	1976	1977
Adult tiger salamander (<i>Ambystoma tigrinum</i>)	1.3	0.8	8.3	30.5	4.2	3.9
Larvae tiger salamander	61.2	26.7	62.1	12.3	60.2	45.8
Combined salamander	62.5	27.5	70.4	42.8	64.4	59.7
Brook stickleback (<i>Eucalia inconstans</i>)	16.2	31.3	8.7	5.9	—	2.2
Black bullhead (<i>Ictalurus melas</i>)	8.3	2.1	13.3	32.6	13.5	13.6
Fathead minnow (<i>Pimephales promelas</i>)	—	19.2	1.0	5.0	0.2	2.3
Carp (<i>Cyprinus carpio</i>)	0.8	0.8	13.1	17.0	—	9.9
Yellow perch (<i>Perca flavescens</i>)	6.9	7.0	8.3	4.4	1.6	5.4
Crayfish (<i>Astacus</i> sp.)	1.7	11.9	7.2	3.5	7.3	2.1
Northern pike (<i>Esox lucius</i>)	2.7	0.1	1.3	2.6	0.1	4.2
White sucker (<i>Catostomus commersoni</i>)	0.2	0.2	0.8	1.0	—	—
All other species	1.5	0.6	3.2	1.4	12.9	—

¹ RFN = (number of individuals of a species/total number of individuals of all species) × 100. Based on 1408 prey items in 1976 and 1984 prey items in 1977.

² FO = (number of samples in which a species occurs/total number of samples) × 100. Based on 542 samples in 1976 and 549 samples in 1977.

³ RFV = (volume of a species/total volume of all species) × 100. A total of 9220 ml of biomass was analyzed in 1976 and 10,274 ml in 1977.

A United States weather station located in Pettibone (12.8 km NNW of Chase Lake) provided monthly precipitation data. Pothole abundance, recorded at Woodworth Wildlife Research Station (19.2 km NE of Chase Lake), was used as an index for availability of foraging areas.

Results and discussion.—Composition of regurgitated boli in terms of RFN, FO and RFV are summarized in Table 1. The single most important prey item in both years was the larvae of the tiger salamanders (*Ambystoma tigrinum*). Sightings of 13 dyed pelicans in 1977 gave us some idea of foraging areas used by the Chase Lake flock. Six sightings occurred at Woodworth Wildlife Research Station. The sighting most distant from Chase Lake (51.2 km) was at Arrowwood National Wildlife Refuge, where an individual was observed in a group

of approximately 1000 pelicans. Johnson (M.S. thesis, Mich. Tech. Univ., Houghton, Michigan, 1976) reported round-trip foraging distances of 96–611 km for this colony.

Types of wetlands used by feeding pelicans included seasonal, semi-permanent and permanent ponds and lakes with fresh or slightly brackish water. The vegetative cover of these areas was disjunct or was primarily open water. Pelicans actively fed along the shoreline or in shallow, open water and avoided dense emergent vegetation.

Wetland conditions varied considerably between 1976 and 1977. During May–August 1974–1976, 30–65% of wetland basins occurring on the Woodworth Study Area (19.2 km NE of Chase Lake) contained water. In 1977, only 5% of the basins had water in them, despite similar amounts of precipitation (1974–1976 \bar{x} precipitation = 36 cm, 1977 = 31 cm) (Leo Kirsch, unpubl. data). The natural drawdown phase of the potholes in 1977 allowed exploitation of prey in areas inaccessible the previous year. Black bullheads (*Ictalurus melas*), carp (*Cyprinus carpio*), brook stickleback (*Eucalia inconstans*), and fathead minnows (*Pimephales promelas*) were concentrated in portions of drying sloughs, making them vulnerable to pelican predation. Consequently, these species formed a larger proportion of the pelican's diet in 1977 (Table 1). In 1976, higher water levels inundated shoreline vegetation which provided cover for smaller fish, such as brook stickleback and fathead minnows. Tiger salamander larvae and noetic forms feed largely on these 2 species (Buchli, M.S. thesis, Univ. North Dakota, Grand Forks, N.D., 1964) and a greater use of salamanders by pelicans occurred in 1976 (Table 1).

Since approximately $\frac{1}{4}$ of the North American breeding population of White Pelicans nests at Chase Lake, the success of this colony is essential to the maintenance of the continental population. Chase Lake now has additional protection under the 1964 Wilderness Act; however, the foraging areas of the Chase Lake flock suffer under land-use practices which favor drainage, channelization and large reservoirs. This will eventually have an adverse effect, not only upon the pelicans, but also on the multitude of waterfowl and marsh birds nesting there.

We appreciate the logistic support of the Northern Prairie Wildlife Research Center, Jamestown, N.D.; Arrowwood National Wildlife Refuge, Pingree, N.D.; and Woodworth Wildlife Research Station, Woodworth, N.D. A special thanks is extended to Mr. Leo Kirsch and Mr. Kenneth Higgins for their advice and support. This project was part of a graduate study through the Dept. of Forestry, Michigan Technological University, Houghton.—GARY R. LINGLE AND NORMAN F. SLOAN, *Dept. Forestry, Mich. Tech. Univ., Houghton, Michigan 49931. Accepted 6 Sept. 1978.*

Wilson Bull., 92(1), 1980, pp. 125–126

Notes on the birds of Honduras.—The study by Monroe (A Distributional Survey of the Birds of Honduras, A.O.U. Monogr. No. 7, 1968) brought together previous information and recorded the results of his own field work in many parts of the country. During a brief visit to Honduras from 23 May–5 June 1973, we obtained a few specimens and sight records that extend the time or area of occurrence of some species recorded by Monroe. Significant records were obtained at Lake Yojoa, elev. 630 m, in the Dept. Cortes in west-central Honduras; at Tela, sea level, in the Dept. Atlantida on the Caribbean coast; and at Choluteca and the Bay of Fonseca area, sea level, in the Dept. Choluteca on the Pacific slope. All specimens obtained have been deposited in the Yale-Peabody Museum collections.

On 30 May, we collected a nonbreeding male Great Egret (*Casmerodius albus*) on the shore