THE SOUTHWESTERN NATURALIST 26(1):37-41 FEBRUARY 21, 1981

CATTLE EGRETS, INLAND HERONRIES, AND THE AVAILABILITY OF CRAYFISH

RAYMOND C. TELFAIR II

ABSTRACT.—Inland heronries in Texas used by African Cattle Egrets (*Ardeola* [= *Bubulcus*] *ibis ibis*) always contain Little Blue Herons (*Hydranassa caerulea*) and Snowy Egrets (*Egretta thula*). Inland breeding distribution and timing of the breeding season of the latter two species probably are determined in Texas by the availability of crayfish which compose about 73% of the diet for Little Blue Heron young and 39% for Snowy Egret young. Inland distribution of Cattle Egrets in Texas appears to be determined by the locations of heronries that have been established or re-established by native species, primarily Little Blue Herons and Snowy Egrets. There is no apparent relationship between distribution and density of grazing cattle and the breeding range of Cattle Egrets or distribution of heronries in which they breed, nor is there any apparent relationship between the breeding range of these egrets and maximum availability of grasshoppers and crickets which increases westward.

Since 1972, I have studied the biology of the African Cattle Egret (*Ardeola* [= *Bubulcus*] *ibis ibis* in Texas (Telfair, 1979). Inland heronries in Texas used by Cattle Egrets always contain Little Blue Herons (*Hydranassa caerulea*) and Snowy Egrets (*Egretta thula*) (Fig. 1). Inland breedings ranges of all three species appear to correspond to crayfish availability (Fig. 2); but, since Cattle Egrets rarely feed upon crayfish, their distribution must be limited by other factors. Thus, correspondence between breeding distribution of Cattle Egrets and those of the two native species appears to be coincidental. However, Little Blue Herons and Snowy Egrets usually return to inland heronries in mid to late March and most Cattle Egrets return to the same breeding areas about one month after the return of the two native species. In this paper, I offer an explanation for the relationship between these three ardeids and the distribution of crayfish.

STUDY AREA AND METHODS.—The study area encompassed that portion of Texas in which Cattle Egrets bred as of 1977 (Blacklock et al., 1978). Data were taken from 29 heronries throughout the area.

Methods for collection, preservation, and analyses of regurgitated, undigested boluses were those of Hartley (1948), Jenni (1969), Medin (1970), Siegfried (1971), and Fogarty and Hetrick (1973). Mass was determined volumetrically. Quantitative analysis of 500 boluses regurgitated by Cattle Egret chicks was used to represent the nesting season diet. For comparison, analyses were made of 190 boluses from Little Blue Heron chicks and 20 boluses from Snowy Egret chicks.

Distribution of the four species of crayfish used as food within the breeding ranges of Little Blue Herons and Snowy Egrets was determined from maps (Penn and Hobbs, 1958; Reimer and Clark, 1974) and in consultation with Dr. William A. Hayes II (Professor, Division of Science, Murray State College, Tishomingo, Oklahoma).

RESULTS AND DISCUSSION.—In inland areas of Texas, most of the diets of Little Blue Herons and Snowy Egrets, especially those of the young, consist of juvenile and small adult crayfish, 72.9% and 39.1%, respectively (Table 1). Percent utilization of the four species of crayfish by Little Blue Herons and Snowy Egrets in Texas was: *Procambarus s. simulans* (69.8%, 75.9%), *P. a.*

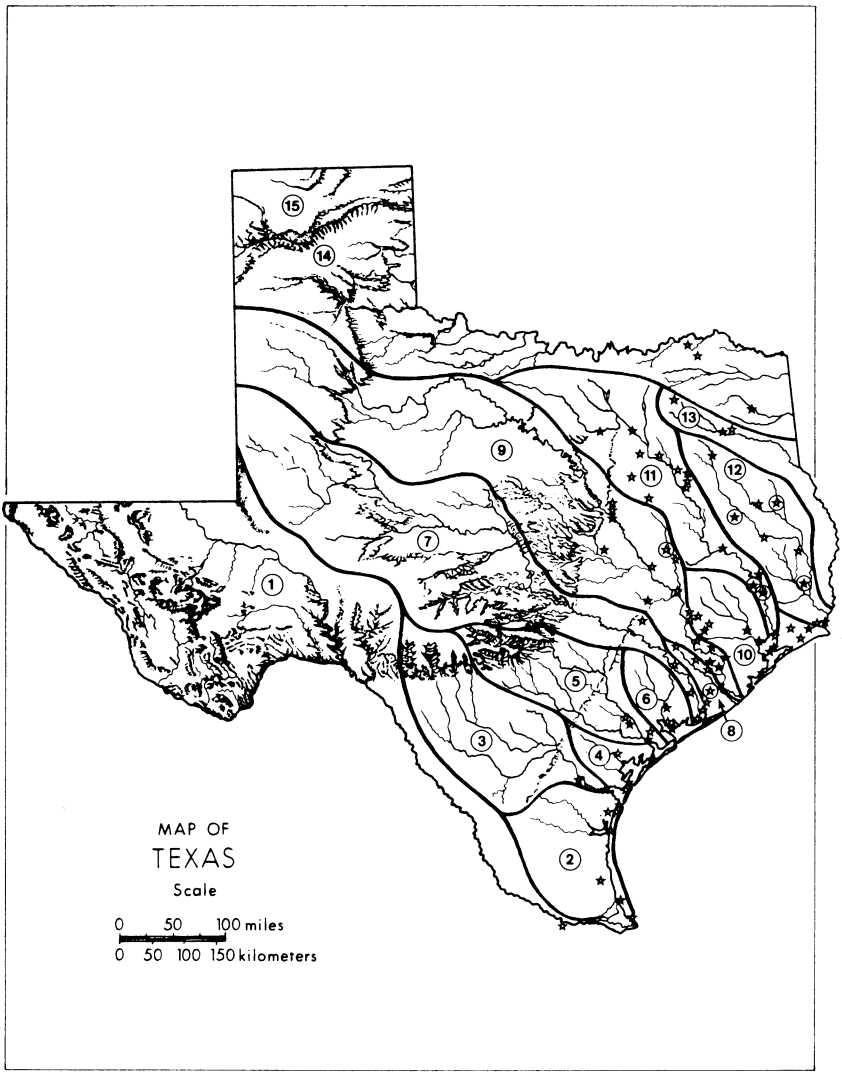

FIG. 1.—Locations of Texas heronries. Symbols are: plain stars, heronries containing Cattle Egrets and other species; circled stars, Little Blue Herons and/or Snowy Egrets only. Numbers refer to river systems: 1. Rio Grande 2. Nueces-Rio Grande 3. Nueces 4. San Antonio-Nueces 5. San Antonio-Guadalupe 6. Guadalupe-Lavaca 7. Colorado 8. Brazos-Colorado 9. Brazos 10. San Jacinto 11. Trinity 12. Neches 13. Sabine 14. Red 15. Arkansas (Canadian). Location of river systems are derived from: 1) Texas Water Development Board (1968); 2) Texas Conservation Needs Committee (1970); and 3) Texas Parks and Wildlife Department (1975).

acutus (14.3%, 13.3%), *P. curdi* (13.7%, 10.8%), and *Cambarellus shufeldti* (2.2%, 0.0%), respectively. Therefore, I suggest that the inland breeding distribution of Little Blue Herons and Snowy Egrets in Texas is determined by the availability of crayfish. The greatest abundance of adults and all growth

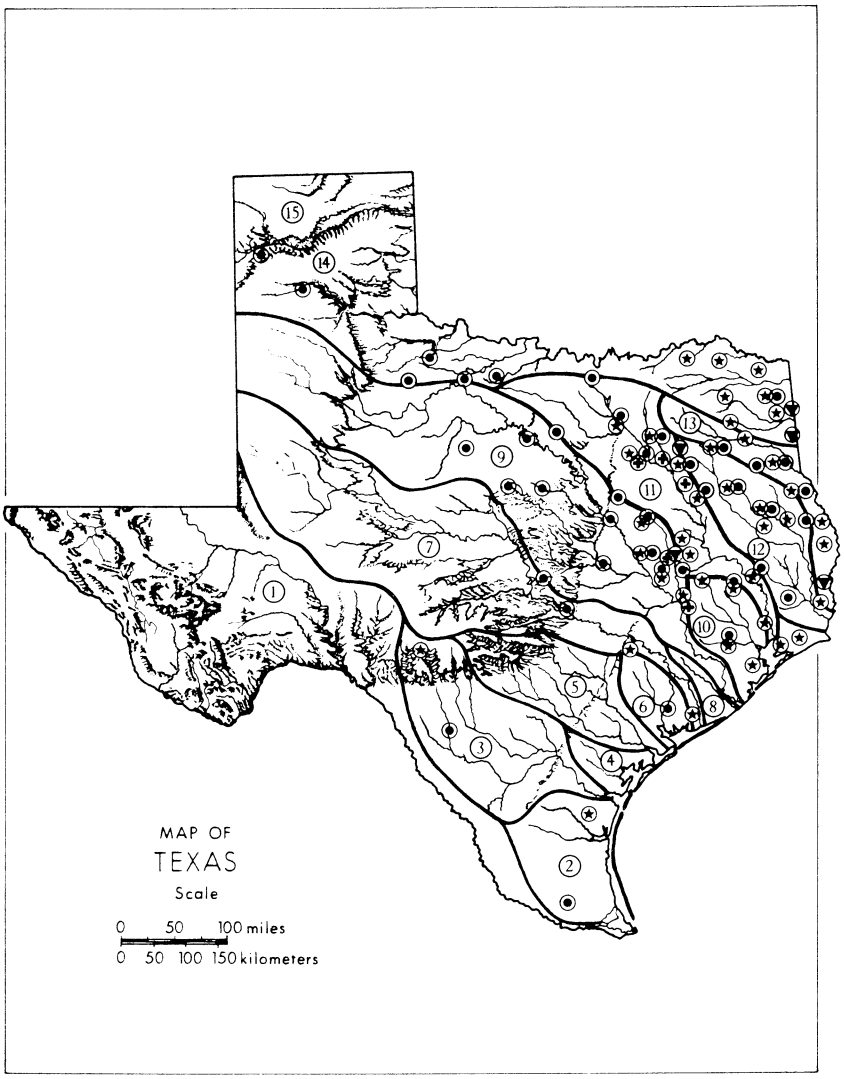

FIG. 2.—Distribution in Texas of four species of crayfish utilized as food within the breeding range of Little Blue Herons and Snowy Egrets. Most distributional data are from maps of Penn and Hobbs (1958) and Reimer and Clark (1974). Symbols refer to crayfish species: dots (*Procambarus s. simulans*), stars (*P. a. acutus*), crosses (*P. curdi*), and triangles (*Cambarellus shufeldti*).

stages of the three species of crayfish used as major food items by Little Blue Herons and Snowy Egrets occurs during spring months when these birds are breeding (Dr. W. A. Hayes II, pers. comm.). This period also corresponds to the average period of maximum spring rains during May (Portig, 1962). Thus, the greatest biomass of available crayfish occurs during the period of hatching and chick growth of Little Blue Herons and Snowy Egrets (Telfair, 1979). During years when rainfall is abundant in spring and early summer,

TABLE 1.—*Comparison of diets (% by number) of Cattle Egret, Little Blue Heron, and Snowy Egret Chicks determined via analysis of undigested, regurgitated boluses.*

Prey items	Cattle Egret[1]	Little Blue Heron[2]	Snowy Egret[3]
Orthoptera	78.6	0.9	0.0
Diptera	4.4	0.2	0.0
Lepidoptera	0.9	0.0	0.0
Odonata	0.2	3.6	1.7
Hemiptera	0.3	2.5	0.2
Coleoptera	0.2	1.0	0.0
Homoptera	0.1	0.0	0.0
Neuroptera	T	0.0	0.0
Hymenoptera	T	0.0	0.0
Araneida	9.9	0.8	0.0
Acarina	T	0.0	0.0
Annelida	T	0.0	0.0
Isopoda	T	0.0	0.0
Decapoda	T	72.9	39.1
Diplopoda	T	0.0	0.0
Chilopoda	T	0.0	0.0
Pisces	T	13.1	58.9
Amphibia	4.3	4.7	0.0
Reptilia	0.3	0.1	0.0
Mammalia	T	0.0	0.0
Total	100.0	100.0	100.0

[1]Sample Size = 500 boluses; [2]Sample Size = 190 boluses; [3]Sample Size = 20 boluses; T = trace (< 0.1%).

flood plain pools, ponds, lakes, swamps, marshes, roadside ditches, and borrow pits contain water and there is abundance of crayfish and other aquatic organisms available to these birds. As breeding nears termination in July, rainfall usually is sparse and many aquatic habitats are drying up or are already dry.

Crayfish are easily caught in shallow water because of their visibility, size, slowness of forward movement, habit of coming to the surface in spring-summer months, and aggressive defense posture upon encountering an enemy (a frozen stance with elevated chelipeds facing the enemy). Such defense behavior, although probably effective in defense from some predators, renders a crayfish defenseless against the quick strike of a feeding heron or egret.

In contrast, the diet of Cattle Egrets is mostly (78.6%) orthopterous insects (Table 1). Although Cattle Egrets usually feed in association with grazing cattle, there is no apparent relationship between distribution and density of grazing cattle and the location of heronries in which they breed. Neither is there any apparent relationship between the breeding range of these egrets and maximum availability of grasshoppers and crickets, their major food items, which increase in abundance westward in Texas (*fide* consensus of Entomology Extension Specialists, Texas A&M University). Thus, it seems reasonable to assume that Cattle Egrets are attracted to inland heronries already established by Little Blue Herons and Snowy Egrets; the latter species, in turn, are limited by the distribution and abundance of crayfish.

I wish to thank Drs. Keith A. Arnold and Charles Davis for their guidance, suggestions, and editorial expertise in reviewing the manuscript. Taxonomic identification and ecological information about crayfish were kindly provided by Drs. W. A. Hayes and R. D. Reimer. I am very grateful to the Rob and Bessie Welder Wildlife Foundation for financial support during the research phase of my study and to the Department of Wildlife and Fisheries Sciences of Texas A&M University for financial support of this manuscript.

Literature Cited

Blacklock, G. W., et al. 1978. Texas colonial waterbird census, 1973-1976. Texas Parks and Wildl. Dept. FA Rep. Ser., 15:1-107.

Fogarty, M. J., and W. M. Hetrick. 1973. Summer foods of Cattle Egrets in north central Florida. Auk, 90:268-280.

Hartley, P. H. T. 1948. The assessment of the food of birds. Ibis, 90:361-381.

Jenni, D. A. 1969. The study of the ecology of four species of herons during the breeding season at Lake Alice, Alachua County, Florida. Ecol. Monogr., 39:245-270.

Medin, D. E. 1970. Stomach content analyses: Collections from wild herbivores and birds. Pp. 133-145, *in* Range and wildlife habitat evaluation—a research symposium. U.S. Dept. Agric./Forest Serv., Misc. Publ., 1147.

Penn, G. H., and H. H. Hobbs, Jr. 1958. A contribution toward a knowledge of the crawfishes of Texas (Decapoda, Astacidae). Texas J. Sci., 10:425-483.

Portig, W. H. 1962. Atlas of the climates of Texas (Based on the 50 year period 1910-1959). Austin, Bur. Eng. Res., Univ. Texas, 33 pp.

Reimer, R. D., and W. J. Clark. 1974. Decapod crustaceans of the Navosota River System in central Texas. Southwestern Nat., 19:167-178.

Siegfried, W. R. 1971. The food of the Cattle Egret. J. Appl. Ecol., 8:447-468.

Telfair, R. C., II. 1979. The African Cattle Egret in Texas and its relation to the Little Blue Heron, Snowy Egret, and Louisiana Heron. Ph.D. dissert., Texas A&M Univ., College Station, 619 pp.

Texas Conservation Needs Committee. 1970. Conservation needs inventory—Texas 1970. U.S. Dept. Agric., Soil Conserv. Serv., Temple, Texas, 297 pp.

Texas Parks and Wildlife Department. 1975. An analysis of Texas waterways: A report on the physical characteristics of rivers, streams, and bayous in Texas, 240 pp.

Texas Water Development Board. 1968. The Texas water plan. Texas Water Dev. Bd., 201 pp.

Address of author: *Dept. of Wildlife and Fisheries Sciences, Texas A&M Univ., College Station, TX 77843.*