

THREE-YEAR STUDY OF THE HERONRY AT ALLIGATOR BAY, N.C.

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The Alligator Bay heronry near Sneads Ferry, N.C., was studied intensively during the 1968, 1969, and 1970 breeding seasons. For a description of the location, vegetation, and history of this colony see Grant (1967). The heronry consists of a chain of small islands in the center of Alligator Bay. I have numbered these islands beginning with Island 1 as the easternmost and ending with Island 4 as the westernmost. In 1967 (Grant, 1967) three islands were occupied, but since that time growth of bushes, primarily waxmyrtle (*Myrica cerifera*) and silverling (*Baccharis* sp.), on the fourth island has created new heron nest sites there. Breeding waders are the Green Heron (*Butorides virescens*), Little Blue Heron (*Florida caerula*), Cattle Egret (*Bubulcus ibis*), Common Egret (*Casmerodius albus*), Snowy Egret (*Leucophoyx thula*), Louisiana Heron (*Hydranassa tricolor*), and Glossy Ibis (*Plegadis falcinellus*). In addition, Willet (*Catoptrophorus semipalmatus*), Red-winged Blackbird (*Agelaius phoeniceus*), and Boat-tailed Grackle (*Cassidix mexicanus*) nests are found on the islands.

ISLAND DISTRIBUTION OF NESTS

Numbers of nests per island from 1968 to 1970 appear in Table 1. In 1968 a total of 275 pairs of herons and egrets nested on the four islands in Alligator Bay. The number of nests swelled to an all-time high of 523 in 1969 but decreased to 369 in 1970 (Table 2). Islands 1 and 2 supported 190 and 199 nests, respectively, in 1969 but the number of nests decreased to 55 (Island 1) and 69 (Island 2) in 1970. Both Islands 1 and 2 exhibited large annual increases in the number of nests up to 1969, but many waxmyrtles were dying and falling down at this time. These are the oldest islands (vegetatively) and the large accumulation of droppings is apparently killing the trees. The

TABLE 1. *Distribution of herons and egrets by islands at the Alligator Bay, N.C., heronry.*

Year	Island 1	Island 2	Island 3	Island 4
1968	154	85	32	4
1969	190	199	116	18
1970	55	69	164	81

TABLE 2. *Number of nests of each species during 1968-1970 study at Alligator Bay, N. C.*

Species	1968	1969	1970
Green Heron	20	38	10
Little Blue Heron	55	46	49
Cattle Egret	45	140	81
Common Egret	60	85	68
Snowy Egret	30	45	40
Louisiana Heron	65	146	114
Glossy Ibis	0	23	7
Total	275	523	369

TABLE 3. *Nesting chronology at Alligator Bay, N. C., heronry 31 May 1968 and 30 May 1969.**

Species	Nest-building	Number of nests each stage		
		Egg	Egg and young	Young
Cattle Egret	2	9 (9)	—	— (4)
Snowy Egret	—	4 (8)	—	1
Green Heron	—	4	2	2
Little Blue Heron	—	2	—	1 (11)
Louisiana Heron	—	1	—	20 (3)
Common Egret	—	— (1)	—	11 (17)

*1969 data in parentheses.

only plant that seems to survive in quantity at the heavy accumulation sites is pokeweed (*Phytolacca rigida*), which cannot support heron nests. Trees will probably continue to die in this area for several years and therefore reduce the nesting sites available in this part of the colony. Two hackberries (*Celtis* sp.) are shading out some of the waxmyrtles on Islands 1 and 2, and these large trees are not used to any extent by the waders for nest sites. In addition, the mud flat connecting Island 1 to the mainland (on low tide) seems to be rising somewhat and may eventually form a land bridge giving some predator species easier access to this island. If this happens, Island 1 will probably be abandoned by the herons and egrets. Verification of this was noted in 1970 when that half of the island closest to the mainland did not support any nests.

A rapid increase in the number of nests on Islands 3 and 4 can be correlated to the increase in nesting sites made available by the growth of bushes and trees there. Only 16 pairs of herons nested on Island 3 in 1967 (Grant, 1967), but it supported 164 nests in 1970 (Table 1). A similar increase can be noted on Island 4 with only four nests in 1968 (none prior to 1968) but 81 in 1970. The vegetation on Islands 3 and 4 should continue to grow and increase the nesting area in this part of the colony.

Another factor contributing to the increase in the number of birds here is a new impoundment at West Onslow Beach (2 miles SW of colony). Converted from a black needlerush (*Juncus roemerianus*) marsh four years ago, this impoundment is the feeding grounds for several hundred herons, egrets, and ibises throughout each summer.

NUMBER OF NESTS BY SPECIES

Fluctuations in the numbers of each nesting species between 1968 and 1970 appear in Table 2. An increase for every species except the Little Blue Heron occurred from 1968 to 1969, but practically all decreased from 1969 to 1970. Cattle Egret figures are low because the counts were made the last week of May each year and they are late nesters. Broods initiated late in the season were not counted since individual nests were not marked. Young are still found in some nests until mid-September.

NESTING CHRONOLOGY AND COMPETITION FOR NEST SITES

On 31 May 1968 and 30 May 1969 I recorded the various stages of the nesting cycle of several species of herons and egrets in the colony (Table 3). Cattle and Snowy Egrets appeared to be later nesters than the other species. Green and Little Blue Herons were intermediate in the breeding cycle on these dates, while the Common Egret and Louisiana Heron were early breeders.

Greater competition for nest sites during the 1970 breeding season would be expected with a decrease in suitable nesting sites due to the dying of much supporting vegetation. The Green Heron, an intermediate nester (Table 3), declined from 38 nests in 1969 to 10 in 1970. The Cattle Egret, a late nester (Table 3; Adams, 1963; Beckett, 1965), declined from 140 nests in 1969 to 81 in 1970. Other species, such as the Little Blue Heron,

Common Egret, and Snowy Egret, remained relatively stable while the Louisiana Heron declined noticeably. Green Herons nest typically around the edges in low shrubbery and are relatively low on the social order (less aggressive), perhaps accounting for their decline in numbers. It was quite evident that the larger herons and egrets had taken over much of this edge shrubbery where only Green Herons had nested previously. The decline in the number of Cattle Egrets can probably be attributed to their arriving at the colony late in the breeding season after many sites had been chosen. The Cattle Egret is second to the Common Egret (Adams, 1963) in social dominance and would probably have maintained its numbers had it arrived and been physiologically ready to begin nesting at the same time as the earlier-nesting species. Little Blue Herons seem to be intermediate both as a nesting wader and in social dominance, but they have actually shown a slight increase from the 1969 to the 1970 breeding season. The Common Egret, being an early nester (Table 3; Beckett, 1965; Teal, 1965) and at the top of the social order (Adams, 1963; pers. obs.), nested in generally the same numbers all three years. The Snowy Egret is intermediate in social dominance and a late nester (Table 3; Beckett, 1965; Teal, 1965), but it was able to maintain its numbers at Alligator Bay. Adams (1963) found Snowy Egrets to be early nesters at Battery Island, near Southport, N.C. An early nester such as the Louisiana Heron would be expected to maintain its numbers since it had second choice (after Common Egret) of nest sites early in the breeding season, but this was not the case in 1970. The area on that part of Island 1 closest to the mainland which was not used in 1970, perhaps because of easier predator access, had been used almost exclusively by Louisiana Herons in 1969. Glossy Ibis appear to be rather erratic nesters at this colony. Thirteen nests were found for the first time in 1962, but only three were found in 1967 (Grant, 1967). No nests were built in 1968, an all-time high of 23 were counted in 1969, and only seven were found in 1970 (Table 2). Glossy Ibis consistently nest later than the heron species in New York (Post, Enders, and Davis, 1970). The increase in abundance of Cattle Egrets, also late nesters, at the Alligator Bay colony may be having a detrimental effect on the Glossy Ibis. Both species began nesting there in the early 1960s (Grant, 1967) but the ibis has exhibited very little build-up while Cattle Egrets have increased annually up to 1969. (The decline in 1970 is attributed to other factors described earlier in this paper.) It seems probable that the more aggressive Cattle Egret is competing with the Glossy Ibis for nest sites late in the breeding season and may be forcing the ibis to nest elsewhere, perhaps to the north.

ROOSTING NOTES

A count of the herons, egrets, and ibises coming in to roost was made on 27 July 1969 at Alligator Bay. Between 18:00 and 20:55 a total of 3,025 herons, egrets, and ibises joined an estimated 500 to 1,000 birds already present at the colony. The roost count cannot be used as a means of measuring the productivity of the colony in 1969 because there was no way to determine how many of these nested and were raised here, how many were post-seasonal dispersants from colonies to the south, and how many local birds had dispersed northward and inland earlier in the season. Only 23 Glossy Ibis nests were found in 1969 and 685 came in to roost on 27 July 1969. No White Ibis (*Eudocimus albus*) nests have ever been found at this colony but 166 (all but three were immature birds) roosted here in late July 1969. The northernmost nesting colony of White Ibis along the Atlantic seaboard is Battery Island, near Southport, N.C. (Adams, 1963). As many as 2,000 were counted at Battery Island in 1968 by Parnell (1968). This influx of non-breeders was an extraordinary example of post-breeding dispersal from southern heronries.

REPRODUCTIVE SUCCESS

Reproductive success at Alligator Bay was high all three years of this study. No storms of any significance occurred during the three breeding seasons, and relatively few

dead young were found on the ground under the nests as compared to the severe 1967 season (Grant, 1967).

BILL COLOR IN YOUNG CATTLE EGRETS

On 8 and 15 September 1968 I studied 12 black-billed immature Cattle Egrets at Alligator Bay. These young were capable of short flights. Palmer (1962) states that most of the bill of the Cattle Egret is a "grayed yellow lime" and that the bill becomes "chrome yellow" in the Basic I plumage acquired between late summer and winter. The only North American literature reference found describing the black bill color was by Quay and Adams (1956), who noted that young Cattle Egrets at Battery Island had "uniformly darkish bills." William Post and I visited the Alligator Bay colony on 27 July 1969 and banded four young Cattle Egrets. In one nest, a black-billed young and a yellow-billed young (both about two weeks old) were banded. The other two young were from separate nests and both had black bills. One chick was about 10 days old and the other was about four weeks old. Several other young with black and yellow bills were observed, and I photographed both types. I returned to Alligator Bay on 1 September 1969 and found 12 young (between one and four weeks old), all with black bills. On 27 July 1970 I counted three (10.3%) yellow-billed and 26 black-billed Cattle Egret nestlings (all between two and four weeks old). William Post (pers. com.) banded 49 Cattle Egrets in the Springfield colony in South Carolina on 20 July 1969 (Post, 1970). The bills of most of these were blackish-gray with yellow tips and edges. Post also took detailed color photographs of the soft parts of these young Cattle Egrets and collected two specimens. Post examined one young (five to seven days old) on 21 July 1969 with an entirely yellow bill and noted some birds retain black bills until almost fledged. Some young retain the black bill color at least until late fall. Thomas L. Quay and Robert J. Hader (pers. com.) studied a black-billed Cattle Egret in a group of six at Lake Mattamuskeet, N.C., on 9 November 1969.

These above notes are consistent with Blaker's (1969, p. 122) findings in South African Cattle Egrets. He found that newly hatched young have "pale flesh- or horn-coloured beaks and lores. From about five days onwards the beak begins to darken until it becomes almost completely black at 10 to 15 days, and from about the 30th day onward it begins to turn paler again until it reaches the normal adult yellow colour at two to three months." He found an estimated 2% to 5% of the young do not go through this black-billed stage but change from flesh color to yellow. Blaker concludes that this color change to black bills in young Cattle Egrets evolved to prevent the nestlings from inflicting injury by attempting to eat each other. He (p. 124) believes the "chicks' beaks act as suboptimal releasers of feeding behaviour" and suggests that the lack of a black-billed stage may be "due to a recessive factor" (Blaker, 1969, p. 124).

SUMMARY

The Alligator Bay heronry near Sneads Ferry, N.C., was studied during the 1968, 1969, and 1970 breeding seasons. The islands that make up the colony are in various vegetational stages, and bird distribution is changing with plant growth. A total of 523 nests were found in 1969, but this decreased to 369 nests in 1970 due to the dying of many trees that supported nests previously. Nesting chronology and social dominance patterns are discussed in relation to the increased competition for nest sites in 1970. Young Cattle Egrets with black bills were studied, and notes are included on this vaguely known subject.

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Route 1, Box 563, Sneads Ferry, N.C., 10 September 1970.