

### SITE SELECTION FOR NESTING COLONIES BY THE AMERICAN WHITE IBIS *EUDOCIMUS ALBUS* IN FLORIDA

The function and adaptive significance of colonial nesting and communal roosting have recently become subjects of considerable discussion. In this paper, I discuss data on the selection of roosting and nesting sites by the American White Ibis *Eudocimus albus* that suggest the process is related to availability of feeding habitat. In southern Florida, U.S.A., from 1972 to 1975, feeding concentrations and nesting colonies were located by aerial reconnaissance and ground observation in the vast freshwater marshes and swamps of the Everglades and Big Cypress Swamp; colonies with foraging grounds in coastal habitats are not considered in this paper.

Rainfall in southern Florida is seasonal, about 85% of the rain falling during May–October. During the winter–spring dry season, water levels drop and the extensive shallow marshes and swamps dry progressively. White Ibis make intra-regional movements during the course of the year responding to changes in water conditions. Many ibis feed along the coast and on higher ground in the summer wet season, move inland during the autumn, and continue to change feeding areas during the winter and spring. These movements correlate with the seasonal drying of the southern Florida wetlands. As the water level at any location falls to a depth at which feeding becomes possible, ibis move in, forage there for a limited period (Fig. 1), and then, concentrated near the edge of residual flooded marshes, follow the withdrawing water to a new area.

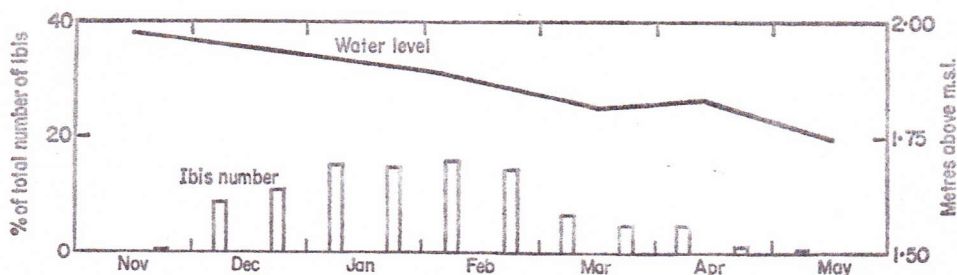


FIGURE 1. Changes in number of White Ibis feeding in an area of the Everglades related to falling water levels.

This movement from one foraging area to the next is accompanied by successive establishment and abandonment of roosts. As the dry season progresses the number of roosting sites used becomes fewer, and the roosting birds at each correspondingly more numerous (Fig. 2).

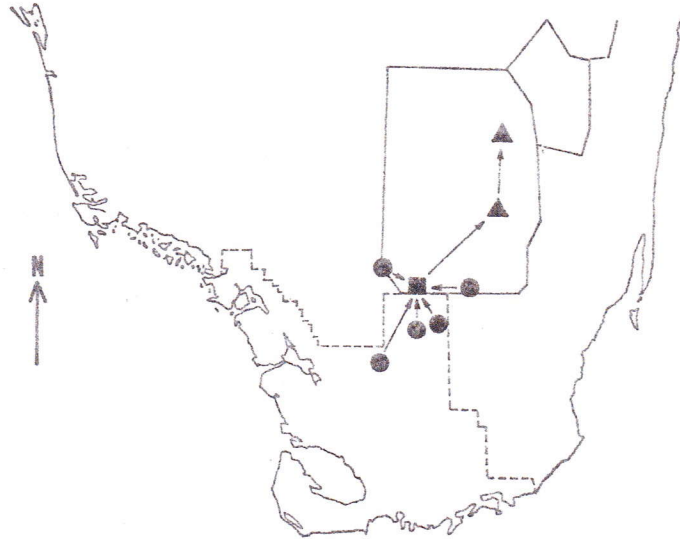


FIGURE 2. Roosts used by White Ibis foraging in the Everglades. Arrows show the succession of roosts used in 1973. (●) December-February; (■) February-March; (▲) March.

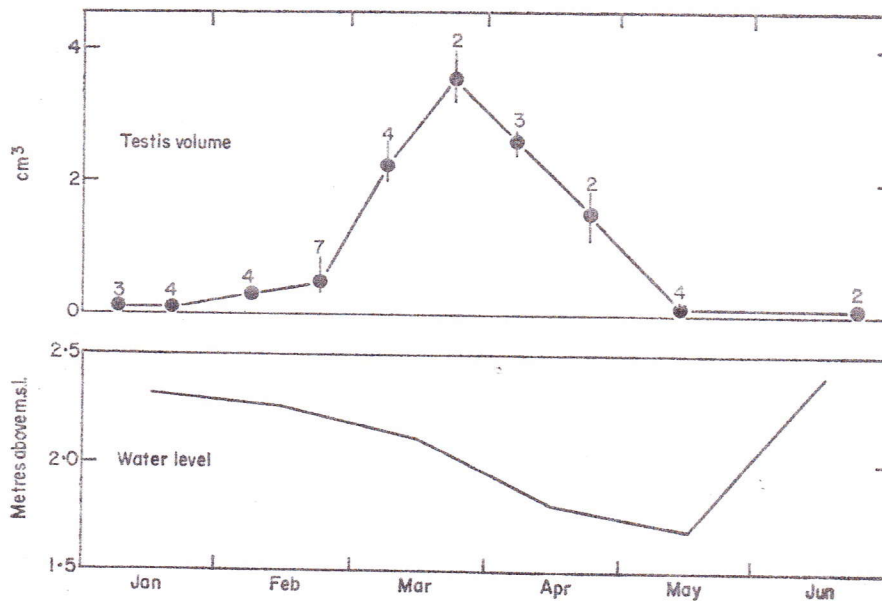


FIGURE 3. Breeding cycle of the White Ibis in interior southern Florida related to water levels. Average testis volume is plotted against time for specimens collected in the Everglades, 1972-73; vertical lines are the ranges; numbers are sample size. The ranges for points without vertical lines are too small to be shown. The long term average pattern of water level changes is shown in the bottom graph.

Breeding of the White Ibis in the Everglades is also affected by water levels. Testes begin enlarging in February (Fig. 3). Nesting can commence in March and typically takes place in the last three months of the dry season. The formation of nesting colonies is initiated by males remaining at roost sites for periods during the day (Meyerrieks 1962). Increasingly intensive displays lead first to pair formation, and subsequently to the selection of nest sites. The initial stages of pair formation take place at roosts which precede those where nests are built. As the ibis follow suitable foraging habitat during the winter-spring drying season, they use roosts near each area in turn. An increasing number of displaying males remaining during the day in a succession of roosts eventually leads to the establishment of a nesting colony at one such roost. Prolonged use of a roost occurs near an area used for foraging for a correspondingly long period, and thus the process generally results in the siting of nests at locations within convenient range of food sources.

Nesting colonies are not established at fixed sites, but differ in location from one year to the next, reflecting changes in the feeding areas currently used. In 1972 the southernmost colony was formed at the edge of the southern Everglades, and the birds fed in the Everglades marshes (Fig. 4). In 1973, the southernmost colony was sited near the coast

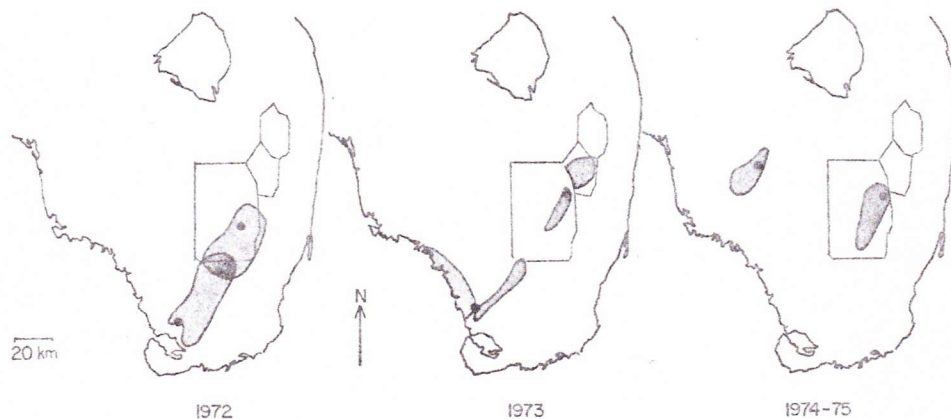


FIGURE 4. Feeding areas (stippled) used by White Ibis nesting at different colonies (dots).

and the birds fed in the western part of the Everglades and in coastal habitats. In 1972 the northern colony formed in the northern Everglades in 'Water Conservation Area 3', in which the birds fed. In 1973, the northern Everglades colony formed further north, and the birds fed primarily in 'Water Conservation Area 2' where water management authorities were lowering the water table. In 1975, when Area 2 was not lowered, a colony again formed in the southeast and feeding was concentrated in Area 3. In 1974, a colony formed in the Big Cypress Swamp after heavy summer rains had elevated the water table and subsequent drying during the autumn provided conditions suitable for feeding and nesting. Thus each year the locations of White Ibis nesting colonies were related to current feeding opportunities, and in two cases unusual water conditions elicited establishment at novel locations (Fig. 5).

Nesting sites used by colonial ciconiiforms are typically subject to vagility; numerous reports exist of the establishment, decline or disappearance of colonies. The data on the American White Ibis presented in this paper suggest that in some cases changes of nesting locations, particularly long distance displacements, are related to variations in feeding resources.

Colonially nesting birds of semi-arid environments, including ibises, undergo similar movements (Carrick 1962, Ward 1971). This suggests an association with climates that

are seasonally and annually variable in the distribution of areas of food availability. In the White Ibis, the behaviour has resulted in long-term shifts in nesting distribution in response to environmental alterations affecting feeding conditions, and thus represents an adaptive response to the natural and artificial variability of the southern Florida environment.

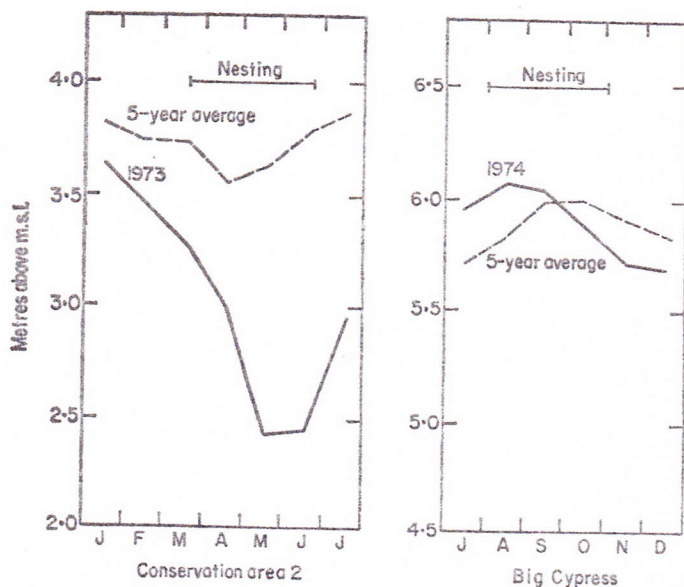


FIGURE 5. Water conditions related to the opening of foraging areas and subsequent nesting of White Ibis in two locations. Both graphs show monthly average water levels during the relevant year compared to the average for the previous five years. In Conservation Area 2, management lowering of water level contrasted with the average condition; White Ibis nested during the spring period of water level decline, and fed in the affected area. In Big Cypress, summer elevation of water levels from the previous dry season was followed by an autumn decline during which ibis nested and foraged in the affected area.

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