

Periodically owl A gave thin, high-pitched whines reminiscent of those of a small dog while preening and, more consistently, while being preened. Following this exchange owl B moved several feet away for about 3 min and began series-hooting, again at roughly 20-sec intervals. It returned to owl A for another brief allopreening session, then moved away again. Thereafter both sat 3 feet apart and preened themselves, paying little or no attention to each other. Owl B gave infrequent series-hoots during this period. The birds continued in this manner until we left them 10 min later.

Neither at the time, nor on subsequent examination of color slides, could the sex or age class of either individual be determined unequivocally, but both appeared to be in full adult plumage. The vertical stripes on the underparts of B were thicker and heavier than those of A. This difference shows up as individual variation between adult specimens of both sexes examined at the Museum of Comparative Zoology. The impression of all three observers present was that owl A may have been larger (suggesting it to be female), but if present, the size difference was very slight.

Allopreening has been recorded in over 40 families of birds (Harrison 1965, op. cit.). Harrison's review indicates that agonistic tendencies between individuals may be appeased through allopreening in many species, but the reciprocal, entirely peaceful nature of the Barred Owl encounter gave no evidence of agonistic behavior. Allopreening also appears to function as a means of sex recognition in some monomorphic species, and it may, in addition, provide a ritualized mechanism for pair bond maintenance in species that pair for extended periods. Thus allopreening could clearly benefit owl pairs, which spend much of their time separated by dense foliage within large territories. Emlen (1973, *Condor* 75: 126) noted that the frequency of temporally coordinated singing in owls is related to the "reduced effectiveness of visual communicatory mechanisms" in most species, thus increasing their dependence on auditory display. The intense vocal duet that preceded the Barred Owl's mutual preening may have been related to pair recognition and maintenance, and offers some evidence that allopreening may serve this function as well.

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Foraging associates of White Ibis.—In estuarine habitats in the Tampa Bay region of Florida, White Ibises (*Eudocimus albus*) commonly forage by probing actively with their bill in soft mud. On 21 November 1972 Courser noted Snowy Egrets (*Egretta thula*) closely associated with White Ibises while the two foraged in Upper Old Tampa Bay, Hillsborough County, Florida. Both of us have since watched for White Ibis feeding associates on numerous occasions throughout 1973 and report here our observations.

Although numerous instances of species of Ciconiiformes using other animals as beaters are reported in the literature (Christman 1957, Parks and Bressler 1963, Heatwole 1965, Emlen and Ambrose 1970, Leck 1971, Dinsmore 1973), the

TABLE 1

SUMMARY OF FORAGING RELATIONSHIPS BETWEEN SNOWY EGRETS AND WHITE IBISES IN TAMPA BAY, FLORIDA, 5 JANUARY 1973

Time	No. of egret-ibis foraging groups	No. ibises present	Ibises in foraging groups	No. egrets present	Egrets in foraging groups
0915	10	15	10	19	16 (84.2 ¹)
0930	10	16	10	18	13 (72.2)
1015	13	16	14	22	20 (90.9)

¹ Percent in foraging groups.

use of the White Ibis as a beater apparently has not been reported previously. The activity we saw on numerous occasions usually involved one or more Snowy Egrets following within 1 m of a White Ibis. Three times we saw a single Louisiana Heron (*Hydranassa tricolor*) use a White Ibis as a beater. The associates fed on organisms apparently disturbed as the ibis probed in mud. Often we saw an egret fly directly to an ibis and begin to follow closely in its wake as soon as the ibis started foraging. The associates would follow an ibis for several minutes if it continued to forage but would move to another ibis if the one they were following stopped foraging or if another nearby ibis began feeding actively. Sometimes an associated egret would pause to investigate or ingest something disturbed by the ibis, then increase its walking speed to catch up to the same ibis. On three occasions we saw a Laughing Gull (*Larus atricilla*) follow an ibis.

On 5 January 1973 Dinsmore made three counts of all of the Snowy Egrets and White Ibises foraging in an estuary near St. Petersburg, Florida, noting all of the foraging associations and also the egrets or ibises that were foraging alone. The results (Table 1) show clearly how prevalent the association can be. At that time over 70% of the Snowy Egrets in the area were foraging with White Ibises. It is tempting to conclude that the egrets benefit by capturing more food more efficiently by using the ibises as beaters, much as Cattle Egrets (*Bubulcus ibis*) do when foraging with cows or farm machinery (Dinsmore 1973), but the few timed observations we have do not support that idea and this aspect needs further study and quantification.

All instances in which we noted this behavior were on mud flats exposed by low tide or in the shallow water along such flats. Although we have commonly seen White Ibises and either Snowy Egrets or Louisiana Herons foraging together in other habitats, we have not noted this close foraging association in these other situations. The association also seems to be most common during the winter as our records of it span 9 November through 13 April. The two may well associate at other times of the year but we have not noted it. These observations further indicate the ability of Ciconiiformes to use a variety of foraging methods while feeding together in one place (Meyerriecks 1962).

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Unusual feeding by Blue-footed Booby.—All Sulidae catch their food by aerial diving, usually by spectacular dives from high in the air—the method termed “deep plunging” by Ashmole (1971, p. 226 in *Avian biology*, vol. 1 (D. S. Farner and J. R. King, Eds.), New York, Academic Press). In the Gannet (*Morus bassanus*) the dive is usually passive except for a few initial wingflaps as the bird turns from level flight into the dive. Gravity alone is responsible for getting the bird deep enough to catch the fish. The situation is different in at least some tropical boobies that gain extra acceleration by flapping during a power dive. Power diving is common in the Blue-footed Booby (*Sula nebouxii*) and Red-footed Booby (*S. sula*) and I have also seen it a few times in the Masked Booby (*S. dactylatra*), though this latter species usually plunges more in the manner of the Gannet. The extra speed probably serves two purposes, both the result of the great clarity of tropical seawater. Firstly birds can detect fish at greater depths and need greater momentum for extra penetration. Secondly as fish near the surface can see the birds coming a split second earlier than they can in murky conditions, extra speed is needed to offset this advantage.

Although all species normally feed by deep plunging, some species have evolved their own specialized feeding techniques. The pelagic feeding Red-footed Boobies, and to a lesser extent Masked Boobies and Brown Boobies (*S. leucogaster*), can catch flying fish put to flight by boats and, presumably under the more natural conditions, by predatory fish. Although Blue-footed Boobies have been reported as catching fish in the air (Gifford 1913, *Proc. California Acad. Sci.* 2, part 1), this must be uncommon, as I have not seen it in 4 years' fieldwork, and the species tends to be an inshore feeder and can dive into remarkably shallow water. Nelson (1968, *Galápagos, islands of birds*, London, Longmans) saw one dive into a pool only 2 feet deep. The following observations show that a few individuals have mastered the technique of fishing in even shallower water.

The dining room of the Charles Darwin Research Station on Santa Cruz in the Galápagos Islands overlooks an extensive coral and stone reef that is exposed at low tide. Blue-footed Boobies are common there and often feed close inshore. During 3 years between 1965 and 1970 I never saw these boobies fishing by any method other than diving into the water from between the vertical and 30° to the horizontal, but in early 1971 I noticed a single adult Blue-footed Booby feeding by flying rapidly a few feet above the water and power diving in at some 10° to the horizontal. Here the power diving was obviously adding speed rather than penetration to the dive. What was presumably the same individual was seen most days for a period of several months and, although difficult to quantify,