COMMENSAL FEEDING OF GREAT EGRETS WITH BLACK-TAILED DEER

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Commensal foraging associations are defined as those in which one species aids the foraging of another while incurring no significant costs and receiving no benefits (Wiens 1989). A common commensal association comprises a "beater" species unintentionally flushing and thus making prey available for an "attendant" species (Wiens 1989). Commensal foraging is relatively common among birds, with most such associations between two or more species of birds (see Baker 1980, Robbins 1981, Hino 1998). Foraging associations between birds and mammals are somewhat less common but have been observed with Nine-banded Armadillos (*Dasypus novemcinctus*; Komar and Hanks 2002), West Indian Manatees (*Trichechus*; Scott and Powell 1982), Maned Wolves (*Chrysocyon brachyurus*; Silveira et al. 1997), human beings (Skutch 1969), other primates (Stott 1947, Boinski and Scott 1988, Ruggiero and Eves 1998), and, most frequently, ungulates (Heatwole 1965, Dinsmore 1973, Grubb 1976, Dean and MacDonald 1981, Burger and Gochfield 1982, Källander 1993, Ruggiero and Eves 1998).

Commensal foraging has been observed in several species of wading birds (see Kushlan 1978, Bennett and Smithson 2001). Kushlan (1978) reported that Great Egrets (*Ardea alba*) attend cattle, citing Rice (1954) and Caldwell (1956). Contrary to Kushlan's (1978) citation, however, Rice (1954) did not observe Great Egrets foraging with cattle. Caldwell (1956) did observe one Great Egret foraging adjacent to cattle but claimed that the egret was attracted to the pasture by a large number of Snowy Egrets (*Egretta thula*) and that it would not have foraged by the cattle in the absence of the Snowy Egrets.

Additional commensal foraging associations between Great Egrets and mammals have been reported from Africa (Dean and MacDonald 1981), where Ruggiero and Eves (1998) observed them accompanying Gorillas (*Gorilla gorilla*), African Elephants (*Loxodonta africana*), and Cape Buffaloes (*Syncerus caffer*), which flushed prey, but to our knowledge there is no published reference to this behavior in North America (see McCrimmon et al. 2001, Kushlan and Hancock 2005).

Here we report the first documented instances of Great Egrets evidently foraging commensally with Black-tailed or Mule Deer (*Odocoileus hemionus*). Two egrets were in one herd, one in the other. We observed this behavior at Bodega Bay, Sonoma County, California (38° 18′ N, 123° 03′ W), on Bodega Head, a rocky headland that forms the entrance to Bodega Harbor, in a mix of annual coastal grasslands and northern coastal scrub (Davison and Barbour 1977). On 24 November 2006, between 14:00 and 15:30 hr PST, we saw two separate herds of deer (of 8 and 14 individuals), approximately 150 m apart. Five Great Egrets were foraging alone, using "stand and wait" and "walk slowly" behaviors (Kushlan 1976, Kelly et al. 2003), on the same slope, the closest egret being approximately 50 m away from the deer at the beginning of the observation. All egrets were a minimum of 10 m away from each other during this period. After 10 min of observation, an egret flew in and landed near the center of the herd of 14 deer and began to "walk slowly," foraging among them while the deer foraged. Five minutes later, another egret flew in and landed centrally in the herd of 8 deer and also began to "walk slowly," foraging within the herd. For the next 30 min both egrets foraged with the deer, moving at their same pace across the grassy slope. Each egret remained 1–2 m behind a particular deer throughout the observation period, closely following the mammal's foraging path

while continually searching for prey behind the deer. Later (45 min), a second egret flew in and joined the herd of 14 deer. This egret foraged in the same manner as the others, staying at least 5 m from the other egrets and 1–2 m from a particular deer. During this observation both deer/egret groups covered a distance of approximately 75 m. While all egrets followed an individual deer during this observation, they were also in front of deer within the same herd.

On numerous occasions we observed both the egrets making foraging strikes and behaving as if they had made a successful catch (e.g., pausing from active foraging apparently to swallow prey). We did not identify the prey obtained nor did we quantify the success rate, either of individuals feeding on their own or of those in the deer herd. Therefore we could not confirm any benefits for the Great Egrets of foraging commensally with the deer. Neither did we measure prey abundances at foraging sites.

The Great Egrets we observed exemplified the species' behavioral plasticity, foraging either individually or commensally with deer in an upland habitat. Maccarone and Brzorad (2002) showed that the Great Egret's foraging strategies are more flexible than previously thought, the birds being successful in both still and moving waters and in habitats influenced by tides and rainfall. While much is understood about the species' foraging behavior in aquatic habitats (see McCrimmon et al. 2001), there is little information about its repertoire in upland habitats.

Commensal feeding by Great Egrets might increase their foraging success (Kushlan 1978). The Cattle Egret (*Bubulcus ibis*) captures more prey and expends less energy while foraging with grazing mammals than without (Heatwole 1965, Dinsmore 1973, Grubb 1976, Burger and Gochfield 1982). Cattle Egrets are adapted to foraging on land, however, while Great Egrets forage primarily in water. In this instance, the movements and grazing of the deer herds might well have flushed terrestrial prey located within the vegetation. But we do not know if this association actually benefited the Great Egrets or simply offered an alternative foraging strategy.

Birds may forage alone, to avoid competition, or with conspecifics, to benefit from the actions of the other birds (Crook 1964, Krebs and Davies 1997). Great Egrets that forage as individuals within a deer herd may avoid conspecific competition yet gain the advantage of commensal disturbance, as the deer flush prey ahead of them or expose prey in disturbed vegetation behind them. Alternatively, the egrets may have been foraging with the deer as an anti-predator tactic, gaining the benefit of sentinel individuals. However, the only local likely mammalian predators of Great Egrets, the Coyote (*Canis latrans*) and Mountain Lion (*Felis concolor*), are uncommon to rare in this area (www-bml.ucdavis.edu/bmr/Mammal_List.PDF) and likely present little threat to egrets.

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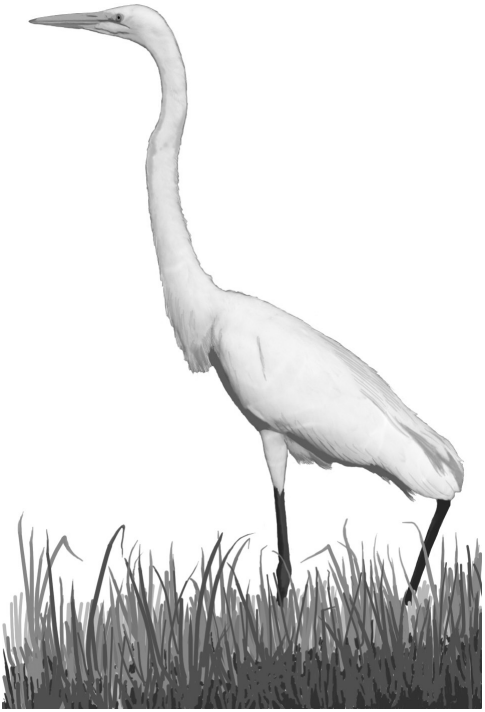

Great Egret

Sketch by George C. West