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INTERACTIVE BEHAVIOR AMONG BALD EAGLES WINTERING IN NORTH-CENTRAL MISSOURI

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Despite the increasing interest in the Bald Eagle (*Haliaeetus leucocephalus*) attested to by recent field studies (Shea 1973; Lish and Lewis 1975; Servheen 1975; Steenhof 1976; Stalmaster and Newman 1978, 1979), few published reports describe intraspecific behavior of Bald Eagles in winter. The present paper describes the frequency and extent of intraspecific conflict, and discusses the possible consequences of patterns of interactions between adults and immatures.

Eagles commonly displace one another from food items and perches (Southern 1963, Shea 1973, Servheen 1975). Intraspecific aggression may be most common during feeding periods (Jonen 1973), and adults usually dominate immature birds in aggressive encounters (Erskine 1968). In Oklahoma, Lish (1973) described displacement, tail chasing (aerial pursuit) and talon presentation behavior of wintering Bald Eagles. From these observations, Lish suggested that a social hierarchy might exist on the wintering grounds. Stalmaster and Newman (1979) stated that the oldest bird usually occupied the highest site when eagles of different age classes perched in the same tree.

METHODS

I watched the behavior of Bald Eagles almost daily from October 1975–March 1976 at Swan Lake National Wildlife Refuge, Chariton Co., north-central Missouri. I observed intraspecific behavioral dominance at or near feeding areas and perch sites, but not near night roosts. I used binoculars (7 × 50 mm) and a spotting scope (15–60×), and made all observations from a vehicle or blind. Birds with entirely white heads and tails were classed as adults; all others were classed as immatures.

Types of aggressive encounters included displacement, aerial pursuit and talon presentation. Criteria of dominance in displacement encounters included the supplanting of 1 eagle by another from a food item or perch, or the fleeing of an eagle when another approached. Aerial pursuits involving more than 1 chasing bird were tallied according to age classes of the birds involved. Only 1 talon presentation was tallied per encounter regardless of the number occurring. To compare participation in aggressive encounters by birds of the 2 age classes, it is necessary to take into account the proportion of birds in each age class. Accordingly, these analyses followed Hailman's (1975) procedure, incorporating a Chi-square test. Twenty-two ground counts were made during the study.

RESULTS AND DISCUSSION

Numbers of Bald Eagles on Swan Lake Refuge fluctuated throughout the winter. A peak of 66 birds occurred on 2 December. In 22 censuses, 353 observations of immatures and 248 of adults were recorded. The adult

TABLE 1

DISPLACEMENT ATTEMPTS, AERIAL PURSUITS AND TALON PRESENTATIONS OF IMMATURE AND ADULT BALD EAGLES, SWAN LAKE NATIONAL WILDLIFE REFUGE

Types of encounter	Immature—Immature[a]	Immature—Adult	Adult—Immature	Adult—Adult	Total
Displacement[b]	102[c] (10)	40[c] (3)	32[d] (1)	64[d] (1)	238 (15)
Percent of total	43%	17%	13%	27%	100%
Aerial pursuits	45[d]	9	3[d]	4[d]	61
Percent of total	74%	15%	5%	6%	100%
Talon presentation	23[d]	3	0[c]	1	27
Percent of total	85%	11%	—	4%	100%

[a] Initiator—recipient.
[b] Numbers of unsuccessful displacement attempts in parentheses.
[c] $P < 0.05$, numbers of encounters according to age class differing from expected (see text).
[d] $P < 0.01$, numbers of encounters according to age class differing from expected (see text).

component ranged from 0–$^4/_5$ of the observed winter population. Detailed information on eagle populations at the refuge during this study is in Griffin (1978).

Feeding.—Feeding was highly communal. A few (2–3) to more than 30 eagles fed close together. Eagles rarely shared the same food item. Most of the heavier food items, waterfowl and fish carcasses, were consumed on the ground or ice. Eagles waded to carcasses in shallow water and dragged them to shore or onto a low perch to feed. Eagles sometimes gathered small carcasses from the water, frozen impoundments or shore by swooping upon them without landing.

Displacement.—Bald Eagles were seen attempting to displace each other from food carcasses and perches at the feeding areas 238 times. All but 15 (6.3%) attempts were successful. Of 238 attempts, 102 (43%) were between immature birds and 64 (27%) between adults. Immature eagles attempted to displace adult birds in 40 (17%) of the observations and adult eagles tried to displace immatures in 32 (13%) (Table 1).

Aerial pursuit and talon presentation.—Aerial pursuits and talon presentation (Fig. 1) occurred at both low and high altitudes throughout the winter, whether or not food was being carried. In a pursuit, one or more eagles chased another, sometimes flying within 0.5 m of each other. Eagles used a fast descending glide when chasing and a labored flapping flight when pursuit was intense. The pursued eagle performed evasive maneuvers, usually steep dives or dives followed by a steep climb. Most aerial pursuits lasted less than 30 sec; however, some pursuits lasted at least 8 min, with the birds flying out of sight. Of 61 observations of aerial pursuits, 27 (44%) involved at least 1 talon presentation. In some instances, after presenting talons, the pursued bird became the pursuer.

FIG. 1. Aerial pursuit and talon presentation of Bald Eagles (after Lish 1973).

Talon presentation occurred when one of the pursuing eagles dived at another in flight. As the diving eagle neared the lower-flying eagle, the latter flipped over and presented its talons. Contact between the bodies of the 2 eagles occurred occasionally. This behavior is similar to Bald Eagle courtship displays (Brown and Amadon 1968) except that whirling with the talons locked does not occur.

The interactions of immature and adult eagles during aerial pursuit and talon presenting are tallied in Table 1. Immature eagles pursued and presented talons to adults or other immatures in most observations. Adult eagles pursued immatures or other adults in only 11% of the aerial pursuit observations. There were no observations of adults presenting talons to immatures, and only 1 observation (4%) of an adult presenting talons to another adult.

Some aerial pursuits and talon presentations involved stealing of food in flight. The number of cases was not determined because of the difficulty of seeing food in the talons. In food-stealing encounters, 1–5 eagles approached the food-carrying bird from the rear, pursuing birds flipped over and took the food from the pursued bird's talons or dived repeatedly, forcing the pursued eagle to drop the food. Once food was dropped, a pursuing eagle attempted to recover it.

Patterns of interactions related to age.—Considering their relative abundances, adult eagles initiated significantly fewer displacement attempts

($\chi^2 = 11.427$, df = 1, $P < 0.01$, N = 238), aerial pursuits ($\chi^2 = 9.389$, df = 1, $P < 0.01$, N = 61) and talon presentations ($\chi^2 = 6.540$, df = 1, $P < 0.05$, N = 27) with immatures than expected. However, adult birds attempted to displace other adults more frequently than expected ($\chi^2 = 13.611$, df = 1, $P < 0.01$, N = 238). Immatures often entered into displacement attempts ($\chi^2 = 4.828$, df = 1, $P < 0.05$, N = 238), aerial pursuits ($\chi^2 = 27.285$, df = 1, $P < 0.01$, N = 61) and talon presentation ($\chi^2 = 20.151$, df = 1, $P < 0.01$, N = 27) with other immatures; however, immatures infrequently attempted displacement of adults ($\chi^2 = 5.415$, df = 1, $P < 0.05$, N = 238) (Table 1). These apparent patterns must be viewed with some caution, because the behavior was possibly influenced by severity of weather, abundance of food and numbers of eagles present. These conditions changed frequently and their effects could not be analyzed.

The potential is great for severe injury from aggressive fighting of such a large and pugnacious bird as an adult Bald Eagle, and immature eagles are probably seldom competitive with adults at aggressive fighting. Conditioning from previous encounters probably has encouraged a dominance-subordinance relationship favoring adults as has been indicated for many large aggressive mammals such as lions (*Panthera leo*) (Schaller 1972), wolves (*Canis lupis*) (Mech 1970) and a number of primate species (Brown 1975).

Several studies of avian foraging have shown that the ability to obtain food improves with age (reviewed by Buckley and Buckley 1974, Verbeek 1977). To compensate for lesser prowess at finding, capturing and defending food, immature eagles may be forced to (1) spend more time than adults in searching for food, (2) seek alternative food sources, (3) use different wintering areas than adults, or (4) resort to stealing. The fourth alternative may lead to the strong tendency noted in this study for immature eagles to enter into aggressive encounters at feeding areas. The third alternative may also be important. The age ratio of immatures to adults at the refuge is lowest during the periods of harshest weather and lowest food availability (Griffin 1978). This fact and the known tendency for immature eagles to winter farther south than adults (Sprunt and Cunningham 1962, Ingram 1965, Sprunt and Ligas 1966) indicate than many immature eagles may seek wintering areas not used by adults.

SUMMARY

Wintering Bald Eagles displayed food and perch displacement, aerial pursuit and talon presentation behavior on the wintering grounds. Immature eagles initiated most of these behavioral interactions, and most displacement attempts were successful. In displacement attempts, immatures tried to displace adults somewhat more frequently than adults tried to displace immatures. Nearly half of all aerial pursuits involved at least 1 talon presentation. An undetermined number of aerial pursuits and talon presentations involved food being

stolen from the pursued eagle. Considering their relative abundances, adult eagles initiated significantly fewer displacement attempts, aerial pursuits and talon presentations with immatures than expected. Although immatures often entered into all 3 behavioral interactions with other immatures, they infrequently attempted displacement of adults.

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PRESIDENT'S MESSAGE

As part of its efforts to encourage research by students and amateurs The Wilson Ornithological Society sponsors a series of awards. Of these, the two oldest, named in honor of Louis Agassez Fuertes and Margaret Morse Nice, are not supported by endowment. Therefore, their distribution is not guaranteed. The Council and I prefer that support for their endowment be gathered from the membership rather than a single donor. The many small donations would provide a special kind of honor, both for the awards and the recipients, and the awards truly would come from the Society.

Most of you will shortly be returning your 1982 Dues Notice to the Ornithological Societies of North America. I have instructed Treasurer Robert D. Burns that any donations to the Wilson Endowment Fund for 1982 be credited to the Fuertes and Nice Awards. Treasurer Burns would also be happy to accept contributions mailed directly to him. The required amount is about $6,000. The Society has just over 2,250 active members. Hence, a contribution from each of us of only $3.00 would be sufficient.

Two years ago many of the "older" Life Members responded to a plea from then President George Hall with major contributions that helped the Society through a difficult period. I trust the general membership will now respond as generously to this solicitation for a much happier cause.

Abbot S. Gaunt, *President*