GENERAL NOTES

Predation in a salt marsh Laughing Gull colony.—As an apparent consequence of predation pressures many colonial seabirds nest in places inaccessible to terrestrial animals (e.g. Crook and Goss Custard 1972). In many parts of their breeding range along the Atlantic and Gulf coasts of North America Laughing Gulls (*Larus atricilla*) nest on salt marsh islands. During 1972, 1973, and 1974 I studied the sources and extent of predation in a Laughing Gull colony in the Brigantine National Wildlife Refuge, New Jersey (39°28′N, 74°21′W).

In May, June, and July 1972 and 1973 hens' eggs or Havahart traps baited with eggs or grain and peanut butter were set in the colony on a marsh island closest to (most accessible to) the barrier beach where an equal number (125) of control settings were made. A diverse mammal population inhabits the barrier beach island. None of the eggs or baits set in the marsh colony were preyed on or manipulated by terrestrial animals, while on the barrier beach 4 eggs were eaten by small mammals (chewed shells recovered), 2 eastern woodrats (*Neotoma floridana*) were caught, and 3 traps were sprung by unidentified mammals. Thus nesting on marsh islands affords the Laughing Gulls protection from mammalian predation.

Each year a central and peripheral nesting area (35 acres each) were censused every day or two. About 150 pairs nested in these locations annually. Nests and eggs were marked, and many chicks were banded soon after hatching. Whenever an egg was found pecked open or the disappearance of an egg could not be attributed to tidal flooding (i.e. nest dry and intact) nor to hatching (daily nest visits at hatching helped insure that new hatchlings were located), a predation loss was recorded. During blind work in 1973, H. F. Andrews, J. Burger, and I recorded sightings of Fish Crows (*Corvus ossifragus*), Common Crows (*C. brachyrhynchos*), and Herring Gulls (*Larus argentatus*) in the colony. Most egg predation occurred early in the nesting cycle (Fig. 1), before incubation behavior was fully developed in many pairs, and when crow and Herring Gull intrusions in the colony were at a maximum (Fig. 2). Probably as a joint consequence of (a) the gradual development of continuous sitting (egg covering) during laying and early incubation (Drent 1970) and (b) the seasonal increase in antipredator behavior (Hunt and Hunt 1975), egg predation is greatest early in the nesting cycles of many gulls (Drent 1970).

About 4.4% (63/1421) of the eggs in the 2 areas were preyed on during the study. Censusing disturbances seemed to induce some gulls to puncture eggs (see Bongiorno 1968), and crows apparently attracted to the site by circling flocks of gulls often exploited these disturbances to steal eggs (see also Schreiber and Riseborough 1972, Picozzi 1975). Predation was lower in the peripheral nesting ground (2.9%, 8/273) than in the central one (4.8%, 55/1138) though not significantly. Central nesting did not serve the antipredator function that it often does in other seabird colonies. The predation success of crows increases as a function of prey density, though disadvantages associated with denser nesting are outweighed by enhanced social

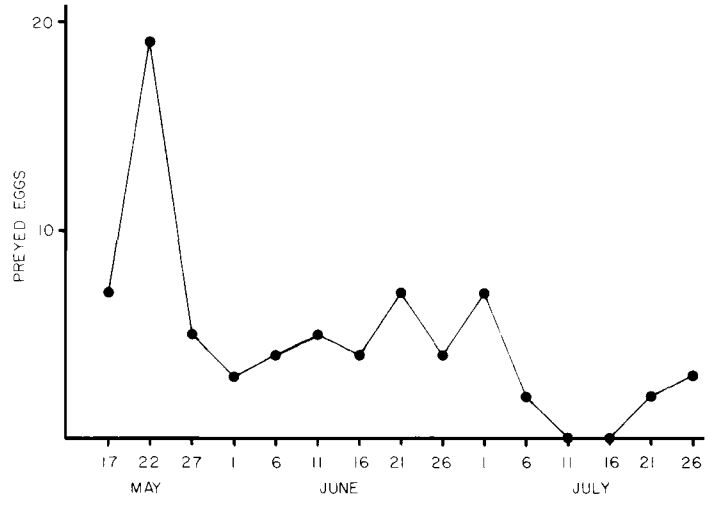

Fig. 1. Seasonal egg predation; 1972 and 1973 data combined. Data collected from sites where about 500 nests and 1400 eggs were present.

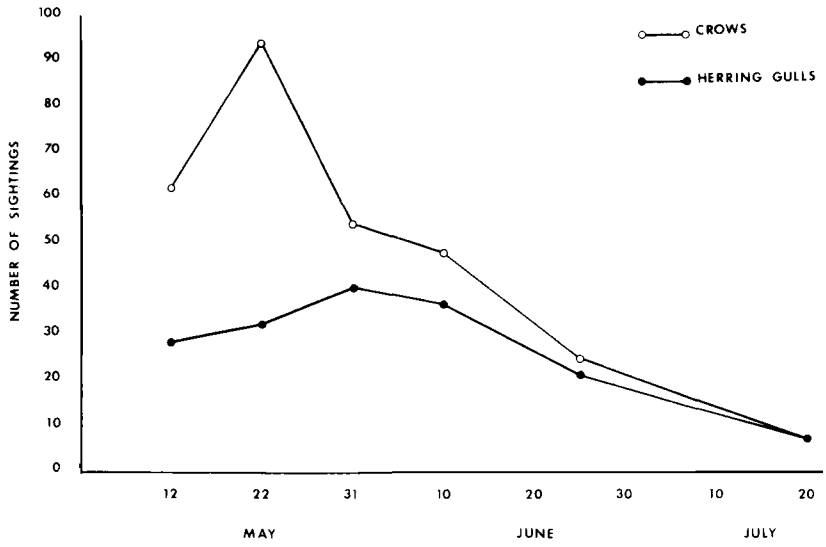

Fig. 2. Sightings of crows and Herring Gulls in the Laughing Gull colony during 1973.

antipredator efficiency among some gulls (Tinbergen et al. 1967). Laughing Gulls nest much more sparsely in the center of the Brigantine colony (Montevecchi 1975) than is usual in a gull colony. Moreover, the antipredator responses of *atricilla* are less intense than those of some other gulls (Impekoven pers. comm.). Under these circumstances avian predators might be more successful hunting centrally rather than peripherally in the Brigantine colony, and the differential egg losses in the two nesting areas may reflect this. Increased predation rates in denser nesting sites may, however, be a simple consequence of increased intraspecific interference and egg cannibalism (Burger, pers. comm.).

A greater proportion of the total number of Herring Gulls sighted were seen in the posthatch period (after 10 June—39%, 65 of 166 sightings) than was the case for the crows (27%, 77 of 287 sightings, $X^2 = 7.43$, df = 1, $P < 0.05$). Herring Gulls were seen preying on *atricilla* chicks, though crows were not. Pecking by adult Laughing Gulls accounted for most of the chick mortality that could be determined; this is a major source of chick mortality among other gulls (e.g. Hunt and Hunt 1975). Most such mortality probably results from chicks wandering into neighboring territories where attack by adults other than parents is almost certain. Parental care is important here in that underfed, hungry chicks are more likely to venture from the home territory and approach strange adults in search of food (Hunt and Hunt 1975); again human disturbance probably influenced this type of mortality.

Raptors preyed on chicks and mature gulls. Barn Owls (*Tyto alba*) and Great Horned Owls (*Bubo virginianus*) are responsible for some and probably most of this predation, though Short-eared Owls (*Asio f. flammeus*), Turkey Vultures (*Cathartes aura*) and Marsh Hawks (*Circus cyaneus*) are probably reponsible for some mortality.

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Literature Cited

Bongiorno, S. F. 1968. Egg puncturing behavior in Laughing Gulls. Auk 85: 697–699.

Crook, J. H., and J. D. Goss Custard. 1972. Social ethology. Ann. Rev. Psychol. 23: 277–312.

Drent, R. H. 1970. Functional aspects of incubation in the Herring Gull. Pp. 1–132 *in* The Herring Gull and its egg (G. P. Baerends and R. H. Drent, Eds.). Behav. Suppl. 17.

HUNT,G. J., Jr., AND M. W. HUNT. 1975. Reproductive ecology of the Western Gull: the importance of nest spacing. Auk 92: 270–279.

MONTEVECCHI, W. A. 1975. Behavioral and ecological factors influencing the reproductive success of a tidal salt marsh colony of Laughing Gulls (*Larus atricilla*). Unpublished Ph.D. dissertation, New Brunswick, New Jersey, Rutgers Univ.

PICOZZI, N. 1975. Crow predation on marked nests. J. Wildl. Mgmt. 39: 151–155.

SCHREIBER, R. W., AND R. W. RISEBOROUGH. 1972. Studies of the Brown Pelican. Wilson Bull. 84: 119–135.

TINBERGEN, N., M. IMPEKOVEN, AND D. FRANCK. 1967. An experiment on spacing-out as a defense against predation. Behaviour 28: 307–321.

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Red-shouldered Hawks in juvenile plumage nest successfully.—On 10 March 1973 in a woodlot along the Chagrin River valley, eastern Cuyahoga County, Ohio, I found an uncompleted nest with Red-shouldered Hawks (*Buteo lineatus*) calling nearby. I flushed an incubating bird off the nest on 8 April; the bird sat tight and flew only when approached very closely. I climbed to the nest on 16 May and estimated that the two young were 10 days old. The nest depression was shallow and covered with greenery from wild black cherry (*Prunus serotina*). One of the parents, presumably the female, defended the nest by flying at me 6 times, coming as close as 2 to 3 m. At this time I determined that one parent was in juvenile plumage. I built a tree blind on 26 and 27 May and began watching from it on 31 May; I then discovered that both parents bore juvenile plumage. In the course of 7 hours of watching the parents brought 3 voles (*Microtus pennsylvanicus*), 2 chipmunks (*Tamias striatus*), and 1 frog (*Rana* sp.) to feed the young. A photograph of one of the parents at the nest appeared on the cover of Bioscience (December 1975). I believe that this is the first reported case of a pair of Red-shouldered Hawks breeding successfully in juvenile plumage.

Henny et al. (1973, Ecology 54: 551) reported the first recorded case of a juvenile (1-year-old) female nesting successfully near the Patuxent Wildlife Research Center, Laurel, Maryland. Henny (pers. comm.) stated that the male was in adult plumage. In Orange County, California, Wiley (1975, Condor 77: 135) found that 3 (10.3%) of 29 nesting Red-shoulder pairs had juvenile-plumage females breeding with adult-plumage males. Two of the three juvenile female nests fledged young. Wiley (pers. comm.) found no nesting cases in which both sexes were in juvenile plumage. In the spring of 1974 and 1975 I conducted a survey of Red-tailed (*Buteo jamaicensis*) and Red-shouldered Hawk populations and productivity in Geauga County, Ohio. In the 2 nesting seasons I found 5 pairs (8.9%) of yearling females paired with adult males among the 56 Red-shoulder nests located. In all 5 cases the pairs failed to raise young; nests were built but either the eggs were not produced (3 pairs) or the eggs were infertile (2 pairs).

Based on these findings it is apparent that a minor component of the Red-shouldered Hawk population is composed of yearling-female/adult-male pairs. The size and nesting success of this component varied between studies conducted in California, Maryland, and Ohio. The case of a pair of Red-shouldered Hawks in juvenile plumage nesting successfully is unique and should be considered a rarity in the breeding population.—VICTOR APANIUS, *P.O. Box 2672, Madison, Wisconsin 53701.* Accepted 10 Feb. 76.

Uncommon natural injuries in hawks.—On 16 November 1974 at Hawk Ridge, Duluth, Minnesota, I caught an adult male Goshawk (*Accipiter gentilis*) that had a stick protruding 4 cm from the skin about 2 cm caudal and 3 cm medial to the left leg. Parting the feathers revealed a moderate amount of dried blood and lymph at the surface of the puncture. I gently removed the stick and applied antiseptic to the wound. The stick extended about 6.5 cm upward along the inner body wall. Neither the stick nor the open wound gave any indication of punctured intestines. Banded with a USF&WS lock-on type band and released, the bird flew off with no apparent difficulty.

The stick, which was dead and brittle, was identified as either *Populus tremuloides* or *P. grandidentata*. The angle of penetration indicated that the puncture probably occurred as the pelvis and