

deaths from striking telephone and power lines, and 20 from striking fences and buildings in his survey covering a period of about 10 years. He suggests that: puddle ducks are most often involved in such wire strikes, males may be more vulnerable than females (perhaps, in part, because of the "reckless" nature of pursuit flights), and the greatest incidence of strikes is during migration.

No-longer-needed barbed wire fences should be removed from the publicly-owned waterfowl production marshes; and, when overhead lines become a frequent local source of mortality, they should be placed underground or moved. The practice of running fences and lines through marshes should be reevaluated and other alternatives considered.

These measures would bear a substantial esthetic bonus in that the natural beauty of our wetlands would be enhanced while at the same time husbanding the waterfowl resource.—GEORGE CORNWELL, *School of Forestry, University of Florida, Gainesville, Florida 32601* AND H. ALBERT HOCHBAUM, *Delta Waterfowl Research Station, Delta, Manitoba. 7 November 1970.*

The Ruddy Turnstone as an egg predator.—The Ruddy Turnstone (*Arenaria interpres*) is well known as an opportunistic feeder, as evidenced by a multiplicity of published notes on unusual food items. That eggs of other birds are not a major element in the normal diet of this species is suggested by their omission from the accounts of the turnstone in most standard reference works. Those few that do mention egg-eating (such as Palmer, in *Shorebirds of North America*, 1967:259) have apparently derived all of their information from Wetmore (in Bent, U.S. Natl. Mus. Bull. 146:288, 1929) and Bergman (*Acta Zool. Fennica*, 47:32–33, 1946). Crossin and Huber have recently published an additional observation of this behavior (*Condor*, 72:372–373, 1970).

All of these reports involve the Old World subspecies *A. i. interpres*. Bergman's is the most detailed description of egg-eating, and forms a part of a general study of the turnstone on its breeding grounds on the coast of Finland. Eggs eaten there included those of several species of gulls and terns, ducks, and other turnstones. The other two reports originated in the islands of the Pacific. Wetmore saw turnstones eating eggs of Sooty and Gray-backed Terns (*Sterna fuscata* and *S. lunata*) on Laysan Island in 1923, and the predation described by Crossin and Huber took place in 1969 on Eniwetok Atoll, Marshall Islands, the victims being Sooty Terns.

In the present note we report two additional observations of egg-eating by turnstones, the first instances of this behavior in the New World subspecies *A. i. morinella*. We will also point out variations in the behavior of the turnstones and of their victims.

John C. Ogden, Research Biologist at Everglades National Park, was kind enough to send us his notes from the Dry Tortugas, Florida. Participants in the Sooty Tern banding project there had noticed numerous punctured eggs in tern nests, especially along the perimeter of the colony, at the head of the beaches, some 4 to 10 yards above high water line. Turnstones had been suspected as likely culprits, as they had often been seen running among setting terns at the beach heads. Predation by turnstones was confirmed by Mr. Ogden in late April and late May 1969, when, during a number of 10–20 minute observation periods, he watched turnstones in the act of puncturing Sooty Tern eggs.

Our own observations took place during the last week of May 1970, when small numbers of turnstones were seen feeding along the shore of Great Gull Island, off the north-eastern tip of Long Island, New York. At about the same time, broken eggs had been found in 23 nests of the island's large colony of Common Terns (*Sterna hirundo*). Most

of the eggs were split in half, with little of the contents left in the shell when they were found. With few exceptions, the nests where broken eggs were found were thought previously to have been deserted or to be incomplete clutches. At about 19:30 EDT on 30 May, as we were observing Common Tern nests from a building used as a blind, Poole noticed one turnstone making its way through the colony, foraging in typical style by probing under and turning small stones and concrete chips. A few moments later we noticed the turnstone with a tern egg shell in its bill. We watched the bird feeding on the remains of the egg's contents, and then left the blind to inspect the nest. The three eggs therein had been split apart and the contents cleaned out, matching the broken eggs we had found earlier.

We returned to the blind the following evening, 31 May, joined by Helen Hays. At about 19:15, a turnstone landed in front of the blind and began foraging. Miss Hays, who was familiar with the locations of the previously destroyed nests, pointed out to us that the turnstone's movements did not appear to be random foraging. On the contrary, it seemed to be following a definite itinerary, running directly to and pausing at four nest sites in succession where broken eggs had been found earlier in the week. We regard this as circumstantial evidence that the turnstone had been responsible for the original breaking of the eggs, although we actually witnessed only the eating from an already broken shell. Only a single turnstone was seen feeding on eggs on each of the two evenings. A turnstone collected by Parkes along the beach on the morning of 31 May had only insect remains and sand in its stomach.

The egg-opening techniques of turnstones as thus far reported have been quite varied. Those seen by Wetmore were taking advantage of the disturbance caused by the presence of humans walking through the tern colony, following 15 or 20 feet behind the men. They "ran quickly about driving their bills into the eggs without the slightest hesitation, breaking open the side widely and feeding eagerly on the contents, sometimes two or three gathering for an instant to demolish one egg and then with this half consumed running on to attack another."

The only turnstones that have been reported to attack a nest attended by a parent bird were those seen by Crossin and Huber, who witnessed only a single actual egg-breaking. They watched several turnstones harrying an incubating Sooty Tern; each time the tern lunged at one of the marauders, the others would dash in and peck at an egg. Although a $\frac{3}{4}$ inch hole was pecked in one egg, the tern finally succeeded in making the turnstones give up their attempts at its nest.

On Great Gull Island, as mentioned earlier, most or all of the destroyed nests had been deserted, so the turnstones could proceed in a more leisurely fashion than where terns actively defended their nests. Here the tern eggs had been relatively neatly split in two, the turnstone then drinking the contents from the inside of the shell-halves.

The turnstones observed by Bergman in Finland had quite a different technique in eating undefended eggs. "As soon as they spotted an egg, they picked a hole in it, and sucked the contents as carefully as possible, whereupon they turned it over with quick head movements in order to pick another hole in the shell. In this way, once, all three eggs of a tern were emptied in twelve minutes" (Bergman, *op. cit.*:32-33, translation by Parkes).

In the Dry Tortugas, too, the turnstones confined their attentions to deserted or temporarily unguarded nests; Ogden never saw one attempt to puncture an egg in an attended nest. Here, however, at least those turnstones that were closely observed were feeding on embryos rather than on the liquid contents of eggs as elsewhere. According to Ogden (in litt.), when a turnstone finds an unguarded egg, it "quickly punctures it with 2-3 hard jabs with its bill, takes hold of the embryo, and pulls it out and eats it.

With one exception, all of the eggs I watched being punctured were relatively fresh and therefore contained small embryos rather quickly extracted. At one egg a turnstone had some difficulty pulling some solid material out through the puncture, which allowed time for a second turnstone to run from 20 yards away, but the second bird almost as quickly ran on after a brief poke at the egg still being worked on by the first turnstone."

The reaction of nearby terns to turnstones is variable, but is relatively mild at most. Our experience on Great Gull Island agreed with that of Wetmore in that the terns did not appear to recognize the turnstone as a predator, neither conspicuously avoiding it or attacking it, although it sometimes passed within inches of incubating terns. Crossin and Huber found that the turnstones on Eniwetok were pecked at as they passed, especially by terns that were incubating; this matches Ogden's observations in the Dry Tortugas. Bergman (op. cit.:110 ff.) comments at length about the proximity of turnstone nests to those of gulls and terns, so it is not surprising that the Finnish terns did not seem to regard turnstones as potential predators. No observer has reported the aerial "mobbing" of turnstones by terns; on Great Gull Island this behavior may be elicited by both predatory (e.g., Blue Jays, hawks) and non-predatory (e.g., Mourning Doves) birds passing over the colony.

Egg-eating by turnstones appears to be an uncommon behavior. Crossin and Huber observed migrant and wintering turnstones in the central Pacific for several years, but had seen only this single instance of egg predation, which apparently involved only five individuals. As stated above, our 1970 observation on Great Gull Island involved only a single turnstone. Although Wetmore did not specify numbers, his observations appear to have been based on many turnstones. Ogden (in litt.) says that "the number of turnstones actually puncturing eggs is small; at least no more than 5-10 may be seen around the total perimeter of the colony of an estimated 80,000 nesting Sooties on any one day. I judge the egg puncturing practice to occur daily during the late March-May incubation period, and that many hundred eggs are destroyed among the relatively small number of Sooties which nest immediately below the vegetation line at the beach head." This concept of a small number of individuals destroying a formidable number of eggs accords with Bergman's findings; he stresses several times that only a few turnstones become what he calls "egg specialists." In fact, he points out that in his study area robbing of tern nests was confined to turnstones nesting on small, isolated, rocky islands. He postulates that the difficulty of foraging in the immediate vicinity of such nests, and the sterility of these wave-washed rocks, had led these few turnstones to investigate abnormal food sources, even including eggs of neighboring turnstones.

In view of the abundance of the New World race of turnstone as a migrant along the Atlantic Coast of the United States at a time when terns and other ground-nesting birds are breeding, it seems remarkable that the Dry Tortugas and Great Gull Island incidents appear to be the first reported cases of egg-eating by turnstones in North America. Many tern colonies, like these two, have been under close surveillance for years. It will be of no little interest to see whether there are increasing reports of egg-eating by turnstones in such well-studied colonies, suggesting that we may be witnessing the spread of a new behavior pattern.

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