Great Horned Owl Predation on Leach's Storm-Petrels in Maine

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Owls apparently rarely prey on seabirds (Morse 1971, Auk 88: 426) and records of predation on storm-petrels seem especially scarce. Examples of predation on storm-petrels by the Short-eared Owl (*Asio flammeus*) include the diurnal White-rumped Storm-Petrel (*Oceanodroma tethys*) and the nocturnal Band-rumped Storm-Petrel (*O. castro*) on the Galapagos Islands (Harris 1969, Proc. Calif. Acad. Sci. 37: 95), the White-faced Storm-Petrel (*Pelagodroma marina*) on Selvagen Island, Madeira (Schweppenburg 1907, Ornith. Jahrb., Hallein 18: 39) and the British Storm-Petrel (*Hydrobates pelagicus*) on Skomer Island, Pembrokeshire, Wales (Glue and Morgan 1977, Bird Study 24: 111). Other examples include a probable Band-rumped Storm-Petrel that may have been taken by a Long-eared Owl (*Asio otus*) or a short-eared Owl on Baixo Island, Madeira (Schweppenburg op. cit.), the Leach's Storm-Petrel (*O. leucorhoa*) taken by the Barn Owl (*Tyto alba*) on Castle Rock, California (Bonnot 1928, Condor 30: 320), and the British Storm-Petrel killed by the Little Owl (*Athene noctua*) on Skokholm Island, Pembrokeshire (Alexander 1935, Bull. Brit. Orn. Cl. 55: 60).

On 6–8 July and 15 August 1977, 16 pellets of a Great Horned Owl (*Bubo virginianus*) were collected on Franklin Island, Muscongus Bay, Knox County, Maine. These pellets contained the remains of 14 Leach's Storm-Petrels, 7 Common Eider (*Somateria mollissima*) chicks, 1 Herring Gull (*Larus argentatus*) fledgling, and 3 meadow voles (*Microtus pennsylvanicus*). One of the petrels found in a pellet on 6 July 1977 had been banded on Haddock Island, 5.0 km west of Franklin Island, on 23 June 1977.

During the 3-day stay in July petrels were quite active over Franklin Island at night. Although Morse studied Great Horned Owl predation on nesting seabirds in Muscongus Bay and owl kills were found on both Haddock and Franklin islands, each having breeding populations of Leach's Storm-Petrels, no petrels were found in pellets by Morse.

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Colonial Nesting as an Anti-predator Adaptation in the Gull-billed Tern

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It has often been noted that colonial nesting in gulls and terns permits joint defense of the nests against predators (Cullen 1960, Kruuk 1964, Patterson 1965, Lack 1968, Andersson 1976). However, other studies have suggested either that colonial nesting does not contribute to nest defense (Lemmetyinen 1971) or that nest defense is not the only effect of colonial nesting (Ward and Zahavi 1973, Hunt and Hunt 1976). In May 1972, while conducting a study of the breeding behavior of the Gull-billed Tern (*Gelochelidon nilotica*) (Sears 1976, 1978), I witnessed a dramatic illustration of the value of other colony members in the defense of a nest against predators.

My study was carried out during 1971, 1972, and 1973 on an unnamed spoil island 0.5 km south of the port at Morehead City, Carteret County, North Carolina. Each colony was almost free of vegetation, contained 20–30 nests, and contained about equal numbers of Gull-billed Terns, Common Terns (*Sterna hirundo*), and Black Skimmers (*Rynchops niger*). Observations were made from burlap blinds and by means of time-lapse photography.

Late in May 1972, an intense subtropical storm struck the area, bringing rain, high winds, and low temperatures. I did not visit the colonies from 21–27 May. On 28 May, I found only one nest still active.

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All other nests were empty, and their previous occupants had left the colony area. Many gulls were present, walking about the colony site and diving at the two remaining terns. The gulls became more active on 29 May, and at 1430 a Laughing Gull (*Larus atricilla*) dove and snatched up the 2-day-old chick. Eight Laughing Gulls and one Herring Gull (*L. argentatus*) were present by 1600. The Laughing Gulls all hovered over the tern nest, the Herring Gull walked up and took an egg, and the rest of the flock dove and scrambled for the remaining egg.

In contrast, in the intact colonies of 1972 and 1973, I rarely saw more than one or two gulls per day in the vicinity of the colony. A gull that approached the colony was usually chased by terns or skimmers, and I never saw a gull actually land in the colony. In 1973, nest success was almost 40% (17 broods/43 nests), many of these 26 nest failures were probably due to my presence rather than to predation by gulls (Sears 1978), and no nest failure was witnessed during the hatching period (18 failures occurred during the first half of the incubation period, 3 more occurred before hatching, and 5 occurred at an undetermined time).

I attempted to obtain a more objective description of the difference between the disturbance to a nesting pair in an intact colony and the disturbance to the pair deprived of its colony by making use of the continuous data provided by time-lapse photography. I focused on the oblique posture, a behavior that involves a harsh call and extension of the neck, and whose effect is to repel intruders (Sears 1976). Thus, performance of the oblique is a good indication of disturbance to the performing tern. In all, seven nests were observed for a total of 68.7 h.

The frequency of performance of the oblique posture at three nests of intact 1972 colonies prior to hatching was only 0.6 per h, and most of these were directed at fellow colony members. At three 1973 nests, the rate was 1.0 per h on dates prior to hatching and 1.9 per h on dates after hatching, again with most performances directed at other colony members. At the isolated nest, the rate of performance of this posture (to potential predators only) was 5.0 per h on 28 May and 14.0 per h on the day of successful attack by the gulls.

The great increase in the disturbance caused by gulls after the destruction of the colony and the rapid demise of the isolated nest in spite of the defensive efforts of both terns attest to the effectiveness of colony defense.

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