

GROUND-NESTING AND RELATED BEHAVIOR OF NIGHTHAWKS

(CHORDEILES MINOR) IN MASSACHUSETTS

by Alexander Hiam and Martin Sutherland

In the summer of 1978 three breeding pairs of Common Nighthawks (Chordeiles minor) were observed in the Myles Standish State Forest in Plymouth County, Massachusetts. Nests of two of the pairs were found, and all three pairs were followed until young were fledged or nesting was abandoned. These observations are of interest because the nesting of the Common Nighthawk has received little attention in recent literature, and because these are the first ground nests to be reported in Massachusetts since 1903. After this date, all reported nests have been on flat rooftops.

The Common Nighthawk is the most widespread of the six Caprimulgids (Nightjars and Goatsuckers) found in North America, and one of two species in its genus found on the continent. The other, the Lesser Nighthawk (C. acutipennis), is found in the southern and southwestern United States, and south to Chile and Brazil. The Common Nighthawk's breeding range covers most of North America from eastern Alaska to Hudson Bay and the Gulf of St. Lawrence in the north, and southward through Mexico and Central America as far as Panama (Ridgely, 1976). Common Nighthawks migrate in the autumn and can be found as far south as Cordoba and Buenos Aires in Argentina during the winter (DeSchaunsee, 1970). The form concerning us is the nominate race, C. m. minor, which breeds west to the eastern edge of the Great Plains and north to British Columbia and the southern Yukon (Bent, 1940).

While most Common Nighthawks nest on rooftops, it is only since the 1800's with the construction of buildings with flat, gravelled roofs that they have adopted this nesting habitat. Bent (1940) discusses the nesting of the Common Nighthawk in its traditional habitat; his conclusions can be summarized as follows: the site is chosen by the female and nests are generally solitary, though sometimes a few will be found close together. There is usually a large, well-defended nesting territory. Eggs are laid on the ground in areas where forest fires have recently occurred, but have also been found on gravel beaches, open rocky areas, and cultivated ground. Nests on fence posts and rails have been reported, and one pair of birds in Farrington, Maine, in 1908 occupied a deserted nest of the American Robin (Turdus migratorius).

The clutch almost always consists of two eggs, typically with dark speckles on a variable dull olive-gray ground color. Harrison (1975) reports that eggs are laid on successive days, and that they average 29.97 x 21.84 mm. Incubation takes 19 days, beginning with the laying of the second egg. Forbush (1927) suggests that the male may help incubate, but Bent (1940) and Harrison (1975) say that incubation is only by the female. We never saw a male on the nest. The young are usually fed by both parents, and after 25 days they can fly fairly well. Being somewhat precocial, the young may move around in the territory when still quite small. Our observations indicate that if the first clutch fails, another attempt may be made at breeding.

The males have a distinctive territorial flight, flying slowly over their

territories while uttering a loud, far-carrying "peent." They also make a loud "boom" by diving and pulling up sharply with wings thrust forward and down, causing the stiff outer primaries to vibrate. Males boom over their territory to defend it and to attract females.

Before this century, the Common Nighthawk was a common ground-nester in Massachusetts "in the pine barrens of the coastal plain ... and more locally in sterile fields and pastures" (Griscom and Snyder, 1955). By 1900, nighthawks were nesting on Boston rooftops, and they soon adopted this habit in other parts of Massachusetts (Bagg and Eliot, 1937). According to Griscom and Snyder, the ground-nesting population in this state "was decimated by the cold rains of 1903" after which there are no Massachusetts records of ground-nesting.

Indirect evidence suggests that small numbers of nighthawks may have continued to nest on the ground after this date, however. Bagg and Eliot (1937) report a few sightings of nighthawks in the summer of 1921 at Chesterfield and a booming bird in West Chesterfield on June 25, 1933, which suggests ground-nesting, but no nests were found. Nighthawks also bred on the Cape before 1903 and may have continued to breed at Sagamore as there were summer sightings in this area until 1942 (Hill, 1965). Kathleen Anderson of the Manomet Bird Observatory recalls summer sightings of Common Nighthawks around a burned-over area in Plymouth in the 1930's, and Trevor Lloyd-Evans of M.B.O. confirmed the presence of nighthawks in Myles Standish State Forest during the breeding season in recent years. Hence it is likely that the birds we observed are part of a small population which has continued to nest largely unnoticed in the pine barrens around Plymouth since 1903, rather than a recently established population.

THE NEST SITES. The three pairs of Common Nighthawks we observed were nesting in areas where forest fires had occurred approximately seven years previously, as determined by the number of tiers of branches on Pitch Pines in the areas. Two of the pairs held adjacent territories, and the third nested within two kilometers of the other two. Following is a description of the territories and nest sites of these three pairs, and a summary of our observations concerning nidification and behavior. The nest site descriptions are supplemented by a systematic list of plants, loosely ranked by density, at each site (see Table I). All botanical names are from Gleason, 1968.

PAIR I. The territory of this pair was the most open of the three. On one side stood a dense, mature (20+ yrs.) Pitch Pine (Pinus rigida) grove. On the territory, trees were widely spaced (up to nine meters apart) and few were much more than three meters in height. There were more dead Pitch Pines, both standing and on the ground, in this territory than in the others. The nest of Pair I was not found. However, according to Bent (1940), the male Common Nighthawk often booms over the nest. This was true of the males of Pairs II and III, and so we determined a likely nest site for Pair I where the male boomed most frequently. This site was used for the vegetation survey (Table I).

Pair I was the first to be discovered, when we heard a male peenting in the area on June 22. We made five more visits to the area without finding eggs or young, probably because the young were old enough to move about the territory. On the 12th of July we flushed a female and one

young bird just after sundown. The fledgling was smaller and rounder-winged than the adult, showing little white in the wings and none in the tail. It flew fairly well. On July 28 we saw one, and possibly two, young birds in the company of a female over this territory. Only this pair successfully fledged young.

PAIR II. The territory of Pair II was adjacent to that of Pair I, and the nest sites were approximately 2/5 of a km. apart. The mid-story in the territory of Pair II was thicker than in the territory of Pair I, but there were many small patches of open ground. A thick growth of fifteen-year-old Pitch Pines bordered much of the territory, and within it were small, dense groups of Pitch Pines. The nest site was a hard, bare patch of earth in a small clearing surrounded by Early Sweet Blueberry (*Vaccinium vacillans*) and a Scrub Oak (*Quercus ilicifolia*). The site was near four Pitch Pines but the eggs were not in shade for much of the day. There was no suggestion of nest building, the eggs being laid on bare ground.

Two eggs were discovered on June 29 when we flushed a female from them. On August 19 the female was still incubating the same two eggs (we are confident of this because we made numerous visits to the site up to this date). As they should have hatched by then, even if the second one had been laid on the day we found them, the eggs were collected. They did not appear infertile, but it seemed that their development had been arrested at an early stage. One measured 29.5 x 21.0 mm., the other, 31.1 x 23.3 mm. The birds were inactive after August 19. It is possible that this was a second clutch in view of the late date upon which the eggs were found, but the female may have been incubating this clutch for a long time prior to our discovering it.

PAIR III. Most of this territory was thickly grown over with Early Sweet Blueberry and Scrub Oak, but there were a number of large bare areas around the nest sites. This pair's first clutch failed, and a second clutch was laid about 18 meters away. Two small patches of bare ground, almost completely surrounded by Scrub Oaks of about two meters in height, formed the nesting sites.

Two young were found at the first nest site on June 25. Half an eggshell lay within 10 cm. of them, and they appeared to be about two days old. The young were crouching on a patch of bare earth under a Scrub Oak, but were not shaded from the sun. On July 5th these young had disappeared, and the female was flushed from a fresh single egg at the second site. It is possible that the young died in the heavy rains on the third and fourth of July, but it is more likely their death was due to some other factor, such as predation, considering that the female was on another egg just one day after the rains. On July 11 we flushed the female from two eggs, indicating that she had laid a full second clutch. By the 28th she was brooding a two- or three-day-old chick while an egg lay unattended 40 cm. away. The egg had begun to star, but appeared lifeless. On August 2, after a prolonged rain had caused minor flooding, we could find nothing but large fragments of eggshell at the site, and it is likely that the young died in this storm.

BEHAVIOR. In our numerous visits to the three territories, we were able to observe a range of behavior associated with territoriality and

response to predators (or, more exactly, ornithologists). As, to our knowledge, some of this behavior has not been described, we include the following descriptions.

Booming. As previously discussed, booming is used to defend the territory against conspecifics. Both females and males are boomed by a male on its territory, usually by flying above the intruder, then diving at it. In boundary disputes, two males may try to fly above each other, peenting and booming until they reach a considerable height. When the male is not disturbed by other nighthawks or predators, its dives and booms are generally directed at the nest site. Booming is also directed at human intruders, trucks, blinds, and presumably predators, in a manner similar to the dive-bombing of terns and other colonial-nesting birds. Booming in this context may serve to alert the female and young to the presence and position of a predator, as well as to frighten the predator.

Peenting. Peenting, like booming, is restricted to males, and functions in territorial advertisement. Males peent constantly in the air (never on the ground), sometimes in association with booming. Peenting also seems to function in contacts between mates, as males sometimes increase their rate of peenting when their mate returns from foraging. In this situation peenting may be associated with other behaviors. This is illustrated by an interaction observed on July 12 between the male and female of Pair I.

The female returned at 1800 hrs. after an absence of one hour, and was greeted by the male with increased peenting while she uttered a croaking "craink" note. Gliding on stiff wings held in a shallow V and rocking from side to side, the male flew across in front of her while the female dived twice as if in (poor) imitation of the male's booms. She then went to the ground. Some of this behavior may have been related to our searching of the area and the presence of a young nighthawk, which we flushed (along with the female) upon going to the spot where the female had landed.

Rocking Flight. We observed this only once, as described above, but felt it worthy of mention because it was clearly stylized and very different from normal flight. Perhaps it is a part of courtship behavior, which occasionally also serves in communication between mates.

Circling. Often when we searched an area where a male had been booming (in our attempts to locate the eggs or young), the male would boom us for a short while, and then begin to circle quietly, flying within ten meters of the ground and sometimes passing within five meters of one of us. Once, circling was observed after we had left the territory. It appeared that the male had lost sight of us and was trying to locate us by flying over its territory. The male of Pair III, who frequently circled, sometimes made a soft churring sound while circling.

Circling functions exclusively as a predator response, unlike booming which functions primarily in territoriality and display. The purpose of circling may be to locate the predator and keep it in sight.

Distraction. Distraction display by the female when she is flushed from

eggs or young has been well described by Tomkins (1942), and in the Lesser Nighthawk by Pickwell and Smith (1939). The female flies low to the ground and lands with wings and tail spread, and mouth fully open toward the intruder. This may be accompanied by hissing. We observed this display once when we flushed the female of Pair III from eggs on July 11. The hissing associated with this distraction and the "craink" in response to a male's peenting (see above) were the only vocalizations we heard from females.

DISCUSSION. Our observations show that a small population of ground-nesting Common Nighthawks exists in Massachusetts. Table I reveals that the nest sites of these birds are strikingly similar, both in the dominant species of plants present, and in the stage of succession of the areas. All three sites were in areas which had been burned over seven years earlier. It is possible that nighthawks would find satisfactory for nesting areas which had been burned more recently than this, as they have been reported nesting on more-open ground in other states (see Tomkins, 1942; Pickwell and Smith, 1938; Howell, 1959). However, it is unlikely that an area which had regenerated after burning for much more than seven or eight years would be satisfactory for nesting. The increasing human population in areas such as Plymouth, and the control of forest fires associated with this, has substantially decreased the amount of recently burned land available for nesting. This habitat destruction is clearly related to the decrease in ground-nesting nighthawks in this state and throughout the country.

It is possible that because of habitat destruction nighthawks were forced to adopt new nesting habitats, and that this resulted in the practice of roof-nesting. But it is also possible that with the building of flat gravelled roofs, a new nesting habitat was opened up in which nesting pairs tended to be more successful, so that many nighthawks deserted their traditional nesting areas. While the fact that habitat destruction did occur suggests that they may have been forced out of the traditional habitat, there is also some evidence to suggest that the new habitat was an attractive one. Predation, and loss of clutches due to flooding, must be less frequent on rooftops than on the ground. In addition, feeding habits seem to differ in cities. Nighthawks take advantage of lights which attract insects, and this may allow them to feed later into the night. For example, Shields and Bildstein (1978) found that Common Nighthawks in the vicinity of "six large spots lighting a sign" which "created a superabundant consistently renewing food source" generally fed near this sign despite competition from other crepuscular insectivores, i.e., bats, which competed aggressively with the birds, confining them to certain elevations when both were present.

It may be that roof nests also differ from ground nests in the range of temperatures to which they are exposed. Bent (1940) suggested that rooftop temperatures could exceed ground temperatures on sunny days, and Weller (1958) reports that on a gravelled roof in Missouri where Common Nighthawks nested, temperatures reached 60 degrees C. and higher. Ground nests are exposed to fairly high temperatures also, and nighthawks have evolved certain physiological and behavioral mechanisms (i.e., gaping, shading young) to cope with these high temperatures (Lasiewski and Dawson, 1964; Howell, 1959). Nonetheless, if roof temperatures are more extreme, the species may have further modified physical and behavioral adaptations in order to cope with this.

TABLE I - PLANT CENSUS

PRESENCE AND DENSITY* OF SPECIES AT NEST SITES OF:

	PAIR I	PAIR II	PAIR III
<u>Canopy 2.5m.+</u>			
Pitch Pine (<u>Pinus rigida</u>)	High	Medium	High
White Pine (<u>P. strobus</u>)	Low	Low	Low
Big Tooth Aspen (<u>Populus grandidentata</u>)	Low	-	-
Black Locust (<u>Robinia pseudo-acacia</u>)	-	Low	-
<u>Mid-Story 1-2.5m.</u>			
Pitch Pine (<u>P. rigida</u>)	Low	Medium	Low
Scrub Oak (<u>Quercus ilicifolia</u>)	Low	Medium	High
<u>Ground Cover 0-1m.</u>			
Early Sweet Blueberry (<u>Vaccinium vacillans</u>)	Medium	Medium	High
Low Sweet Blueberry (<u>V. angustifolium</u>)	Low	Low	Low
Bearberry (<u>Arctostaphylos uva-ursi</u>)	High	High	High
Sweet Fern (<u>Comptonia peregrina</u>)	Medium	Medium	Low
Golden Heather (<u>Hudsonia ericooides</u>)	Medium	Low	Medium
Black Huckleberry (<u>Gaylussacia baccata</u>)	-	Low	Low
Wild Indigo (<u>Baptisia tinctoria</u>)	Low	-	Low
Stiff Aster (<u>Aster linariifolius</u>)	Low	Low	-
New York Aster (<u>A. novae-belgii</u>)	-	Low	-
Bristly Sarsaparilla (<u>Aralia hispida</u>)	-	Low	-
Sedge sp. (<u>Carex sp.</u>)	Low	Low	Low
Goldenrod sp. (<u>Solidago sp.</u>)	-	Low	-
Wormwood sp. (<u>Artemesia sp.</u>)	-	Low	-

* Relative densities are ranked (Low, Medium, High) to be consistent within categories (Canopy, Mid-Story, Ground Cover) as their sole purpose is to provide a basis for comparison of nest sites.

- Indicates that a species is absent from a site.

Other aspects of behavior, for example, those associated with feeding, may also be different in roof-nesting populations. The discovery of a ground-nesting population makes it possible to compare such traits, to see how they differ between ground- and roof-nesting birds, and perhaps to understand better the nighthawks' shift of breeding habitat. A thorough understanding of nighthawk behavior is clearly important in such a comparative study, and it is hoped that our observations of nighthawk behavior will be useful in this context.

We hope to continue this study of the nesting of the Common Nighthawk in the coming summer. Any information concerning other ground-nesting birds in the state, or roof-nesting birds to which observers might gain access, would be much appreciated. Information may be sent to Alex Hiam, c/o Manomet Bird Observatory, Manomet, Massachusetts 02345.

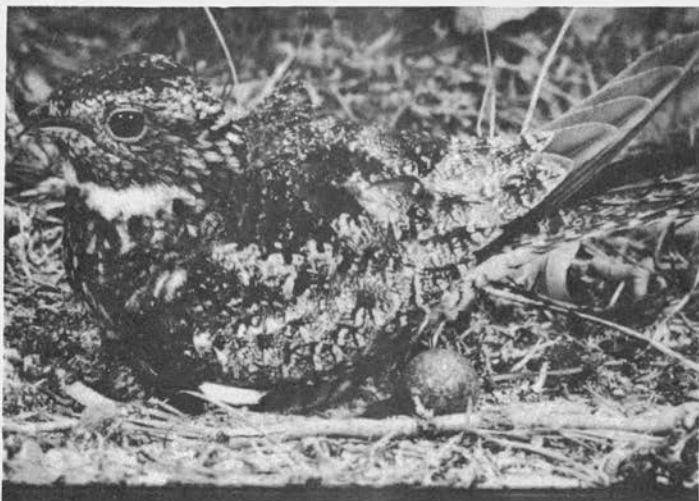
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Female Common Nighthawk at Nest
 Myles Standish State Forest, Plymouth
 Photo by Jack O'Connor, Courtesy of Manomet Bird Observatory

GOLDEN EAGLES IN EASTERN UNITED STATES

Sightings and reports of Golden Eagles east of the Mississippi River are being systematically catalogued by the U.S. Fish and Wildlife Service to determine the bird's status in the eastern U.S. Any such sightings should be reported to:

Dr. Mark R. Fuller
 Migratory Bird and Habitat
 Research Laboratory
 Patuxent Wildlife Research Center
 U.S. Fish and Wildlife Service
 Laurel, Maryland 20811