

cherry (*Prunus serotina*), silver maple, and hackberry (*Celtis occidentalis*). The cherry and hackberry trees, loaded with fruit, were centers of activity for Starlings and Common Grackles, and other Robins. In the Robin's area of activity there were 156 trees of 19 species with diameters (four feet above ground) of six inches or more. Black cherry trees comprised only about 6 per cent of this total yet the Robin spent over 30 per cent of its day in trees of this species.

The bird definitely appeared to choose the species of trees in which it foraged and rested (Figure 2). Silver maples seemed to be particularly favored as resting sites, and the night roost was in a silver maple. The Robin also rested in the day in the cherry and hackberry trees where it fed. It spent most of its day (about 71 per cent) sleeping or resting with eyes closed, and no more than 26 per cent of the day foraging and feeding. Hackberries and cherries were so abundant that the bird usually required only one to three minutes to satiate itself, after which it rested for periods ranging from five minutes to more than an hour, usually 30 to 50 minutes. The Robin usually preened itself after resting or feeding, and probably spent more time preening than feeding while in the trees. After 1600 its tempo of feeding and preening definitely increased. It fed for the last time (that day) about 1750, and then flew into a large silver maple where it slept more than an hour. At 1900 it moved a few feet, into a cluster of leaves about 40 feet up in the maple, and settled for the night. Sunset came at 1920, but a heavy cloud layer in the west brought darkness early.

The Robin's behavior the second day was similar to that of the first; it frequented the same areas and even the same trees. Survival at this season appeared to be extremely easy for the bird, and its quiescent behavior would seem to have real value for a bird in molt.

The Robin was tracked intermittently for 32.5 hours before the transmitter's signal became so weak that we could no longer locate the bird. The signal showed definite attenuation after 28 hours, but the range was not noticeably altered before that time. The most serious difficulty we encountered in tracking the bird was related to the urban situation of the study area. Ignition noises from traffic were very annoying to the trackers, and certain vehicles all but drowned the transmitter's signal. Persons who need to use the telemetric technique in an urban situation should be particularly careful, in choosing their study area, to avoid sites of heavy traffic and other potential ignition interference.—RICHARD R. GRABER and STEVEN L. WUNDERLE, *Illinois Natural History Survey, Urbana, Illinois.*

Predator-induced parental neglect in a Ring-billed Gull colony.—While making studies of parental and chick behavior in a peninsular colony of the Ring-billed Gull (*Larus delawarensis*) at Rogers City, Michigan, in the summer of 1965, we noted that in one large nesting unit of about 1,000 nests the onset of hatching began about nine days after that in the other units. Hatching success was low in this unit and, of the chicks hatching, only a few survived beyond the second day. Suspecting nocturnal disturbances we checked the colony before daybreak on 8 June and discovered that a large raccoon was feeding among the nests while the adult gulls milled noisily overhead. On visiting the colony at 10:30 P.M. that evening, we found the disturbed unit completely deserted. All-night observations on the nights of 9–10 and 10–11 June revealed that the raccoon, apparently a single animal, was causing very little direct destruction, but was indirectly responsible for the extensive egg and chick mortality and probably the delayed hatching in the disturbed unit, by inciting "panic flights" which took the entire adult population of that unit

away from their nests for up to four hours at a time. Adults in the other nesting units only a few hundred feet away hovered noisily above their nests when the intruder came their way, but did not desert the area in panic.

The behavior of the birds at their nests in the disturbed unit was apparently normal during the daylight hours. Data from our studies on parental behavior indicated that the nests were covered by the parents as much as in the previous year. The frequency of rising to examine eggs was no different, and the flushing distance of brooding birds was similar. At dusk, however, the birds became "flighty" and large segments of the unit rose en masse at even slight disturbances. As darkness fell many birds, particularly those near the colony edge, sat with their heads high; many of them faced outward from the colony center; no birds were sleeping.

"Upflights" started shortly after dark. It was our impression that few of these were caused by the actual presence of a predator. Rather it appeared that they were socially propagated "panic flights," triggered by a few excited birds, especially those at the west edge of the nesting unit. The flightiness of these particular birds could well have been due to periodic intrusion of the raccoon from the west—on one occasion tracks were found leading into the unit from the west, the direction of the raccoon's den.

Most of the upflights were small, involving only 10 or 20 birds. These typically started at the colony edge. The birds would rise rather suddenly and sweep back towards the colony center low over the heads of their brooding colony mates. A soft growling call, *aurrr*, rarely heard under other circumstances, characterized these flights and seemed to stimulate unrest and alertness in the birds that remained on their nests. Characteristically the birds landed only 50 to 100 feet away and then ran and fluttered back to their nests through the intervening occupied territories.

The disturbance created by a small upflight sometimes spread back into the colony interior until large sections were vacated as the birds jumped from their nests to join the swirling flights above them. On occasion large fractions of the unit were involved while the rest sat alert and restless. Several birds far from the disturbance area were seen to make sudden jumping movements on their nests at such times.

We observed three large upflights which involved the entire nesting unit. At 1:00 A.M. on the night of 9–10 June, a typical small upflight of 20 to 30 birds took place at the west end of the nesting area. As the birds swooped low over the center of the colony they were joined by nearly the whole west half of the unit, followed within 10 seconds by all but perhaps a dozen birds from the east half. In one great flock they circled in tight formation over the breeding area several times and then out over the bay to the north.

At 11:35 P.M. on the night of 10–11 June a complete upflight started without detectable cause at the edge of an open nestless area near the center of the colony. About 100 birds flew up almost in unison and swept back over the colony center with a chorus of low *kukukuks* and soft guttural "growl" calls. Hundreds more leaped into the air as they passed, and within 15 seconds all but two birds had joined the massed swirling flight.

A third complete upflight occurred on the same night at 12:45 A.M. Just prior to this particular upflight we heard the alarm calls of a Killdeer (*Charadrius vociferus*) to the west of the colony. Several minutes later the gulls at the west edge of the nesting area began emitting low *kukukuk* notes. Suddenly a hundred or so birds at the northwest tip jumped into the air, noisily hovered 25 to 30 feet above the ground for 20 to 30 seconds, and then swung over the center of the unit where they were joined by other birds. Within seconds all but a few of the birds were in the

air. No ground predator could be observed in the moonlight, but the calling of the Killdeer and the hovering behavior of the gulls suggested to us that such a predator was present. Tracks found the next morning near two dismembered chicks indicated that a raccoon had been present at the northwest tip of the area in the night.

After the birds were in the air the aerial maneuvers of the large flocks were remarkable for their coordination and their tightly massed formations, suggestive of the wheeling flights of shorebirds over a mud flat. Wing clashes could be heard every few seconds as the closely crowded birds swirled in irregular circles and figure eights. Most of the birds were silent, but many of the familiar *kah* calls were uttered by at least the peripheral individuals, and each sweep back over the nesting area was accompanied by a chorus of the soft low growls. In the big "panic flight" on the first night the swirling flight eventually moved north about 200 yards, and a large part of the flock settled on the water, not to return for four hours. On the next night, in the 11:35 P.M. flight the birds remained in the air and returned within 15 minutes, and in the 12:45 A.M. flight they were back in about one hour.

The return to the colony after a massed "panic flight" was also a socially controlled process. The first observed large upflight ended when the birds returned at dawn (3:45 A.M. on 10 June) in one large flock. After several circles, the flock swooped to within four feet of the ground at the east end and then noisily advanced in a broad "tidal wave" across the nesting area. Individuals dropped down from this surging wave as they reached their nests until, after about 30 seconds, the entire two-acre nesting area was again filled with birds noisily repossessing their territories.

When the birds returned from the massed upflights on the next night they landed just beyond the east end of the nesting area; perhaps 1,000 birds swarmed into a space only about 100 feet in diameter. The advance into the colony from this point was on foot or in low hovering flight. The birds moved in a front, cautiously at first, but then noisily and rapidly in a rolling wave. No individuals ventured more than a few feet ahead of the line when it was stationary or advancing slowly, but as the advance gained momentum, individuals dashed ahead and the flock rolled across the terrain as a swirling wave of running and fluttering birds. Within seconds each bird was back on its nest and, except for a few stragglers, normalcy was restored.

The effects of these mass exoduses were apparent. The eggs and newly hatched young were cold; the cheeping heard shortly after a mass departure soon subsided as the chicks became chilled in the 5° to 15° C temperatures. A sampling of 87 eggs on 5 June revealed that 32 per cent of the embryos were dead. Daytime checks of nests on the days following the upflights showed a nightly mortality of between 30 and 80 per cent of one- to two-day-old chicks, and a check of the site in late June indicated that very few, if any, young had been produced. That the cause of death was not due to intrinsic weaknesses of the chicks is indicated by 100 per cent survival during the first two days in a group of 17 chicks hatched from eggs taken from the colony unit and artificially incubated. The nine-day delay in hatching may also have been due to this nocturnal chilling; this unit showed no such lag with respect to the other units of the colony in either 1963 or 1964.

The contagious social behavior described in this note was probably advantageous to the survival of the adults, but the resulting parental neglect was clearly unfavorable to the productivity of the colony unit. Despite the decreased chick production, however, such social behavior may be of adaptive value to the species insofar as it discourages the establishment of mainland colonies accessible to ground predators. —JOHN T. EMLÉN, DON E. MILLER, ROGER M. EVANS, and DAVID H. THOMPSON, *Department of Zoology, University of Wisconsin, Madison, Wisconsin.*