

suggest that the Heinroth-Nice procedure is best applied in the Sora (and in other species that similarly exhibit egg-neglect) by calculating the incubation period for the egg laid on the day that incubation begins. This is equivalent to current practice in groups of birds in which all eggs hatch synchronously (within one 24-h period). By extension, if all eggs hatch asynchronously as they were laid, one can assume that incubation begins with the first egg and that its incubation period is a representative minimal period for the clutch.

Since egg neglect should affect only the last few eggs to be laid in a Sora nest, incubation periods calculated for the first several eggs laid after incubation begins may well be similar (Table 1). But, for purposes of standardization, any method employed should be used consistently.

In two Sora nests that we recently observed on Long Island, New York (Greenlaw and Miller, *Kingbird* 32:78–84, 1982), we found evidence of egg neglect affecting the hatching time of the last one or two eggs. We have full data on laying and hatching schedules for only one of these nests, so we use it here to illustrate the applications of unmodified and modified Heinroth-Nice procedures for determining minimal incubation periods (Table 1).

In this nest, 10 eggs were laid, one each day. Incubation began with laying of egg 4 (eggs 1–4 hatched synchronously). Eggs 5–8 hatched on a daily schedule, but eggs 9 and 10 each missed a day before hatching. Using egg 4 as the representative egg (modified procedure), the incubation period for this nest is 18.8 ± 0.35 days. This value is close to the mean period of 18.7 days reported by Pospichal and Marshall (1954) for a sample of 22 Sora nests. An indiscriminate use of the unmodified procedure (egg 10) for our nest yields a period of 20.6 ± 0.57 days, a value which lies near the upper end of the range of reported values for this species (Pospichal and Marshall 1954; Tanner and Hendrickson 1956; Walkinshaw 1940; *Auk* 74:496, 1957).

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Do secondary roosts function as information centers in Black-billed Gulls?—In a widely-cited hypothesis, Ward and Zahavi (*Ibis* 115:517–534, 1973) suggested that certain bird assemblages function primarily as information centers, where birds that are unsuccessful in finding food follow more successful birds. Relevant assemblages were said to include breeding colonies, large communal roosts, and “secondary” roosts that sometimes form as satellite aggregations closer to current food sources. Gulls (*Larus ridibundus*, *L. argentatus*) were included as examples of species employing secondary roosts, but no one to date appears to have looked closely at gull roosts to see if they could function as information centers. One study (Lowman and Tamm, *Am. Nat.* 115:285–305, 1980) has examined the relevance of the information center hypothesis at communal roosts of Hooded Crows (*Corvus cornix*) and Common Ravens (*C. corax*), but with equivocal results.

Roosts are common on or near foraging areas used by Black-billed Gulls (*L. bulleri*) breeding inland in New Zealand. These gulls typically feed on short-lived but temporarily rich and patchily distributed food (Evans, *Behaviour* 79:28–38, 1982) and so might be expected to employ functional information centers as an aid to food finding. I examined this hypothesis for roosts located inland, adjacent to the Ashley River, near Christchurch, in 1979. I found

roosts at 34 separate locations. Thirty roosts lasted no more than 1 day, one lasted up to 2 days, and three lasted up to 3 days, giving a total of 41 site-days of observation.

If an assemblage is to function as an information center, it seems evident (Ward and Zahavi 1973), that it must be located at some distance from current food supplies. In Black-billed Gulls, most roosts were located either on ($N = 21$ site-days) or immediately adjacent to ($N = 13$ site-days) the area currently being searched for food. In all of these cases, it appeared to me that the foragers were usually visible to gulls at the roost, and vice versa. Movement between roosts and active foragers was common, often almost incessant, and typically involved direct flights between the two groups. Since the active foragers normally moved about from place to place within sight of the roosts, new recruits from the roost could not have been joining them on the basis of the recruit's memory of prior feeding spots as required for "leaders" at an information center. Foragers leaving the roost to begin foraging appeared clearly to be cueing directly to the birds already feeding, an example of local enhancement.

At seven other locations, the active foragers eventually moved completely out of sight of the roosting birds. Distances between the roosts and new foraging areas were small (<1 km for five roosts, 1.6 and 2.2 km for the other two), and flights between foragers and roosts continued to occur. These detached roosts were soon abandoned, usually within 1–3 h, in favor of the new foraging area. Because of the short distances involved, it is possible that once the birds from the roosts became airborne they would still have been able to see the foragers. If not, they would almost certainly have known, from their own immediate experience, the correct general direction to fly to regain visual contact with the active foragers. According to a recent theoretical model developed by Waltz (Am. Nat. 119:73–90, 1982), short distances and ease of locating a new food patch represent resource characteristics that are not conducive to the development of functional information centers.

In conclusion, the tendency for Black-billed Gull roosts to occur on or close to the feeding grounds effectively precludes them from functioning as information centers, at least under the conditions that prevailed on my study area. It remains possible that roosts might function as information centers at other times, e.g., when food is scarce, but there is no evidence for this view. The results of this study and others (Lowman and Tamm 1980; Andersson et al., Behav. Ecol. Sociobiol. 9:199–202, 1981) suggest that the information center hypothesis is not likely to be as general as originally claimed. Some other advantage(s) may underlie the formation of roosts. Several other possible food-related benefits of grouping have been advanced (e.g., Evans, Auk 99:24–30, 1982; Bayer, Auk 99:31–40, 1982), and merit additional examination.

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The Rufous-rumped Antwren (*Terenura callinota*) in Costa Rica.—The Rufous-rumped Antwren (*Terenura callinota*) has a wide distribution from southern Middle America to Guyana and Perú, but is known chiefly from a handful of specimens from widely scattered localities. The collector Jelski, quoted by Wetmore (Birds of the Republic of Panamá, Pt. 3, Smithsonian Misc. Coll., Vol. 150, 1975), stated that his specimen of the very closely