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Posthatch brood amalgamation by Mallards.—Eadie et al. (Can. J. Zool. 66:1701–1721, 1988) reviewed the occurrence of brood amalgamation by North American anatids and the hypotheses advanced to account for it. Posthatch brood amalgamation (e.g., creching, gang-brooding, or kidnapping) has been reported more frequently among species of geese (Anserini) and sea ducks (Mergini) than among puddle ducks (Anatini). It has never been reported for Mallards (*Anas platyrhynchos*; Eadie et al. 1988). Here we report two observations of short-term creche formation by Mallards on wetlands in southern Gotland, Sweden (57°00′N, 18°10′E).

Between 07:45 and 08:15 h on 23 May 1988, while observing waterfowl with a spotting scope on a wetland 1.3 ha in size and 30 cm deep, JDB observed two distinct Mallard broods, each 14–18 days of age (Class IC; Gollop and Marshall, 1954, p. 27 in: Bellrose, Ducks, Geese and Swans of North America, Stackpole Books, 1976). Each brood was attended by a single hen and was feeding in a different part of the wetland. One had 14 ducklings, the other eight. At 08:15 h, the broods were within 10 m of each other. Very soon thereafter, a large brood formed that was attended by a single hen; no other hens were visible. At this time, a Hooded Crow (*Corvus corone cornix*) swooped to within 20 cm of the brood. Hooded Crows are predators of ducklings (P. Lundberg pers. comm.; K. Sjöberg

pers. obs.). The hen responded by flapping her wings, vocalizing loudly and stretching upwards to meet the crow. The ducklings were clustered together tightly, and when two of them left the brood, the hen quickly herded them back into it. The crow departed, and two min later the brood disappeared into vegetation. By 08:30 h, three distinct broods, each attended by a hen, reappeared close to the site of the crow attack. One brood had 14 ducklings, another eight, and the last, four. (Evidently, the brood of four had been present earlier but was not visible.) Although the wetland was observed continuously from 06:00 h to 10:00 h, no other ducklings were seen. We conclude that the large brood observed comprised a temporary association of the smaller ones.

About 13:00 h on 10 June, 1988, KS and another observer approached a wetland (1.1 ha and 50 cm deep) while conducting brood surveys. There were two distinct Mallard broods, of 12 and 13 ducklings, in different parts of the wetland. Each was 14–18 days of age (Class IC, Gollop and Marshall 1954) and each was with a single hen. One brood was sitting on a rock and the other was swimming about 20 m from it. At the approach of the person, whose job it was to flush any other broods concealed by vegetation, both broods swam toward a narrow constriction in the wetland which led to a heavily vegetated, adjacent water body. They disappeared into vegetation and a brood of 25 was observed following a single hen shortly after. A second hen without ducklings remained behind and made no attempts to retrieve any ducklings from the other hen. No other hens or broods were observed except an older brood at the opposite end of the wetland. We conclude, therefore, that the brood of 25 was a composite of the broods of 12 and 13.

These events shared two important features. First, distinct broods apparently joined together in response to a threat. In one case, the amalgamated brood disbanded soon after the threat, and at least two broods were the same size as before the appearance of the threat. Second, one or more hens appeared to abandon their ducklings to the care of single hen. In one case, the abandoning hens could not be seen while the threat was present; in the other case, the abandoning hen was well away from the amalgamated brood.

In the second case, it might be argued that brood amalgamation resulted as a consequence of the simultaneous approach of the two broods to the single, constricted passage out of the wetland, i.e., that the amalgamation was "accidental" and imposed by physical habitat constraints. This hypothesis, however, does not adequately account for the behavior of the abandoning hen.

Posthatch brood amalgamation may result for a variety of reasons (Eadie et al. 1988), including accidental mixing of ducklings from different broods during predator attacks (Munro and Bedard, J. Anim. Ecol. 46:799–810, 1977), though ducklings in large groups nevertheless survive better than those in small groups (Munro and Bedard 1977; Kehoe Am. J. Zool. 67:406–411, 1989). In the first of the cases we report, however (although marked ducklings are required to know for sure), the constancy of brood sizes before and after the crow attack suggests that these Mallards reestablished family groups. If so, the predator attack did not result in accidental mixing. Regardless, both of our observations of short-term creche formation are consistent with the idea that one selective advantage of creche formation may result from a "safety in numbers" effect (Eadie et al. 1988). Perhaps individuals of some species of waterfowl, like White-winged Scoters (*Melanitta fusca*) (Kehoe 1989) or Common Eiders (*Somateria mollissima*; Munro and Bedard 1977) form creches permanently for this reason, while others, like Mallards, do so opportunistically.

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Effects of radio transmitters on the foraging behavior of Barn Swallows.—In studies using radiotelemetry, it is important to determine the effects of transmitters on the animal's behavior. Studies on small bats and large birds (>75 g) have shown that the effects of transmitter packages vary greatly depending on species, weight of the package, and means of attachment (Boag 1972, Ramakka 1972, Sayre et al. 1981, Caccamise and Heddin 1985, Gessaman and Nagy 1988, Obrecht et al. 1988). Aldridge and Brigham (1988) showed that a 1:1 relationship should theoretically exist between percent transmitter load and percent decrease in maneuverability of small bats. Bats carrying increasingly heavier loads demonstrated significantly lower maneuverability as predicted. The purpose of the present study was to determine if radio transmitters have a measurable effect on the foraging behavior of Barn Swallows (*Hirundo rustica*). Transmitter loads weighing 5% of body mass might negatively affect maneuverability making insect capture more difficult (Aldridge and Brigham 1988). If prey capture efficiency is reduced, I predict that the number of foraging bouts and or the duration of individual bouts, and the proportion of total time spent foraging by tagged birds should increase.

I monitored five female Barn Swallows (mean mass 18.2 g) nesting on a building on the east shore of Vaseaux Lake, 10 km south of Okanagan Falls, British Columbia. I attached transmitters, resembling in shape those which produce minimum drag (Obrecht et al. 1988), to four individuals mid-dorsally using Skinbond (Pfizer Hospital Products, Largo, FL) cement after clipping a small area of feathers to expose the skin. The transmitters remained attached for 1–4 days, and in two instances, I reattached transmitters to individuals. The transmitter package weighed 0.8–1.0 g representing loads of 4.1–5.6% of a bird's body mass.

The birds were observed from 10 June to 23 June 1987 during the egg laying or incubation stage of nesting. I assumed that females incubating or laying eggs would leave the nest only for the purpose of foraging. Data were collected during all daylight hours with the majority of observations made in the afternoon. During all observation periods, at least one untagged and one tagged individual were monitored. On several occasions I monitored the behavior of the same bird visually and by radio tracking. The visual observations confirmed my ability to determine by radiotelemetry when birds departed and returned to their nests.

In 121 bird hours of observation I recorded the duration of 264 foraging trips. Tagged birds spent a significantly greater time away from the nest during each foraging bout than did untagged individuals ($\bar{x} = 11.6 \pm 0.9$ [SE] and 7.9 ± 0.8 min, respectively; $F = 8.5$, $P < 0.001$). However, tagged birds were not absent for a significantly greater proportion of the total observation period ($\bar{x} = 35.3 \pm 4.4$ and 36.6 ± 5.5 percent, respectively; $F = 0.1$, $P > 0.10$). This apparent paradox is due to the tendency for tagged individuals to make fewer bouts per hour than untagged individuals ($\bar{x} = 1.7 \pm 0.2$ and 2.4 ± 0.2 bouts per hour, respectively; $F = 3.35$, $0.05 < P < 0.10$). If the load imposed by radio transmitters influences foraging, only bout duration increased in the manner I predicted. A decrease in the number of bouts by tagged birds resulted in virtually identical total foraging time. This suggests that if the 5% "rule" of transmitter loads for small volant animals is used, there