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THREE ADULT SWAINSON'S HAWKS TENDING A NEST[1]

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Helping and communal breeding have been documented in over 200 species of birds to date (Brown 1987). Although rare among raptors (Brown and Amadon 1968, Newton 1979), intraspecific helpers are known to occur regularly in at least three species: the Mississippi Kite (*Ictinia mississippiensis*; Parker and Ports 1982), the Harris' Hawk (*Parabuteo unicinctus*; Mader 1975, 1979; Bednarz 1988; Bednarz and Ligon 1988) and the Galapagos Hawk (*Buteo galapagoensis*; Faaborg et al. 1980). Within the genus *Buteo* there are also reports of isolated cases of intraspecific helping in the Red-tailed Hawk (*B. jamaicensis*; Wiley 1975, Santana et al. 1986).

Here I describe a Swainson's Hawk (*B. swainsoni*) nest that was attended by three adults. These observations were collected while closely monitoring a breeding population of Swainson's Hawks in southern Alberta, Canada.

On 3 May 1987 a lone Swainson's Hawk was observed building a nest approximately 5 m above the ground in a 10-m balsam poplar (*Populus balsamifera*) approximately 25 km south of the city of Calgary, Alberta. On the following day three adults were observed in the nest tree, one actively engaged in nest building and two perched above the nest.

The trio members were tentatively sexed on the bases of size and behavioral differences. Males of this species were slightly smaller than females, seldom engaged in incubation or brooding and tended to defend the nest and territory more aggressively than did females (Fitzner 1978, this study). The smallest of the three birds was most aggressive toward intruders and although present on all ($n = 14$) visits to the territory was never observed incubating or brooding. Based on these observations and plumage differences I tentatively identified the trio as consisting of one dark-phase male and two light-phase birds of which at least one must have been female. Plumage differences between the light-phase birds were insufficient to permit individual identification.

The trio was observed four times from a distance during the incubation period. The nest was first examined on 23 June and was found to contain four chicks, the youngest of which had hatched within the previous 24 hr. The nest was visited 10 times between hatching and the fledging of the youngest chick on 4 August. During each visit all three adults took part in nest defense by calling loudly and stooping to within 1–2 m of workers who were handling the chicks.

In 1988 a pair of Red-tailed Hawks occupied the nest. However on 17 May 1988 a light-phase Swainson's Hawk was observed standing on an old American Crow (*Corvus brachyrhynchos*) nest located 5 m up in an 8-m dead balsam poplar, approximately 350 m west of the 1987 nest. When the nest was approached, two additional birds appeared and all three began to defend the area. Because none of the birds was banded it was not possible to confirm that they were the same trio that had nested nearby during the previous year. This trio, however, also consisted of one dark-phase and two light-phase adults. The coincidence of a trio having been recorded in approximately the same locality during two consecutive years strongly suggested that they were the same individuals in both years.

The nest contained a clutch of four eggs on 22 June. Two of the four eggs hatched and both young fledged by 10 August. Three adults were present on each of 12 subsequent visits made to the nest and all three participated in vigorous defense of the nest.

It is possible that the trio actually consisted of a resident pair and a third adult from a neighboring territory. The nearest active Swainson's Hawk nests were located 1.5 and 2.0 km, respectively, from the trio's nest in 1987 and 1988. I suggest that it was unlikely that any adult would have repeatedly joined in territory defense so far from its own nest or that any neighboring adult would have been tolerated by the resident pair in such close proximity to their own nest. Moreover, I have never observed neighboring adults join a resident pair in defense at other nest sites.

In neither year did I observe any trio members acting aggressively toward one another and during most visits to the site two or more of the birds would be perched less than 2 m from one another. Unfortunately, I was unable to carry out more detailed observations required to determine the role of each trio member in incubation, obtaining prey, and feeding and brooding the young.

While the advantage, if any, of forming a breeding trio in Swainson's Hawks remains unclear these observations suggest that such trios, although rare, may endure over several breeding seasons. Furthermore the fact that all three adults were in adult plumage in both years suggests that this may be an example of polygamous breeding rather than a case of helping.

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BIGAMY IN NORTHERN MOCKINGBIRDS: CIRCUMVENTING FEMALE-FEMALE AGGRESSION[1]

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Key words: Northern Mockingbird; bigamy; opportunistically polygynous; female-female aggression; behavioral options.

Polygamy based on males opportunistically acquiring a second mate is rare among passerine species and probably reflects a conflict between the sexes (Orians 1969, Wittenberger and Tilson 1980). Selection should favor polygyny in males whenever the benefits of a second concurrent clutch exceed costs to his primary clutch. In contrast, if bigamy decreases female reproductive success through reduced survivorship of fledglings, selection might increase female-female aggression. This aggression would represent an additional cost to any other female being courted by her mate and could limit the number of additional females her mate could attract.

Obviously, a male must attract a second female in order to become bigamous. Then, he must invest time in courtship and defense of the second female while keeping his mated status hidden (Ford 1983). Alternatively, he could reduce the disruptive influence of his first mate to some level tolerable to the secondary female. The tolerance shown by the secondary female is likely to change with her level of investment, being greatest when she has a completed clutch. Several behavioral options are available to the male. Among these are: (1) acquiring a large territory, (2) influencing the females' movements relative to each other, and (3) timing when the second female begins her clutch. How often these behavioral options are used by males to circumvent female-female aggression requires detailed behavioral observations and is still poorly documented for most species.

Northern Mockingbirds (*Mimus polyglottos*) typically are monogamous (Laskey 1935, Verner and Willson 1969, Ford 1983), and pairs commonly remain mated for several nesting attempts during a single breeding season and even through consecutive breeding seasons. Nesting duties generally are shared: both males and females vigorously defend their territory

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