The Condor 94:1022–1025

THE THREAT TO BANK SWALLOWS FROM THE HOBBY AT A LARGE COLONY[1]

TIBOR SZÉP
Ecological Research Group, Hungarian Ornithological Society, Budapest, Költő u. 21., H-1121, Hungary

ZOLTÁN BARTA
Department of Zoology, Kossuth University, Debrecen, H-4010, Hungary

Key words: Riparia riparia; Falco subbuteo; *predation; coloniality; swallow.*

The effects of predators on colonial birds are widely investigated (Siegel-Causey and Kharitonov 1990, Wittenberger and Hunt 1985). In the case of Bank Swallow coloniality, attacks by avian and mammalian predators are known to be highly effective (Freer 1973, Mead and Pepler 1975, Persson 1987, Windsor and Emlen 1975). Some studies suppose antipredation benefits of coloniality are the most important reason for colonial breeding (Hoogland and Sherman 1976, Stutchbury 1988). Others suggest that the colonial breeding of swallows may increase their foraging efficiency by the transfer of information at the colony (Brown 1986, 1988; Emlen and Demong 1975; Ward and Zahavi 1973). Measuring the potential cost of predation and benefits of antipredation behavior in colonies may clarify the contribution of both to the evolution of coloniality. In this paper, we investigate avian predation on Bank Swallows (*Riparia riparia*) at a colony of more than 1,500 pairs over three periods (total: 19 days, 304 hr) to gain information about the potential threat by Hobbies (*Falco subbuteo*). This falcon is one of the commonest avian predators of the Bank Swallow in Europe (Mead and Pepler 1975).

METHODS

The studied colony has been situated for decades near the village of Tiszatelek (48°11′N, 21°57′E) on the Tisza river in northeastern Hungary. This is the largest colony along the Tisza River, and its size was 2,537 pairs in 1989 and 2,118 pairs in 1990 (Szép 1991a, 1991b). The colony size at Tiszatelek varied between 1,516 and 2,537 pairs during 1986 to 1991. The changes are highly correlated to the Bank Swallow population size at the Tisza River, which is mainly related to the condition of the migrating and wintering areas in Africa (Szép 1991a). Observations were performed in the following interval: period JULY89 was July 2 to 8 in 1989; period JUNE90 was June 13 to 17 in 1990; period JULY90 was June 30 to July 6 in 1990. Period JUNE90 was before fledging, but period JULY89 and JULY90 were after fledging. Two people 150 m from the colony observed the swallows from 05:00 until sunset (20:00), continuously. Observers were changed every second or third hour, and they registered the time of Bank Swallows' alarm calls (Windsor and Emlen 1975), the time of Hobby attacks and the number of the captured birds during attacks. The success of the Hobby was identified by direct observation of caught swallows or by checking the feet of the departing Hobby. The observers were able to watch the colony and its neighboring area of 500 m × 300 m. During periods JULY89 and JULY90, bird banding work was done at the colony in the early morning (05:00–08:00) and evening (17:00–20:00). This was concentrated only on a 20–40 m portion of the 200 m long colony (Szép 1991a). The intensity of hobby attacks was independent of whether the banders checked the mist-nets at the bank surface. The Hobbies' behavior suggested that they were one pair which nested near the colony.

RESULTS

Only the difference between the number of attacks per day of periods JULY89 and JUNE90 was significant (Kruskal-Wallis one-way analysis of variance; $P < 0.005$) (Table 1). The maximum number of swallows captured per day was four birds on 5 July 1989 when the Hobbies attacked the colony 39 times.

After recording the variables into categories, we investigated the possible relationship between predation variables and the number of swallows at the colony. In this analysis, we considered the number of swallows which could be preyed on. This number was the smallest in period JUNE90 (2,118 pairs, prefledglings), larger in period JULY90 (2,118 pairs, fledglings) and the largest in period JULY89 (2,537 pairs, fledglings). There is a significant association between the number of attacks and the number of swallows (Pearson's $r = 0.66$; $P < 0.002$, $n = 18$) and between the number of swallows caught and the number of swallows available (Pearson's $r = 0.47$; $P < 0.05$, $n = 18$). The number of alarm calls was not dependent on the number of swallows (Pearson's $r = 0.20$; $P > 0.05$, $n = 18$).

All predation variables showed similar daily patterns with peaks in the morning and early evening (Fig. 1, Fig. 2, Fig. 3). The total number of attacks by hobbies per hour were significantly correlated with alarm calls ($r = 0.92$, $P < 0.001$ for period JULY89; $r = 0.69$, $P < 0.01$ for period JUNE90; and $r = 0.87$, $P < 0.001$ for period JULY90; $n = 16$ for all cases). The patterns of attacks during the two periods (JUNE90, JULY90) of 1990 were matched ($r = 0.63$; $P < 0.01$; $n = 16$) but we found no correlation between years ($r = 0.31$;

[1] Received 18 March 1992. Accepted 27 July 1992.

TABLE 1. Number of alarm calls, Hobby attacks and caught Bank Swallow at Tiszatelek colony during the observation. Observed periods: JULY89 was 02–08 July in 1989, fledglings; JUNE90 was 13–17 June in 1990, prefledglings; JULY90 was 30 June–06 July in 1990, fledglings. The difference between the number of attacks per day of periods JULY89 and JUNE90 was only significant (Kruskal-Wallis test; $P < 0.005$). We could not identify the reason of about 50% of alarm calls.

Period	JULY89	JUNE90	JULY90
Observed day	7	5	7
Colony size (pairs)	2,537	2,118	2,118
No. alarm call	230	114	255
No. Hobby attack	182	23	93
No. caught swallow	10	1	4
Average call/day (SD)	32.86 (17.23)	22.80 (10.16)	42.50 (14.01)
Average attack/day (SD)	27.00 (11.90)	4.60 (2.07)	16.83 (12.34)
Average caught/day (SD)	1.43 (1.40)	0.20 (0.45)	0.67 (0.82)

$P > 0.05$ for period JULY89 and JULY90; $n = 16$). There was also a similar pattern in the case of alarm calls ($r = 0.77$, $P < 0.001$ for the two periods of 1990; and $r = 0.25$, $P > 0.05$ for period JULY89 and period JULY90; $n = 16$ for both cases).

DISCUSSION

Compared to the rates found in North America and Britain, the results show a low predation rate on Bank Swallows by Hobbies at a huge colony (Freer 1973, Mead and Pepler 1975, Windsor and Emlen 1975). Our data on the number of captured birds suggest that the maximum number in this area may be less than ten birds per day. The difference in predation rates from those found by Freer (1973), 25 young captured within a few days, may arise from differing species of avian predators and from dissimilar colony sizes. The positive correlation between the number of Hobby attacks, the number of birds caught and the number of swallows in the air, indicates that Hobbies increase their effort to attack the colony if the quantity of available prey is higher. When there was the highest amount of available prey at the colony, the distribution of attacks along the day was also changed. The intensity of alarm calls did not vary with the number of birds in the air at the colony. This may be because the efficiency of vigilance is not a linear function of the group size (Bertram 1980), so above some limit it would not sufficiently increase with the number of birds in the air.

For this huge colony, the threat by avian predators seems to be low. This is probably because of a dilution effect and the high efficiency of vigilance. A more complete evaluation of the influence of predation would require quantifying other types of predation, such as that on the nest.

We thank Tibor Duljánszky, Sándor Imre, László Orosz, Erzsébet Pallai, Gábor Priksz, Zsolt Sóvári,

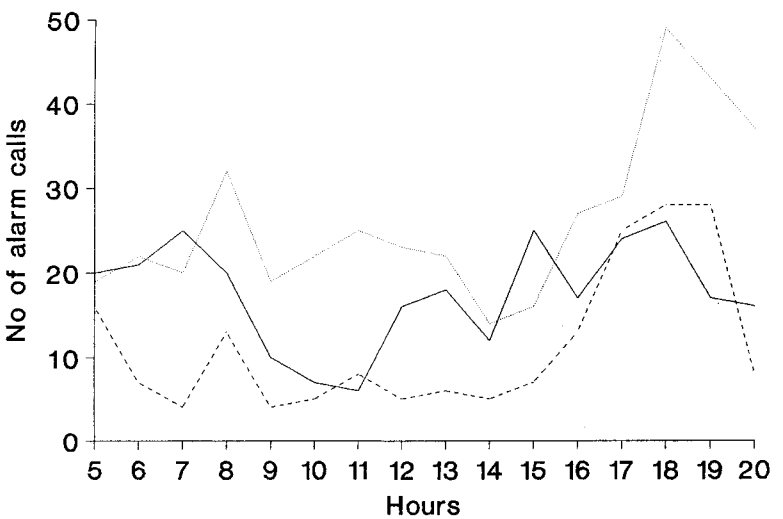

FIGURE 1. Daily patterns of alarm calls. The presented values were the summarized number of alarm calls for a given hour in a period. (solid line: period JULY89; dashed line: period JUNE90; dotted line: period JULY90.)

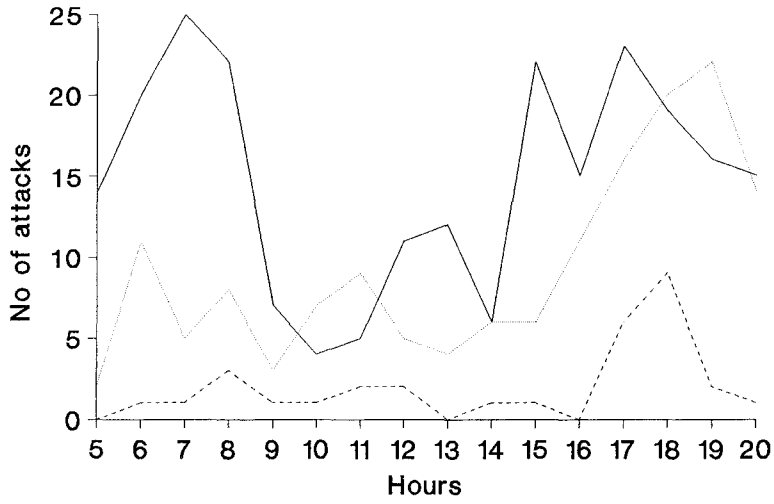

FIGURE 2. Daily patterns of attacks by Hobbies. The presented values were the summarized number of attacks for a given hour in a period. (solid line: period JULY89; dashed line: period JUNE90; dotted line: period JULY90.)

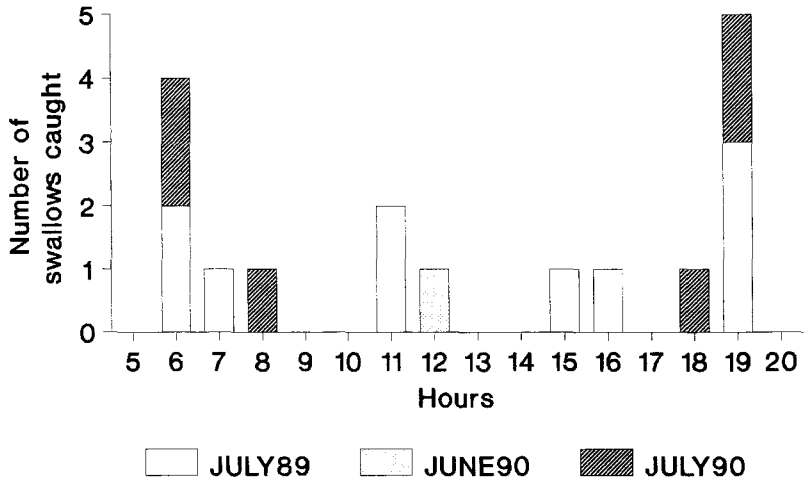

FIGURE 3. Daily patterns of swallows preyed on in the studied periods. Values are the summarized number of swallows preyed on for a given hour across periods.

József Szalóki and the participants of the AKCIO RIPARIA Research Camp for the field assistance and Kevin Anderson for polishing our English. This study was supported by the Nyíregyháza Chapter of the Hungarian Ornithological and Nature Conservation Society. Financial support was provided by an OTKA Grant No. F 5480.

LITERATURE CITED

BERTRAM, B. C. R. 1980. Vigilance and group size in Ostriches. Anim. Behav. 28:278–286.

BROWN, C. R. 1986. Cliff Swallow colonies as information centers. Science 234:83–85.

BROWN, C. R. 1988. Enhanced foraging efficiency through information centers: a benefit of coloniality in Cliff Swallows. Ecology 69:602–613.

EMLEN, S. T., AND N. J. DEMONG. 1975. Adaptive significance of synchronized breeding in a colonial bird: a new hypothesis. Science 188:1029–1031.

FREER, V. M. 1973. Sparrow Hawk predation on Bank Swallow, *Riparia riparia*. Wilson Bull. 85:231–233.

HOOGLAND, J. L., AND P. W. SHERMAN. 1976. Advantages and disadvantages of Bank Swallow (*Riparia riparia*) coloniality. Ecological Monographs 46:33–58.

MEAD, C. J., AND G. R. M. PEPLER. 1975. Birds and

other animals at Sand Martin colonies. British Birds 68:89–99.

PERSSON, C. 1987. Sand Martin (*Riparia riparia*) populations in south-west Scania, Sweden, 1964 to 1984. J. Zool., Lond. 1:619–637.

SIEGEL-CAUSEY, D., AND S. P. KHARITONOV. 1990. The evolution of coloniality in birds, p. 285–330. *In* Power [ed.], Current ornithology, vol. 7. Plenum Press, New York.

STUTCHBURY, B. J. 1988. Evidence that Bank Swallow colonies do not function as information centers. Condor 90:953–955.

SZÉP, T. 1991a. Monitoring of abundance and survival rate of Sand Martin (*Riparia riparia*) population in the upper reaches of the River Tisza, 1986–1990. Ornis Hungarica 1:37–44. (English summary)

SZÉP, T. 1991b. Number and distribution of the Hungarian Sand Martin (Riparia riparia L., 1758) population breeding along the Hungarian reaches of the River Tisza. Aquila 98:111–124.

WARD, P., AND A. ZAHAVI. 1973. The importance of certain assemblages of birds as "information centres" for food-finding. Ibis 115:517–534.

WINDSOR, D., AND S. T. EMLEN. 1975. Predator-prey interactions of adult and prefledgling Bank Swallows and American Kestrels. Condor 77:359–361.

WITTENBERGER, J. F., AND J. L. HUNT, JR. 1985. The adaptive significance of coloniality in birds, p. 1–75. *In* Farner, King, and Parkes [eds.], Avian biology, vol. VIII. Academic Press, New York.

The Condor 94:1025–1027

MALE-BIASED BREEDING SITE FIDELITY IN A POPULATION OF NORTHERN SHRIKES[1]

REUVEN YOSEF[2]
Mitrani Center for Desert Ecology, Department of Biology, Ben-Gurion University, Jacob Blaustein Institute for Desert Research, Sede Boqer Campus, 84993 Israel

Key words: Northern Shrike; Lanius excubitor; *Israel; breeding site fidelity; shrike.*

Northern Shrikes (*Lanius excubitor*) are the most widely distributed of true shrikes (Laniinae) with a circumpolar breeding range. In Israel, it is a permanent resident (Paz 1987). I studied sex-biased, nest site-fidelity of a population of this species during three breeding seasons (mid-January to mid-June, 1987–1989). The study area was on Sede Zin, a loess-covered plateau, near Sede Boqer (30°52′N, 34°47′E; 475 m altitude) in the Negev Desert highlands. The region is arid with mild winters and warm summers. The Sede Zin plateau supports a sparse dwarf-shrub community dominated by *Hammada scoparia, Zygophyllum dumosum, Raemuria hirtella, Anabasis syriacus,* and *Artemesia herba-alba.* The major woody species are *Tamarix nilotica, Atriplex halimus, Retama raetam,* and *Thymelaea hirsuta* (Danin et al. 1975).

METHODS

I trapped Northern Shrikes using a modified Bal-Chatri noose trap (Clark 1967), and banded all individuals included in the study area with a unique combination of aluminum and colored plastic leg bands. I visited active nests every 2–5 days, and mapped territories based on activity of males and their aggressive responses to playbacks of other males and a taxidermic mount. Seven breeding pairs were observed during 1987–1989.

In all three years, Northern Shrikes were the earliest nesting passerines in the area. Their nests are bulky structures made of sticks and twigs and are anchored to the surrounding branches of the nesting tree or bush. I observed 31 nest initiations. The period of nest initiation was 23 January–19 May in 1987, 1 March–21 May in 1988, and 23 March–17 May in 1989. Average time for completion of the nest was 9.0 ± 3.2 days ($\bar{x}$ ± SD; n = 27 pairs). The shrikes nested in a variety of trees and bushes situated in open areas, building mainly in *Atriplex halimus* (74%), but also in *Tamarisk nilotica* (11%), *Ochradenus baccatus* (6%), and *Colutea istria* (4%). Two nests (4%) were built in a roll of barbed wire. The average height of the rim of the nests above ground was 95.2 ± 27.9 cm ($\bar{x}$ ± SD; n = 33).

In Loggerhead Shrikes (*Lanius ludovicianus*), nest sites used for two or more consecutive years have been taken as an indication of nest-site fidelity (e.g., Atkinson 1901, Miller 1931, Porter et al. 1975). Because some pairs of Northern Shrikes were multi-brooded within a breeding season, I used three measures of nest site fidelity within and among breeding seasons: (1) repeat use of same supporting structure; (2) second or additional nest within a radius of 25 m from the initial nest of the season, which can be described as the core territory; and (3) all nests beyond the core territory.

In 1987, of nine second or third nesting attempts,

[1] Received 19 March 1992. Accepted 18 May 1992.

[2] Present address: Department of Zoology, The Ohio State University, Columbus, OH 43210