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Brief report

Effect of research activity on the success of Red-backed Shrike *Lanius collurio* nests

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1. Introduction

Most investigations, promoted by concerns over human effects, have been conducted on ground-nesting birds, most notably waterfowl, waders and sea birds (see review in Bart 1977, Götmark 1992, Keller 1995). On the basis of 11 studies on passerine birds, Götmark (1992) suggested that the effect of visiting on nesting success is small. Similarly, later studies have confirmed this conclusion (O'Grady et al. 1996, Ortega et al. 1997, Mayer-Gross et al. 1997). These studies have largely concerned species which are common around human settlements and have nests which are easy to find and observe. They did not involve activities such as measuring eggs or ringing nestlings.

The Red-backed Shrike has exhibited population declines over large parts of its range, especially in Western Europe (Tucker et al. 1994, Bauer & Berthold 1996), and has been subjected to intensive research (Diehl 1971, 1995, Jakober & Stauber 1983, Mann & Brandl 1986, and many others). This species nests in thick, thorny bushes, usually a away from human settlements. In this paper we analyse the breeding success of the Red-backed Shrike *Lanius collurio* in relation to the number of visits by the observers.

2. Study area and methods

The study was conducted near Leszno in south-western Poland (51°51´N, 16°35´E). A detailed description of this study area has been presented elsewhere (Kuźniak 1991). The area was surveyed for Shrikes nests. The nests were visited at several-day intervals throughout the period from mid-May to July in 1971–1996. We included in the analyses only data from the 11 years in which at least 10 nests were found. Of the more than over 300 nests observed, 204 nests found at the time of laying or incubation were used here. Each nest was visited 2 to 7 times. The minimal number of two visits occurred when a nest was found in the stage of laying eggs and visited for the second time near the end of the nestling stage to ascertain the number of fledglings and to determine the breeding success. A higher number of visits were made to nests found during incubation and to nests where selected elements of breeding biology were more thoroughly examined (cf. Kuźniak 1991). In all nests where the clutch was completed, eggs were measured using sliding callipers, and nestlings were ringed at about 10-day-old. The age of nestlings was established based on their hatching date, or on their appearance compared with a photographic guide (Olsson 1995). At about 10 days,

nestlings have remiges with distinctly developed vanes. Adult birds were captured at nests only in 1996 during the fledgling stage.

The analyses performed included separately the mean number of visits per each of three nest stages (eggs, nestlings–young to 10 days of age, fledglings–10 days old). A successful nest (fledged young) visited 3 times, scores one visit per stage. A nest, if visited 3 times where nestlings were preyed upon, scores 1.5 visits per stage. The differences in the numbers of eggs laid, nestlings hatched and young leaving the nests with respect to the total and per stage number of visits were tested using the one-way ANOVA (Sokal & Rohlf 1995).

3. Results and discussion

In total, 94 of 204 study nests (46.1%) were successful, i.e., at least one fledgling left the nest. There were differences in the survival between nests visited on average less than once per stage (88.9% survived) and those visited more frequently (38.3% survived)($\chi^2 = 44.86$; df = 1; $p < 0.0001$). It was found that the number of visits per stage significantly affected the number of nestlings and fledglings (in both cases $p < 0.0001$, Table 1).

We found differences in breeding success with respect to the number of visits to a nest. This may result from several factors. First, the observer makes changes in the vegetation around the nest, thus attracting the attention of possible predators. Second, the observer's presence near the nest can itself be a signal of the presence of a nest for predators. Third, the fact of visiting the nest is indicated by the behaviour of Shrikes which are mobbing humans and defending their nests, especially during later stages (Gotzman 1967). Another problem is the desertion of nests at the stage of incubation and during the first 1–7 days after hatching (Gotzman 1967, Carlson 1989). Korodi Gai (1969) who studied Red-backed Shrike reproduction in Romania, found that 40% of nest losses were due to human interference. In other studies losses caused by man did not exceed 10% (Jakober & Stauber 1983, Mann & Brandl 1986). These studies, however, did not take into account the indirect effect of nest visitation, i.e. the increased nest predation rate resulting from the high number of visits.

Our results differ from similar studies on other passerine birds. Very few studies clearly have shown negative effects of research activity (Bart 1977, Lenington 1979, Major 1990), while others have shown minimal or no effect (O'Grady et al. 1996, Mayer-Gross et al. 1997, Ortega et al. 1997). This discrepancy may reflect differences in the predator community, in the habitat structure and in the overall human influence between study areas.

Following earlier suggestions (Gotzman 1967, Carlson 1989, Götmark 1992, Mayer-Gross et al. 1997), we recommend simple steps to minimise possible nests losses: (1) minimise the number of visits to nests; and (2) minimise the length of time spent at the nests; and (3) minimise any disturbance to the vegetation surrounding the nests.

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Table 1. Mean number of eggs, nestlings and fledglings in relation to nest visitation intensities (visit per stage). *n* refers to sample size. Means are presented with ± 1 SD.

	Visits per stage							
	< 1	1	2	3	> 3	F	df	P
n	19	99	55	20	11			
Eggs	4.8 ± 0.8	5.0 ± 0.8	5.2 ± 0.9	5.2 ± 0.9	5.4 ± 0.7	1.32	4,199	0.262
Nestlings	4.0 ± 1.0	4.3 ± 1.2	1.5 ± 2.3	0.2 ± 0.9	0.0 ± 0.06	5.42	4,199	0.000
Fledglings	3.8 ± 1.2	3.3 ± 2.0	0.8 ± 1.9	0.0 ± 0.0	0.0 ± 0.03	5.88	4,199	0.000

Selostus: **Pesillä vierailu laski pikkulepinkäisen pesimismenestystä**

Kirjoittajat tutkivat, miten tutkimustarkoituksessa tapahtuneet pesillä vierailut vaikuttivat pikkulepinkäisen pesimismenestykseen Puolassa. Vuosina 1971–1996 kirjoittajat löysivät yhteensä 204 muninta- tai haudontavaiheessa olevaa pesää, joilla vierailtiin 2-7 kertaa. Tutkituista pesistä 94 (46%) tuotti vähintään yhden lentopoikasen. Vierailukertojen määrän vaihtelu oli selkeässä yhteydessä pesimismenestyksen kanssa. Pesien, joilla vierailtiin vähemmän kuin kerran pesinnän vaihetta kohti, menestys oli selkeästi parempi (89% tuotti vähintään yhden jälkeläisen) kuin useammin vierailtujen pesien (38% tuotti vähintään yhden jälkeläisen). Samoin pesäpoikasten ja tuotettujen lentopoikasten määrä aleni vierailukertojen lisääntyessä (Taulukko 1). Kirjoittajat suosittelevat, että pesätappioiden minimoimiseksi tutkijoiden tulisi minimoida 1) pesillä vierailujen määrä, 2) pesillä vietetty aika ja 3) pesää ympäröivälle kasvillisuudelle aiheutunut häiriö.

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