

# HABITAT CHOICE OF POST-BREEDING RED-BACKED SHRIKES (*LANIUS COLLURIO*) IN NORTHEASTERN HUNGARY

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**ABSTRACT.**- At the first International Shrike Symposium it was evident that information about shrikes in previously inaccessible eastern European countries was scarce. All five shrike (*Lanius* spp.) species found in Europe are categorized as having either 'moderate' or 'large' population declines. In a census conducted on 28 August 1994 along 138 km of roads in northeastern Hungary, a total of 138 Red-backed Shrike (*L. collurio*) was seen (i.e., 1 shrike/km). Our results indicate that Red-backed Shrikes were observed in greater densities in pastures and cropland, than if they were randomly distributed, and urban areas (0.1 shrikes/km) and forests (0.2 shrikes/km) had lower than expected densities. In addition, Red-backed Shrikes seen in forests were either in ecotones between the undergrowth and the road, or in clearings. Hungary presently is experiencing significant land-use changes that affect shrikes negatively. Privatization of agricultural areas has led to smaller plots, with a reduced use of biochemicals. Hence, farming practises are reverting to traditional methods. Perhaps, more significantly, formerly protected native grasslands are now being converted to agriculture with considerably negative effect on birds because these preserves were the major remaining habitat for grassland species. The extent and rate of this conversion remains unknown.

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Shrikes (Laniidae) are prominent birds of open habitats and are important as indicator species of environmental degradation because they are predatory and closely associated with agricultural areas (Hands et al. 1989). Shrikes are at present of special concern because many of the 30 species are declining, or have become extinct locally (Tucker et al. 1994, Yosef 1994). Many long-term studies of previously robust populations of shrikes have documented drastic declines, mostly in the late 20th century (e.g., Peterjohn and Sauer 1995).

Several factors have been suggested as causes for shrike population declines, but changes in human land-use practices may be the most likely explanation - Great Grey Shrike (*Lanius excubitor*) in Switzerland (Bassin 1981); Red-backed Shrike (*L. collurio*) in Sweden (Olsson 1995); Loggerhead Shrike (*L. ludovicianus*) in North America (Droege and Sauer 1990); Brown Shrike (*L. cristatus*) in Japan (Haas and Ogawa 1995). Other explanations range from climate change, with wetter, cooler summers reducing activity

and abundance of invertebrates (Durango 1950, Peakall 1962, Lefranc 1993), to heavy application of inorganic nitrogen fertilizer causing vegetation to grow early, dense, and high (Ellenberg 1986, Marechal 1993).

At the first International Shrike Symposium, January 1993, Florida, USA, it was evident that data from previously inaccessible East European countries are scarce (Yosef 1994). Similarly, it is estimated that 60,000 - 90,000 Red-backed Shrike pairs breed in Hungary, but the quantitative data is incomplete (Tucker et al. 1994). All five species found in Europe are either categorized as having 'moderate' or 'large' population declines (Tucker et al. 1994). The Red-backed Shrike is classified as a Category 3 species (i.e., species whose global populations are not concentrated in Europe but which have an unfavorable conservation status in Europe), with a moderate rate of decline in Europe. During a recent visit to Hungary by RY, the authors undertook a roadside census of shrikes in northeastern Hungary.



Fig. 1  
Map of Hungary showing the 138 km of roads censused for Red-backed Shrikes (*Lanius collurio*) on 28 August 1994.

#### METHODS

We conducted a census on 28 August 1994 along 138 km of roads in northeastern Hungary. We began the census at the village Kisterenye (east of Budapest), extended north till the village Jósavafő (Aggtelek National Park), and then south till Eger (Bukki National Park, Fig. 1). Shrikes observed within a distance of 500 m from the road were recorded from a

reading was recorded to allow plotting the location of each sighting on maps (cf. Yosef et al. 1993). We also noted the dominant habitat in a 50 m radius of the perched shrike. Data on exact locations of each sighting are on file with the authors.

The predominant habitat sampled by the census route was open pasture or croplands with wheat (*Triticum aestivum*),

and common alder (*Salix alba*, *S. cinerea*, *S. fragilis*, *Populus nigra*, *Alnus glutinosa*).

We calculated the number of shrikes/km/habitat by dividing the total seen by the percent of each habitat included in the census. In addition, we treated the sample with Chi-square test with Yates correction. We verified habitat preference by Red-backed Shrike by applying Jacobs field preference index (JFPI; Jacobs 1974) which measures degree of

Table 1. Matrix of number of Red-backed Shrikes (*Lanius collurio*) expected, and observed, in northeast Hungary.

	Agriculture	Urban	Forests	Riverine
Total area, km (%)	60.8 (44)	44.0 (31.9)	16.8 (12.2)	16.4 (11.9)
Shrikes - expected	61	44	16	17
Shrikes - observed	112	5	18	3
Jacobs Index	+0.7	-0.9	-0.7	+0.05

corn (*Zea mays*), or sunflower (*Helianthus annuus*). Other habitats included vehicle travelling at 35-40 km/h, and the odometer bottomland and upland forests, riverine habitats, and urban areas (Table 1). Bottomland forests (250-450 m elevation) were composed mostly of oaks and ash (*Quercus petraea*, *Q. cerris*, *Acer campestre*, *Viburnum lantana*); the upland forests (above 450 m) of oak-hornbeam forests (*Q. robur*, *Q. petraea*, *Carpinus betulus*, *Ulmus campestris*, *A. campestre*, *A. plantanoides*, *Cerasus avium*); and riverine habitat mostly of willow and poplar species

presence of birds in a given habitat. The index is calculated as:

$D = (r - p) \sqrt{(r + p - 2rp)}$  where  $r$  = proportion of birds in a given habitat and  $p$  = proportion of area of given habitat. If JFPI = 0 then occurrence of birds is proportional to availability of given habitat; if JFPI = +1 habitat is used exclusively and if JFPI = -1 the given habitat is completely avoided.

#### RESULTS AND DISCUSSION

All shrikes observed along the census route were

Red-backed Shrike. A total of 138 shrikes was seen along the 138 kms of the route (i.e., 1 shrike/ km). The major habitat along this route was pasture and croplands (Table 1). Villages and other urban areas, forests, and riverine habitats were found in that order of abundance (Table 1). Our results indicate that more Red-backed Shrikes were observed in greater densities (1.8 shrikes/km; Table 1), than if they were randomly distributed, in areas of pasture and cropland (Chi-square test with Yates correction = 55.93, 3 DF,  $n = 138$ ,  $P < 0.001$ ; Fig. 2). To the contrary, urban areas (0.1 shrikes/km) and forests (0.2 shrikes/km) had lower than the expected densities (Fig. 3).

Our results concur with earlier studies that show shrikes prefer open areas with appropriate hunting perch sites. Their habitat preference is illustrated by the fact that most individuals were clumped in agricultural areas or natural meadows. In addition, Red-backed Shrikes, like most other *Lanius* spp., seen in forests were either in ecotones between the undergrowth and the road, or in clearings (Lefranc

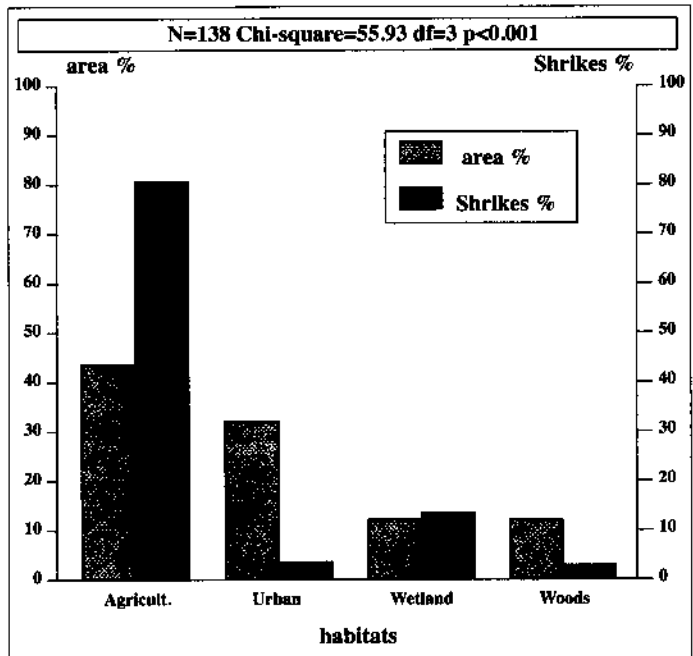


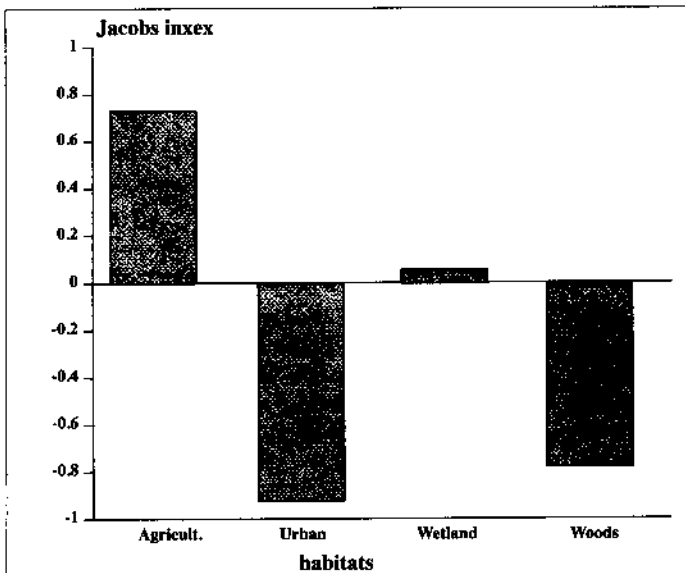
Fig. 2. Proportion of habitats and the relative presence of Red-backed Shrikes (*Lanius collurio*).

1979, Malchevskiy and Pukinskiy 1983, Jakober and Stauber 1987).

Lesser Grey Shrikes (*L. minor*) also known to breed in comparatively large numbers in the study area, although by the fact that most individuals were clumped in agricultural areas or natural meadows. In addition, Red-backed Shrikes, like most other *Lanius* spp., seen in forests were either in ecotones between the undergrowth and the road, or in clearings (Lefranc 1979, Malchevskiy and Pukinskiy 1983, Jakober and Stauber 1987).

Lesser Grey Shrikes (*L. minor*) also known to breed in comparatively large numbers in the study area, although The density we observed in Hungary (1 shrike/km) is similar to that reported for neighboring Czech and Slovak Republics (Holan 1993), but are greater than in Switzerland (Weggler 1991), and Austria (Dvorak and Zuna-Krathy 1993). At present it is difficult to evaluate the influence of the political situation in neighboring Yugoslavia on avian populations in general, and of shrike populations in particular. Hungary presently is experiencing

Fig. 3. Jacobs field preference index of the Red-backed Shrikes (*Lanius collurio*) observed in the different habitats.



Hungary presently is experiencing significant land-use changes that affect shrikes negatively. The privatization of agricultural areas has led to smaller plots, with a reduced use of biochemicals. Hence, farming practices are reverting to the traditional methods. However the real danger in Hungary is that areas of grassland, formerly protected, are now being converted to agriculture (cereals, sunflower).

This will affect grassland populations of birds because this will lead to fewer areas remaining as natural meadows. The extent to which this has occurred, and continues to occur today, remains unknown. However, conversion of

grasslands to agricultural fields appears to be the major factor that has contributed to a widespread decline in numbers, of up to 50%, of the European population of Red-backed Shrikes during 1970-1990 (Tucker et al. 1994).

Shrikes are good indicators of the status of the grassland community, and it is essential that regular roadside censuses in Hungary are conducted to evaluate the effects of changing farming practices on avian communities. This simple technique can help to detect negative changes prior to their becoming drastic declines.

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#### LITERATURE CITED

- BASSIN, P. 1981. Repartition et biotopes de la Pie-grieche grise, *Lanius excubitor*, dans le nord-ouest de la Suisse (Ajoie, canton du Jura). Nos Oiseaux 36:1-20.
- DROEGE, S., AND J. R. SAUER. 1990. North American Breeding Bird Survey annual summary, 1989. U.S. Fish Wildl. Serv. Biol. Rep. 90:1-22.
- DURANGO, S. 1950. Om klimatets inverkan pa tornskatans (*Lanius collurio* L.) utbredning och levnadsmojligheter. Fauna Flora 45: 49-78.
- DVORAK, M., AND T. ZUNA-KRATHY. 1993. Zur aktuellen Situation ausgewahlter Kulturlandvogel im Neusiedlersee-Gebiet. Vogelkund. Nachr. Osterreich 4:125-138.
- ELLENBERG, H. 1986. Warum gehen Neuntoter (*Lanius collurio*) in Mitteleuropa im bestand zuruck? Uberlegungen zu den auswirkungen von pestiziden sowie zu den landschaftsveranderungen im winterquartier und im brutgebiet. Corax 12: 34-46.
- HAAS, C. A., AND I. OGAWA. 1995. Population trends of Bull-headed and Brown shrikes in Hokkaido, Japan. Proc. West. Found. Vert. Zool. 6:72-75.
- HANDS, H. M., R. D. DROBNEY, AND M. R. RYAN. 1989. Status of the Loggerhead Shrike in the northcentral United States. Missouri Coop. Fish Wildl. Res. Unit, Univ. Missouri, Columbia.
- HOLAN, V. 1993. Populacni hustota a hnidni bionomie t'uhyka obecneho (*Lanius collurio*) na Vsetinsku. Sylvia 29: 3-11.
- JACOBS, J. 1974. Quantitative measurement of food selection. Oecologia 14:413-417.
- JAKOBER, H. AND W. STAUBER. 1987. Habitatsanspruche des Neuntoters (*Lanius collurio*) und massnahmen fur seinem schutz. Beih. Veroff. Natursch. Landschaft. Bad.-Wurt. 48: 25-53.
- LEFRANC, N. 1979. Contribution a l'ecologie de la Pie-grieche ecorcheur (*Lanius collurio* L.) dans les Vosges moyennes. Oiseau 49: 245-298.
- LEFRANC, N. 1993. Les Pies-grieches d'Europe, d'Afrique du nord et du moyen-orient. Delachaux et Niestle, Lausanne.
- MALCHEVSKIY, A. S., AND Y. B. PUKINSKIY. 1983. Birds of Leningrad region and adjacent territories. Leningrad Univ. Press, Leningrad.
- MARECHAL, P. 1993. Over externe factoren die de habitatkwaliteit van de Grauwe Klauwier *Lanius collurio* beinvloeden. Vogeljaar 41: 34-48.
- OLSSON, V. 1995. The effects of habitat changes on the distribution and population trends of the Great Grey and Red-backed shrikes in Sweden. Proc. West. Found. Vert. Zool. 6:108-111.
- PEAKALL, D. B. 1962. The past and present status of the Red-backed Shrike in Great Britain. Bird Study 9: 198-216.
- PETERJOHN, B. G., AND J. R. SAUER. 1995. Population trends of the Loggerhead Shrike from the North American breeding bird survey. Proc. West. Found. Vert. Zool. 6:117-121.
- TUCKER, G. M., M. F. HEATH, L. TOMIALOJC, AND R. F. A. GRIMMETT. 1994. Birds in Europe: their conservation status. Birdlife Conserv. Series 3. Birdlife Int., Cambridge.
- WEGGLER, M. 1991. Brutvogel im Kanton Zurich. Zurcher Vogelschutz, Zurich.
- YOSEF, R. 1994. Evaluation of the global decline in the True Shrikes (Family Laniidae). Auk 111:228-233.
- YOSEF, R., J. N. LAYNE, AND F. E. LOHRER. 1993. Trends in numbers of Loggerhead Shrikes on roadside censuses in peninsular Florida, 1974-1992. Fla. Sci. 56:92-97.