

PERCH SITE PREFERENCE  
OF THE BULL-HEADED SHRIKE (*Lanius bucephalus*)  
DURING THE BREEDING SEASON IN JAPAN

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ABSTRACT

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Perch site preference of territorial Bull-headed Shrikes was studied in three habitat types („city park and garden,” „riverbank” and „farmland”) in the region of Osaka and in Hokkaido, Japan, during the 1997 breeding season. In 5 out of the 15 territories studied, shrikes' use of perch sites showed significant difference with availability, measured by random samples within the territories. This suggests preference of shrikes for perch sites with special characteristics in the park and farmland habitats, but no preference was found in the riverbank habitat. We detected a significant correlation between height of perch sites and flying distances from perch during ground hunting. When bushes and trees had cut-crowns in Japanese gardening style, which made them compact and dense, they were unsuitable for shrikes as perch sites.

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INTRODUCTION

Ecological research on shrikes (*Laniidae*) recently have increased, mainly because of the drastic population changes reported for several species around the world (Yosef and Lohrer 1995). Shrikes seem to be good indicators of habitat change that results from global climate change (Safriel 1995). Shrikes are songbirds, but use their specialised bill and hunt like small raptors (Cade 1995, Schön 1996). They are sit-and-wait predators, often perching at the top of high grasses, bushes and trees while looking for moving prey.

Some previous studies revealed different aspects of shrike foraging ecology. In North America, Craig (1978) analysed the predatory behaviour of the Loggerhead Shrike (*Lanius ludovicianus*) relating to cycles in prey availability and to other environmental factors during the nonbreeding period. Yosef and Grubb (1993, 1994) pointed out the effects of habitat structure on foraging methods of the Loggerhead Shrikes. Severinghaus and Liang (1995) studied the foraging behaviour of the Brown Shrike (*L. cristatus*) in Taiwan – characterised the food searching behaviour and quantified its elements in different habitat types. Studies on the Great Grey Shrike (*L. excubitor*) in Israel (Yosef 1993) and in Germany (Rothhaupt 1995) revealed characteristics of their habitat use and of territory physiognomy (Schön 1994, 1995). Hernandez (1995) compared the temporal-spatial pattern of food caching in two sympatric shrike species – Great Grey Shrike and Red-backed Shrike (*L. collurio*) in Spain.

The goal of this paper is to evaluate perch site selection of the Bull-headed Shrike in respect to availability in different habitats in Japan. The Bull-headed Shrike is widespread throughout Japan (Brazil 1991) and in most parts of eastern Asia (Panow 1996). A decade ago in some parts of Japan, *e.g.* in the Osaka region, it was considered as common bird, but in the last few years its population has decreased considerably (Yamagishi, pers. obs.). In Hokkaido, the population is more stable (Haas and Ogawa 1995).

## STUDY AREA AND METHODS

The study was conducted in two sites: one in the town of Osaka (34°34'N, 135°32'E), including suburban areas where the Bull-headed Shrike is resident (Yamagishi *et al.* 1992). In the present study it was observed in city parks, gardens and on the banks of the Yamato River. The other study area was in the surroundings of the town Obihiro (42°52'N, 143°12'E) on Hokkaido Island, where the Bull-headed Shrike is a migratory species (Takagi and Ogawa 1995). It was found in farmlands and in the flood plain of the Satsunai River. Twelve territories were found in the Osaka site and six in the Obihiro site. To reduce variation in the data we concentrated only on the males' foraging behaviour during the first part of their nesting period, *i.e.* in the pair-formation, pair-bonding, and egg-laying stages (Yamagishi and Saito 1985).

The present study was conducted during 1997, from mid-March to mid-April in the Osaka area and from mid-April to mid-May in Hokkaido.

In three habitats we conducted a detailed survey of perch site availability. The coordinates of 100 points in a shrike territory were chosen randomly and the details of the perch site closest to each of these random points were evaluated. This sample shows the frequency distribution of available perch sites. The *chi*-square test was applied for testing the difference between use and availability of perch sites. The level of significance of 5% was adjusted for the number of tests made using sequential Bonferroni adjustment (Rice 1989).

## RESULTS AND DISCUSSION

Height of perch sites used by Bull-headed Shrikes showed differences among habitat types (Fig. 1), which were related to habitat structure. In the city park, Bull-headed Shrikes usually perched on the lowest branches of deciduous trees, *ca* 1.5-2.5 m. Higher branches were rarely used. The farmland habitat was more open and heterogeneous than the city park, having three main types of potential perch sites: high grass and planted coniferous saplings up to 1.5 m, coniferous bushes up to 2.5 m height and coniferous trees from 3.5 m to 10 m (mainly up to 6 m). At the riverbank, shrikes mainly foraged from high grass. Beside high grass (up to 2 m), they also perched on small bushes (1.5-3 m).

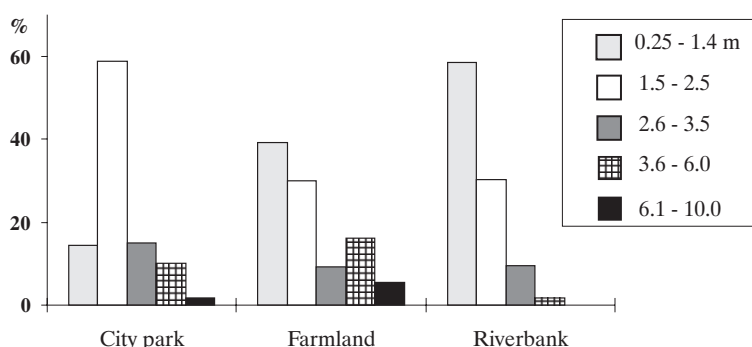


Fig. 1. Histogram of perch site heights selected by Bull-headed Shrikes in three habitat types in Japan: „city park and garden”, „farmland” and „riverbank”.

A positive significant relationship exists between perch site height and hunting distance (Spearman's  $r = 0.564$ ,  $df = 72$ ,  $p < 0.001$ ). Shrikes mostly detect and hunt for moving animals on the ground. Prey movement is so important that wintering Loggerhead Shrikes lost weight when temperature became cooler and as a consequence their main prey items, *i.e.* grasshoppers and lizards, became sessile late in the morning (Craig 1978). Higher perch sites offer better visibility of prey where high grass covers the territory. From the coniferous saplings, shrikes foraged in a small circle with a radius of 6 m, but from the top of the coniferous trees shrikes were able to look over a bigger circle around the perch site (radius *ca.* 25 m in bare ploughed field) in the farmland habitat in Obihiro. In Florida, Loggerhead Shrikes changed from ground hunting to aerial chase when visibility of prey items decreased in high grass (Yosef and Grubb 1993). The highest of these farmland perch sites were also used by the males to watch over the territory in order to guard the boundaries from trespass by other shrikes.

Use of different types of perch sites and their availability did not differ significantly in the riverbank habitat (Table 1). However, there was a significant difference between them in three territories out of five in the „city park and garden” habitat

(Table 1). Interestingly, bamboo was present only in this habitat and it was highly preferred. Groups of bamboos offered good quality perch sites. In the „city park and garden” habitat, some preference for exotic palm trees and iron fences was also observed. One territory was established in a hotel garden, where shrikes were frequently observed on the top of stone lanterns. In this territory, trees and bushes with cut-crowns occurred. Shrikes appeared to avoid these dense and compact perch sites (Fig. 2). A categorisation of perch sites showed that shrikes preferred perch sites offering good visibility, such as single twigs or loose groups of twigs, but avoided bushes and trees with closed, dense canopies (Table 2). In the farmland habitat, availability of evergreen bushes (including young coniferous trees) was dominant (Table 1), but shrikes preferred higher coniferous trees offering improved visibility of prey and territory borders.

Table 1

Preference of perch sites by territorial Bull-headed Shrikes, *i.e.* the ratio of use and availability, where availability of perch sites was measured on 100 randomly selected points in each of the 15 territories. Statistical comparison of use and availability of perch sites was carried out by *chi*-square test at the 5% significance level, after Bonferroni correction.

Code of territory:	Gardens and parks (Osaka)				
	1	2	3	4	5
Bush	4/47	14/27	8/10	21/30	14/25
Tree	37/21	29/18	71/83	40/40	48/38
Coniferous tree	6/9	19/10	-	-	-
Evergreen bush	15/14	14/20	-	0/1	-
Grass and herb	-	19/16	-	5/15	10/24
Bamboo	28/5	-	-	-	24/9
Reed	-	-	-	-	-
Palm trees	-	-	9/9	-	-
Heap of twigs	-	-	-	-	-
Others	15/4	5/9	12/5	34/14	4/4
$\chi^2$	63.62	11.95	3.81	15.92	16.85
<i>df</i>	5	5	3	4	4
<i>p</i>	<b>0.003</b>	<i>n.s.</i>	<i>n.s.</i>	<b>0.005</b>	<b>0.004</b>

Code of territory:	Riverbank (Osaka)				
	6	7	8	9	10
Bush	22/17	44/35	5/8	39/30	11/15
Tree	23/15	18/12	13/10	17/15	46/30
Coniferous tree	-	-	5/4	-	-
Evergreen bush	-	-	-	-	11/18
Grass and herb	48/66	30/40	50/64	39/52	18/22
Bamboo	-	-	-	-	-
Reed	-	4/7	16/8	-	-
Palm trees	-	-	-	-	-
Heap of twigs	-	-	-	-	-
Others	7/2	4/5	11/6	5/3	14/15
$\chi^2$	7.95	4.58	7.05	3.66	6.11
<i>df</i>	3	4	5	3	4
<i>p</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>

Code of territory:	Farmland (Obihiro)				
	11	12	13	14	15
Bush	36/28	12/28	6/4	12/14	17/22
Tree	23/17	17/17	2/4	15/12	22/20
Coniferous tree	18/27	50/60	38/18	38/17	44/30
Evergreen bush	-	-	12/34	19/23	-
Grass and herb	23/28	21/19	19/27	12/20	17/28
Bamboo	-	-	-	-	-
Reed	-	-	-	-	-
Palm trees	-	-	-	-	-
Heap of twigs	-	-	23/13	-	-
others	-	-	-	4/5	-
$\chi^2$	4.19	21.52	22.9	10.6	6.07
$df$	3	3	5	5	3
$p$	n.s.	<b>0.004</b>	<b>0.004</b>	n.s.	n.s.

Table 2

Perch site availability, use and preference (calculated as the ratio of use and availability) in a Hotel garden, Osaka, Japan. Highest preferences shown in bold.

Perch type	Availability %	Use %	Preference
Bush (cut-crown)	24	0	0
Bush (non-cut)	23	4	0.174
Evergreen bush	14	15	1.071
Tree (cut-crown)	12	2	0.167
<b>Tree (non-cut)</b>	9	30	<b>3.334</b>
Coniferous tree	9	6	0.667
<b>Bamboo</b>	5	28	<b>5.600</b>
<b>others</b>	4	15	<b>3.750</b>

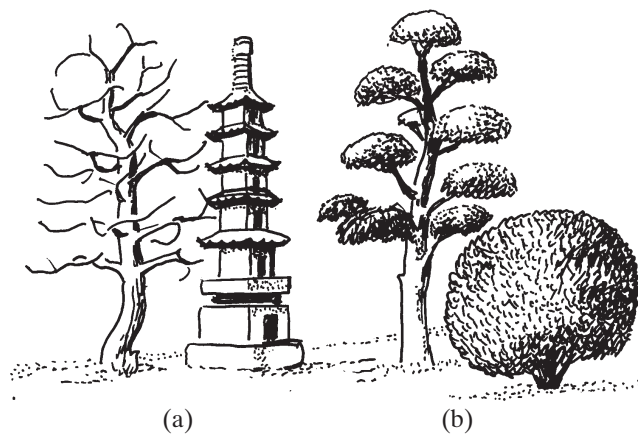


Fig. 2. Examples of perch site quality. (a): high quality perch sites (tree with loose crown and stone lantern), (b) low quality perch sites (tree and bush cut in Japanese gardening style).

Characterisation of perch site selection is important for understanding how birds evaluate habitat quality. Although preference of the Bull-headed Shrike for certain perch types showed a great variability among territories, we describe a high preference for specific perch sites in respect to availability in two out of the three habitats studied. We conclude that the availability of good quality perch sites in hunting areas is important for the management of Bull-headed Shrikes and to ensure their continued survival in the wild.

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#### REFERENCES

- Brazil M. A. 1991. *The birds of Japan*. Christopher Helm. London.
- Cade T. J. 1995. *Shrikes as predators*. Proc. West. Found. Vertebr. Zool. 6: 1-5.
- Craig R. B. 1978. *An analysis of the predatory behavior of the Loggerhead Shrike*. Auk 95: 221-234.
- Haas C. A., Ogawa I. 1995. *Population trends of Bull-headed and Brown shrikes in Hokkaido Island, Japan*. Proc. West. Found. Vertebr. Zool. 6: 72-75.
- Hernandez Á. 1995. *Temporal-spatial patterns of food caching in two sympatric shrike species*. Condor 97: 1002-1010.
- Panow E. N. 1996. *Die Würger der Paläarktis. Die Neue Brehm-Bücherei*. Vol. 557. Westarp Wissenschaften, Magdeburg, Akademischer Verlag, Heidelberg.
- Rice W. R. 1989. *Analyzing tables of statistical tests*. Evolution 43: 223-225.
- Rothhaupt G. 1995. *Current status and habitat of the Great Grey Shrike in Germany*. Proc. West. Found. Vertebr. Zool. 6: 122-127.
- Safriel U. N. 1995. *What is special about shrikes? Conclusions and recommendations*. Proc. West. Found. Vertebr. Zool. 6: 299-308.
- Schön M. 1994. *Characteristics of the habitats of the Great Grey Shrike Lanius e. excubitor in the region of the southwestern Schwabische Alps (southwestern Germany): seasonal utilization and territory-size, structural characteristics and their changes, micro-structures and cultivation*. Ökol. Vögel 16: 253-495.
- Schön M. 1995. *Habitat structure, habitat change, and causes of decline in the Great Grey Shrike Lanius excubitor in southwestern Germany*. Proc. West. Found. Vertebr. Zool. 6: 142-149.
- Schön M. 1996. *Raptor-like passerines – some similarities and differences of Shrikes (Lanius) and raptors*. Ökol. Vögel. 18: 173-216.
- Severinghaus L. L., Liang C. T. 1995. *Food and foraging behavior of the Brown Shrike Lanius cristatus in Taiwan*. Proc. West. Found. Vertebr. Zool. 6: 194-199.
- Takagi M., Ogawa I. 1995. *Comparative study on nest sites and diet of Lanius bucephalus and L. cristatus in northern Japan*. Proc. West. Found. Vertebr. Zool. 6: 200-203.
- Yamagishi S., Saito M. 1985. *Function of courtship feeding in the Bull-headed Shrike, Lanius bucephalus*. J. Ethol. 3: 113-121.

- Yamagishi S., Nishiumi I., Shimoda C. 1992. *Extrapair fertilization in monogamous Bull-headed Shrike revealed by DNA fingerprinting*. Auk 109: 711-721.
- Yosef R. 1993. *Influence of observation posts on territory size of Northern Shrikes*. Wilson Bull. 105: 180-183.
- Yosef R., Grubb T. C. Jr. 1993. *Effect of vegetation height on hunting behavior and diet of Loggerhead Shrikes*. Condor 95: 127-131.
- Yosef R., Grubb T. C. Jr. 1994. *Resource dependence and territory size in Loggerhead Shrikes (Lanius ludovicianus)*. Auk 111: 465-469.
- Yosef R., Lohrer F. E. (Eds). 1995. *Shrikes (Laniidae) of the world: biology and conservation*. Proc. West. Found. Vertebr. Zool., No. 6.