The Condor 100:400–402

AZURE-WINGED MAGPIES AVOID NEST PREDATION BY NESTING NEAR A JAPANESE LESSER SPARROWHAWK'S NEST[1]

MUTSUYUKI UETA
Research Center, Wild Bird Society of Japan, 2-35-2 Minamidaira, Hino, Tokyo 191-0041, Japan, e-mail: mj-ueta@netlaputa.ne.jp

Abstract. Nest site selection of Azure-winged Magpies (*Cyanopica cyana*) was studied in relation to their proximity to the nests of Japanese Lesser Sparrowhawks (*Accipiter gularis*). Magpies used nest sites that were more concealed when not nesting in association with the hawk, and nests with a higher rate of leaf cover were less frequently depredated. Magpies preferred to nest close to hawk nests, and such sites had higher breeding success. However, Azure-winged Magpies nested in places with less leaf cover near hawk nests. Despite the lack of cover, the magpie nests were more successful when located near a hawk nest. Magpies effectively avoid nest predation by exploiting the defending behavior of the hawks.

Key words: Azure-winged Magpie, behavioral exploitation, Cyanopica cyana, *Japanese Lesser Sparrowhawk, nest predation, nest site selection.*

Nest site selection may vary depending upon tactics used to avoid nest predation. For species that build well-camouflaged nests, nest spacing is important for avoiding nest predation (Tinbergen et al. 1966). On the other hand, nest concentration is important for species that defend their nests (Andersson and Wiklund 1978). Does nest site selection vary according to the tactics used in species that use several distinct tactics to avoid nest predation?

Azure-winged Magpies (*Cyanopica cyana*) are gregarious, territorial birds with a cooperative breeding system (Komeda et al. 1987). Within their Japanese range, they have two tactics to avoid nest predation. One tactic is to defend their nest (Hosono 1975) and the other is to nest in association with Japanese Lesser Sparrowhawks (*Accipiter gularis*) (Uchida 1986, Endo and Hirano 1990, Ueta 1994a). They avoid nest predation by taking advantage of the hawk's nest defense (Ueta 1994a, 1994b). Here, I discuss nest site selection of Azure-winged Magpies and determine whether they alter how they place their nests depending upon whether they are near a hawk nest or not.

METHODS

The study was conducted from May to July 1993 and 1994. I studied the general nest site selection of Azure-winged Magpies in 11 groves where the hawks did not breed. I also studied nest site selection of the magpies in 15 groves where the hawks bred in order to examine nest site selection of the magpies around hawk nests. All study areas were isolated coppices of less than 20 ha in the suburban areas of Tokyo, central Japan, and the coppices consisted of 40-year-old trees with no or little bush layer. The coppices primarily were composed of *Quercus acutissima, Q. serrata, Styrax japonica,* and *Chamaecyparis pisifera.*

Because many bird species select concealed places for nest sites, I examined the concealment of each magpie nest. Nest concealment was measured by leaf cover within 2 m of a nest. After magpies finished breeding, I measured nest concealment at four points which were vertically and horizontally 2 m distant from each nest. By observing the selected points through a tube of 11 cm in length and 4 cm in diameter, I estimated the percent of the field of view that was vegetation. The percentages were added, divided by 4 and classified into one of four categories: 0–25%, 26–50%, 51–75%, and 76–100%.

I counted the magpie nests within 100 m of each hawk nest, and measured the distance between the associated hawk nest and that of each magpie nest. I categorized distance from the hawk nest in 20 m intervals up to 100 m. The number of magpie nests was compared with the expected number in each distance category. Expected values for each distance category were calculated by dividing the area within each distance category by the total research area, and multiplying each result by the total number of magpie nests.

In order to determine whether nests with a greater amount of leaf cover were less vulnerable to nest predation in the study areas, predation rates were compared among nests with differential leaf cover. In addition to observation of real magpie nests, I used an experimental approach to study nest predation rate. Simulated Azure-winged Magpie nests made of dry grass, 10 cm in diameter and 5 cm high, were used at nine sites in 1993 and another seven sites in 1994. These study sites were at different locations, but of the same vegetation structure as those for nest site selection of the magpies. Each site contained 25 × 25 m plots with 10 simulated nests each. Each simulated nest contained two Japanese Quail (*Coturnix coturnix*) eggs and was attached to the base of a branch 3–4 m above ground. Five of 10 simulated nests at each site were attached to branches having 26–50% leaf cover. The other five nests were placed on branches with 76–100% leaf cover, which was the most common coverage for magpie nests not in association with a hawk.

[1] Received 27 January 1997. Accepted 20 November 1997.

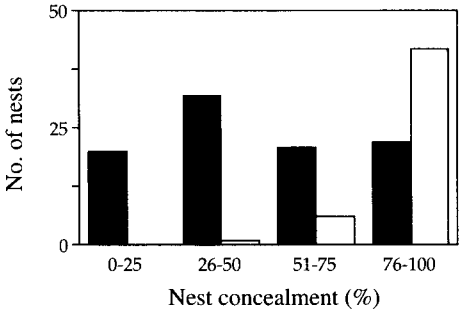

FIGURE 1. Concealment rates of Azure-winged Magpie nests within 100 m (solid bars) and farther than 1 km (open bars) from hawk nests.

Each nest was checked seven days after placement to assess predation of the eggs.

In order to determine whether nesting closer to a hawk nest has an effect on nest predation, nest predation rates were compared between distance categories from the hawk nest. In addition to natural nests, an experiment using simulated nests with two eggs was used. Simulated nests were employed at two sites in 1993 and another three sites in 1994; each site contained three 20 × 20 m plots, with five simulated nests each. Plot 1 was within 20 m of a hawk nest, plot 2 was 40–60 m from it, and plot 3 was 80–100 m from the nest. I selected plots with similar canopy cover (60–80%) to make the conditions as equal as possible. I checked each nest seven days after placement. The real magpie nests at the experimental plots were eliminated from calculation of nest predation rate because of the possibility that the presence of simulated nests would increase the density of nests and thereby induce nest predation of the real nest.

RESULTS

I found 49 magpie nests at distances greater than 1 km from a hawk nest. Forty-two of the 49 nests (85.7%) were built on branches with 76–100% leaf cover, 6 (12.2%) with 51–75% leaf cover, and 1 (2.0%) with less than 50% leaf cover (Fig. 1). At distances within 100 m of a hawk nest, I found 95 magpie nests; 22 (23.2%) were built on branches with 76–100% leaf cover, 21 (22.1%) with 51–75% leaf cover, 32 (33.7%) with 26–50% leaf cover, and 20 (21.1%) with 0–25% leaf cover. The magpies nested on branches with a lower amount of leaf cover in the areas within 100 m of a hawk nest (Fig. 1). There was a significant difference in the extent of concealment of real magpie nests between the two distance categories (χ^2_3 = 54.6, $P < 0.001$).

Real Azure-winged Magpie nests within 100 m of the hawk nest were observed at 86.7% of the hawk nests (n = 15). Mean (± SD) number of real magpie nests within 100 m of the hawk nest was 6.8 ± 2.0 (n = 13). The number of real magpie nests at 20 m intervals from the hawk nest is shown in Figure 2. The real magpie nests within 20 m of the hawk nest accounted for 55.1% of all real nests (n = 89), and the number of real nests in each distance category decreased with increasing distance from a hawk nest. The difference in the number of real magpie nests between the distance categories was significant (χ^2_4 = 643.3, $P < 0.001$).

The predation rate of simulated nests with 76–100% leaf cover seven days after placement was 51.3% (n = 80), whereas simulated nests with 26–50% leaf cover had a 95.0% predation rate (n = 80). Predation rates differed between the simulated nests with differential leaf cover (Mann-Whitney U = 36, n_1 = 16, n_2 = 16, $P < 0.001$). The predation rate of real magpie nests was 66.7% (n = 42) in concealed sites (76–100% leaf cover), and 85.7% (n = 7) in open sites (less than 75% leaf cover).

The predation rate of dummy nests increased with distance from a hawk nest. In plot 1 (within 20 m of the hawk nest), there was no predation of simulated nests, but 40.0% (n = 25) of nests were depredated within seven days after placement in Plot 2 (40–60 m), and 84.0% (n = 25) in plot 3 (80–100 m). This difference in predation rates between plots was significant (Kruskal-Wallis H = 11.7, A = 150.0, n_1 = 5, n_2 = 5, n_3 = 5, $P < 0.001$). The predation rate of real magpie nests also increased in relation to distance from a hawk nest. The predation rate of real magpie nests was 2.4% (n = 41) within 20 m of the hawk nest, 50.0% (n = 6) at 40–60 m, and 75.0% (n = 4) at 80–100 m.

DISCUSSION

Most of the magpies that nested far from a hawk nest used nest sites with 76–100% leaf cover. The importance of nest concealment for reducing the probability of predation has been noted in many bird species (Sugden and Beyersbergen 1986, 1987, Clark and Nudds 1991). Because predation rates of real and simulated nests were higher in open places than in concealed ones, it suggests that Azure-winged Magpies nest in concealed places to avoid predation.

Another tactic to avoid nest predation is exploitation of nest defense provided by nesting in association with Japanese Lesser Sparrowhawks (Ueta 1994a). This strategy is shown by the decreasing number of Azure-winged Magpie nests at increasing distances from a hawk nest, and the increasing predation rates of simulated and real nests at increasing distances from the

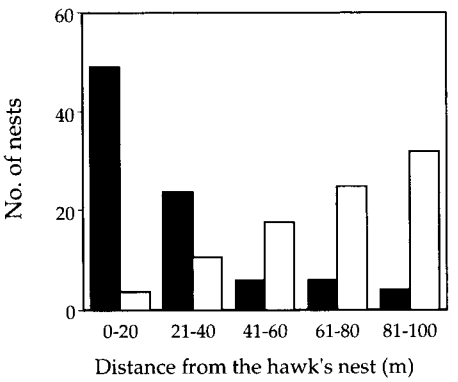

FIGURE 2. Observed (solid bars) and expected (open bars) number of Azure-winged Magpie nests at varying distances from Japanese Lesser Sparrowhawk nests. Data were collected from 13 sites.

hawk nest. The magpies represented only 0.5% of the hawk's prey items (n = 433; Ueta 1992), suggesting that the risk of nesting close to a hawk nest may be outweighed by the benefits of enhanced nest defense.

Azure-winged Magpies generally nested in places with less leaf cover when nesting in association with a hawk. Although the nests with less leaf cover were vulnerable to nest predation in the areas far from a hawk nest, they were not depredated around a hawk nest. Magpies breed in sites close to hawk nests, even if they are less concealed, in order to avoid nest predation by exploiting the defending behavior of the hawk effectively.

I thank Takashi Kurosawa, Reiko Kurosawa, and Jason Minton for discussion of ideas that led to this work and for helpful comments on earlier drafts.

LITERATURE CITED

ANDERSSON, M., AND C. G. WIKLUND. 1978. Clumping versus spacing out: experiments on nest predation in fieldfares (*Turudus pilaris*). Anim. Behav. 26: 1207–1212.

CLARK, R. G., AND T. D. NUDDS. 1991. Habitat patch size and duck nesting success: the crucial experiments have not been performed. Wildl. Soc. Bull. 19:534–543.

ENDO, K., AND T. HIRANO. 1990. Breeding records and nesting habitats of the Japanese Lesser Sparrowhawk in residential area of Tochigi Prefecture. Jap. J. Ornithol. 39:35–39. (In Japanese with English summary)

HOSONO, T. 1975. A study of the life history of Blue Magpie (10). Its response against other birds. J. Yamashina Inst. Ornithol. 7:533–549. (In Japanese with English summary)

KOMEDA, S., S. YAMAGISHI, AND M. FUJIOKA. 1987. Cooperative breeding in Azure-winged Magpies, *Cyanopica cyana,* living in a region of heavy snowfall. Condor 89:835–841.

SUGDEN, L. G., AND G. W. BEYERSBERGEN. 1986. Effect of density and concealment on American Crow predation of simulated duck nests. J. Wildl. Manage. 50:9–14.

SUGDEN, L. G., AND G. W. BEYERSBERGEN. 1987. Effect of nesting cover density on American Crow predation of simulated duck nests. J. Wildl. Manage. 51:481–485.

TINBERGEN, N., M. IMPEKOVEN, AND D. FRANCK. 1966. An experiment on spacing-out as a defence against predation. Behaviour 28:307–321.

UCHIDA, H. 1986. Passerine birds nesting close to the nests of birds of prey. Jap. J. Ornithol. 35:25–32. (In Japanese with English summary)

UETA, M. 1992. The number of small birds predated by breeding Japanese Lesser Sparrowhawk *Accipiter gularis* in suburban areas, Tokyo. Strix 11:131–136. (In Japanese with English summary)

UETA, M. 1994a. Azure-winged magpies, *Cyanopica cyana,* "parasitize" nest defence provided by Japanese lesser sparrowhawks, *Accipiter gularis.* Anim. Behav. 48: 871–874.

UETA, M. 1994b. Nest abandonment by Japanese Lesser Sparrowhawks *Accipiter gularis* resulting in predation of nests of nearby Azure-winged Magpies *Cyanopica cyana.* Strix 13:205–208. (In Japanese with English summary)

The Condor 100:402–404

LEUCOCYTOZOON SIMONDI IN EMPEROR GEESE FROM THE YUKON-KUSKOKWIM DELTA IN ALASKA[1]

TUULA E. HOLLMÉN
Faculty of Veterinary Medicine, Department of Basic Veterinary Sciences, P.O. Box 57, 00014 University of Helsinki, Finland

J. CHRISTIAN FRANSON[2] AND LYNN H. CREEKMORE
U.S. Geological Survey, Biological Resources Division, National Wildlife Health Center, 6006 Schroeder Road, Madison, WI 53711

JOEL A. SCHMUTZ AND ADA C. FOWLER
U.S. Geological Survey, Biological Resources Division, Alaska Biological Science Center, 1011 East Tudor Road, Anchorage, AK 99503

Abstract. We surveyed Emperor Geese (*Chen canagica*) in western Alaska for avian hematozoa. Blood smears were collected from 134 adults and goslings in late July 1996, on their breeding grounds on the Yukon-Kuskokwim Delta. One of 134 (0.7%) Emperor Geese harbored *Leucocytozoon simondi,* representing a new host record for this parasite. No other hematozoa were detected. This is one of few reports of avian blood parasites from the arctic tundra.

Key words: Alaska, Chen canagica, *Emperor Geese,* Leucocytozoon simondi.

Avian blood parasites have been documented from many species throughout the world, particularly in temperate and warm climates where vector populations are abundant (Atkinson and van Riper 1991). How-

[1] Received 6 October 1997. Accepted 15 December 1997.

[2] Corresponding author. e-mail: chris_franson@usgs.gov