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NEST-SITE SELECTION OF NORTHERN GOSHAWKS AND EURASIAN SPARROWHAWKS IN A FRAGMENTED LANDSCAPE IN NORTHERN JAPAN

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ABSTRACT.—We measured the characteristics of trees and sites of 14 Northern Goshawk (*Accipiter gentilis*) and 14 Eurasian Sparrowhawk (*Accipiter nisus*) nests in the Ishikari Plain of Hokkaido, Japan, where their nesting habitats were fragmented into small woodlots. We also randomly located 25 plots (0.033 ha each) in unused woodlots to compare differences between nest and random sites. Goshawks nested in a variety of trees and diameters at breast height (dbh) of nest trees were significantly larger than the mean values for all trees in the nest sites, and were similar to the largest trees in these sites. The heights of nest trees were significantly larger than the mean values of all trees in the nest sites. Goshawks nested in a variety of forest types, in proportion to their availability. The dbh and tree heights of sparrowhawk nest trees were significantly larger than the mean values of all trees in the nest sites, and were significantly smaller than the largest trees in these sites. Sparrowhawks nested only in evergreen conifers, and their nests were more likely to occur in evergreen coniferous forests than in other forest types. Diameters of nest trees were larger for goshawks than sparrowhawks, but the tree density was higher for sparrowhawks. Goshawks and sparrowhawks nesting sites were further from human habitation than random sites, but averaged only 247 and 229 m from houses, respectively.

KEY WORDS: *Northern Goshawk*; Accipiter gentilis; *Eurasian Sparrowhawk*; Accipiter nisus; *fragmented habitat*; *nest-site selection*.

SELECCIÓN DE SITIOS DE NIDIFICACIÓN POR PARTE DE *ACCIPITER GENTILIS* Y *ACCIPITER NISUS* EN UN PAISAJE FRAGMENTADO EN EL NORTE DE JAPÓN

RESUMEN.—Medimos las características de los árboles y los sitios utilizados para nidificar por 14 individuos de la especie *Accipiter gentilis* y 14 de la especie *A. nisus* en Ishikari Plain, Hokkaido, Japón, una localidad en donde el hábitat de nidificación estaba compuesto por pequeños fragmentos de bosque. También utilizamos 25 parcelas (cada una de 0.033 ha) localizadas al azar, en fragmentos de bosque no utilizados, para comparar las características entre los sitios de nidificación y los sitios seleccionados al azar. *Accipiter gentilis* nidificó en una variedad de árboles y el diámetro a la altura del pecho (dap) de los árboles en los que se ubicaron los nidos fue significativamente mayor que el valor promedio de todos los árboles de los sitios de nidificación, y fue similar al de los árboles más grandes de estos sitios. La altura de los árboles en los que se ubicaron los nidos fue significativamente mayor que la altura promedio de todos los árboles de los sitios de nidificación. *Accipiter gentilis* nidificó en una variedad de tipos de bosque, en proporción a su disponibilidad. El dap y la altura de los árboles en los que se ubicaron los nidos de *A. nisus* fueron significativamente mayores que los valores promedio de todos los árboles de los sitios de nidificación, pero los árboles en los que se ubicaron los nidos fueron significativamente más pequeños que los árboles más grandes de los sitios.

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Accipiter nisus sólo nidificó en bosques siempreverdes de coníferas y sus nidos tuvieron una mayor probabilidad de encontrarse en este tipo de bosques que en otros bosques. El diámetro de los árboles en los que se ubicaron los nidos de *A. gentilis* fue mayor que el de los árboles en los que se ubicaron los nidos de *A. nisus*, pero la densidad de árboles fue mayor en los sitios de nidificación de *A. nisus*. Los sitios de nidificación de *A. gentilis* y *A. nisus* estuvieron más lejos de las localidades con habitaciones humanas que los sitios escogidos al azar, pero los nidos de *A. gentilis* y *A. nisus* estuvieron en promedio a sólo 247 y 229 m de casas, respectivamente.

[Traducción del equipo editorial]

Finding a suitable place to live and reproduce is one of the ways that birds increase their fitness (Cody 1985), and features of the nest site directly affect breeding success in birds (Newton 1991). Because many raptors are long-lived and have large home ranges, they are likely to select nesting places that maximize breeding success and lifetime reproduction (Newton 1979).

Because of increasing human activity, the habitats of several raptors have either changed or disappeared (Bird et al. 1996). For example, timber harvesting activities have affected forest raptors by altering foraging areas and nest sites (McCarthy et al. 1989, Crocker-Bedford 1990, Lõhmus 2005). Furthermore, the changing of woodlands into farmlands and human residential areas can lead to disappearance of nest sites for forest raptors. In Japan, according to national policy for managing forests, natural forests were converted to single-species coniferous forests in the middle of the nineteenth century (Hokkaido Forestry Kaikan 1983). In addition, river modifications and dam construction have caused a decline in habitat and population of fish (Shimoda et al. 1993). Consequently, piscivorous Blakiston's Fish-Owls (*Ketupa blakistoni*) are threatened with extinction, because of the reduction in nest sites and food resources (Hayashi 1997, Takenaka 1998). Conversely, some raptor species have responded to human activities by colonizing areas in and near human habitation. For example, Peregrine Falcons (*Falco peregrinus*) and Eurasian Kestrels (*Falco tinnunculus*) have nested on human-made structures such as buildings and bridges (Newton 1979, Cade 1982).

Northern Goshawks (*Accipiter gentilis*) range across the holarctic region and Eurasian Sparrowhawks (*Accipiter nisus*) are distributed in Eurasia and northern Africa, and both species inhabit forests and prey primarily on birds (Brown and Amadon 1968). Goshawks have been considered an area-sensitive species, preferring deep and remote forest patches and requiring isolation from human disturbance (Marquiss and Newton 1982, Robbins et al. 1989, Krüger 2002). However, some recent studies report that goshawks nest in fragmented forests within more agricultural landscapes in Europe (Kenward 1982, 1996, Krüger 2002). Sparrowhawks are found closer to human habitation and often nest in fragmented smaller forests (Brown and Amadon 1968, Newton 1986, van Diermen 1996).

In Japan, goshawks prefer nesting in low to middle elevations, and sparrowhawks are thought to nest primarily in highland areas (Higuchi et al. 1996). The latter also breed in low elevations of northern Japan, and the two hawks occasionally nest in the same forests (Morioka et al. 1995). In Hokkaido, the northernmost island of Japan, natural forests were replaced by farmlands and grasslands after the beginning of reclamation at the end of the nineteenth century (Takenaka 1998). As a result, the Ishikari Plain of Hokkaido contains many fragmented small or long and narrow woodlots such as shelterbelts, which do not appear suitable for nesting by forest species. Both goshawks and sparrowhawks commonly nest in those fragmented woodlots of the Ishikari Plain. The objectives of this study were to describe the characteristics of nest trees and nest sites for goshawks and sparrowhawks breeding in fragmented woodlots, and to determine the important factors for nest-site selection of each hawk species in this region.

STUDY AREA

Our study was conducted from 2002–2006 on the Ishikari Plain, central Hokkaido (area: 920 km^2, elevation: 5–80 m), including the northern margins of Sapporo city. The monthly mean temperature was -5.9°C in January and 20.5°C in August, and the annual precipitation was ca. 1000 mm, with snow cover from December to April (from the database of Japan Meteorological Agency, http://www.data.jma.go.jp/obd/stats/etrn/index.php). The study area included agricultural lands (70%; rice paddy fields, croplands, and meadows), urban/suburban areas (15%), woodlots (7%), and rivers/oxbows (3%). Most of the woodlots were long and narrow shelterbelts adjacent to agricultural lands (Fig. 1), providing humans easy access to the woodlots through contiguous fields or roads. The woodlots consisted of deciduous broad-leaved trees including Manchurian ash (*Fraxinus mandshurica* var. *japonica*) and Japanese white

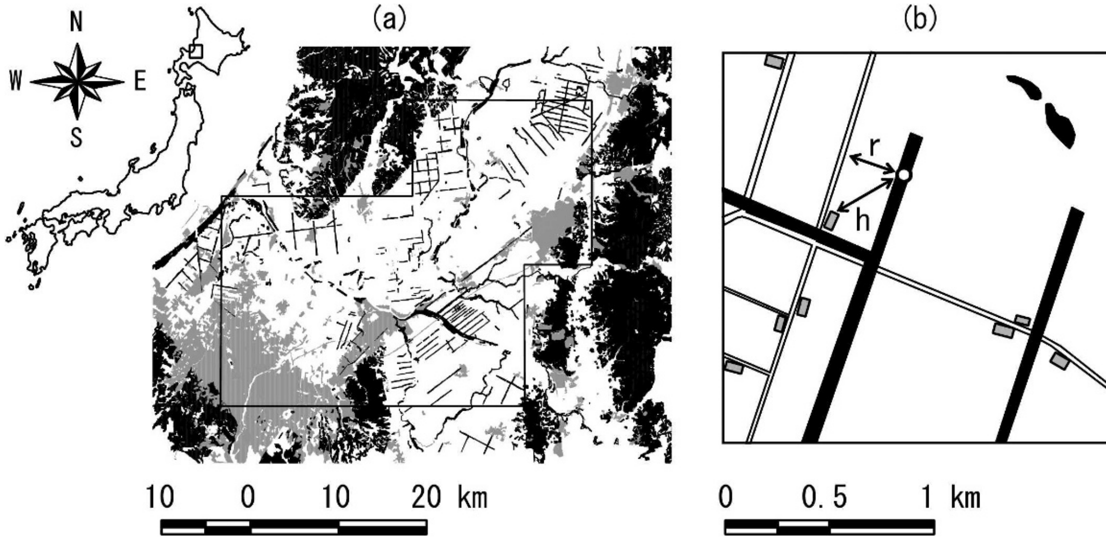

Figure 1. The study area in the Ishikari Plain of Hokkaido in Japan. (a) Land use in the study area, where dark shading indicates woodlands, including shelterbelts (represented by lines); gray shading indicates residence area; blank area indicates agricultural lands. Sapporo city is located southwest of the study area. (b) Schematic map of a nesting site: open circle, line, and shaded square indicate nest, road and house, respectively; distances from nest to nearest road and house are measured as r and h (m).

birch (*Betula platyphylla* var. *japonica*), evergreen conifers including Norway spruce (*Picea abies*) and Sakhalin spruce (*Picea glehnii*), and a deciduous conifer Japanese larch (*Larix kaempferi*).

Methods

Nest Surveys. We conducted nest searches on foot throughout woodlots in the study area except in woodlots consisting of only saplings which were unsuitable for nesting. We excluded large forests from our analysis and focused on fragmented habitats. Goshawks start incubation in late April and sparrowhawks in early May (F. Abe unpubl. data.). We checked the occupancy of goshawk nests from mid-May in 2002–2005 and sparrowhawk nests from mid-May in 2003–2005. We searched for nests until the end of July, by which time most sparrowhawk nestlings had fledged.

We located 34 goshawk nesting areas and 22 sparrowhawk nesting areas during the survey. Most nests were located in shelterbelts or isolated forests that had similar features. The nesting areas often contained several nests that were used at least once during the years of our study. To avoid biases due to preferences of individual birds, we selected one nest which was used at least one time between 2002–2005 from each nesting area for our study. Our final data set contained 14 goshawk and 14 sparrowhawk nests randomly selected from the study area.

Nest and Nest Site Measurements. Vegetation surveys were conducted during September to February, 2003–2006. We identified nest tree species and categorized them as evergreen conifer, deciduous conifer, or deciduous broad-leaved trees. We measured the diameter at breast height (dbh), tree height, nest height, nest position, and distance from each nest tree to the nearest woodlot margin for all nest trees. Nest height was measured to the nest's upper edge from the ground. Nest position was calculated as nest height in relation to tree height. The nest site was defined as immediate area surrounding the nest (0.033-ha hexagonal plot centered on each nest tree). The plot's diagonal line (22.6 m) was set to the same length as a diameter of the circular plots used by James and Shugart (1970). We measured all trees >5 cm dbh. Based on composition of tree types within each plot, we categorized nest sites into four forest types: (1) ≥70% dominated by evergreen conifers, (2) ≥70% dominated by deciduous conifers, (3) ≥70% dominated by deciduous broad-leaved trees, and (4) <70% dominated by evergreen conifers, deciduous conifers, or deciduous broad-leaved trees (mixed forest). We calculated the mean values of dbh and tree height, and noted the maximum values of those measurements at each nest site. We also calculated tree density and basal area at each nest site and width of the woodlot for each plot. Distances from a nest tree to the nearest house or road were estimated using 1:25000 topographic maps (see Fig. 1; Geographical Survey Institute of Japan 1997).

We randomly located 25 hexagonal plots (0.033 ha; random sites) on unused woodlots in fragmented habitat. The random sites were located in a random direction and more than 500 m away from any nests. We measured distances from each centered tree to the nearest house or road, and made all other measurements as in the nest plots (above).

Data Analyses. We used paired *t*-tests to compare the values of dbh and height of each nest tree with the mean values and the maximum values of those measurements in

Table 1. Nest tree species of goshawks and sparrowhawks in the Ishikari Plain of Hokkaido, Japan, 2002–2005.

Tree Species	Number of Nest Trees	
	Goshawks	Sparrow-hawks
Evergreen conifer	**3 (21.4%)**	**14 (100.0%)**
Abies sachalinensis	0	1
Picea abies	2	11
Picea glehnii	0	1
Pinus strobus	1	1
Deciduous conifer	**5 (35.7%)**	**0 (0.0%)**
Larix leptolepis	5	0
Deciduous broad-leaved tree	**6 (42.9%)**	**0 (0.0%)**
Betula platyphylla	3	0
Alnus japonica	1	0
Ulmus davidiana	1	0
Fraxinus mandshurica	1	0

each nest site and Fisher's exact test to compare composition of forest types in nest sites and random sites. We performed logistic regression analysis to compare the measurements of characteristics in nest sites with those in random sites. Explanatory variables were mean tree dbh, mean tree height, tree density, basal area, distance to the nearest house, distance to the nearest road, and width of woodlot. To detect multi-collinearity among variables, we checked the tolerance value for each variable. Tolerance for a variable was calculated as $1 - r^2$ from the OLS regression analysis of it against the remaining variables (Quinn and Keough 2002). When a tolerance value was <0.10, we checked correlations between variables and excluded one of two variables indicating correlation ($r > 0.70$). All tolerance values of variables were >0.10, indicating no multicollinearity between variables. All seven variables were put in the logistic regression model and variable selection was conducted using Bayesian Information Criterion (BIC; Burnham and Anderson 1998). BIC were calculated for all possible subsets of models.

To compare nest tree/site selections between the two hawk species, logistic regression analyses were performed. For the nest trees comparison, explanatory variables including dbh of nest tree, nest tree height, nest height, nest position, and distance to the nearest woodlot margin were put into the analysis. Tolerance values of nest tree height, nest height and nest position were <0.10, and there was strong correlation between nest height and nest position ($r = 0.77$); therefore, we excluded nest position from our analysis. For the nest sites comparison, explanatory variables including mean tree dbh, mean tree height, tree density, basal area, distance to the nearest house, distance to the nearest road, and width of woodlot were input into the logistic regression models. The statistic analyses were performed using the statistical package R (http://www.r-project.org/). Significance level was set at $P < 0.05$.

Results

Nest Tree Characteristics. Goshawks nested in evergreen conifers, deciduous conifers, and deciduous broad-leaved trees (Table 1). Dbh values of nest trees were greater than mean dbh in the nest sites ($t = 7.01$, df = 13, $P < 0.001$; Table 2), and were similar to those of the largest trees in the nest sites ($t = -1.75$, df = 13, $P = 0.10$). Nest trees were taller than other trees in the nest sites ($t = 7.47$, df = 13, $P < 0.001$) but shorter than the tallest trees in the nest sites ($t = -6.46$, df = 13, $P < 0.001$).

Sparrowhawks nested only in evergreen conifers (Table 1). Dbh and tree height of nest trees were

Table 2. Characteristics of nest trees of goshawks and sparrowhawks in the Ishikari Plain of Hokkaido, Japan, 2002–2005. Nest tree dbh and nest tree height were compared with the largest tree (MAX) and mean measurement (MEAN) in each nest site.

Variable	Nest Tree ± SD	Max ± SD	Mean ± SD
Goshawks ($N = 14$)			
DBH (cm)	30.6 ± 6.9	35.0 ± 9.6	17.3 ± 2.7*
Tree height (m)	16.8 ± 2.6	18.6 ± 2.5*	12.6 ± 2.2*
Nest height (m)	8.4 ± 1.8	—	—
Nest position (%)	50.7 ± 11.3	—	—
Distance to woodlot margin (m)[a]	18.2 ± 8.0	—	—
Sparrowhawks ($N = 14$)			
DBH (cm)	21.7 ± 7.0	31.8 ± 8.2*	16.7 ± 2.2*
Tree height (m)	15.1 ± 3.5	17.4 ± 3.2*	12.4 ± 2.3*
Nest height (m)	8.7 ± 3.2	—	—
Nest position (%)	56.9 ± 11.7	—	—
Distance to woodlot margin (m)[a]	19.7 ± 16.6	—	—

[a] From a nest tree and a center tree.

* Significant difference between nest tree and the largest trees or mean trees ($P < 0.05$).

Table 3. The best five models to detect variables discriminating goshawk nests from sparrowhawk nests in logistic regression analysis. BIC, number of parameters (K) and ΔBIC for each model are provided.

Model[a]	BIC	K	ΔBIC
Nest trees			
− Nest tree DBH	32.07	1	0.00
− Nest tree DBH + Distance to woodlot margin	34.42	2	2.35
− Nest tree DBH + Nest height	35.07	2	3.00
− Nest tree DBH + Nest tree height	35.34	2	3.27
− Nest tree DBH + Nest height + Distance to woodlot margin	37.38	3	5.31
Nest sites			
+ Tree density	27.59	1	0.00
+ Mean tree DBH[b] − Mean tree height[b] + Tree density	28.57	3	0.98
+ Mean tree DBH + Tree density	29.35	2	1.76
+ Tree density + Width of woodlot	29.95	2	2.36
+ Mean tree DBH + Basal area	30.32	2	2.73

[a] + and −: sparrowhawks larger and smaller than goshawks, respectively.
[b] Mean value in nest sites.

greater than mean values in nest sites ($t = 2.84$, df = 13, $P < 0.05$ and $t = 3.60$, df = 13, $P < 0.01$, respectively; Table 2). Nest trees had smaller dbh and were shorter than the largest trees in each nest site ($t = -5.38$, df = 13, $P < 0.001$ and $t = -4.27$, df = 13, $P < 0.01$, respectively).

The results of logistic regression analyses for detecting differences between nest trees of goshawks and sparrowhawks are shown in Table 3. The best logistic regression model included dbh of nest tree; sparrowhawk nest trees were smaller in dbh than those of goshawks.

Nest Site Characteristics. Goshawk nests were located in all forest types, but were frequently in mixed forests (Table 4), and the composition of forest types did not differ between nest sites and random sites ($P > 0.05$). The measurements of characteristics in nest sites and random sites are shown in Table 5. The best logistic regression model discriminating goshawk nest sites and random sites included distance to the nearest house (Table 6), which was greater for nest sites than for random sites (Table 5).

Most sparrowhawk nests were located in evergreen coniferous forests (Table 4), and the composition of forest types at nest sites differed from that at random sites ($P < 0.01$). The best logistic regression model to distinguish nest sites from random sites included basal area and distance to the nearest house (Table 6), both of which were greater at nest sites than at random sites (Table 5).

The best logistic regression model detecting the difference between nest sites of each species included only tree density (Table 3). Sparrowhawk nest sites had a higher tree density than goshawk nest sites (Table 5).

Table 4. Comparison of forest type of nest sites used by goshawks and sparrowhawks with random sites in the Ishikari Plain of Hokkaido, Japan, 2002–2005.

		Nest Sites of	
Forest Type	Random Sites	Goshawks	Sparrowhawks
Evergreen conifer forest	5	2	11
Deciduous conifer forest	2	2	0
Broad-leaved deciduous forest	13	4	1
Mixed forest	5	6	2
P-value[a]		0.31	0.001

[a] Fisher's exact test for comparison of forest type between nest sites and random sites.

Table 5. Characteristics of nest sites of goshawks and sparrowhawks and random sites in the Ishikari Plain of Hokkaido, Japan, 2002–2005.

Variable	Goshawk Nest Sites (N = 14)		Sparrowhawk Nest Sites (N = 14)		Random Sites (N = 25)	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Mean tree DBH (cm)[a]	17.3 ± 2.7	13.3–21.7	16.7 ± 2.2	12.9–20.2	18.7 ± 5.2	11.5–29.0
Mean tree height (m)[a]	12.6 ± 2.2	8.1–15.7	12.4 ± 2.3	7.3–15.9	12.7 ± 2.9	7.8–19.4
Tree density (trees/ha)	1169.3 ± 344.0	542.7–1748.6	1882.1 ± 502.5	1025.0–2592.7	1102.2 ± 659.2	211.0–2532.4
Basal area (m^2/ha)	32.4 ± 11.1	18.3–62.1	45.4 ± 12.2	32.8–75.0	29.9 ± 8.8	17.2–53.0
Distance to house (m)[b]	247.0 ± 160.8	67.0–530.0	229.1 ± 172.4	42.0–495.0	189.4 ± 244.3	31.8–442.3
Distance to road (m)[b]	75.4 ± 91.6	11.0–314.0	54.7 ± 35.2	13.0–120.0	54.5 ± 27.4	11.4–312.0
Width of woodlot	60.2 ± 16.5	36.0–91.3	61.8 ± 33.4	25.9–163.0	61.1 ± 25.8	26.0–146.0

[a] Mean of all trees (> 5 cm dbh) in the sites.
[b] From the nest trees and center trees.

Discussion

In the Ishikari Plain, goshawks nested in some of the largest-diameter trees within the nest site. Because a goshawk nest is usually used over several years (Brown and Amadon 1968) and often exceeds 1 m in diameter (Higuchi et al. 1996), a large tree with large branches is required to provide a stable platform for the nest. We suggest that goshawks selected their nesting sites based on stability of nest structure foundations.

Goshawks' nests in our study area were found in a variety of tree species, but nearly half of them were deciduous broad-leaved trees, which usually have larger total diameter of branches supporting a nest than conifers (Lõhmus 2006) and provide nest stability. However, goshawks in other regions in Japan generally nest in conifers (Higuchi et al. 1996) such as Japanese larch (Suzuki 1999) or red pine (*Pinus densiflora*; Horie et al. 2006). As goshawks appear to choose their nest tree based on structure rather than tree species (Marquiss and Newton 1982, Squires and Reynolds 1997, USFWS 1998), nest tree species vary widely among regions (Cooper and Stevens 2000, Penteriani 2002).

Deciduous broad-leaved trees provide less nest cover than evergreen conifers (Solonen 1982), but we suggest that goshawks in our study area selected trees that offered greater nest stability, rather than overhead cover. Overhead nest cover may not be important in areas with few aerial predators (Lõh-

Table 6. The models to detect variables discriminating nest sites and random sites in logistic regression analysis. BIC, number of parameters (K) and ΔBIC for each model are provided.

Model[a]	BIC	K	ΔBIC
Goshawks			
+ Distance to house	49.84	1	0.00
− Mean tree DBH + Distance to house	52.15	2	2.31
+ Basal area + Distance to house	52.91	2	3.07
+ Distance to house − Width of woodlot	53.15	2	3.31
+ Tree density + Distance to house	53.16	2	3.32
Sparrowhawks			
+ Basal area + Distance to house	35.21	2	0.00
− Mean tree DBH[b] + Basal area + Distance to house	36.86	3	1.65
+ Tree density + Basal area + Distance to house	36.93	3	1.72
+ Basal area	37.45	1	2.24
+ Basal area + Distance to house − Distance to road	37.60	3	2.39

[a] + and −: hawks nest sites larger and smaller than random sites, respectively.
[b] Mean value in nest sites.

mus 2006) or for larger raptors not susceptible to aerial predation. Except for occasional attacks on chicks by conspecifics, goshawks have very few natural aerial predators in the Ishikari Plain. Furthermore, females spend most of their time on or near their nest in early nestling periods (Schnell 1958, Cramp and Simmons 1980), so they are likely to protect their chicks from other goshawks. Goshawks also showed no preference for forest types for nesting in our study area, in contrast to previous studies in which goshawk nests were found primarily in evergreen coniferous forests (Reynolds et al. 1982, Siders and Kennedy 1996, Selås 1997). Our results, in combination with those of other goshawk studies, support the suggestion by Squires and Reynolds (1997) that goshawks nest in both coniferous and deciduous stands, depending on their availability.

Though goshawks have shown a preference for sparse, open forests for nest sites in some previous studies (Penteriani and Faivre 1997, Suzuki 1999), we did not find such tendency in our present study. Goshawks require flight corridors to their nests and adequate flight space around the nests (Hayward and Escano 1989, Squires and Ruggiero 1996, Penteriani 2002); however, the shelterbelts in which most of the nests were located were narrow and the nests were located on the woodlot margins (mean 18.2 m from edge) in our study area; thus, goshawks would not need to choose sparse woodlots as they can easily access their nests in such fragmented habitat.

Sparrowhawks showed a strong preference for evergreen conifers. Dense foliage close to the nest is important as cover, which conceals nests and reduces the probability of predation (Reynolds et al. 1982, Martin 1993). Evergreen conifers may provide more effective cover from aerial predators than deciduous broad-leaved trees, especially at the beginning of incubation when deciduous broad-leaved trees do not have leaves. Sparrowhawks also nested in evergreen coniferous forests, which have a larger basal area and relatively higher tree density than randomly selected forests. Goshawks are one of the primary predators of sparrowhawks (Newton 1986, Selås 1997) and they nest close to sparrowhawks in the Ishikari Plain. It might be advantageous for sparrowhawks to nest in dense evergreen coniferous forests to reduce the probability of detection and attacks by goshawks. Further, sparrowhawks usually build a new nest each year and their nests are small (ca. 60 cm in diameter; Brown and Amadon 1968), so they don't require the large branches offered by deciduous trees for stability of their nests. Therefore, sparrowhawks in our study area appeared to select evergreen coniferous trees and forests that provide protective cover rather than deciduous broad-leaved trees that provide stable platform for building their nests.

In the Ishikari Plains, although nest sites were significantly farther from houses than were random sites, goshawks and sparrowhawks did nest fairly close to human habitations (mean of 247 m and 229 m, respectively). Possibly, the lack of persecution by humans in Japan may enable these species to nest and forage closer to human habitation. However, both species chose nest sites within relatively undisturbed portions of habitat near humans, rather than in places of high human activity. We recommend maintaining a variety of woodlots with an ample number of sufficiently large deciduous and coniferous trees for the conservation and management of goshawks and sparrowhawks in the Ishikari Plains and other areas where nesting habitat is limited.

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