Ontario's Cavity-Nesting Birds

by
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Introduction

Standing dead trees (snags) play an essential role in the provision of nesting, roosting, denning, perching, and feeding sites for a variety of Ontario birds and mammals. Approximately 85 species of birds in North America either nest or feed in snags, and these birds often represent 30-45% of a forest bird community (Scott *et al.* 1977). Thirty-eight species of Ontario breeding birds are to some degree dependent upon snags for nesting (see Table 1).

The Role of Cavity-Nesting Birds in Ontario Forests

Cavity-nesting birds can be separated into two categories: primary excavators and secondary cavity-nesters. Primary excavators are those species which excavate a nesting or roosting cavity in a live or dead tree. The species belonging to this group are largely non-migratory, except Common Flicker (*Colaptes auratus*), Yellow-bellied Sapsucker (*Sphyrapicus varius*) and Red-headed Woodpecker (*Melanerpes erythrocephalus*), and mainly insectivorous. Insectivorous birds play an important role in a forest community by influencing destructive insect populations (Koplin 1972; Dickson *et al.* 1979; and Temple *et al.* 1979) in three ways: (1) directly through consumption, (2) indirectly by spreading pathogens to insect populations and (3) by altering the insect microhabitat.

Woodpecker populations in particular have been known to exhibit functional and numerical responses to localized outbreaks of insect infestations. Kendeigh (1947) documented increased consumption of spruce budworm (*Choristoneura fumiferana*) by woodpeckers during an outbreak in Ontario forests. Besides accelerating the decline of an outbreak, and perhaps more importantly, insectivorous birds play a major role in the retardation of insect populations before they reach outbreak levels. Species most involved in this respect are non-migratory residents like woodpeckers, chickadees (*Parus* spp.) and nuthatches (*Sitta* spp.). These birds have the greatest impact on insect populations during the winter when their diet consists mainly of sedentary insect larvae. Resident bird species limit the number of insects emerging in the spring, thus reducing the severity of summer outbreaks. Most insectivorous birds feed by pecking, which disrupts the microhabitat of the insect prey thus having a detrimental effect on the over-winter survival of the remaining insects (Otvos 1979).

Ontario's primary excavators not only play an important role in insect suppression, but also in the provision of nesting cavities for other species. Secondary cavity-nesters are unable (or rarely attempt) to excavate their own cavity, and are thus dependent upon natural cavities or those built by other species. When a cavity built by a primary excavator is abandoned, it may then provide a nesting site for a secondary cavity-nester. Some

Table 1: Cavity Nesting Ontario Breeding Birds, Showing Snag Use and Preference

	Use of Snags						Snag Type Preference			
SPECIES	Roost	Nest	Forage	Perch	Primary Exc.	Secondary Exc.	Soft Snag	Hard Snag	Live With Heartrot	Live with Broken top and limbs
Wood Duck *		X		X		X				X
Common Goldeneye		X				X				X
Bufflehead *		X				X				
Common Merganser		X		X		X				X
Hooded Merganser *		X		X		X				X
Turkey Vulture		X		X		X				X
American Kestrel *		X		X		X				
Merlin		X		X		X				
Eastern Screech Owl *	X	X		X		X		X		
Northern Hawk Owl		X		X		X				X
Barred Owl		X		X		X				X
Great Horned Owl		X		X		X				X
Northern Saw-whet Owl *		X		X		X		X		X
Boreal Owl *		X		X		X				
Chimney Swift		X				X				

Common Flicker *	X	X	X	X	X		X			X
Pileated Woodpecker *	X	X	X	X	X			X		
Yellow-bellied Sapsucker *	X	X	X	X	X				X	X
Red-bellied Woodpecker *	X	X	X	X	X					
Red-headed Woodpecker *	X	X	X	X	X					
Hairy Woodpecker *	X	X	X	X	X				X	X
Downy Woodpecker *	X	X	X	X	X		X	X	X	X
Black-backed Woodpecker *		X	X		X		X	X	X	
Three-toed Woodpecker *		X	X		X		X	X	X	
Great Crested Flycatcher *		X				X				X
Tree Swallow *		X				X				
Purple Martin *		X				X				
Black-capped Chickadee *	X	X			X		X			
Boreal Ckickadee *	X	X			X		X			
Tufted Titmouse *	X	X				X	X			
White-breasted Nuthatch *	X	X	X			X			X	X
Red-breasted Nuthatch *	X	X	X		X	X			X	X
Brown Creeper	X	X	X			X		X	X	X
House Wren *	X	X	X			X	X		X	X
Winter Wren		X				X	X			
Carolina Wren		X				X				
Eastern Bluebird *	X	X	X			X	X	X		X
European Starling	X	X				X		X		

* Denotes obligate cavity nesters
Principle Sources: Bent 1938, 1939, 1948; Thomas et al 1979; Scott et al 1977

secondary cavity-nesters are very selective in their choice of a cavity to the point of becoming dependent upon a particular species of primary excavator. For example, both Bufflehead (*Bucephala albeola*) (Bellrose 1976; Scott *et al.* 1977; and Harrison 1984) and American Kestrel (*Falco sparverius*) (Scott *et al.* 1977) have demonstrated a distinct preference for abandoned Common Flicker nesting sites. In order for cavity-nesting birds to perform their role in the forest ecosystem, they must be provided with suitable nesting habitat in the form of snags.

Snags in Ontario Forests

We seem to know a great deal about cavity-nesting species, but very little is known about the snags which provide the nesting substrate critical to the reproductive success of these species. Insufficient knowledge of the role snags play in meeting the requirements of cavity-using wildlife in Ontario has in the past forced resource managers to develop habitat prescriptions based upon studies conducted in the northeastern United States. Concern for the lack of information on snags prompted the Ontario Ministry of Natural Resources to conduct a study to determine the abundance and characteristics of snags in stands representing various forest types. I was involved in this study and would like to present a brief summary of the results from the report (MacDonald 1990).

Methods

The survey was conducted during the summer of 1989 within the Leslie M. Frost Natural Resource Centre management unit encompassing parts of Sherborne, Stanhope, Ridout, Havelock and Hindon townships in Muskoka D.M. and Haliburton County. Forty-four stands (978 ha) representing a variety of hardwood and conifer forest types typical of the Great Lakes - St. Lawrence Forest Region were surveyed. The stands ranged in age from 80 to 160 years and varied in disturbance history (managed forests and those which are relatively undisturbed from logging and fire were included in the study).

Stands were sampled by cruising a continuous strip 10 m wide in a zig-zag formation throughout the stand resulting in a sampling intensity of 5%. For the purposes of this survey, snags were defined as standing dead trees greater then 10.2 cm in diameter at breast height (1.4 m) and greater than 1.8 m in height. For each snag encountered, the following information was recorded: species, diameter, height, state of decomposition (whether hard or soft), and presence of excavated cavities.

Results

The mean density of snags per hectare of all stands surveyed was 53.1 snags/ha (range 16.3-97.3). Stands dominated by intolerant species, white birch (*Betula papyrifera*) and poplars (*Populus* spp.), had the highest average density of snags. Undisturbed stands had the lowest average number of snags per hectare. White pine (*Pinus strobus*) and sugar maple (*Acer saccharum*) represented the most abundant snag species. Seventy-five percent of the snags recorded were within the 10.2-25.4 cm diameter class. Undisturbed stands contained proportionally more large-diameter

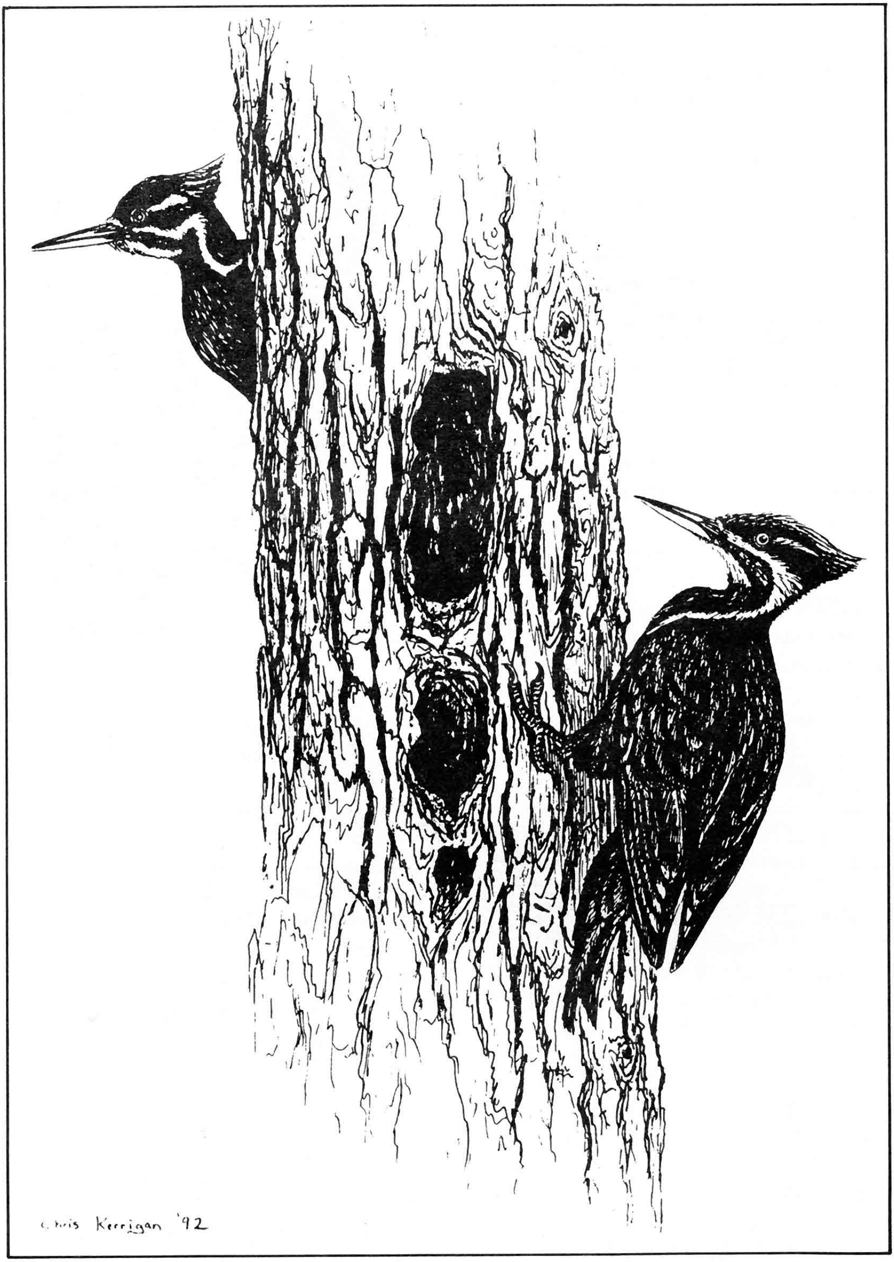

Figure 1: Pileated Woodpeckers on snag. Drawing by *Chris Kerrigan.*

snags (»50 cm) than any other forest type. Large-diameter snags were utilized most frequently in relation to their abundance. Cavities excavated in live trees were found mainly in white pine and sugar maple.

Discussion

The availability of suitable nesting habitat is critical to the reproductive success of all cavity-nesters. Numerous studies indicate that cavity-nesting species densities are strongly correlated with snag density (Balda cited by Back 1979; Land *et al.* 1989; Howard *et al.* 1986; Zarnowitz and Manual 1985; Rapheal and White 1984). Snag density in the stands surveyed is similar to that reported in the United States by Carey (1983) who found that snag densities ranged from 22.4-55.1/ha in maple/beech/birch forests with old growth stands having the lowest density. Cavity-nesting bird density is also closely correlated with the density of large-diameter snags (Rapheal and White 1984). Most species which nest in snags have individual requirements regarding snag diameter. For example, Pileated Woodpeckers (*Dryocopus pileatus*) require snags »35 cm in diameter (Peck and James 1983). Large diameter snags are capable of supporting the greatest number of snag-dependent species. A large-diameter snag with limbs intact can provide a nesting site in the trunk for species which require large cavities (e.g. Pileated Woodpecker), while providing sites for cavities in the branches for species which require smaller-diameter substrate, e.g. Black-capped Chickadee (*Parus atricapillus*).

Figure 2: Northern Hawk Owl in nest cavity. Drawing by *Mark Reeder.*

Reduction of available snags may result in increased competition for nesting sites, poor reproductive success, and heavier dependence upon artificial nesting structures. European Starlings (*Sturnus vulgaris*) are known to be aggressive competitors with the Common Flicker, Bufflehead, Yellow-bellied Sapsucker, House Wren (*Troglodytes aedon*) and numerous other species for nesting cavities. Competition may also result from mammals which require cavities to raise their young, e.g. flying squirrels (*Glaucomys* spp.). If sufficient cavities are not available, some species may be forced to excavate or build their own nests. The first choice of a nesting site for Barred Owls (*Strix varia*) is a broken topped snag, or a tree with a large cavity. When these sites are not available, Barred Owls may attempt to build their own stick nest or use a hawk/crow/raven/squirrel nest. Although attempts may be made to repair nests, nesting is often unsuccessful due to poorly constructed nests offering little or no protection to eggs and young (Bent 1938; Stokes and Stokes 1989).

As the result of decreased snag availability due to fuelwood cutting and the clearing of forested land, many of Ontario's secondary cavity-nesters have become heavily dependent upon nest boxes; examples are House Wren, Eastern Bluebird (*Sialia sialis*), Wood Duck (*Aix sponsa*), Tree Swallow (*Iridoprocne bicolor*), and Purple Martin (*Progne subis*) (Peck and James 1987). Nest boxes are only suitable for secondary nesters; primary excavators require a natural snag in which to excavate cavities. Nest boxes do not provide sufficient insulation for winter roosts and even though they are used by many species, they do not provide feeding and roosting sites which natural snags can, and by no means provide habitat for the multitude of species of microorganisms, fungi, insects, birds and mammals which natural snags do.

Conclusions

Current Ontario Ministry of Natural Resources guidelines regarding snags in timber management in the study area (Central Region) require that a minimum of 6 cavity trees greater than 25 cm in diameter per hectare be maintained within stands allocated for harvest (Watton 1989). In comparison to snags surveyed in managed stands, on average this represents 46% of existing snags. The guidelines represent 36.1% of the average density of snags found in undisturbed stands within the study area. During logging operations, snags which pose a safety hazard are removed in accordance with the Occupational Health and Safety Act. Forest and wildlife managers are continuously collecting more information to provide a basis for determining exactly how to manage for snags and snag-dependent species in Ontario forests.

Standing dead trees represent an essential component of any forest ecosystem, and are critical for the maintenance of healthy populations of all cavity-using wildlife. It is my hope, and the hope of those who contributed to this survey and others like it, that the data collected will help satisfy the need for pertinent information regarding snags which will form the basis of snag management in Ontario forests.

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