The Importance of Old Growth Refugia in the Yukon Boreal Forest to Cavity-nesting Owls

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Abstract.—The Yukon's boreal forest is a slow-growing yet dynamic system greatly affected by wildfire. Trees of a diameter and age to accommodate cavity-nesting owls and other larger birds should be rare. An experiment was conducted by erecting just over 100 nest boxes throughout the southern Yukon to test the availability of nest holes for small owls. After 5 years an insignificant 1 percent of boxes have been used by Boreal Owls (Aegolius funereus). Apparently adequate natural cavities exist. Unique old growth riparian forests are suggested, apparently protected from fire by wetlands. Management and protection of these valuable areas is becoming a priority as pressures are building for human harvest of trees, even in the northern extremes of the boreal forest.

Cavity nesting is clearly a strategy important to the survival of small owls. The Boreal Owl (Aegolius funereus) is fairly common throughout the forested areas of the Yukon Territory. Of practical interest is whether cavity availability does, or potentially could, limit their breeding, notably in the northern limits of the boreal forest.

The boreal forest of the Yukon is characterized by relatively low species diversity and discontinuous distribution due to the generally mountainous topography. Generally, black spruce (Picea mariana) associations dominate on poorly drained permafrost sites. Trees on these sites rarely reach a size useful to secondary cavity nesting birds. Only on rarer, more mesic sites do white spruce (P. glauca), lodgepole pine (Pinus contorta), and sometimes balsam poplar (Populus balsamifera) and aspen (P. tremuloides) attain sufficient size.

The age they must attain in addition to size is another complication. It is generally known that wildfire plays one of the most important roles in the ecology of the boreal forest. Fire history studies suggest about an 80-200 year occurrence rate (Y.S.E.R. 1996). It seems reasonable to assume that in the slow-growing environment of the Yukon, trees living long enough to attain sufficient size (and decadence) to host nesting cavities will be rare. This in turn should cause competitive stress in populations that need them. Potentially exacerbating the problem, in the last decade, a resurgence has occurred in interest by humans to cut both dead trees for firewood and live trees for sawtimber.

A simple test of these ideas was to provide artificial nest cavities. An overwhelming acceptance of the boxes would signal that natural cavities are limiting; a lack of nest box use would suggest the opposite.

METHODS

Over a 5-year period commencing 1984, 105 nest boxes were erected. All had a floor size of 20 cm x 20 cm (8 in.), a cavity depth of 30 cm (1 ft) and a hole size which varied from 8 cm (3 in.) to 10 cm (4 in.). Nest fronts were of natural slabs although a small percentage were rough cut lumber. Boxes were stained brown; overall the plan was to have the boxes blend with the natural forest community.

Boxes were erected in natural forests where trees were of sufficient diameter to hold the boxes, and the canopy suggested suitable owl nesting habitat. Boxes were placed at various heights from the ground averaging 3-4 m. Locations were purposely selected to make re-visits easy. In practice, this meant boxes were placed along road and drainage corridors. (An added objective was to provide an accessible breeding population of hole-nesting birds to be

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used in public interpretation programs.) All boxes were erected in the southern half of the Yukon (south of 66 N. latitude).

Revisits were attempted annually. Occupancy of boxes visited late in the breeding season were inferred from nest and food debris.

RESULTS

In total, 573 'box-years' have been 'logged' by this work. Virtually all the species expected did make some use of the boxes on occasion:

American Kestrel	*Falco sparverius*
Bufflehead	*Bucephala albeola*
Barrow's Goldeneye	*B. icelandica*
Northern Flicker	*Colaptes auratus*
Red squirrel	*Tamiasciurus hudsonicus*

Significantly, occupancy was much lower than expected (23 percent) and use by Boreal Owls was remarkably low. Barely 1 percent of box-years were occupied by Boreal Owls (table 1). This happened in spite of continuing reports of sightings and specimens retrieved by the public. Singing adults were regularly recorded in the same general locations where unoccupied nest boxes existed.

DISCUSSION AND CONCLUSIONS

Clearly the idea that the population of small owls has been limited by cavity availability has to be rejected. Cavities of sufficient size are probably not as rare in the boreal forest as once thought. The ecological processes responsible for producing these cavities are of interest and undoubtedly critical to maintaining healthy populations of larger secondary cavity nesters.

Old-growth in the Boreal Forest

The notion that unique parts of forest communities may be naturally protected from normal forest-renewing regime (in this case fire), is not a well-studied phenomenon in the boreal forest.

Recently, ongoing wetland research in the Yukon offered an understanding of at least one geological land form which may turn out to be quite widespread. A feature of the recent glacial past of the southern Yukon landscape are large flat-bottomed U-shaped valleys. Many of these now host small relict streams which meander across the flat valley bottoms. Many of the most important wetlands of the mid and southern Yukon are a result of impeded drainage and ice

Table 1.—Nest boxes available and occupancy by Boreal Owls (Aegolius funereus), Southern Yukon 1983-1996.

	New boxes	Cumulative Box-Years	Occupied	Occupied by Boreal Owls
1983	13	0	0	0
1984		13	6 (6)	1 (1)
1985		26	5 (11)	0
1986		39	4 (15)	2 (3)
1987	23	42	5 (20)	0
1988	4	55	10 (30)	0
1989	3	91	8 (38)	1 (4)
1990	18	131	8 (46)	0
1991	20	170	7 (75)	1 (5)
1992		231	10 (85)	0
1993	4	312	12 (97)	0
1994	10	393	10 (107)	1 (6)
1995		476	14 (121)	0
1996		573	10 (131)	0
(brackets show cumulative values):			23%	1.04%

lens melt in these habitats. Moreover levees are often built by the streams, producing tiny, mesic, very productive forest community sites where some of the largest diameter trees grow.

More recently, it has become apparent that at times these narrow patches of forest in association with riparian wetlands may be true "old-growth". Apparently, wetlands behind such levees may be protecting these forests from wild fire in the more continuous boreal forest. Very old trees with ample cavity development may be a result.

Owls in the Old-growth

It will be important to quantify the importance of these sites as old-growth and to determine the possible link with critical nesting habitat for owls. Most Boreal Owl sightings are made in riparian forests which is not surprising. However, if certain riparian systems are critical for the species' welfare, it will be essential to protect these areas from recent threats.

Old-growth Under Threat

In the Yukon, firewood cutting has been eliminating most dead trees within road corridors near human habitation over the last 10 years. A relatively high proportion of home heating in the Yukon comes from fuel wood; an estimated 20,000 cords are being cut annually for this purpose. Simple economics dictates that forest managers will be moving further afield to meet this demand.

Of more concern is commercial saw log harvest, which recently has seen a surge of interest in the Yukon. About 100,000 m^3 are cut annually and managers dream of a 400,000 m^3 industry (Y.S.E.R. 1996). Most forest ecologists agree this will not be sustainable, and will lead to the elimination of the few riparian forests with suitable nest trees. These valuable patches will be under severe threat unless good preharvest analysis is required and carried out.

Understanding and protecting these unique and critical sites is very likely to be a priority of boreal forest biodiversity management in the immediate future.

LITERATURE CITED

Y.S.E.R. 1996. Yukon state of the environment report, 1995. Yukon Department of Renewable Resources and Environment Canada. 156 p.