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Effects of Vertical Structure and Biogeoclimatic Subzone on Nesting Locations for Woodpeckers on North Central Vancouver Island: Nest Tree Attributes

Introduction

Accelerated resource extraction from the forests of North America during the latter part of the 20th century has altered habitats at a rate greater than the rate at which forest ecosystems can recover to their pre-disturbance condition. However, resource managers may be able to manipulate forest ecosystems to create desired habitat characteristics before an ecosystem has undergone a complete ecological rotation (Smith et al. 1997). For example, logging debris has been used to create 'artificial snags' for primary and secondary cavity nesters in harvested forests (Deal 1995). To mitigate the effects of accelerated timber harvesting on forest ecosystems, the coarse-filter approach to resource management (Hunter 1990) is being promoted by the BC Forest Practices Code through deliberate attempts to retain landscape patterns that are within the natural range of regional variation for ecological attributes historically encountered in British Columbia (BC Environment 1995). Accurate resource inventories that describe pre- and post-disturbance ecological attributes of the forest (e.g. species composition, snag density, coarse woody debris, plant communities) are essential to the successful implementation of the coarse-filter approach of resource management. Unfortunately, inadequate resource inventories and the lack of pre-disturbance baseline ecological data are all too common (Kessler 1996, Lautenschlager 1997).

The aim of this paper is to describe the nest tree characteristics for the red-breasted sapsucker (RBSA, *Sphyrapicus ruber*), northern flicker (NOFL, *Colaptes auratus*), and hairy woodpecker (HAWO, *Picoides villosus*) in the Nimpkish Valley (Tree Farm License 37) on north central Vancouver Island.

Methods

Sites chosen for sampling were all within old-growth forests (>250 years) greater than 20 ha in size, or in old-growth riparian management areas within recent (0 to 20 years) clearcuts that were observed to have high levels of woodpecker activity. Sites were searched intensively for nests during the months of May, June, and July of 1993 to 1997. Surveys began at dawn and continued until early afternoon. Nests were found by locating birds by site or call and then following them to their nest site with the aid of pre-recorded calls. Methodology followed Steeger and Machmer (1994) and is further detailed in Deal and Lessard (1995) and Deal and Smith (1997).

Results

Nests were located in five biogeoclimatic subzone/variants (Klinka et al. 1991). Within the Coastal Western Hemlock Zone (CWH), 57% of the nests were in the xm2, 22% in the vm1, and 20% in the vm2. Only 3 out of 322 nests were within the Mountain Hemlock (MH) zone. The number and percentage of nests for each species by zone is provided in Table 1. The four most commonly excavated tree species selected by woodpeckers for nesting were western hemlock (*Tsuga heterophylla*), western white pine (*Pinus monticola*), Douglas-fir (*Pseudotsuga menziesii*), and Pacific silver fir (*Abies amabilis*) (Table 2). Additional excavations for nests were found in six red alder (*Alnus rubra*) (avg. dbh 40.8 cm, avg. ht 11.6 m, avg. nest ht 7.8 m), one lodgepole pine (*Pinus contorta*) (dbh 36 cm, ht 18 m, nest ht 5 m), one yellow-cedar (*Chamaecyparis nootkatensis*) (dbh 84 cm, ht 37 m, nest ht 19 m), and

TABLE 1. Number and percentage of observed woodpecker nests within the Coastal Western Hemlock biogeoclimatic subzones and the four most common tree species used for nesting.

	Woodpecker species ^a		
	HAWO	NOFL	RBSA
Subzone			
CWHvm1	21 (26%)	16 (19%)	34 (22%)
CWHvm2	5 (6%)	9 (11%)	51 (32%)
CWHxm2	54 (68%)	58 (68%)	71 (45%)
Tree species			
hemlock	49 (61%)	46 (54%)	81 (51%)
white pine	2 (2%)	9 (11%)	50 (32%)
Douglas-fir	16 (20%)	15 (18%)	9 (6%)
true fir	8 (10%)	11 (13%)	14 (9%)
red alder	3 (4%)	3 (3%)	2 (2%)
yellow-cedar	1 (1.5%)	0	0
redcedar	1 (1.5%)	1 (1%)	0
lodgepole pine	0	0	1 (<1%)

^a HAWO = hairy woodpecker. NOFL = northern flicker. RBSA = red-breasted sapsucker.

two western redcedar (*Thuja plicata*) (dbh 74 cm, ht 30.5 m, nest ht 20.5 m). It is noteworthy that few nests were observed in the cedars although they are perceived by some to be of high value as wildlife trees (Moore 1995). The paucity of nests in the cedars could be due to their slower rates of decay relative to other tree species. Alternatively, hemlock, Douglas-fir, white pine, and true fir may simply have a more desired distribution of age, decay, and diameter classes, particularly the older and larger classes, relative to other species.

Discussion

The CWH zone is structurally more diverse, has a milder climate, and is located at a lower elevation than the MH zone (Klinka et al. 1991). A primary distinction between the CWH and MH zones is the presence of western hemlock in the CWH zone and mountain hemlock (*Tsuga mertensiana*) in the MH zone. The criterion of past woodpecker sightings that we used to select stands for nest searches may have been influenced by the 'crowding effect' resulting from woodpecker habitat reduction in the surrounding landscape (Schmiegelow et al. 1997). This 'crowding effect' may have affected both the number of woodpecker sightings and the physical characteristics of the nesting sites (Table 2).

Other species of woodpeckers also rely primarily on conifers for nesting sites. For example, colonies of the red-cockaded woodpecker (*Picoides borealis*) rely exclusively on older longleaf pine (*Pinus palustris*) trees infected with the red heart fungus (*Phellinus pini*) for their nesting sites (Jackson 1994). Throughout their range, pileated woodpeckers (*Drocopus pileatus*) rely on both conifer and deciduous trees for nesting and feeding sites (Beck et al. 1996). In contrast to our results, Martin and Eadie (in press) reported that both primary and secondary cavity nesters selected both aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) over conifer species in north-central British Columbia. Our results likely differ because of the paucity of the only member of the genus *Populus* indigenous to our study area (black cottonwood [*Populus trichocarpa*]). Western

TABLE 2. Tree diameter measured at 1.3 m above ground level (dbh), tree height, and nest height summary statistics for the four most commonly observed woodpecker nesting tree species.

statistic	Tree species ^a			
	hemlock	white pine	Douglas-fir	true fir
n	176	61	40	33
dbh	74.4	90.2	100.7	67.9
(cm)	(27.0 - 150.0)	(38.0 - 128.0)	(40.0 - 195.0)	(31.0 - 149.0)
total height	24.6	33.5	31.6	23.4
(m)	(5.0 - 54.0)	(6.0 - 50.0)	(12.0 - 65.0)	(3.0 - 40.1)
nest height	18.5	19.3	22.3	17.4
(m)	(4.0 - 51.0)	(5.0 - 37.5)	(< 1 - 52.0)	(1.5 - 31.0)

^a Range of data is shown in parenthesis.

hemlock, white pine, Douglas-fir, and the true firs that are in various stages of decay appear to serve as functional equivalents to aspen for nesting woodpeckers in our study area. From a functional perspective (e.g. presence of softer decayed heartwood) western hemlock, white pine, Douglas-fir, and true firs on Vancouver Island appear to fulfill an ecological role similar to *Populus* species in the interior mainland. Management of forests for multiple values requires the recognition and main-

tenance of the structural and compositional resources required by specific species.

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