

Characteristics of Snags Used by the Pileated Woodpecker (*Dryocopus pileatus*) in Old-Growth Red and Eastern White Pine Forests of Temagami, Ontario

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Introduction

Many organisms benefit from old-growth forests. One of the species that thrives within these ancient ecosystems is the pileated woodpecker (*Dryocopus pileatus*) (Bull and Holthausen 1993, D'Eon and Watt 1994, Naylor et al. 1996). However, when forest management activities including clearcuts, shelterwood cuts and seed tree cuts occur, generally they have negative impacts on pileated woodpecker populations (Kirk and Naylor 1996) by removing security cover, nesting trees, roosting trees and feeding sites (Naylor et al. 1996). Although old-growth red and eastern white pine (OGRWP) forests are currently endangered (Quinby 1993, Ontario Environmental Assessment Board 1994, Quinby 1996), and despite the fact that these pine forests are the pileated woodpecker's most strongly preferred habitat in central Ontario (Naylor et al. 1996), the Ontario Ministry of Natural Resources continues to promote the logging of this unique ecosystem (e.g. Crins 1996).

In addition, although Naylor et al. (1996) address some habitat requirements of pileated woodpeckers, they do not identify and describe the specific features of snags within red and eastern white pine forests that are preferred by the pileated woodpecker. Thus, the purpose of this study was to identify and characterize some of the key features of snags preferred by pileated woodpeckers in OGRWP forests. As these old-growth ecosystems move closer towards extinction due to logging, descriptive studies designed to document their valuable features takes on greater importance. At the very minimum we may need this information for the purpose of one day restoring these endangered ecosystems.

Methods

Data used in this study were collected during the summers of 1989 and 1990. During this time, 1,165 individual snags were assessed within 108, 50 x 20 m plots located in old-growth red and eastern white pine dominated stands throughout the Temagami region of Ontario. All snags 10+ cm dbh in each plot were assessed for feeding use by pileated woodpeckers, percentage of bark remaining on the trunk, decay rank from 1 to 5 (1 being little to no decay and 5 being highly decayed), diameter at breast height (dbh), and height of the snag. Feeding was indicated by a large, often rectangular excavation in the sapwood and/or the heartwood of the snag.

Two types of data analysis were undertaken. First, snag species preference of the pileated woodpecker was calculated by dividing the number of snags of a particular tree species used by the pileated woodpecker by the total number of snags of that tree species that were available to the woodpecker for feeding. And second, 150 snag samples were randomly selected from the group of snags that had been used by pileated woodpeckers and 150 snag species were randomly chosen from those that had not been used by pileated woodpeckers to compare snag variables including decay rank, dbh, bark cover and height. The Statistix software program (Statistix 1994) was used to compare the means of these snag variables using the rank sum test (Mann-Whitney U statistic).

Results and Discussion

For this study, a total of ten snag species were found in the OGRWP forests of Temagami (Table 1). From most to least abundant they included white pine (265 or 22.7%), balsam fir (262 or 22.5%), red pine (211 or 18.1%), white birch (166 or 14.2%), black spruce (82 or 7.1%), poplar (61 or 5.2%), white cedar (47 or 4.0%), jack pine (33 or 2.8%), red maple (23 or 2.1%), and white spruce (15 or 1.3%). Of these ten snag species, only six were used by the pileated woodpecker including, in order of preference, eastern white pine, red pine, poplar, white cedar, white birch and balsam fir (Table 1). Those snag species that were not used by pileated woodpeckers included black spruce, jack pine, red maple and white spruce. It is unlikely that the pileated woodpecker never feeds on these latter species, but rather, it is more likely that it rarely uses these species when foraging in OGRWP forests.

Pileated woodpeckers preferred to feed on eastern white pine snags (33.2%) four times more than on white cedar (8.5%), white birch (3.6%) and balsam fir (0.8%) snags; and roughly two times more than on red pine (19.4%) and poplar (14.8%) snags. This preference for eastern white pine is not simply a factor of snag availability (abundance) supported by the fact that the number of balsam fir snags was nearly equivalent to the number of eastern white pine snags. Further supporting the importance of snag variables other than availability is the fact that both white birch and black spruce were more available than both poplar and white cedar yet the pileated woodpecker feeding

preference for them (3.6% and 0.8% respectively) was much less than for both the poplar (14.8%) and white cedar (8.5%).

Analysis of snag characteristics that may influence or are related to pileated woodpecker feeding preference showed that, compared to unused snags, (1) %cover of bark on the used snags was 43.5% less ($p=.0000$) with a mean of 28.2%, (2) the dbh of used snags was 63.9% higher ($p=.0000$) with a mean of 37.2 cm and (3) the decay rank of used snags was 32% higher ($p=.0000$) with a mean of 3.3 (Table 2). There was no significant difference in height between used and unused snags. These findings for mean decay rank and mean diameter of used snags are consistent with the findings of Bull and Holthausen (1993) and Kirk and Naylor (1996), respectively.

Table 1. Characteristics of Snag Species Used and Unused by Pileated Woodpeckers in Old-Growth Red and Eastern White Pine Forests in Temagami, Ontario (D.p. - pileated woodpecker)

<i>SNAG SPECIES AND VARIABLES</i>	<i>ALL SNAGS</i>	<i>USED BY D.p.</i>	<i>UNUSED BY D.p.</i>
WHITE PINE	265	88	177
<i>preference (%)</i>	33.2		
<i>dbh (mean cm)</i>	37.1	41.1	35.1
<i>bark (mean %)</i>	28.1	20.6	31.8
<i>decay (mean rank)</i>	3.1	3.3	2.9
<i>height (mean rank)</i>	2.4	2.5	2.4
RED PINE	211	41	170
<i>preference (%)</i>	19.4		
<i>dbh (mean cm)</i>	29.1	32.2	28.4
<i>bark (mean %)</i>	24.2	22.6	24.6
<i>decay (mean rank)</i>	3.1	3.1	3.1
<i>height (mean rank)</i>	2.3	2.1	2.3
POPLAR	61	9	52
<i>preference (%)</i>	14.8		
<i>dbh (mean cm)</i>	22.8	26.8	22.2
<i>bark (mean %)</i>	85.9	67.2	89
<i>decay (mean rank)</i>	2.6	3.5	2.5
<i>height (mean rank)</i>	2.1	2.5	2.1
WHITE CEDAR	47	4	43
<i>preference (%)</i>	8.5		
<i>dbh (mean cm)</i>	34.1	39.2	27.6
<i>bark (mean %)</i>	69.5	71.2	68.8
<i>decay (mean rank)</i>	2	2	2.1

<i>height (mean rank)</i>	2.1	2	2.3
WHITE BIRCH	166	6	160
<i>preference (%)</i>	3.6		
<i>dbh (mean cm)</i>	21.6	26.9	21.4
<i>bark (mean %)</i>	94.7	100	94.5
<i>decay (mean rank)</i>	3.2	3.5	3.1
<i>height (mean rank)</i>	2.1	2.2	2.1
BALSAM FIR	262	2	260
<i>preference (%)</i>	0.8		
<i>dbh (mean cm)</i>	14	19	14
<i>bark (mean %)</i>	85.6	90	85.6
<i>decay (mean rank)</i>	2	3.5	2
<i>height (mean rank)</i>	2.1	2.5	2.1
BLACK SPRUCE	82	0	82
<i>preference (%)</i>	0		
<i>dbh (mean cm)</i>	16.3	0	16.3
<i>bark (mean %)</i>	84.6	0	84.6
<i>decay (mean rank)</i>	1.7	0	1.7
<i>height (mean rank)</i>	2.6	0	2.6
JACK PINE	33	0	33
<i>preference (%)</i>	0		
<i>dbh (mean cm)</i>	15.5	0	15.5
<i>bark (mean %)</i>	83.1	0	83.1
<i>decay (mean rank)</i>	1.6	0	1.6
<i>height (mean rank)</i>	2.6	0	2.6
RED MAPLE	23	0	23
<i>preference (%)</i>	0		
<i>dbh (mean cm)</i>	14.3	0	14.3
<i>bark (mean %)</i>	72.1	0	72.1
<i>decay (mean rank)</i>	2.4	0	2.4
<i>height (mean rank)</i>	2	0	2
WHITE SPRUCE	15	0	15
<i>preference (%)</i>	0		
<i>dbh (mean cm)</i>	21.5	0	21.5
<i>bark (mean %)</i>	98.3	0	98.3
<i>decay (mean rank)</i>	1.3	0	1.3
<i>height (mean rank)</i>	2.8	0	2.8

Table 2. Differences Between Snag Variables for Those Snags Used by Pileated Woodpeckers Compared with Unused Snags

SNAG VARIABLE	MEAN USED SNAG	MEAN UNUSED SNAG	RANK SUM P VALUE	% DIFFERENCE
BARK (N=150) (% COVER)	28.2	71.7	0	43.5
DBH (N=150) (CM)	37.2	22.7	0	63.9
DECAY RANK (N=150) (1-5)	3.3	2.5	0	32
HEIGHT (N=95) (1-3)	2.4	2.3	0	N/A

Summary

Old-growth forests typically provide pileated woodpeckers with prime habitat and in central Ontario, their most preferred community type is red and eastern white pine forest. Thus, in this region, old-growth red and eastern white pine forests are the most preferred habitat of the pileated woodpecker. Possibly the most important component of pileated woodpecker habitat is the snag component, yet very little is known about these snags in OGRWP forests. If we are to conserve and restore pileated woodpecker populations, we must better understand the nature of these snags that they are so dependent upon. Snag species, dbh, bark cover, decay, and height for a total of 1,165 snags sampled in 108 plots throughout the Temagami region were studied to identify key features of snag preference by pileated woodpeckers. Only six snag species were used by the pileated woodpecker including, in order of preference, eastern white pine, red pine, poplar, white cedar, white birch and balsam fir. Pileated woodpeckers preferred to feed on eastern white pine snags four times more than on white cedar, white birch and balsam fir snags; and roughly two times more than on red pine and poplar snags. Red pine snags were preferred over all other snag species except for white pine. Pileated woodpeckers preferred to feed on snags with (1) 28.2% mean bark cover, (2) a 37.2 mean dbh, and (3) a mean decay rank 3.3. No preference was indicated for height.

In central Ontario, both red and eastern white pine trees are the most preferred snag species by pileated woodpeckers in their most preferred habitat type - old-growth red and eastern white pine forest. The continued logging of these endangered ecosystems that is being promoted by the Ontario Government will only continue to have negative impacts on pileated woodpecker populations (Naylor et al. 1996).

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