

CAVITY AND BARK NESTERS ON EAST LIMESTONE ISLAND

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ABSTRACT

In an eleven-year study (1990 to 2001) on a 48 ha forested island in Haida Gwaii, 196 nests of six species of primary and secondary cavity nesters were located. Red-breasted Sapsuckers were the most common species to nest on Limestone Island (n=169 nests) with the remaining nests built or occupied by Chestnut-backed Chickadee, Hairy Woodpecker, Brown Creeper, Northern Flicker or Northern Saw-whet Owl. Forty-one percent of all nests were in trees previously occupied, some for as many as eight years. Sixteen nest trees were used by two or more species during the study, four times by two species in the same year. Sapsuckers and other species nested at an approximate density of 0.16 - 0.54 nests/ha or approximately one nest per 2.7 ha. Nest hole heights averaged 15.8 ± 8.2 m for all six species. All but two of 74 nest trees measured were dead coniferous trees greater than 10 m tall and 50 cm in diameter. Sitka spruce was the most common tree species, followed by western hemlock; two nests were in red alder. Red-breasted Sapsuckers generally formed nests in Sitka spruce trees averaging 22.1 ± 10.7 m, and a diameter of 130 ± 46 cm. Observations of nesting phenology for Red-breasted Sapsuckers showed that they began nest excavation mid - late April and incubation in early May. Chicks began calling in late May - early June and fledged as early as 8 June. Twelve colour-banded Red-breasted Sapsuckers were re-sighted, some banded as adults in 1995. This on-going study provides valuable nest tree use information, nest tree characteristics and provides a record for adult longevity and possibly nest site fidelity in Red-breasted Sapsuckers.

INTRODUCTION

Woodpeckers and other cavity nesters depend upon so-called 'wildlife trees' for nesting, roosting and feeding (Steeger and Machman 1994). Cavity excavation is generally part of an annual courtship ritual. Many cavity nesters create a new nest each year and consequently, a large number of cavities exist in forested areas. Abandoned cavities may be used by secondary cavity nesters, like owls, chickadees and squirrels, and may be limited by the availability of natural cavities. In virtually all forest habitat types, cavity nesters rely on the presence of trees with decayed heartwood for nesting (Harestad and Keisker 1989). Cavity nesting birds are among those species that are adversely affected by the removal of dead and decaying trees.

Red-breasted Sapsuckers (*Sphyrapicus ruber*) are the most common primary cavity nesting species in the Pacific Northwest. They are considered an uncommon resident along the entire British Columbia coast (Campbell et al. 1990). Red-breasted Sapsuckers nest in a wide range of forested ecosystems, including old growth, from sea level to 1,220 m. Nests occur primarily in dead trees, 3-20 m tall, with a minimum diameter of 30 cm (Steeger et al.). This species is a year-round resident on Haida Gwaii.

Other primary cavity nesting species present on Haida Gwaii are the Hairy Woodpecker (*Picoides villosus picoideus*), Northern Flicker (*Colaptes auratus*) and Chestnut-backed Chickadee (*Parus rufescens*) (Table 1). Hairy Woodpeckers, sub-species *picoideus*, are endemic to Haida Gwaii and on the provincial blue-list (1993) because of concern for declining populations. Hairy Woodpeckers are uncommon residents in BC, occupying all forested types from sea level to 1,900 m (Campbell et al 1990). This species excavates nests in deciduous and coniferous trees with minimum diameter of 25 cm (Steeger et al.). Northern Flickers are common throughout BC and will nest in either old or newly excavated cavities in trees greater than 40 cm in diameter (Steeger et al.). Lastly, Chestnut-backed Chickadees nest in natural or excavated cavities, in trees up to 26 m tall.

Secondary cavity nesters on Haida Gwaii include Northern Saw-whet Owl (*Aegolius acadicus brooksi*) and Red-breasted Nuthatches (*Sitta canadensis*). Northern Saw-whet Owls, sub-species *brooksii*, is an uncommon resident on Haida Gwaii; there are no known nest records for this sub-species of saw-whet owl on Haida Gwaii (see Tarver, this volume). This owl will nest in abandoned woodpecker holes, especially those of Northern Flickers, as well as natural cavities (Ehrlich et al. 1988). Similarly, nuthatches nest in abandoned woodpecker holes but they will excavate their

own nests in rotten stumps or branches (Ehrlich et al 1988). Brown Creepers (*Certhia americana*) nest in similar trees to those used by the above cavity nesting species, but these birds are only occasional cavity nesters, preferring to nest under tree bark (Ehrlich et al 1988).

Table 1
Cavity and bark nesting species on Haida Gwaii

Species	Scientific name	Type of Cavity Nester
Red-breasted Sapsucker (RBSA)	<i>Sphyrapicus ruber</i>	Primary – annual
Hairy Woodpecker (HAWO)	<i>Picoides villosus picoideus</i>	Primary – annual
Northern Flicker (NOFL)	<i>Colaptes auratus</i>	Primary – perennial
Chestnut-backed Chickadee (CBCH)	<i>Parus rufescens</i>	Natural or Primary
Brown Creeper (BRCR)	<i>Certhia americana</i>	Under bark, rarely cavity
Northern Saw-whet Owl (NSOW)	<i>Aegolius acadicus brooksi</i>	Secondary
Red-breasted Nuthatch (RBNU)	<i>Sitta canadensis</i>	Secondary

Nest tree selection and nest use has been examined for sapsucker and woodpecker species in other part of British Columbia. Harestad and Keisker (1989) found that most cavity nesting species were flexible in their choice of nest trees but preferred certain species if they were available. The decay characteristics of a nest tree seemed to be the most important factor determining nest location, followed by height and diameter (Harestad and Keisker 1989, Dobkin et al 1995). Tall trees provide protection from predators because nests can be placed higher up. On Limestone Island, red squirrels (*Tamiasciurus hudsonicus*) are year round residents on East Limestone Island, having been introduced to Graham Island in 1950 by the BC Forest Commission. Squirrels are secondary cavity nesters and compete with other species for these nest sites. As well, squirrels prey upon the eggs of other cavity nesting species and their presence may influence nesting site selection for cavity nesting birds living on this island.

Despite the extensive alteration of forested habitat on Haida Gwaii, little is known about nest tree characteristics, frequency of nest tree use and timing of nesting for cavity nesting birds. The Laskeek Bay Conservation Society operates a field camp on East Limestone Island each year from late March to early July, which provides an excellent opportunity to monitor wildlife tree use. The objectives of this on-going study are to document the number of bird species using tree cavities on Limestone Island and summarise tree characteristics and annual use. The approximate timing of breeding in Red-breasted Sapsucker was examined because this species is the most numerous cavity nester on the island.

METHODS

The study was conducted on East Limestone Island, Haida Gwaii (52° 54.4' N, 130° 37.5' W), a 48 ha forested island on limestone bedrock, dominated by Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*). Willow (*Salix* spp.), Pacific crabapple (*Malus fusca*) and red alder (*Alnus rubra*) occur on rock outcroppings and in open areas. Spruce is the most abundant tree throughout the island, mixed with redcedar along the west, north and east sides. Hemlock is more common in the center of the island, with alders in some of the valleys. The island rises to an elevation of 65 m on the south ridge. A natural fire affected the forest on the southeast slopes and the area now supports mature alder and spruce stunted by years of browsing from introduced deer. This island was never logged.

The study area lies within the Coastal Western Hemlock, wet Hypermaritime subzone, on the eastern side of Louise Island. The eastern side of the island is exposed to strong southeast and northeast winds blowing from the Hecate Strait, but it is protected by Louise Island on the westward side. Limestone Island occurs within a Provincial Wildlife Management Area protecting it from future resource development. The adjacent forested islands to the west (Louise and Moresby) are managed for timber harvesting and nearby slopes support early and advanced successional stage forests.

Beginning in 1990, the LBCS recorded the presence of cavity and bark nesting species on East Limestone Island and their use of specific trees. As nest trees were discovered, they were numbered, tagged, mapped and sometimes photographed. In 1995, the methodology was improved by dividing the island into four roughly equal areas. Each year all four areas were checked for nests three times between late May and mid-July (French 1995). In 2000, the protocol was adjusted so that inactive trees from the previous five years were not checked.

Each year in late April, previously active nest trees from the last five years were watched for 30 minutes for signs of nesting (e.g. excavation, adults nearby) or until activity was observed, whichever time was shorter. Active trees from the April check were re-checked weekly from late May to early June to establish whether chicks had hatched. Opportunistically during this time, trees were watched for copulation and incubation exchanges. Once a nest was known to contain chicks, the tree was checked every five days, for fifteen days, and then every other day until chicks were either seen outside the nest hole or were no longer heard calling from the nest (i.e. presumed fledged). The area under the nest tree was searched for eggshell fragments or any signs of nest predation.

From 1995-2001, a songbird banding project on East Limestone Island allowed for the capture and banding of sapsuckers and other cavity nesters. Red-breasted Sapsuckers were banded with aluminum US Fish and Wildlife Service Bands and plastic, colour-bands. The presence of banded sapsuckers was looked for and noted throughout the study.

In 1995 and 2001, most nest trees were measured for tree height, diameter at breast height (dbh), and classified according to the British Columbia Wildlife Tree Classification System (Guy and Manning 1995) (Table 2). Nest cavity heights were measured in 1995 and 1998.

Table 2
British Columbia Wildlife Classification System

1	Live/Healthy; no decay
2	Live/Unhealthy; internal decay or growth deformities (including insect damage, broken tops); dying tree
3	Dead; needles or twigs may be present; roots sound
4	Dead; no needles/twigs; 50% of branches lost; loose bark; top usually broken, roots stable
5	Dead; most branches/barks absent; some internal decay; roots of larger trees unstable
6	Dead; no branches or bark; sapwood/heartwood sloughing from upper bole; decay more advanced; lateral roots of larger trees softening; smaller ones unstable. Tree approximately 2/3 original height.
7	Dead; extensive internal decay; outer shell may be hard; lateral roots completely decomposed; hollow or nearly hollow shells. Tree approximately 1/2 original height
8	same as 7. Tree approximately 1/3 of original height
9	Dead Fallen; debris; downed trees or stumps

All data were summarized to describe occupancy and nest success. Red-breasted Sapsucker observations were summarized to establish nesting phenology. Descriptive statistics were used (± 1 SD) to summarize nest tree characteristics. Nest trees that were used multiple times were only counted once for each analysis (heights and diameters). Full data are presented in Appendices 1-4.

RESULTS

Species and annual nest counts

Six species of birds excavated or occupied 196 nests in 81 wildlife trees from 1990 to 2001 (Table 3). The number of nests per year ranged from 1 to 26 (mean 16.3 ± 7.7) at a nesting density of 0.16 - 0.54 nests per hectare (mean 0.37 ± 0.13) or approximately one nest per 2.7 hectares. Red-breasted Sapsuckers were the most common species to nest on the island with a total of 169 nests, at a density of 0.16 - 0.46 nests per hectare, mean 0.31 ± 0.11 , or 1 nest each 3 hectares. Chestnut-backed Chickadees were the next most numerous species followed by Hairy Woodpeckers, Brown Creepers and Northern Flickers. In 2001, a Northern Saw-whet Owl (sub-species *brooksi*) nested in an abandoned Northern Flicker nest (1992), the first record for this species on Limestone Island and

probably Haida Gwaii. A red squirrel was observed to bring nesting material (moss) to a hole in Wildlife Tree 1 in 1994, the only nesting record for this species on the island.

Table 3
Number of nest cavities each year on East Limestone Island, 1990-2001

Year	Number of nests each year						Total nests
	RBSA	HAWO	NOFL	CBCH	NSOW	BRCR	
1990	1						1
1991	8						8
1992	9		1				10
1993	9						9
1994	14						14
1995	22						22
1996	20	2				1	23
1997	16	1		1		1	19
1998	13	1	1	3		2	20
1999	15	2		2			19
2000	21	1		2			24
2001	21	1	1	2	1	1	27
Total	169	8	3	10	1	5	196

Three of the cavity nesting species used the same wildlife tree (WT) more than once for nesting: Red-breasted Sapsuckers, Hairy Woodpeckers and Chestnut-backed Chickadees (Table 4). Nearly 80% (n=125) of all sapsucker nests were excavated in trees that already contained at least one nest from a previous year. Seven trees were used by this species from five to eight times since 1991: WT 7, 12, 13, 20, 33, 34, 43 and 48. Wildlife Tree 34 was used for five consecutive years, 1997 to 2001. Wildlife Tree 7 was active most years from 1991 to 2001, six of them consecutively (1993-1999). Wildlife Tree 43 was used 1996 - 2001, six consecutive years. Sapsuckers nested in Wildlife Tree 13 from 1992 to 1998: it fell down in 1999. WT 20 was continuously occupied for eight years (1994 - 2001). The remaining three species of birds made only one nest in each tree.

Table 4
The number of years the same nest tree was used by cavity nesters on Limestone Island, BC 1990-2001

Species	Number of years the same tree used								Total nests
	1	2	3	4	5	6	7	8	
Red-breasted Sapsucker	35	12	12	6	3	2	1	2	169
Hairy Woodpecker	6	1							8
Northern Flicker	3								3
Chestnut-backed Chickadee	9	1							10
Northern Saw-whet Owl	1								1
Brown Creeper	5								5
All species	58	14	12	6	3	2	1	2	196

During the study period, 64 of the wildlife trees (79%) were occupied by only one species of cavity nester at a time. However, 16 trees were used by two or three species, five times in the same year: 1997 – WT 37; 1998 – WT 7; 1999 – WT 33 and WT 61; 2001 – WT 43 (Table 5). There were two records of nest trees being used by three different species in separate years, WT 1 and WT 33.

Table 5
Cavity and bark nesters that have shared the same nest tree on East Limestone Island, 1990-2001
 (* indicates same year)

Species	Frequency	WT Number
Red-breasted Sapsucker & Chestnut-backed Chickadee	6	7*, 17, 18, 19, 43*, 61*
Red-breasted Sapsucker & Brown Creeper	4	5, 24, 30, 37*
Red-breasted Sapsucker & Hairy Woodpecker	3	16, 33*, 39
Red-breasted Sapsucker & Northern Flicker & Hairy Woodpecker	1	33
Red-breasted Sapsucker & Northern Flicker & Northern Saw-whet Owl	1	1
Brown Creeper & Chestnut-backed Chickadee	1	54
All species	16	

Tree species

Three tree species were used for nesting: Sitka spruce, western hemlock and red alder (Table 6); no birds have used western redcedar. All of the nest trees were dead except one, a spruce (WT 16). Of the 74 nest trees measured, Sitka spruce was the most common nest tree (66% of trees), followed by hemlock (31%) and alder (3%). Spruce heights average 21.1 m and hemlock, 22.1 m. Trees were classified as Wildlife Classification 2 - 6 (Figure 1).

Table 6
Summary of diameters and heights of nest trees used by all cavity and bark nesters on Limestone Island, 1992-2001

	n	Nest tree height (m)		Nest tree diameter (cm)		Wildlife Classification			
		Mean	SD	Mean	SD	Mean	SD	Min	Max
Sitka spruce	49	21.1	11.4	121	48	4.9	0.7	2	6
Western hemlock	23	22.1	9.8	95	26	4.3	0.6	3	5
Red alder	2	14.5	5	57	7	5.5	0.7	5	6
All trees	74	21.2	10.8	111	44	4.7	0.7	2	6

Nest tree heights ranged from 3.7 to 49.0 m with diameters of 47 to 260 cm (Table 7). Red-breasted Sapsuckers nested most often in spruce trees (n=43), with average heights that were 22.1 ± 10.7 m tall with a diameter of 130 ± 46 cm (Figure 1). Northern Flickers, Chestnut-backed Chickadees and a Northern Saw-whet Owl only nested in spruce.

Table 7
Diameters and heights of nest trees used by each cavity or bark nesting species, 1990 - 2001

	n	Tree height (m)				Tree diameter (cm)			
		Mean	SD	Min	Max	Mean	SD	Min	Max
Red-breasted Sapsucker	66	22.1	10.3	7.3	49.0	115	43	47	260
Hairy Woodpecker	7	16.4	10.2	3.7	31.9	74	20	49	110
Northern Flicker	3	18.4	3.5	15.1	22.1	87	37	61	130
Chestnut-backed Chickadee	8	25.0	16.9	6.3	46.6	130	45	65	170
Northern Saw-whet Owl	1	15.1	-	-	-	130	-	-	-
Brown Creeper	4	23.3	16.9	12.5	40.0	145	84	60	260
All species	89	21.8	10.9	3.7	49.0	114	46	47	260

Figure 1
Wildlife tree classes of trees used for cavity nesters on Limestone Island, 1995-2001

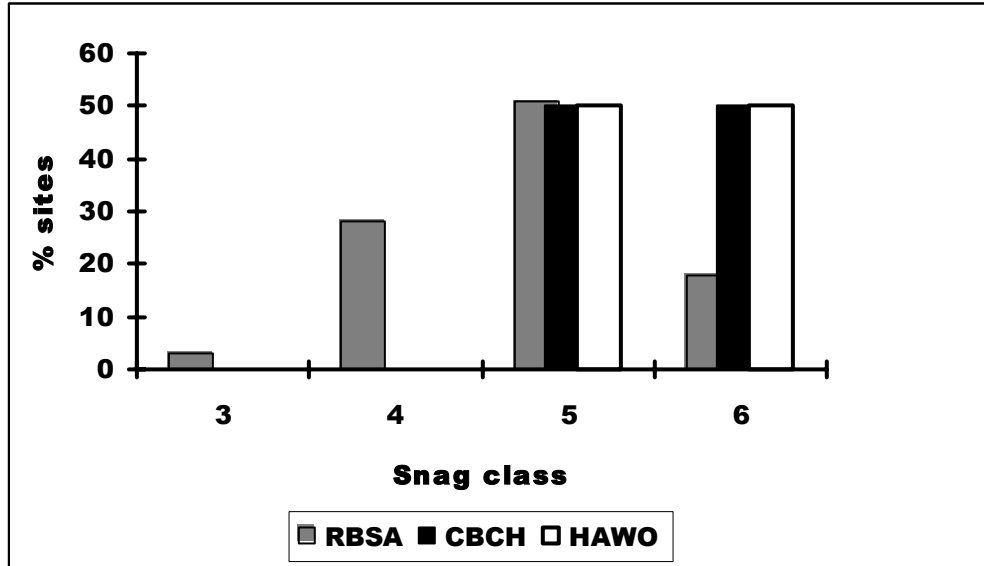
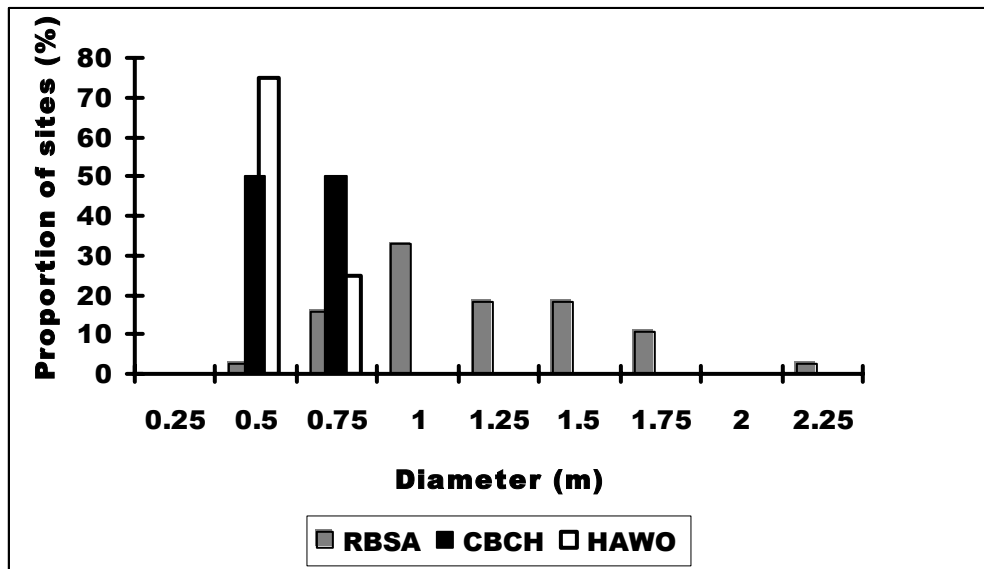


Figure 2
Diameter classes (m, DBH) of trees used for nesting by Red-Breasted Sapsuckers (RBSA), Chestnut-backed Chickadees (CBCH) and Hairy Woodpeckers (HAWO) on East Limestone Island, 1995-2001



Nest heights

Forty-four nest heights were measured. Mean nest heights were 15.8 ± 8.2 m for all species (Table 8). Chestnut-backed Chickadees nested in the lowest (5.1 m), and highest cavities (41.3 m). Red-breasted Sapsuckers nested on average 15.7 m above the ground, higher than Northern Flickers but lower than Chestnut-backed Chickadees.

Table 8
Nest and tree heights for cavity and bark nesters on Limestone Island, 1992-2001

	n	Nest tree height (m)				Nest height (m)			
		Mean	SD	Min	Max	Mean	SD	Min	Max
Red-breasted Sapsucker	35	22.1	8.9	9.8	51.2	15.7	6.9	5.3	34.5
Hairy Woodpecker	1	37.2	-	-	-	32.7	-	-	-
Northern Flicker	2	18.5	4.7	15.1	21.8	13.9	6.9	9.0	18.8
Chestnut-backed Chickadee	3	23.7	19.1	6.9	44.4	19.3	19.3	5.1	41.3
Northern Saw-whet Owl	1	15	-	-	-	9.0	-	-	-
Brown Creeper	2	18.2	2.3	16.6	19.8	9.5	0.4	9.2	9.8
All species	44	22	9.4	6.9	51.2	15.8	8.2	5.1	41.3

Red-breasted Sapsucker nesting chronology

Observations from 1997-2001 show that Red-breasted Sapsuckers began excavating new nest holes in early April (Table 9). Birds copulated on branches near the newly excavated hole from early to mid May. The first incubation exchanges occurred in early - late May, with the last exchanges seen near the end of the same month. Chicks called from nest holes by the third week in May and continued until they fledged, or were presumed fledged, beginning in early June.

Table 9
Timing of nesting of Red-breasted Sapsuckers on East Limestone Island, 1999-2001

Year	Nest excavation	First incubation shifts observed	Last incubation shifts observed	First chicks heard calling	Fledging Dates
1997	Early April			Late May-early June	Start 10 June
1998	11 April			25 May	13-23 June
1999	13 April			5-24 June	18 June – 9 July
2000	Early April	2-6 May			13-24 June
2001	23 April	3-24 May	22-30 May	22 May-16 June	8-25 June

Timing of nesting in other species was not well quantified. However, in 2001, Hairy Woodpecker adults were seen copulating on 26 April. Hairy Woodpecker Chicks were heard calling from a nest hole 6-11 June and had fledged by 18-20 June. Chestnut-backed Chickadee chicks were heard calling from 24 June to 8 July 2001, but were not heard during a survey on 13 July and were presumed fledged.

Red-breasted Sapsucker banding

Of 33 Red-breasted Sapsuckers banded between 1995 and 2001 on East Limestone Island, 13 were sighted in later years (Table 10). One individual, Y/Y-R/M, nested in the same wildlife tree (WT 43) for three years in a row. A second individual, Y/R-G/M, nested in the same tree (WT 20) for two years in a row, with two different mates. One of these mates, Y/Y-Y/M, was seen on three different trees (WT 20, 21 and 39). All of the marked birds had successful nests in the year that they were sighted.

Table 10
Re-sightings of marked Red-breasted Sapsuckers on East Limestone Island

Tree	Nest Year	Nest hole Location	Band Combination	Year banded
20	1997	West, 20 m up	Y/R-G/M, Y/Y-Y/M	1996,1995
20	1998	North, 8 m up	Y/R-G/M, Y/O-Y/M	1996,1998
21	2000	? 3/4 way up	Y/Y-Y/M	1995
29	1995	?	Y/Y-R/M, BR/Y-Y/M	1995,1995
31	1998	Northeast, 0.5 m from top	Y/R-R/M	1996
37	1995	?	Y/W-W/M	1995
39	1999	?	Y/Y-Y/M	1995
40	1995	?	Y/Y-W/M	1995
43	1996	?	Y/Y-R/M	1995
43	1997	North, half way up	Y/Y-R/M	1995
43	1998	?	Y/Y-R/M	1995
44	1998	East, 25 m up	Y/O-W/M	1998
48	1998	East, next to 1997	Y/W-R/M	1995

DISCUSSION

Clearly, cavity nesters on Limestone Island, in particular Red-breasted Sapsuckers, may use the same nest tree for several consecutive years. The longevity of nest trees may be related the availability of suitable nest trees or possibly, rates of decay. The repeated use of the same nest tree may indicate a lack of available trees with the necessary decayed heartwood for nesting. The presence of fungal bodies (conks) on deciduous trees in south-central British Columbia was the most distinguishing characteristic of nest versus non-nest trees (Harestad and Keisker 1989). The presence or absence of conks was not noted for nest trees on Limestone Island, but this feature could be recorded to quickly separate suitable and non-suitable nest trees for various classes of cavity nesters (weak to strong).

Alternatively, slower decay rates on Limestone Island may allow trees to remain in the nest tree pool for a long time. The island is in the rain shadow of Louise Island and enjoys relatively lower levels of annual rainfall than other parts of Haida Gwaii or the mainland coast. Trees suitable for nesting may be available to sapsuckers and other species for many years before breaking off or toppling because the heartwood decays slowly, as suggested by eight consecutive years of sapsuckers nesting in a class 5 tree.

Cavity nesters on Limestone Island nested almost exclusively in coniferous trees (spruce and hemlock). It is not possible to say whether these birds prefer conifer trees, especially spruce, because nest tree availability was not measured. However, all trees, whether coniferous or deciduous, were more than 10 m tall and greater than 50 cm diameter, indicating that this may be a minimum size preference for these species, at this location. The large percentage of nests in spruce trees (66%) most likely reflects the abundance of mature spruce on this island. A study to examine nest tree availability would help in the discussion of whether a certain nest tree type is limited or it is simply preferred.

Most of the nest records on East Limestone Island were of Red-breasted Sapsucker. Nest tree characteristics for this species are consistent with other studies in coastal British Columbia. A two-year study at Mt. Cain, Vancouver Island revealed that Red-breasted Sapsuckers nested in dead coniferous trees with a mean diameter of 93 cm (Joy 2000). Large diameter trees are essential for creating enough space for the adults and nestlings, and larger trees will have more wood to serve as insulation for the nest cavity. Nest trees at Mt. Cain were in decay class 5 and 6, and Joy (2000) determined that this distribution was significantly different than what was actually available. On Limestone Island, Red-breasted Sapsuckers nested in trees in classes 2 to 6, indicating that they are capable of excavating cavities in trees with no visible signs of decay. Harestad and Keisker (1989) found that nest tree preference varied among cavity nesting species and depended upon their strength as nest excavators. Red-breasted

Sapsuckers are classed as strong excavators, which explains their use of the only live wildlife tree in this study. Northern Flickers are weak excavators and nested only in trees in later stages of decay (class 5). Internal decay is necessary for all primary cavity nesters because it allows them to excavate nest holes (Harestad and Keisker 1989).

Sapsuckers in other coastal areas placed nests high in tall trees, probably as an adaptation to avoid predation by terrestrial predators (Dobkin et al. 1995). The heights measured to date at East Limestone Island for Red-breasted Sapsuckers were greater than those reported by Campbell et al. (1990), where 67% of nests were below 9.1 m. Predation by red squirrels, an introduced species, may influence nest cavity excavation in sapsuckers and other cavity nesters. Squirrels on Limestone Island have been seen climbing nest trees and harassing sapsuckers.

The timing of nesting for Red-breasted Sapsuckers on Limestone Island falls generally within the dates provided by other studies, although overall timing may be later because no nests were observed fledged before the beginning of June. Provincial records indicate that Red-breasted Sapsucker nests were completed from 7 May to 21 June, with some eggs found as early as 25 April (Campbell et al, 1990). Fledging dates for sapsuckers ranged from 10 May to 20 July, and a small sample of five nests suggests that the nestling period was 22 days.

That sapsuckers nest in such seemingly high densities and will use the same nest tree for eight consecutive years is probably not well known in British Columbia. As well, the diversity of cavity nesting species, the simultaneous use of the same nest tree by several species and the first Northern Saw-whet owl nest are exciting discoveries. As the LBCS intends to continue work on this island in future years we have the opportunity to assess the surrounding habitat for its suitability for nesting and to gain more information on nest site fidelity and species longevity.

Recommendations for future study

- Compare nest site tess with those available in the surrounding habitat. Measure tree characteristics (height, species, decay class, percent bark) of trees in a plot containing the nest tree to examine the question of preferred vs. available nest tree
- Measure habitat variables to describe nest locations in greater detail. Habitat variables that could be measured include: dominant tree species, index of tree density (basal area), height of the understory vegetation
- Measure nest cavity variables: the horizontal and vertical diameter of the entrance, the compass direction of the nest and entrance height above ground. (see Peterson and Gauthier 1985)
- Continue colour banding to collect further information on nest-site fidelity and longevity
- Record presence or absence of fungal conks on nest trees.

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