

Williamson's Sapsucker Population Assessment and Habitat Description in the Boundary Region of British Columbia in 2007

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Abstract

Call playback surveys for presence of Williamson's Sapsuckers (WISA) were conducted around the edge of the known area of occupancy (AO), to re-examine the extent of WISA range in the Boundary project area. One new nesting territory was found, resulting in an extension of the AO east of Greenwood (Lonestar-Phoenix area). Re-visiting previously known nest trees and searches for new nest trees generated a total of 36 active nests for the 2007 breeding season. Productivity information was obtained for 22 nests, 18 of which met the 22 day-criterion for successful fledging of young. The average brood size at fledging for these 18 nests was 3.8 young, which was higher than the 2.4 value obtained for 2006 productivity ($n = 9$). Habitat sampling using vegetation plots for trees and coarse woody debris and ant colony counts was conducted at nests for which productivity data was available. With respect to density of active nests, the Lehman Springs Conservation Area (owned by The Land Conservancy) was exceptionally productive with 5 active nests located within an area of approximately 30 ha. The Lehman Springs forest may therefore be useful as an ecological benchmark for Williamson's Sapsucker habitat management. Recommendations are forwarded with respect to protection of nesting territories within Wildlife Habitat Areas, habitat management, and future research and monitoring activities.

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Introduction

The Williamson's Sapsucker (*Sphyrapicus thyroideus*) is a migratory woodpecker species that breeds in the southern interior of British Columbia (BC). The species was listed in Canada as Endangered under the federal Species At Risk Act (SARA) in 2006. Three populations are recognized: Okanagan-Boundary, East Kootenay and Western (Princeton, Merritt) (Environment Canada 2007). The Okanagan-Boundary is the largest population with an estimated 141 known occupied territories and 500-600 individuals (Gyug et al. 2007a). The Area of Occupancy (AO) of this population is about 742 km², with the Boundary Timber Supply Area (TSA) and TFL 8 representing the majority of this AO.

As part of a joint provincial-federal initiative to provide population updates and baseline habitat information for the development of a species recovery strategy, population surveys and habitat characterization were conducted during the 2006 and 2007 breeding seasons. This report summarizes the activities and general results of the 2007 surveys within the Boundary project area. Separate surveys (with the same methodology) were conducted in 2006 and 2007 in the Okanagan and East Kootenay, and in the Western population in 2007. More in-depth analyses, modelling, and interpretation of the BC-wide results are being conducted by Gyug et al. (2007a, b, and c; in prep.).

Objectives

The specific objectives of the 2007 Williamson's Sapsucker surveys in the Boundary project area were to:

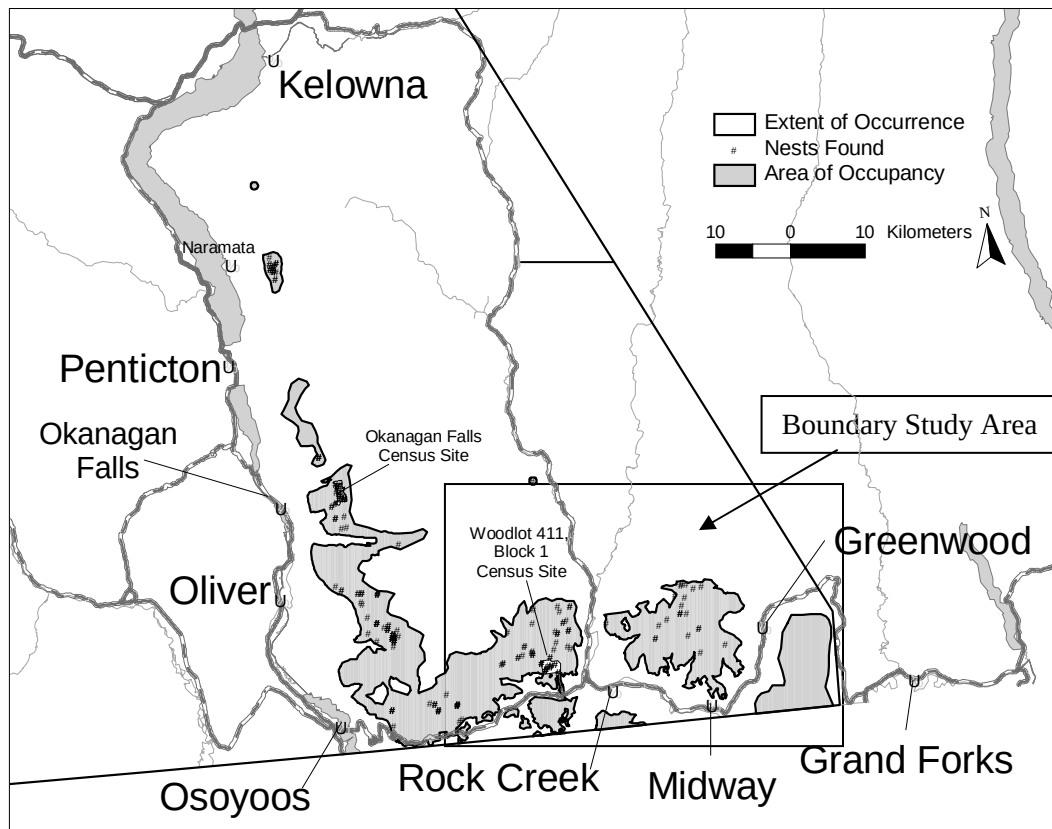
1. Estimate relative density of potentially occupied areas at edges of the known range and refine Area of Occupancy boundaries;
2. Identify and describe occupied nest trees;
3. Determine nest productivity; and
4. Describe those habitat elements (live and dead trees, stumps, logs, and ant resources) relevant to the biology of Williamson's Sapsucker within 16-ha habitat patches surrounding occupied nest trees.

Study Area and Methods

Study Area

The study area was the WISA "Extent of Occurrence" (EO) and adjacent areas within the Boundary TSA and TFL 8 (Figure 1). This area extends approximately from Anarchist Mountain in the west to Phoenix (east of Greenwood), north to Beaverdell, Conkle Lake and the Wallace drainage, and south to the US border. The study area lies primarily within the Interior Douglas-fir and, to a lesser extent, Montane Spruce and Interior Cedar Hemlock biogeoclimatic ecosystem classification units.

Figure 1. Approximate extent of the Boundary project area in 2007.



Methods

Relative detection density

Priority for inventory was given to sites within the Arrow-Boundary Forest District portion of the AO that either had not been surveyed previously or where Williamson's Sapsuckers had been detected previously but active breeding territories had not been confirmed. Call playback surveys and nest searches followed standards as outlined in the FIA Activity Standards for *Williamson's Sapsucker Inventory, Stand-level Habitat Assessment and Nest Productivity Assessment* (April 2006).

Relative breeding density

Identification of nest tree occupancy focused on previously known occupied nest trees or territories ($n=31$), including all 2006 active nests ($n=26$). Due to time constraints and lack of sapsucker detections in 2006, 23 previously known territories were not checked in 2007. In these territories, nest trees were either gone or rendered unsuitable ($n=8$) or no Williamson's Sapsuckers were detected in 2006 ($n=15$) (see tabulation below).

Nest # - reason for not checking in 2007

WN006 - no WISA in 2006	WN028 - no WISA in 2006
WN007 - nest tree gone by 2006	WN032 - no WISA in 2006
WN008 - no WISA in 2006	WN033 - nest tree gone by 2006
WN012 - no WISA in 2006	WN045 - no WISA in 2006
WN013 - no WISA in 2006	WN202 - no WISA in 2006
WN014 - no WISA in 2006	WN220 - no WISA in 2006
WN015 - nest tree gone by 2006	WN221 - no WISA in 2006
WN019 - nest tree gone by 2006	WN310 - no WISA in 2006
WN020 - nest tree gone by 2006	WN318 - no WISA in 2006
WN022 - nest tree gone by 2006	WN319 - no WISA in 2006
WN025 - nest tree unsuitable by 2006	WN321 - no WISA in 2006
WN026 - within same territory (WTY077) as WN020 which was gone in 2006	

Data collected at each Williamson's Sapsucker nest included: location determined by GPS, tree species, DBH, tree height, nest height, nest-hole aspect, wildlife tree decay class, type of decay, elevation, slope, aspect, topographic situation, soil moisture regime, general characteristics of nesting stand, and understorey information for determination of site series within BEC variants.

Other previously unknown active nest trees were identified through incidental observations or non-systematic but area-specific nest searches. Surveys were conducted from June 4-27, 2007.

Nest productivity

Nest productivity was determined through filming of young within nest cavities. Nests were accessed by a tree climber who filmed the contents of nest with a micro-camera, which was recorded on video-tape. Exact number of young and their gender was determined through subsequent detailed examination of the video films. The criterion for a successfully fledged young was 80% of fledging age. Fledging age was considered to be about 28 days, therefore 80% of fledging age was about 22 days. Productivity of the nest was the number of young successfully fledged.

Habitat Characterization

Following the nest searches and productivity determinations, habitat sampling using vegetation plots for trees and CWD and ant colony counts was conducted in September 2007 at those nests for which productivity data was available. The habitat sampling within 16-ha patches (225-m radius) surrounding nest trees followed the standard methodology used in 2006 (FIA 2006b).

Additional line-intercept diameters were collected for all CWD >7.5-cm at the intercept. This included both the CWD with large-end-diameters <22.5 cm that were measured in the 4-m x 50-m plots, and all smaller CWD as well. This extra data was collected so that comparisons can be made between the CWD volume estimates derived from the FIA 4-m x 50-m plots to those derived from standard line-intercept methods, and to provide data on the amounts of smaller CWD. Data was entered into a standardized template for submission to SPI. These data are not summarized here as

full analysis and interpretation will be done when the data from all four Williamson's Sapsucker projects in B.C. are merged (L. Gyug, pers. comm.).

Data Management and Analysis

Data were entered into standardized Excel file templates developed specifically for this project by the Species Inventory (SPI) system in April 2007. Separate files for the observation data and for the tree/CWD/ant data have been submitted with this report.

This is the second year of this project. Field activities in 2006 for the Boundary project area were summarized by Steeger (2006). WISA Bayesian Belief Network (BBN) models and more in-depth analyses of the province-wide 2006 studies are available in draft reports (Gyug et al. 2007a, b, c), which will be updated with the 2007 data. This report therefore summarizes the 2007 field activities in support of analyses for validating the provincial WISA BBN models and population estimates.

Results

Call-playback Surveys

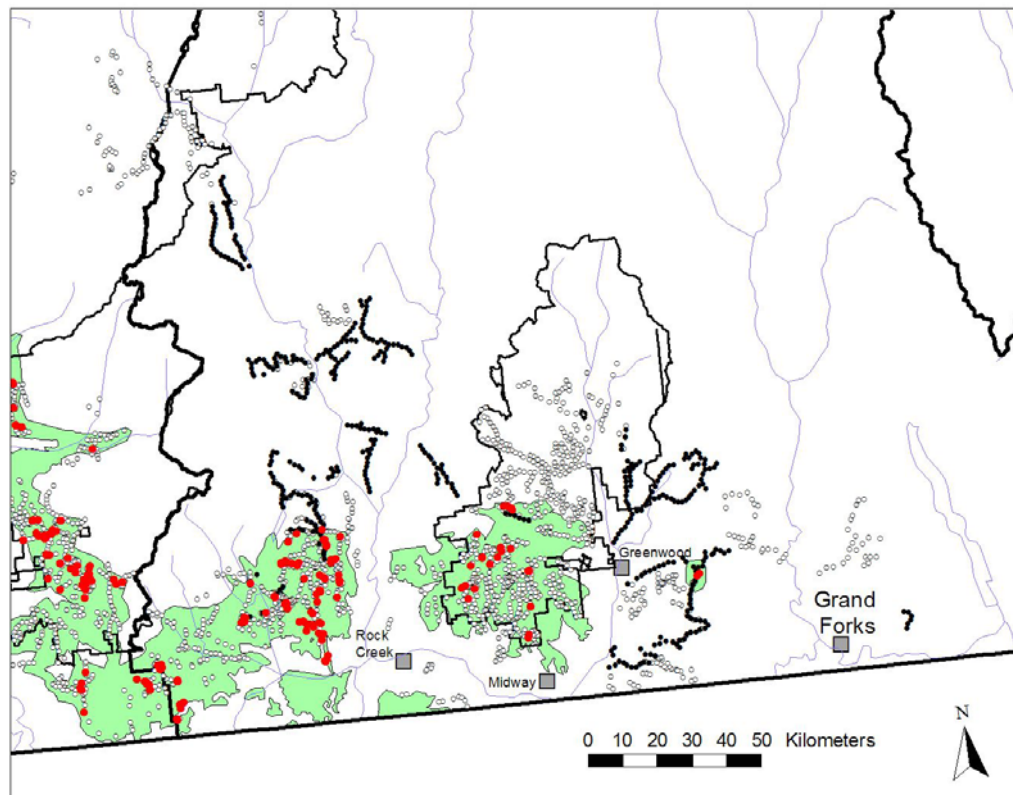
Systematic call-playback surveys (CPB) were conducted around the edge of the known breeding range of Williamson's Sapsuckers within the Boundary project area (Figure 2). The main survey areas were:

- | | |
|-----------------|----------------------|
| ➤ Boomarang | ➤ McCarren Creek |
| ➤ Chenier Road | ➤ Norwegian Road |
| ➤ Conkle Lake | ➤ Ouellette |
| ➤ Eholt | ➤ Pelly Mountain FSR |
| ➤ Fiva | ➤ Phoenix |
| ➤ Gidon Road | ➤ Rich Road |
| ➤ Harrison | ➤ Roderick FSR |
| ➤ Hay | ➤ Tuzo |
| ➤ Jewel Lake | ➤ Taurus Road |
| ➤ Lonestar | ➤ Upper Dhu FSR |
| ➤ Marshall Lake | ➤ Wallace Creek FSR |

A total of 405 systematic CPB sessions were completed from June 04-20 in the extended search area. Additional CPB sessions were conducted opportunistically near areas (McKinney, Stanhope, Stormhill, Bubar, Johnstone, Ingram) where Williamson's Sapsuckers were known to breed. The data for the CPB surveys have been submitted digitally in the Boundary 2007 SPI database (MS Excel File "WISA SPI Boundary Data v2007d_Final").

Within the extended search area, two WISA detections were made following CPB: one at Conkle Lake West, the other one along Lonestar Road east of Greenwood. Only the latter resulted in detection of an active nest, which represents an eastward extension of the known breeding area (or *Area of Occupancy*) in the Boundary (Figure 2).

Figure 2. Locations of the Boundary call playback surveys. The black dots = 2007, white dots = 2006 and earlier, red dots = WISA observations 2006 and 2007, and green polygons = updated Area of Occupancy including 2007.



Nest Trees

During the 2007 breeding season, we detected a total of 36 active nest trees; of those 21 were nest trees known from 2006 and 15 were discovered in 2007 for the first time (Figure 3; Table 1). Most nests were located in western larch (29, 80.6%) while the others were located in trembling aspen (6, 16.7%) and water birch (1, 2.8%). A comprehensive analysis and description of nest trees will be performed as part of the BC-wide data analysis (L. Gyug, pers. comm.).

Nest Productivity

Of the 36 active nest trees we discovered, 23 were climbed to determine nest productivity. Estimating the age of the young (based on the parents feeding behaviour) at the time of productivity checks resulted in 18 nests with young of at least 22 days of age, 4 nests with young less than 22 days of age, and 1 nest for which the video footage was inconclusive. Average productivity for the 18 nests with one or more young greater or equal to 22 days of age was 3.8 (SD= 1.1, range 2-5). For all 22 nests with one or more young greater or equal to 19 days of age, the average was also 3.8 young (SD=1.3, range 1-6). Productivity for nests with one or more young in 2006 (av. = 2.4, SD = 0.7, range = 2-4, n = 9) was lower than in 2007. Overall nest productivity for all known active nests from both 2006 and 2007 is summarized in Table 1.

Figure 3. Williamson's Sapsucker nest tree status 2006/07 in the Boundary project area.

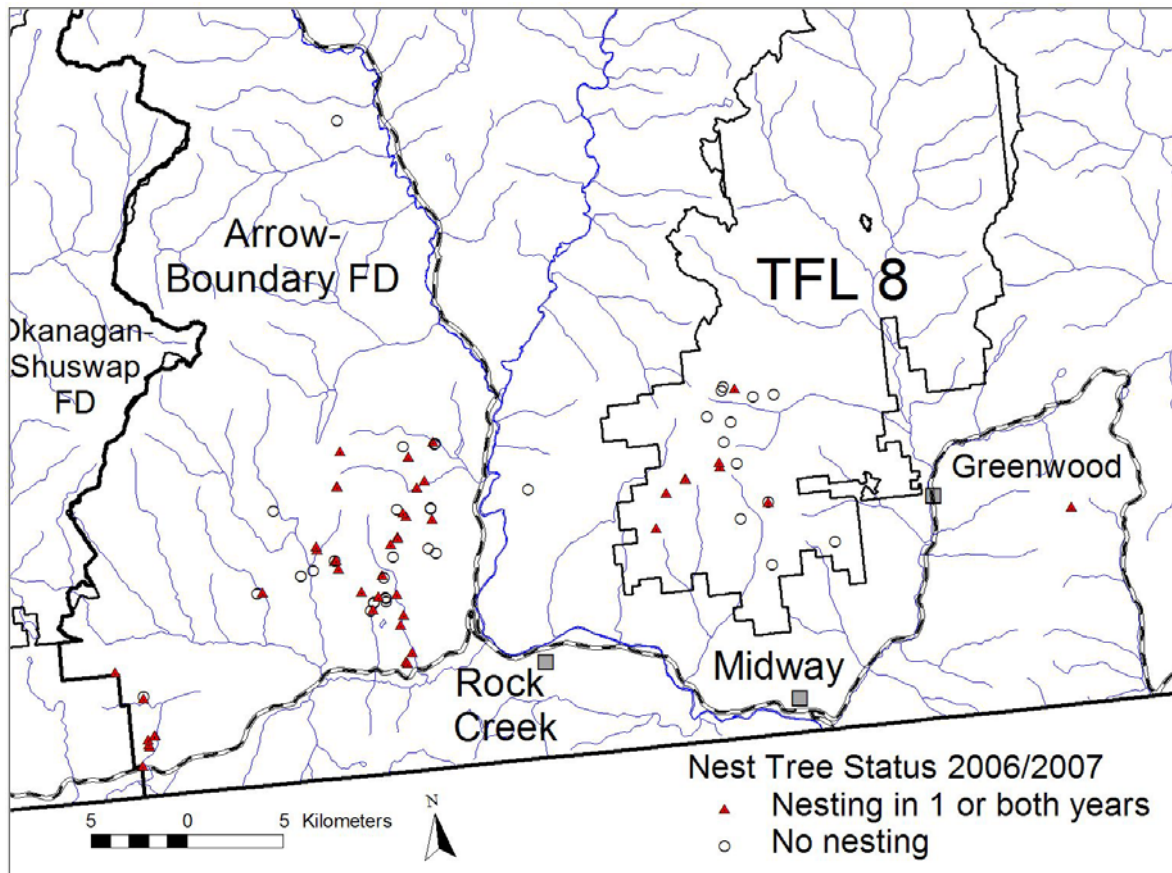


Table 1. Nest productivity (# of young successfully raised to at least 22 days of age) and occupancy of Williamson's Sapsucker nests in the Boundary project area, 2006 and 2007. Nest trees in bold were active in 2007.

Nest Tree	2006	2007	Comments
WNB001	not counted ¹	not occupied	
WNB002	not counted	see WNB032	moved to tree WNB032 in 2007
WNB003	2	5	
WNB004	2	see WNB018	moved to tree WNB018 in 2007
WNB005	2	2	
WNB006	2	5	
WNB007	failed	4	
WNB008	3	4	
WNB009	3	3	

Nest Tree	2006	2007	Comments
WNB010	2	see WNB023	moved to tree WNB023 in 2007
WNB011	3	not occupied	moved to tree WNB020 in 2007; unclimbable nest location
WNB012	failed	see WN316	2006: moved to WNB012; 2007: moved back to tree WN316; nest successful but fledged before nest productivity check
WNB013	1	see WNB026	moved to tree WNB026 in 2007
WNB014	not counted	not counted	2007 June 7: occupied with Phase 1 young; June 21: no action at nest; June 22: M calling in area.
WNB015	not counted	not counted	tree unclimbable due to size (diameter); nest successful in 2007 as nesting at Phase 4 on June 22.
WNB016	not counted	not counted	2007 June 7: occupied with Phase 2 young; June 22: no WISA in nest; several WISA in vicinity but may not be from WNB016 as WNB030 only 100m away.
WNB017	no data	4	discovered in 2007
WNB018	no data	3	discovered in 2007
WNB019	no data	4	discovered in 2007
WNB020	no data	not counted	discovered in 2007; unclimbable nest location
WNB021	no data	5	discovered in 2007
WNB022	no data	not counted	discovered in 2007; tree unclimbable
WNB023	no data	5	discovered in 2007
WNB024	no data	4	discovered in 2007
WNB025	no data	1	discovered in 2007
WNB027	no data	6	discovered in 2007
WNB028	no data	1+?	discovered in 2007; video inconclusive; confirmed 1 male chick about 14 days of age
WNB029	no data	1+?	discovered in 2007; tree unclimbable; confirmed 1 male chick > 22 days of age
WNB030	no data	2+?	discovered in 2007; not climbed; confirmed 1 M + 1F chick > 22 days of age
WNB031	no data	not counted	discovered in 2007; nest successful; likely more than 1 chick > 22 days of age
WNB032	no data	5	discovered in 2007
WN011	4	4	
WN016	no data	2	1 M chick fledge during climb; 1 F chick in nest; 1 dead chick at base of tree
WN017	not occupied	not counted	discovered in 2007; not climbed; nest successful; likely more than 1 chick > 22 days of age on June 21
WN018	unknown	not occupied	
WN029	not counted	not counted	2007 June 5: only M seen entering cavity; young chicks?; June 25: no young in nest; M nearby; no sign of F.

Nest Tree	2006	2007	Comments
WN046	not counted	not occupied	2006: successful but not checked with camera; 2007: territory occupied by M; no sign of F
WN047	not counted	2	2006: successful but fledged before camera check; 2007 June 15 LG video: 3 M and 2 F in nest 12+ days old; June 20: 1 M chick and 1 dead F in nest; June 22: 1 M in nest + 1M fledged.
WN213	unknown	not occupied	2006: possibly successful; may have fledged or been killed and removed before final check on June 27th; 2007: see WNB021 (215 m from WN213).
WN215	not counted	4	
WN217	not counted	3	
WN218	2	not counted	2007: nest successful; likely more than 1 chick > 22 days old on June 25.
WN223	2	5	
WN237	unknown	not occupied	2006: very late nest; nesting phase 2 on June 28; 2007: see WNB028 (221 m from WN237).
WN311	2	not counted	2007 June 7: chicks in phase 2; June 22: no WISA (fledged or unsuccessful).
WN316	see WNB012	not counted	2007 June 7: F in cavity, possibly inc or phase 1 young; June 25: no sign of WISA; presumed to have failed
WN317	no data	4	2005 nest tree

¹“Not counted” indicates that young were present in the nest, but they could not be counted because of inaccessibility, nest failure, or fledging prior to last check.

Habitat Sampling

We sampled a total of 10 new nesting territories for vegetation characteristics and ant colonies, with numbers of new transects ranging from 4-15 (Table 2), for a total of 115 transects. Sampled territories were those for which productivity data had been obtained in 2007. Several territories with new nest trees (WNB018, WNB030, and WNB032) did not require new vegetation sampling because the 2007 nest trees were in very close proximity to the 2006 nest trees and there would not have been any change in the 16 ha sampling area. The data for habitat sampling have been submitted digitally in MS Excel File “WISA_Veg_Plots_BOBC_07Oct_2007”).

Benchmark Habitat

Some high-value habitats have attributes that support particular high densities of breeding sapsuckers. Such habitats may be considered as ecological benchmark habitats for management and conservation purposes. Prior to the 2007 breeding season, the highest average nest density found in B.C. was 3.1/km² (7 nests in 2.26 km²) in a census area east of Okanagan Falls. A second census area (Woodlot 411 near Rock Creek) generated an average nest density of 0.91 nests/km² (Gyug et al. 2007a). During the 2007 sampling season, we detected 5 active nests within a 24 ha forest patch owned by The Land Conservancy of BC near Bridesville (Figure 4).

Table 2. Number of habitat transects sampled in Williamson's Sapsucker nesting territories in 2007.

Nest ID	Productivity Data Available (Y or N)	Habitat sampling plots (Y or N)	No. sampling transects
WNB018	Y	N	0
WNB019	Y	Y	15
WNB021	Y	Y	9
WNB023	Y	Y	4
WNB024	Y	Y	15
WNB025	Y	Y	15
WNB027	Y	Y	15
WNB028	Y	Y	8
WNB030	N	N	0
WNB032	Y	N	0
WN215	Y	Y	15
WN217	Y	Y	15
WN317	Y	Y	4

We observed the sapsucker pair nesting at the northern perimeter of the stand (WNB030) feeding in the open forest north of the TLC property (Figure 4). We estimate this open forest area to be approximately 6 ha. Considering that the TLC property is an isolated forest patch within a matrix of agricultural fields, it is likely that the other 4 pairs forage exclusively within the forest patch. If this was the case, then the 5 pairs would occupy an area of approximately 30 ha or 0.3 km², which corresponds to a nest density of 16.7/km², or more than 5 times the density observed in the Okanagan Falls census site.

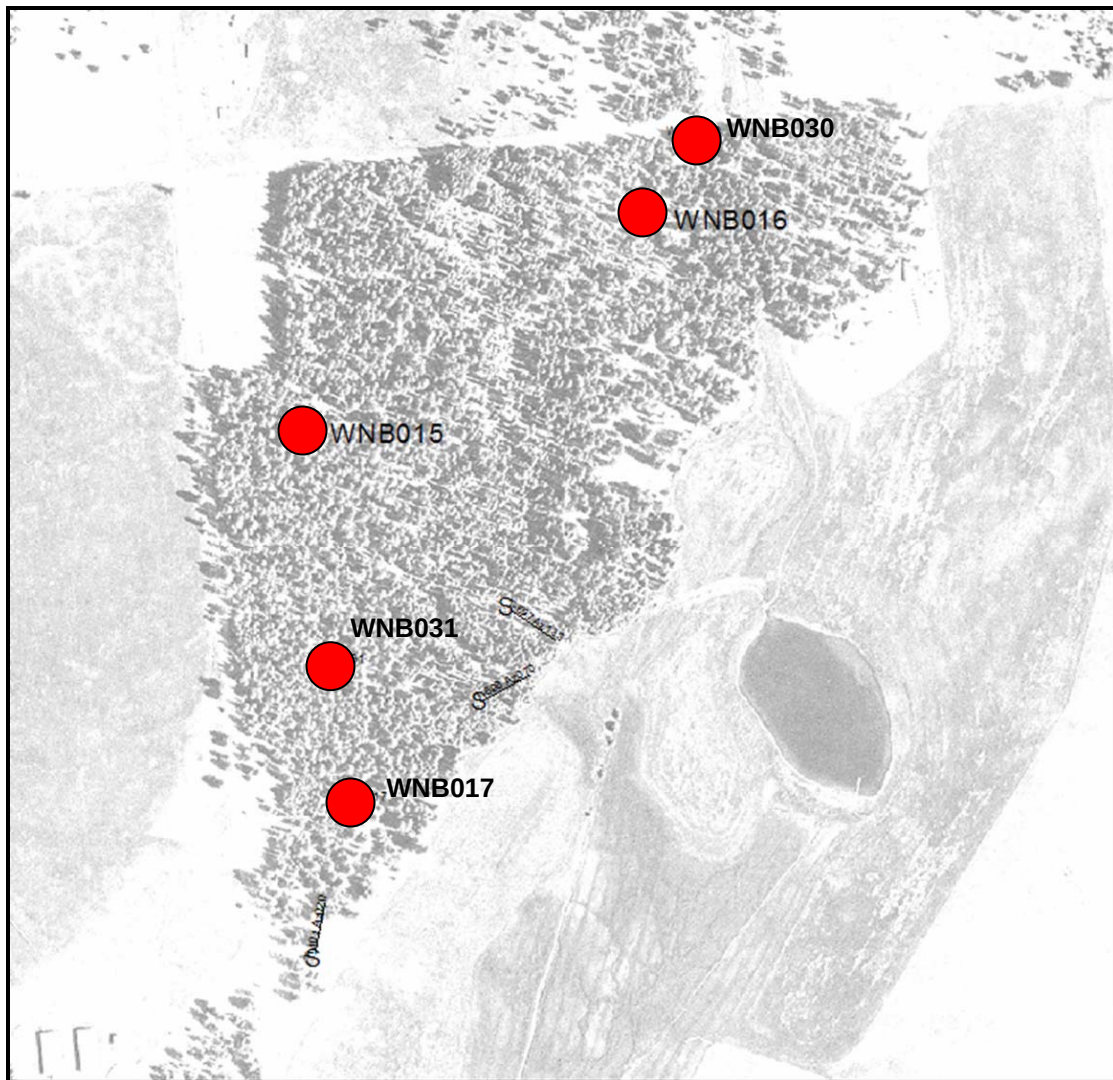
The forest, which is now known as the Lehman Springs Conservation Area, is ecologically unique in many ways. The large old growth Western Larches are over 600 years old, and the largest of these trees is 170 feet tall. The stand also includes ponderosa pines, spruce, and interior Douglas fir trees, along with a high density of large and small snags (quote from TLC website; accessed October 24, 2007)¹.

Basal area of the unharvested forest area within the Okanagan Falls census area was twice that of Woodlot 411 (36.5 and 18.1 m²/ha respectively), and at an intermediate level at Lehmann Springs (27.8 m²/ha). Density of moderate sized trees 23-57 cm diameter-at-breast-height (DBH) was about 25% less in the Okanagan Falls area than on Woodlot 411 (108 and 147 trees/ha), and was similar to Woodlot 411 at Lehmann Springs (151 trees/ha). Density of large veteran trees >57 cm DBH was much higher at Okanagan Falls than at Woodlot 411 (35.0 and 2.2 trees/ha), and was similarly high at Lehmann Springs (30.0/ha). The density of snags (standing dead trees) was higher at Okanagan Falls than at Woodlot 411 (11.2 and 4.9/ha), and was at an intermediate level at Lehmann Springs (7.1/ha). Volume of logs >22 cm large-end-diameter was also higher at Okanagan Falls than at Woodlot 411 (54.7 and 18.7 m³/ha), and was at an intermediate level at Lehmann Springs (32.4 m³/ha) (Gyug et al. 2007a, updated manuscript, October 2007).

¹ <http://www.conservancy.bc.ca/content.asp?sectionid=70&regionack=OK>

Considering the high density of nests at Lehman Springs compared with the other known high-quality habitats at Okanagan Falls and Woodlot 411, the Lehman Springs forest may be considered an ecological benchmark for Williamson's Sapsucker habitat management in BC. More observations on nesting density and the actual extent of foraging areas should be conducted to confirm this recommendation.

Figure 4. Locations of active WISA nests at Lehman Springs TLC Property, 2007.



Fecal Sac Collection

Fecal sacs are bags of excrement removed by adult sapsuckers from their nests during much of the nestling period. Fecal sacs contain ant remains that can be analyzed to determine the ant species fed to nestling sapsuckers. We collected fecal sacs from 29 nests during the 2007 sampling season. These samples were submitted for future analysis planned to be conducted at the University of Northern BC.

Recommendations

1. Protect all known WISA breeding territories in Wildlife Habitat Areas (WHAs).
2. Confirm potential breeding territories (e.g., where WISA have been observed and suitable habitat exists) and protect territories in WHAs where possible. Two examples are:
 - (i) WISA Site ID: WB081 in the Bubar (Spur 1700) area of the West Ingram drainage where a female was observed on a potential nest tree surrounded by suitable habitat; and
 - (ii) WISA Site ID: WB082, the back bowl off the ridge in the East Ingram drainage (spur 4200) where WISA was heard responding to CPB although not visually confirmed.
3. Aside from WHAs established specifically for WISA, consider creating multi-species WHAs that include suitable WISA habitat.
4. At a scale broader than that of WHAs, consider WISA habitat requirements as part of ecosystem-based forest management practices.
5. Increase the intensity of surveys and foraging observations at the Lehman Springs site to confirm the potential benchmark habitat status of this area. Manage or restore some forest stands within WISA range toward attaining the habitat characteristics of the Lehman Springs stand.
6. Continue monitoring WISA nesting activities within delineated census areas, to determine longer-term population trends.
7. Determine ant species composition of WISA diet through analysis of fecal sacs.
8. Inform forestry planners, operational staff and field workers through research extension activities about the characteristics and habitat requirements of WISA and encourage communication / reporting of breeding territories and high-value habitat patches.
9. One of the most critical habitat elements for nesting WISA in the Boundary project area is large-sized living or dead western larch. The structural soundness of the stem and root systems of these trees are often such that forestry operations could be conducted in their vicinity without compromising worker safety. For higher level-of-disturbance work activities however, many of these trees would not pass the general criteria for safe trees as developed by the provincial Wildlife/Danger Tree Assessor's Course (Province of BC 2006). Consider therefore the development of new, specific criteria for retention of large-sized or veteran larch, to avoid the requirement of "no-work zones" where no safety concerns exist. This could either be incorporated directly into the Wildlife/Danger Tree Assessor's Course or via a variance to the Workers' Compensation Boards hazard tree regulations.

Literature Cited

Environment Canada. 2007. Recovery Strategy for the Williamson's Sapsucker. October 2007 draft. Canadian Wildlife Service, Delta, B.C.

FIA 2006. FIA Activity Standards Document: Information Gathering and Management Component, Resource Inventories Activity Area, Wildlife and Wildlife Habitat Activities, specifically Williamson's Sapsucker Inventory, Stand-level Habitat Assessment and Nest Productivity Assessment Standards.

Gyug, L.W., I. Ohanjanian, C. Steeger, I. A. Manley, and P. W. Davidson. 2007a. Distribution and Density of Williamson's Sapsucker (*Sphyrapicus thyroideus*) in British Columbia, Canada. Draft. Prepared for Ecosystems Branch, Ministry of Environment, Victoria, B.C.

Gyug, L.W., S. F. Wilson, C. Steeger, and I. Ohanjanian. 2007b. Characterizing Nest and Sap Trees Used by Endangered Williamson's Sapsuckers (*Sphyrapicus thyroideus*) in British Columbia. Draft. Prepared for Ecosystems Branch, Ministry of Environment, Victoria, B.C.

Gyug, L.W., S. F. Wilson, C. Steeger, and I. Ohanjanian. 2007c. Bayesian belief network modeling of foraging resources and nest productivity for Williamson's Sapsucker (*Sphyrapicus thyroideus*) in British Columbia. Draft. Prepared for Ecosystems Branch, Ministry of Environment, Victoria, B.C.

Province of BC. 2006. Wildlife/Danger Tree Assessor's Course Workbook Version January 2006. Ministry of Environment and Ministry of Forests and Range, Victoria, BC and WorkSafe BC, Richmond, B.C.

Steeger, C. 2006. Williamson's Sapsucker Survey – Boundary 2006. Prepared for Pope & Talbot Ltd., Box 70, 1160 Highway 3, Midway, B.C.