

Williamson's Sapsucker, Western Region 2007

by

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ABSTRACT

Data from all Williamson's Sapsucker projects west of Okanagan Lake have been pooled in this report to estimate the abundance in that region. Potentially occupied BEC variants west of Okanagan Lake were subdivided into 20 sampling units of about 500 km² of each (excepting the Merritt area which had been sampled in 2006), and a subsample of about 5% of each area was randomly sampled using call playbacks (CPB). 1600 CPB points were sampled by Okanagan Wildlife Consulting in May, 2007, and an additional 1351 CPB were conducted by other projects within this sampling regime. Okanagan Wildlife Consulting made 4 Williamson's Sapsucker detections—1 in the Salmon River (Monte Lake) area, and 3 in the south Okanagan west of Okanagan Lake. No nests were found at these sites during follow-up searches in June. The predicted number of detections, occupied territories and nests if the entire area (excepting Merritt and Princeton) had been sampled was 113, 97 and 53 with 90% confidence intervals of 85%, 98% and 119% respectively. The Area of Occupancy boundaries near Princeton and Merritt were revised. The estimate of the number of breeding adults at Merritt and Princeton were 166 and 68 respectively. These estimates should be expressed as ranges of 120-200 and 40-100 respectively to acknowledge that the estimates contain sources of error that are difficult to estimate precisely. While we predict there are about 50 Williamson's Sapsucker nesting territories west of Okanagan Lake outside of the Merritt and Princeton areas, these occurrences are widely scattered, and there are not believed to be any other localities where there are concentrations of breeding Williamson's Sapsuckers.

Overall productivity of Williamson's Sapsucker was lower in the western region than in the Okanagan-Boundary region. Mean number of young fledged per successful nest was lower (3.2 vs 3.6), and the nest density was lower as determined both from nest census areas and as inferred from the significantly higher inter nest distances. Nest hole re-use in the year after nesting was fairly low in the Okanagan-Boundary (4%) but higher in the western and East Kootenay regions (14-20%). Renesting in the same territory in the next year was about 67% in the Okanagan-Boundary and in the western region, but lower (43%) in the East Kootenay.

The relative BEC variant rankings by CPB detections and by the discovery of nesting territories were updated with the 3939 CPB points conducted in 2007 for relative density determinations including those from all B.C. projects. The IDFdm1 and IDFxh1&4 of the Okanagan-Boundary region were still the BEC variants with the highest relative detection density, and had the highest detections of nests. These were nearly double the next highest BEC variants: the IDFxh1 of the western region, and the MSdm1 of the Okanagan-Boundary region.

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INTRODUCTION

Williamson's Sapsucker is a species of woodpecker that has been designated as Endangered by the Committee on the Status of Wildlife in Canada (COSEWIC 2005) primarily because of its low population numbers in Canada and the tendency to use old Western Larch stands as nesting habitat which are being altered by timber harvesting and private land clearing.

The area of this project was west of Okanagan Lake (Figure 1). There were three other inventory projects for Williamson's Sapsucker west of Okanagan Lake in 2007: Nicola Tribal Association project, Gill 2007; Kamloops project, Manning Cooper and Assoc. (unpublished data); and B.C. Transmission Corridor project near Merritt conducted by Keystone Wildlife Research (unpublished data). The data from those projects have been incorporated into the results of this project so that this report provides a single overview of the current status and location of Williamson's Sapsuckers west of Okanagan Lake.

The objectives of the western Williamson's Sapsucker project in 2007 were to:

- 1) Determine relative abundance from responses to call playbacks, and nest abundance using follow-up nest searches, of Williamson's Sapsucker in the area west of Okanagan Lake using a stratified random sampling scheme,
- 2) Use the Williamson's Sapsucker detections to revise the Area of Occupancy west of Okanagan Lake,
- 3) Revisit all previously known Williamson's Sapsucker nest trees in the project area to determine:
 - a) renesting rates in previously used nest trees and nest holes, and
 - b) productivity, i.e., the number of young successfully raised to 80% of fledging age wherever possible, and
- 4) Collect habitat measurements including tree, snag, Coarse Woody Debris (CWD), and ant nest densities in territories (225-m radius) around nests where productivity information was available.

This was the second year of this project on Williamson's Sapsucker west of Okanagan Lake. The 2006 portion of the project concentrated solely on the Merritt portion of the region with results summarized by Gyug (2006a, 2006b). Small amounts of data on Williamson's Sapsucker were available west of Okanagan Lake prior to 2003 and have been summarized by Gyug (2006a) and by Gyug et al. (in press). This report provides an up-to-date account of the status and distribution of Williamson's Sapsucker west of Okanagan Lake that builds on the results reported in Gyug et al. (in press). Final reports that provide analysis and interpretations of the nesting and productivity data will be produced in two reports that were produced in draft form in April 2007, and which will incorporate the results of from all B.C. projects when updated by November 2007.

METHODS

Williamson's Sapsucker respond to call playbacks (CPB) anytime in the breeding season from the earliest date of arrival on the breeding range (from late March to early April depending on the year) to shortly after the young have fledged. CPB protocol followed the FIA (2006a) standards. All cavity nesting birds and raptors heard or seen from the CPB points were recorded. Date, time, and wind and sky conditions were recorded for each CPB point, with temperature recorded at the beginning and end of the surveys. Location was recorded on GPS units to an accuracy of at least 10 m at every CPB point.

CPB surveys were usually done from roadsides with 400 m between successive CPB points. Surveys were generally done by a surveyor working alone. When there was a Williamson's Sapsucker detection at a CPB point, then no CPB survey was done at the next 400-m point because there was a high likelihood that the same bird would respond. We made every effort to avoid double counting Williamson's Sapsuckers detected at adjacent or nearby CPB points by not doing CPBs at the next 400-m point, and by estimating the locations of detected birds so that we could determine if the same birds were being detected, or if detections at adjacent points were actually separate birds.

To estimate the relative density throughout the area west of Okanagan Lake, a spatially balanced random sampling plan was developed for CPB surveys. Potentially occupied BEC variants within the Extent of Occurrence (Gyug et al. in press) west of Okanagan Lake were the IDFxh1, IDFxh2, IDFdK1, IDFdK2, PPxh2, and ICHmk1. The extent of these BEC variants were divided into 287 10-km x 10-km blocks based on UTM grid squares. The sampling frame was considered to be these grid squares excluding grid squares that were primarily on private land (N = 12), grid squares that were primarily slopes >60% (mainly the canyons of the lower Similkameen, Fraser and Thompson Rivers, N = 10), and grid squares where the potentially occupied BEC variants made up <10% of the total grid area (N = 31). This left 234 grid squares in the sampling frame. Within this frame, the area was divided into seven geographic areas of approximately 2000 km² each (Figure 1), which were subdivided into four sub-areas of approximately 500 km² each.

One geographic area (Merritt) had been adequately sampled in 2006, and was not sampled again in 2007. From the remaining six geographic areas, sampling effort was apportioned equally between areas and sub-areas. From within each sub-area, two blocks (i.e. 10-km grid squares) were selected randomly for sampling with two field days allotted in each block (Figure 2). This level of effort allowed for about 80-100 CPB points in each block, which allowed for about 25% of the block to be effectively sampled by CPB points (assuming a 300-m effectively sampled radius) which was attainable from roadsides in almost all blocks. Placement of CPB points within blocks depended on local road patterns, but was intended to be as even as possible over the potentially-occupied BEC variants within the entire block.

Blocks covered by <100% of potentially occupied BEC variants were sampled in proportion to the amount of BEC variants contained. For example, a block that was 50% occupied by potentially-occupied BEC variants was only given 1 day of sampling, rather than 2 days. Any remaining sampling effort was re-allocated to the next randomly selected block within the same sub-area. Therefore sampling effort was intended to be equal between all sub-areas and geographic areas.

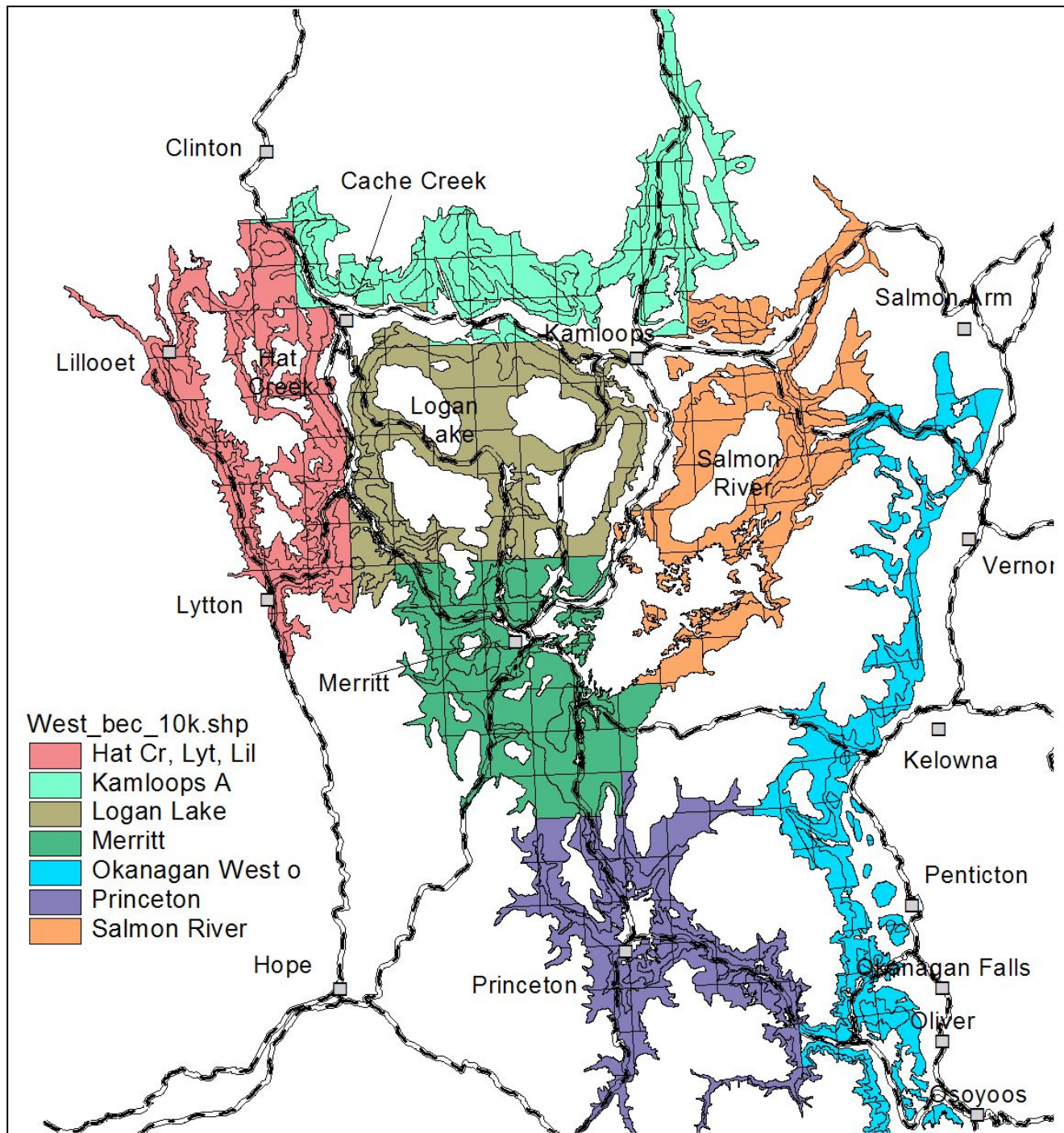


Figure 1. The seven geographic sampling areas and the potentially occupied BEC variants west of Okanagan Lake.

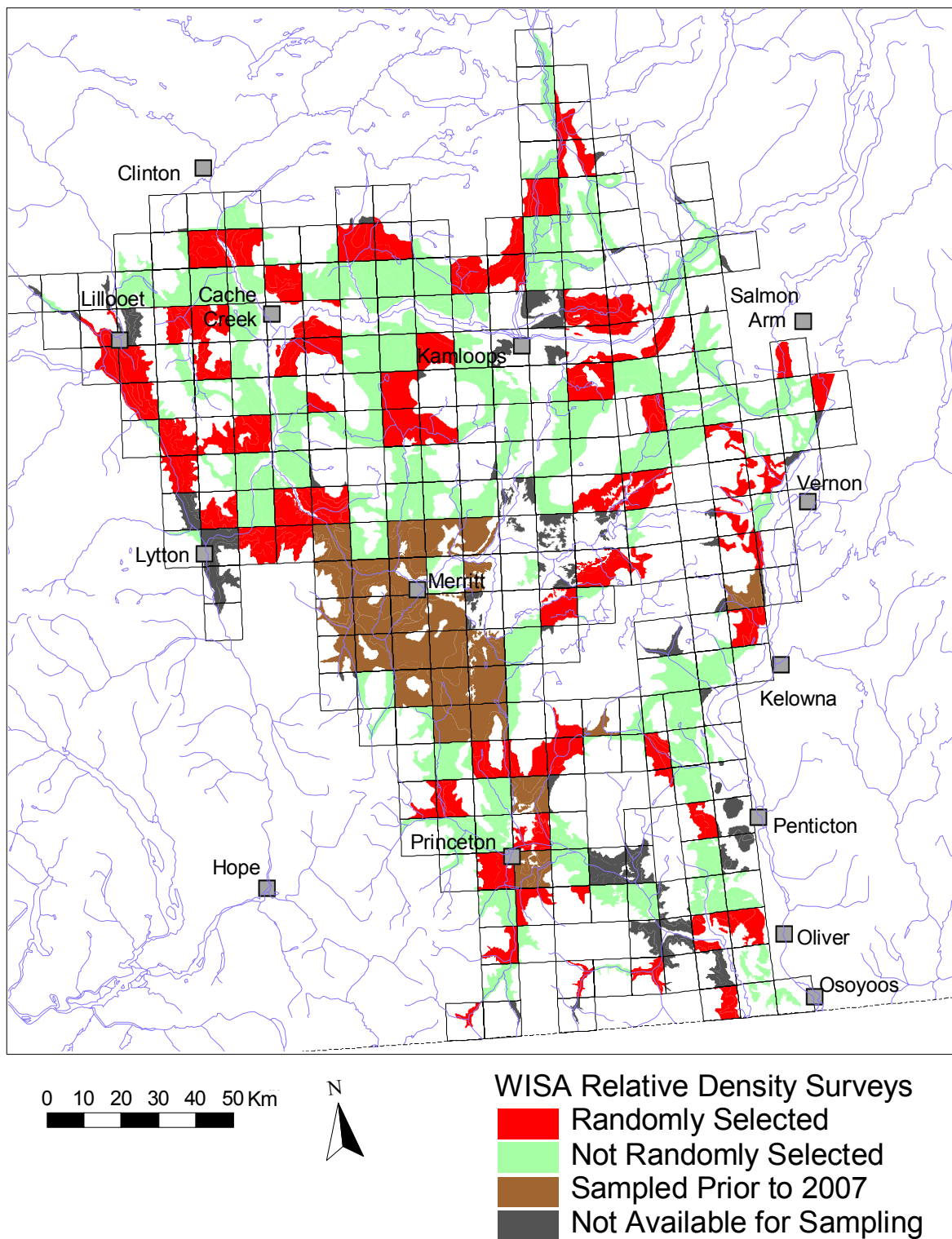


Figure 2. The call playback sampling blocks for 2007 based on potentially occupied BEC variants within 10-km UTM grid squares west of Okanagan Lake.

By late May, 2007, it became obvious that there were very few detections of Williamson's Sapsucker being made in the randomly selected blocks west of Okanagan Lake. To determine if this may have been because any populations west of Okanagan Lake had somehow fluctuated to very low levels in 2007 from higher levels in 2006, three relative abundance survey routes of about 40 points each in 2006 were resampled with 40 CPB points each in late May, 2007. These routes were selected because Williamson's Sapsucker were relatively abundant along these routes in 2006. The routes were: Lindley Creek Road southwest of Merritt, Kane Valley Road southeast of Merritt, and the Otter Valley Road from Highway 5A to the Voght Valley Road up to Davis Lake.

We returned for nest searches and follow-up nest visits between June 8 and 25 at all of the Williamson's Sapsucker detections made during CPBs except in the Merritt and Princeton areas where time and budget constraints did not allow us to return for nest searches to all detection sites. Detection sites on crown lands were considered higher priority for follow-up searches than sites on private lands, as were detections that would alter the boundaries of the Area of Occupancy.

To determine re-use, all 29 Williamson's Sapsucker nest territories that were previously known from 1998 to 2006 west of Okanagan Lake were revisited at least once between June 8 and June 22, 2007. Some territories had more than one previously known nest tree, in which case all previously used nest trees were checked for current occupancy. Nest trees in which there were no active Williamson's Sapsucker nests in 2006 upon the first visit were visited at least twice, if possible, to confirm that they were not being used. Additional searches within a 300-m radius were conducted to determine if a different nesting tree was being used in 2007.

If adults were present, but the previously known nest tree was not occupied, then we would try to discover where they were nesting by following adults or listening for the begging calls of the nestlings. 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 enough understory information to later determine Site Series once the BEC variant had been determined.

Nest holes that were within 15-m of the ground were examined with a nest camera on a 15-m telescoping pole. Nests >15-m height were climbed and then examined with a nest camera whenever possible. Nest camera observations were recorded on video tape so that they could be re-examined later to confirm the number and sex of young present. After nests were discovered, they were revisited at 3-7 day intervals whenever possible, to determine the number and sex of the young that were raised to within 80% of fledging age and would be considered successfully fledged. 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.

Nest density was determined in four census areas of between 200 and 400 ha each. Potential nest census areas were determined and then randomly selected after 2007 CPB surveys had been completed. Potential nest census areas were delineated wherever there was >1 previously known nest, or wherever there was estimated to be >1 territory in a given 300-ha

area, i.e., where there were at least 2 nests, or at least 1 nest from 2006 and at least 1 occupied territory from 2007, and the nests or territories were <2 km apart. Only five potential census areas were available: three near Merritt (Jesse Creek, Lindley Creek and Otter Valley Road-Davis Lake) and two near Princeton (China Creek and August Lake). Other potential census areas in the Kane Valley south of Merritt were not considered because of active mountain pine beetle logging within the areas. The only potential area not censused was the August Lake area south of Princeton because it had already been censused in 2005. Nest census methods were conducted according to the FIA (2006a) standards.

After all young had fledged, habitat measurements were made including tree, CWD and ant colony counts and measurements at the nests and in the surrounding 16-ha territory (225-m radius) for which productivity was available. These plots were completed from July-September using the same methods as 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 could 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. This data is not summarized here because full analysis and interpretation will only be done when the data from all 4 Williamson's Sapsucker projects in B.C. in 2006 are merged.

Habitat measurements were made within census areas at all known nests as described in the paragraph above. The habitat of the remainder of the census areas were described using 20 randomly-placed 50-m transect plots. The methodology was the same as described in the previous paragraph. All plots were placed such that they did not cross a vegetation resource inventory polygon boundary.

All Williamson's Sapsucker observation data was entered from the field data sheets into the Species Inventory (SPI) Williamson's Sapsucker Excel data file template that was developed specifically for this project in April 2007. There were separate sheets in the Excel file for CPB data, for nest search and visit results, and for nest or sap tree measurements and basic habitat data. There was a separate Excel file for the habitat measurement plots in the 225-m territories around the nest trees. Both of these files were submitted to SPI as the data deliverables for this project.

Table 1. Call playbacks (CPB) conducted west of Okanagan Lake in 2007 by all projects, and Williamson's Sapsucker detections and new nests found.

Project	CPB Purpose	CPB points	Detections	Detections /100 CPB pts	New Nests Found
Okanagan West	Stratified Random Block (SRB) sampling	1600	6	0.38	1
Okanagan West	Points other than SRB	175	0	0	0
Okanagan West	Census Areas	45	13	N/A	2
Okanagan West	Recheck of old nests (not recorded as CPBs)	N/A	N/A	N/A	7
Kamloops	SRB sampling	1238	2	0.16	2
Kamloops	Points other than SRB	372	0	0	0
Kamloops	Census Areas	62	7	N/A	2
Princeton	Area of Occupancy determination	127	14	11.0	1
Thirsk Lake	RA	14	0	0	0
NTA	RA	174	4	2.3	3
NTA	Overlap with SRB	113	0	0	0
BCTC	RA	117	1	0.9	1
Total		4037	47	N/A	19

*3 routes of 40 stops each (400-m intervals) were pre-planned, but 15 points were listening stops only because Williamson's Sapsucker were detected at the previous stop.

INVENTORY RESULTS

Call Playbacks

1600 CPB points for the stratified random block (SRB) surveys of the Okanagan West project were conducted from May 2 to May 31, 2007, all from roadsides (Table 1, Figure 3). Four Williamson's Sapsucker were detected on these 1600 points: two near Trout Creek west of Summerland, one near Shingle Creek west of Penticton, and 1 near Monte Creek west of Salmon Arm. No nests were found at any of the sites, but males were still present at the first three sites later when we returned in June to search for nests.

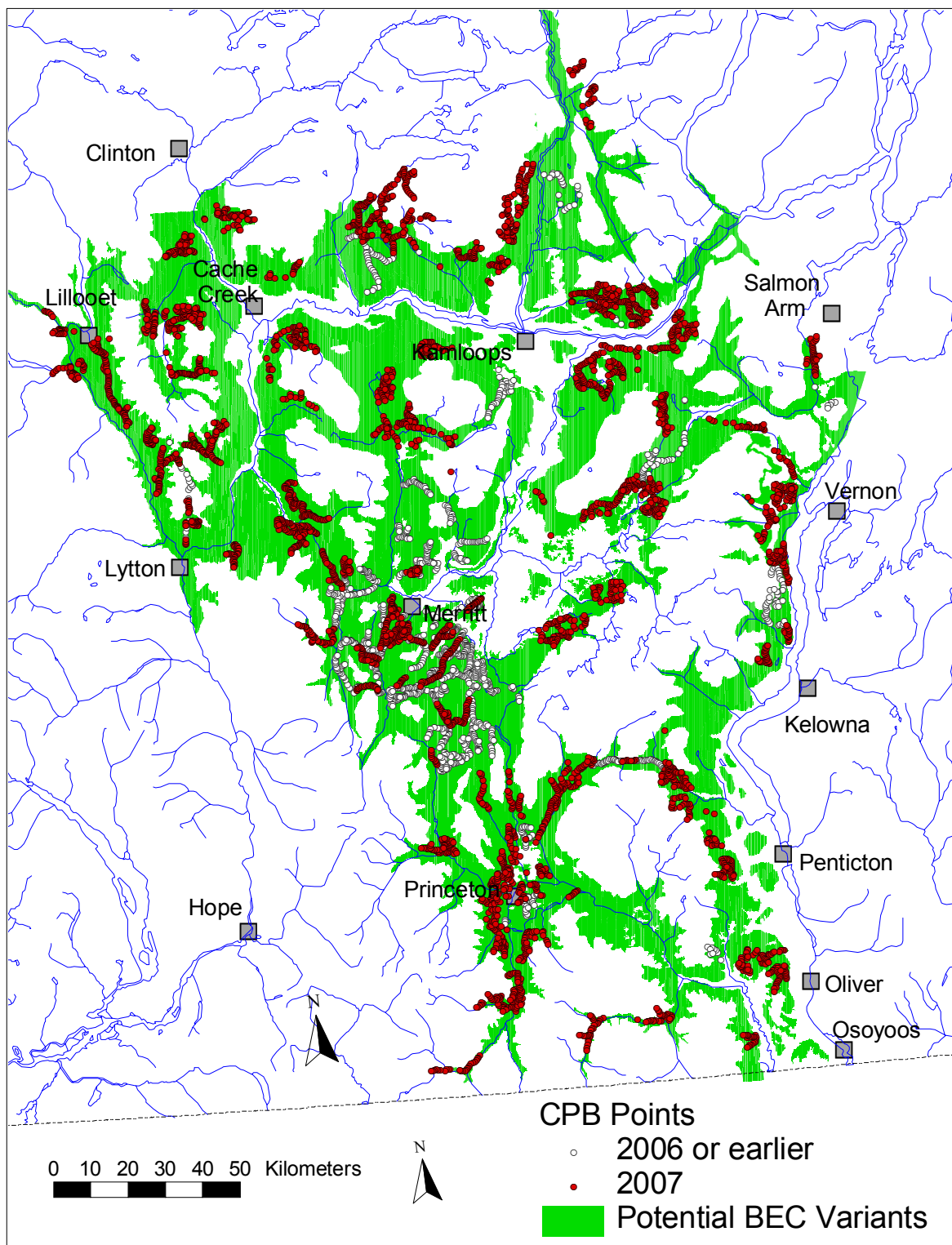


Figure 3. Williamson's Sapsucker Call Playback (CPB) points conducted west of Okanagan Lake by all projects 2003-2007.

175 CPB points were conducted outside of the SRB blocks in areas that we were passing through to reach other areas, and where the habitat looked potentially good for Williamson's Sapsucker. No Williamson's Sapsuckers were detected on these CPB points. An additional 105 CPB points were conducted near Merritt in late May to compare relative abundance of Williamson's Sapsucker in 2006 and 2007 (Table 1). 127 CPB points were conducted near Princeton in late May to try to determine the exact boundaries of the Area of Occupancy in the Princeton area.

The Kamloops project completed an additional 1238 CPB points between May 10 and June 5, 2007 that were part of the SRB surveys, as well as an additional 372 points outside the SRB blocks (Table 1). The Kamloops project detected two Williamson's Sapsuckers on the SRB surveys, both of which resulted in the discovery of nests upon later searching: one near Scotty Creek (north of Cache Creek), and one east of Logan Lake. The details of these CPB surveys and nests are covered in the separate Kamloops project report.

There were three other Williamson's Sapsucker inventory projects in 2007 in the area west of Okanagan Lake. 14 CPB points were conducted by One Wild Earth Ecological Services funded by the City of Summerland near Thirsk Lake to determine if this location occupied by Williamson's Sapsucker between 2005 and 2007 was still occupied. The Thirsk Lake area was not occupied in 2007, with no Williamson's Sapsuckers detected. 117 CPB points were conducted by Keystone Wildlife Research from May 1-4 and June 26-29, 2007, to determine presence of Williamson's Sapsucker near the proposed widening of the B.C. hydro transmission corridor near Merritt. Only one pair was detected, and the nest was found immediately adjacent to the current hydro transmission corridor southwest of Merritt. 287 CPB points were conducted by the Nicola Tribal Association project from June 11 to June 22, 2007, on some of the First Nations Reserves near Merritt to determine presence of Williamson's Sapsuckers. Four territories were found, with nests discovered in 3 of the territories. 113 of these CPB points overlapped with an area in the lower Nicola drainage that was selected for sampling in the SRB program under the Kamloops project, and was considered to be in the Logan Lake sampling unit. The areas sampled by these points were added to the areas sampled within SRB blocks for calculating the sampled area.

Based on a 300-m effectively sampled radius around each CPB point, 5.1% of the total area of potentially occupied BEC variants west of Okanagan was sampled in 2007 by all projects (Table 2). Extrapolating the numbers of Williamson's Sapsucker detected for each BEC variant based on the percentage of each BEC variant sampled resulted in a predicted 109 Williamson's Sapsucker detections, 88 possible territories, and 37 nests in the entire area west of Okanagan Lake, excluding the Merritt and Princeton areas (Table 2). This method of calculation does not allow for an estimate of error because the estimate is based on the sum of the BEC variants, which are not distributed equally among the sampling units.

Table 2. Area randomly sampled by Williamson's Sapsucker call playback surveys in 2007 west of Okanagan Lake broken down by sampling unit and BEC variant.

BEC Subzone	Area (km ²)		% Sampled	Sampled			Predicted		
	Sampled	Total		Detec- tions	Terri- tories	Nests	Detec- tions	Terri- tories	Nests
Okanagan West									
ICH mk 1	3.5	86.5	4.1	0	0	0			
IDF dk 1	25.3	284.6	8.9	2	2	0			
IDF dk 2	17.5	467.5	3.7	0	0	0			
IDF xh 1	54.6	982.9	5.6	1	1	0			
IDF xh 2	0.0	65.3	0.0	0	0	0			
Salmon River									
IDF dk 1	81.4	946.3	8.6	0	0	0			
IDF dk 2	15.1	228.6	6.6	0	0	0			
IDF xh 2	49.0	724.8	6.8	1	0	0			
PP xh 2	0.0	20.1	0.0	0	0	0			
Kamloops									
IDF dk 1	19.8	511.4	3.9	0	0	0			
IDF dk 2	13.7	322.8	4.2	0	0	0			
IDF xh 2	19.0	896.4	2.1	1	1	1			
PP xh 2	1.7	280.0	0.6	0	0	0			
Logan Lake									
IDF dk 1	48.5	1254.1	3.9	1	1	1			
IDF dk 2	0.0	8.3	0.0	0	0	0			
IDF xh 2	29.1	574.0	5.1	0	0	0			
PP xh 2	10.3	182.4	5.7	0	0	0			
Lillooet									
IDF dk 1	44.9	644.4	7.0	0	0	0			
IDF dk 2	3.2	66.5	4.8	0	0	0			
IDF xh 2	53.1	822.9	6.4	0	0	0			
PP xh 2	10.7	456.7	2.3	0	0	0			
Entire Western Area (not incl. Princeton and Merritt)									
ICH mk 1	3.5	86.5	4.1	0	0	0	0	0	0
IDF dk 1	219.8	3640.7	6.0	3	3	1	50	50	17
IDF dk 2	49.4	1093.8	4.5	0	0	0	0	0	0
IDF xh 1	54.6	982.9	5.6	1	1	0	18	18	0
IDF xh 2	150.2	3083.4	4.9	2	1	1	41	21	21
PP xh 2	<u>22.7</u>	<u>939.3</u>	2.4	0	0	0	<u>0</u>	<u>0</u>	<u>0</u>
Total	528.5	10353.1	5.1			Total	109	88	37

Using what we have termed the “sub-areas”, each with an area of about 500 km², as the sampling unit did allow calculation of a population estimate upon which we can place an estimate of precision. The predicted density of detections, territories and nests in each sampling unit was calculated based on the percentage of each sampling unit sampled, which ranged from 2.6 to 9.2%, averaging 5.4%. One sampling unit was only sampled at 0.6% (north of Kamloops along the North Thompson River) because most of the sampling within the unit was not within the sampling frame of potentially occupied BEC variants, even though the areas sampled were in “apparently suitable” habitat in the MSdm3 and the IDFmw2. This sampling unit was excluded from the analysis. The Lillooet 500 km² sampling unit at the western edge of the study area (Fraser Canyon and westwards) was excluded from the analysis because it occurred entirely outside the Extent of Occurrence. This left 18 sampling units in the analysis.

The mean predicted number of detections, territories and nests per sampling unit was 6.30, 5.38 and 2.93. Given the 18 sampling units, the total predicted number of detections, territories and nests for the sampling frame (minus the Lillooet and North Thompson sampling units) was 113, 97 and 53. The standard errors on these estimates were 49%, 56% and 69% of the means respectively. The 90% confidence intervals of the means were 85%, 98% and 119% respectively. The estimate of the number of breeding pairs (i.e. nests) in the western population separate from the Merritt and Princeton populations is therefore 53 with 90% confidence that the mean is between 0 and 116.

The results from three 40-CPB point transects done in the Merritt AO in 2007 found 24 separate Williamson's Sapsucker detections. Number of detections on each of the routes in 2006 and 2007 respectively were: Lindley Creek, 13 and 13; Kane Valley, 6 and 6; Otter Valley Rd to Davis Lake, 6 and 7. The numbers of Williamson's Sapsucker detected on the routes in 2006 and 2007 were almost identical, and a paired t-test indicated no significant difference between the number of detections between years (N = 3 pairs, t = 1, p = 0.42). Therefore the conclusion was that the population in the Merritt area did not appear to be fluctuating on an annual basis between 2006 and 2007.

Nest Territory and Nest Tree Re-use

Nineteen Williamson's Sapsucker nest trees were newly discovered in all of the projects in the area west of Okanagan Lake (Figure 4, Table 1). This project discovered 4 new nests in the Princeton area and re-nesting in 2 previously known nest trees in the Princeton area, as well as 7 new nest trees in the Merritt area, and re-nesting in 7 previously known nest trees. Six other nests were discovered in the Merritt area by other projects.

Nesting was found at only 13 of the 29 previously known nesting territories in the western project area (Table 3). Six new nest trees were found in previously known territories where pairs had nested in different trees in previous years. The male was present near one of the known nesting trees from 2006 on May 25, 2007 (WNM003 in Kane Valley southeast of Merritt) but the nest tree had been pushed over by early June as road crews widened an old road to make it suitable for logging trucks removing mountain pine beetle salvage. A female was still present near the tree on that date but by June 8, 2007, the site had been abandoned. Since the tree was already on the ground, I cut into the nest hole used in 2006 to see if a nest had been started in 2007. There were some pieces of grass in the hole, indicating some other species of

Table 3. Results of visits to all previously known (1998-2006) Williamson's Sapsucker nesting territories in 2007 in the western project area, and situation of newly discovered nests.

Results	N	% Previously Known Territories (n=29)	% Suitable Territories (n=27)
Territory still occupied			
Nests in a previously known nest tree	7	24.1	25.9
Nest found in a different tree	6	20.7	22.2
Could not find any nest because of incorrect search timing, failed nesting, or lack of a nest	8	27.6	29.6
Territory apparently unoccupied or abandoned during breeding season			
Former nest tree(s) still standing and apparently suitable	6	20.7	<u>22.2</u>
Former nest tree(s) still standing, but habitat now considered less suitable because of timber harvesting	1	3.4	
Former nest tree knocked down	<u>1</u>	<u>3.4</u>	
Total Previously Known Nesting Territories	29	100	100
Newly discovered nest within previously:			
Unknown territory	10		
Territory where nesting not previously confirmed	3		
Known nesting territory	<u>6</u>		
Total New Nests	19		

secondary cavity nester may have started building a nest in the hole. While it was uncertain if the Williamson's Sapsucker pair might have started a different hole in the tree that was obscured because it was on the side of the tree facing the ground, it was certain that there was no successful nesting in that territory in 2007.

For the 6 nest trees that were used in both 2006 and 2007, nesting was definitely in the same nest hole in 3 cases, and new nest holes were excavated in the other 3 cases. For the 14 newly discovered nests in 2007 for which data was available, nesting was in newly-excavated nest holes in 8 cases, in re-used holes in 5 cases, and we could not ascertain the age of the nest hole in 1 case because the nest was too high and difficult to see from the ground.

Nest tree characteristics in the western project areas followed the same pattern as in the past (see COSEWIC 2005). Of the 19 newly-discovered nest trees including those found in all projects, 79% were trembling aspen between 23 and 44 cm dbh (mean $\pm$ S.E.; 33.5 ± 1.9 cm dbh; N = 15), 10.5% were large Douglas-fir (N = 2; 67 and 91 cm dbh) and 10.5% were ponderosa pine (N = 2; 40 and 94 cm dbh).

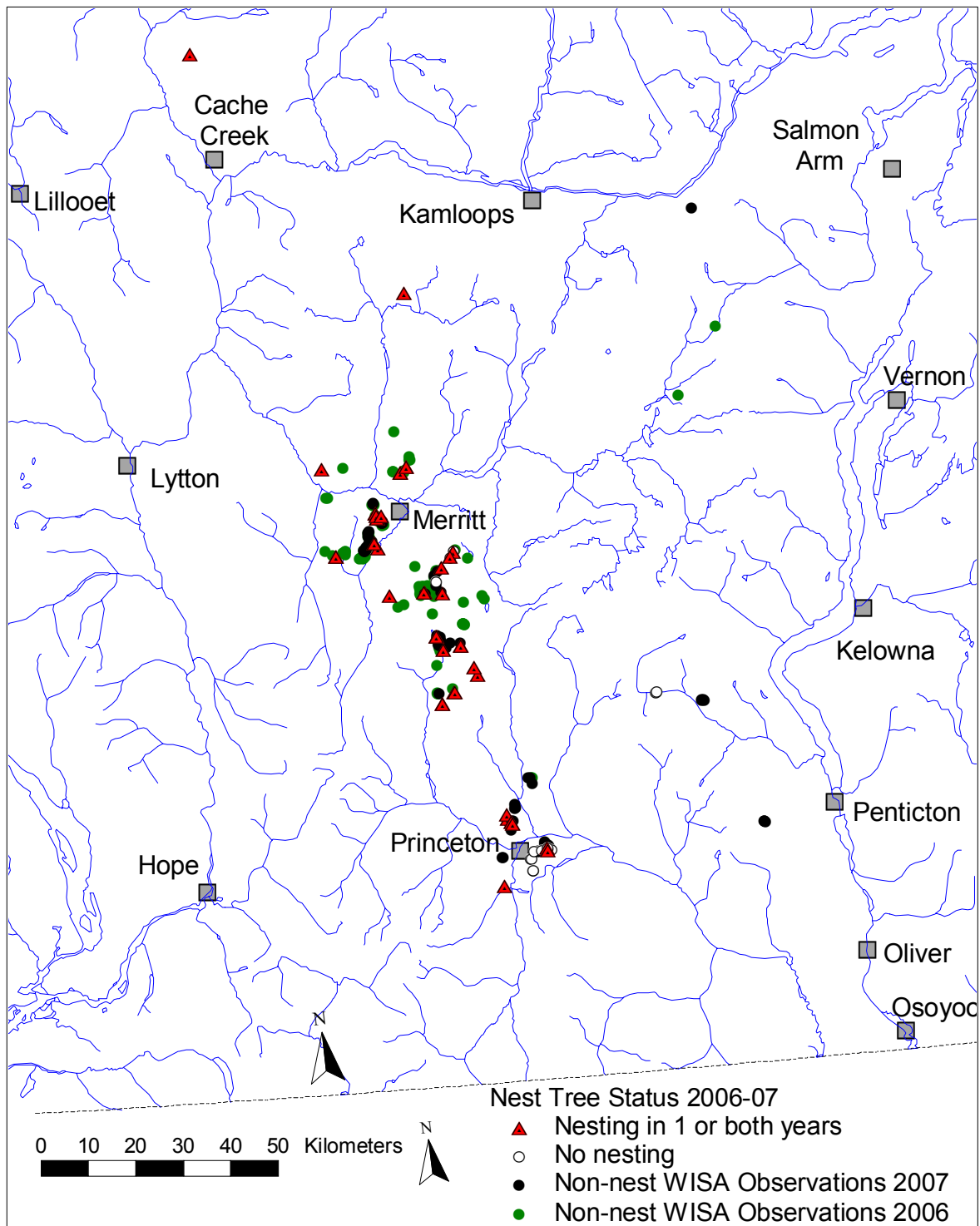


Figure 4. Williamson's Sapsucker observations west of Okanagan Lake showing the location of all previously known nesting territories and trees, and nest trees occupied in 2006-7, and all other non-nesting observations of Williamson's Sapsucker from all projects in 2006 and 2007 (see text).

Table 4. Nest productivity (number of young successfully raised to at least 22 days of age) and occupancy of Williamson's Sapsucker nests in the Okanagan project area, 2006 and 2007.

Nest Tree	N Young Successfully Raised		Comments
	2006	2007	
WN207	Not counted	Male only	Nest >15-m high in 2006
WN324	Unoccupied	4	Nest > 15-m high, but climber available in 2007
WNA001	<i>Unknown</i>	<i>Not counted</i>	<i>Nest >15-m high, Discovered by Kamloops Project</i>
WNL001	<i>Unknown</i>	3	<i>Discovered by Kamloops Project</i>
WNM001	2	See WNM024	Nest moved to tree WNM024 in 2007
WNM002	3	See WNM025	Nest moved to tree WNM025 in 2007
WNM003	3	Unknown	Nest tree pushed over by road clearing crews in late May 2007. Pair present before tree pushed over, but not known if they were nesting in tree.
WNM004	4	5	
WNM005	3	See WNM020	Nest moved to tree WNM020 in 2007
WNM006	2	2	
WNM007	3	Failed	
WNM008	2	4	
WNM009	4	Unoccupied	
WNM010	3	See WNM019	Nest moved to tree WNM019 in 2007
WNM011	2	3	
WNM012	3	Male only	RNSA nest in tree WNM012 in 2007
WNM013	3	Male only	RNSA nest in tree WNM013 in 2007
WNM014	2	Male only	
WNM015	4	1	
WNM016	Not occupied	4	Previously (2004) known nesting territory at tree WN204
WNM017	Unknown	Failed	Previously (2005) known nesting territory at tree WN301
WNM018	Unknown	None fledged, if nesting occurred	Male at nest hole with broken eggshell below but camera not available for use; TRSW occupying nest 8 days later. Uncertain if WISA nested in tree.
WNM019	See WNM010	4	
WNM020	See WNM005	4	
WNM021	<i>Unknown</i>	5	<i>Discovered by Nicola Tribal Assoc. Project</i>
WNM022	<i>Unknown</i>	2	<i>Discovered by Nicola Tribal Assoc. Project</i>
WNM023	<i>Unknown</i>	4	<i>Discovered by Kamloops Project workers in a Merritt census area</i>
WNM024	See WNM001	2	
WNM025	See WNM002	5	
WNM026	<i>Male Only</i>	3	<i>Discovered by Kamloops Project workers in a Merritt census area; only a male present at the site in 2006.</i>
WNM027	<i>Unknown</i>	1+	<i>Discovered by Nicola Tribal Assoc. Project; Some young already fledged by the time nest camera used.</i>
WNM028	<i>Unknown</i>	<i>Not counted</i>	<i>Discovered by Keystone BCTC Project</i>
WNP001	Not counted	Male only	Nest >15-m high in 2006
WNP002	Unknown	3	
WNP003	Unknown	5	
WNP004	Unknown	2	
WNP005	Unknown	5	Nest > 15-m high, but climber available in 2007.

Table 5. Williamson's Sapsucker nest and pair densities in four census areas west of Okanagan Lake, 2007, and the August Lake census of 2005.

Census Area	Nests	Other Pairs	Other Males	Area (km ²)	Density (/km ²)	
					Nests	Nests + Pairs
Merritt:						
Jesse Creek	2	1	0	3.92	0.51	0.77
Lindley Creek	3	0	0	3.06	0.98	0.98
Otter Valley Rd-Davis Lake	1	2	2	3.88	0.26	0.77
Princeton:						
China Creek	2	0	1	2.68	0.75	0.75
August Lake (2005)	4	2	1	4.23	0.95	1.42

Nest Productivity and Foraging

Productivity data was collected at 22 of the nests in the western project area in 2007. This included two nests that were on First Nations land as part of the Nicola Tribal Alliance project, and one nest near Logan Lake that was part of the Kamloops project. Two of the nests near Princeton required a tree climber to look into the nest as they were >15-m in height. These two nests (WN324 and WNP005) could not be climbed again because of the unavailability of the climber closer to fledging age, but the nestling counts have been included here even though the nestlings were probably only 14-16 days old. The one nest north of Cache Creek (Scotty Creek) in the Kamloops project area was >15-m in height, but a tree climber was not available to check the nest. Including nests which were known to have failed, the average number of young successfully fledged per nest in 2006 (see Table 2) was 2.87 ± 0.19 (mean $\pm$ S.E., $N = 15$) and in 2007 was 3.14 ± 0.34 ($N = 22$). The number of young fledged per nest was not significantly different between the two years ($t = 0.69$, $P = 0.49$). In the 2006 the sex ratio of nestlings was skewed toward males (28 M, 15 F, Gyug 2006b) but in 2007 was skewed towards females (29 M, 41 F).

Nest Census Areas

The Jesse Creek and Lindley Creek census areas were completed by the Kamloops project crew because there were no suitable census areas in the Kamloops, Logan Lake and Lillooet geographic areas. One census southeast of Princeton had been conducted in 2005 with the results included in Table 5. The five census areas had nest densities between 0.26 and 1 nest/km² (Table 5). Including pairs found for which no nest could be found (presumably

Table 6. Predicted number of Williamson's Sapsucker breeding pairs in the Merritt and Princeton Areas of Occupancy.

Area of Occupancy	Area (km ²)		% Sampled	Probable and Confirmed Nesting Territories	Predicted Pairs*	Likely Range of Pairs
	Sampled	Total				
Merritt	168.39	685.32	24.6	34	83	60-100
Princeton	20.85	84.71	24.6	14	34	20-50

*Assuming that 60% of the territories will be occupied by a breeding pair in any given year.

because the nest failed before the census started), densities ranged between 0.75 and 1 nest/km² except for the August Lake census area southeast of Princeton where the density was 1.4 nests/km². These nest densities cannot be extrapolated directly to a density estimate over the Area of Occupancy because the plots were not randomly selected but were, instead, picked in areas where we thought we might find the maximum densities at which Williamson's Sapsucker occurs west of Okanagan Lake.

Area of Occupancy- Merritt and Princeton

Based on the additional CPB and nest searches from 2007, the Areas of Occupancy near Princeton and Merritt were refined. The extent of the Area of Occupancy changed very little (Figure 5). The principal change from 2006 was in the Princeton area where it was extended slightly west of Princeton. Revisions were made in the Merritt area to exclude habitat that was not likely to be occupied, usually thicker higher elevation Douglas-fir and lodgepole pine forests. Williamson's Sapsucker distribution west of Okanagan Lake is probably best considered to be in two population centres: one at Merritt and one at Princeton. The remainder of any nests found would be considered part of the widespread and disjunct overall western population. There was no evidence of any Williamson's Sapsucker at Hat Creek (Cooper et al, unpublished data), so the Hat Creek portion of the Area of Occupancy where Williamson's Sapsucker were known to nest in the past (COSEWIC 2005) has now been deleted, but could be added again in the future if they are found to nest there again.

Numbers of breeding territories in the Merritt and Princeton areas of occupancy were estimated by extrapolating numbers of known breeding territories in the searched area to the entire area. The total area searched within these areas by all call playbacks and other methods from 2004-2007 was estimated based on a 300-m effective search radius around CPB points (Table 6). The percentage of the AO sampled was used to predict the number of breeding pairs present based on the number of probable (pair present) and confirmed (nest known) territories found during the sampling.

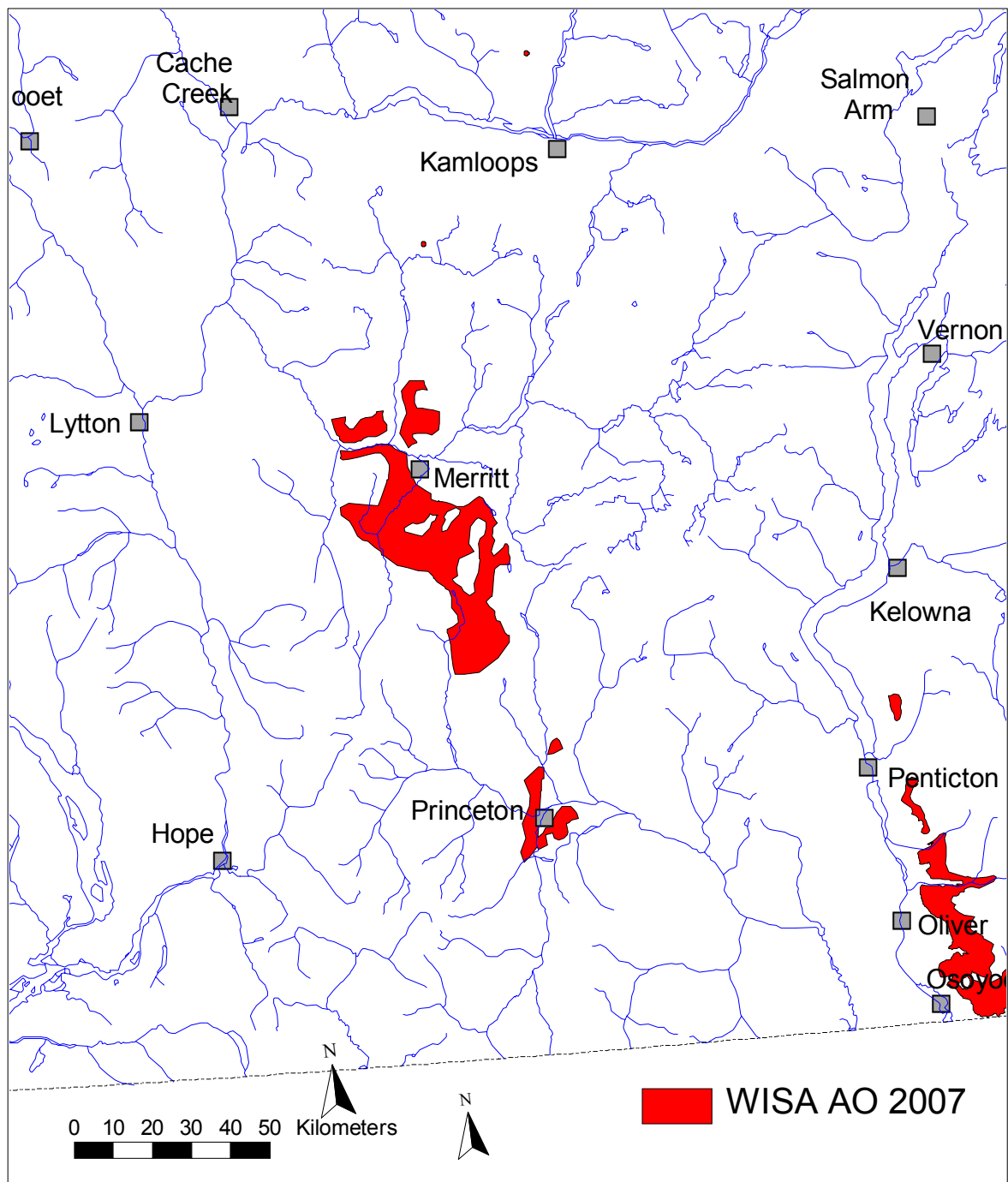


Figure 5. The modified Area of Occupancy (AO) of Williamson's Sapsucker (WISA) west of Okanagan Lake, 2007.

Tree, CWD and Ant Plots

Data was collected at the nests ($N = 11$) in the western area in 2007 for which nest productivity data was available for the first time. Five of these nests were completed under different projects ($N = 2$ for Nicola Tribal Association; $N = 3$ for Kamloops Project). For nests ($N =$) that were between 50 and 225 m from a 2007 nest, plots were added to the 2006 plots to make a complete set of plots (1 per ha) from within 225 m of the new nest. For nests ($N = 2$) that were < 50 m from the 2006 nest, no new plots were done. Data for the 6 other nests with 2007 productivity data had already been collected in 2006, and these did not need to be resampled.

Twenty plots were conducted in each of the portions of the four census areas in which there were no Williamson's Sapsucker nests found. These will be used to contrast the nest habitat characteristics with the habitat characteristics where no nests were found within the Williamson's Sapsucker habitat summaries that will be prepared separately.

Full analysis of the tree, CWD and ant density data will be completed when the western 2007 data is merged with the data from the other Williamson's Sapsucker projects in B.C. and will include all data from 2006 and 2007. This data is not expected to be available and ready for analysis until late October 2007.

DISCUSSION

Given that there did not appear to be much annual fluctuation in the Merritt population from 2006 to 2007, the relative lack of detections outside the Princeton and Merritt areas in 2007 was considered to accurately reflect the current population status west of Okanagan Lake. There were not believed to be any concentrated areas occupied by Williamson's Sapsucker west of Okanagan Lake, except those already known near Merritt and Princeton.

The confidence limits on the predicted population in the western region outside of the Merritt and Princeton areas was quite large, i.e., on the order of 100%. This was because the population was simply so small and Williamson's Sapsuckers so scarce, i.e., they were not found within most of the sampling units. Only with much more intensive sampling could this source of error be reduced. This sort of sampling is not proposed because of the very high costs that would be involved that would likely show very little return. The best estimate of the number of breeding pairs in the western population outside of the Merritt and Princeton areas is 53, with 90% confidence that the true mean is between 0 and 116. The estimate of number of breeding adults would be twice this number or about 100, with a possible range of 0-200.

Other sources of error in the sampling methods include the error involved in assuming complete sampling of a 300-m radius around CPB points. Many nests were detected at distances > 300 m, but we do not know the number of nests that remained undiscovered within 300 m, and so cannot estimate the amount of possible error associated with this term. There is also some error associated with responsiveness of birds to CPB, i.e. not every Williamson's Sapsucker will be discovered by CPB sampling. For Red-naped Sapsuckers, Rushmore (1973) estimated responsiveness to be 87% in the pre-nesting season, and 61% in the nesting season.

The population estimates for the Merritt and Princeton areas of occupancy were not calculated in a manner that would allow us to estimate the error involved in the estimates. And in those cases, the sampling that was conducted was not randomly placed, so that there is uncertainty about the validity of the extrapolation. However, I have attempted to define the limits of the AO fairly narrowly so that the sampling that was conducted could be considered representative of the entire AO, and therefore I would consider the population estimates to be relatively reliable, but with an error that cannot be estimated precisely. While we predict there to be 83 and 34 pairs respectively in the Merritt and Princeton AOs, which would be equivalent to 166 and to 68 breeding adults, this is probably better expressed as a range of 120-200 and 40-100 breeding adults given that there is an unknown, but probably fairly large, error associated with these estimates.

Productivity

The number of young fledged per successful nest in the Okanagan-Boundary in 2007 (3.59 ± 0.13 ; $N = 41$) was not significantly different from that in the East Kootenay in 2007 (3.86 ± 0.46 ; $N = 7$) ($F_{1,46} = 0.23$, $P = 0.63$). There were no significant differences between 2006 and 2007 in either the Okanagan-Boundary (2006: 3.48 ± 0.25 , $N = 21$; 2007: 3.87 ± 0.46 , $N = 38$; $F_{1,57} = 1.87$, $P = 0.18$) or in the western regions (2006: 2.87 ± 0.19 , $N = 15$; 2007: 3.45 ± 0.29 , $N = 20$; $F_{1,33} = 2.49$, $P = 0.12$) although in both regions the number of fledged young per successful nest was slightly higher in 2007 than in 2006. Grouping the Okanagan-Boundary with the East Kootenay, and using both 2006 and 2007, the number of young fledged per successful nest in the Okanagan-Boundary-East Kootenay (3.59 ± 0.13 ; $N = 41$) was significantly higher than in the western region (3.20 ± 0.19 ; $N = 65$) ($F_{1,98} = 5.91$, $P = 0.02$). Only successful nests were used for this comparison because unsuccessful nests that failed early in the nesting period did not have an equal chance of being discovered given our discovery method of searching for adults feeding young, or listening for the vocalizations of young in the nest.

The nest census areas chosen for census west of Okanagan Lake were picked as the areas where we could expect to find the maximum densities. Maximum nest density found (about 1.5 nest/km^2) was considerably lower than the maximum density found east of Okanagan Lake (3.1 nests/km^2 ; Gyug et al. in press) where Williamson's Sapsucker live in western larch forests at slightly higher elevations. And it was considerably lower than the maximum density of 5 nests in about 30 ha found in old growth western larch forest at Lehmann Springs Conservation Area.

The mean distance to the nearest-neighbour nest in the Okanagan and East Kootenay populations was 438 m ($SD = 125$; $N = 52$ pairs of nests; Figure 6). Only 7 pairs of nests were <360 m apart, all of those in western larch forests, with 3 of those pairs in Lehmann Springs where the highest density known was found (Steeger 2007). There was only one nest pair between 650 and 850 m apart. The mean distance to the second-nearest neighbour nest was only slightly higher at 503 m ($SD = 104$; $N = 31$ pairs of nests; Figure 7) than the nearest neighbour.

In the Western population, only 7 nearest-neighbour nests could be found that were within 1 km of each other using data up to the end of 2007. This was not for a lack of search

effort which was similar to the search effort in the Okanagan. These nearest-neighbour nests were 557, 569, 608 618, 730, 860 and 975 m apart. The mean distance between active nests that were < 1-km apart in the Western population was 702 m (SD = 161; N = 7 nest pairs), and for nests <850-m apart was 616 m (SD = 68; N = 5 nest pairs). When compared to the Okanagan and East Kootenay nest distances on the same basis (i.e. only including those <850 m apart), the nearest neighbour distance for active nests was significantly higher in the Western population ($t = 5.07$, $p < 0.001$).

Overall productivity of Williamson's Sapsucker was lower in the western region than in the Okanagan-Boundary region when considering both the number of young fledged per nest, and the density of nests on the landscape. Number of young fledged successfully per nest was lower in the western region, and the nest density was lower as determined both from nest census areas and as inferred from the significantly higher inter nest distances. It is also possible that many more nests tend to fail in the western population where nest searches were much less likely to result in finding an active nest than in the Okanagan-Boundary (22% vs 61%, Gyug et al. in press).

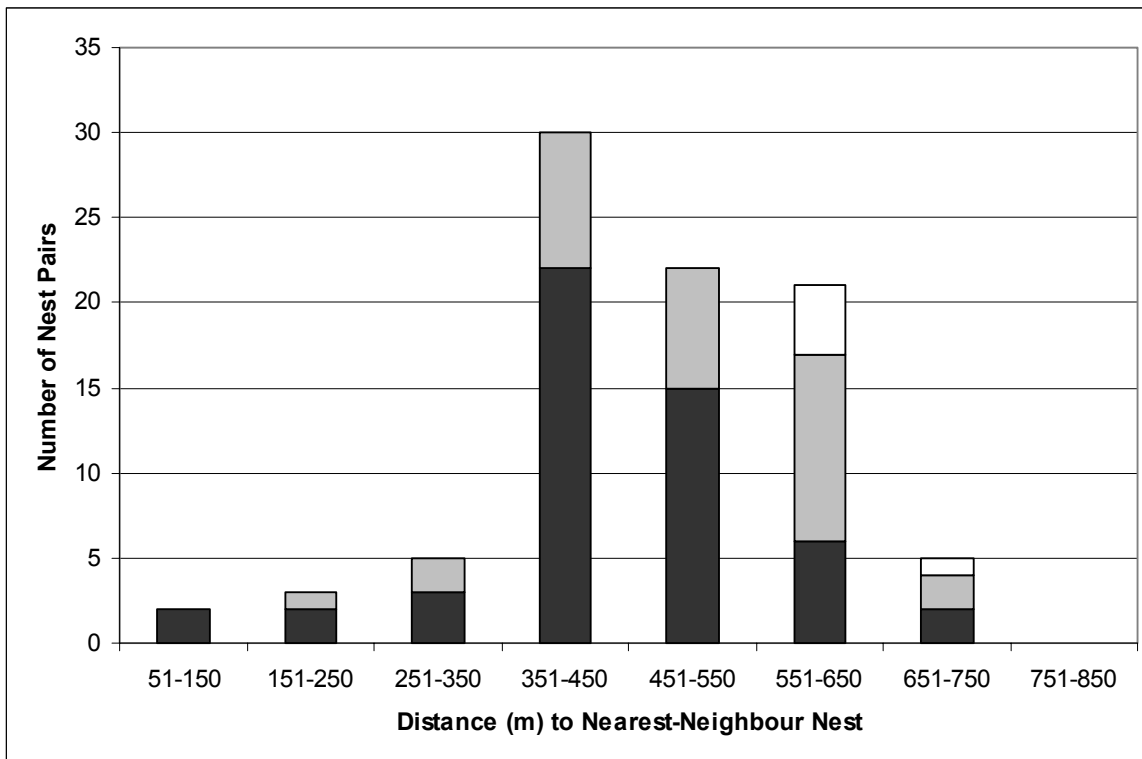


Figure 6. Distances between nearest-neighbour nest pairs of Williamson's Sapsucker in the Okanagan and East Kootenay regions (black bars; N = 52) and the Western region (white bars; N = 5) and the second nearest-neighbour nests in the Okanagan and East Kootenay regions (grey bars; N = 31).

Table 7. Annual territory and nest tree re-occupancy for Williamson's Sapsucker in B.C. by region.

Region-Year	N nests	Renesting within same territory in:	
			Nesting Not Found but found:

		Same Hole	Same Tree (new hole)	Different Tree	Total Renesting	Pair ¹	Male Only ²	None ³
Okanagan-Boundary								
2005-2006	35	3	43	9	54	6	9	31
2006-2007	52	6	56	21	83	2	4	12
Annual Mean		4	49	15	68	4	6	21
East Kootenay								
2006-2007	7	14	14	14	43	14	0	43
Western								
2006-2007	15	20	20	27	67	0	27	7

¹probable failed nest which was not discovered

²either unmated male, or a failed nest

³either territory completely unoccupied or nest failed early and territory abandoned before survey period.

In the 2006 the sex ratio of nestlings west of Okanagan Lake was skewed toward males (28 M, 15 F, Gyug 2006b) but in 2007 was skewed towards females (29 M, 41 F). The sex ratio also varied in the Okanagan region from 2006 to 2007 when it was even in 2006 (26 M, 25 F), but skewed towards males in 2007 (76 M, 59 F) (Gyug 2007, Steeger unpublished data). Sex ratio of in the East Kootenays in 2007 was 16 M, 11 F in 7 total nests (Ohanjanian, unpublished data). It would appear that sex ratio of the nestlings may vary randomly, and not be a good indicator for any particular environmental condition or population parameter.

Nest and Territory Reoccupancy

The probability that a given nest hole, nest tree and breeding territory will be occupied in the year after nesting was found was calculated from the entire set of Williamson's Sapsucker provincial data. The probability that a given nest hole would be used in the next year was fairly low for the Okanagan-Boundary, but slightly higher for the East Kootenay and western regions (Table 7). The probability that a nesting territory would be re-used for nesting the next year was similar in the Okanagan-Boundary and western regions (about 67%) but lower in the East Kootenay. The probability that a previously-known nesting territory would not be used for nesting, i.e., only an unmated male present or no adults found, was lowest in the Okanagan-Boundary (21%), but slightly higher in the western region (34%) and in the East Kootenay (43%). The number of nests used for these calculations in the East Kootenay and western regions were fairly low with 15 or fewer nests, so firm conclusions should wait for larger sample sizes in more than 1 year.

Table 8. Relative densities of Williamson's Sapsucker in BEC variants in British Columbia from 1997-2007. Data sorted from highest to lowest relative territory density.

Region	BEC Variant or Subzone	CPB Survey Points			Nest Territories ²	
		N	% with detections	N detected ¹ /100 CPBs	N	N found/100 CPBs
Okanagan	IDFdm1	936	8.0	9.2	83	8.9
Okanagan	IDFxb1&4	197	10.2	10.2	16	8.1
Western	IDFxb1	570	6.1	7.2	21	3.7
Okanagan	MSdm1	687	6.3	6.4	25	3.6
E. Kootenay	MSdk	539	1.9	2.2	10	1.9
Western	PPxb2	159	3.1	5.0	3	1.9
E. Kootenay	IDFdm2	570	2.1	2.3	10	1.8
Western	IDFdk1	1700	2.1	2.3	17	1.0
Western	IDFxb2	1091	1.5	1.6	9	0.8
Okanagan	ICHmk1	254	2.0	2.0	2	0.8
Western	IDFdk2	890	0.8	0.8	3	0.3
E. Kootenay	ICHmk1	69	0	0	0	0
Western	IDFdk3	83	0	0	0	0
Western	IDFmw1&2	117	0	0	0	0
-	Others ⁴	343	0	0	0	0
ALL	ALL	8205	3.2	3.6	199	4.0

¹Detections of breeding pairs counted as one detection.

²Nest Territories included discovered nests as well as adults found with fledged young where a nest could not be found because of late timing of the nest search.

³Other BEC variants with <50 CPB survey points included: BGxb1, ESSFmw, ICHdm, ICHdw2, ICHmk2, IDFmw1, IDFww1, IDFxb, MSdm2, MSdm3, MSxb1, MSxb2, MSxb3, PPdh1, PPdh2, PPxb1

Relative Density by BEC Variant

The relative detection density broken down by BEC variant was updated from what was reported in Gyug et al. (in press) with the >3900 CPB points conducted in 2007 by all projects (Table 8). The relative ranking of BEC variants by the numbers of nest territories found (which included adults found with fledged young, even if the nest could not be located) did not change significantly even when the sampling was almost doubled. The relative ranking of the IDFdk1 and IDFdk2 in the western region declined because there were many more samples from areas outside of the areas of occupancy, but the updated results were considered to be more reflective of their actual value, given that the 2007 sampling had been randomly selected to be representative. The IDFdm1 and IDFxb1/4 of the Okanagan Region were still the BEC variants with the highest relative detection density, and had the highest detections of nests, which were nearly double the next highest BEC variants, which were the IDFxb1 of the western region, and the MSdm1 of the Okanagan-Boundary region. These were almost double the relative density of the MSdk, and IDFdm2 in the East Kootenay, and of the PPxb2 in the western region.

Recommendations

The boundaries of the AO must be considered tentative in that only 25% of the Merritt and Princeton AO have actually been sampled by CPB or nest searches. These boundaries may be revised with future sampling within, or very near to, the potentially occupied BEC variants. Management of these areas need to reflect the uncertainty near these unsampled boundaries.

Only one new Wildlife Habitat Area would be proposed based on the 2007 inventories west of Okanagan Lake and from Merritt and southwards at nest WNM023 about 5 km southwest of Merritt. All other known nests that were newly discovered were on private land, on First Nations reserves, on woodlots, or were near known nests and already included within existing WHA proposals.

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