Best Management Practices for Timber Harvesting, Roads, and Silviculture for Williamson's Sapsucker in British Columbia:

Okanagan-Boundary Area of Occupancy

Prepared by B.C. Ministry of Forests, Lands and Natural Resource Operations

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Les Gyug. Photo of Williamson's Sapsucker male (left) and female (right).

Additional copies

Additional copies can be downloaded from the Guidelines and Best Management Practices webpage at:

<http://www.env.gov.bc.ca/wld/BMP/bmpintro.html>

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1 INTRODUCTION

1.1 Species Information

Williamson's Sapsucker is a medium-sized woodpecker breeding in Canada only within British Columbia. It has been designated Endangered by the Committee on the Status of Endangered Wildlife in Canada, is listed under Schedule 1 of the *Species at Risk Act*, and is on the provincial Red list in British Columbia.

The recovery goal (population and distribution goal) for Williamson's Sapsucker is to ensure the persistence of the populations in Canada (Western, Okanagan-Boundary, and East Kootenay) by maintaining them at or above (1) the current abundance and (2) the current distribution and area of occupancy, allowing for natural fluctuations in both cases (BCMOE 2012).

The entire breeding range within B.C. encompasses a geographic area larger than the contiguous areas that are regularly occupied for breeding (i.e., the contiguous Areas of Occupancy [AOs]) (Gyug *et al.* 2007). These contiguous AOs are estimated to contain about 90% of the breeding pairs with the rest of the breeding pairs highly dispersed and often in sites used only for a few years. The contiguous AOs consist of three distinct regions (Figure 1): the Western AO, west of Okanagan Lake where Williamson's Sapsucker is primarily associated with mixed ponderosa pine – trembling aspen stands; and the Okanagan-Boundary and East Kootenay AOs, where Williamson's Sapsucker is primarily associated with mixed western larch forests.

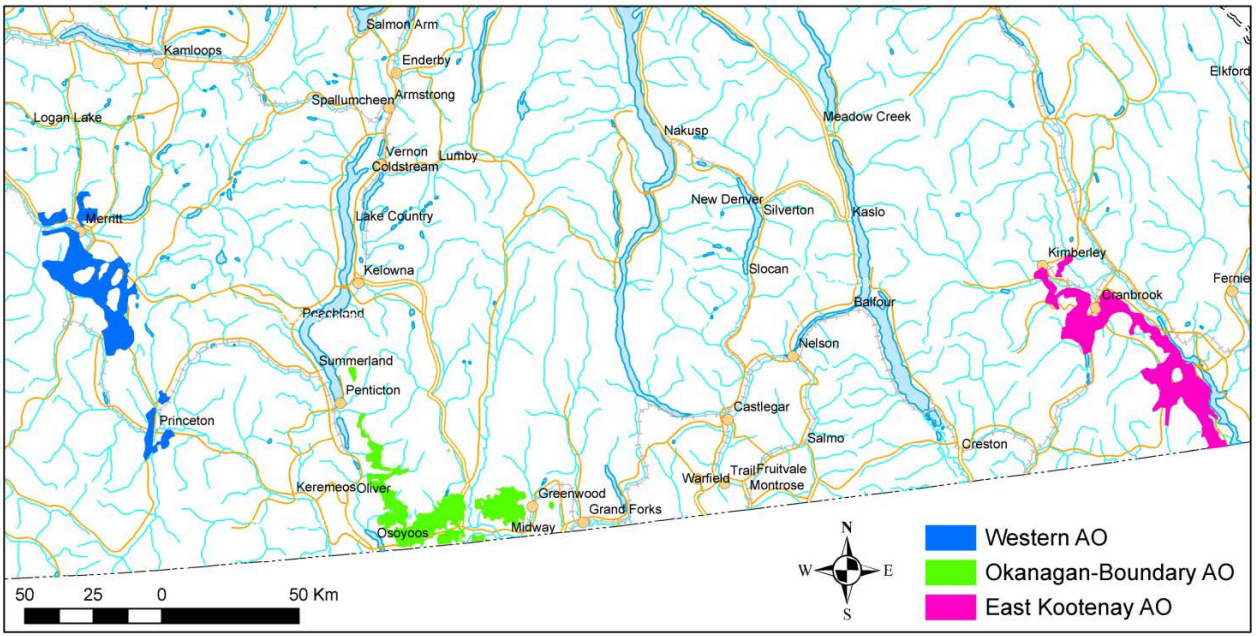

Figure 1. Areas of occupancy for Williamson's Sapsucker in British Columbia as of 2011.

1.2 Background to Best Management Practices

Development of Best Management Practices (BMPs) was identified as an essential action in the provincial recovery plan (BCMOE 2012).The recovery plan outlines the current best available science on the biology of the Williamson's Sapsucker including distribution, population size, and important biological and physical habitat requirements. The recovery plan is a companion document to this one.

Implementation of BMPs will help meet the recovery goal for the species and support the principle that there should be no further loss of amount and quality of currently known suitable Williamson's Sapsucker habitat, including important biological attributes. These BMPs provide guidance for maintenance of Williamson's Sapsucker habitat during harvesting, road building and maintenance, and silviculture activities.

The BMPs are based on best available science and information as compiled in the *Recovery Plan for Williamson's Sapsucker on British Columbia Crown Lands* (hereafter the recovery plan; BCMOE 2012), other planning documents (e.g., BCMWLAP 2004; COSEWIC 2005); published research (e.g., Gyug *et al.* 2007, 2009a, 2009b, 2010); and research that has yet to be published. Refer to these resources when further background or technical information on Williamson's Sapsucker is desired.

BMPs can be updated in future years as knowledge is gained through scientific research, the monitoring and results of BMP implementation, or the monitoring and results of alternative practices applied during timber harvesting operations.

It is expected that a combination of tools including these BMPs will be used to manage potential impacts on provincial Crown lands in suitable habitat for Williamson's Sapsucker from timber harvesting, roads, and silviculture activities.

1.3 Other Management Tools

To help achieve recovery of Williamson's Sapsucker on provincial Crown lands, a combination of legislation, regulations, guidance documents, and BMPs will be used to manage the impacts to suitable habitat as a result from timber harvesting, roads, and silviculture activities.

Williamson's Sapsucker and its habitat are protected and managed under both provincial and federal legislation. Williamson's Sapsucker nests are protected under Section 34 of the B.C. *Wildlife Act*. Williamson's Sapsucker is considered a migratory bird under the federal *Migratory Birds Convention Act* (1994). The federal *Migratory Birds Convention Act* and its regulations protect the Williamson's Sapsucker and its nests and eggs anywhere they are found in Canada, regardless of ownership. General prohibitions under the Act and its regulations protect migratory

birds, and their nests and eggs. Williamson's Sapsucker nests are protected as residences[1] under Section 33 of the federal *Species at Risk Act*. This protection applies anywhere they are found in Canada, regardless of ownership.

Williamson's Sapsucker is listed as a Species at Risk that requires special management attention to address the impacts of forest and range activities under the *Forest and Range Practices Act* (FRPA; Province of British Columbia 2002) and/or the impacts of oil and gas activities under the *Oil and Gas Activities Act* (OGAA; Province of British Columbia 2008) on Crown land as described in the Identified Wildlife Management Strategy (IWMS; Province of British Columbia 2004). The IWMS accounts and measures for Williamson's Sapsucker will continue to be used as a tool for management of Williamson's Sapsucker on Crown land (BCMWLAP 2004). The identified wildlife provisions and additional management considerations provide practices to reduce impacts of forest management and the BMPs are consistent with this guidance in the IWMS species account. The Wildlife Habitat Area (WHA) objectives and General Wildlife Measures will also continue to be applied to WHAs.

Continued implementation of FRPA authorities was identified as an essential action in the provincial recovery plan. Many WHAs have already been established under FRPA and WHAs will continue to be established. It is anticipated that portions or all of the area within the AOs, but outside of established WHAs, may be proposed as Specified Areas. Specified Area Orders are established through the Government Actions Regulation.

Future protection may also be provided under Section 11 of the provincial Government Actions Regulation. Williamson's Sapsucker nest trees are included in a draft order listing Wildlife Habitat Features (WHFs). The B.C. Forest Planning and Practices Regulation Section 70(2) states that WHFs must not be damaged or rendered ineffective by primary forest activities. Confirmed Williamson's Sapsucker nest trees that are not included within a WHA would receive the WHF designation should this order come into effect.

2 DATA SHARING

2.1 Access to Information

Spatial datasets and other information necessary for the implementation of these BMPs are located on publically accessible ftp sites. The ftp sites contain the following information: nest locations, AO boundaries, suitability mapping (West and Okanagan-Boundary), 500-m radius management areas (East Kootenay), and assorted background documents. Contact information for your provincial government habitat or species at risk biologist is contained on the ftp sites in case you have any questions.

[1] "residence" means a dwelling-place, such as a den, nest, or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding, or hibernating.

- West and Okanagan-Boundary AOs
  - ftp.geobc.gov.bc.ca/publish/Regional/Kamloops/Species_At_Risk/Williamsons_Sapsucker/
- East Kootenay AO
  - ftp.geobc.gov.bc.ca/publish/Regional/Cranbrook/Williamsons_Sapsucker

2.2 Reporting Nests

Information sharing is an important part of successful BMP implementation. MFLNRO asks that **licensees and BC Timber Sales (BCTS) report the location of all new Williamson's Sapsucker nests to the B.C. Conservation Data Centre within 30 days of discovery.**[2] MFLNRO staff will report the location of all new Williamson's Sapsucker nests to local licensees and BCTS within 30 days of discovery.

3 BEST MANAGEMENT PRACTICES

These BMPs provide guidance for maintenance of Williamson's Sapsucker habitat during harvesting, road building and maintenance, and silviculture activities. BMPs that apply to management of Williamson's Sapsucker throughout its range in B.C. as well as BMPs specific to each AO where habitat requirements vary are presented. **Ensure that you have obtained the correct BMP for your AO.**

BMPs are one tool that can be applied for management of Williamson's Sapsucker on provincial Crown lands. These BMPs are not intended to apply to Crown lands where other regulations and acts are in place that exceed the management recommendations within the BMPs (e.g., Wildlife Habitat Areas [WHAs], conservation lands, provincial parks, or protected areas).

The following BMPs apply to provincial Crown lands that are within the contiguous Williamson's Sapsucker AOs as well as within a 500-m buffer around known Williamson's Sapsucker breeding locations outside the contiguous AOs.

3.1 Overview of Breeding Habitat Attributes

Habitat attributes required to support suitable habitat for Williamson's Sapsucker breeding include:

- suitable nest trees for cavity nesting (Section 3.3; Gyug *et al.* 2009a);
- greater than 85 live trees per hectare > 17.5 cm dbh (Section 3.4; Gyug *et al.* 2010);
- coniferous trees for sap trees (Section 3.5; Gyug *et al.* 2009b); and
- woody debris that supports ants (Section 3.6; Meggs *et al.* 2009).

The quality, amount, and spatial arrangement of required habitat attributes within the AOs at a landscape-level, territory-level, and nest site level are important for the persistence of Williamson's Sapsucker populations. Availability of all the required habitat attributes within

[2] See http://www.env.gov.bc.ca/cdc/contribute.html (CDC data contribution).

200–500 m of a nest is preferred. Williamson's Sapsucker are commonly observed foraging up to 500 m from a known nest with shorter flights being more common and longer flights being less common. Habitat quality and the availability of required attributes will influence foraging distances. In lesser quality habitats breeding territory size will be larger, and larger areas may need to be managed for each nest and for the population.

These habitats also change over time with forest succession and natural disturbance events, even in the absence of harvesting or silviculture entries. Where the required habitat attributes do not currently exist or are limited in availability or quality, consideration should be given during operations and planning to how required habitat attributes and recommended targets could be recruited and achieved in the future.

3.2 Application of Habitat Suitability Modeling

Habitat suitability modelling has been completed for all three contiguous AOs for Williamson's Sapsucker. Detailed information on the methodology and results of the habitat suitability modeling and model assessment can be found in Gyug (2009, 2010a, 2010b, 2010c, 2011). All habitat suitability ratings are relative to provincial benchmark stands in the Okanagan-Boundary AO. Provincial benchmark densities are based on absolute nest densities determined in census areas. Within the Okanagan-Boundary AO, five habitat suitability classes were identified: high, moderate, low, very low, and nil (Figure 2). The Okanagan-Boundary AO is the only one in the province to contain habitat classed as high suitability.

Although the habitat suitability model has been assessed as reliable on the landscape level it is possible that some sites, upon field inspection, may have been classed incorrectly. Where field checks determine that habitat suitability differs from model results, management practices can be adjusted accordingly. The justification and rationale for changes in management practices, the alternative practices applied, and any notable results from alternative practices should be documented.

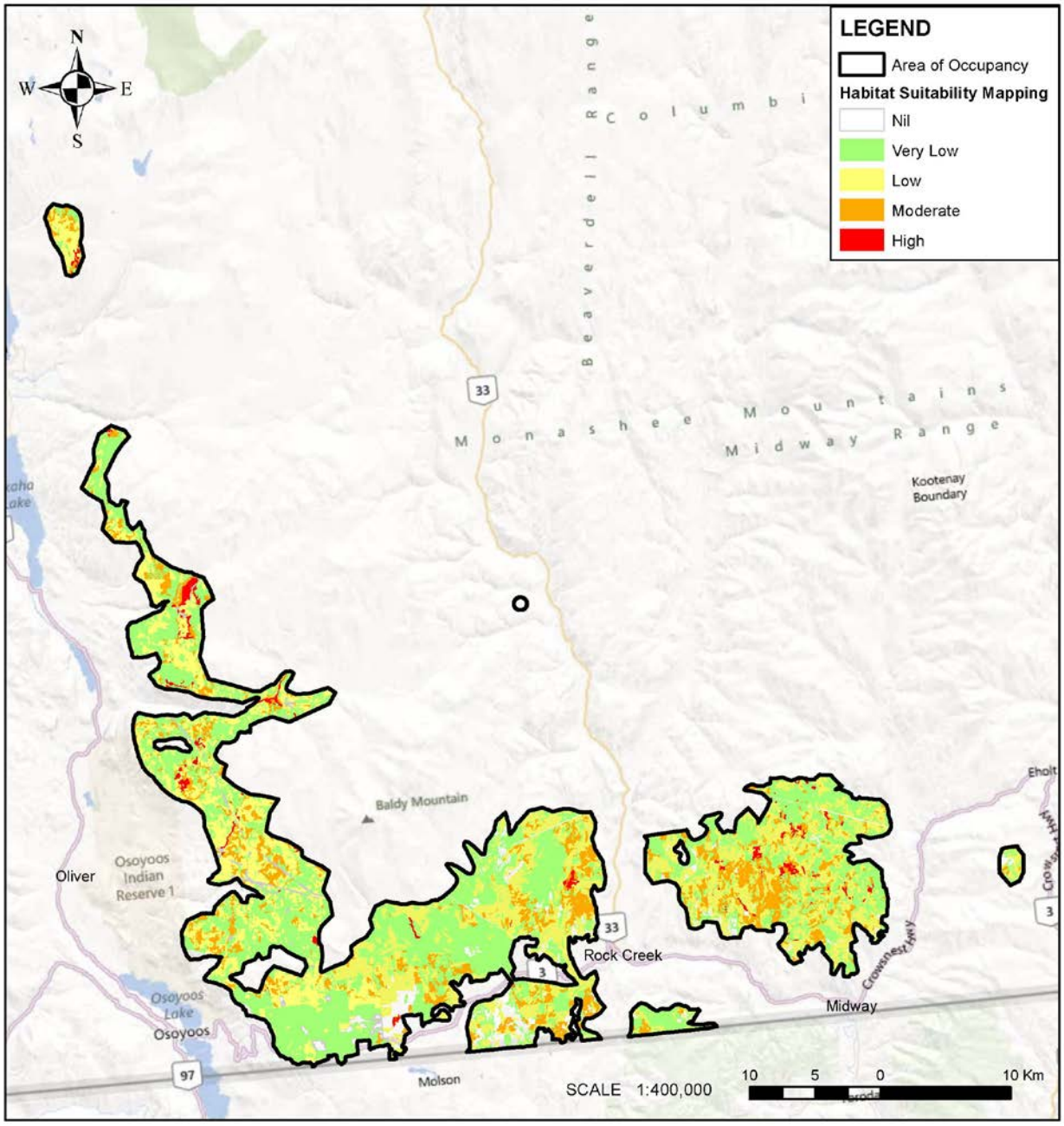

Figure 2. Map of habitat suitability results for the Okanagan-Boundary AO.

3.3 Nest Tree Retention and Recruitment

Nest trees are the required habitat attribute in shortest supply across the AOs in general and are probably the most critical single habitat requirement (Gyug *et al.* 2009a). Nest trees require long-term management to ensure adequate recruitment in all areas of potentially suitable habitat, not just areas known to be currently occupied. Even if all other targets are met, the lack of a suitable nest tree will prevent a habitat from being suitable.

Nest tree retention and recruitment targets are to be applied to low and moderate suitability habitat classes in the Okanagan-Boundary AO. **Outside the contiguous AO**, confirmed and probable nest sites and all habitats within a 500-m radius surrounding them (hereafter referred to as habitat management areas) should also have nest tree retention and requirement targets applied. The minimum nest tree target is 7 existing and/or suitable nest trees per hectare. Nest tree targets will first be met by retention of existing nest trees and then by retention and/or recruitment of potentially suitable nest trees up to target densities. The recommendations below lay out the sequence to follow to ensure minimum nest tree retention and recruitment targets are met.

Recommendations for minimum retention targets of existing (confirmed and probable) and suitable nest trees:

1. Retain all confirmed and probable nest trees, even if this exceeds the minimum target of 7 nest trees per hectare.
2. If a confirmed or probable nest tree is a single, isolated tree within an existing open area, maintain all existing trees (of any size class) as well as all woody debris within a retention area of 0.5 ha where feasible.
3. Retain 7 existing and/or suitable nest trees per hectare where minimum retention target of 7 cannot be met with existing nest trees,
4. Suitable nest trees are the largest trees available on site from among live trees with signs of internal decay and dead trees of the following species, in order of preference: western larch > 27cm dbh; ponderosa pine or Douglas-fir > 30 cm dbh; or trembling aspen > 25 cm dbh. The diameters listed are minimums; the largest trees available on site should be retained.
5. Retain live western larch > 50 cm dbh up to a maximum of 25 trees per hectare target. These trees in general are in short supply and take > 300 years to develop.
6. If nest tree targets cannot be met in the short term, then retain all suitable trees plus trees identified as recruitment trees to make up to the target density.
7. Selection of suitable nest trees should be based on preferred species and size class criteria. Suitable nest trees should be well dispersed across the managed block or area unless there is a natural clumping of existing suitable nest trees.
8. Existing and suitable nest trees should be incorporated into retention patches large enough to safely buffer the tree(s) to ensure that removal will not be required during current or future harvesting and silviculture activities to meet WorkSafeBC regulations.
9. Where preferred species and size classes are not available, follow WTP guidance (Section 3.9).
10. Road and landing construction shall be located far enough from confirmed and probable nest trees to ensure that the tree does not need to be removed as a danger tree.
11. Consider placing a wildlife tree sign on confirmed, probable, and suitable nest trees to educate the public about the high ecological value of these types of trees. This may help protect nest trees that are often targeted by firewood cutters. Signs can be obtained from your provincial government habitat or species at risk biologist. For contact information, visit the applicable ftp site referenced in Section 2.1.

Some forest harvesting methods (e.g., cable logging) will be incompatible with recommended nest retention targets. Where no other harvest method is practicable, the BMPs can be modified

to allow for completion of the block; however, the BMPs must be met to every extent possible. The justification and rationale for changes in management practices, the alternative practices applied, and any notable results from alternative practices should be documented.

3.4 Live Tree Retention Targets

Within the Okanagan-Boundary AO, five habitat suitability classes were identified: high, moderate, low, very low, and nil. Live tree retention targets are defined in the following sections and are to be applied to the high, moderate, and low habitat suitability classes within the Okanagan-Boundary AO. Habitat management areas around confirmed and probable nests **outside the contiguous AO** should also be managed as per the moderate and low habitat suitability recommendations.

Although the habitat suitability model has been assessed as reliable on the landscape level, it is possible that some sites, upon field inspection, may have been classed incorrectly. Where field checks determine that habitat within the proposed block is not suitable habitat (see Sections 3.3–3.7 for a description of habitat attributes required for suitable habitat) or has no attributes that could be managed to become suitable habitat in the future, management practices can be adjusted accordingly. Examples of habitat that is not likely to be suitable include soil and moisture regimes resulting in stand composition of > 70% lodgepole pine or subalpine fir; or soil and moisture regimes resulting in stand composition of > 10% western redcedar. The justification and rationale for changes in management practices, the alternative practices applied, and any notable results from alternative practices should be documented.

3.4.1 High Suitability Habitat

Within the Okanagan-Boundary AO, 1027 ha of habitat has been rated as high suitability. The Okanagan-Boundary AO supports the highest density of Williamson's Sapsucker in the province and prudent management of this AO is crucial to meeting the population and distribution goals. The high suitability habitat represents the best available habitat at this time and therefore has a high conservation value. High suitability habitat will be included in WHAs where possible.

All high suitability habitats outside of WHAs should be managed to the following specifications:

- Retain > 225 stems per hectare of live trees > 17.5 cm dbh post-harvest.
    - Include all western larch on site
    - Include all ponderosa pine and Douglas-fir > 50 cm dbh
    - Live stems retained for nest tree retention and recruitment can count towards the overall retention target of > 225 stems per hectare
- The harvest should be from across the entire range of size classes and species remaining after retention targets are met.

3.4.2 Moderate and Low Suitability Habitat

The following live tree retention specifications are required to ensure sufficient foraging resources (e.g., sap feeding trees, ant gleaning trees) and forest cover requirements (e.g., perching trees) are retained to maintain habitat suitable for Williamson's Sapsucker. The recommended live tree retention targets (Table 1) should be applied to new forest harvest and silviculture activities within moderate and low suitability habitat. Application of the retention targets should be made at the individual operating area level (i.e., by licensee, woodlot).

Table 1. Live tree retention targets (> 17.5 cm dbh) and the percent area of new blocks (blocks established after April 1, 2014) to be retained in the target classes for each licensee within moderate and low suitability habitat.

Average live tree retention target (trees per hectare)	% area of new blocks for each licensee
85–125	5–15
126–175	25–35
176–225	40–50
> 225	10–20

The following guidelines should be applied when calculating live tree retention targets (see documentation on the ftp site for rationale):

- Stand-level retention features such as WTPs, riparian reserves, and other stand-level reserves can be included in block-level stem retention target averaging.
- Old growth management areas (OGMAs) are landscape-level retention features in place to achieve biodiversity objectives and cannot be included in block stem retention target averaging.
- **WHAs for any species are excluded from live tree retention target averaging.** WHAs are a species-specific habitat reserve managed by the Province to support species at risk management. Species-specific habitat enhancements, such as thinning, harvesting, and prescribed burning, could occur within WHAs. These actions could alter licensee and BCTS accounting of live tree retention target classes and landscape-level availability of suitable habitat over time if included.

The percent area of new blocks should be reviewed periodically to ensure targets are being achieved consistently over time. The percent area within new blocks by retention class could be calculated based on a time period (e.g., every 2–3 years but no more than 5 years) or spatial area (e.g., 5000 ha). Results should be reported to the Ministry to enable provincial tracking of the percent area in different retention classes in moderate and low suitability habitats within each AO over time.

In applying live tree retention targets, existing stand characteristics, the current seral distribution in the surrounding area, future harvesting plans, and proximity of OGMAs and riparian reserves should be considered.

Recommendations for preferred tree species, tree size, and distribution of live tree retention targets:

- Live tree retention within suitable habitat on a block must average between 85 and 275 stems per hectare > 17.5 cm dbh (see Table 1).
- Live tree retention targets include any live trees retained for nest tree retention and recruitment.
- The minimum live tree retention for any given hectare within the harvested area should be ≥ 20 live trees >17.5 cm dbh
- Include a mix of the preferred tree species (western larch, ponderosa pine, Douglas-fir, and trembling aspen) in a range of size classes. Trembling aspen should not contribute > 25% of live tree retention target to any block.
- Where preferred trees species and size classes have been exhausted in retention or are not present, other trees species can used towards live tree retention targets.
- Openings > 0.5 ha without any leave trees should not be created through harvesting on the net area to be reforested.
- Retained trees may be in a mosaic of openings, single trees, patches, and clumps, or may be relatively evenly spaced (see Section 2.6 WTP).
- The 85 stems per hectare live tree retention target is the minimum average density required for suitable habitat. If losses due to windthrow, fire, insects, or disease are anticipated following harvesting, higher densities should be retained to allow for these losses without compromising desired retention levels.
- The lower live tree retention targets should be applied to areas that naturally have lower tree densities (e.g., low elevation, drier stands).
- Where requirements to manage forest health issues (e.g., larch mistletoe, pine beetle, bark beetle) interfere with the ability to achieve retention targets, the justification and rationale for changes in management practices, the alternative practices applied, and any notable results from alternative practices should be documented.
- Some forest harvesting methods (e.g., cable logging) will be incompatible with recommended retention targets. Where no other harvest method is practicable, the BMPs can be modified to allow for completion of the block; however, the BMPs must be met to every extent possible. The justification and rationale for changes in management practices, the alternative practices applied, and any notable results from alternative practices should be documented.

3.5 Activities in Very Low Suitability Habitat

Within the Okanagan-Boundary AO, extensive areas do not meet the structural criteria identified for high, moderate, or low habitat suitability, but about 5% of known Williamson's Sapsucker nests are located in these very low habitat suitability forest types. Breeding territories are usually centered on suitable nest trees. Habitat management in habitats classified as very low suitability should focus on maintaining existing nesting and foraging habitat within the regulatory framework provided by FRPA. **Where there is a known nest in very low suitability habitat that has not been established as a WHA, the nest and live tree retention targets for the**

moderate/low suitability habitats (Section 3.4.2) should be applied within a 500-m radius management area around the nest (i.e., the habitat management area)**.**

The suitability of forested stands is not static. Many of the stands currently in very low suitability have been altered from past timber harvest and other land management practices but could become low or better suitability given the right stand management. Although they may not be currently suitable habitats, they are capable of supporting Williamson's Sapsucker if managed appropriately. Wildlife tree and WTP retention practices in very low suitability habitat should be implemented with specific attention to:

- protecting existing high value nest trees and recruitment nest trees;
- maintaining patches of young to mature conifers for ant gleaning and that may serve as sap trees; and
- retaining large downed wood wherever possible to maintain or enhance ant populations.

3.6 Sap Tree Habitat Targets

Sap trees are required for sap well creation and adult feeding throughout the breeding and post-breeding season. Sap trees are most often mid-sized Douglas-fir (15–50 cm dbh), although other conifers may be used as well. Unhealthy Douglas-fir seems to be preferred over healthy ones. Although the goal is to maintain at least 4–5 suitable conifer sap trees per hectare, separate targets for retention of sap trees are not considered necessary. Achieving live tree retention targets should address sap tree requirements.

3.7 Ant Habitat Targets

Volumes of 40–50^{+} m^3/ha of downed wood have been documented in habitats assessed as having high suitability for Williamson's Sapsucker. Habitats with volumes less than 15 m^3/ha of downed wood may have limited ant resources available. It is not expected that high volumes of downed wood will be available across the full range of habitats where Williamson's Sapsucker breeds; however, it is necessary to provide as much substrate as possible to support colonies of preferred ant species to maintain habitat suitability for Williamson's Sapsucker.

Recommendations for ant habitat targets to be applied within low, moderate and high suitability habitats:

- Leave as much existing coarse woody debris (CWD) on site as is practicable.
- Take measures to protect existing large high value CWD from damage. Western larch logs and stumps and veteran (> 60cm dbh) ponderosa pine are the highest value CWD.
- Where available, leave 15 m^3/ha of large CWD (> 30 cm large-end diameter).
- If volumes > 15 m^3/ha are available on site pre-harvest, efforts should be made to retain this during harvest.
- If existing volume of CWD is < 15 m^3/ha, select and distribute leave trees such that CWD may be recruited over time.
- Although large pieces of CWD are preferred, smaller pieces will still provide habitat for ant colonies where large pieces are not present.
- Leave larger diameter (e.g., > 40 cm dbh) stumps of variable heights where practicable.

- Retain standing dead and declining trees (e.g., in WTPs) to ensure sources of large CWD in the future.

3.8 Timing Windows

To avoid disturbance of confirmed and probable nest sites the following is recommended:

- Avoid high-disturbance forestry activities such as active falling and yarding, road construction, and mechanized silviculture treatments (e.g., chainsaws, excavators) with potential for prolonged disturbance (i.e., more than just a few hours) within 100 m of confirmed or probable Williamson's Sapsucker nest sites from March 15 to July 15.
- Where blasting is required for road construction, a buffer of 1000 m should be applied to any confirmed or probable Williamson's Sapsucker nest sites from March 15 to July 15.
- Where high-disturbance forestry activities as described above cannot be rescheduled, a qualified professional biologist should conduct a site-specific survey to determine if satisfactory options are available to mitigate disturbance to Williamson's Sapsucker nest sites.

3.9 Wildlife Tree Patches

It is expected that Wildlife Tree Patches (WTPs) and other retention areas will be incorporated into stand-level planning to achieve the recommended nest and live tree retention targets. The following recommendations should be applied during the development of WTPs wherever practicable:

- Connect WTPs to other retention areas where feasible.
- Consider including other wildlife features and values in WTP design to ensure that biodiversity is addressed.
- Where there is an existing Williamson's Sapsucker nest tree that has not been incorporated into a WHA, a WTP should be approximately centered on the nest tree. If this spatial configuration is not practical for operational, topographic, or other reasons, then connect the WTP patch to adjacent forested habitat.
- Where there is not an existing nest tree, WTPs should be designed to capture as many Williamson's Sapsucker habitat attributes (e.g., suitable nest trees, large diameter coarse woody debris, and snags for ant nests and sap trees) as is practicable. If replacement habitat is available, these reserves can shift spatially and temporally at each pass/entry.
- WTPs should be large enough to safely buffer an existing nest tree, suitable nest trees, snags, or other trees containing nest cavities from the adjacent work area and to maximize wind firmness.
- WTPs should be located away from roads to discourage firewood cutting.
- Where possible, include larger patches (e.g., > 0.5 ha) as opposed to multiple small patches.
- Where partial-cut harvesting systems are employed, WTPs should be embedded within the overall stand retention matrix so that suitable nest trees can be safely retained inside the retention patch.

3.10 Stand Management Practices

Several stand management practices, including planting, stand tending, and unplanned entries such as firewood cutting, can reduce the quality of Williamson's Sapsucker habitat. Key issues and potential mitigation measures include:

- Preferred species for reforestation are western larch, Douglas-fir, and ponderosa pine.
- Do not plant > 30% lodgepole pine, spruce, and subalpine fir.
- Maintain a range of stem densities within a stand during density management and brushing to help create habitat diversity.
- Ensure that vegetation management is designed to recruit large diameter trembling aspen and to allow them to develop on mesic and subhygric sites.
- Where broadleaf management requires brushing, retain pockets of aspen and birch that would develop into at least 10 mature trees and develop suitable nest tree characteristics (> 20–25 cm dbh) relatively early in the development of the stand.
- To reduce the loss of large diameter suitable nest trees to firewood cutters, employ educational signage (e.g., wildlife tree signs) and consider strategic road deactivation or road closures.
- Where road access is no longer required, consider closing or deactivating roads to high suitability habitat areas and WHAs to discourage firewood cutting.

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Personal Communications

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