Species at Risk Act
Recovery Strategy Series

Amended Recovery Strategy for the Williamson's Sapsucker (*Sphyrapicus thyroideus*) in Canada

Williamson's Sapsucker

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For copies of the recovery strategy, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

Cover illustration: Male (left) and female (right) Williamson's Sapsuckers at a nest hole in a Trembling Aspen, Johnstone Creek, British Columbia, June 2005. Photos by Les W. Gyug.

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[1] http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1

PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years.

The Minister of the Environment is the competent minister for the recovery of the Williamson's Sapsucker and has prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with:

- Government of British Columbia
- Environmental Non-Governmental Organizations – South Okanagan Similkameen Conservation Program, Great Basin Partners in Flight, Wildlife Tree Stewardship Program Okanagan-Similkameen
- Industry stakeholders – Council of Forest Industries, Tembec, Weyerhaeuser, Interfor
- First Nations – St. Mary's Band of the Ktunaxa Nation

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada, or any other jurisdiction, alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Williamson's Sapsucker and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment Canada and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

This recovery strategy was amended for the purpose of replacing Figure 3 (Critical habitat for the western area of occupancy).

[2] http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2

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EXECUTIVE SUMMARY

The Williamson's Sapsucker (*Sphyrapicus thyroideus*) is a medium-sized migratory woodpecker that breeds in coniferous forests in the mountains of western North America from southern British Columbia to the southern United States, and northern Baja California in Mexico. In British Columbia, the species breeds in three distinct geographic regions: Princeton-Merritt (referred to as the Western area), Okanagan-Boundary, and East Kootenay. Using the best available inventory data, the current population within the three main areas is estimated at 837 individuals (424 in the Okanagan-Boundary, 374 in the Western, and 39 in the East Kootenay). The species was listed as Endangered under the *Species at Risk Act* in 2006.

Recovery of Williamson's Sapsucker is considered biologically and technically feasible.

The population and distribution objective for Williamson's Sapsucker is to ensure the persistence of the populations in Canada within each of the identified Areas of Occupancy (AO) including: Western, Okanagan-Boundary and East Kootenay by maintaining them at or above: 1) the current abundance; 2) the current distribution and AO, allowing for natural fluctuations in both cases.

The broad strategies to be taken to address the threats to the survival and recovery of the species are presented in the section on Strategic Direction for Recovery.

The majority of currently suitable habitat is on provincial crown land, much of which is managed for timber harvesting. Loss or degradation of breeding habitat through removal of mature forest has been identified as the primary threat to the Williamson's Sapsucker in Canada.

Sufficient critical habitat has been identified in the Western AO to support the population and distribution objectives for that region. The critical habitat identified in the Okanagan Boundary and East Kootenay AOs is not sufficient to support the population and distribution objectives for those regions. A schedule of studies is included that outlines the studies required before the critical habitat identification can be completed. Areas within which critical habitat occurs that have been delineated in this recovery strategy are 31,600 ha in the Western AO; 37,699 ha in the Okanagan-Boundary AO; and 4260 ha in the East Kootenay AO.

One or more action plans will be posted on the Species at Risk Public Registry within three years of the final posting of the recovery strategy.

RECOVERY FEASIBILITY SUMMARY

Recovery of Williamson's Sapsucker in Canada is considered technically and biologically feasible, as it meets all four criteria for determining recovery feasibility recommended in the draft *Species at Risk Act* Overarching Policy Framework (Government of Canada 2009).

1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.

Yes. The Okanagan-Boundary geographic area, which makes up 48-56% of the estimated known population, appears to be self-sustaining, thereby fulfilling the criterion of reproductive individuals available for population persistence. Information on the population in the Western geographic area is currently insufficient to determine the degree of self-sustainability, and the population in the East Kootenay geographic area is extremely small (probably less than 80 individuals). However, both these geographic areas are contiguous with the northern portion of U.S. populations, so continued persistence is likely, should habitat remain.

2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.

Yes. There is currently sufficient suitable habitat available to support nesting Williamson's Sapsuckers, and additional habitat to support expansion of species numbers could be made available through habitat restoration.

3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.

Yes. The principal known threat to Williamson's Sapsucker is breeding habitat loss through forest harvesting (see Table 1). It is technically feasible to address or mitigate this threat using methods that retain habitat structures required by the Williamson's Sapsucker. While the severity of the impact from habitat loss on wintering grounds is not yet understood, it should be possible to clarify the impact through research and to help mitigate the impact through participation in international habitat conservation initiatives.

4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.

Yes. Possible recovery techniques exist to provide suitable habitat, including a long-term reliance on natural forest and ecosystem processes associated with the aging of individual trees and forest stands.

As the small Canadian population of the Williamson's Sapsucker occurs at the northern part of its continental range, and the vast majority of its continental distribution and population occurs further south in the United States, it is important to note that population changes at the continental level may have a significant effect on recovery feasibility in Canada. If the continental population of this species experiences an ongoing downward or upward population trend, its range may expand or contract towards the centre of its range or near the periphery. In these cases, the rate of recovery of the Canadian population, and the rate of achievement of

population and distribution objectives, may reflect both these continental range changes and local response to the provision of suitable habitat and mitigation of key threats. However, there does not appear to be a consistent continental population trend for this species at present.

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1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: May 2005

Common Name (population): Williamson's Sapsucker

Scientific Name: *Sphyrapicus thyroideus*

COSEWIC Status: Endangered

Reason for Designation: This woodpecker is associated with mature larch forests in south-central British Columbia; less than 500 individuals breed in Canada**. Habitat loss through forest harvest is estimated to have been 23% over the last 10 years and is projected to be about 53% over the next decade.

Canadian Occurrence: British Columbia (B.C.)

COSEWIC Status History: Designated Endangered in May 2005.

*Committee on the Status of Endangered Wildlife in Canada

** The population estimate at the time of the 2005 COSEWIC assessment has subsequently been adjusted to incorporate inventory data up to and including the 2011 breeding season. The current estimate and its rationale are presented in 3.2 Population and Distribution and Appendix 1.

2. SPECIES STATUS INFORMATION

The Williamson's Sapsucker (*Sphyrapicus thyroideus*) was listed under Schedule 1 of the *Species at Risk Act* (SARA) in 2006. The conservation status of the species is summarized in Table 1. It is estimated that less than 5% of the breeding range of the species is in Canada.

Table 1. Conservation status of the Williamson's Sapsucker (from NatureServe 2009, B.C. Conservation Data Centre 2011, and B.C. Conservation Framework 2011).

Global (G) Rank*	National (N) Rank*	Sub-national (S) Rank*	COSEWIC Status	B.C. List	B.C. Conservation Framework
G5	N3B	British Columbia (S3B) Idaho (S5) Montana (S3S4B) Oregon (S4BS3N) Washington (S3S4B) Arizona (S4) California (S3) Colorado (S4B) Navajo Nation (S4) Nevada (S2) New Mexico (S4B,S5N)	Endangered (2005)	Red	Highest priority : 1, under Goal 3**

		Texas (S2N) Utah (S2B) Wyoming (S2)			

*Rank 1 - Critically Imperiled; 2 - Imperiled; 3 - Vulnerable; 4 - Apparently Secure; 5 - Secure; H – possibly extirpated; SNR – Status Not Ranked; SNA – Not Applicable; B – breeding; N – non-breeding
** The three goals of the B.C. Conservation Framework are: 1. Contribute to global efforts for species and ecosystem conservation; 2. Prevent species and ecosystems from becoming at risk; 3. Maintain the diversity of native species and ecosystems

3. SPECIES INFORMATION

3.1 Species Description

The Williamson's Sapsucker is a medium-sized migratory woodpecker and primary cavity excavator with specialized tongue adaptations for eating sap. It is unique among woodpeckers in that the male and the female exhibit striking differences in plumage. Males have patches of white on the wing-coverts, rump, and head that contrasts with iridescent black upperparts, head, and breast. Adult males also have a distinctive red patch on the chin and upper throat and have a yellow belly. Females are heavily barred with no white wing-coverts, a breast that is partly black and yellow, and a brownish head (see cover photo for reference). Prior to 2012, there were two recognized subspecies, *S. t. thyroideus and S. t. nataliae,* occurring in Canada. Patten (in Gyug et al. 2012) determined that the species should be considered monotypic because of insufficient differentiation between the two subspecies. The COSEWIC (2005) assessment also treated the two subspecies as a single group because there were no distinctive morphological features that could reliably separate individuals of the two subspecies. The Red-naped Sapsucker (*S. nuchalis*) may be confused with Williamson's Sapsucker, as the range and territories of the two species overlap and both are similar in size. However, the Red-naped Sapsucker utilizes deciduous forest components rather than coniferous, is much more common and widespread, and has very different plumage patterns (with a prominent red forehead and barred breast).

3.2 Population and Distribution

The breeding range of Williamson's Sapsucker includes the mountains of western North America from southern British Columbia to the southern United States, and northern Baja California in Mexico (Figure 1; Gyug et al. 2012). In Canada, Williamson's Sapsucker is a migrant that breeds only in British Columbia. It generally arrives between mid-March and early April, with fall migrants departing by mid-September (Campbell et al. 1990). Eggs are generally laid in mid to late May, and young fledged from mid-June to mid-July (Gyug et al. 2007). Nothing is known in Canada about post-breeding behaviour or any possible local dispersal.

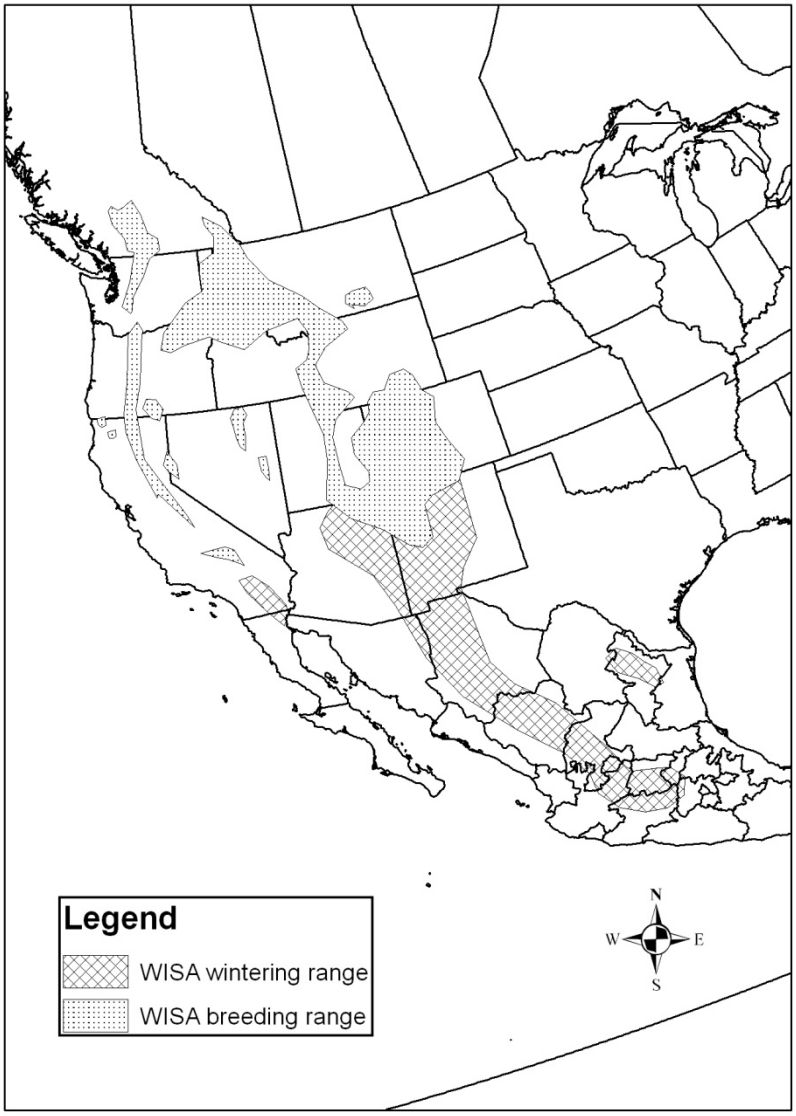

Figure 1. North American range of Williamson's Sapsucker (WISA). Prepared by Environment Canada based on Dobbs et al. (1997) and Sauer et al. (2004), and on Gyug et al. (2007a) for the Canadian portion of the range.

In the 1950s Williamson's Sapsucker was only known in British Columbia from the Okanagan-Similkameen and the East Kootenay areas and, since that time, may have undergone a northward range expansion to the Merritt and Thompson River areas (Gyug et al. 2007). Currently in British Columbia, the breeding range is divided into three geographic populations[3]: the East Kootenay population in the Rocky Mountain Trench, from the U.S. border north 65 km to

[3] The population names stated here reflect a regional nomenclature, which equates to the nomenclature used in the 2005 COSEWIC Status Report as follows: East Kootenay population = Cranbrook area of the Rocky Mountain Trench and the Rocky Mountains; Okanagan-Boundary population = Okanagan-Greenwood; Western population = Princeton, Merritt and Hat Creek (west of Cache Creek). The term 'population' is used as a convention and is defined here based on the broad biogeographic patterns, with each population being separated by areas of unsuitable habitat; however, it is not meant to imply knowledge of migration or connectivity between the populations.

Kimberley; the Okanagan-Boundary population on the east side of the Okanagan River valley from the U.S. border north 90 km to the village of Naramata, and east 75 km to the city of Grand Forks; and the Western population, extending as much as 125 km west of the Okanagan valley through the Similkameen River valley to the Cascade Mountains, and as much as 250 km north of the U.S. border (see Figure 2; Gyug et al. 2007). A few isolated nests have been recorded to the north of the Area of Occupancy[4] (AO) of the Western population. The East Kootenay population represents what was considered to be the former *nataliae* subspecies while the Okanagan-Boundary and Western populations represent what was considered to be the former *thyroideus* subspecies. It is unknown where breeding birds from British Columbia winter within the global winter range of the species, which covers southern Oregon, Arizona, and New Mexico southward to southern Mexico (Gyug et al. 2012).

The likely number of breeding adults within the three AOs in British Columbia has been estimated at 837 individuals (Gyug 2012; Appendix 1). In the Okanagan-Boundary AO, the estimated number of breeding adults is 424 individuals (95% CI: 96-752). In the Western AO, the estimated number of breeding adults is 374 (95% CI: 4-882), where the majority of birds detected to date have been within the Princeton and Merritt localities. The number of breeding adults in the East Kootenay AO is estimated at 39 (95% CI: 14-50); however, the confidence in the East Kootenay estimate is significantly lower than for the other AOs due to less efficient habitat stratification (owing to a less reliable habitat suitability model). As a result, the predicted number of pairs is more uncertain for the East Kootenay area than for the Okanagan-Boundary or Western AOs. Williamson's Sapsuckers are also sometimes found nesting outside of the current boundaries of the three AOs (see Appendix 1).

[4] The geographic populations are quantified as 'Areas of Occupancy', based on known presence and absence from extensive call playback surveys (Appendix 1).

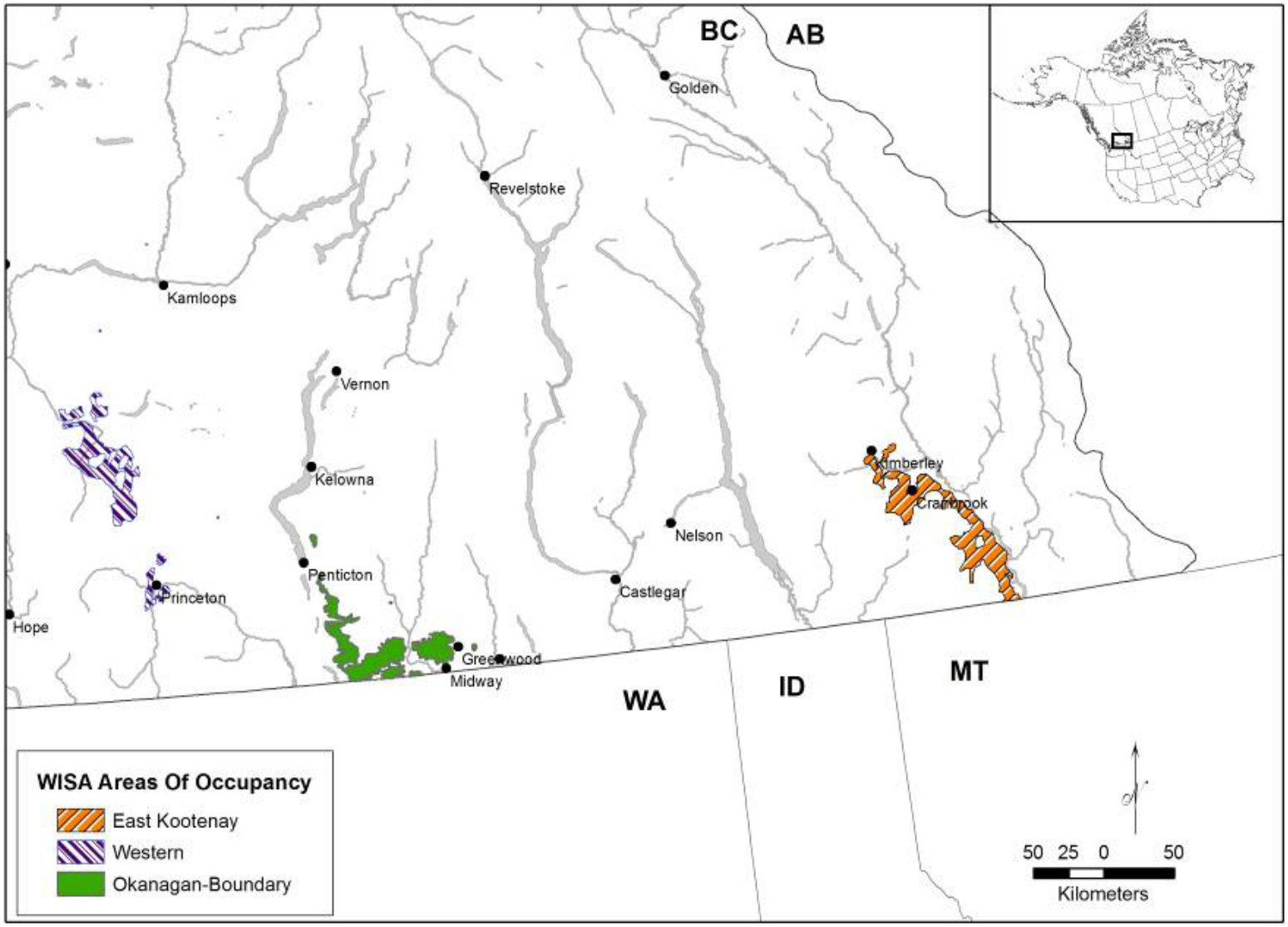

Figure 2. Areas of Occupancy of Williamson's Sapsucker in British Columbia, 2010. Prepared by Environment Canada.

There are no quantifiable range-wide trends in population because the species has been detected too infrequently in most areas of its range on Breeding Bird Surveys[5] (BBS) to develop reliable trend estimates, and there have been no previous population estimates prior to the 2005 COSEWIC assessment. Only in Oregon were there enough data (26 routes, abundance >1.0 per route per year, and low variance) to provide a reliable estimate of trends from BBS routes; in this area Williamson's Sapsucker numbers decreased at an annual rate of 3.3% from 1980 to 2003.

In 2005, COSEWIC determined the Okanagan-Boundary population to be declining, based on historic and projected decreases in the extent of older forests and the occurrence of the majority of the Williamson's Sapsucker population within older forests (COSEWIC 2005). However, the analysis only considered a portion of the Area of Occupancy and used simplified estimates of harvest rates. A range-wide re-analysis is required to more rigorously estimate trends in amount and quality of suitable habitat, taking into account more recent information. The population trends for the East Kootenay and Western geographic areas are not known.

3.3 Needs of the Williamson's Sapsucker

Williamson's Sapsucker breeds in coniferous mountain forests at middle to high elevations throughout most of its range. It also uses mixed coniferous-deciduous forests where Trembling Aspen (*Populus tremuloides*) can be an important nesting tree (Crockett 1975, Smith 1982, Conway and Martin 1993, Loose and Anderson 1995, COSEWIC 2005, Gyug et al. 2009a). In British Columbia, Williamson's Sapsuckers were recorded at elevations from 610 m to 1580 m with nests found at elevations from 800 m to 1560 m (Gyug et al. 2007). The breeding territory size of one radio-tagged male was 54 ha, with a maximum range distance of 500 m from the nest (Manning and Cooper 1996). The habitat elements required by this species for breeding are nest trees, sap trees, and ant habitat.

Nest Trees: standing live and/or dead trees suitable for nest cavity excavation, or containing existing cavities. Sapsuckers are relatively weak excavators (Spring 1965), usually requiring trees or snags infected with heart rot in order to be able to excavate cavity nests (Erskine and McLaren 1972, Keisker 1987, Harestad and Keisker 1989). Williamson's Sapsuckers will occasionally reuse old nesting cavities (Crockett 1975, Conway and Martin 1993, COSEWIC 2005, Gyug et al. 2009a). In the Okanagan-Boundary and East Kootenay geographic areas, the birds nest primarily in large veteran Western Larch (*Larix occidentalis*) trees (COSEWIC 2005, Gyug et al. 2009a). In the Western geographic area, where veteran Western Larch trees are absent, the primary nest tree species are Trembling Aspen and Ponderosa Pine (*Pinus ponderosa*), and some Douglas-fir (*Pseudotsuga menziesii*) (Gyug et al. 2009a). Nest trees tend to be larger diameter at breast height (DBH) than other trees in the immediate stand (mean DBH for coniferous and deciduous nest trees are 72.4 and 35.4 cm respectively; Gyug et al. 2009a).

Sap Trees: live coniferous trees for sap well creation and foraging. Breeding Williamson's Sapsuckers feed exclusively on sap and phloem during the pre-nestling period (COSEWIC 2005). Pairs will use 4-5 sap trees for feeding, visiting these several times daily throughout the breeding season to drill new sap wells or to keep existing sap wells open (Crockett 1975), and

[5] BBS Canada: http://www.ec.gc.ca/ron-bbs/P004/A001/?lang=e&m=s&r=WISA&p=LUnited States: http://www.pwrc.usgs.gov/bbs/results/

defending them from other Williamson's Sapsuckers. In British Columbia, sap trees are generally small to moderately-sized living conifers, typically Douglas-fir (Gyug et al. 2009b). In Colorado, Ponderosa Pines are used as sap trees in addition to Douglas-firs (Crockett 1975). Pine sap trees typically have some injury or stress which may be causing sap to flow at higher rates than in healthy trees (Oliver 1970, Crockett 1975). In contrast, Douglas-fir sap trees are typically healthy (Crockett 1975). In a study in British Columbia, most actively used sap trees were found within 100 m of a nest tree, and were usually between 25 and 50 cm DBH (Gyug et al. 2009b).

Ant Habitat: decaying trees, logs and stumps, as well as adjacent live trees, utilized by ants for foraging. Williamson's Sapsuckers shift to mainly ants-after the young hatch (Beal 1911, Stanford and Knowlton 1942, Crockett 1975, Otvos and Stark 1985, Higgins et al. 2010). Ants (mainly *Camponotus* and *Formica* spp.) gleaned from the surface of trees represent 75-99% by volume or by prey item count of the diet of breeding adults or nestlings (Beal 1911, Stanford and Knowlton 1942, Crockett 1975, Otvos and Stark 1985, Higgins et al. 2010). Other ants and other insects may also be taken opportunistically (Crockett 1975, Gyug et al. 2012, COSEWIC 2005). Carpenter ants typically inhabit larger and older decaying trees similar to those preferred by Williamson's Sapsuckers for nesting, but they will also inhabit large decaying trees, logs and stumps and will forage on nearby trees to tend aphid colonies (Hansen and Klotz 2005), where they will be available to Williamson's Sapsuckers (Stallcup 1968, Crockett 1975).

Within suitable foraging habitat, the nest tree can be located in a wide range of stand types. In a study in British Columbia, nest trees were located in naturally very open stands, in recently partially-cut stands, and in very densely stocked stands (L. Gyug unpubl. data). Nest trees were always within 400 m of stands used for foraging (i.e. stands containing sap trees or ant foraging opportunities). Sap trees may be in open stands or in densely-stocked stands (L. Gyug unpubl. data). Further, modelling of plot data suggests Williamson's Sapsucker actively selected nesting sites featuring an average of >85 live trees per hectare that were greater than 17.5 cm DBH across the territory (Gyug et al. 2010). In the Okanagan-Boundary and the East Kootenay geographic areas, multi-layered Western Larch stands appear to provide high habitat quality, as the three key elements needed by Williamson's Sapsucker are present (Gyug 2009, 2010a,c). In the Western geographic area, Williamson's Sapsuckers use coniferous or mixed stands containing Trembling Aspen, Ponderosa Pine, Douglas-fir, and Lodgepole Pine (*Pinus contorta*; COSEWIC 2005; Gyug 2010b).

Little is known about dispersal and philopatry (the tendency to stay in, or return to, a home area) of Williamson's Sapsucker, but a relatively high degree of philopatry and low dispersal (Crockett 1975) may result in individuals attempting to breed in sub-optimal habitat, if suitable habitat is altered or destroyed.

4. THREATS

4.1 Threat Assessment

The loss or degradation of breeding and foraging habitat through removal of mature forest has been identified as the primary threat to the Williamson's Sapsucker in Canada. Table 2 outlines a number of distinct activities, existing regulatory practices, or phenomena that may result in habitat loss or degradation.

Table 2. Threat Assessment Table.

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
			Local/ Range-Wide		Local/ Range-wide	
Habitat Loss or Degradation						
Commercial forest harvesting	Medium - High	Widespread	Current/ Imminent	Recurrent	Variable depending on the type of harvesting method	High
Removal of 'dangerous trees'	Medium - High	Widespread	Current	Recurrent	Variable depending on policies and legislation	High
Salvage logging	Medium	Widespread	Current/ Imminent	Recurrent	Medium	Medium
Firewood collection	Medium	Widespread	Current	Recurrent	Medium/ Low	Low
Urbanization	Low	Localized	Current/ Anticipated	Recurrent	High/ Low	High
Rangeland clearing	Low	Widespread	Current	Recurrent	High/ Low	High
Mining, petroleum exploration	Low	Widespread	Unknown	Recurrent	High/ Low	High
Habitat loss in wintering areas	Unknown	Widespread	Current	Recurrent	Unknown	Unknown

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Changes in Ecological Dynamics or Natural Processes						
Stand-replacing wildfire	Medium	Widespread	Anticipated	Unknown	High/ Low	High
Accidental Mortality						
Nestling mortality due to removal of nest trees during the breeding season	Medium	Widespread	Anticipated, possibly current	Recurrent	High/Low	High
Climate and Natural Disasters						
Climate change	Low	Widespread	Anticipated	Continuous	Unknown	Low
Disturbance or Harm						
Recreational activities	Low	Widespread	Unknown	Recurrent	Low	Unknown
Road and right-of-way construction	Low	Widespread	Unknown	Recurrent	High/ Low	High
Pollution						
Pesticide treatment of beetle-infested trees	Low	Localized	Unknown	Continuous	Low	Low

Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table.

[2] *Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).*

[3] *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).*

4.2 Description of Threats

The threat descriptions below are presented in order of decreasing level of concern.

Commercial forest harvesting

Harvesting (i.e. tree removal) in Williamson's Sapsucker breeding and foraging habitat has been identified as a high-priority threat to recovery of this species in Canada (COSEWIC 2005). Forests are being actively harvested throughout much of the Williamson's Sapsucker's range in Canada, including suitable or potentially suitable habitat within the known Area of Occupancy. Future harvesting within the AOs is also planned. Recent and projected rates of forest harvesting in apparently suitable habitat (especially in Okanagan-Boundary stands containing older forests) largely motivated COSEWIC's assessment of the Williamson's Sapsucker as Endangered in Canada. Previously reported (COSEWIC 2005) harvesting projections require re-calculation using more detailed timber harvest data supplied by the forest industry.

Severity of impact from forest harvesting likely depends on the specific characteristics retained within the cut-block and the spatial context of the surrounding landscape. For example, Williamson's Sapsuckers in British Columbia do nest in partial retention blocks, although adjacency to mature stands appears to be required to meet foraging requirements (COSEWIC 2005, L. Gyug unpubl. data). In the Okanagan-Boundary and the East Kootenay, partial retention has occurred for almost 100 years in many of the forests used by Williamson's Sapsuckers.

Provincial regulations govern the amount of coarse woody debris, a major source of ant habitat, which may be left after forest harvesting operations; these may also impact Williamson's Sapsucker through a reduction in food resources[6]. In addition, the Mountain Pine Beetle (*Dendroctonus ponderosae*) epidemic has left British Columbia with an abundance of underutilized wood residues (standing and downed timber) and the province is committed to the development of a domestic renewable fuel industry (British Columbia Energy Plan[7]). If residual coarse woody debris or potential nest trees are removed for use as biofuel, there is the potential for both the quality and quantity of suitable breeding habitat to be reduced.

Removal of 'dangerous trees'

High value habitat trees (i.e., 'wildlife trees' providing nesting and foraging opportunities) may pose a safety hazard to people, equipment or facilities, so are often labelled as 'dangerous trees' when they fall within operational areas. Provincial Occupational Health and Safety regulations under the *Workers Compensation Act* prohibit the exposure of any workers to 'dangerous trees' (WorkSafe B.C. 2009). Consequently, during forestry operations, 'dangerous trees' are often flagged for removal. Removal of 'dangerous trees' within Williamson's Sapsucker nesting habitat will result in loss of important nesting resources. While removal of potential nest trees due to safety concerns has not been explicitly quantified, it is expected to be a significant threat because the majority of Williamson's Sapsucker nesting habitat falls outside of protected areas.

[6] Further information on merchantability specifications and regional volumes can be found in the British Columbia Provincial Logging Residue and Waste Measurement Procedures Manual at http://www.for.gov.bc.ca/hva/manuals/rwprocedures.htm

[7] http://www.energyplan.gov.bc.ca/

To prevent the unnecessary loss of ecologically valuable but potentially dangerous wildlife trees, the planning and management of areas containing Williamson's Sapsucker habitat trees must include procedures for ensuring worker safety. In British Columbia, a recognized program exists for determining tree hazards under various work scenarios and for implementing appropriate safe work procedures when required (http://www.for.gov.BC.ca/hfp/values/wildlife/wlt/training.htm). Establishing no work zones in accordance with WorkSafe B.C. guidance is a common practice that could mitigate this concern sufficiently, and could also be used to contribute to Wildlife Tree Patches that have not been recognized as a mitigation tool.

Salvage logging

Based on provincial forest pest infestation mapping, over 20% of the three Williamson's Sapsuckers AOs are affected by Mountain Pine Beetle. Extensive proliferation of Mountain Pine Beetle infestations has led to significant logging in areas affected by the current expansion and many current and/or potential nest trees are being removed for salvage, or are being felled as hazard trees (B.C. Ministry of Forests and Range 2009). Stand mortality from Mountain Pine Beetle in the southern portions of the province has not been as extensive as the central interior because Lodgepole Pine salvage logging was undertaken in the 1980s through the 1990s to combat an infestation of Mountain Pine beetle Beetle at that time. However the influence of Mountain Pine Beetle on Ponderosa Pine is expected to increase as the infestation re-radiates southward. Salvage logging is also a concern in stands that have been affected by other natural disturbances, including other insect pests (e.g., Spruce Budworm *Choristoneura fumiferana*), wildfire, and windthrow. Salvage harvest of stands affected by windthrow has been documented in the most densely occupied Williamson's Sapsucker habitat in the Okanagan-Boundary (L. Gyug, personal comm. 2012).

Firewood collection

Felling of standing dead trees for firewood, either illegally or under a free-use firewood permit, may also represent a significant loss of nesting opportunities in some areas. However, there is no reliable way to estimate the magnitude of firewood harvest because the permits do not limit the amount taken. In the Okanagan-Boundary and East Kootenay regions, there is anecdotal evidence suggesting that Western Larch trees are a favourite target for firewood harvesting. The threat may only be locally important, as firewood harvesters are generally restricted to easily accessible trees. Typically, it is not permissible under a free-use permit to harvest live trees or larger snags that would be valuable nesting habitat features for the Williamson's Sapsucker. Confirming compliance with the conditions of the free-use permits to cut firewood has historically not been a priority throughout British Columbia.

Stand replacing wildfires

Stand-replacing wildfires represent a significant threat to the Williamson's Sapsucker as they have the potential to destroy high quality sapsucker habitat such as veteran nesting snags and the coarse woody debris elements important for ant nests. While the Williamson's Sapsucker has evolved in ecosystems in which wildfires have always been an important ecological process there is evidence that the frequency and severity of wildfires in North America has increased in recent decades (Westerling et al. 2006). Anthropogenic fire suppression has been advanced as a primary factor driving this trend, along with climate change; however, the root cause is

uncertain. Other potential drivers could include silvicultural practices, livestock grazing, and anthropogenic ignitions.

Habitat loss in wintering areas

In addition to quality and availability of suitable breeding habitat in British Columbia, which may be limiting overall reproductive output, conditions on wintering grounds may also be limiting the number of Williamson's Sapsuckers that return to breed in Canada each year. According to the World Wildlife Fund Terrestrial Ecoregions Database (World Wildlife Fund 2012), the conservation status of ecoregions containing coniferous forest within the Williamson's Sapsucker's wintering range is Critical/Endangered, due largely to rapid deforestation. However, the extent to which this limits population growth within Canada is not yet understood.

Nestling mortality due to removal of nest trees during the breeding season

Nestlings that have not yet fledged may be killed when active nest trees are accidentally removed during the course of forest harvesting, removal of 'dangerous trees', or salvage logging. No specific data are available about the extent or frequency of this threat, but it may be more widespread in some geographic areas than others due to the relative likelihood of encountering a possible nest tree.

Urbanization

Encroachment and habitat conversion are current and ongoing threats to this species. Direct effects are loss of breeding and foraging habitat (COSEWIC 2005). A long history of urban and agricultural development in the southern interior of British Columbia, especially in the portion of the range where it was once abundant on Anarchist Mountain, has been especially significant (COSEWIC 2005).

Rangeland clearing

Clearing of forested habitat for rangeland and grazing is a current and ongoing threat to this species in certain areas, resulting in loss of breeding and foraging habitat. This is most significant in the Western geographic area where Williamson's Sapsucker occurs in Trembling Aspen and Ponderosa Pine stands at the edges of open rangelands. However, this threat is assigned a low level of concern overall, because it is geographically restricted.

Mining and petroleum exploration

Mineral and petroleum exploration and mining activities in British Columbia may pose a threat to Williamson's Sapsucker, both through direct habitat loss and indirect effects of increased access associated with road-building activities and mine operations (e.g., firewood collection).

Climate change

Climate change may lead to changes in Williamson's Sapsucker habitat, however its effects on stand-level tree composition and how the birds will adapt to these changes are extremely difficult to quantify at this time. Changing climate may also increase the severity of insect and disease outbreaks, the frequency of stand-replacing fires (Westerling et al. 2006, and see the Ecological Narratives and Vulnerability Summaries in the Kamloops Future Forest Strategy 2009), impact tree health and vigour, and cause a mismatch between migration timing and the availability of food items on the breeding grounds (e.g., Parmesan 2006**,** Both et al. 2006, Visser et al. 2006).

This threat is assigned a low level of concern, primarily because the ability to meaningfully address this threat is limited.

Road and right-of-way construction

Creation of linear corridors for road development or right-of-way construction has the potential to directly result in loss of breeding and foraging habitat, and possibly disrupt foraging or nesting behaviour due to continued human use of these areas. This threat is generally relatively low in total area impacted, and therefore of lower significance.

Recreational activities

Disturbance from recreational activities near Williamson's Sapsucker nest sites may reduce breeding success (e.g., Crockett 1975). All seasonal recreational activities have increased in the last 20 years in the southern interior of British Columbia. Motorized vehicles accessing remote areas have the potential to disrupt nesting and foraging behaviour; however, a direct link to reduced nest success is not clear and therefore this threat is generally a lower concern as compared to other threats.

Pesticide treatment of beetle-infested trees

Williamson's Sapsucker may also be affected through indirect ingestion of pesticides (via ontaminated ants). In particular, they may be exposed to residues of the arsenic-based insecticide, MSMA, a chemical which was used from the early 1980s to 2004 in many areas of British Columbia to suppress local outbreaks of Mountain Pine Beetle (Morrissey et al. 2006, 2007). The extent to which historical MSMA-treated trees overlap with Williamson's Sapsucker breeding habitat is not known.

5. POPULATION AND DISTRIBUTION OBJECTIVES

The population and distribution objective for Williamson's Sapsucker is to:

> Ensure the persistence of the populations in Canada within each of the identified Areas of Occupancy (Okanagan-Boundary, East Kootenay, and Western) 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.

Rationale: Although historic and ongoing habitat loss was determined to have resulted in population declines in the Canadian portion of the range (COSEWIC 2005), substantial reduction in the Area of Occupancy has not yet occurred. As no estimates of population size or distribution are available prior to 2003, it is not possible to further quantify historic population size or distribution. An objective of increasing the population is therefore not being considered because historical information does not provide substantive evidence that this species has ever been abundant or widespread in British Columbia. In addition, this species requires relatively specific habitat features and elements and there is a limited ability to restore or create more habitat to promote population increase. The maintenance of the existing populations at current levels, allowing for natural fluctuations in population size, is believed to be an achievable and reasonable population objective. To achieve this objective, existing land use practices, including forest harvesting, will need to be carefully evaluated to determine whether there is a need to alter

management practices. The East Kootenay and Western geographic areas are likely viable only to the extent that both existing suitable habitat in British Columbia, as well as potential for dispersal from the U.S. portion of these populations, are maintained. Provided that the U.S. populations are not declining (although some data in Oregon suggest they might be), it is reasonable to expect persistence of these Canadian populations. Similarly, the Okanagan-Boundary geographic area represents the northern portion of a population that extends into the Okanogan Highlands of northeastern Washington State. The British Columbia portion of this population is likely large enough to be self-sustaining.

6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVES

6.1 Actions Already Completed or Currently Underway

From 1996-2005, the British Columbia Ministry of Environment contracted call playback surveys and nest searches (Gyug et al. 2007) to determine the distribution and habitat of Williamson's Sapsucker in British Columbia and to identify nesting habitat elements that could be protected[8] in Wildlife Habitat Areas, under provisions of the *Forest and Range Practices Act*, as outlined in the Identified Management Strategy (B.C. Ministry of Water, Land and Air Protection. 2004). From 2006 to 2008, a group of partners including the Ministry of Environment, several forest licensees, the Council of Forest Industries and Environment Canada - Canadian Wildlife Service, continued the distribution surveys, and also undertook modelling to determine the relationship of foraging resources and various habitat elements to nest productivity and nest density. This model was used to define productive habitat for Williamson's Sapsucker breeding territories. Details of this work are available through Gyug et al. 2009a and Gyug et al. 2009b.

In 2008, field studies aimed at collecting information to inform the identification of critical habitat were undertaken in all three geographic areas. These data were incorporated with the existing nest dataset for the purposes of a habitat selection analysis (Drever et al. unpublished manuscript). Algorithms defining high-, medium- and low-quality habitat were derived from additional analyses of this data and were used to spatially define these habitats in the Western and Okanagan-Boundary AOs (Gyug 2009, 2010b,c). Habitat suitability modelling has also been initiated for the East-Kootenay AO (Gyug 2010a); however, the East-Kootenay model was not shown to perform well (Gyug 2011a).

The Province of British Columbia is using the results of the habitat modelling work conducted to date to draft Best Management Practices (BMPs) for timber harvesting and silviculture activities within Williamson's Sapsucker habitat.

A two-year study was initiated in 2008 to determine the nestling diet of Williamson's Sapsuckers relative to available ant species. Preliminary results were delivered in 2010 (Higgins et al. 2010). Further analysis of the data that was collected will be necessary to establish a link between the

[8] "Protection" in this case should not be confused with the protection of critical habitat under the federal *Species at Risk Act*, which would need to be determined separately.

abundance/availability of nutritionally important ant species and specific types of woody substrate that can be measured reliably in the field.

Finally, a long-term Adaptive Monitoring Framework (Marmorek and Pickard 2010) was initiated by Environment Canada in 2010 with the dual purpose of 1) tracking the status of Williamson's Sapsucker populations across the three AOs and 2) ensuring that recovery and protection measures are effective in supporting the population and distribution objective of population maintenance. In 2010 and 2011, baseline call-playback and habitat information was collected to evaluate and improve the monitoring methods outlined in the initial framework, and to assess the performance of the habitat suitability models (Gyug 2011a).

6.2 Strategic Direction for Recovery

Table 3 outlines broad strategies and specific recommended approaches for achieving the population and distribution objectives and addressing threats.

Recovery of Williamson's Sapsucker is entirely predicated on the maintenance of the current amount and quality of suitable habitat. Specifically, it is likely necessary to implement changes to land use practices such that habitat functionality for Williamson's Sapsuckers within the AOs is maintained. Although maintenance of habitat quality and amount cannot be easily measured directly, we believe it can be inferred from a properly designed population monitoring program.

Table 3. Recovery Planning Table.

Threat or limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
• Commercial forest harvesting; • Removal of 'dangerous trees'; • Salvage logging; • Firewood collection; • Stand replacing wildfire/Fire suppression;	Urgent	Habitat protection and management	• Identify and designate protected, conservation and management areas on provincial Crown lands incorporating known Williamson's Sapsucker breeding territories[9]. • In accordance with best available information, evaluate and implement, where necessary, changes to land use practices (including directed compliance actions) such that stand and landscape-level functionality for Williamson's Sapsuckers is maintained. • Evaluate the effectiveness of current forest management activities (e.g., partial harvest systems) in maintaining or enhancing habitat and support implementation of those that are effective. • Investigate the need for and feasibility of habitat element creation, such as creation of potential nest trees through fungal inoculation and 'tree topping', and implement, if feasible. • Engage private land owners with Williamson's Sapsucker on their property and facilitate &

[9] Recommended management areas include such designations as Wildlife Habitat Areas under the British Columbia *Forest and Range Practices Act*.

Threat or limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
			encourage the use of Best Management Practices on private lands.
Knowledge gaps – habitat trends	Urgent	Habitat supply analysis	• Conduct a range-wide analysis to determine trends in rate of loss in amount and quality of suitable habitat, to re-assess projected trends in the COSEWIC status report. • Conduct habitat supply modelling to identify and evaluate management scenarios which will result in no net loss of habitat or degradation of functionality.
Knowledge gaps - habitat needs	Urgent	Habitat research	Refine Critical Habitat identification and habitat protection measures over time through research such as: • Determining nest hole / nest tree / territory re-occupancy, and relating this to habitat variables; • Determining size and stand type composition of home ranges in habitats of differing quality using radio-telemetry studies. • Determining whether a lower limit exists on one or more types of ant nest substrate (below which an area cannot provide the foraging resources required to support breeding Williamson's Sapsuckers).
• Commercial forest harvesting • Removal of 'dangerous trees' • Salvage logging • Firewood collection • Stand replacing wildfire/fire suppression	Urgent	Evaluate regulatory environment and enforcement	• Evaluating policy and regulation issues (e.g., 'dangerous tree' removal, waste and residue policy, illegal firewood collection, retention and stocking standards, and wildfire policy) with respect to impacts on functionality of Williamson's Sapsucker habitat.
All threats except climate change and pesticide treatment	Necessary	Stewardship; Outreach and Education	• Reduce incidental loss of nest trees through partnership with existing organizations to increase awareness of the importance of wildlife trees for Williamson's Sapsuckers and other cavity nesters (e.g. South Okanagan-Similkameen Conservation Program, Wildlife Tree Stewardship Program Okanagan-Similkameen, Canadian Intermountain Joint Venture). • Develop and present materials to increase awareness of Williamson's Sapsuckers among firewood cutters and forestry workers. • Develop Williamson's Sapsucker Stewardship Plans for application on First Nations reserve lands, in cooperation with First Nations.

Threat or limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
All threats	Urgent	Range-wide monitoring	• For each of the three populations, establish population size and trend, distribution, and AO baselines that can be monitored quantitatively and reliably by 2013. • Continue the development and implementation of an inventory and monitoring program to produce reliable estimates of population size and trend, population distribution and AO for each population, using defensible methods.
Knowledge gaps – habitat needs	Necessary	Research	• Using government, industry, and academic funding sources, initiate research studies from 2012 to 2016 to: a. Identify characteristics and quantities of key habitat elements and their spatial configuration needed to maintain functionality of Williamson's Sapsucker habitat. b. Determine breeding territory size and/or breeding territory density. c. Study the fire history and therefore determine characteristics of historical stand structure.
• Habitat loss in wintering areas	Necessary	Research; Habitat protection and management	• Pursue partnerships with universities to clarify the impact of wintering ground habitat loss. • Support habitat conservation initiatives by international organizations in key wintering locations.

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

Critical habitat for Williamson's Sapsucker is identified in this recovery strategy to the extent possible, based on the best available information. This identification is believed to be sufficient to support the population and distribution objectives (to maintain current populations) for the Western AO because it includes all currently occupied habitat as well as potentially occupied habitat as delineated by habitat suitability models. The habitat suitability model for the East Kootenay AO was not considered sufficiently reliable for use in critical habitat identification; therefore, the critical habitat identification was based solely on known breeding locations. Because surveying intensity has not been sufficient to conclude with confidence that all occupied and potentially occupied areas have been identified, the current critical habitat identification is not considered sufficient to support the population and distribution objectives in the East Kootenay AO. In addition, within a portion of the Okanagan-Boundary AO critical habitat has not been identified at this time. Environment Canada will work with the applicable organizations to complete the identification of critical habitat on those lands. The schedule of studies (Section 7.2) outlines the activities required to identify additional critical habitat necessary to support the population and distribution objectives of the species.

Within the Western and Okanagan-Boundary AOs, critical habitat for Williamson's Sapsucker is identified as areas containing suitable habitat (defined as habitat rated as low, medium, or high suitability by the habitat suitability model based on provincial Forest Cover (FC)/Vegetation Resource Inventory (VRI) mapping, TRIM Digital Elevation Models (DEM), and stereo aerial photo interpretation (Gyug 2009, 2010 a,b,c). It should be noted that the categories of habitat suitability in the model (low, medium, or high) are a relative ranking against provincial bench-mark sites which have very high densities of individuals. Therefore, the "low" habitat suitability category simply means low suitability relative to the high suitability bench-marks, not low in absolute terms. "Low" suitability areas still possess the characteristics required to support nesting Williamson's Sapsuckers and do contain a large percentage of the population (63% of known nests, Gyug unpublished data); however, there is much less certainty about the locations of the critical characteristics (and thus potential nests/territories) within those areas. Habitat that is truly low-suitability for Williamson's Sapsucker is not identified as critical habitat. Locations in habitats rated as very low or nil suitability with probable or confirmed breeding (using Breeding Bird Atlas criteria[10]) surrounded by an area with a radius equivalent to the largest known breeding home range distance are also identified as critical habitat. Within the East Kootenay AO, the habitat suitability model was not reliable, so critical habitat is only identified as locations with probable or confirmed breeding surrounded by an area with a radius equivalent to the largest home range distance (using Breeding Bird Atlas criteria).

For the Western and Okanagan-Boundary AOs, final model variables included stand age, height, site index, and crown closure; dominant tree species (Western Larch or Douglas-fir in the Okanagan-Boundary AO; Douglas-fir and/or Ponderosa Pine in the Western AO); representation of non-preferred tree species (e.g., Lodgepole Pine *Pinus contorta,* Western Redcedar *Thuja plicata,* Subalpine Fir *Abies lasiocarpa*, and Western Hemlock *Tsuga heterophylla*); and slope and aspect. The model for the Okanagan-Boundary AO also included % representation of preferred tree species (Douglas-fir and Western Larch). In the Western AO, polygons were upgraded to a higher suitability class if Trembling Aspen patches (which were not otherwise captured in the model variables) were visible in stereo aerial photos.

The radius of the circular areas delineated around locations with probable or confirmed breeding was 500 m, based on radio-telemetry data for Williamson's Sapsucker (Manning and Cooper 1996) and the closely related Red-naped Sapsucker (Walters 1996).

The areas containing critical habitat for Williamson's Sapsucker are presented in Figures 3-5. Critical habitat for Williamson's Sapsuckers in Canada occurs within the shaded yellow polygons shown on each map where the critical habitat criteria and methodology described in this section are met. The 50 km x 50 km and 10km x 10 km UTM grid overlays shown on these figures are a standardized national grid system that highlights the general geographic area containing critical habitat, for land use planning and/or environmental assessment purposes. Because the mapping is coarse in scale and has less than 100% accuracy, it is expected that those areas contain some habitat that does not possess the biophysical attributes critical to Williamson's Sapsucker survival. The following description of biophysical attributes for

[10] See <http://www.birdatlas.bc.ca/bcdata/codes.jsp?lang=en&pg=breeding> for accepted signs of probable and confirmed breeding.

Williamson's Sapsucker habitat must be used to determine whether a given area is considered critical habitat or not.

Biophysical attribute description:

Williamson's Sapsuckers require specific structural features within their breeding territory for both nesting and foraging. There are lower limits on the size of a habitat patch that can support a Williamson's Sapsucker territory and on the sizes and densities of key habitat attributes within that patch. The numbers presented here define those lower limits. They should not be misinterpreted as definitions of habitat quality. Preferred or optimal sizes/densities are higher. All of these required attributes must be present within 500 m of each other (maximum known breeding home range distance; Manning and Cooper 1996), for an area to be considered critical habitat (i.e., a group of potential nest trees with no live trees or ant nests within 500 m is not critical habitat).

1. Minimum patch size of 16 ha (Gyug et al. 2007).
    - The minimum territory size estimate is 16 ha, based on nearest neighbour nest distances in high quality habitat in British Columbia (Gyug et al. 2007).

2. Suitable nest trees (at least 5.6/territory or 0.35/ha[11]; Gyug et al. 2009a):
    - Contain nest cavities with entrances in the size range made and used by sapsuckers (3–5 cm diameter)
    - Either live with internal decay and/or stem damage, or dead
    - Conifers at least 27 cm DBH (although larger preferred; mean DBH of coniferous nest trees = 72.4 cm ± 1.9 cm[12]):
        i. primary species is Western Larch
        ii. secondary species include Ponderosa Pine, Douglas-fir and hybrid White Spruce (*Picea glauca* x *engelmannii*)
    - Deciduous trees at least 22 cm DBH (although larger preferred; mean DBH of deciduous nest trees = 35.4 cm ± 1.1 cm):
        i. primary species is Trembling Aspen (particularly in clumps < 1 ha)
        ii. secondary species include Water Birch (*Betula occidentalis*) and Black Cottonwood (*Populus trichocarpa*)

3. Live trees for foraging and cover (at least 85/ha in the >17.5 cm DBH class; Gyug et al. 2010).

[11] Equal to one standard deviation (SD) below the mean density of suitable nest trees measured within a 16 ha area. Conner (1979) suggested that minimum standards be set at 1 SD below the mean. Mean = 7.4/territory or 0.47/ha (Gyug et al. 2009a); 1 SD = 25% of the mean, based on nest tree densities measured in 2009 in the East Kootenay AO, where plot sizes were large enough to accurately represent stand composition (Gyug, unpublished data). Note: the SDs for the other two AOs could be larger or smaller resulting in regional variation in minimum nest tree densities. 25% is the best estimate of SD based on available information.

[12] Standard Error (SE).

4. Colonies of aphid-tending ants for foraging:
    - Wood-inhabiting ant species are the primary food sources for Williamson's Sapsucker nestlings, indicating that woody ant nest substrate is a critical habitat attribute (Higgins et al. 2010). However, there has been no clear evidence indicating the category of substrate (downed wood, stumps, or decaying trees) that is important, or the minimum density/volume of the substrate that is necessary (e.g., Drever et al. unpublished manuscript). Consequently, more work will be required to identify the critical type(s) of substrate and the minimum density/volume that is necessary.

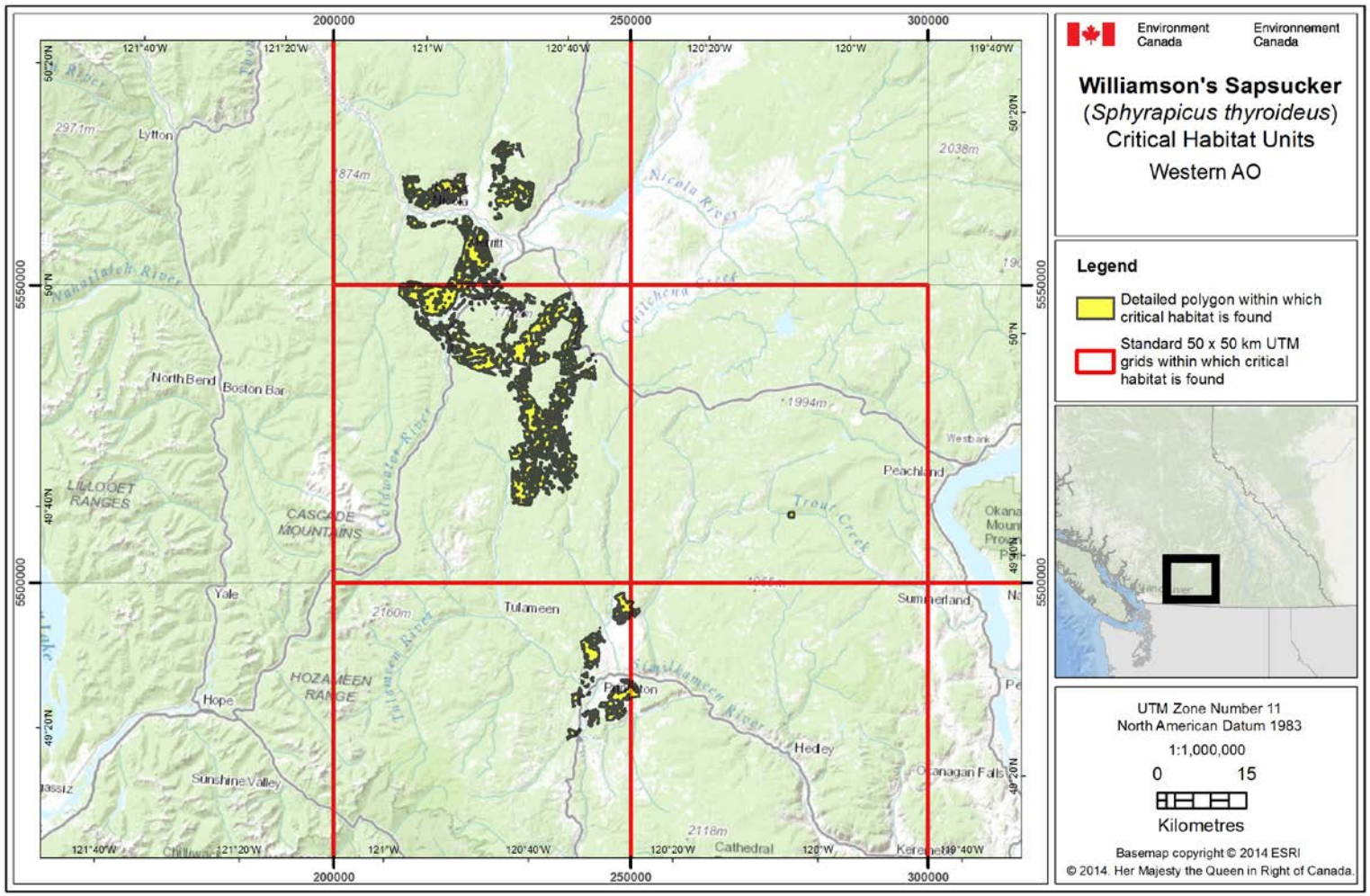

Figure 3[13]. Critical habitat for Williamson's Sapsucker in the Western AO is represented by the yellow shaded units, comprising 31,600 ha, where the criteria and methodology set out in section 7.1 are met. The 50 km x 50 km UTM grid overlay shown on this figure is a standardized national grid system that indicates the general geographic area containing critical habitat.

[13] amended June 2016

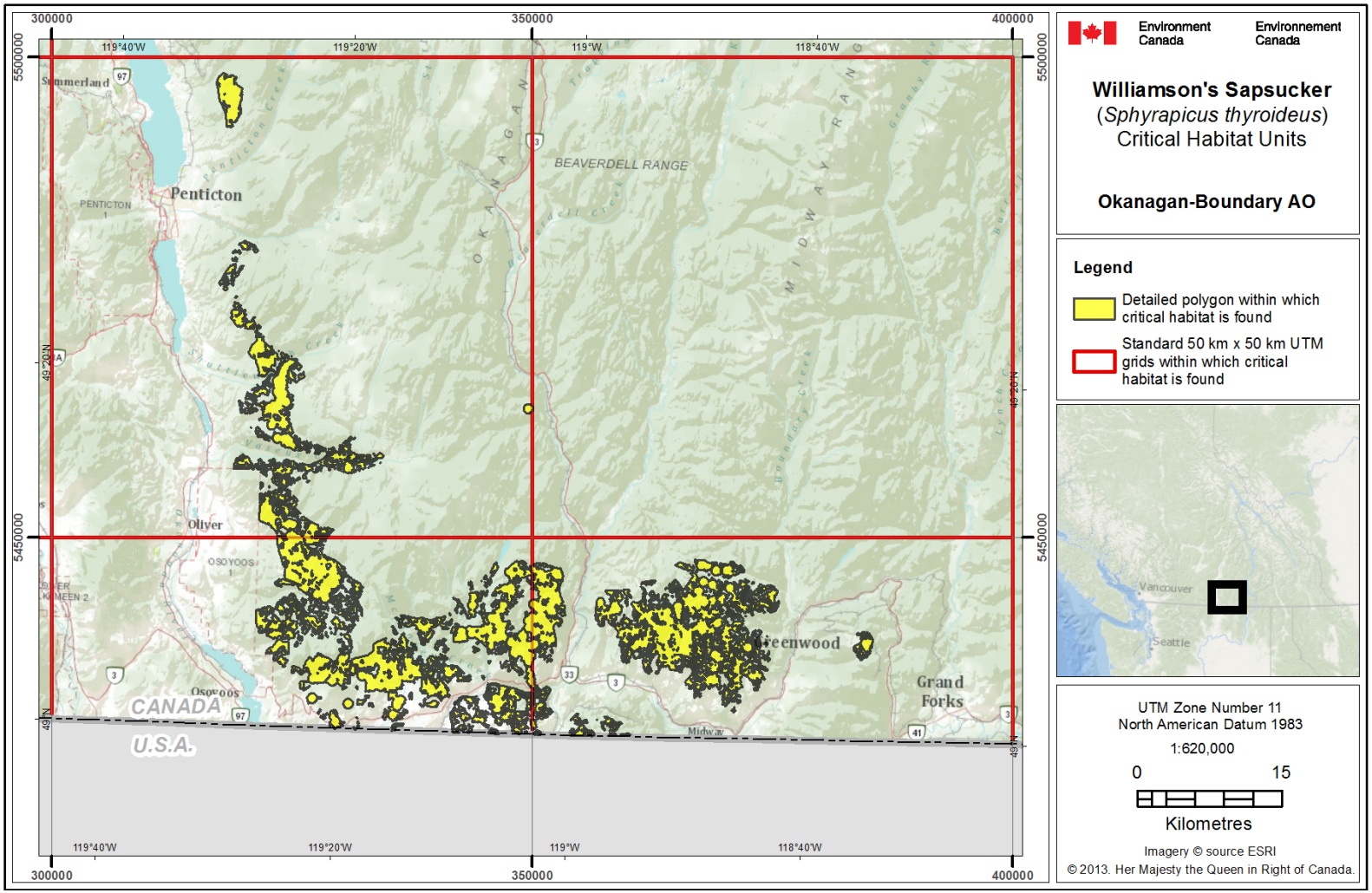

Figure 4. Critical habitat for Williamson's Sapsucker in the Okanagan-Boundary AO is represented by the yellow shaded units, comprising 37,699 ha where the criteria and methodology set out in section 7.1 are met. The 50 km x 50 km UTM grid overlay shown on this figure is a standardized national grid system that indicates the general geographic area containing critical habitat. USA landbase (shaded grey) is excluded.

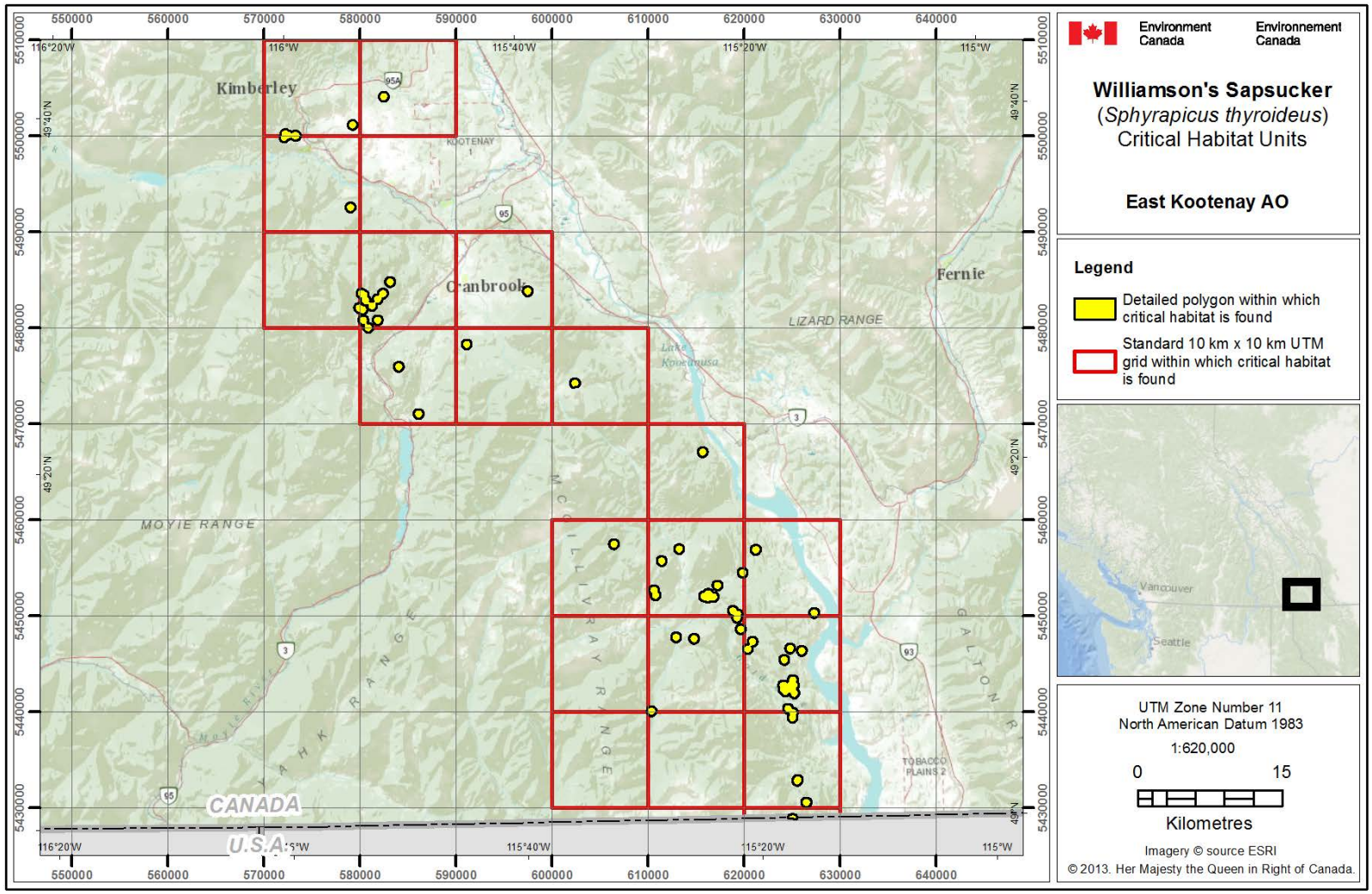

Figure 5. Critical habitat for Williamson's Sapsucker in the East Kootenay AO is represented by the yellow shaded units, comprising 4260 ha, where the criteria and methodology set out in section 7.1 are met. The 10 km x 10 km UTM grid overlay shown on this figure is a standardized national grid system that indicates the general geographic area containing critical habitat. USA landbase (shaded grey) is excluded.

7.2 Schedule of Studies to Identify Additional Critical Habitat

Table 4. Schedule of studies for identifying additional critical habitat.

Description of Activity	Outcome/Rationale	Timeline
Update and refine GIS habitat suitability models for the East Kootenay AO, and selectively ground-truth for accuracy.	Critical habitat that is sufficient to support the population and distribution objectives (to maintain the current population) is identified in the East Kootenay AO.	2014-2017
Continue East Kootenay breeding bird surveys along the boundaries of the current AO to better define the East Kootenay AO.	The boundaries of the critical habitat in the East Kootenay AO reliably capture the breeding population in that region.	2014-2017
Work cooperatively with applicable organizations to complete the identification of critical habitat in the Okanagan-Boundary AO.	Critical habitat that is sufficient to support the population and distribution objectives is identified in the Okanagan-Boundary AO.	2014-2017

7.3 Activities Likely to Result in the Destruction of Critical Habitat

Understanding what constitutes destruction of critical habitat is necessary for the protection and management of critical habitat. Potential for destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from single or multiple activities at one point in time, or from the cumulative effects of one or more activities over time.

Activities described in Table 5 include those likely to cause destruction of critical habitat for Williamson's Sapsucker; destructive activities are not limited to those listed. Where a situation does not clearly fit within the list of activities identified in Table 5, but has a potential impact on critical breeding and foraging habitats for Williamson's Sapsucker, the proponent should contact Environment Canada – Canadian Wildlife Service, Pacific and Yukon Region, for guidance on the activity. The lower size and density limits in the critical biophysical attribute definitions (Section 7.1) should not be interpreted as range-wide thresholds for destruction and should absolutely not be viewed as management targets. To ensure that the suitability of critical habitat is not degraded, it is recommended that habitat- and region-specific retention targets/removal limits be established through provincial Best Management Practices or regulatory means.

Table 5. Examples of activities likely to result in destruction of critical habitat for Williamson's Sapsucker.

Activity	Habitat feature destroyed	Biological function lost
Removal of any known nest tree *(e.g., clear-cut logging, danger tree removal, clearing for development, etc.)*	• Nest trees	• Reproduction
Significant removal of suitable nest trees *(e.g., clear-cut logging, danger tree removal, clearing for development, etc.)*	• Nest trees	• Reproduction
Significant removal of live (non-nest) trees *(e.g., clear-cut logging, clearing for development, etc.)*	• Sap trees • Ant-gleaning substrate • Perches • Escape / security cover	• Foraging and feeding young • Roosting / preening • Predator evasion
Removal of ant nests in woody substrate *(e.g., danger tree removal, clearing for development, etc.)*	• Foraging resources	• Feeding young

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives.

Performance indicators for the next 5-10 years:

- Population abundance in all three AOs is maintained or increased.
- The distribution and area of each of three AOs is maintained or increased.

9. STATEMENT ON ACTION PLANS

One or more action plans will be posted on the Species at Risk Public Registry within three years of the final posting of the recovery strategy.

The scope of action planning for Williamson's Sapsucker requires that recovery actions be implemented across all jurisdictions in British Columbia, including provincial Crown land, private land, First Nations land, and federal properties.

10. REFERENCES

Beal, F.E.L. 1911. Food of the woodpeckers of the United States. U.S. Department of Agriculture, Biological Survey Bulletin 37.

B.C. Conservation Data Centre. 2011. B.C. Species and Ecosystems Explorer. B.C. Ministry of Environment, Victoria, B.C. Available at <http://a100.gov.bc.ca/pub/eswp/> (Accessed December 8, 2011).

B.C. Conservation Framework. 2011. Conservation Framework Summary: *Sphyrapicus thyroideus*. B.C. Ministry of Environment. Victoria, B.C. Available: http://a100.gov.bc.ca/pub/eswp/ (accessed November 2, 2011).

B.C. Ministry of Forests and Range. 2009. Monitoring Harvest Activity Across 29 Mountain Pine Beetle Impacted Management Units. Unpublished report. Forest Analysis and Inventory Unit. Available: <http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/Monitoring-Harvest-Activity-Across-29-Mountain-Pine-Beetle-impacted-management-units_FINAL.pdf> (Accessed December 9, 2011)

B.C. Ministry of Water, Land and Air Protection. 2004. Procedures for Managing Identified Wildlife – V. 2004. B.C. Ministry of Water, Land and Air Protection, Victoria, B.C. Available: <http://www.env.gov.bc.ca/wld/frpa/iwms/procedures.html> (Accessed December 1, 2010).

Both C., S. Bouwhuis, C.M. Lessells, and M.E. Visser. 2006. Climate change and population declines in a long-distance migratory bird. Nature 441: 81-83.

Cadman, M.D, D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds). 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, ON.

Campbell, R.W., A.K. Dawe, I. McTaggart-Cowan, J. Cooper, G. Kaiser, and M.C. McNall. 1990. Birds of British Columbia: Volume 2, Nonpasserines; Diurnal Birds of Prey through Woodpeckers. Royal British Columbia Museum.

Conner, R. N. 1979. Minimum standards and forest wildlife management. Wildlife Society Bulletin 7:293-96.

Conway, C.J. and T.E. Martin. 1993. Habitat Suitability for Williamson's Sapsuckers in Mixed-Conifer Forests. Journal of Wildlife Management 57: 322-328.

COSEWIC. 2005. COSEWIC assessment and status report on the Williamson's Sapsucker, *Sphyrapicus thyroideus*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. 45 pp.

Crockett, A.B. 1975. Ecology and behavior of the Williamson's Sapsucker in Colorado. Ph.D. Thesis, Univ. of Colorado, Boulder, CO.

Drever, M. C. L.W. Gyug, A. K. Stuart-Smith, I. P. Ohanjanian, K. T. Fort, and K. Martin. Unpublished Manuscript. Habitat selection by nesting Williamson's Sapsuckers in Southern British Columbia.

Erskine, A.J. and W.D. McLaren. 1972. Sapsucker nest holes and their use by other species. Canadian Field-Naturalist 86: 357-361.

Gill, C. 2010. Williamson's Sapsucker Baseline Monitoring in the Western Region Area of Occupancy. Report prepared for Environment Canada – Canadian Wildlife Service, Delta, B.C.

Government of Canada. 2009. *Species at Risk Act* Policies, Overarching Policy Framework [Draft]. *Species at Risk Act* Policy and Guidelines Series. Environment Canada, Ottawa. 38 pp.

Gyug, L. 2012. Distribution, population size, and monitoring of Williamson's Sapsucker in British Columbia. DRAFT report (7 December 2012) prepared for Environment Canada – Canadian Wildlife Service, Delta, B.C.

Gyug, L. 2011. Williamson's Sapsucker Baseline Monitoring 2011: Field Report and Preliminary Analyses. Report prepared for Environment Canada - Canadian Wildlife Service, Delta, B.C.

Gyug, L.W. 2010a. Final species account for species-habitat model for Williamson's Sapsucker in the East Kootenay. Report prepared for Environment Canada - Canadian Wildlife Service, Delta, B.C., and Ministry of Environment, Victoria, B.C.

Gyug, L.W. 2010b. Final species account for species-habitat model for Williamson's Sapsucker West of Okanagan Lake. Report prepared for Environment Canada, Canadian Wildlife Service, Delta, B.C., and Ministry of Environment, Victoria, B.C.

Gyug, L.W. 2010c. Final species account for species-habitat model for WISA in the Okanagan. Report prepared for Weyerhaeuser Co. Ltd., Princeton, B.C.

Gyug, L.W. 2009. Final species account for species-habitat model for Williamson's Sapsucker in the Boundary. B.C. Timber Sales, Kootenay Business Region, Nelson, B.C.

Gyug, Les W., R. C. Dobbs, T. E. Martin and C. J. Conway. 2012. Williamson's Sapsucker (Sphyrapicus thyroideus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available: http://bna.birds.cornell.edu/bna/species/285. (Accessed: September 25, 2013).

Gyug, L.W., S. Wilson, C. Steeger and I. Ohanjanian. 2010. Williamson's Sapsucker (*Sphyrapicus thyroideus*) nest productivity in relation to tree densities in British Columbia. British Columbia Birds 10.

Gyug, L. W., C. Steeger, and I. Ohanjanian. 2009a. Williamson's Sapsucker (*Sphyrapicus thyroideus*) nest tree characteristics and densities in British Columbia. Canadian Journal of Forest Research 39:2319-2331.

Gyug, L. W., C. Steeger, and I. Ohanjanian. 2009b. Williamson's Sapsucker (Sphyrapicus thyroideus) sap trees in British Columbia. British Columbia Birds 19: 6-12.

Gyug, L.W., I. Ohanjanian, C. Steeger, I.A. Manley, and P.W. Davidson. 2007. Distribution and density of Williamson's Sapsucker (*Sphyrapicus thyroideus*) in British Columbia, Canada. British Columbia Birds 16:2-15.

Haines, D.E. and K.H. Pollock. 1998. Estimating the number of active and successful bald eagle nests: an application of the dual frame method. Environmental and Ecological statistics 5: 245-256.

Hansen, L.D. and J.H. Klotz. 2005. Carpenter ants of the United States and Canada. Comstock Publ., Cornell Univ. Press, Ithaca, NY. i-xii+204 pp.

Harestad, A.S. and D.G. Keisker. 1989. Nest tree use by primary cavity-nesting birds in southcentral British Columbia. Canadian Journal of Zoology 67: 1067-1073.

Higgins, R.J., M.A.Todd, J.M. Meggs, L. Gyug[4], B.S. Lindgren, and K. Fort. 2010. Dietary dependence of Williamson's Sapsucker on coarse woody debris-associated ants. Draft final report: FSP Project No. Y102172, submitted to Environment Canada – Canadian Wildlife Service, Delta, B.C. Aug. 2010.

Kamloops Future Forest Strategy Timber Supply Area Team. 2009. The Kamloops Future Forest Strategy Final Report and Compendium of Supporting Information. British Columbia Ministry of Forests, unpublished. Available at <www.for.gov.bc.ca/hcp/ffs/KFFS_REPORT_ONLY_June25-09.pdf.> (Accessed August 26, 2009.)

Keisker, D.G. 1987. Nest tree selection by primary cavity-nesting birds in south-central British Columbia. British Columbia Ministry of Environment, Wildlife Branch, Victoria, B.C. Wildlife Report No. R-13. 67pp.

Loose, S.S. and S.H. Anderson. 1995. Woodpecker habitat use in the forests of southeastern Wyoming. Journal of Field Ornithology 66: 503-514.

Manning, E.T. and J.M. Cooper. 1996. Progress Report (Year 1 – 1996). An assessment of woodpecker foraging, home range and patch utilization at Wallace Creek, British Columbia. Prepared for B.C. Ministry of Environment, Penticton, B.C.

Marmorek, D. and D. Pickard. 2010. Adaptive Monitoring Framework (AMF) for Assessing the Status and Trend of Williamson's Sapsucker (WISA). Draft Prepared by ESSA Technologies Ltd., Vancouver, B.C. for Ian Parnell, Environment Canada-Canadian Wildlife Service.

Morrissey C.A, P.L. Dods, C.A. Albert, W.R. Cullen, V. Lai, T. Williams, and J.E. Elliott. 2006. Assessing forest bird exposure and effects from Monosodium Methanearsonate (MSMA) during the Mountain Pine Beetle epidemic in British Columbia. Technical Report, Environment Canada, Canadian Wildlife Service. 100 pp.

Morrissey C.A, C.A. Albert, P.L. Dods, W.R. Cullen, V.W.M. Lai, and J.E. Elliott. 2007. Arsenic accumulation in bark beetles and forest birds occupying mountain pine beetle infested stands treated with monosodium methanearsonate. Environmental Science and Technology 41: 1494-1500.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available at <http://www.natureserve.org/explorer>. (Accessed: December 1, 2010).

Ohanjanian, P. 2011. Monitoring of Williamson's Sapsucker, *Sphyrapicus thyroideus*, in the East Kootenay Area of Occupation, 2011. Prepared for Environment Canada – Canadian Wildlife Service, Delta, B.C.

Ohanjanian, P. 2010. Williamson's Sapsucker (Sphyrapicus thyroids) baseline population monitoring in the East Kootenay. Prepared for Environment Canada – Canadian Wildlife Service, Delta, B.C.

Oliver, W.W. 1970. The feeding pattern of sapsuckers on Ponderosa Pine in northeastern California. Condor 72:241.

Otvos, I.S. and R.W. Stark. 1985. Arthropod food of some forest-inhabiting birds. Canadian Entomologist 117: 971-990.

Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. Annual Review of Ecology Evolution and Systematics 37: 637-669.

Resource Inventory Standards Committee (RISC). 1999. B.C. Wildlife Habitat Ratings Standards Version 2.0. Ministry of Environment, Lands and Parks, Victoria, B.C. <http://www.ilmb.gov.bc.ca/risc/pubs/teecolo/whrs/assets/whrs.pdf> [Accessed September 2, 2011]

Sauer, J. R., J. E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966 - 2003. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, MD.

Smith, K.G. 1982. On habitat selection of Williamson's and "Red-naped" Yellow-bellied sapsuckers. Southwestern Naturalist 27: 464-466.

Spring, L.W. 1965. Climbing and pecking adaptations in some North American woodpeckers. Condor 67: 457-488.

Stallcup, P.L. 1968. Spatio-temporal relationships of nuthatches and woodpeckers in Ponderosa Pine forests of Colorado. Ecology 49: 831-843.

Stanford, J.S. and G.F. Knowlton. 1942. Food of some Utah birds. Auk 59: 580-581.

Steeger, C. 2010. Baseline population monitoring for the Williamson's Sapsucker (Sphyrapicus thyroides) – Okanagan Boundary Area. Report prepared for Environment Canada – Canadian Wildlife Service, Delta, B.C.

Visser M.E., L.J.M. Holleman, and P. Gienapp. 2006. Shifts in caterpillar biomass phenology due to climate change and its impact on the breeding biology of an insectivorous bird. Oecologia 147: 164-172.

Walters, E.L. 1996. Habitat and space use of the Red-naped Sapsucker, *Sphyrapicus nuchalis*, in the Hat Creek valley, south-central British Columbia. M.Sc. Thesis, University of Victoria.

Westerling A.L., H.G. Hidalgo, D.R. Cayan, and T.W. Swetnam. 2006. Warming and earlier spring increase western US forest wildfire activity. Science 313: 940-943.

WorkSafe B.C. 2009. Occupational Health and Safety (OHS) Regulation. Available at <http://www2.worksafeB.C..com/Publications/OHSRegulation/Home.asp>. (Accessed 26 Aug 2009.)

World Wildlife Fund. 2012. Terrestrial Ecoregions GIS Database. Available at http://www.worldwildlife.org/science/data/item6373.html>. (Accessed 14 Aug. 2012).

APPENDIX 1 –METHODOLOGICAL DETAILS OF AREA OF OCCUPANCY DETERMINATION AND POPULATION ESTIMATION

Area of Occupancy determination

"Area of Occupancy" (AO) is defined as the area within its 'extent of occurrence' which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the entire area of its extent of occurrence, which may, for example, contain unsuitable habitats. The size of the AO will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon. The criteria include values in km^2, and thus to avoid errors in classification, the AO should be measured on grid squares (or equivalents) which are sufficiently small." (IUCN http://www.iucnredlist.org/technical-documents/categories-and-criteria/1994-categories-criteria). For Williamson's Sapsuckers, there are many areas that have never been surveyed but where it is assumed to breed based on biogeoclimatic zone, elevation and forest habitat similarities to where they have been found breeding (see Gyug et al. 2007). Summing the AO as a set of occupied 1-km x 1-km grid squares would therefore be misleading as there would be many gaps in the AO that may actually be occupied. Therefore, based on known presence and absence from extensive call playback surveys, the general limits of the AO were spatially defined as a set of polygons that should be interpreted in a broad sense, i.e., within the range of a few km accuracy, and that may be adjusted in the future as previously unsurveyed areas may be found to be unoccupied, and areas that were previously thought to be unoccupied and were excluded may become occupied. Area sampled was estimated based on an average sampled radius of 300-m around call playback points (see Gyug et al. 2007), and adding any other areas searched by other means such as nest searches or breeding census areas.

Population estimation

Population estimates for each AO were derived from random call-playback surveys and follow-up nest searches conducted across habitat strata (in 2008 for the Okanagan-Boundary and Western AOs and 2011 for the East Kootenay AO; Gyug 2012). For the Okanagan-Boundary AOs, the population estimates were calculated using detection probabilities derived from call-playback sampling and an estimated effective detection radius (based on distance from survey stations to nests found), and extrapolated across the AO based on the area of habitat in each suitability class. For the East-Kootenay AO, a 'dual-frame' approach (Haines and Pollock 1998) to population estimation was employed. In this approach, part of the population estimate is derived from 'area frame' sampling (as described above) and the remainder of the estimate is derived from a census of previously known territories (the 'list frame'). This method is intended to reduce the variance associated with population estimation based purely on random area-based sampling, which is often particularly high for species that are very rare. However, there is low confidence in the reliability of the East Kootenay AO population estimate because the habitat suitability model (upon which the habitat stratification and subsequent population size extrapolation are based) is not accurate for that AO.

APPENDIX 2 - EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*[14]. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non--target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

Recovery activities for Williamson's Sapsucker will focus on efforts to maintain or increase important habitat elements (e.g. old and mature trees with advanced heart rot, coarse woody debris) that are beneficial to many forest-dependent wildlife species. For example, management strategies emphasizing the protection of trees or snags infected with heart rot would be beneficial to various cavity-nesting bird species.

As a primary cavity excavator, successful recovery of Williamson's Sapsucker will likely result in an increase in potential nest sites for the broad class of secondary cavity nesters including Mountain Bluebird (*Sialia currucoides*), American Kestrel (*Falco sparverius*), and Flammulated Owl (*Otus flammeolus*).

Recovery activities aimed at protecting and restoring multi-layered Western Larch stands for the East Kootenay and Okanagan-Boundary populations of Williamson's Sapsucker will likely be beneficial to the Douglas-fir - Western Larch/pine grass ecological community, which is red-listed in British Columbia.

[14] http://www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1