Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Sage Thrasher (*Oreoscoptes montanus*) in Canada

Sage Thrasher

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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].

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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 federal Minister of the Environment is the competent minister for the recovery of the Sage Thrasher and has prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with the Governments of British Columbia, Alberta, and Saskatchewan, and Parks Canada Agency.

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 Sage Thrasher 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.

ACKNOWLEDGMENTS

Many people are to be acknowledged for their involvement in the preparation of this recovery strategy. The first version was written by Martin Gebauer and Rhonda Millikin in 1998. The recovery strategy changed substantially with input from the recovery team, which included, at various times: the former Chair, Pam Krannitz (Environment Canada), Richard Cannings (Cannings Holm Consulting), Orville Dyer (B.C. Ministry of Natural Resource Operations), Andrew Gray and Ronald Casorso (Dominion Radio Astrophysical Observatory, National Research Council), Ron Hall (Osoyoos Indian Band), Alex McLean and Rick Tucker (B.C. Ministry of Forests, Mines, and Lands), Howie Richardson (Okanagan University College), Alyson Skinner and Bianka Sawicz (The Land Conservancy of B.C.), Al Smith, Helen Trefry, and Katrina Roger (Environment Canada), Leanna Warman (University of British Columbia, and Matt Vander Haegen (Washington Department of Fish and Wildlife).
Dave Prescott and Sue Cotterill (Alberta Sustainable Resource Development) commented on the strategy. Christopher Wood (B.C. Ministry of Environment) and Allison Haney provided data and/or assistance with Figures 2 and 3.

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

EXECUTIVE SUMMARY

The Sage Thrasher (*Oreoscoptes montanus*) is a medium-sized songbird that can be distinguished from other thrashers by its smaller size, short tail and short bill. Adult Sage Thrashers have brownish-grey upper parts with indistinct streaking on their crowns, off-white under parts streaked with dark brown spots, and brownish wings with narrow whitish wing-bars and black bills. The Sage Thrasher song is a long, harmonious, flute-like series of warbling notes. Sage Thrashers are short-distance migrants, and are only present in Canada between spring and late summer.

In Canada, Sage Thrashers have been sighted regularly in the southern Similkameen and Okanagan valleys of British Columbia and occasionally in southwestern Saskatchewan and southeastern Alberta. They have very low population numbers in Canada, which is at the very northern periphery of their range. Abundance in Canada appears to be linked to population size fluctuations in the core of the species range, in the United States. The species was listed as Endangered under the *Species at Risk Act* in 2003. It is a migratory bird protected under the *Migratory Birds Convention Act,1994*, and is under the jurisdiction of the federal government. The species is also identified as a Species at Risk under the *Forest and Range Practices Act* and is listed as Identified Wildlife under the Identified Wildlife Management Strategy.

The main threats to the Sage Thrasher are habitat loss and degradation resulting from urban and agricultural development, wildfire, inappropriate livestock grazing, and road construction and maintenance. In the prairies, oil and gas exploration and range management activities are also significant threats. Other potential threats include mineral exploration, fire suppression and climate change.

Recovery is considered to be biologically and technically feasible. The population and distribution objective is to enable a population of Sage Thrashers, in the range of 15-20 pairs, to persist across a minimum of five sites distributed across the species' Canadian range. 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 (Section 6.2).

Critical habitat is partially identified in this recovery strategy at White Lake, West Chopaka, and Kilpoola Lake; three areas in the south Okanagan valley within British Columbia where occurrence records have been clustered over time. Critical habitat for the Sage Thrasher is located on both federal and non-federal land.

An action plan or plans for the Sage Thrasher will be posted on the Species at Risk Public Registry by 2019.

RECOVERY FEASIBILITY SUMMARY

Recovery of the Sage Thrasher in Canada is biologically and technically feasible based on the following four criteria (Environment Canada 2009):

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, there are individuals capable of reproduction present in most years. The population of Sage Thrashers is highly variable from year to year, but nesting records do occur regularly. In addition, due to the highly mobile nature of this species, birds will move between the United States, where the species is more common, and Canada.

Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration. Yes, there is enough suitable habitat (and additional habitat that could be made suitable) in British Columbia. While habitat has been lost in both B.C. and the prairies, sufficient suitable habitat does still remain to support Sage Thrashers at their historical population maxima. It is believed that factors within the core of the species' range (in the United States) are more responsible for limiting the Canadian Sage Thrasher population than habitat availability/suitability in Canada. Habitat availability and suitability is not well known in the prairies, but habitat appears available to support the small and sporadic occurrences of the species in Alberta and Saskatchewan.

The primary threats to the species or its habitat (including threats outside of Canada) can be avoided or mitigated. Yes. The most significant threat to the species is habitat loss and degradation due to urban and agricultural development. This threat can be reduced or mitigated through current land use designations, voluntary stewardship, and other mechanisms for habitat securement.

Recovery techniques exist to achieve the population and distribution objectives, or can be expected to be developed within a reasonable timeframe. Yes, habitat protection techniques such as stewardship agreements and conservation covenants on private lands, land use designations on Crown lands, and protection in federal, provincial and local government protected areas exist and have some demonstrated success. Site-specific habitat management techniques are a knowledge gap that can be addressed through research and implemented through a voluntary stewardship approach or existing land use designations. Active re-introduction from source populations in the U.S.A. is not considered necessary at this time; nor is a captive breeding program, because of the dispersive nature of this species.

As the small Canadian population of Sage Thrasher 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 Sage Thrasher 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 goals, 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 Sage Thrasher at present.

TABLE OF CONTENTS

PREFACE i
ACKNOWLEDGMENTS i
EXECUTIVE SUMMARY ii
RECOVERY FEASIBILITY SUMMARY iii
1. COSEWIC* SPECIES ASSESSMENT INFORMATION 1
2. SPECIES STATUS INFORMATION 1
3. SPECIES INFORMATION 2
3.1 Species Description 2
3.2 Population and Distribution 2
3.3 Needs of the Sage Thrasher 6
4. THREATS 7
4.1 Threat Assessment 7
4.2 Description of Threats 8
5. POPULATION AND DISTRIBUTION OBJECTIVE 12
6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVE 13
6.1 Actions Already Completed or Currently Underway 13
6.2 Strategic Direction for Recovery 15
6.3 Narrative to Support the Recovery Planning Table 15
7. CRITICAL HABITAT 16
7.1 Identification of the Species' Critical Habitat 16
7.2 Schedule of Studies to Identify Additional Critical Habitat 22
7.3 Activities Likely to Result in the Destruction of Critical Habitat 22
8. MEASURING PROGRESS 23
9. STATEMENT ON ACTION PLANS 23
10. REFERENCES 24
11. PERSONAL COMMUNICATIONS 29
APPENDIX A. EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES 30

1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2010

Common Name (population): Sage Thrasher

Scientific Name: *Oreoscoptes montanus*

COSEWIC Status: Endangered

Reason for Designation: In Canada, this species occurs in British Columbia, Alberta and Saskatchewan. Its Canadian population is extremely small, ranging from 7 to 36 individuals depending on the year. Populations in adjacent parts of the U.S., which are a likely source of birds for Canada, are declining. In addition, the sagebrush habitat necessary for breeding is decreasing, particularly in British Columbia, where the species is a regular breeder.

Canadian Occurrence: British Columbia, Alberta, Saskatchewan

COSEWIC Status History: Designated Endangered in April 1992. Status re-examined and confirmed in November 2000 and November 2010.

*Committee on the Status of Endangered Wildlife in Canada

2. SPECIES STATUS INFORMATION

Globally, the rank assigned to the Sage Thrasher is G5 (secure; NatureServe 2009). However, in British Columbia and Saskatchewan, the species is ranked as critically imperiled (Table 1). In Alberta, the rank is Undetermined because of lack of information about the species in that province (ASRD 2004). Canada represents significantly less than 1% of the global abundance of Sage Thrashers (Partners in Flight 2007).

Table 1. List and description of various conservation status ranks for Sage Thrasher (from NatureServe 2009, British Columbia Conservation Data Centre 2010, Saskatchewan Conservation Data Centre 2009, and B.C. Ministry of Environment 2010).

Global (G) Rank	National (N) Rank	Canada Status	Sub-national (S) Rank	B.C. Conservation Status
G5	Canada: N1B United States: N5B, N5N	COSEWIC: E (Endangered) SARA: Schedule 1 (Endangered)	British Columbia (S1B) Saskatchewan (S1B) Alberta (Undetermined)	• Red List (B.C. CDC) • Conservation Framework Priority 1 under Goal 3[1]

G/N/S1: Critically Imperiled; 2: Imperiled; 3: Vulnerable; 4: Apparently Secure; 5: Secure; B: Breeding.
B.C. CDC: British Columbia Conservation Data Centre
[1]*Goal 3: Maintain the diversity of native species and ecosystems. Priority 1: highest priority.*

3. SPECIES INFORMATION

3.1 Species Description

The Sage Thrasher is a medium-sized songbird that can be distinguished from other thrashers by its smaller size (length 20.0-23.0 cm, mass 39.6-50.3 g), short tail and short bill (11.1-13.3 mm; Reynolds et al. 1999). Adult Sage Thrashers have brownish-grey upper parts with indistinct streaking on their crowns, off-white under parts streaked with dark brown spots, and brownish wings with narrow whitish wing-bars and black bills. Adult males are slightly larger than females; otherwise the sexes are similar in appearance. Juveniles are similar to adults but with paler and less distinctly streaked under parts compared to adults. The Sage Thrasher song is a long, harmonious, flute-like series of warbling notes. Sage Thrashers are short-distance migrants, and are only present in Canada between spring and late summer (May to early September). There are no inherent biological traits that would limit population growth in the Sage Thrasher. They breed the first year after hatching and annually thereafter and can double-brood. The average clutch size is four eggs (Gooding 1970, Reynolds and Rich 1978, Reynolds 1981, Campbell et al. 1997). Sage Thrashers quickly reject parasitic cowbird eggs (Rich and Rothstein 1985).

3.2 Population and Distribution

Sage Thrashers predominantly breed throughout the western and central United States, with wintering distributions occurring south into Mexico (Figure 1). In Canada, Sage Thrashers have been sighted regularly in the southern Similkameen and Okanagan valleys, occasionally in the Thompson and Fraser valleys of British Columbia (Godfrey 1986; COSEWIC 2010; Figure 2), and in southwestern Saskatchewan and southeastern Alberta (ASRD 2004, Smith 2005; Figure 3). While sporadic occurrences have occurred throughout extreme south-central British Columbia, the majority of recent survey records are clustered in three main areas: White Lake, West Chopaka, and Kilpoola Lake (Figure 2).

Figure 1. Global distribution of the Sage Thrasher. The species winters locally to the dashed line (Birds of North America Online 2010).

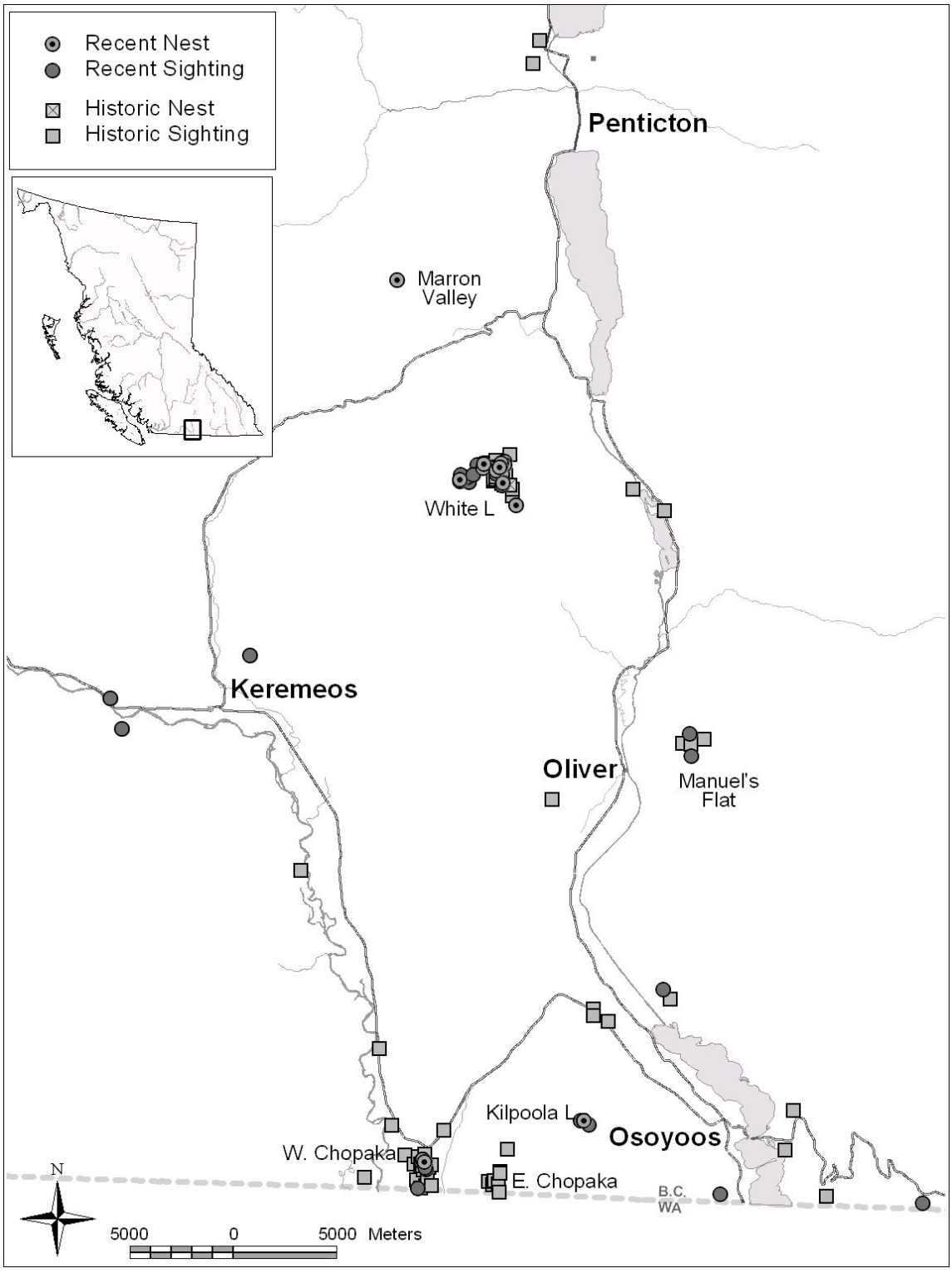

Figure 2. Historic (1910-1999) and recent (2000-2011) Sage Thrasher sightings and nest locations in the South Okanagan-Similkameen region of British Columbia. Inset map is not to scale.

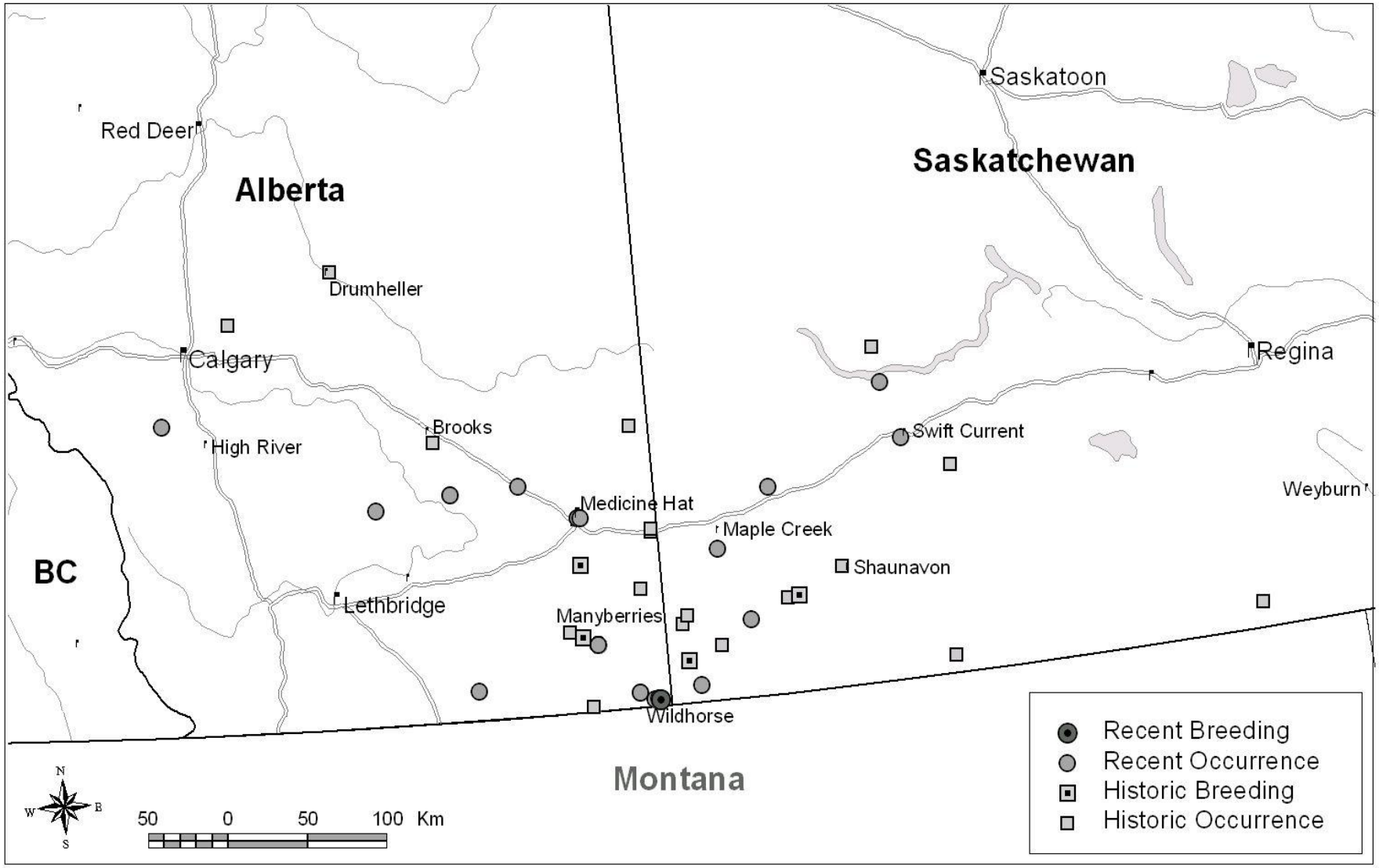

Figure 3. Historic (1924-1999) and recent (2000-2010) Sage Thrasher sightings and confirmed breeding locations in Prairie Canada.

The global Sage Thrasher population is estimated at 7.9 million individuals (Partners in Flight 2007). The G5 ranking of the Sage Thrasher indicates that it is globally common to very common, and demonstrably secure under present conditions (NatureServe 2009). According to Breeding Bird Surveys (BBS; reference period 1966-2007), global Sage Thrasher populations have shown a neutral trend (Sauer et al. 2008). In Canada, however, the Sage Thrasher has been assessed as endangered based on very small numbers, a restricted range, and the fact that sagebrush habitat availability and quality are under significant pressure in British Columbia, the only province where the species breeds regularly (COSEWIC 2010). No BBS trend data is available for Sage Thrashers in Canada. Informal survey records suggest that Sage Thrasher populations have fluctuated over the last 100 years in British Columbia, up to a maximum of 30 pairs (Cannings et al. 1987). In recent decades, the population in British Columbia has ranged between three and twelve pairs; in Alberta and Saskatchewan, the population has ranged from one bird to six pairs (COSEWIC 2010). Breeding records in Prairie Canada remain infrequent and few.

3.3 Needs of the Sage Thrasher

In British Columbia, Sage Thrasher detections have occurred exclusively in areas dominated by Big Sagebrush (*Artemisia tridentata*). Big Sagebrush has also been a consistent predictor of Sage Thrasher occurrence elsewhere in the species' range (Braun et al. 1976, Dobler et al. 1996, Knick and Rotenberry 1995, Vander Haegen et al. 2000), and the species has been known to nest almost exclusively in Big Sagebrush (Reynolds and Rich 1978, Rich 1980, Reynolds 1981, R. Millikin, unpubl. data.). The greatest limiting factor to the recovery of Sage Thrashers is thus the restricted distribution of Big Sagebrush. Within sagebrush habitats, Sage Thrashers occupy areas with greater than average sagebrush cover (Knick and Rotenberry 1995, Dobler et al. 1996) or greater cover of shrubs in general (Vander Haegen et al. 2000). In Alberta and Saskatchewan, Silver Sagebrush, not Big Sagebrush, is the species used by Sage Thrashers (ASRD 2004). Silver Sagebrush rarely reaches heights suitable for Sage Thrasher nesting outside of riparian areas (ASRD 2004).

Nest site habitat characteristics were measured from 1993-1996 in the South Okanagan region of British Columbia (R. Millikin, unpubl. data). Sage Thrashers selected larger than average sagebrush shrubs for nesting (total height averaged 132 cm, crown height averaged 114 cm and width of crown averaged 168 cm). Nests were placed at least 53 cm from the top of crown, which is consistent with other reports (e.g., Reynolds and Rich 1978, Rich 1980, Reynolds 1981), indicating that the density of vegetative cover over the nest may be critical in providing protection from predators (Gooding 1970, Rich 1980, Castrale 1982, R. Millikin, unpubl. data.).

In the United States, Sage Thrasher abundance has been correlated with several vegetation characteristics below the shrub level; abundance was positively correlated with bare soil and perennial grass cover and negatively correlated with annual grass cover (Wiens and Rotenbery 1981, Dobler et al. 1996, Reynolds et al. 1999). There are currently insufficient data from British Columbia to determine whether these same associations exist in Canada; however, perennial grass and bare soil were the most dominant cover types at point count stations where Sage Thrashers were detected in a south Okanagan-wide survey in 1998 (S. Paczek, unpub. data). Vegetation data were also collected within eleven Sage Thrasher territories (centered on nests)

between 2005 and 2010. Perennial grass cover in the eleven territories averaged 9% and bare soil averaged 31%. These features may be selected because Sage Thrashers forage almost exclusively on the ground, where more open structure may increase foraging efficiency (reviewed in Reynolds et al. 1999). In British Columbia, Sage Thrashers breed at lower elevations (300-1000 m) than in the centre of their range in the United States (generally 1300-2000 m elevation, Reynolds and Rich 1978).

Sage Thrashers occupy multi-purpose territories (i.e., all needs are met within the bounds of the territory; Reynolds et al. 1999). Territories within British Columbia have averaged 3.93 ha in size (range 0.28 to 10.57, Environment Canada unpubl. data). Larger territories have been measured in British Columbia than in the United States (Idaho: largest = 1.64 ha, Reynolds and Rich 1978; Washington: largest = 1.7 ha; Gooding 1970). Patch size may be an important determinant of Sage Thrasher occurrence or reproductive success. Sage Thrasher rates of occupancy declined with patch size in Idaho (Knick and Rotenberry 1995) and reproductive success was lower in more fragmented habitat in Washington (Vander Haegen 2007). However, no studies have identified a threshold patch size required to support breeding Sage Thrashers.

Given the peripheral nature of the Sage Thrasher population in Canada, immigration from the United States is deemed necessary in sustaining and stabilizing the number of birds breeding in Canada (see 5.0 Population and Distribution). Therefore, Sage Thrashers breeding in Canada require suitable habitat not just within Canada, but also within adjacent U.S. states.

Little information exists on Sage Thrasher habitat selection in non-breeding or over-wintering habitat; however, Sage Thrashers have been detected in a broader range of habitats during the overwintering period, including a variety of arid scrub, brush, and thicket habitats (Howell and Webb 1995).

4. THREATS

4.1 Threat Assessment

Table 2. Threat Assessment Table

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Habitat loss or degradation						
Urban development and agricultural cultivation	High	Localized	Historic, current, anticipated	Continuous	High	High
Wildfire	High	Localized	Historic, current, anticipated	Recurrent	High	High

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Inappropriate livestock grazing	Medium	Widespread	Historic, current	Recurrent	High	Moderate
Road construction and maintenance	Medium	Localized	Historic, current, anticipated	Continuous	Moderate	Moderate
Mineral, oil and gas exploration/ extraction	Medium	Localized	Current	Continuous	Unknown	Low
Range management	Medium	Localized	Historic (B.C.), current, anticipated (Alberta and Sask.)	Recurrent	High	High
Changes in ecological dynamics or natural processes						
Fire suppression	Medium	Widespread	Historic, current, anticipated	Recurrent, continuous	Low	Low
Climate change and natural disasters						
Climate change	Low	Widespread	Current, anticipated	Continuous	Unknown	Low

[1] *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

Threats listed as having a low 'level of concern' in Table 2 are not described in this section.

Sage Thrasher populations in Canada have always been low, and it is likely that factors from the core of the species' range in the United States influence population sizes in Canada as much as, if not more so, than threats on the Canadian breeding grounds. However, for birds that do breed within Canada, the primary threat to their persistence is loss of habitat through urban and agricultural development. Additional activities that can or may result in habitat loss and degradation include wildfire, inappropriate livestock grazing, road construction and maintenance, and mineral exploration. In the prairies, oil and gas exploration and range management activities also pose threats. Road construction and maintenance and oil and gas exploration are new threats

that were not listed in the COSEWIC status report (COSEWIC 2010). Both road construction and other infrastructure development in support of the oil and gas industry in Alberta are listed as threats in the Greater Sage-Grouse Recovery Strategy (Lungle and Pruss 2008), and Sage Thrashers and Greater Sage-Grouse occupy very similar habitats. Roadside vegetation management also has the potential to threaten Sage Thrashers nesting at the two main sites in British Columbia. Fire suppression may also result in degradation of Sage Thrasher breeding habitat.

Habitat Loss and Degradation

Urban development and agricultural cultivation

Habitat loss and fragmentation due to urban development and agricultural cultivation have been linked with declines or disappearances of sagebrush birds, including Sage Thrashers, in the United States (Knick and Rotenberry 1995, Vander Haegen 2007).

In British Columbia, sagebrush habitats that formerly supported Sage Thrashers were converted for agricultural cultivation, primarily to orchards and vineyards, in the 1930s (Cannings 1992). Lea (2008) documented declines of sagebrush habitat between 1800 and 2005 in the southern Okanagan and Similkameen valleys. The Big Sagebrush shrub-steppe habitat type, which has contained all the Sage Thrasher occurrences in British Columbia, has been reduced by over 33%. No calculation of the loss of previously occupied habitat has been completed due to limited data. According to COSEWIC (2010), 70% of the remaining suitable Sage Thrasher habitat in the south Okanagan and Similkameen valleys is on land where there is constant pressure for development (e.g., vineyards, golf courses, and housing developments). In addition, a portion of the land at White Lake that has been used by Sage Thrashers is subject to a grazing lease that does not include conservation restrictions, so future cultivation of that land is possible.

In Alberta and Saskatchewan, Greater Sage-Grouse (*Centrocercus urophasianus*) occupy similar habitats to Sage Thrashers (i.e., Silver Sagebrush-dominated mixed grassland), and have had more detailed estimates done on the extent of their habitat lost. In Saskatchewan, 69% of potential habitat for Greater Sage-Grouse has been lost to cultivation (McAdam 2003), with most of the loss occurring prior to 1981 (Thorpe et al. 2005). In Alberta, 46% of potential habitat has been lost to some form of development (Nernberg and Ingstrup 2005). These losses of Greater Sage-Grouse habitat in the prairies are also losses of Sage Thrasher habitat.

Wildfire

Big Sagebrush does not generally survive fires and must regenerate from seed (Baker 2006). While fire is a natural component of sagebrush ecosystems, with fire return intervals in the range of 25 to 40 years, burned stands have taken over 50 years to return to pre-fire canopy cover (Lesica et al. 2007, Ziegenhagen and Miller 2009), meaning that burned habitat is lost in the short- to mid-term. A portion of the White Lake site that was burned in the 1980s has yet to return to pre-fire sagebrush cover. Because Sage Thrashers occur regularly on only a few sites in British Columbia, and those sites are adjacent to well-travelled roads, where careless disposal of cigarettes may occur, there is an elevated risk of important habitat being lost to wildfire. This

risk was proven in 2012 when a human-caused fire burned 30 ha of the most suitable Sage Thrasher habitat at White Lake, and again in 2014 when a fire burned 20 ha of habitat that included an active Sage Thrasher nest at White Lake.

Silver Sagebrush, found in the prairies, differs from Big Sagebrush in that it reproduces vegetatively (Thorpe 2002). Thus, light spring burning may result in increased production of new shoots (Adams et al. 2004) as well as resprouting in senescent plants or in areas trampled by livestock (Connelly et al. 2000, Owens and Norton 1992). The effects of fire on Silver Sagebrush habitats in the prairies require further investigation.

Inappropriate livestock grazing

Cattle have been shown to directly affect grassland and shrubland nesting birds through physically breaking or trampling nest shrubs or seedlings (Adams et al. 2004, Connelly et al. 2000, Owens and Norton 1992). Inappropriate grazing regimes (e.g., overstocking, overutilization, and inadequate rest) also promote the growth of invasive annual grasses like brome (*Bromus* spp.), which are highly flammable and can cause fires that reduce or eliminate sagebrush (Knick and Rotenberry 1997; Paige and Ritter 2009). In Washington, Sage Thrashers were less abundant on sites classed as having poor range condition, than at sites with range conditions classed as good or fair (Vander Haegen et al. 2000).

However, some level of disturbance, such as that created by cattle grazing, may be necessary to maintain the high sagebrush densities associated with Sage Thrasher occurrence (Krannitz 2008). Grazing also increases the exposure of bare ground (Yeo 2005), which has been positively associated with Sage Thrasher occurrence in the United States (Wiens and Rotenbery 1981, Dobler et al. 1996, Reynolds et al. 1999). Several studies from the core of the species' range have found that Sage Thrashers are either unaffected by moderate intensity grazing (subjectively defined) or are actually more abundant in 'moderately' grazed habitats (Reynolds and Trost 1981; Kantrud and Kologiski 1982; Saab et al.1995). In the prairies, Thorpe and Godwin (2003) suggest that Silver Sagebrush, which is an important nest shrub for Sage Thrashers in the prairie provinces, is an 'increaser' species in response to grazing, although that pattern may change when grazing intensities increase (Adams et al. 2004). Environmental conditions may also affect the level of threat posed by cattle grazing; cattle have been observed browsing Silver Sagebrush during years of drought (H. Trefry, pers. comm.).

Cattle grazing occurs at both White Lake and Chopaka in British Columbia, and in areas where Sage Thrashers have been detected in the prairies. Inappropriate grazing does not appear to be a current threat to Sage Thrashers at these sites. Range management guidance must be provided to landowners or grazing tenure holders and range condition must be monitored in order to ensure that inappropriate grazing does not threaten Sage Thrashers in the future.

Road construction and maintenance

Removal or damage of nest shrubs or potential nest sites by heavy equipment during highway construction or maintenance activities has been documented at a small portion of one of the key breeding sites in British Columbia. These activities are also potential threats at the other two

main breeding sites, and are expected to be potential threats at any additional Critical Habitat in the future. Maintenance standards for the highways require mechanical brush removal on major highways to be conducted up to 7 m from the road edge where vegetation height exceeds 3 m (rare for Big Sagebrush), and on minor highways up to 5 m from the edge where vegetation height exceeds 4m. On all classes of highways, mowing is required up to 1.8 m from the edge where vegetation height exceeds 0.5 m (B.C. Ministry of Transportation 2003). While there are no records of Sage Thrasher nest shrubs being destroyed by roadside mowing and brushing, it is possible that potential nest shrubs could be removed during brushing activities, or that Sage Thrashers nesting adjacent to mowed areas could be disturbed by the activity. This potential threat was realized in 2014 when an active Sage Thrasher nest was located 14 m from the edge of a main road at White Lake.

Collisions of individual birds with vehicles on roads pose a threat to many other species in Canada (Bishop and Brogan 2013), but the threat to Sage Thrasher requires further investigation. The building of roads in support of oil and gas exploration and infrastructure development also threatens sagebrush habitat in Alberta (Braun et al. 2002, Lungle and Pruss 2008).

Mineral, oil and gas exploration/extraction

Oil and gas exploration and extraction is common in the Sage Thrasher range in Alberta. Braun et al. (2002) determined that 1500 wells have been drilled in the Greater Sage-Grouse range (which overlaps with the Sage Thrasher range) in southeastern Alberta, and an estimated 575 of those wells are still producing. This equates to one active and two inactive wells/km^2 (Braun et al. 2002). These wells are connected by a series of roads and trails, as well as powerlines and pipelines that are interlaced with compressor stations and gas camps (Braun et al. 2002). Although the effects of oil and gas exploration on the Sage Thrasher are poorly understood, these structures and features will result in direct loss and degradation and fragmentation of sagebrush habitat. Vertical structures associated with oil and gas infrastructure also provide popular perches for avian predators, such as raptors (H. Trefry, pers. comm.). Further oil and gas exploration is expected in southeastern Alberta (Braun et al. 2002). In addition, there is substantial oil and gas exploration and development in southwestern Saskatchewan (A.R. Smith pers. comm.). This type of development is not a threat to Sage Thrasher habitat in British Columbia.

While there are no active mines within potential Sage Thrasher sites in Canada, mineral exploration is occurring close to Sage Thrasher sites in British Columbia and could pose a future threat (InfoMine 2010). Strip mining has destroyed sagebrush habitat in the United States (Braun et al. 1976 in COSEWIC 2010).

Range management

Intensive range management programs in the United States, such as burning, mowing, use of herbicides, and planting with crested wheatgrass (*Agropyron spicatum*) have negatively impacted sagebrush habitats and the birds utilizing these areas, including Sage Thrashers (Reynolds and Trost 1981, Wiens and Rotenberry 1985, McAdoo et al. 1989, Knick and Rotenberry 2000).

In British Columbia, some historical clearing of sagebrush (to improve range condition) occurred at two Sage Thrasher sites: West Chopaka (mowing), and White Lake (burning; Cannings 1992). Crested wheatgrass was also seeded on private rangelands adjacent to Kilpoola Lake, and has now partially invaded the Kilpoola Lake site (M. Harrison, pers. comm.). Sites that have been converted through intensive range management, or that have experienced invasion of crested wheatgrass from adjacent managed areas, may need to be restored. However, range management activities are no longer being practiced on Sage Thrasher sites in British Columbia.

In the prairies, range management poses a current threat. Planting of crested wheatgrass has occurred within the Sage Thrasher's range in both Alberta and Saskatchewan, and the species has successfully invaded native grasslands adjacent to planted areas (Henderson and Naeth 2005). In addition, water impoundment (for livestock) has reduced natural overflow, limiting moisture availability and stunting the growth of Silver Sagebrush (McNeil and Sawyer 2003).

Changes in Ecological Dynamics or Natural Processes

Fire suppression

The lifespan of Big Sagebrush is estimated at approximately 40 years (Wambolt and Hoffman 2001). When fire is excluded from sagebrush ecosystems for a period greater than the sagebrush lifespan, over-mature and dying plants, which are characterized by reduced foliage density, become abundant. The reduced foliage density in over-mature and dying sagebrush plants makes them less capable of concealing Sage Thrasher nests. In semi-desert habitats of British Columbia, fire suppression has also been associated with tree encroachment (Turner and Krannitz 2001). Over the long term, continued tree encroachment could reduce the extent of Big Sagebrush habitat.

However, because Big Sagebrush habitat that is burned is lost over the short- to mid-term, and Sage Thrashers only occur on a few sites in British Columbia, fire suppression may be necessary in order to prevent too much habitat from being temporarily lost. The extent to which fire should be excluded from Sage Thrasher sites is unclear. This represents a knowledge gap that will need to be addressed through future research.

5. POPULATION AND DISTRIBUTION OBJECTIVE

The population and distribution objective is to enable a population of Sage Thrashers, in the range of 15-20 pairs, to persist across a minimum of five sites distributed across the species' Canadian range.

Rationale: Historical occurrence data suggest that this species was never abundant in Canada; consequently, achieving a "minimum viable population" is not a reasonable objective, nor is downlisting to "Threatened" status. In recent decades, the Canadian population has ranged from 3 to 18 pairs (3-12 pairs in British Columbia and 0-6 pairs in Prairie Canada; COSEWIC 2010). The objective is to enable the population to persist at its current maximum (approximately

18 pairs); a range of 15-20 pairs acknowledges annual variation in population size owing to factors in other parts of the species' range. This range will be assessed over a five year period. Five sites are necessary to allow for redundancy, given the dynamic nature of the sagebrush ecosystem and temporary loss attributable to fire. With five protected sites in Canada, if any one of the sites were lost due to fire, sufficient suitable habitat would still be present to support the population and distribution objectives.

This population will always be vulnerable to extirpation due to stochastic events in sagebrush habitats in Canada and perhaps adjacent United States. While the peripheral nature of the population in Canada means that the number of pairs present in any year will vary in relation to external factors, including population changes at the continental level, it is possible to increase the likelihood of this species persisting in Canada by maintaining the habitat that supports the small and sporadic occurrences of this species. The size of the Canadian population may reflect both continental range changes, local response to the provision of suitable habitat, and mitigation of key threats.

6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVE

6.1 Actions Already Completed or Currently Underway

The following overview is provided for context to understand the broad strategies outlined in Table 3.

Habitat protection and stewardship:

- Habitat has been conserved in three historical breeding areas in British Columbia (Chopaka, Kilpoola and White Lake) through establishment of the South Okanagan Grasslands Protected Area by B.C. Parks, and purchase of private land at Kilpoola Lake and grazing lease at the White Lake Biodiversity Ranch by The Nature Trust in partnership with Habitat Conservation Trust Fund.
- Sagebrush habitat has been re-created in Washington State through the Conservation Reserve Program (Vander Haegen et al. 2005).
- Informational road signs have been erected regarding Sage Thrashers and their habitat at White Lake and Keremeos in British Columbia (2004).
- An intensive Sage Thrasher habitat mapping project has been completed at White Lake (2013). The mapping products and associated report containing monitoring and management recommendations will feed into a site level management plan.
- A site-level management plan is under development for White Lake. It will outline requirements/procedures for protection of Sage Thrasher critical habitat.

Research and monitoring:

- Surveys of Sage Thrashers have been conducted in British Columbia: 1990 (preliminary); 1993-1996 (intensive, including colour banding and habitat descriptions); 1998,

2001-2006 (point counts); 2003-2005 (point counts plus nest searching and monitoring); 2008-2012 (grassland bird surveys).

- Sagebrush stand height and density has been mapped across approximately 350,000 ha of mixed grassland in Saskatchewan (Penniket 2003, 2004), and approximately 409,000 ha in Alberta (Jones et al. 2005) as part of the process to identify the extent of suitable habitat for Greater Sage-Grouse. Due to similarities in the species' habitat requirements, this mapping will also be relevant for Sage Thrashers.

6.2 Strategic Direction for Recovery

Table 3. Recovery Planning Table

Priority	Threat or Limitation	Recommended approaches to recovery (general research and management)
Broad Strategy 1: Habitat protection and stewardship		
Urgent	***Habitat loss and degradation:*** development; road construction/maintenance; inappropriate livestock grazing; mineral, oil and gas exploration/extraction; range management ***Changes in ecological dynamics:*** fire suppression	• Identify (by 2018) two additional patches of dry sagebrush habitat in the south Okanagan – Similkameen area of British Columbia as critical habitat. • Develop and implement mechanisms for habitat protection. These may include voluntary stewardship agreements, conservation covenants, sale by willing vendors on private lands, land use designations on Crown lands, and protection in federal, provincial and local government protected areas. • Create and implement, by 2018, management guidelines that will result in conservation of sagebrush habitat suitable for breeding Sage Thrashers at the five sites in British Columbia, and at any sites where Sage Thrashers are found to occur consistently in Alberta and Saskatchewan (if applicable).
Broad Strategy 2: Research and monitoring		
Necessary	***Knowledge gaps:*** detailed habitat associations in British Columbia; distributions and habitat associations in Prairie Canada; ecological consequences of fire suppression ***Threats on migration routes and wintering sites***	• Fill knowledge gaps relating to population estimates and distribution, habitat requirements and threats, and causal factors associated with variability in habitat and numbers. • Characterise use of sagebrush by Sage Thrashers in Alberta and Saskatchewan by 2018, targeting Sage Thrasher monitoring in areas where Silver Sagebrush mapping (Penniket 2003, 2004; Jones et al. 2005) has indicated that habitat potential is highest. • Determine factors important to producing healthy, vigorous, and dense big sagebrush, suitable for Sage Thrasher nesting. • Build habitat suitability and other models to refine selection of critical habitat. • Work with American colleagues to investigate correlations and causes of yearly variance in the Canadian population size.

6.3 Narrative to Support the Recovery Planning Table

Rationale behind Broad Strategy 1:

While only three sites have been consistently occupied by Sage Thrashers in the last decade (White Lake, West Chopaka, and very recently, Kilpoola Lake), with additional monitoring and habitat surveying work, it is possible for additional sites with frequent occupancy and/or high habitat potential to be identified as critical habitat. More time will be needed to protect these sites than the 5-year time frame of this recovery strategy; however, this objective is achievable in the longer term given the extent of remaining suitable habitat. The sizes of the five patches will

vary depending upon the extent of suitable habitat available in each area, but will collectively be large enough to allow any three of them to support 15-20 pairs. Assuming that each pair requires 10 ha (10 ha = the largest territory recorded in Canada, Environment Canada unpubl. data), 15-20 pairs would require 150-200 ha of suitable habitat.

Mechanisms for habitat conservation and management must be developed because Sage Thrashers occur on land under a range of ownership classes and usage patterns, creating a need for multiple conservation and stewardship approaches.

Rationale behind Broad Strategy 2:

There are significant knowledge gaps that must be filled regarding threats, such as fire, and factors that influence annual variability in Sage Thrasher numbers. The current population and distribution objective and critical habitat identification are also preliminary, and must be refined using more detailed information on Sage Thrasher distributions and habitat suitability. Research into the correlations between U.S. and Canadian populations could help explain and predict annual variation.

Because there is currently less information about habitat requirements and usage patterns in the prairies, an effort must be made to gather that information. Occurrences in the prairies are currently sporadic, unpredictable, and widely distributed. Targeting Sage Thrasher monitoring in areas where Silver Sagebrush mapping has indicated that habitat potential is highest will help to narrow down the search area, and increase the likelihood of birds being detected. If particular areas are found to be used consistently, habitat conservation measures could be undertaken.

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

Sage Thrashers have been detected consistently over the last decade at three sites within British Columbia: White Lake, West Chopaka, and Kilpoola Lake. No other sites within British Columbia, or within Saskatchewan or Alberta, have been known to have consistent occupancy over the last decade (although not all potential sites have been monitored regularly). The population and distribution objective requires five sites to be available, in order to provide the redundancy necessary to buffer against the temporary loss of sites attributable to fire or other disturbance. Because only three sites are identified in this recovery strategy, critical habitat has only been partially identified at this time. Two additional areas will need to be identified, and protected, in order to achieve the population and distribution objective. Additional surveys and monitoring will be required before critical habitat can be identified outside the three most regularly occupied sites.

Biophysical Attributes

Critical habitat for Sage Thrashers in British Columbia consists of habitats that:

- are 300-1000 m in elevation;
- contain larger than average Big Sagebrush shrubs, in terms of total height (average 132 cm), crown height (average 114 cm), and width of crown (average 168 cm; R. Millikin, unpubl. data);
- have >10% cover of Big Sagebrush, on average (determined using the unbiased line intercept method on 100-m transects extending out from 11 nests monitored between 2005 and 2010);
- are >0.28 ha (minimum territory size recorded in Canada) in size (i.e., patches with taller than average Big Sagebrush and >10% cover that are less than 0.28 ha are not critical habitat).

Identified Critical Habitat

The spatial extent of the critical habitat at White Lake, West Chopaka, and Kilpoola Lake was determined by using computer-based mapping (GIS) to establish 187 m buffers (corresponding to an area of 10 ha, i.e., the maximum territory size observed in British Columbia) around all detection points and nests. Areas of overlap were dissolved to form contiguous polygons, and clearly unsuitable features (e.g., roads and lakes) were clipped out. Minimum bounding rectangles were then drawn around the outside of the polygons, in order to delineate the outer bounds of the occupied area.

Critical habitat consists of habitat with the biophysical attributes outlined above and occurring within the bounding rectangles depicted in Fig. 4-6. The bounding rectangles within which critical habitat occurs are described below.

Note: while the area contained within the three bounding rectangles currently exceeds the estimated area required to supported 15-20 pairs (150-200 ha, based on a 10 ha territory size), only a portion of the habitat contained within the bounding rectangles possesses the biophysical attributes required to support Sage Thrashers. In addition, if habitat at the White Lake site was temporarily lost to fire, it is unlikely that the two remaining sites would be capable of supporting 15-20 pairs. This possibility was partially realized in 2012 when a human-caused fire burned 30 ha of the most highly suitable Sage Thrasher habitat at White Lake, and again in 2014 when a fire burned 20 ha that included an active nest containing two chicks. Consequently, despite the large area depicted, this is still a partial critical habitat identification and two additional sites will be identified in the future.

White Lake

Critical habitat is contained within the 836 ha minimum bounding rectangle (Fig. 4) described by the following coordinates (Universal Transverse Mercator [UTM] zone 11, North American Datum [NAD] 1983):

Starting at the Point of Commencement (POC) at 308999.967, 5466538.831 Meters.

Thence, approximately 178.1 degrees in a straight line to Point 1 (P1) at 309094.422, 5463705.888 Meters.

Thence, approximately 268.1 degrees in a straight line to Point 2 (P2) at 306147.719, 5463606.868 Meters.

Thence, approximately 358.1 degrees in a straight line to Point 3 (P3) at 306053.163, 5466439.854 Meters.

Thence, approximately 88.1 degrees in a straight line to the Point of Commencement (POC).

West Chopaka

Critical habitat is contained within the 232 ha minimum bounding rectangle (Fig. 5) described by the following coordinates (Universal Transverse Mercator [UTM] zone 11, North American Datum [NAD] 1983):

Starting at the Point of Commencement (POC) at 305047.435, 5433064.945 Meters.

Thence, approximately 176.4 degrees in a straight line to Point 1 (P1) at 305185.250, 5430887.085 Meters.

Thence, approximately 271.6 degrees in a straight line to Point 2 (P2) at 304093.597, 5430917.129 Meters.

Thence, approximately 356.4 degrees in a straight line to Point 3 (P3) at 303962.035, 5432995.717 Meters.

Thence, approximately 86.4 degrees in a straight line to the Point of Commencement (POC).

Kilpoola Lake

Critical habitat is contained within the 26 ha minimum bounding rectangle (Fig. 6) described by the following coordinates (Universal Transverse Mercator [UTM] zone 11, North American Datum [NAD] 1983):

Starting at the Point of Commencement (POC) at 312088.955, 5434630.298 Meters.

Thence, approximately 120.5 degrees in a straight line to Point 1 (P1) at 312800.425, 5434211.051 Meters.

Thence, approximately 210.4 degrees in a straight line to Point 2 (P2) at 312580.565, 5433836.165 Meters.

Thence, approximately 300.5 degrees in a straight line to Point 3 (P3) at 311869.096, 5434255.411 Meters.

Thence, approximately 30.4 degrees in a straight line to the Point of Commencement (POC).

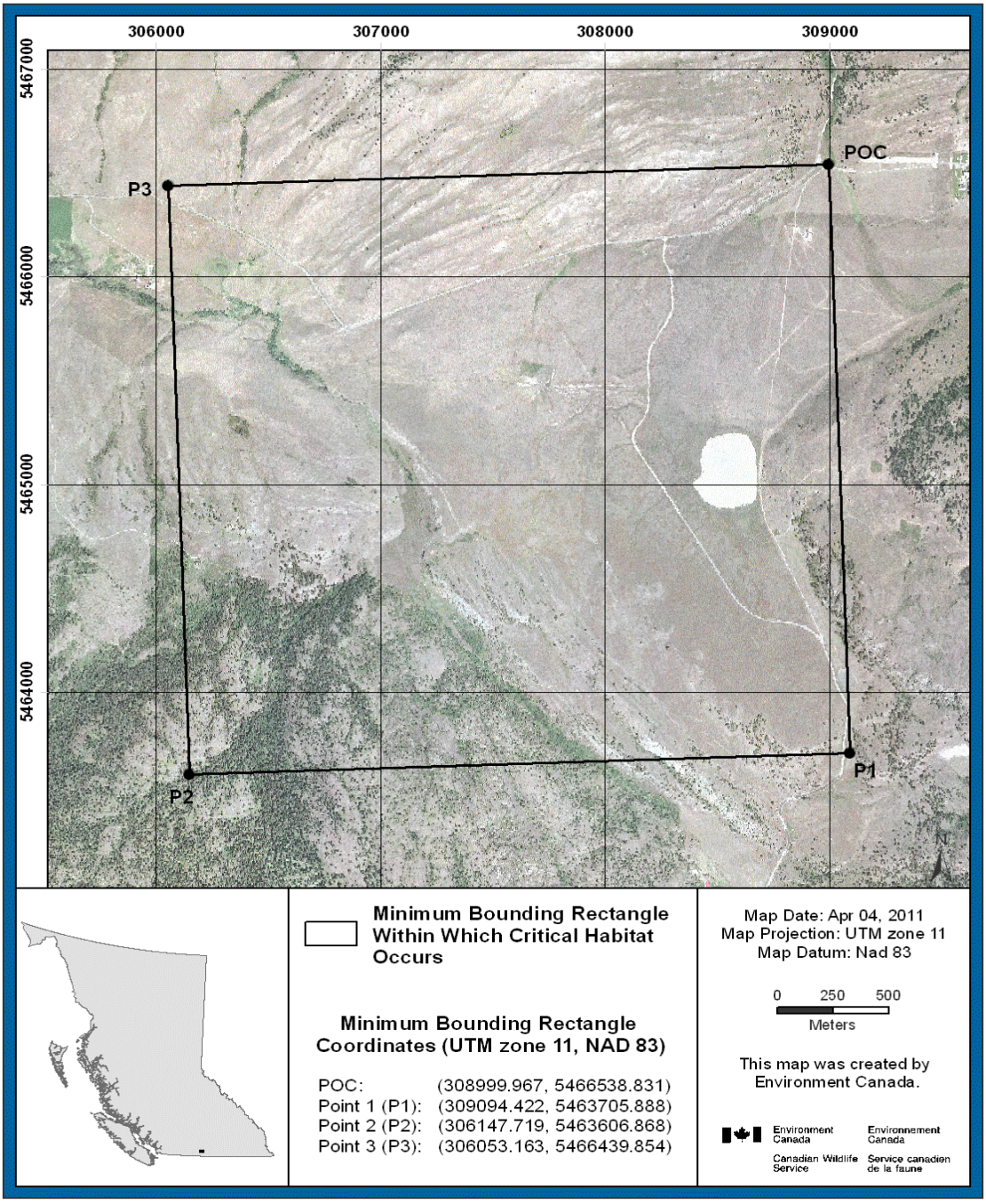

Figure 4. Area within which critical habitat for the Sage Thrasher occurs at White Lake. **Minimum Bounding Rectangle and Coordinates:** Environment Canada, unpublished data, 2010. **Ortho-photograph:** Province of British Columbia. 2004. Ministry of Natural Resource Operations. British Columbia Imagery WMS on openmaps.gov.bc.ca.

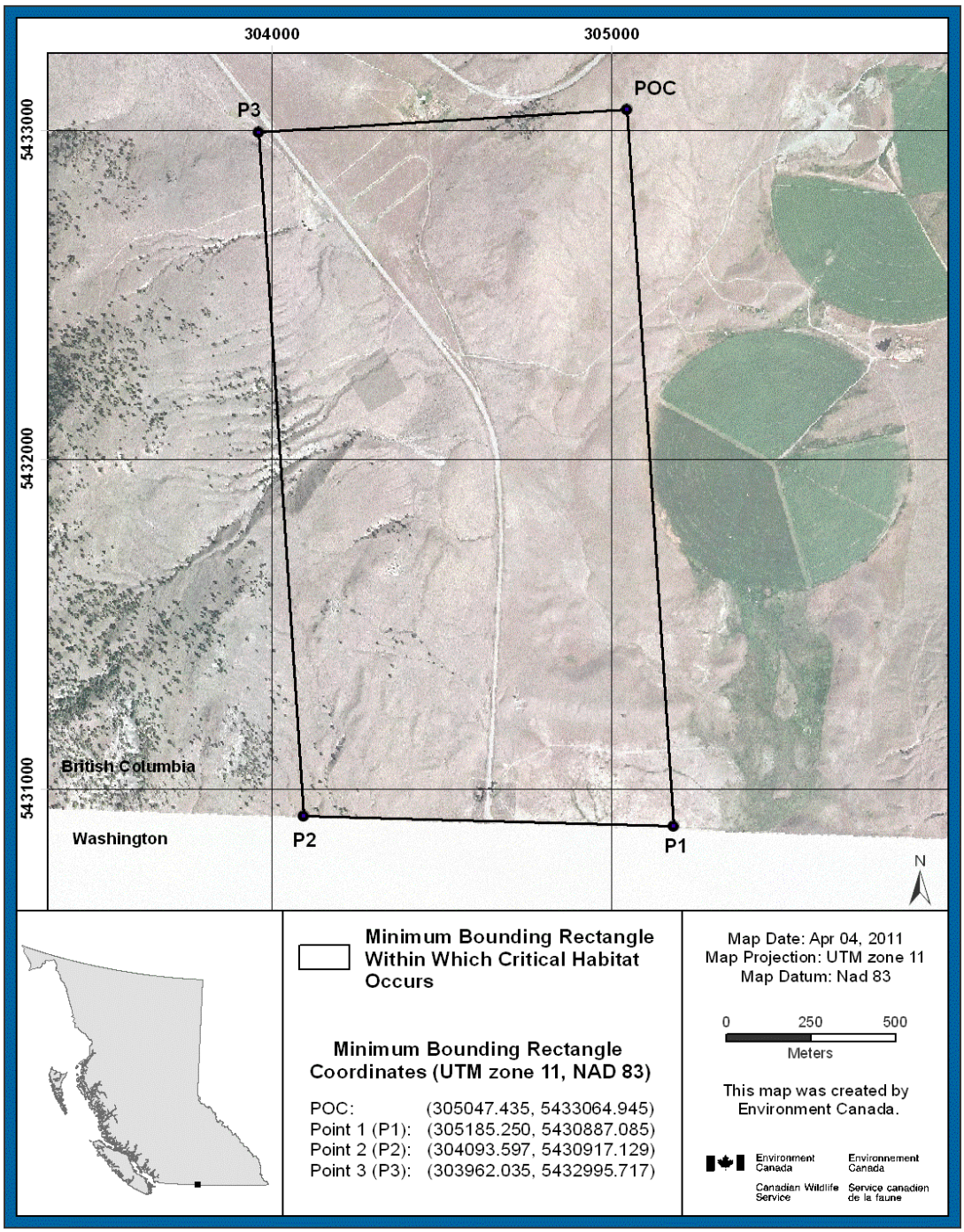

Figure 5. Area within which critical habitat for the Sage Thrasher occurs at West Chopaka. **Minimum Bounding Rectangle and Coordinates:** Environment Canada, unpublished data, 2010. **Ortho-photograph:** Province of British Columbia. 2004. Ministry of Natural Resource Operations. British Columbia Imagery WMS on openmaps.gov.bc.ca.

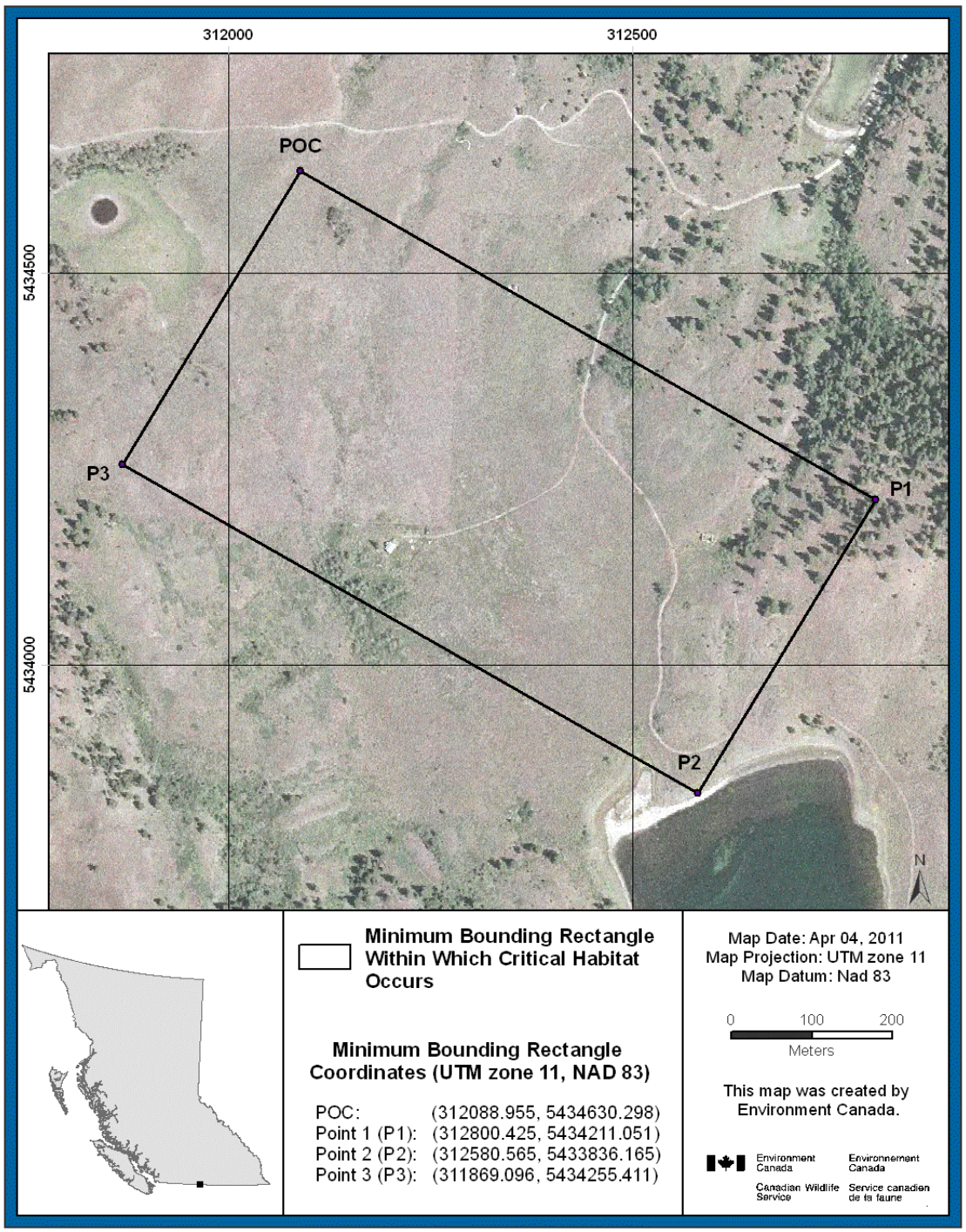

Figure 6. Area within which critical habitat for the Sage Thrasher occurs at Kilpoola Lake. **Minimum Bounding Rectangle and Coordinates:** Environment Canada, unpublished data, 2010. **Ortho-photograph:** Province of British Columbia. 2004. Ministry of Natural Resource Operations. British Columbia Imagery WMS on openmaps.gov.bc.ca.

7.2 Schedule of Studies to Identify Additional Critical Habitat

Table 4. Schedule of studies to identify additional critical habitat for Sage Thrashers

Description of Activity	Rationale	Timeline
BRITISH COLUMBIA		
1. Solicit occurrence records and habitat observations on an ongoing basis.	Additional information about possible suitable habitat patches is gained.	2014-2018
2. Identify, map, and prioritize two additional patches of capable/suitable habitat.	List of priority sites, with the top 2 additional habitat patches identified. Of the 5 patches in total, 3 should provide suitable habitat at any one time to account for habitat dynamics and the effects of fire.	2019

If the extremely sporadic and widely-distributed occurrence history for this species in Alberta and Saskatchewan continues into the future, it is unlikely that it will ever be possible to identify critical habitat in the prairies. If a more consistent pattern of habitat use emerges in the future, it may be possible to consider an identification of critical habitat in the prairies at that time.

7.3 Activities Likely to Result in the Destruction of Critical Habitat

Activities that are likely to result in destruction of critical habitat are based on known habitat needs and habitat-related threats. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its biological function for 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.

Since Sage Thrashers nest almost exclusively in or below large shrubs (Reynolds and Rich 1978; Rich 1980; Reynolds 1981; Stubbendieck et al. 1992; Millikin unpubl. data), removal of large shrubs would be considered destruction of critical habitat. Examples of activities that would destroy critical habitat by removing large shrubs include, but are not necessarily limited to:

- Conversion of shrub-dominated habitats for urban or agricultural development.
- Construction of roads and clearing of shrubs adjacent to existing roadways.

Other activities could indirectly lead to the loss of critical habitat by promoting a set of conditions that can lead to the loss of shrubs. Examples of activities that could lead, indirectly, to the destruction of critical habitat include, but are not limited to:

- Inappropriate livestock grazing

Livestock grazing can be compatible with Sage Thrasher nesting habitat when the intensity, timing, frequency, and duration of grazing are controlled to limit physical disruption of sagebrush, loss of native grasses, and subsequent invasion by invasive annuals. Appropriate grazing practices are dependent upon existing range condition, local soil type, and pre-grazing

plant community composition (Lacey and Taylor 2005). Guidelines for establishing appropriate grazing regimes in Big Sagebrush ecosystems can be found in the Montana Guide to Range Site, Condition and Initial Stocking Rates (Lacey and Taylor 2005), in the Grazing Management Guide (B.C. Agriculture Council 2005), or in the Grasslands Monitoring Manual for British Columbia (Delesalle et al. 2009).

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objective. Subsequent action plans will provide more specifics about how the recovery strategy will be implemented.

- Five large patches of dry sagebrush habitat in the south Okanagan are identified by 2018, and management practices to maintain and enhance Sage Thrasher habitat have been initiated at the five sites in British Columbia and in southern Alberta and Saskatchewan (where appropriate), resulting in more suitable habitat, and enabling 15-20 pairs to breed in Canada.
- The number of Sage Thrashers breeding in Canada is in the range of 15-20 pairs.

9. STATEMENT ON ACTION PLANS

One or more action plans will be completed by 2019.

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11. PERSONAL COMMUNICATIONS

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APPENDIX A. 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*[3]. 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.

Habitat protection and enhancement of sagebrush-steppe habitats will benefit many SARA-listed wildlife species in British Columbia, including: the endangered American Badger (*Taxidea taxus jefferesonii*), Desert Nightsnake (*Hypsiglena torquata*), Grand Coulee Owl-clover (*Orthocarpus barbatus*), and Tiger Salamander (*Ambystoma tigrinum*); the threatened Western Rattlesnake (*Crotalus oreganos*), Great Basin Gopher Snake (*Pituophis catenifer deserticola*), Showy Phlox (*Phlox speciosa*), Great Basin Spadefoot (*Spea intermontana*), and Lewis's Woodpecker (*Melanerpes lewis*); and species of special concern, including Western Harvest Mouse (*Reithrodontomys megalotis megalotis*), Western Yellow-bellied Racer (*Coluber contstrictor mormon*), and Nuttall's Cottontail (*Sylvilagus nuttallii*).

In Alberta and Saskatchewan, Greater Sage-Grouse (Endangered) utilize the same habitats as Sage Thrasher and will benefit from habitat protection. Greater Sage-Grouse also prefer larger sagebrush (S. McAdam, pers. comm.).

The only negative effect might be with true grassland species that prefer shrubless habitats, such as Grasshopper Sparrow (*Ammodramus savannarum*). The Grasshopper Sparrow is not listed under SARA at this time, but is Red-listed in British Columbia.

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