

Recovery Strategy for the Pygmy Short-horned Lizard (*Phrynosoma douglasii*) in Canada

Pygmy Short-horned Lizard



2017



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For copies of the recovery strategy, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the [Species at Risk \(SAR\) Public Registry](http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1)¹.

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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 after the publication of the final document on the SAR Public Registry.

The Minister of Environment and Climate Change is the competent minister under SARA for the Pygmy Short-horned Lizard and has prepared this recovery strategy, as per section 37 of SARA. To the extent possible, it has been prepared in cooperation with the Province of British Columbia, as per section 39(1) of SARA.

It was determined that the recovery of the Pygmy Short-horned Lizard in Canada is not technically or biologically feasible. The species may benefit from general conservation programs in the same geographic area and will receive protection through SARA and other federal, and provincial or territorial, legislation, policies, and programs.

The feasibility determination will be re-evaluated as part of the report on implementation of the recovery strategy, or as warranted in response to changing conditions and/or knowledge.

The recovery strategy sets the strategic direction to support recovery of the species, including identification of critical habitat to the extent possible. It provides all Canadians with information to help take action on species conservation. When critical habitat is identified, either in a recovery strategy or an action plan, SARA requires that critical habitat then be protected.

In the case of critical habitat identified for terrestrial species including migratory birds SARA requires that critical habitat identified in a federally protected area³ be described in the *Canada Gazette* within 90 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry. A prohibition against destruction of critical habitat under ss. 58(1) will apply 90 days after the description of the critical habitat is published in the *Canada Gazette*.

For critical habitat located on other federal lands, the competent minister must either make a statement on existing legal protection or make an order so that the prohibition against destruction of critical habitat applies.

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

³ These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Birds Convention Act, 1994* or a national wildlife area under the *Canada Wildlife Act* see ss. 58(2) of SARA.

If the critical habitat for a migratory bird is not within a federal protected area and is not on federal land, within the exclusive economic zone or on the continental shelf of Canada, the prohibition against destruction can only apply to those portions of the critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies as per SARA ss. 58(5.1) and ss. 58(5.2).

For any part of critical habitat located on non-federal lands, if the competent minister forms the opinion that any portion of critical habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, or the laws of the province or territory, SARA requires that the Minister recommend that the Governor in Council make an order to prohibit destruction of critical habitat. The discretion to protect critical habitat on non-federal lands that is not otherwise protected rests with the Governor in Council.

Acknowledgments

This document was developed by Darcy Henderson, Matt Huntley, and Kella Sadler (Environment and Climate Change Canada, Canadian Wildlife Service (ECCC CWS) – Pacific region), with input provided by Marie-Andrée Carrière (ECCC CWS-National Capital Region), and Orville Dyer and Purnima Govindarajalu (B.C. Ministry of Environment).

Executive Summary

The Pygmy Short-horned Lizard (*Phrynosoma douglasii*) is a small (~4-6 cm long), round, flat-bodied lizard with small horns (spiny scales) on its head and along its body. The species varies in colour and pattern from tan-brown-grey background with dark blotches, but often matches the colour of the soil and rocks within shrub-steppe, bunchgrass and dry forest habitat where it still occurs.

In Canada, confirmed occurrences include only two specimens collected by one observer, and two additional reliable sightings from south-central British Columbia, in the Okanagan Valley, near the town of Osoyoos. The last reliable sighting was in 1957. Anecdotal observations have continued infrequently up to 2003. Although threats cannot be assessed in detail, suspected past, present, and future threats include habitat loss or degradation due to residential and commercial development, crop and livestock production, roads and railways, fire suppression, and invasive alien species. Some invasive alien and problematic native species may also contribute to increased predation. Intensive agricultural and residential development have occurred in the past 100 years within the area formerly occupied by Pygmy Short-horned Lizard, and may account for the extirpation.

The Pygmy Short-horned Lizard was designated as Extirpated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1992 and was listed as Extirpated in Canada on Schedule 1 of the federal *Species at Risk Act* in 2003. Likewise, it is ranked SX (extirpated) by the British Columbia Conservation Data Centre, and it is protected from capture and killing under the B.C. *Wildlife Act*. Globally, the Pygmy Short-horned Lizard is considered to be secure. It is considered to be secure at a national level in the United States (i.e., its remaining range), although at a sub-national level, it is ranked as vulnerable to extirpation in Washington State.

Recovery in Canada is not considered to be biologically and technically feasible at this time. Recovery feasibility may be revisited if relict populations are discovered, and/or if translocation and reintroduction of Pygmy Short-horned Lizard from external sources in the U.S.A. becomes feasible and appropriate.

Recovery Feasibility Summary

Based on the following four criteria that Environment and Climate Change Canada uses to establish recovery feasibility, recovery of the Pygmy Short-horned Lizard in Canada has been determined not to be technically or biologically feasible at this time. Recovery is considered not feasible when the answer to any of the following questions is “no”. The feasibility of recovery may be revised if relict population(s) are discovered in Canada, or if translocation from U.S. populations becomes appropriate.

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.

No. There are no known individuals capable of reproduction in Canada, or within 30 km of the Canadian border in Washington State. The Pygmy Short-horned Lizard is deemed extirpated from its only known historical range in B.C. for more than 50 years, and in Washington State the lizards are classified as vulnerable to extirpation. Recolonization through immigration appears highly unlikely given the presumed limited mobility of individual Pygmy Short-horned Lizards, and suspected threats that create barriers to dispersal. Germano & Bishop (2009) suggest successful translocations for reptiles to sustain a population require >1000 individuals, which is two orders of magnitude more than the total number ever observed in Canada, and possibly 10% of the global population. Translocation of those numbers from Washington State populations would further threaten those populations, no captive breeding program exists now nor would one likely produce 1000 offspring in the coming 5 years, and permission for translocation of >1000 individuals from the United States is improbable. Individuals from Oregon and Idaho where the species is more secure may or may not be adapted to a colder northern location in British Columbia (Grigg & Buckley 2013).

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

Unknown. The habitat requirements of the Pygmy Short-horned Lizard in Canada are poorly understood, with only one reliable sighting with a specific location upon which to describe habitat (Ryder et al. 2006). Microhabitat studies for this species in nearby Washington State (Lahti 2005) describe suitable habitat as shallow soils with high coarse-fragment content and shrub-steppe vegetation; which is similar to the interface between sparsely vegetated, sagebrush steppe, and antelope-brush ecosystems in the southern Okanagan valley (Iverson et al. 2008). The species has small (~0.08 ha) and overlapping home ranges, so a relatively small amount of habitat is capable of maintaining a viable population. However, the species occurred in Canada at the extreme northern extent of its range at the extreme southern end of a deep, north-south oriented valley that opens to a broader plain southward into Washington State, so other environmental factors may have naturally limited the species and account for its rarity. So it is truly not clear if sufficient suitable habitat exists now or ever did to support the species. Natural

sparsely vegetated rock outcrops have not changed significantly over time, but shrub-steppe ecosystems have been significantly reduced and fragmented from historic levels by on-going agricultural and residential development in the southern Okanagan valley (Lea 2008). This development pressure limits the duration and certainty of any habitat management benefits, and negates meaningful habitat restoration.

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

Unknown. With only one historical and reliable sighting providing a specific location for this species, current threats cannot be identified for the Pygmy Short-horned Lizard at this time and therefore it is unknown if threats could be avoided or mitigated. Assuming threats were and continue to be similar as adjacent Washington State, the major threat is loss and fragmentation of habitat. This loss historically resulted from conversion for agricultural crop production, and currently results from residential development. Other natural system modifications resulting from fire suppression have allowed conifer encroachment and increased shading, while shrub cover has been reduced by increased fire frequency following cheatgrass (*Bromus tectorum*) invasion..

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

Unknown. Owing to the lack of available individuals for reintroduction, uncertainty and limited information about sufficiency and suitability of habitat, and uncertainty of threats, it is not clear if appropriate techniques exist for reintroduction, habitat management and restoration, or threat abatement. As a species apparently extirpated long ago, that may never have bred in Canada, with transformation of the habitat over the past 100 years, and significant search effort expended over the past 30 years, no reasonable population and distribution objectives can be identified in this document. Instead, a conservation approach has been outlined. Recovery efforts for the Greater Short-horned Lizard (*Phrynosoma hernandesii*) are ongoing in Alberta and Saskatchewan (Environment and Climate Change Canada 2015), providing some framework for possible recovery of the Pygmy Short-horned Lizard should a relict population of Pygmy Short-horned Lizard be discovered in Canada.

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1. COSEWIC* Species Assessment Information

Assessment Summary – April 2007

Common Name: Pygmy Short-horned Lizard

Scientific Name: *Phrynosoma douglasii*

COSEWIC Status: Extirpated

Reason for Designation:

There have been no confirmed sightings in Canada in the past 50 years, although there have been anecdotal reports during that time.

Canadian Occurrence: British Columbia

COSEWIC Status History:

Last reported in 1898. Designated Extirpated in April 1992. Status re-examined and confirmed in May 2000 and in April 2007. Last assessment based on an update status report .

* COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

2. Species Status Information

Legal Status: SARA Schedule 1 (Extirpated) (2003).

Table 1. Conservation Status of Pygmy Short-horned Lizard (NatureServe 2015, B.C. Conservation Data Center 2015, B.C. Conservation Framework 2015).

Global (G) Rank ^a	National (N) Rank ^a	Sub-national (S) Rank ^a	COSEWIC Designation	B.C. List	B.C. Conservation Framework
G5	Canada (NX); United States (N5)	Canada: British Columbia (SX); United States: California (SNR), Idaho (S5), Nevada (SNR), Oregon (S4), Washington (S3)	Extirpated (2007)	Red	Highest priority: 2 under goal 3 ^b

^a The conservation status of a species is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment (G = Global, N = National, and S = Subnational). The numbers have the following meaning: 1 = critically imperiled, 2 = imperiled, 3 = vulnerable, 4 = apparently secure, 5 = secure. SX = Presumed Extirpated, SNR = Unranked.

^b 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 Pygmy Short-horned Lizard (*Phrynosoma douglasii*) is the smallest of the horned lizards. It is one of only two horned lizard species reported in Canada; the other being the Greater Short-horned Lizard (*P. hernandesii*) from southeastern Alberta and southwestern Saskatchewan (SARA Schedule 1 Endangered). Pygmy Short-horned Lizards are wide, oval-shaped, flat-bodied lizards with adults averaging 4.5 cm from snout to tail (range of 3.7 to 6.4 cm) with the female being slightly larger than the male (Hallock and McAllister 2005; Lahti et al. 2010). Compared to other ornately armoured horned lizards, the Pygmy Short-horned Lizard has relatively small horns on its head and body. Colouring is variable within the species but matches the colour of the soil and rocks when they are motionless, making them very difficult to detect (COSEWIC 2007).

3.2 Species Population and Distribution

The Pygmy Short-horned Lizard currently ranges from central and eastern Washington and Oregon into northern California and Nevada, and most of southern Idaho (Figure 1), where it occurs in the Great Basin and surrounding areas. It has been recorded in the Okanogan County in Washington State (30-40 km south of the Canada-U.S.A. border) as recently as 2015 (Hallock & McAllister 2005; COSEWIC 2007; Sarrell pers. comm. 2015).

In Canada, only two specimens were ever collected from a single observer between 1898 and 1910, and two additional reliable sightings⁴ were made in 1937 and 1957 (COSEWIC 2007; Ryder et al. 2006) near the town of Osoyoos in British Columbia. A captive specimen in Trail, B.C. was photographed in a school room in 1958 (Ashpole 2017). No information exists to explain if this individual was captured from a natural occurrence in B.C., or obtained on a trip to the United States. As such the record should be treated as anecdotal. The closest known naturally occurring populations and suitable habitats in the United States are >100 km away from Trail, B.C. (Hallock and McAllister 2005). Lord (1866) participated in the North American Boundary Survey in British Columbia, and casually reported the species occurred north of the border in drainages of the Columbia, Kootenay, and Flathead River valleys, but that does not match the corresponding known distribution in the United States (see Fig. 1). In more than 100 years, no Canadian specimens, reliable sightings, or anecdotal observations have come from outside the South Okanagan and Similkameen valleys. Further, the only specimens and reliable sightings are all prior to 1957, and thus historical (COSEWIC 2007; Hobbs pers. comm. 2015; Sarrell pers. comm. 2015). The human population in this valley, and availability of cameras to document observations has grown exponentially since 1957, yet only verbal accounts from untrained observers have comprised the remaining anecdotal observations of this slow-moving lizard (see

⁴ Reliable sightings involved cases of field notes from a skilled observer (Ryder et al. 2006), and capture and release by two people capable of corroborating the observation (COSEWIC 2007).

COSEWIC 2007 for details). Four targeted surveys by experts within the past 30 years have not detected any individuals (COSEWIC 2007). The historical abundance of Pygmy Short-horned Lizards in Canada is unknown, and currently presumed to be zero.

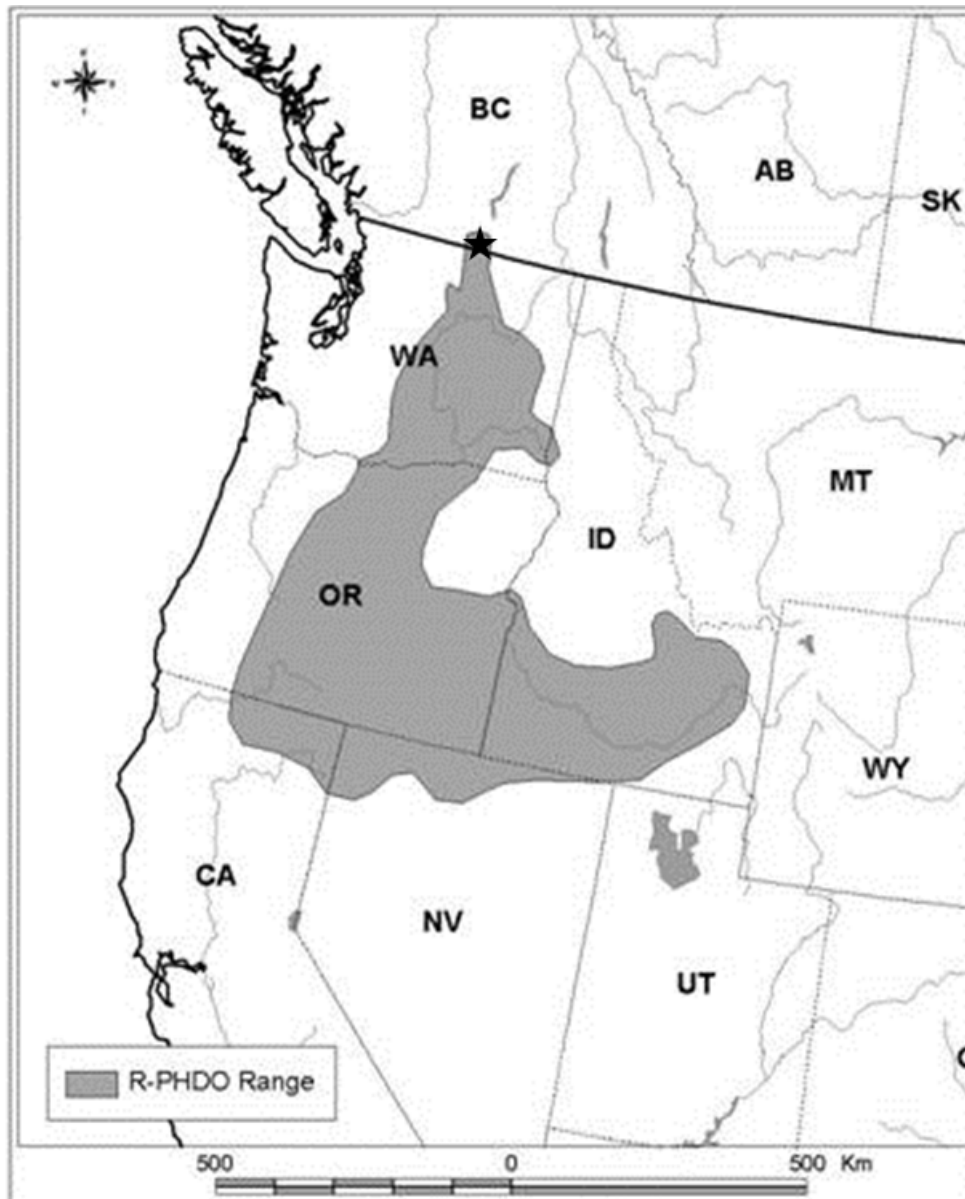


Figure 1. Approximate historic range of Pygmy Short-horned Lizard. Black star marks the location of the historic occurrences of Pygmy Short-horned Lizard in Canada (adapted from COSEWIC 2007).

3.3 Needs of the Pygmy Short-horned Lizard

3.3.1 Habitat and biological needs

Owing to the lack of observation and/or occurrence information, the habitat requirements of the Pygmy Short-horned Lizard in Canada are poorly understood.

Most horned lizard species have adaptations for consuming ants (Hymenoptera: Formicidae) such as specialized teeth and a large stomach capacity for the storage and digestion of this prey (Pianka & Parker 1975). Juvenile Pygmy Short-horned Lizards in Washington State almost exclusively eat ants, which constitute up to 90% of their diet (Lahti & Beck 2008). Adult Pygmy Short-horned Lizards are not strict ant specialists and consume other insects like grasshoppers, crickets, and beetles; but ants do make up ~70% of their diet (Hallock & McAllister 2005; Lahti & Beck 2008). It is believed that horned lizards do not require free-standing water and that their water requirements are met by licking dew, taking advantage of precipitation by “rain harvesting” (water moves along their scales to the mouth) and from the prey they consume (Sherbrooke 2003).

Pygmy Short-horned Lizard habitat consistently features well-drained soils with exposed ground and access to loose or friable soils (sand grains to crumbly aggregates free of binding roots) for burrowing, thermoregulating and foraging (Hallock & McAllister 2005). Loose or friable soils are required for burrowing within part of an individual's home range, although the area can be dominated by very shallow or coarse-textured soils. In Washington State, Lahti (2005) found lizards most commonly occupy “lithic soils” of coarse fragments, rather than finer-textured loamy soils. Unlike most reptiles in B.C., these lizards do not appear to rely on rocky over-wintering dens (hibernacula), and instead burrow into soil where they overwinter until spring (Hallock & McAllister 2005; COSEWIC 2007). The only described over-wintering of Pygmy Short-horned Lizards is from Kittitas County, Washington, where a female repeatedly burrowed during cool nights and then was last observed in mid-October at a depth of 4 cm (Lahti 2005).

A broad range of vegetation types are used in the United States, including bunchgrass, shrub-steppe, and dry forest ecosystems (Hallock & McAllister 2005; Lahti et al. 2010). At a local scale, vegetation cover must be patchy to allow sun basking and unencumbered movement across bare ground to disperse and forage. However, some amount of vegetation is needed, as it is selectively used for shade in very hot weather to adequately thermoregulate. Lahti (2005) reported lizards were most often observed in the open but in proximity to short sagebrush (*Artemisia* spp.) and buckwheat (*Eriogonum* spp.) shrubs that were presumably used for shade.

3.3.2 Limiting factors

Short-horned lizards require an uncluttered environment for dispersal and thermoregulation. The restricted mobility of these small lizards curbs their ability to cross unsuitable habitat. The Okanagan and Similkameen valleys could potentially

support suitable habitat necessary for the species at a local scale. However, the deep, steep-sided, north-south oriented Okanagan and Similkameen valleys may naturally present habitat discontinuities. Shaded north-aspect slopes along east-west oriented valley-side drainages will generate colder microclimates that may be insufficient to meet thermal requirements of lizards with limited mobility (Grigg & Buckley 2013).

Pygmy Short-horned Lizard reproduction is ovoviviparous (retain their eggs within the body and bear live young). This may be an adaptation allowing them to tolerate cooler average temperatures (eg. higher elevations and latitudes) than other horned lizards (Pianka & Parker 1975). Between 3 and 15 young are commonly born from July to September (Hallock & McCallister 2005). In a Washington State study, Lahti et al. (2010) suggested that at higher latitudes and elevations females may not reproduce every year due to temperature constraints. Overwintering mortality is also suggested to be an important factor contributing to low population densities of Greater Short-horned Lizards in Alberta (James 2004; Environment and Climate Change Canada 2015). Likewise, overwintering mortality likely limits the range of Pygmy Short-horned Lizard in North America (Lahti et al. 2010).

Pygmy Short-horned Lizard populations tend to be localized, likely due to limited mobility in a habitat of patchy soils, vegetation, ant colonies, and microclimate conditions suitable for survival and reproduction. Those populations are therefore susceptible to local extinction if any development wipes out a local population, creates impassable barriers, or imposes ongoing sources of mortality between populations (COSEWIC 2007). This also greatly complicates any proposal for reintroduction, as a few individuals are unlikely to disperse quickly, if at all, and colonize other suitable habitats. A single cold winter early in a reintroduction effort could also result in high mortality and reduced reproduction, further limiting success of reintroduction. Further, Germano & Bishop (2009) suggest the likelihood of translocation success is greatest when >1000 individuals are released. Given COSEWIC (2007) summarizes that surveyors in the field find <1 lizard per hour when searching, great effort would be required to gather enough wild individuals for reintroduction. All limiting factors combined suggest low potential for successful reintroduction at this time.

4. Threats

4.1 Threat Assessment

Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational) (Salafsky et al. 2008). Threats presented here do not include biological features of the species or population which are considered limiting factors.

The threat classification used in this document is based on the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification

system and is consistent with methods used by the B.C. Conservation Data Centre and the B.C. Conservation Framework. For a detailed description of the threat classification system, see the Conservation Measures Partnership website (CMP 2010).

A threat assessment for the Pygmy Short-horned Lizard was not completed as no extant locations in Canada are known. Without extant locations threats cannot be scored for scope⁵ or severity⁶ to determine individual threat impacts⁷ nor is it possible to calculate the overall Threat Impact⁸ for this species at this time. Instead, threats were examined and described using the IUCN-CMP threat categories.

4.2 Description of Threats

Possible threats to the Pygmy Short-horned Lizard in Canada are discussed below under the Threat Level 1 headings (Threat Level 2 headings provided in brackets). Some of these threats (particularly habitat loss, road mortality, and predation by native and non-native animals) may be ongoing should a relict population be discovered in Canada, and/or become relevant if reintroduced populations are established in the future.

IUCN-CMP Threat 1 – Residential & commercial development [1.1 Housing & urban areas; 1.2 Commercial & industrial areas]

Habitat loss, degradation, and/or fragmentation due to urban, commercial and industrial developments were likely important historical, current, and future threats to populations of Pygmy Short-horned Lizards in Canada. In particular, the establishment and growth of Osoyoos and surrounding rural residential communities could isolate populations and impede movements of individuals. Initial development of Osoyoos after 1927 and following irrigation development was concentrated in the valley bottom where habitat was least suitable for Pygmy Short-horned Lizards. In recent years though, pressures from tourism and retirement development centred around vineyards, orchards, and

⁵ **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%)

⁶ **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%)

⁷ **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: very high (75% declines), high (40%), medium (15%), and low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment timeframe (e.g., timing is insignificant/negligible or low as threat is only considered to be in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit

⁸ The overall threat impact is calculated following Master et al. (2012) using the number of Level 1 Threats assigned to this species. The overall threat considers the cumulative impacts of multiple threats.

beach recreation in the valley bottom has led to growth in residential and commercial accommodations. New accommodations are developed on the sparsely-vegetated rocky outcrops on surrounding valley sides to protect the valuable agricultural lands in the valley bottom. The distribution of potentially suitable habitats in the Okanagan currently is highly fragmented (Lea 2008, Iverson et al. 2008). The historical habitat loss is very likely irreversible, as high land values and growth trajectories preclude any habitat restoration potential. Residential development also brings with it an increase in the number of domestic pets that could become predators of lizards (see Threat 8 below for additional information).

IUCN-CMP Threat 2 – Agriculture and aquaculture [2.1 Annual & perennial non-timber crops; 2.3 Livestock Farming & Ranching]

Habitat loss, degradation, and/or fragmentation due to agricultural development may have also threatened populations of the Pygmy Short-horned Lizards historically in Canada. The dry climate limited cultivated crop production to riparian areas in the valley bottom for most of the early 1900s, and that is not the habitat suitable for Pygmy Short-horned Lizards. After major irrigation works were established in 1927, adjacent sagebrush steppe and antelope-brush ecosystems were cleared for orchards, vegetables, forages, and more recently vineyards. This agricultural development has eliminated much of the loose and friable soil habitat adjacent to sparsely-vegetated rock outcrops, and fragmented the landscape inbetween. The rate of land conversion has slowed down over the past decade, because much of the arable land is already under cultivation. These habitat losses are very likely irreversible.

The net impacts of historic and ongoing grazing practices are unknown in habitats that supported historical populations of Pygmy Short-horned Lizard in Canada. Newbold & MacMahon (2008) suggest grazing may have neutral or beneficial effects on other Short-horned Lizards, but Jones (1981) reported the lizards were less frequent in heavily grazed areas than in lightly grazed areas. During the gold rush era of the late 1800s and early 1900s, high cattle stocking rates were common in the Osoyoos area because cattle were driven north into the British Columbia interior from the United States through this narrow portion of the Okanagan valley (McLean 1982). Grazing has been shown to increase the probability of invasion by the invasive annual Cheatgrass (*Bromus tectorum*) see Threat 8 below for additional information, and Reisner et al. 2013).

IUCN-CMP Threat 4 – Transportation and service corridors [4.1 Roads & railroads]

Road traffic can cause direct mortality for short-horned lizards. Roads may be utilized as dispersal corridors, and/or may attract short-horned lizards as a source of heat when it is cold (Environment and Climate Change Canada 2015). Historically this threat was less than it is today but this threat will remain ongoing should a relict population be discovered and/or for any deliberately reintroduced population. Traffic volumes on Highways #3 and #97 in the vicinity of Osoyoos are likely to increase in future and intensify the severity of this threat.

IUCN-CMP Threat 7 Natural System Modifications [7.1 Fire & Fire Suppression]

Pygmy Short-horned Lizard habitat is described as generally open grassland and shrub-steppe ecosystems. After a century of successful fire suppression coniferous trees have expanded from higher elevations into lower elevation grasslands and sagebrush steppe in British Columbia (Gyug & Martens 2002; Turner & Krannitz 2000). This historical threat also may threaten any potentially-suitable remaining habitat for the species. Recent high-intensity and large-scale wild fires have burned in the southern Okanagan valley and have opened the forest canopy in low-elevation habitats, so it is unclear if this is a current threat.

IUCN-CMP Threat 8 - Invasive & Other Problematic Species & Genes [8.1 Invasive Non-Native/Alien Species; 8.2 Problematic Native Species]

Invasive plants, such as Cheatgrass, often occur in large, dense, continuous patches and occupy the spaces between native vegetation, thereby hampering lizard mobility. Horned lizards have been shown to actively avoid areas with high Cheatgrass cover (Newbold 2005). Knapweed (*Centaurea* spp.), Puncture Vine (*Tribulus terrestris*) and Longspine Sandbur (*Cenchrus longispinus*) are more recently-arrived invasive species that may further degrade potentially suitable habitat, and could cause physical injury to individuals (COSEWIC 2007).

Predation may be increased through enhanced natural predator populations (e.g., ravens, crows, raccoons, coyotes) and the introduction of domestic predators (e.g., dogs and cats; COSEWIC 2007).

Impacts of invasive plants and predation (at least by domestic predators) were likely lower historically than they are today. These threats will remain ongoing, and increasing, should a relict population be discovered and/or for any deliberately reintroduced population.

5. Critical Habitat

Section 41 (2) of SARA requires that if the recovery of a listed wildlife species is not feasible, the recovery strategy must include an identification of the species' critical habitat to the extent possible. Critical habitat identification for the Pygmy Short-horned Lizard is not possible at this time. The former distribution of the species in British Columbia is virtually unknown and it is unknown if sufficient suitable habitat is available for management or restoration. The identification of critical habitat may be added if new information suggests that recovery is technically and biologically feasible, in a revised recovery strategy.

6. Conservation Approach

Recovery of the Pygmy Short-horned Lizard is not considered technically and biologically feasible at the present time. Although the Province of British Columbia, Nature Conservancy of Canada, and The Nature Trust of British Columbia have substantial land holdings protected for conservation surrounding Osoyoos and along the border with the U.S.A., there remain many uncertainties. It is unlikely that reintroduction of 1000 translocated or captive-bred individuals will be possible in the next 5-10 years. The nearest populations occur >30 km south in Washington State (U.S.A.), where the species is ranked as vulnerable to extirpation, and there is no associated recovery program to expand the range northward to the Canadian border. Further, there is a lack of information to estimate risks and probability of successful reintroduction (e.g., sufficiency and suitability of remaining habitat in Canada and whether it can be enhanced or restored, what are the threats, can threats be abated). Recovery of the species may become biologically and technically feasible in future if relict populations are discovered in Canada, and/or if translocation of 1000 individuals from the United States is deemed feasible and appropriate, habitat suitability (particularly thermal requirements) and sufficiency are better understood, and threats can be abated.

Recovery efforts for the Greater Short-horned Lizard (*Phrynosoma hernandesii*) are ongoing in Alberta and Saskatchewan (Environment and Climate Change Canada 2015), providing some framework for possible recovery of the Pygmy Short-horned Lizard should a relict population of Pygmy Short-horned Lizard be discovered in Canada. Successful recovery planning for any discovered or reintroduced Pygmy Short-horned Lizard populations in Canada would likely require cooperation and coordination with adjacent Washington State, as well as directly-affected landowners in Canada. It is highly likely that recovery and management planning and actions for the other 22 Species At Risk in the same habitat (see Section 7 below) would benefit conservation of any relict Pygmy Short-horned Lizards that may occur.

7. 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](#)⁹. 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 and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the [Federal Sustainable Development Strategy](#)'s¹⁰ (FSDS) goals and targets.

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

⁹ www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1

¹⁰ www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1

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.

The historic range of Pygmy Short-horned Lizard overlaps with that of several other rare species occurring in similar habitats of the south Okanagan valley in British Columbia, such as: American Badger (*Taxidea taxus jeffersonii*), Behr's Hairstreak (*Satyrium behrii*), Branched Phacelia (*Phacelia ramosissima*), Burrowing Owl (*Athene cunicularia*), Common Nighthawk (*Chordeiles minor*), Desert Nightsnake (*Hypsiglena chlorophaea*), Grand Coulee Owl-clover (*Orthocarpus barbatus*), Great Basin Gophersnake (*Pituophis catenifer deserticola*), Great Basin Spadefoot (*Spea intermontana*), Half-moon Hairstreak (*Satyrium semilunar*), Lewis's Woodpecker (*Melanerpes lewis*), Lyall's Mariposa Lily (*Calochortus lyallii*), Mormon Metalmark (*Apodemia mormo*), Northern Rubber Boa (*Charina bottae*), Nuttall's Cottontail (*Sylvilagus nuttallii nuttallii*), Okanagan Efferia (*Efferia okanagana*), Sage Thrasher (*Oroscoptes montanus*), Western Harvest Mouse (*Reithrodontomys megalotis megalotis*), Western Rattlesnake (*Crotalus oreganus*), Western Skink (*Plestiodon skiltonianus*), Western Toad (*Anaxyrus boreas*), and Western Yellow-bellied Racer (*Coluber constrictor mormon*). If a relictual population of Pygmy Short-horned Lizard is discovered and/or if reintroduction of the species is considered, recovery planning impacts on non-target recovery species in British Columbia will need to be taken into account. Any recovery planning activities for the Pygmy Short-horned Lizard will be implemented with consideration of all co-occurring species at risk, to avoid or minimize negative impacts to these species and their habitats.

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