

Management Plan for the Milksnake (*Lampropeltis triangulum*) in Canada

Milksnake



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PREFACE

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#) 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 management plans for listed species of special concern 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 the Environment and the Minister responsible for the Parks Canada Agency are the competent ministers under SARA for the management of the Milksnake and have prepared this management plan as per section 65 of SARA. To the extent possible, it has been prepared in cooperation with the Government of Ontario and the Government of Quebec.

Success in the conservation 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 management plan and will not be achieved by Environment Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this management plan for the benefit of the Milksnake and Canadian society as a whole.

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

This management plan was drafted by Jennie L. Pearce (Pearce & Associates Ecological Research) and David Anthony Kirk (Aquila Conservation and Environment Consulting) with input and direction from Angela McConnell (Environment Canada, Canadian Wildlife Service – Ontario). It was updated and revised by Rachel deCatanzaro and Lee Voisin (Environment Canada, Canadian Wildlife Service – Ontario), Tianna Burke, and Louis Gagnon (formerly of Environment Canada, Canadian Wildlife Service – Ontario). Contributions and advice from Sylvain Giguère, Mark Dionne, and Gabrielle Fortin (Environment Canada, Canadian Wildlife Service – Quebec), Karine Bériault (Ontario Ministry of Natural Resources), James Paterson (Ontario Nature), conservation data centers and herpetofunal atlas projects are also gratefully acknowledged.

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EXECUTIVE SUMMARY

The Milksnake (*Lampropeltis triangulum*) is a non-venomous constrictor in the family Colubridae. In Canada, the Milksnake ranges throughout southern Ontario as far north as Sault Ste. Marie and Lake Nipissing. It also occurs in southwestern Quebec, particularly near Montreal, Montérégie, and the Gatineau areas. The current distribution of the Milksnake within its known range in Canada is not fully understood and there is insufficient information available to assess trends in the species' abundance or distribution.

The Milksnake is known to inhabit a wide variety of natural and human-modified habitats including prairies, meadows, pastures, hayfields, rocky outcrops, rocky hillsides and forests. The species requires suitable cover for egg-laying, hibernation, and thermoregulation¹.

Although limiting factors are not well-known in Canada, the range of the Milksnake is thought to be limited by temperature and by suitable habitat for egg-laying within its Canadian range. In addition, the resiliency of Milksnake populations may be constrained by the species' life history characteristics. Milksnakes are long-lived, have delayed sexual maturity, and females may only lay a clutch of eggs every second year. As a result, even slight increases in adult mortality can cause populations to decline.

The main threats to the Milksnake in Canada include: urban, industrial, and intense agricultural development; persecution; road mortality; removal of old farm buildings; disturbance from human recreation; predation by domestic animals; mortality caused by agricultural equipment; and collection for the pet trade.

The management objective for the Milksnake is to maintain populations throughout the known range in Canada where it is known to occur and, where possible, fill knowledge gaps on demographics, habitat use and threats to the subspecies found in Canada. There are a number of broad strategies to achieve the management objectives described in section 6.2. Several initiatives have been completed or are currently underway that will aid in the conservation of the Milksnake.

A number of conservation measures to achieve the management objective are proposed. Conservation measures will best be achieved through an integrated approach with recovery initiatives for other snake species-at-risk wherever possible. Negative effects on other species are not expected from conservation activities for Milksnake, and activities aimed at conserving the Milksnake in Canada are likely to benefit a number of other species at risk.

¹ The ability of an organism to keep its body temperature within certain boundaries, even when the surrounding temperature is very different (Row and Blouin-Demers 2006a).

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1. COSEWIC* Species Assessment Information

Date of Assessment: May 2002

Common Name (population): Milksnake

Scientific Name: *Lampropeltis triangulum*

COSEWIC Status: Special Concern

Reason for Designation: This species is still widespread in Ontario but anecdotal information indicates that it occurs in small numbers. The species maintains a small but apparently stable population in Quebec. The Milksnake is subject to high levels of road kill and is still deliberately killed because of its resemblance to venomous snakes. Currently, there is only anecdotal information of this species' biology in Canada, with no quantitative data on life history and demographic measures and no quantitative data on abundance or trends in abundance.

Canadian Occurrence: Ontario and Quebec

COSEWIC Status History: Designated Special Concern in May 2002.

*COSEWIC – Committee on the Status of Endangered Wildlife in Canada

2. Species Status Information

While the Milksnake (*Lampropeltis triangulum*)² is ranked Secure³ both globally (G5) and in the United States (N5), the species is considered Critically Imperiled⁴ (S1) in the District of Columbia and Delaware, and Imperiled⁵ (S2) in Arizona, Montana, and South Carolina (NatureServe 2012). Appendix A contains a complete list of subnational ranks for the Milksnake throughout its range in the U.S.

In Canada, the Milksnake has a rank ranging between Vulnerable⁶ and Apparently Secure⁷ (N3N4) nationally, meaning that there is some uncertainty about the status of the species. Subnationally, it is ranked Vulnerable (S3) in Ontario and Quebec, the only two provinces in which it occurs. The Milksnake is listed as Special Concern under

² Status ranks apply to the species in its entirety, including all subspecies that occur in the named jurisdiction.

³ Common, widespread and abundant in the jurisdiction.

⁴ Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as steep population declines making it especially vulnerable to extirpation from the jurisdiction.

⁵ Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from jurisdiction.

⁶ At moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

⁷ At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern due to local declines, threats, or other factors.

Schedule 1 of the federal *Species at Risk Act* (SARA), as well as under Schedule 4 of Ontario's *Endangered Species Act, 2007* (ESA). In Quebec, it is on the List of Wildlife Species Likely to be Designated as Threatened or Vulnerable under the *Act Respecting Threatened or Vulnerable Species* (RLRQ, ch. E-12.01). The Milksnake has also been designated as a Specially Protected Reptile under Ontario's *Fish and Wildlife Conservation Act* (S.O. 1997, c.41).

The percentage of the species' global range found in Canada is approximately 7%.

3. Species Information

3.1 Species Description

The Milksnake is a non-venomous constrictor in the family Colubridae with brightly coloured, glossy smooth scales and a single anal plate. There are currently 25 recognized subspecies of Milksnake, which exhibit extreme variation in colour and pattern (COSEWIC 2002). It was suggested that the large degree of variation may reflect the existence of multiple species (e.g., Savage 2002; Pyron and Burbrink 2009), however genetic evidence was not available at the time to support this idea. Now certain recent studies have added support for a change in the organization of the various sub-species of Milksnake. Due to recent genetic analyses, the sub-species of Milksnake found in Canada is likely to be recognized as its own distinct species with the name Eastern Milksnake, however this does not change the latin name of *Lampropeltis triangulum* or the species conservation status (Ruane et al. 2013; Bryson et al. 2007). All subspecies are tri-coloured, with red or brown dorsal⁸ blotches or rings outlined in black on a white or tan background (Conant and Collins 1998). The species is secretive and often attempts to move away when approached or it may vibrate its tail, hiss, and strike when threatened (Conant and Collins 1998).

Only the northernmost subspecies, the Eastern Milksnake (*L. t. triangulum*), occurs in Canada (Figure 1). This subspecies generally grows to be 60-90 cm in length (Strickland and Rutter 1992 in COSEWIC 2002). It has large red or reddish-brown oval blotches outlined in black along its back, and one or two rows of smaller blotches along each side. The blotches are bright red in young Eastern Milksnakes, but fade as the snake ages (Harding 1997). There is usually a light-coloured y- or v-shaped pattern on the back of the head and neck. The belly has a black checkerboard pattern on a tan, gray or whitish background, which may be obscured by dark pigment in older individuals (Harding 1997). Males tend to be longer than females, but in general males cannot be distinguished easily from females by their external features (Harding 1997).

In Canada, the Milksnake may be confused with several other blotched snake species that have overlapping ranges, including the Massasauga (*Sistrurus catenatus*), Eastern Foxsnake (*Pantherophis gloydi*), Northern Watersnake (*Nerodia sipedon*), Eastern Hog-nosed Snake (*Heterodon platirhinos*), and juvenile Gray Ratsnake (*Pantherophis*

⁸ The upper side or back of an animal (Conant and Collins 1998).

spiloides). Massasauga has a much thicker body, darker body colouration, saddle-shaped blotches, a vertical eye pupil and a distinctive rattle at the end of the tail. The heat-sensitive facial pits of the Massasauga give the head an arrow shaped head differentiating it from other Ontario snake species. Eastern Foxsnake does not have smooth scales, has a divided anal plate⁹ and typically lacks the distinctive v- or y-shaped blotch head pattern. The Eastern Hog-nosed Snake is a thicker-bodied snake relative to its length and has a distinctive upturned snout. The Northern Watersnake has highly keeled (or rough) scales and has a banded rather than blotched dorsal pattern. The back pattern on juvenile Gray Ratsnakes is composed of dark grey or brown blotches on a pale grey background and a divided or semi-divided anal plate. A recent summary of the natural history, distribution and status of the snakes of Ontario, including Milksnake, is available in Rowell (2013).

3.2 Populations and Distribution

The Eastern Milksnake subspecies is the northernmost subspecies of Milksnake and occurs from southern Maine and Quebec west to Minnesota and Iowa and south to northern Georgia and Alabama covering a total of 26 states and 2 provinces (COSEWIC 2002; Conant and Collins 1998; Figure 1). The distribution of the Eastern Milksnake overlaps to some extent with other subspecies in parts of its range in the United States (Conant and Collins 1998; COSEWIC 2002). Hereafter in this document, the *triangulum* subspecies (Eastern Milksnake) will simply be called Milksnake.

⁹ Anal plate refers to the belly scale covers the cloaca of the snake.

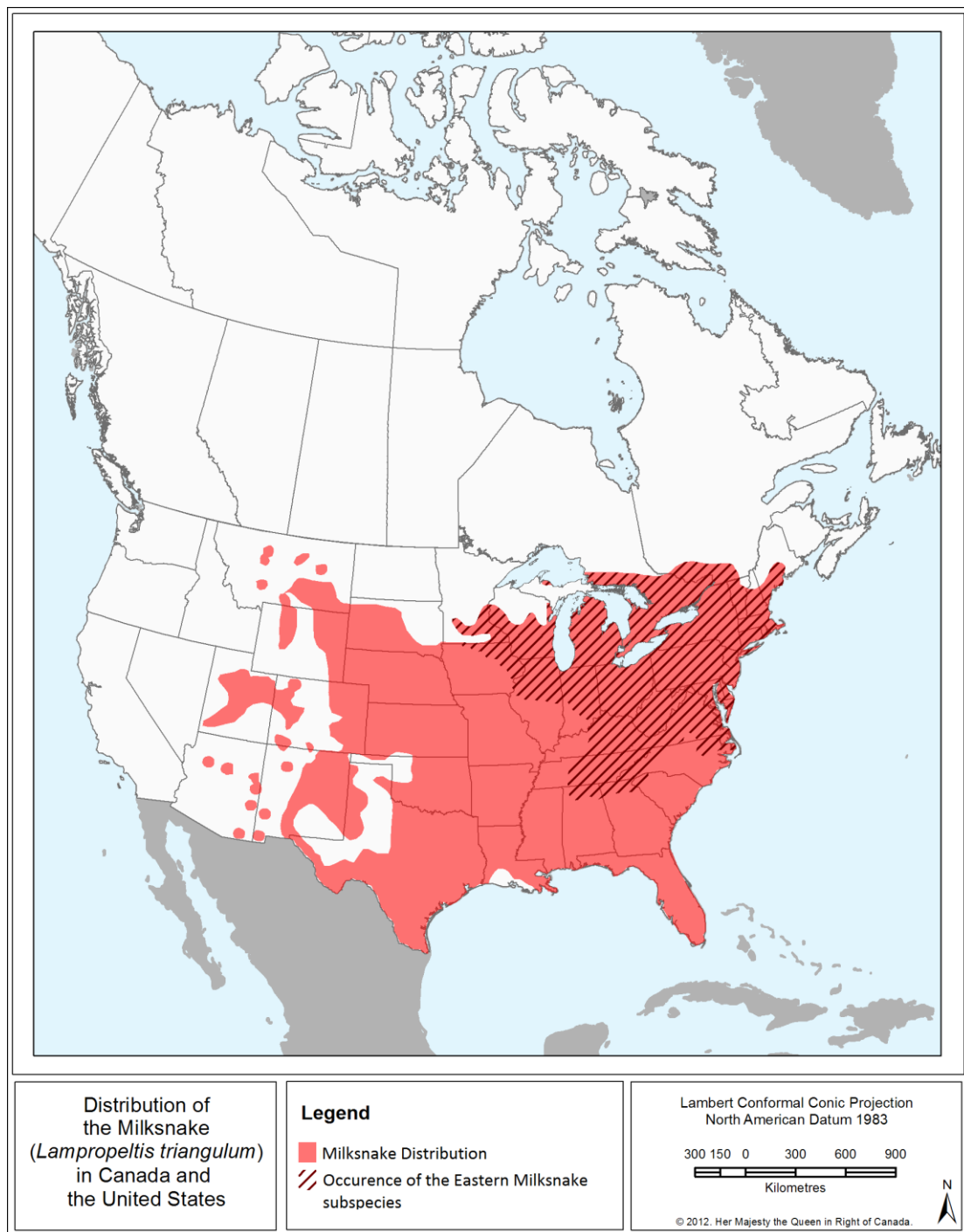


Figure 1. Distribution of the Milksnake in Canada and the United States (from NatureServe 2012), and occurrence of the Eastern Milksnake subspecies (based on Conant and Collins 1998).

In Canada, the Milksnake ranges throughout the Carolinian and the Great Lakes/St. Lawrence zones (COSEWIC 2009). In Ontario, some records have occurred as far north as Sault Ste Marie, the north shore of Lake Huron, and Lake Nipissing (Figure 2). The current distribution of the Milksnake in Ontario stretches from the extreme southwest up to Echo Lake in Algoma District and as far east as Ottawa and Brockville (Rowell, 2013). In Quebec, Milksnakes are found only along a narrow southwestern section of the province (Bider and Matte 1996), where it is regularly found in the St. Lawrence Lowlands, including the area near Montreal, Montérégie, as well as in the Gatineau area (Centre de Données sur le Patrimoine Naturel du Québec 2012; Figure 3). The extent of occurrence in Canada has been estimated to be approximately 229,285 km² (COSEWIC 2014).

Recent work on Milksnake has confirmed its presence in every Ontario jurisdiction currently within the known range of this species, with recent findings in Quebec showing the presence of Milksnake outside of its documented range (COSEWIC 2014). The total adult population in Canada is estimated to be greater than 10,000 adults (COSEWIC 2014). There is evidence that Milksnake populations have been lost from large urban centers and areas of intense agriculture, in much of Southwestern Ontario, so that Milksnake occurrences are extremely rare or absent and assumed to be extirpated from certain historical locations in the region (COSEWIC 2014).

Milksnake records continue to be obtained through public reporting, conservation organizations and species-at-risk surveys associated with development applications. The Ontario Reptile and Amphibian Atlas and the Atlas des Amphibiens et des Reptiles du Québec both collect data on Milksnake distribution within the Province of Ontario and Quebec, respectively. Population estimates, however, are difficult to determine because of low detection rates, and because most observations were not collected using standard sampling methods (Paterson pers. comm. 2012).

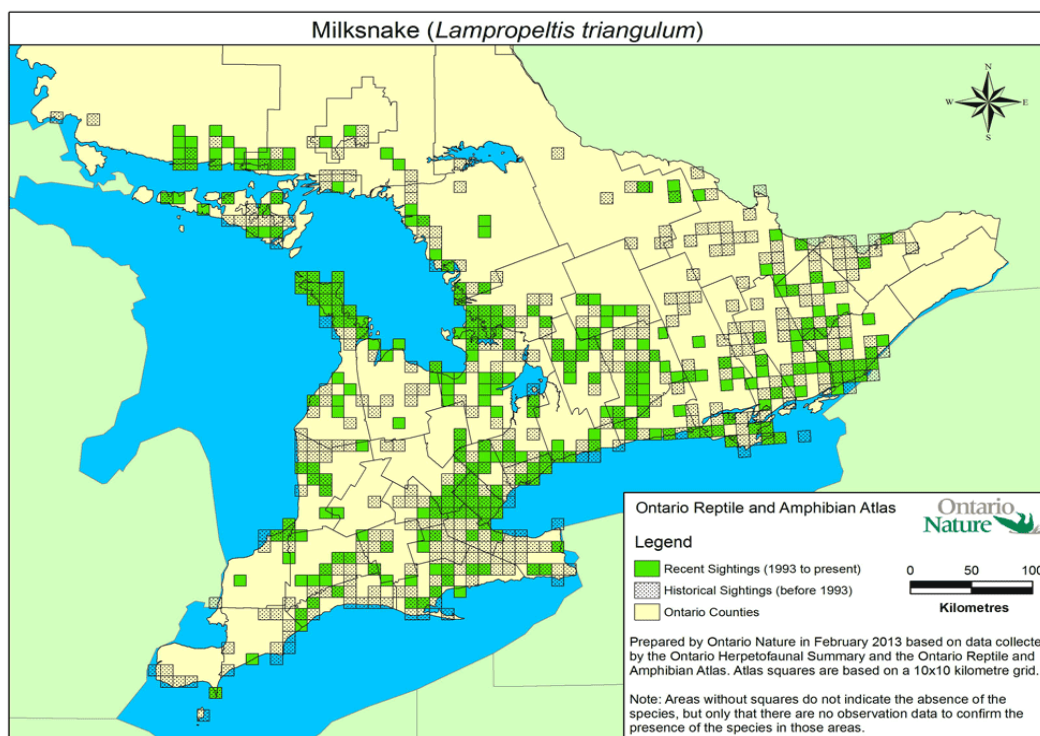


Figure 2. Distribution of the Milksnake in Ontario (Ontario Nature 2013)¹⁰.

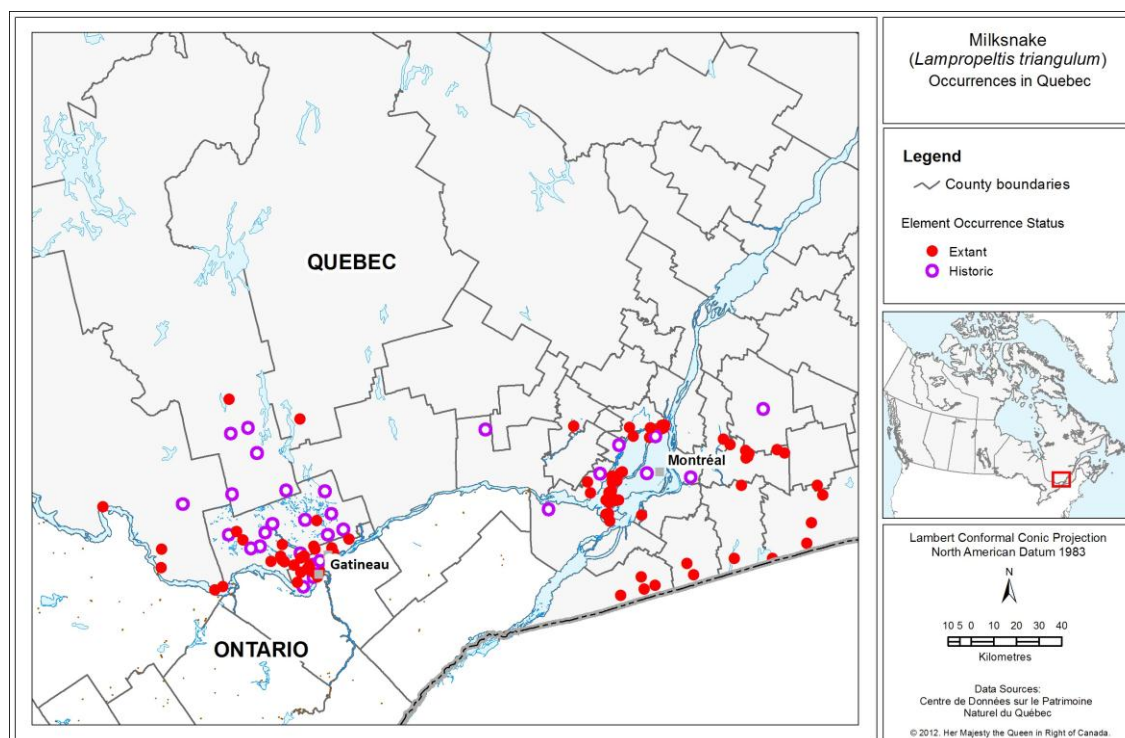


Figure 3. Occurrences of the Milksnake in Quebec.

¹⁰ It should be noted that Parks Canada considers the recent sighting of a Milksnake in Point Pelee National Park to be a likely misidentification, however there are valid records of a recent sighting for Main Duck Island in Thousand Islands National Park.

3.3 Needs of the Milksnake

3.3.1 Habitat and biological needs

The Milksnake inhabits a wide variety of natural and human-modified habitats including prairies, meadows, pastures, hayfields, rocky outcrops, rocky hillsides and forests (deciduous, coniferous, and mixed). Analysis of Milksnake distribution in southern Ontario (at a macrohabitat scale) found the species to be abundant in areas with high forest cover where there is more natural habitat (Lamond 1994 *in* COSEWIC 2002). A study in eastern Ontario (within areas of high forest cover) found the species preferred home ranges with extensive forest cover, and move to open (rocky outcrops and fields) and edge microhabitats, likely because these habitats facilitate thermoregulation (Row 2005; Row and Blouin-Demers 2006a). In Quebec, the largest concentration of Milksnake sightings are in areas open to development (near Gatineau and the west island of Montreal) (COSEWIC 2002). Home range size of Milksnakes varies from 10-20 ha in the United States. (Fitch and Fleet 1970; Kjoss and Litvaitis 2001). Snakes move across these home ranges throughout the year for a variety of reasons such as movement to and from breeding, hibernation and basking sites. Corridors of natural habitat between natural areas, such as riparian areas, are important to facilitate movement. The species is frequently encountered in rural areas around buildings such as barns, sheds and houses, and may also be found in suburban parks and gardens (COSEWIC 2002). Milksnakes have often been linked to living or hibernating in human-made structures or refuse, such as basement or crumbling foundations (Rowell 2013). Milksnakes may be found near a water source (Oldfield and Moriarty 1994) such as the edges of bogs, marshes, swamps and other wetlands (Rowell 2013).

Egg-laying habitat

Milksnakes lay 8 to 16 eggs (Rowell 2013) in a variety of substrates, including rotting logs, stumps, mammal burrows, piles of manure, leaf mounds, sawdust piles, compost, sand, under boards, or in loose soil. Multiple females may lay eggs at a single egg-laying site, often within several centimetres of each other, possibly because suitable egg-laying sites are scarce (Tyning 1990; COSEWIC 2002). Incubation of the eggs takes 50-70 days at a constant temperature of approximately 24°C (Ernst and Barbour 1989).

Hibernation habitat

Milksnakes may hibernate communally, and require hibernation sites that maintain an optimal hibernation temperature of 4 to 6°C and sufficient moisture to prevent dehydration over the winter. Hibernacula¹¹ that Milksnakes will use are varied, from natural sites such as old burrows and rock crevices to human-made structures such as the foundations of old buildings and other human debris (e.g. car parts, old pipes) (Rowell 2013).

¹¹ An area used by an animal for hibernation, this spot is usually used year after year (Row 2005).

Thermoregulation habitat

Milksnakes demonstrate selection for open and edge habitat to meet their thermoregulatory needs for basking to raise their temperatures (Row and Blouin-Demers 2006a; Row and Blouin-Demers 2006b). Within these open and edge habitats, at a micro-habitat scale, Milksnakes most frequently bask under objects (e.g. planks, stumps, rock piles, rubbish, metal) that are in direct sunlight and provide some protection from predators, and are less frequently found basking in the open (COSEWIC 2002). At night, they may also absorb heat from black-topped roads (Harding 1997). As the air temperature drops at the onset of fall and winter, Milksnakes tend to move below the frost line (Johnson 1989).

Diet and Feeding

Milksnakes are opportunistic predators and are restricted to consuming relatively small-sized prey (Tyning 1990). Young Milksnakes have been recorded eating worms and the young of other snakes, and likely eat other small prey such as amphibians or invertebrates. While rodents appear to be the most important food source, adult Milksnakes have also been known to eat birds and their eggs, reptiles, fish, amphibians and invertebrates (COSEWIC 2002).

Predators

Predators of Milksnakes include Bullfrogs (*Rana catesbeiana*), Brown Thrashers (*Toxostoma rufum*), Raccoons (*Procyon lotor*), Coyotes (*Canis latrans*), hawks, owls, foxes, skunks, Virginia Opossum, and other snakes (including the Milksnake itself). Weasels and shrews, which hunt underground for food, may pose a threat to eggs and young hibernating Milksnakes. Domestic and feral dogs and cats may also kill Milksnakes (COSEWIC 2002).

3.3.2 Limiting factors

As with many reptiles, the resiliency of Milksnake populations may be constrained by the species' life history characteristics. Milksnakes can be quite long-lived, generally live anywhere in the range from 10 to 20 years, and some captive specimens have lived over 20 years (Harding 1997; Ernst and Barbour 1989). Milksnakes do not reach sexual maturity until approximately three or four years of age (Fitch and Fleet 1970; DeGraff and Rudis 1983; Harding 1997). There is still very little known about Milksnakes, though they appear to live at low densities and females may lay a clutch of eggs only every second year (Tyning 1990). As a result of these life history traits, even slight increases in adult mortality can cause populations to decline (Ontario Nature 2012).

The range of the Milksnake in Canada is limited by temperature. The short activity season in Canada (May to October), combined with the lengthy incubation period of 50-70 days at a constant temperature of approximately 24°C (COSEWIC 2002), likely limits reproductive success in Canada where the species is at the northern limits of its range. There is also little known on hatchling survivorship, but it has been suggested

that mortality may also occur if hatchlings do not have time to feed before their first winter and an optimum hibernation site is not found (A. Lentini, pers.comm. 2002). Within Canada, availability of suitable egg-laying and hibernation habitat may also limit the distribution of the species.

There are likely additional factors that limit the survival, reproduction, and distribution of the Milksnake in Canada. However, currently there is insufficient information available on the survivorship, mortality and population demographics of the species in Canada to assess these factors.

4. Threats

4.1 Threat Assessment

Table 1. Threat Classification Table

Threat	Level of Concern ¹	Extent	Occurrence	Frequency	Severity ²	Causal Certainty ³
Habitat Loss or Degradation						
Urban, industrial, and intense agricultural development	High	Widespread	Historic/ Current/ Anticipated	Recurrent	Medium	Medium
Removal of old farm buildings	Medium	Widespread	Current/ Anticipated	Recurrent	Low	Medium
Disturbance or harm						
Discriminate killing	High	Widespread	Current	Seasonal	Low	Medium
Accidental Mortality						
Road mortality	High	Widespread	Current	Seasonal	Medium	Medium
Mortality from use of agricultural equipment	Low	Widespread	Current	Seasonal	Medium	Low
Exotic, invasive or introduced species						
Predation by domestic/feral/human subsidized predators	Medium/ Low	Widespread	Current	Continuous	Low	Low
Snake Fungal Disease	Low	Unknown	Anticipated	Unknown	Unknown	Low
Biological Resource Use						
Pet trade	Low	Widespread	Current	Recurrent	Low	Low

¹ Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the conservation of the species, consistent with the management objectives. This criterion considers the assessment of all the information in the table.

² Severity: reflects the population-level effect (High: 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

Urban, industrial, and intense agricultural development

Historically, conversion of forests and fields for urban, industrial and intense agricultural development has caused loss and fragmentation of Milksnake habitat in Ontario and Quebec (Harding 1997; COSEWIC 2002). For example, about 90% of the original forest cover and 72% of the original wetland habitat in southwestern Ontario has been converted to agricultural uses (Larson et al. 1999; Ducks Unlimited Canada 2010). Today, development continues to pose a threat in many areas. In particular, urban expansion is a threat around areas with high concentrations of Milksnake sightings: Gatineau and the west island of Montreal, Quebec and the Greater Toronto Area, Ontario (COSEWIC 2002).

While it is likely that development has reduced or eliminated some local Milksnake populations, the severity of the threat is difficult to assess because the Milksnake appears to use a broad range of habitat types, and can be common in human-modified landscapes including agricultural and suburban environments (Harding 1997; COSEWIC 2002).

Removal of old farm buildings

Old farm buildings and barns from pre-industrialized agriculture continue to be removed from the landscape to make room for industrial agriculture, urban and industrial development or for safety reasons. Removal of these buildings may lead to a loss of egg-laying, foraging, or hibernation habitat for Milksnakes which may use the foundations. In areas around Toronto, Milksnake populations are often located in areas near old farm buildings or near the foundations of former buildings (Johnson 1989), and it is expected that many of the remaining buildings will be removed to allow for further urban development (COSEWIC 2002). In addition, it is possible that modern barns and altered farming practices may have decreased rodent populations, reducing the prey availability for Milksnakes in agricultural landscapes (COSEWIC 2002).

Persecution

People often fear the Milksnake because of its defensive behavior or because they mistake the Milksnake for the venomous *Massasauga* due to its colour and tendency to vibrate its tail when threatened (COSEWIC 2002; Ontario Nature 2012). This, in combination with other misconceptions about the species and the fact that Milksnakes sometimes enter human dwellings, result in Milksnakes being frequently killed by humans (COSEWIC 2002). It is difficult to assess the severity of this threat because many of these encounters on residential property undoubtedly go unreported; however, a large number of reported *Massasauga* sightings each year are in fact misidentified Milksnakes (COSEWIC 2014; Johnson 1989; Bériault pers. comm. 2009). Milksnake, as with all snakes, can be harmed or killed because of humans having a general dislike of snakes (Nolan et al. 2006). Studies on the intentional killing of snakes by vehicle motorists found that drivers do attempt to run over snakes and about 2.7% of motorists intentionally hit them (Langley et al. 1989; Ashley et al. 2007).

Road mortality

A large percentage of Milksnake sightings reported in Ontario are from snakes that have been killed on roads (COSEWIC 2002). For example, 22 dead Milksnakes were recorded in a study on the 1000 Islands Parkway in Eastern Ontario between 2008 and 2011 (Garrah 2012). Road mortality appears to be highest in the spring and autumn, a trend that may be explained by migration to and from hibernacula. However, road mortality also occurs throughout the active season, suggesting that snakes are killed during both dispersal and migration (Ashley and Robinson 1996). Snakes may be attracted to roads to facilitate thermoregulation, enhanced prey resources in roadside ditches or to move throughout its range, leading to mortality from passing vehicles (Harding 1997; Fourtney et al. 2012). Any roads intersecting Milksnake home ranges are a threat and have the potential to cause mortality.

Road mortality can also occur with non-vehicular transportation such as bikes, off-road vehicles, and pedestrians. The creation and use of urban and rural trails by pedestrians, off-road vehicles, and bicycles in Milksnake habitat may result in mortality or injury of individuals or nests from trampling, disturbance or loss of hibernation habitat.

Mortality from use of agricultural equipment

As Milksnakes frequently inhabit rural areas, they can get into farm and agricultural machinery such as haying equipment during routine farming activities (COSEWIC 2002). Mortality can also occur when eggs are laid in compost, sawdust piles and manure piles and later destroyed when these piles are disturbed or removed (Froom 1972; Lamond 1994; Tynning 1990).

Predation by domestic, feral, and wild animals

Due to the large human population within the range of the Milksnake in Canada, and the fact that Milksnakes will use human-modified habitats, predation by domestic and feral cats and dogs, as well as raccoons and skunks, may be a significant threat (COSEWIC 2014). The large numbers of domestic and feral cats have an especially large impact on Milksnake populations both in residential areas and around farms or agricultural lands (Carbone and Gittleman 2002). Recent research shows that feral cats are a significant threat to reptile populations in the United States (Loss et al. 2013); feral cats around urban areas might also be a threat to Milksnakes in Ontario. Populations of raccoons are dense in southern Ontario (approximately 1.1 million), especially around urban areas where there is an estimated 8-18 raccoons per square kilometre (OMNR 2009). Skunk population abundance may also be higher in human-modified landscapes, further contributing to increased predation.

Snake Fungal Disease

An emerging disease in wild snakes, snake fungal disease, is currently known to affect Milksnake, Massasauga and Northern Watersnake (Sleeman 2013). While information on Canadian occurrences of this disease are not available the disease has been found in many of the U.S. Great Lakes states such as New York, Ohio and Wisconsin (Sleeman 2013). The disease has caused mortality in some cases but information on

the effects of the disease at a population level is unavailable. However this disease may pose a threat to isolated and small populations as it adds yet another pressure upon them.

Pet trade

Across its global range, collection for the pet trade is thought to have led to declines in populations of Milksnake (NatureServe 2012). This threat may not be as severe in Canada as it is elsewhere because the Eastern Milksnake subspecies (*L.t. triangulum*) is less colourful than other Milksnake subspecies making it less desirable in the pet trade (Markel 1995). Several other subspecies are maintained and bred in captivity. Nevertheless, there is a market for Eastern Milksnake in some areas and this threat could contribute to local extirpations (COSEWIC 2002).

5. Management Objective

The management objective for the Milksnake is to maintain populations throughout the known range in Canada where it is known to occur and, where possible, fill knowledge gaps on demographics, habitat use and threats to the subspecies found in Canada.

6. Broad Strategies and Conservation Measures

6.1 Actions Already Completed or Currently Underway

Several initiatives have been completed or are currently underway that will aid in the conservation of the Milksnake. Along with provincial and other programs, Canada's Habitat Stewardship Program (HSP) and Aboriginal Fund for Species at Risk (AFSAR) play an integral part in helping to protect Species at Risk (SAR). The following are projects that are particularly pertinent to the conservation and habitat management for the Milksnake:

Road Mortality:

- The Board of Management, Toronto Zoo through the Ontario Road Ecology Group (OREG) at the Toronto Zoo (and now associated with the Royal Ontario Museum in Toronto) applied a Geographic Information System (GIS) model that predicts and prioritizes where roads act as wildlife mortality sinks. Barriers to habitat connectivity in various municipal, provincial and federal road projects are also identified to help mitigate the negative effects on local wildlife populations including Milksnake and other SAR species. In addition, OREG has initiated local wildlife-road interaction monitoring projects involving citizen scientists and workshops to improve input to environmental assessments to promote and improve SAR recovery efforts.

- The Chippewas of Georgina Island First Nation have found the Milksnake to be abundant on Georgina Island. Signs have been posted on the roadways where Milksnakes have been known to cross most frequently, and door-to-door surveys and youth awareness sessions were used to educate the community. These actions were taken in the hopes of reducing the fear of snakes and showing their positive ecological role on the island and mitigating road mortality of Milksnake.
- Long Point World Biosphere Reserve Foundation initiated the Long Point Causeway Improvement Project that is intended to reduce road mortality of reptiles and amphibians, and restore aquatic connectivity between the Big Creek Marsh and Long Point Bay, near Port Rowan, Ontario. Activities have included; the construction of eco-passages, the installation of barrier fencing along both sides of the roadway to reduce reptiles on the road and an on-going outreach program to raise awareness of the dangers of road mortality to reptile species. Monitoring on this causeway over the past years indicates that the barrier fencing and ecopassages have resulted in a significant reduction in road mortality of many reptile species at risk, including the Milksnake.
- Thousand Islands National Park has been the focus of several studies into road mortality on the 1000 Islands Parkway. These studies focus on determining hotspots for wildlife crossings, including reptiles and amphibians, with the intent of using the data to make decisions on the placement of wildlife passages and fencing. During the two studies conducted between 2008 and 2011, 16 Milksnakes were found dead on the road (Eberhardt et al. 2013).
- Nature Conservancy of Canada has conducted reptile road mortality surveys in the Bruce Peninsula since 2012 (Bruce Peninsula Environment Group 2013). This research will produce data to identify mortality hotspots to target and contribute to a masters thesis.

Conserve and Manage Milksnakes and their Habitat:

- Haliburton Highlands Land Trust (HHLT) identified 2,596 ha of wetland as important habitat and this information will be used in conservation planning and property acquisition in the region. Five workshops were run highlighting reptiles at risk through the distribution of outreach materials and species education, including information on the Milksnake. Throughout this project a total of 20 observations of Milksnakes were recorded from an area that previously had no sightings.
- Construction of hibernacula for Milksnakes (and other snake species) has also occurred in a few locations in Ontario (Bériault pers. comm. 2009).
- Ontario provides direction to protect known hibernacula of the Milksnake during forest management operations. This direction is provided in the Ontario Ministry of Natural Resources (MNR) 2012 *Forest Management Guide for Conserving*

Biodiversity at the Stand and Site Scales. In this Guide, Milksnake hibernacula and egg laying sites are defined as values that are used at least once within the past five years and include habitat within a 30 m radius or as otherwise defined by the *Endangered Species Act, 2007* habitat description or habitat regulation. Forestry management guidelines applies to hibernacula identified by MNR prior to, or during, forestry operations.

Inventories and Monitoring Targeting the Milksnake and Its Habitat:

- Magnetawan First Nation conducts opportunistic and habitat surveys, as well as monitors road interactions between the Milksnake and the two highways which bisect their land. They collect data on the presence or absence of this species on the roadways, total road mortality and individual snake morphometrics. The data collected is forwarded to Environment Canada, Ontario Ministry of Natural Resources (OMNR) and Ontario Reptile and Amphibian Atlas (ORAA). It is also used to guide and mitigate development and construction projects on their land in a sustainable manner. Magnetawan First Nation also presents facts and findings to the community, along with nearby First Nation communities.
- Parks Canada has specific conservation objectives directed at Milksnakes as part of their draft Multi-species Action Plan for Thousand Islands National Park. One of these actions is to confirm continued occupancy in all known locations within the Park, which will be confirmed by actively observing individuals at least once every five years.
- The Ontario Nature Reptile and Amphibian Atlas is aimed at improving the knowledge of species' distributions and local population occurrence. The information is submitted to the Natural Heritage Information Centre (NHIC) annually, and informs local and regional land use planning, conservation and stewardship work. A webpage with an online reporting form, program information and an online Ontario Reptile and Amphibian Atlas has also been created (www.ontarionature.org/atlas). Other activities initiated by Ontario Nature include: conducting an outreach campaign in Grey and Bruce Counties to increase local stewardship, encouraging the submission of road observation data to the NHIC, Milksnake population mapping, and identifying Milksnake populations and habitat on several of Ontario Nature's reserves across Ontario.
- Long Point Basin Land Trust has developed reptile sighting forms and identification fact sheets for several species at risk, including Milksnake.
- Research focused on Milksnake behaviour, habitat and thermoregulation has been conducted and has filled several knowledge gaps on the species (Row 2005, Row and Blouin-Demers 2006a, Row and Blouin-Demers 2006b).

Outreach and Communications:

- Sciensational Sssnakes!! and Scales Nature Park have presented sessions about species at risk reptiles and amphibians throughout various regions of Ontario at public venues. In many presentations, live Milksnakes were on display for the public to view and learn about them. There were statistically significant increases in participants' knowledge (60% increase) and attitude (13% increase) scores regarding snakes. The long-term result of this project will be increased awareness of, and interest in, the issues relating to reptile species at risk conservation, decreased persecution of snakes, and increased support for other recovery activities.
- Parks Canada: Parks such as Thousand Islands, Georgian Bay Islands and Bruce Peninsula that have populations of Milksnake, regularly present outreach and in-park education programs on snake species at risk. This includes having decals on vehicles to promote awareness of snake mortality on roads. Species at risk outreach programs have been a part of the PCA's educational activities for decades.
- Many other groups and aboriginal communities through HSP, AFSAR and provincial funding programs, have conducted a variety of habitat enhancement activities, surveys, educational workshops and created outreach materials. These groups and communities included Alderville First Nation, Carolinian Canada Coalition, Georgian Bay Biosphere Reserve, Grand River Employment and Training Inc., Laurentian University, Long Point Basin Land Trust, and Nature Conservancy of Canada.

Quebec

Inventories and Monitoring Targeting the Milksnake and Its Habitat:

- The Atlas des Amphibiens et des Reptiles du Québec provides information on all reptile and amphibian species in Québec, including the Milksnake, and provides data on amphibians and reptiles to the Centre de données sur le patrimoine naturel du Québec (CDPNQ).
- Several organizations, such as Ambioterra, the Appalachian Corridor, the Centre de conservation de la nature du Mont-Saint-Hilaire, the Centre d'interprétation du milieu écologique du Haut-Richelieu (CIME), the Nature Conservancy of Canada (NCC), Nature-Action Québec and the Société d'histoire naturelle de la vallée du Saint-Laurent have also conducted projects targeting the Milksnake directly or amphibians and reptiles in general. Those projects include reptile and amphibian surveys, mark-recapture studies, relocation of snakes prior to major construction, and installation of amphibian and reptile drift fences.

Conserve and Manage Milksnakes and their Habitat

- The Centre de conservation de la nature du Mont-Saint-Hilaire, CIME, NCC and Nature-Action Québec are involved in land acquisition and stewardship in the Montérégie and Outaouais regions. From 1998 to 2012, they acquired properties where Milksnakes or suitable habitat for them were found in the adjacent to these sites: Mont-Saint Hilaire Nature Reserve (25 ha), Mont-Saint-Bruno (8 ha), Mont-Rougemont (6 ha), Corridor vert de Vaudreuil-Soulanges (111 ha), Mont-Saint-Grégoire (70 ha), Pin-Rigide ecological reserve (30 ha), and Bristol (342 ha).

Outreach and Communications:

- A study investigating the effect of relocation on survival and movement of Milksnakes received funding from the Fondation de la Faune du Québec in 2012. Outreach activities have included soliciting observations/encouraging public reporting of individuals, educating landowners and/or the public on species identification, threats, and stewardship options, publishing pamphlets and articles on conservation of the Milksnake, and creating a visual identification key for reptiles and amphibians in Québec.

A number of research projects to fill knowledge gaps have also been conducted, several of which are referenced in this plan.

6.2 Broad Strategies

The broad strategies of this management plan are as follows:

1. Conserve and manage Milksnakes and their habitat throughout their Canadian range by mitigating threats, where feasible;
2. Conduct inventories and monitoring that target the Milksnake and its habitat, and solicit observations from the public to better document the current distribution of the species and changes in its distribution (and, where possible, abundance) over time;
3. Evaluate the severity of threats in different habitat types across the Canadian range of the Milksnake, determine the compatibility of land uses and land management practices with Milksnakes and encourage research to fill knowledge gaps, mitigate threats and evaluate population;
4. Conduct outreach and communication to increase awareness of the Milksnake and encourage stewardship.

6.3 Conservation Measures

Table 2. Conservation Measures and Implementation Schedule

Conservation Measure	Priority	Threats or Concerns Addressed	Timeline
1. Conservation and management			
1.1 Develop and implement best management practices and land-use guidelines for Milksnake habitat for use on various sites where it occurs; Encourage the conservation, protection and management of Milksnake habitat where the species occurs.	High	Urban, industrial, and intense agricultural development; Removal of old farm buildings; Road mortality	2014-2019
1.2 Where possible, mitigate road mortality at hotspots through the creation of ecopassages, modifying road design, and a combination of other measures (e.g., signs, installing wildlife fencing, reduced speed limits and driver education).	High	Road mortality	2014-2019
1.3 Protect individuals from being collected for the pet trade by enforcing regulations in Quebec and Ontario under existing wildlife laws.	Low	Pet trade	Ongoing
2. Inventories and monitoring			
2.1 Promote the following programs and activities: 1) reporting programs that solicit incidental observations of Milksnake and other species at risk from the public; 2) inventory and monitoring programs that target Milksnake where it is known or suspected to occur; 3) identify and protect hibernacula for Milksnake and other species at risk snakes; and 4) tracking changes in distribution/abundance of Milksnake populations.	High	All threats; knowledge gaps	Ongoing
2.2 Inventory and quantify known and potential habitat and monitor landscape-level habitat changes (cover type) periodically, in relation to changes in Milksnake distribution.	Medium	Urban, industrial, and intense agricultural development; Removal of old farm buildings; knowledge gaps	Ongoing
2.3 Plan and implement a monitoring system based on the quality and quantity of available habitat	Medium	knowledge gaps	2014-2019
3. Evaluate threats and encourage research to fill knowledge gaps			
3.1 Use data from conservation measure 2.1 to evaluate road mortality rates and identify road mortality hotspots	High	Road mortality	2014-2019
3.2 Encourage research to fill knowledge gaps and inform management activities such as: population studies across the Milksnake's range in Canada to determine habitat use, activity range size, dispersal distances, population density and population ecology; and genetic studies to assess variability across its range.	Medium	Knowledge gaps	2014-2019
3.3. Encourage research to evaluate mortality rates from domestic and feral pets and wild animals, and investigate the potential impact of the pet trade on Milksnake.	Low	Knowledge gaps; Predation by domestic animals; Pet trade	2014-2019

4. Outreach and communication

4.1 Develop educational outreach material and/or a social marketing strategy for Milksnake in coordination with recovery efforts for other species at risk (particularly snakes) to ensure an efficient and coordinated approach to inform and engage target audiences; Make educational material available to schools, visitors to protected areas, stakeholders, aboriginal communities, and landowners to promote a better understanding of Milksnakes and encourage stewardship.	High	All threats	2014-2019
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7. Measuring Progress

Every five years, success of this management plan will be measured against the following performance indicators:

- Known populations of Milksnake throughout its range in Canada are maintained;
- Increased knowledge of locations of Milksnake populations (and, where possible, relative abundance), demographics, and habitat use in Canada.

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Appendix A: Subnational Conservation Ranks for the Milksnake

Table 3: Subnational Conservation Status Ranks (S-Ranks) for the Milksnake (*Lampropeltis triangulum*) in the United States of America (NatureServe 2012).

Sub-national Rank	State
SNR	Arkansas, Illinois, Indiana, Missouri, New Jersey, Ohio
S1	Delaware, District of Columbia
S2	Arizona, Montana, South Carolina
S3	North Carolina, Oklahoma, Utah, Wyoming
S4	Georgia, Iowa, Kansas, Louisiana, Minnesota, Mississippi, New Mexico, South Dakota, Wisconsin
S5	Alabama, Colorado, Connecticut, Kentucky, Maine, Maryland, Massachusetts, Michigan, Nebraska, New Hampshire, New York, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, Virginia, West Virginia

S1: Critically Imperiled; S2: Imperiled; S3: Vulnerable; S4: Apparently Secure; S5: Secure; SNR: Unranked – Status not yet assessed.

Appendix B: 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](#). 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.

Management planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans 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 plan itself, but are also summarized below.

Many activities contributing to the conservation of the Milksnake, particularly those relating to habitat management, surveys and outreach, and threat mitigation, also target other at-risk reptiles, especially snakes, turtles and amphibians. Examples of species likely to benefit from these activities are listed in Table 4.

Table 4. Species at risk expected to benefit from management techniques directed at Milksnake in Canada.

Common Name	Scientific (Latin) Name	SARA Status	Province
Massasauga	<i>Sistrurus catenatus</i>	Threatened	Ontario
Eastern Foxsnake (Carolinian population)	<i>Pantherophis gloydi</i>	Endangered	Ontario
Eastern Foxsnake (Great Lakes/ St. Lawrence population)	<i>Pantherophis gloydi</i>	Endangered	Ontario
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	Threatened	Ontario
Gray Ratsnake (Carolinian population)	<i>Pantherophis spiloides</i>	Endangered	Ontario
Gray Ratsnake (Great Lakes/ St. Lawrence population)	<i>Pantherophis spiloides</i>	Threatened	Ontario
Five Lined Skink (Carolinian population)	<i>Plestiodon fasciatus</i>	Endangered	Ontario
Five Lined Skink - Great Lakes Population	<i>Plestiodon fasciatus</i>	Special Concern	Ontario
Blanding's Turtle	<i>Emydoidea blandingii</i>	Endangered	Ontario, Quebec
Wood Turtle	<i>Glyptemys insculpta</i>	Endangered	Ontario

While some of the proposed management activities will benefit the environment in general and are expected to positively affect other sympatric native species, there could be consequences to those species whose requirements differ from those of the Milksnake. Consequently, it is important that habitat management activities for the Milksnake be considered from an ecosystem perspective through the development, with input from responsible jurisdictions, of multi-species plans, ecosystem-based recovery programs or area management plans that take into account the needs of multiple species, including other species at risk.