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Le présent document est offert en anglais seulement en raison de sa circulation limitée et du contenu technique. Pour plus de renseignements sur la couleuvre obscure (black rat snake), prière de s'adresser à Shaun Thompson, écologiste du district de Kemptville, au 613-258-8235, qui se fera un plaisir de vous fournir de la documentation en français.

# The Black Rat Snake

ONTARIO  
SPECIES  
AT RISK

## Live & Let Slither



Shedding light  
on Canada's  
largest snake

 Ontario

# Big, black and benign

**J**UST HOW BIG is Canada's largest snake? Most adults reach 1.5 to 1.8 metres. Black rat snakes on the shorter end of this range would stretch from side to side of a queen size mattress; those on the longer end, from top to bottom. This is about a metre shorter than the record-setting black rat snake, which stretched in at 2.57 metres (about 8½ feet).



## Close Encounters of the Snake Kind

"I was driving to the cottage and this huge black snake appeared out of nowhere. I swear it stretched from one side of the road to the other. It disappeared so quickly, I was left wondering if I'd imagined the whole thing."

—An Ontario cottager

So by just about anyone's standard, an adult black rat snake is a large snake. And to many of us, any snake, particularly a large one, is intimidating. But despite their impressive size, black rat snakes are harmless – unless you are a chipmunk or a small bird. Neither are they venomous. A gray squirrel is about the largest creature that a black rat snake could subdue.

Black rat snakes are not aggressive, but when harassed or threatened they may rear and strike, and will often vibrate the tip of their tail against dry leaves in imitation of a rattlesnake. Within their Ontario range, black rat snakes and eastern massasauga rattlesnakes share habitat only in Wainfleet Bog near Port Colborne in the Carolinian region. In all of the other areas where black rat snakes live, there are no rattlesnakes.

In spite of their name, not all black rat snakes are solid black. Though most adults are a shiny black with a white or cream chin and throat, many retain faint remnants of their juvenile colouration and



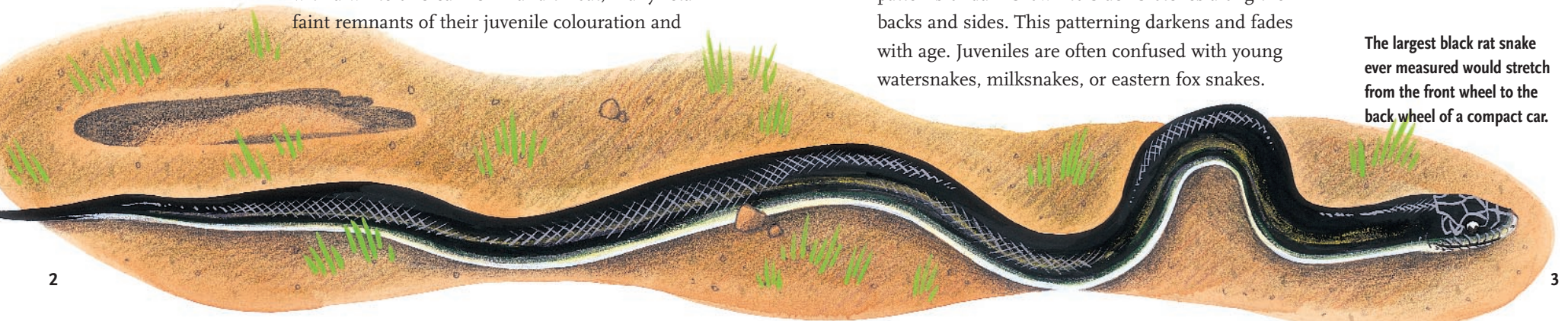
patterning. Their backs and sides may have faint irregular blotches of brown, and the tips of their scales may be edged with white. Colours between the scales can be shades of yellow, red, white, green, and brown, making some individuals quite colourful. Their bellies are generally unpatterned and range in colour from light cream to almost black, sometimes even orange. Adult black rat snakes are sometimes confused with large female water snakes, melanistic garter snakes, or eastern fox snakes.

Young black rat snakes are pale gray with irregular patterns of dark brown to black blotches along their backs and sides. This patterning darkens and fades with age. Juveniles are often confused with young watersnakes, milksnakes, or eastern fox snakes.



The juvenile black rat snake's distinctive pattern (bottom) eventually fades to near-black as it reaches adulthood (top).

The largest black rat snake ever measured would stretch from the front wheel to the back wheel of a compact car.



# Harmless – but becoming homeless

CANADA'S LARGEST snake lives only in two distinct regions of Ontario – the Carolinian Forest region, running across the north shore of Lake Erie in southwestern Ontario, and the Frontenac Axis region in southeastern Ontario. The black rat snakes in these areas are at the periphery of the species' range, with those in the Frontenac Axis being at the very northern edge.

From their population centre in the eastern United States, they moved northward with the retreating glaciers. This means that for about 7,000 years they have made these areas of Ontario their home.

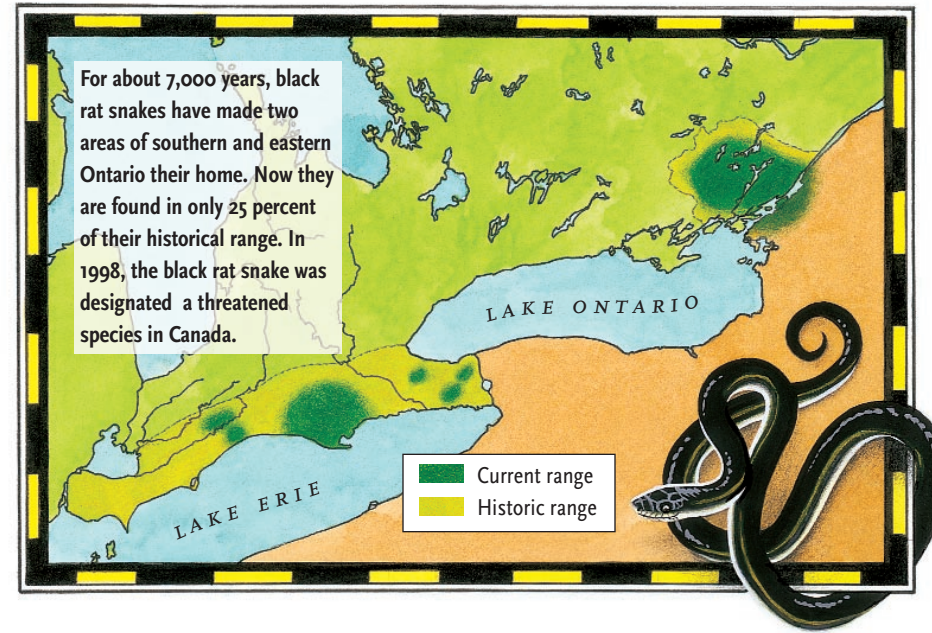
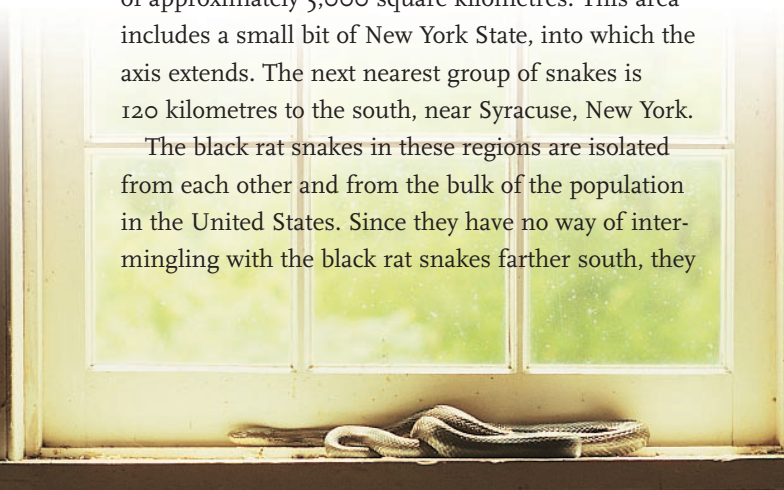
Historic records indicate that prior to European settlement, black rat snakes lived throughout much of the Carolinian forest region. Over the past 200 years, the Carolinian forest cover has been reduced to patches, most of which measure less than three hectares. The black rat snake population in this area has been fragmented along with the forest. These snakes now live as a handful of small, isolated groups.

The Frontenac Axis snakes are confined to an area of approximately 5,000 square kilometres. This area includes a small bit of New York State, into which the axis extends. The next nearest group of snakes is 120 kilometres to the south, near Syracuse, New York.

The black rat snakes in these regions are isolated from each other and from the bulk of the population in the United States. Since they have no way of intermingling with the black rat snakes farther south, they



Black rat snakes are harmless. They will only strike or bite in self-defense.



are particularly vulnerable to the pressures of continued loss and alteration of habitat.

Habitat loss and fragmentation have reduced their geographic distribution in Ontario by an estimated 75 percent. Most of the reduction has occurred in the Carolinian region, but there is also evidence of significant range contraction in the Frontenac Axis region.

The increase in the number of roads through black rat snake habitat and the ever-increasing traffic spell bad news for black rat snakes. They don't reach sexual maturity until they are 9 or 10 years old. If individuals are to contribute to their population, they not only have to avoid natural predators for a decade, but must also avoid becoming roadkill and being killed or collected by humans.

In 1998, the black rat snake was designated a "threatened" species in Canada. This designation means they are likely to become endangered in this country if the factors affecting their vulnerability are not reversed. If their 7,000-year legacy in Canada is to continue, we must dig down to the very old – and twisted – roots of the human/snake relationship.

## How threatened is "threatened"?

"Threatened" is one of several categories used to describe the probability of a species' extinction:

- **Extinct:** no longer existing
- **Extirpated:** no longer existing in the wild in Canada, but existing elsewhere in the wild
- **Endangered:** facing imminent extirpation or extinction
- **Threatened:** likely to become endangered if nothing is done to reverse the factors leading to extirpation or extinction
- **Special concern:** particularly sensitive to human activities or natural events, but not defined by any of the above.

# They're under our skin...

## SNAKES IN THE HUMAN PSYCHE

**S**NAKES ARE NOT popular. They are very likely the most persecuted of animals. Many are killed on sight simply because they are snakes. Some of us actually go out of our way to kill them. This is not true for many, if any, other animals. Snakes' lack of popularity is reflected even at the level of scientific research. Getting funds for snake projects is a big challenge. The barrier is our predominant response to snakes: fear.

We fear them perhaps because of their extreme difference – from ourselves and all other animals. They swallow their food whole, they shed their skin, and their eyes are always open – they have a “fixed stare.” They move quickly and quietly without limbs. These traits – along with their ability to appear suddenly on the ground, in trees, in water, and from holes – make them really good at surprising us.

Research with our closest non-human relatives, the chimpanzees and gorillas, indicates that snakes are good at surprising them, too. They respond to snakes in the same way that a lot of us do. Even a black hose in a snake-like shape on the ground can cause stress, anxiety, and fear. This research suggests that our relationship to snakes is deeply rooted in prehistory – and in our genes.

Our fear of snakes is disproportionate to the harm they can do. The vast majority of snakes are non-venomous, and therefore absolutely harmless. Even if we take into account venomous snakes, many other animals are more able, or more likely, to harm us. Yet those animals do not generate anywhere near the same emotional reactions as snakes.

Snakes conjure up all kinds of weird and wonderful things in our imaginations. In fact, no other animal is so rich in meaning for the whole human



species. In virtually all cultures, past and present, the snake is a prominent symbol. This is even true of cultures that evolved in places where there are no snakes, such as Ireland and Lapland, suggesting that the snake was the first animal symbol. It remains fundamental to creation myths worldwide, yet is also associated with death and chaos. The snake represents opposite values: good and evil; health and sickness; immortality and death.

Why snakes take up more than their fair share of our psyche remains an intriguing mystery. What is absolutely clear, however, is that we have the ability to modify our responses to the serpentine image that may be lurking there. Snakes may be under our skin, but our latent fear of them does not have to drive us to harm them. We can shed some of our deeply rooted myths and misunderstandings.

Snakes can't blink because their clear eyelids are fused over their eyes. During shedding, the skin of the eyelids separates from the eyes – resulting in their clouded appearance – and is shed with the rest of the skin.



Snakes are masters of sudden appearance and disappearance.



### Serpentine symbols

In virtually all cultures, the snake is a prominent symbol: In Western culture, the two snakes entwined around a staff, known as the caduceus, are a symbol for medicine. The ancient Greeks believed that Medusa's gaze could turn those who looked upon her to stone. And in ancient Mesopotamia, the snake eating its own tail, or ouroboros, signified rejuvenation and the continuity of life.

# ...And we're under theirs

## IMPLANT TECHNOLOGY

**I**N AN ATTEMPT to shed light on what black rat snakes need to survive and prosper, researchers have turned to implant technology.



### DNA tells us a story

Not only are we under their skin, but we're in their genes. Genetic analysis on black rat snake blood samples shows us how their populations and subpopulations interact across the landscape. We have discovered that the isolated black rat snake populations in Ontario are genetically distinct from other regional populations in the United States. They represent a significant portion of the genetic diversity of the species.

In 1982, at Queen's University Biological Station at Chaffey's Locks, small battery-operated radio-transmitters were surgically implanted in black rat snakes' body cavities. These transmitters emitted a signal that could be tracked up to one kilometre away, allowing researchers with radio telemetry equipment to follow the snakes' movements. In 1984, researchers began radio-tracking black rat snakes in St. Lawrence Islands National Park. The marked snakes led researchers to two hibernating sites. Wardens were then able to return to the site in the spring to gather valuable information on when and how many snakes were emerging from hibernation.

These successes with radio telemetry led to further initiatives. Three-year research projects were conducted at Murphy's Point and Charleston Lake provincial parks. These studies provided valuable information on movement patterns, breeding frequency, home range and habitat use, and population ecology.

In 1994, researchers began implanting snakes with microchips, or passive transponders. The chips are inserted under the snakes' skin with a large bore needle, where they remain for the duration of the snake's life. Each microchip has a unique 10-digit, alpha-numeric code allowing for individual identification of implanted snakes.

Transponders differ from transmitters in that they do not send out a signal, so with this technology, the snakes cannot be tracked. Transponders are used



Researchers implant a transponder.

solely to identify an individual once it has been recaptured, aiding research on growth rates, longevity, and population ecology.

Transponders are also useful in determining if black rat snakes have been illegally captured from the wild. As specially protected reptiles, no one can own them without a permit. Unfortunately, they are still captured illegally and held in captivity for the pet trade. If marked snakes were to show up in such a situation, transponders would be useful for enforcement purposes. They rule out any argument that the snakes may have been bred in captivity.



The reader passes over an embedded microchip to get a positive I.D.

# Habits and habitat

**B**LACK RAT SNAKES spend a good portion of their time in trees hunting and basking. Though they use – and need – deciduous forest interior, they prefer edge habitat, where the forest and field meet. Recent research suggests that edge habitat provides them with better opportunities for regulating their body temperatures. For snakes, thermoregulation, as it is

known in scientific circles, is critical. It is particularly important for snakes at the northernmost point of their range, and especially for pregnant females. Edge habitat also tends to be home to more prey, making it preferred hunting ground.

Black rat snakes are commonly found along dry rocky ridges and around drained beaver ponds. A concern to many a property owner is that they are also often found in and around barns, houses, and sheds. A resident black rat snake can keep the rodent population in check.



## Survival of the genetically diverse

Hibernacula populations, found in crevasses or rocky ridges like the one pictured above, are “outbred,” meaning there is gene flow between populations of different hibernacula. We do not know how genes get around. It may be that members of different hibernacula meet and mate during the active season, or it could be juvenile dispersal or egg-laying away from the hibernaculum. We do know that the long-term survival of black rat snakes requires connectivity between the different populations. Hibernacula “islands” result in inbreeding and decrease genetic diversity.

### A black rat snake’s to-do list

Implant technology has provided a clear picture of what kind of habitat features support the “activities” and equally important “inactivities” of black rat snakes.

#### Activities

- eating
- avoiding being eaten (fleeing or fighting)
- getting to and from loafing trees (places of important inactivity)
- finding mates
- mating
- egg laying
- in spring: getting away from the hibernaculum
- in fall: getting to the hibernaculum

#### Inactivities

- digesting (hanging out after a large meal)
- avoiding being eaten (hiding)
- loafing
- basking (soaking up rays)
- preparing to shed (a process that takes a couple of weeks)
- shedding
- hibernating



Black rat snakes are often found in and around barns, houses, and sheds, where they can keep the rodent population in check.

## Home is where the hibernaculum is

**O**NE OF THE key findings of the implant research was the importance of hibernacula – the rocky, underground cavities where the snakes can descend to below the frost line to hibernate for seven months of the year. Communal hibernacula, some of which may have been in use for several hundred years, may harbour between 30 and 60 individuals. Black rat snakes are loyal to their hibernacula. Almost all of the snakes that leave a particular hibernaculum in the spring return to the same one in the fall. In the event that a traditional hibernaculum is destroyed, emigration of residents to another location is unlikely. Their hibernacula and the immediate areas surrounding them are probably the most important habitat features required for their survival.

Black rat snakes begin to emerge in mid April and are active until early October. They must accumulate



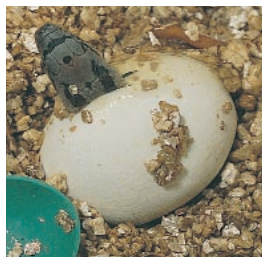
This is black rat snake country – edge habitat, where forest and field meet.



A black rat snake makes a meal of a barn swallow.

### Fine dining

Active hunters, black rat snakes are able to follow prey by scent – predominantly small mammals, such as mice, squirrels, bats, and baby rabbits. They are also good climbers and avid nest predators. Known predators of adult black rat snakes are raccoons, coyotes, foxes, mink and hawks.



Females lay eggs on average every two to three years. Eggs hatch from early September to early October. Juveniles average 30 centimetres in length when they hatch and weigh about 10 grams.

enough energy reserves to grow, reproduce, and survive the winter in this very short, active season. They disperse on average 1.2 kilometres from their hibernaculum. From year to year, they frequent a relatively consistent area, their “home range.” They are not territorial, and within this range share important habitat features with other individuals. Take, for instance the “loafing tree.” This is a dead, dying, or downed tree that serves as a communal site for shedding skin, laying eggs, digesting food, and soaking up sun.

## Natural histories and herstories

**I**N ONTARIO, black rat snakes live 25 to 30 years. Both males and females reach maturity at about 10 years, with males becoming larger than females. Mating takes place in June, away from hibernacula. In July, a clutch of 9 to 21 cream-coloured, leathery, round-to-oblong eggs are laid. They are from 2.5 to 5 centimetres long and are laid in decaying vegetation. Nest sites may be standing, hollow snags in an advanced state of decay, rotten logs or stumps, tilled garden soil, or compost and manure piles. Some nests are communal, holding the eggs of several females, whereas others contain the eggs of a solitary female. The same site may be used year after year if the conditions remain right.

Black rat snakes mature late and reproduce infrequently. Therefore, when adult females are killed, either intentionally or accidentally on the road, it can have a significant impact on the population.

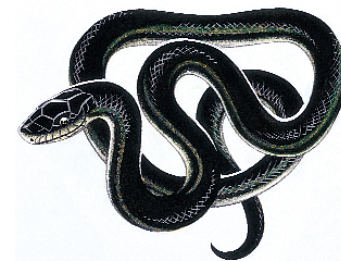


## Let's not let them silently slip away

**T**HE SITUATION facing Ontario black rat snakes is strikingly similar to that facing wildlife worldwide. More and more species are being confined to fragmented remnants of their former range; habitat alteration is the leading problem facing all vertebrate groups.

About one in four vertebrate species are limited to small and localized populations, are declining steeply in numbers, or are threatened with extinction. Most biologists believe that we are presently in the middle of one of the great mass extinctions of geologic history. But whereas all of the others were caused by natural phenomena, this one is unique in being brought about by one species: *homo sapiens*. The dubious distinction is ours.

We still have time to avert the collapse of our living world. The only way to prevent the big picture of mass extinction is to treat each little picture – like black rat snakes in Canada – as vitally important.



Black rat snakes are an “umbrella” species. Initiatives that ensure their protection and recovery will have far-reaching benefits for many other species.



# Live and let slither

## SHARING HABITAT WITH BLACK RAT SNAKES

SOME OF US are permanent residents in black rat snake habitat; some of us are seasonal; and some of us may just pass through. Here is a list of things we can do to actively share habitat with black rat snakes.



Dead or hollow trees provide benefits to black rat snakes, as well as other wildlife.

- **Consider supporting or volunteering** for black rat snake projects at provincial or national parks, such as the “Adopt a Snake” programs run by the Friends of Murphy’s Point and Friends of Charleston Lake Provincial Parks.
- **Reduce driving speed and increase observational skills** during spring and fall when black rat snakes are most likely to be basking on roads. At other times of the year, black rat snakes may be crossing the road just to get to the other side. Be mindful!
- **Leave dead or hollow trees on property** for basking, shedding and egg-laying sites. They are also beneficial to other wildlife.
- **Leave downed trees and woody debris** with rotten cavities because of their importance as egg-laying sites.
- **Start a compost pile** for a potential egg-laying site. Don’t turn it in July and August, or eggs may be crushed.
- **Leave known hibernacula and the surrounding area undisturbed.**
- **Create small brush piles on property.** These can serve as places where snakes can escape predators and find prey.
- Perhaps most importantly, **let the snakes be!**



# Recovery initiatives

IN 1999, THE Ministry of Natural Resources (MNR) assembled the Black Rat Snake Recovery Team. It consists of a dedicated group of experts from the MNR, Ontario Parks, and Parks Canada – as well as academic researchers from the United States and Canada, and non-government representatives.

Their overall goal is to ensure that black rat snakes remain a healthy component of Canadian biodiversity. To this end, they have developed a recovery strategy and are implementing an action plan. They have set separate medium-term goals for the two population regions: For the Frontenac Axis, the aim is to retain current distribution and connectivity among populations, with no decrease in numbers. For the Carolinian region, they aim to achieve self-sustaining populations, with no further decrease in numbers. They also aim to restore connectivity, or gene flow, among the currently isolated populations.

The recovery team will attempt to coordinate with existing landscape conservation initiatives such as the Algonquin to Adirondacks (A2A) project and Carolinian Canada’s “Big Picture Project.”



## Related Laws and Legislation

All wildlife is protected within national and provincial parks. However, only about five percent of the black rat snake’s range in Canada falls within park boundaries. Outside of these areas they are protected under the following:

### Fish and Wildlife Conservation Act

Protected from harassment, taking, hunting or trapping.

### Planning Act

Protects significant portions of habitat from development.

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