

Dear Educator/Interpreter,

Thank you for your interest in the eastern massasauga rattlesnake and this education package. The National Recovery Strategy for this threatened species lists education as one of its primary goals.

Please find enclosed:

- Poster "Snakes of Ontario"
- Laminated identification guide "Snakes of Ontario"
- Video "Living With Wildlife -The Eastern Massasauga Rattlesnake"
- Video question and answer sheet
- Eastern Massasauga Rattlesnake Stewardship Guide
- Exciting lessons and activities on snake biology and ecology
- Cross-curricular activities that promote snake conservation
- Activities to complete at the Toronto Zoo
- Certificate of Appreciation (to be copied for each student)
- Snake bite and safety information sheets

Many naturalist groups and nature centres as well as students and educators have participated in massasauga workshops and make a commitment to the recovery of the species. These organizations and agencies include Sudbury's Science North, Ojibway Nature Centre in Windsor, Toronto Zoo, conservation authorities, national and provincial parks, service groups, and cottage associations. We invite you to join with us in providing a new source of information to your community and in sharing this curriculum-based resource with other educators.

This resource contains background information designed to familiarize you with the massasauga rattlesnake. Hopefully, it will help you feel confident in facilitating activities and lessons on snake biology, ecology, safety, community-based participation in the recovery process, and ongoing changes in public attitudes towards this often misunderstood species. These engaging activities are cross-curricular and appropriate for various grade levels. Most of the activities do not require additional resources. The specific curriculum expectations met by each activity are listed in **Appendix I on page 97**.

These activities will require students to observe, communicate, analyze, use mathematical skills, and manipulate materials and equipment, while having FUN. Students will acquire some understanding of the basic biology and ecology of the massasauga and become sources of information at home and in the community. Using this guide allows you to introduce students to the fascinating world of this and other snakes. *While meeting your curriculum expectations, you will contribute to an informed and empathetic generation of environmental leaders.*

If you would like to be added to our mailing list and receive "Rattlesnake Tales," or if you have any further questions, please write, fax or e-mail your request along with your name and full address to:

Andrew Lentini, Toronto Zoo
361A Old Finch Ave.
Scarborough, Ontario M1B 5K7
Fax: (416) 392-4979
e-mail: alentini@torontozoo.ca

For more information
on the recovery team:
www.massasauga.ca

We thank you for your participation and welcome feedback about your use of these materials. Your feedback may be incorporated into our newsletter "Rattlesnake Tales," which reprints student artwork, poetry, or essays. The newsletter provides a forum for sharing your experiences and ideas with other educators and community members.

Sincerely,

Bob Johnson, Curator of Reptiles and Amphibians

*In the end
we will conserve only what we love;
we will love only what we understand, and;
we will understand only what we are
taught.*

*-Baba Dioum
Senegalese Conservationist*



TEACHERS!

This resource will:

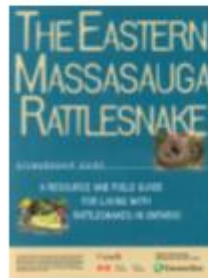
Incorporate lessons on the biology and ecology of the eastern massasauga rattlesnake into the Life Systems Strands of Grades 1 to 7.



Help create your own unit on the eastern massasauga rattlesnake and conservation science issues related to this threatened species.



Offer you factual information about rattlesnakes that will help you to dispel myths and fear about this fascinating creature.



Provide fun, easy, cross-curricular Science and Technology, Mathematics, Language Art's, Health and Physical Education, And Visual Arts activities that can be easily adapted to suite any elementary grade level or interpretive experience.



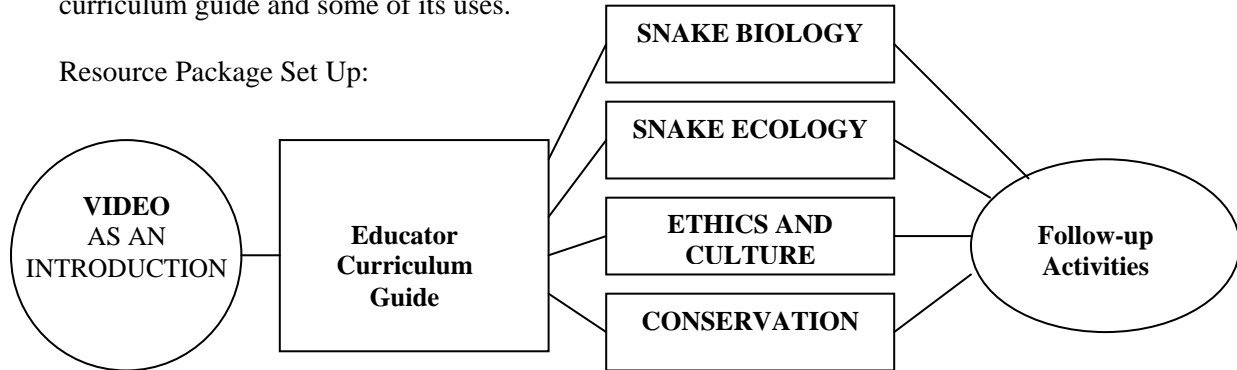
Allow you and your students to appreciate and preserve wildlife while sharing recovery goals of the eastern massasauga rattlesnake recovery team.



SHORT CUT

This is a simple curriculum guide on the eastern massasauga rattlesnake that is easy to use and applicable to many subject areas of the Ontario Curriculum. We understand that it may be implausible to utilize this entire package. To help you, here is a succinct description of the curriculum guide and some of its uses.

Resource Package Set Up:



Suggested Progression:

VIDEO - introduce students to topics and issues surrounding the species.

SNAKE BIOLOGY (UNIT 1) - help students to gain an appreciation for the world of snakes by learning about snake biology.

SNAKE ECOLOGY (UNIT 2) - explain species-specific needs and connections in snake communities and habitats. Help to explain the roll of snakes in promoting the healthy ecosystem that humans depend on.

ETHICS AND CULTURE (UNIT 3) - explore, in more depth, myths and fears about snakes.

CONSERVATION (UNIT 4) - explore threats to snake survival and issues related to the recovery of snakes.

Proposed Usage:

Each section features:

1. Background information designed to familiarize you with the subject matter.
2. Activities for your class designed to meet specific expectations of the Ontario Elementary Science and Technology Curriculum as well as Mathematics, Language Arts, Health and Physical Education, and Visual Arts.
3. A list of the grade levels and curricular strands for each activity.

N.B.: The specific curriculum expectations met by each individual activity are listed in Appendix 1 at the end of the document.

You may use one activity (or more!) from each section to effectively demonstrate each topic in a relatively short period of time. For greatest time efficiency, you may incorporate one of the many activities into your normal curricular plans.

As a token of our appreciation for class involvement in learning about the massasauga, we include in Appendix 2, a *Certificate of Appreciation* for you to copy and distribute to your students.

ACKNOWLEDGEMENTS

Funding for the Curriculum Guide and the supply of materials that accompany it have been provided by:

Environment Canada
Endangered Species Recovery Fund (ESRF)
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Canadian Museums Association
Habitat Stewardship Fund
Parks Canada
Sydenham Conservation Foundation
Toronto Zoo: Endangered Species Fund
World Wildlife Fund (WWF)
Young Canada Works (YCW)

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SNAKES OF ONTARIO IDENTIFIER



An identification guide to the Eastern Massasauga Rattlesnake and other Ontario snakes.

Recovery through education and conservation.

This guide will help you identify the Eastern Massasauga Rattlesnake and other snakes in Ontario. The Massasauga is one of five Ontario snakes with blotches. Snakes on this identifier are grouped by appearance (blotched, striped and no pattern). When you see a snake, look at its size and pattern. Does it have blotches, stripes, or no pattern?

Snakes are illustrated at quarter-life size. These snakes are not found in all Ontario regions. Consult a field guide for maps of snakes in your area. The size of snakes includes U.S. populations as listed in 'Conant, Roger and Joseph T. Collins, 1991 A Field Guide to Reptiles and Amphibians of Eastern and Central North America, 3rd edition, Houghton Mifflin Co. Boston'

For information on attending a rattlesnake workshop, or the Toronto Zoo's Rattlesnake Education Programme write to:

Toronto Zoo - Rattlesnakes
361-A Old Finch Ave.
Scarborough, ON, CANADA
M1B 5K7
or email: alentini@zoo.metrotor.on.ca
Recovery Team website: www.terra-plex.com/sin

Eastern Milk

Lampropeltis triangulum triangulum

- 61-90 cm; record 132.1 cm
- cream, tan, or light grey with red or dark brown black-bordered blotches or rings on back alternating with blotches along each side
- young have red blotches bordered in black
- blotch on neck may appear Y or V shaped
- belly whitish with black checkerboard pattern
- scales smooth; anal scale single
- lays eggs



Eastern Hognose

Heterodon platirhinos

- 51-84 cm; record 115.6 cm
- large dark blotches down back alternating with smaller blotches along sides
- when threatened, spreads neck to display darker neck pattern and will roll over to play dead
- can be blotched phase or plain grey, green-brown or even black
- heavy-bodied
- flat head with upturned snout
- belly yellow-grey with greenish grey pattern
- underside of tail lighter colour than body
- scales keeled; anal scale divided
- lays eggs
- SPECIAL CONCERN

Northern Water

Nerodia sipedon sipedon

- 61-106.7 cm; record 140.5 cm
- well patterned individuals have reddish brown squarish blotches down back with row of alternating blotches along each side
- at front of body, some blotches extend as saddles over back and on to sides
- pattern on older individuals may be obscured and they appear black or brown
- usually found in or near water
- belly cream with irregular rows of reddish half moon crescents
- scales keeled; anal scale divided
- gives birth to live young



Lake Erie Water

Nerodia sipedon insularum

- 61-106.7 cm; record 140.5 cm
- a sub-species of the more wide spread Northern Water snake
- range from uniformly grey with no markings to dark grey-brown with some banding
- only found at western end of Lake Erie and on Pelee and surrounding islands
- belly whitish yellow to grey
- scales keeled; anal scale divided
- gives birth to live young
- ENDANGERED



Juvenile Fox

- grey with reddish brown blotches edged in black
- dark bar across snout and from eye to jaw



Eastern Fox

Elaphe gloydi

- 91-137 cm; record 179.1 cm (large snake)
- yellow-brown with large brown or black blotches on back that alternate with smaller blotches along sides
- may have red-brown head
- belly yellow with black checkerboard pattern
- scales weakly keeled; anal scale divided
- lays eggs
- THREATENED

Eastern Massasauga Rattlesnake

Sistrurus catenatus catenatus

- Ontario's only venomous snake
- 47.2-76 cm; record 100.3 cm
- grey to brownish grey with darker blotches along back and several rows of alternating blotches along sides; blotches edged in white
- black snakes with no pattern, very rare
- pit on each side of head between eye and nostril
- distinct segmented rattle
- tail thick, squarish; does not taper to a point like all others
- does not always rattle a warning; relies on pattern and remaining motionless to go undetected
- heavy bodied; often found coiled
- belly black
- scales keeled; anal scale single
- gives birth to live young
- THREATENED



Northern Brown

Storeria dekayi dekayi

- 23-33 cm; record 49.2 cm (small snake)
- light grey-brown to red-brown
- two rows of spots along light coloured stripe on back
- rows of spots may be joined by narrow lines
- dark downward bar on side of head
- juveniles have three yellowish spots on neck
- belly cream or pinkish
- scales keeled; anal scale divided
- gives birth to live young

Northern Redbelly

Storeria occipitomaculata occipitomaculata

- 20.3-25.4 cm; record 40.6 cm (small snake)
- reddish brown to grey-brown in colour
- three light brown or yellow spots on neck
- orange-red belly; few dark spots may be present
- scales keeled; anal scale divided
- gives birth to live young

Smooth Green

Ophiodrys vernalis

- 30.3-51 cm; record 66 cm
- bright green and shiny
- belly white or yellow
- scales smooth; anal scale divided
- lays eggs

Northern Ringneck

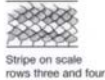
Diadophis punctatus edwardsii

- 25.4-38 cm; record 70.6 cm
- shiny steel blue, slate or brown in colour
- neck ring and belly orange-yellow
- scales adjacent to neck ring darker
- belly has interrupted row of small black spots
- scales smooth; anal scale divided
- lays eggs

Northern Ribbon

Thamnophis sauritus sauritus

- 45.7-66 cm; record 96.5 cm
- black with 3 yellow stripes
- lateral stripes on scale rows 3 and 4
- distinct white half-moon spot in front of eye
- may have brown colour along each side of belly
- belly yellow-green
- scales keeled; anal scale single
- gives birth to live young



Queen

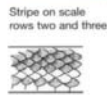
Regina septemvittata

- 38-61 cm; record 92.1 cm
- yellow-brown with yellow stripe along lower flank
- 3-5 dark stripes may be found on back
- belly cream-yellow; brown stripes may be visible
- usually found near rivers and marshes
- scales keeled; anal scale divided
- gives birth to live young
- THREATENED

Eastern Garter

Thamnophis sirtalis sirtalis

- 45.7-66 cm; record 123.8 cm
- black, green or brown with three yellow or yellow-green stripes
- stripes may be orange or reddish in some parts of range
- some snakes may be all black with no stripes (melanistic)
- lateral stripes on scale rows 2 and 3
- may have dark scales or spots between stripes giving it a checkered pattern
- belly yellowish green
- scales keeled; anal scale single
- gives birth to live young



Blue Racer

Coluber constrictor foxii

- 90-152 cm; record 182.90 cm (large snake)
- grey to greenish blue
- head dark, throat white
- belly light blue
- only found on Pelee Island
- scales smooth; anal scale divided
- lays eggs
- ENDANGERED

Red-sided Garter

Thamnophis sirtalis parietalis

- 41-66 cm; record 124.1 cm
- black-brown with 3 yellow stripes
- red bars between stripes and reddish wash on sides between scales
- lateral stripes on scale rows 2 and 3
- belly green-black
- in Ontario, only found along the Manitoba border
- scales keeled; anal scale single
- gives birth to live young

Juvenile Blue Racer

- grey with central row of dark grey-brown blotches
- few or no blotches on brown or grey tail
- side of head speckled white and black

Butler's Garter

Thamnophis butleri

- 38-51 cm; record 69.2 cm
- black or brown-green with 3 yellow stripes
- stripes may be orange
- lateral stripes on scale row 3 extending onto row 2 below and 4 above
- towards back of body lateral stripe on scale rows 2 and 3
- smallish head
- belly green-yellow
- only found in SW Ontario
- scales keeled; anal scale single
- gives birth to live young
- SPECIAL CONCERN

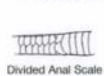
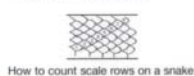
Black Rat

Elaphe obsoleta obsoleta

- 106.7-183 cm; record 256.5 cm (large snake)
- in some, faint blotched pattern may be seen
- throat white
- belly grey-brown wash
- scales weakly keeled; anal scale divided
- lays eggs
- THREATENED

Juvenile Black Rat

- light grey with grey-brown blotches on body and tail
- dark bar across snout and from eye to jaw



INTRODUCTION

Snakes, particularly venomous species, have unfortunately acquired a bad reputation in many cultures and have been subjected to considerable persecution. In several areas of North America, some species of snakes are in danger of disappearing forever. Such is the case with the Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*), a fascinating creature that few have taken the time to get to know and appreciate.

Understanding is the key to acceptance. This curriculum resource offers you the opportunity to learn about and provide factual information to help students understand rattlesnakes. The five units are divided to cover the following topic areas:

1. Snake Biology (Unit 1)

- How they keep their bodies warm
- The snake's scaled, shedding skin
- The snake's heat sensing pits

2. Snake Ecology (Unit 2)

- Snake habitat
- Community functions

3. Ethics and Culture (Unit 3)

- Dispelling myths and cultural labels surrounding the snake

4. Conservation (Unit 4)

- How we can contribute to the recovery of this wonderful animal

5. The Eastern Massasauga Rattlesnake Follow-Up

- Activities and Resources

We hope you and your students enjoy the various activities while learning about the Eastern Massasauga Rattlesnake!

EASTERN MASSASAUGA RATTLESNAKE FACT SHEET

Scientific Name: *Sistrurus catenatus catenatus*
Class: Reptilia
Order: Squamata
Family: Crotalidae (Pit vipers)
Genus: *Sistrurus*
Species: *catenatus*
Sub-species: *catenatus*



DISTRIBUTION:

CANADA: Only found in Ontario. The eastern massasauga rattlesnake is found along the eastern shores of Georgian Bay, on a few islands in Georgian Bay, on the Bruce Peninsula, in Wainfleet Bog near Port Colborne, within the cities of La Salle, and Windsor (Fig.1)

USA: New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Missouri, Iowa, Wisconsin, and Minnesota.

STATUS:

THREATENED in Canada and the United States. It is illegal to harm, capture or kill a threatened species.

HABITAT:

The name Massasauga means "great river mouth" in the Chippewa language. The name reflects the swampy and wetland areas preferred by this snake in the spring and fall. In the summer, rattlesnakes are often found in forest clearings, areas under power lines, open bog and prairie habitats, and within other dry upland habitats.

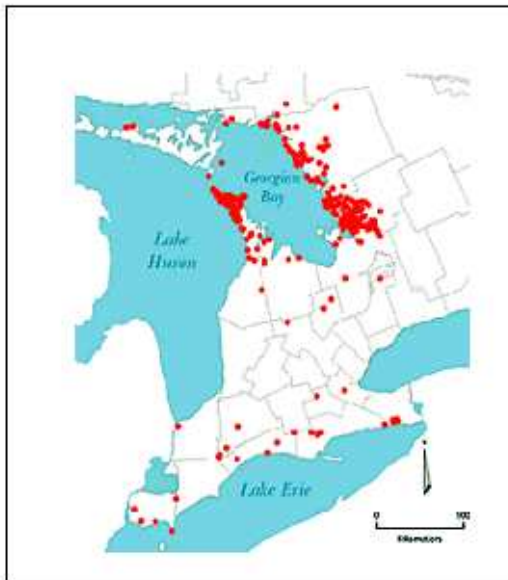


Figure 1a: Historical Ontario range map for the Eastern Massasauga Rattlesnake

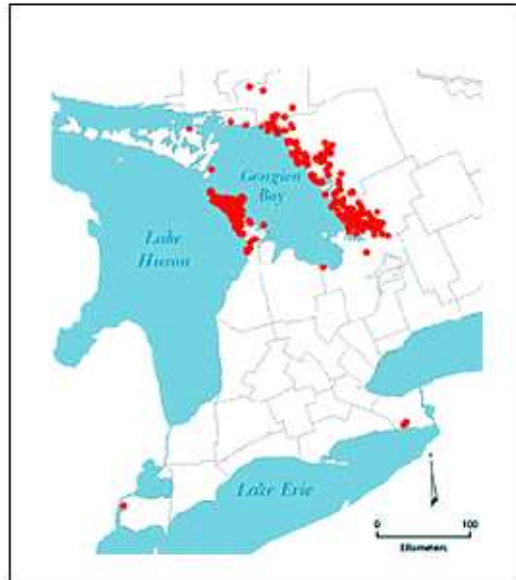


Figure 1b: Current Ontario range map for the Eastern Massasauga Rattlesnake

DESCRIPTION:

- Adults range from 47.2 to 76.0 centimetres long.
- Body colour ranges from grey to tan. Included is a row of grey/brown blotches down the centre of its back, with smaller rows of alternating spots along each side of the body. Massasauga rattlesnakes have a black belly.
- Rattlesnakes are known for having a blunt tail with a rattle. All other Ontario snakes have a pointed tail and no rattle. The dark brown rattle of the rattlesnake is formed from a series of hard interlocking segments of scale-like material. Rubbing against each other, the hollow segments produce an insect-like buzz when the snake vibrates its tail (Fig. 5).
- This is the only Ontario snake with vertical pupils (Fig. 3).
- All members of the pit viper family possess a pair of heat sensitive pits between the nostrils and eyes.



Figure 2: Eastern Massasauga Rattlesnake

FEEDING:

- Massasaugas feed mainly on rodents, especially mice. Birds, frogs, and smaller snakes provide an additional food source.
- Massasaugas do not chase prey. Instead, they wait quietly in a well-chosen area for the prey to appear.
- Heat sensitive pits allow the massasauga rattlesnake to detect small changes in temperature around them and find warm-blooded prey (such as a mouse) easily in the dark.
- Their hollow fangs, similar to hypodermic needles, are the most highly developed tooth-type among snakes. Fangs are hinged and fold back when not in use. Fangs allow the venom to be injected inside the bodies of small prey animals.
- Venom is a specialized digestive enzyme that disrupts blood flow, digests tissue, and prevents blood clotting in the prey. After biting, the rattlesnake backs away from the potentially dangerous prey until it dies and can be consumed whole.
- Venom is designed to quickly kill small prey - not to be used to attack large animals or people. As many animals do, the snake will bite to protect itself. It is important to know that not all rattlesnakes inject venom in a defensive strike (it is estimated that 25% of all defensive bites are "dry bites" where no venom is involved).
- Venomous snakes do not want to waste their venom on something they cannot eat.
- Loosely hinged jaws allow the rattlesnake to open its mouth wide enough to swallow prey larger than the snake's head.
- Overlapping body scales distend to accommodate the large prey within.



Figure 3: Vertical Pupil of the Eastern Massasauga Rattlesnake

BREEDING:

- Mating occurs in September before hibernation, or occasionally in May and June after hibernation.
- The female carries the developing embryos inside her body until the babies are ready to be born. Females are ovoviviparous, meaning that babies are born live within a membrane free from the confines of an egg. Clutches consist of 8 to 19 young, born in July or August. Neonates are about 20 centimetres.

FACTS:

- A rattlesnake is born with a single rattle segment called a button
- A new segment is added to the rattle each time the snake sheds its skin, which it does three to four times a year. The number of rattle segments on a snake's tail cannot be used to age a snake because the rattle is brittle and breaks off occasionally (Fig. 4).
- The small size of the fangs, along with a relatively small amount of injected venom make the massasauga less dangerous than many of its larger relatives.
- If bitten by a rattlesnake, seek medical attention as quickly as possible. Remember, rattlesnakes do not always inject venom when they strike and many venomous snakebites do not require anti-venom treatment. While symptoms may not require anti-venom, they do require hospital care. Do not apply a tourniquet, ice, or suction to a bite. In Ontario there have only been two recorded deaths in the 1960's and in both cases proper treatment was not received.
- The massasauga rattlesnake is shy and will avoid people when possible. Snakes often prefer to sit still and disguised in areas where their pattern will keep them well camouflaged as you pass by. If approached in the wild, massasauga rattlesnakes will usually make no sound. If disturbed, they will rattle their tail loudly as a warning. Move away and give the snake room to escape. A massasauga will not chase you.
- Some other Ontario snakes such as the milk snake and the fox snake will imitate the rattling sound of the rattlesnake by vibrating their tails on the ground when threatened. Such "mimickers" have neither rattles nor venom.
- The massasauga usually hibernates alone. It seeks shelter below the frost line in existing holes in bogs or cracks in rocky areas.
- The eastern massasauga rattlesnake is one of three rattlesnakes found in Canada. The other two are the northern pacific rattlesnake of south central British Columbia and the prairie rattlesnake of southern Alberta and Saskatchewan. The timber rattlesnake, formerly inhabiting extreme southwestern Ontario and the Niagara Gorge, has not been sighted since 1941 and is extirpated in Canada.

CANADIAN RATTLESNAKES:	Eastern Massasauga	<i>Sistrurus catenatus catenatus</i>
	Northern Pacific	<i>Crotalus viridis oreganus</i>
	Prairie	<i>Crotalus viridis viridis</i>

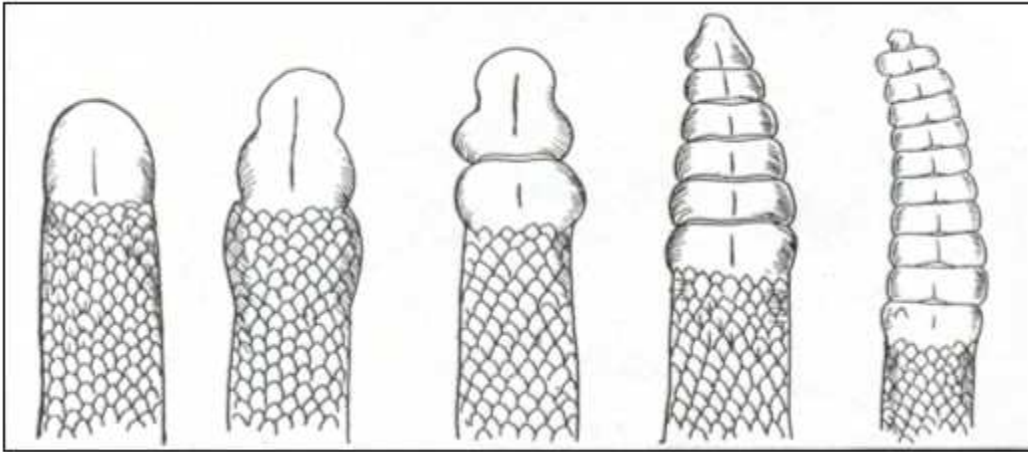


Figure 4: Juvenile button and maturing rattles



Figure 5: Rattle in cross section

VIDEO QUESTION SHEET

1. List ALL of the venomous snakes found in Ontario.

2. Name 3 visual characteristics that can help you to tell a massasauga rattlesnake apart from a fox snake or milk snake.

3. List 2 reasons why it can be tricky to tell a massasauga apart from some other snakes.

4. What do rattlesnakes do in the winter?

5. How does a rattlesnake regulate its body temperature?

6. Describe a massasauga rattlesnake's "personality."

7. What should you do if you come across a massasauga rattlesnake in the wild?

8. What should you do if a rattlesnake bites your dog?

9. What should you do if a rattlesnake lives on your property or campsite?

10. List 3 safety tips you should follow in rattlesnake country.

Note: All rattlesnake encounters, identification opportunities, and transportation of snakes should be undertaken by *adults*, preferably after suitable training. Toronto Zoo and recovery team members offer workshops and training in relocating rattlesnakes to secluded areas of your property.

ANSWERS TO VIDEO QUESTION SHEET

1. The eastern massasauga rattlesnake is the only venomous snake in Ontario.
2. You can tell a massasauga rattlesnake apart from the others because:
 - Rattlesnakes have a rattle on the end of their tail.
 - Rattlesnakes have a blunt tail; fox snakes and milk snakes have a pointed tail.
 - Size: at 47.2 - 76.0 centimetres, an adult rattlesnake is smaller than a fully-grown fox snake, 80 to 140 centimetres. Also, rattlesnakes have a more stout body than a milk or fox snake.
 - Rattlesnakes have heat-sensitive pits on either side of their head, between the eyes and nose; fox and milk snakes do not.
 - The belly scales of rattlesnakes are black to greyish black; fox and milk snakes have whitish bellies with small black squares (checker board pattern).
 - Rattlesnakes have a vertical pupil; all other Ontario snakes have round pupils.
3. It can be tricky to tell the massasauga apart from some other snakes because:
 - They may have similar colours and markings.
 - Some snakes (fox, milk) imitate rattlesnakes by vibrating their tails on the grass or leaf litter. Although they don't have a rattle, the sound of the leaves moving resembles the sound of a rattle.
4. In the winter, rattlesnakes hibernate below the frost line. Massasauga rattlesnakes do not dens with other snakes but usually hibernate alone. They return to the same hibernation spot year after year.
5. Rattlesnakes, like all reptiles, are ectothermic. Their body temperature is regulated by the ambient temperature in their environment. The colder the outside temperature gets the lower the rattlesnakes body temperature will fall.
6. Massasauga Rattlesnakes are shy and prefer to avoid any contact with humans. If given the chance a massasauga rattlesnake will always retreat to avoid conflict.
7. If you see or hear a rattlesnake you should:
 - Stop walking and locate the snake by listening closely.
 - Move away from the snake to give it room to escape.
 - Watch where you step; some rattlesnakes don't rattle until you are very near.
 - From a safe distance, enjoy this unique wildlife experience.
8. If your dog surprises a rattlesnake and gets bitten you should:
 - Stop your dog from moving around; keep your pet calm.
 - Clean the wound and put on a firm bandage.
 - Take your pet to the veterinarian right away.
 - DO NOT apply a tourniquet to the limb; DO NOT apply ice or suction to the wound. These same rules apply if a person gets a rattlesnake bite. Remind the class that this is a very rare occurrence.
9. If you spot a snake on your campsite or at home you can contact Niagara Peninsula Conservation Authority, Ojibway Nature Centre, Toronto Zoo, Ministry of Natural Resources, or a local park warden for help. Leave the snake alone. DO NOT try to chase or

scare the snake away. The zoo can provide you with a list of helpful agencies and will provide training on how to safely move snakes to more secured areas of your property. See "Rattlesnake Resources" in Unit 5.

10. Any of the snake safety tips outlined on the Snake Safety Sheet (APPENDIX 2) is correct. Go over all of these points with the class. Learn to identify snakes, wear appropriate footwear, keep pets on leash, do not pick up snakes, watch where you step and reach, stop and back away from a rattling sound, and do not try to kill rattlesnakes. They are a threatened species and legally protected.