

FOWLER'S TOAD STEWARDSHIP GUIDE

A resource and field guide for living with
Fowler's toads in Ontario



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Canada



TABLE OF CONTENTS

The Fowler's toad stewardship guide.....	1
Acknowledgments.....	2
Why is Fowler's toad a Species at Risk?.....	3
Research on Fowler's toad.....	4
The Fowler's toad Recovery Team.....	5
Stewardship as a tool for conservation.....	6
How the Fowler's toad was discovered.....	7
Biology and Natural History	
Ectotherm verses Endotherm.....	8
What does a Fowler's toad look like?.....	9
Fowler's toad verses American toad.....	10
Hybridization	10
What do they sound like?	11
Fowler's toad life cycle.....	12
Breeding season.....	13
A Fowler's feast	16
Their sensational skin	17
Pop-up eyes	18
Digging and burrowing ability.....	18
Sticky tongue	18
Toads are cool.....	19
Toad trip.....	20
Every season has a habitat type.....	21
Where do they live?.....	22
Benefits of open beach and dune habitats.....	23
Other Species at Risk.....	24
The natural Lake Erie environment.....	26
The Lake Erie watershed.....	31
Algae and the Fowler's toad.....	32
Threats to habitat.....	34
Exotic and invasive species.....	43
Living with Fowler's toads.....	44
How can you help?	45
Stewardship at work.....	48
Scientific research.....	51
Toad friendly alternatives.....	53
Laws to help Species at Risk.....	55
Regional information.....	56
Learn more about Species at Risk.....	57
Glossary.....	58
References.....	60

THE FOWLER'S TOAD STEWARDSHIP GUIDE

The National Fowler's toad Recovery Team compiled this guide for people who live, work or visit within the range of Fowler's toad –a threatened species and a unique and fascinating toad!

The Fowler's toad is a threatened amphibian whose Canadian distribution is limited to three places in Ontario. This species can be found on the Lake Erie shoreline in Niagara, Long Point and Rondeau, the three remaining locations with suitable habitat. As an amphibian, this toad has a life cycle that involves an extraordinary change or "metamorphosis", from a gill breathing, swimming aquatic tadpole to a lung-breathing, hopping, terrestrial toad. The Fowler's toad is active less than half the year and most often at night. Whether they are on the beach feeding, singing along the shoreline or marsh areas or hopping along the dunes, Fowler's toads are gentle and interesting creatures that depend on the very special Lake Erie landscape.

This stewardship guide provides useful information about how to identify the Fowler's toad, Fowler's toad habitat, threats, protection and additional resources that may be useful in the future.

This guide was designed to improve public awareness about activities that can impact the toad and its Lake Erie habitats. Our goal is to provide people with practical ways to minimize their impact on the habitat of the Fowler's toad and to become good resource stewards for our future toad watchers.

One person can make a difference!

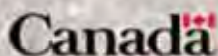
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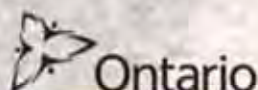
This guide may be used purely for information about Fowler's toad. If you choose to become more actively involved in stewardship activities, this guide may also serve as a tool and resource to help you make good stewardship choices for your land. Please feel free to use the contacts listed at the end of this guide for further information and advice on how to be a part of this important program.

Thank you for your interest in the protection and recovery of Ontario wildlife.

ACKNOWLEDGMENTS

The Fowler's toad Recovery Team gratefully acknowledges our "toadally cool" partners and dedicates this guide to the next generation of toad watchers.

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McGill



NIAGARA PENINSULA
CONSERVATION
AUTHORITY

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WHY IS FOWLER'S TOAD A SPECIES AT RISK?

The Fowler's toad lives in a highly dynamic natural environment on the shores of Lake Erie. It has a complex life cycle, a short life span and high natural mortality at all life stages as estimated through population viability analysis. Scientists are concerned about the dramatic population declines in the last twenty years and have estimated that Fowler's toad has more than a 20% chance of becoming extirpated from Canada in the next 100 years. As a result, the Fowler's toad is considered "threatened" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Canada's governing organization for assessing the status of endangered species. That means that this toad is at risk of becoming endangered if the causes of its decline are not curtailed. The causes are also known as "threats" and for this species, the threats are all related to changes made to its habitat by people living or visiting the Lake Erie shoreline. In this case, there is hope for a full recovery, through stewardship actions; people can make a difference and learn how to coexist with toads and the landscape we all share.

In 2003, the National Fowler's toad Recovery Team was formed to prepare a strategy for the recovery of this species. This guide has been designed to inform people, who live within its range, about this species and its habitat needs and how they can help stop the decline through stewardship activities.



In Canada, Fowler's toads are found only along the Lake Erie shoreline and currently only in the Rondeau, Long Point and Niagara areas where they inhabit beaches, dunes, shoreline rocky pools, creek and stream mouths, backshore wetlands and marshes. This species has adapted to the dynamic Lake Erie environment which means storm events, which periodically wipe out a portion of a population and alters the Lake Erie shoreline, also improve the habitat quality so that the next generation of toads can live there. The water level cycles, which include high and low water levels are necessary to maintain quality breeding, feeding and hibernation sites for this species.

The primary threats to the toads' habitat are excessive beach, dune and shoreline disturbances, stabilization of dunes, loss of breeding sites and pollution.

RESEARCH ON FOWLER'S TOADS

Most of what we know about the ecology for this species is from the ongoing, dedicated research of Dr. David M. Green and his biology students from the Redpath Museum of McGill University. He is a Canadian expert on amphibians and a world-renowned herpetologist and has spent the last 25 years researching this species in Long Point near Port Rowan, Ontario. Recent field research conducted by the Ontario Ministry of Natural Resources using Dr. Green's methodology has greatly improved our knowledge and understanding of the Niagara and Rondeau populations.



Dr. David Green, McGill University a.k.a "The Toad King"

Interesting fact: Fowler's toads are active mostly at night but can occasionally be seen during the day on humid overcast days. Fowler's toads come to the waters edge of the beach for feeding, to cool off and absorb water. Amphibians do not drink water but absorb all water through their skin.

THE FOWLER'S TOAD RECOVERY TEAM

In 2003, the Fowler's toad Recovery Team was formed. This recovery team includes both private and government organizations from across Canada. The team meets regularly to discuss the recovery needs of the Fowler's toad. Funding opportunities from the Ontario Ministry of Natural Resources' Species at Risk fund, the Community Fisheries and Wildlife Improvement Program, Environment Canada's Habitat Stewardship Program and the Canadian Ontario Agreement have allowed the recovery team to continue with surveys and monitoring projects, initiate habitat enhancement projects and produce educational materials such as this stewardship guide.



Fowler's toad Recovery Team members near Long Point, Ontario, June 2004. Left to right, Rob Tervo, Sandy Dobbyn, Dr. Alex Smith, Jeff Robinson, Devin Mills, Dr. David Green (Chair), Anne Yagi (Co-Chair), Deb Jacobs, Al Woodliffe. Absent from photo Bob Johnson, Kim Frohlich, John Marchington and Tim Seburn.

STEWARDSHIP AS A TOOL FOR CONSERVATION

In southern Ontario, along the north shore of Lake Erie, private landowners own most of the land that surrounds the lake. There are very few provincial parks or conservation lands within this area. Most of these landowners are people like you who live or vacation near Lake Erie because they love the water, nature and everything else that comes with the lake and its surrounding features. Ultimately, it is the landowner that decides what stewardship actions are appropriate for their property.

Fowler's toad and other species at risk, need your help in protecting and conserving habitat that is on your land and nearby surrounding areas. This is "important habitat" that Fowler's toads need in order to survive.

It is very important that private landowners understand why land stewardship is an essential tool that can be used for land conservation, restoration and enhancement.

Being a good land steward involves as much or as little, time, energy and money as you want, whether you would like to conserve the natural sand dunes that already exist on your property or whether you would like to put a lot more effort into removing existing breakwalls, restoring historic sand dunes or enhancing a backshore wetland. The choice is yours!!



Fowler's toad



Fowler's toad



Fowler's toad

Conservation of your land will ensure that the land, water, trees and wildlife will be there for future generations to enjoy for years to come. If you wish to find out more about becoming a good land steward, please contact your local Stewardship Council or any of the agencies listed in the "Regional Information" section of this guide. They will be happy to assist you with any questions you may have.

Learn to identify the Fowler's toad by using this stewardship guide. Learn how to identify other species at risk by going to the web sites listed in the "Useful Web Site" section at the end of this guide. You can help by reporting species at risk observations to the Ministry of Natural Resources Natural Heritage Information Centre at: <http://nhic.mnr.gov.on.ca>

HOW THE FOWLER'S TOAD WAS DISCOVERED

In 1858, naturalist Samuel P. Fowler, from Danvers, Essex County, Massachusetts reported on differences in what was assumed to be common American toads. Some toads had spotted bellies with one to two large warts per spot on the back and other toads had unspotted bellies with three to seven warts per spot on the back. This observant naturalist also noted that the two sorts of toads differed in song and habitat. These observant differences lead to the discovery of a new, smaller and "hitherto undescribed" species of toad...the Fowler's toad.

Fellow naturalist, F.W. Putnam, named it "*Bufo fowleri*", Fowler's toad, after S. P. Fowler.

In 1882, Mary H. Hinckley published a scientific description, based on the tadpoles that formally distinguished Fowler's toad from the American toad.



Photograph courtesy of the Peabody Essex Museum, Massachusetts

Copy of original painting by S.P. Fowler of the Fowler's toad.

Interesting fact: For nearly 60 years after its discovery, Fowler's toad was thought to be found only in the vicinity of Danvers, Massachusetts! The true extent of its large range began to be known only after 1918 when herpetologists, now equipped with flashlights, could go out at night and realized it was found all over the eastern United States and in southern Canada.

ECTOTHERM vs. ENDOTHERM: Temperature Regulation

Cold-blooded creatures such as toads, snakes, fish and turtles use the outside temperature and select temperature variations in their habitat to regulate body temperature. These creatures are called ectotherms, "ecto" meaning outside and "therm" meaning temperature. The body temperature of an ectotherm creature is directly related to the outside environment. These animals may increase or decrease their body temperature by basking in the sun to heat up or going for a swim to cool down. This is called behavioural thermoregulation.



Smooth Green Snake



Blanding's Turtle

Ectotherm creatures can function at a wide range of body temperatures; however, the further the body temperature is from the ideal, the more they decrease their activity. Fowler's toads are most active at temperatures between 18°C and 25°C. At extremely cold or hot temperatures, ectotherms become inactive and either hibernate (in winter) or aestivate (in summer). For this reason, they don't have to eat to keep their bodies warm as the environment provides the heat to warm their bodies.



White-tailed Deer



White-Breasted Nuthatch

Warm blooded creatures, such as humans, dogs, birds and deer are called endotherms, "endo" meaning inside. They use up to 90% of their food energy from metabolism to maintain a constantly warm body temperature. In this way, they maintain their body temperature even though outside temperatures change, therefore; endotherms are able to remain active all year round.

Whether an animal is endothermic (birds and mammals) or ectothermic (reptiles and amphibians), will determine their daily and seasonal activity patterns.

WHAT DOES A FOWLER'S TOAD LOOK LIKE?

Each individual's pattern is unique!

Short and blunt snout

Paratoid gland (large wart behind eye) contacts with the bony ridge behind the eyes

Grey, beige or buff coloured on the back with slightly darker patches or spots on their back, each containing 3 or more smaller warts



Fowler's toad adult

Medium-sized toad -adults are 50 to 80 millimeters snout to vent (body) length.

Cream or white underbelly with either no spots, or a single dark spot between the two front legs

Small warts on the upper surface of the lower leg

A FOWLER'S TOAD IMPOSTER: AN AMERICAN TOAD

Each individual's pattern is unique!

Longer and sharper snout

Paratoid gland either does not contact with the bony cranial ridge or connects only by a short spur

Darker brown, tan or khaki colour on the back, usually 2 or fewer larger warts per dark spot



American toad adult

A bigger toad, Adult American toads are 65 to 100 millimeters long, larger than adult Fowler's toads

Creamy or yellowish underbelly usually speckled with many dark spots

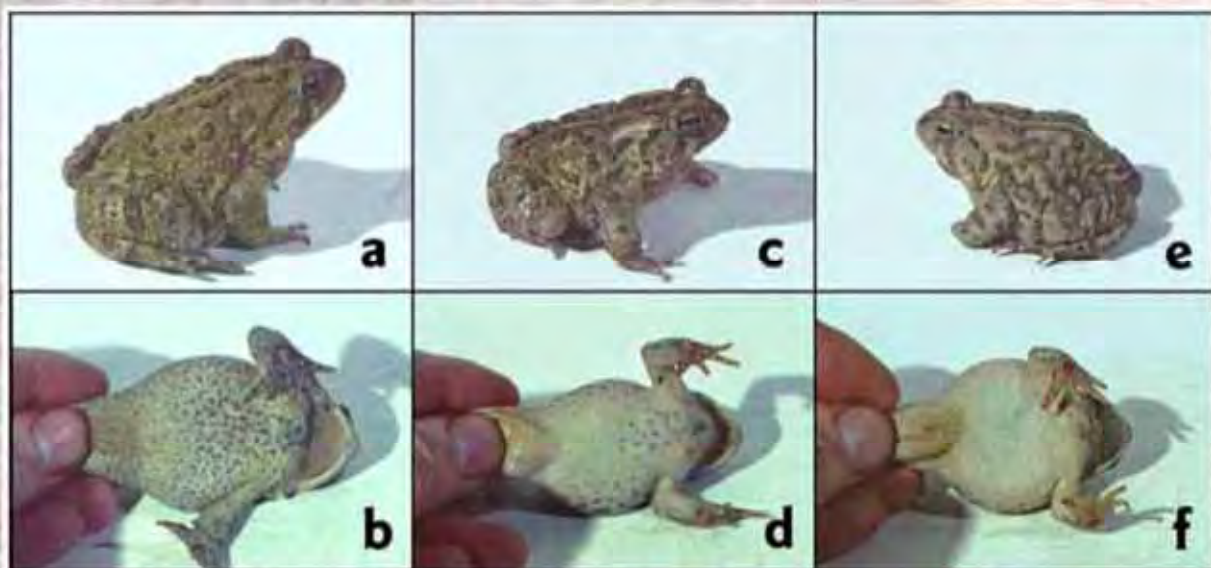
Large warts on the upper surface of the lower leg

FOWLER'S TOAD vs. AMERICAN TOAD

American toad

Hybrid toad

Fowler's toad



American toad (*Bufo americanus*) (a,b), Fowler's toad (*Bufo fowleri*) (e,f) and their natural hybrid (c,d). From Green (1984).

When in doubt contact an expert, found in the "Regional Information" section at the back of this guide.

Interesting fact: Smelling the skin of the toad will quickly tell you whether you have found a Fowler's toad or an American toad. Fowler's toads have a distinct odour of roasted peanuts. American toads smell slightly musky, similar to the sand, gravel, or pond water you found them in.

HYBRIDIZATION

The Fowler's toad can mate with the American toad, which is a closely related species. The offspring from such a mating is called a hybrid and carries genetic information from both species. Hybridization often creates individuals that have the appearance of the two parent species. Amphibian hybrids are often viable and fertile, which is unusual for other groups of vertebrates. Scientific evidence shows that hybridization in Fowler's toad populations is very uncommon and not likely to contribute to losses in genetic variation.

WHAT DO THEY SOUND LIKE?



Male Fowler's toad with dark throat from calling

You really have to hear it to believe it! People who live along the shoreline know it well! It's the sound of springtime.

During the breeding season, male Fowler's toads can be recognized by their vocalization. The Fowler's toad call has been described as, "a muffled scream from a small distressed sheep".

Interesting fact: Fowler's toads are polite! During the breeding season, each male calls, trying not to interrupt any of his chorus-mates, that way female toads are able to hear and select a suitable mate. Only the males sing; the females are silent!

All toads have a large external ear (tympanum) that appears as a large flat circle slightly behind and below each eye. These ears are sensitive to airborne vibrations. During the breeding season females prefer males who vocalize more persistently, so males are constantly trying to 'out-do' each other and sing as much as they can. This ultimately depends on the temperature outside; males try to be as warm as they can so they will be able to sing as much as they can.



External ear located behind and below eye

Toad ears are even more complex than most vertebrate ears because there is an additional connection between the middle ear and the shoulder blade of the toad. This allows vibrations from the ground to be detected through their bones!

Interesting fact: The American toad sings a different song. The calls of the American toad and the Fowler's toad are easily distinguished. You really have to check it out! Visit the Toronto Zoo's Adopt-a-Pond web site to listen to the Fowler's toad and American toad call at: www.torontozoo.com/adoptapond

FOWLER'S TOAD LIFE CYCLE



Interesting fact: Generally, the easiest ways to tell the difference between a male and female toad are that males are smaller and have dark throats during the breeding season, whereas females are usually larger and have white throats. Another way to tell whether you have found a male or female is to pick it up and listen – a male will give a grunt-like release call, that demonstrates to other males that they have grabbed the wrong sex. Sometimes a male toad will vibrate in your hand!

BREEDING SEASON

Fowler's toads begin breeding when the springtime temperatures are consistently mild and above 14°C. Once the temperatures are warm enough, males gather together in suitable ponds, pools, stream mouths and marshes along the shoreline and sing in an attempt to attract females. This normally happens in May but can range from April until the end of June.

Males and females will join in amplexus (the mating position). Males use a dark rough patch of thickened skin that only develops during the breeding season, to tightly clasp onto the females from behind.



The male Fowler's toad has a "modified thumb". This modified thumb is a thick patch of skin that forms on the males fore limbs during the breeding season. This is also called a nuptial pad.

Modified thumb on male toad

The male fertilizes the female's eggs externally as they are discharged into the water. Eggs hatch within one week of fertilization. When the eggs first hatch the tadpoles have non-functional eyes, a closed-off mouth, an underdeveloped tail and no legs. At first, the newly hatched tadpoles will stay attached to the jelly coat that surrounds the egg by using suckers located under the head. Newly hatched tadpoles also have external gills that water passes across in order for the tadpole to respire.

Interesting fact: The higher the temperature, the faster the pulse rate of the call and the shorter the duration of the call. Male Fowler's toads sing at a minimum body temperature of 14°C and will sit either in or out of the water, whichever is warmer. Females generally prefer males that sing the most.

ADULTS IN AMPLEXUS



Adults in amplexus

The breeding season is normally from mid-May to late June in shoreline ponds, pools, stream and river mouths, backshore wetlands and marshes.

Males will call from breeding sites to attract females. Females are silent and cannot call. Most of the time female Fowler's toads are larger than males. Larger females usually have more eggs.

EGGS

Eggs are laid in shallow shoreline and rocky pools, marshes, ponds, backshore wetlands, stream and river mouths in May to late June. Eggs are found in two long, single strands and are jelly coated with a black centre and are 3 to 4 millimeters (mm) in diameter. The numbers of eggs range from 2,000 to 10,000 and hatch in 7 days.



Fowler's toad eggs

Interesting fact: The eyes of the toad are on the sides of their head. The field of vision for each eye of a toad without moving the head is approximately 270 degrees!

LARVAE ARE CALLED "TADPOLES"



Tadpoles

Tadpoles are 7 to 10 mm in length when they hatch and grow up to 27 mm before transforming into little toads. Tadpoles are mottled black in colour with a pale underside. They are found along the lake, pool or pond bottoms in shallow areas of water.

Tadpoles use their tails for swimming and have scraping and sucking mouthparts for feeding on algae and detritus. They have gills for breathing in the water and change or "metamorphose" in 40 to 60 days.

BABY TOADS ARE CALLED "TOADLETS"

Toadlets appear in late July to mid August along the waters edge. Their tail is gone (resorbed) and now they have legs with webbed feet. Toadlets skin is now dry and rough to touch.

Toadlets are tiny when they transform, about 8 to 12 mm in length, but grow rapidly to 30 mm or larger before September. Toadlets are the same colour as adults.



Toadlet

Interesting fact: Tadpoles are very difficult to identify until the last stage of development and even then, a microscope may be needed to detect the subtle differences between toad species.

JUVENILE TO ADULT

Once toadlets survive their first winter hibernation they become juveniles. They spend most of their active season feeding, growing and hiding from predators. They usually become adults after their second winter when sexual maturity is reached at about 50 mm in length.



Juvenile Fowler's toad

A FOWLER'S FEAST

Fowler's toads search on the beach at night for a variety of invertebrates. Fowler's toads eat beetles, ants, midges and other flying or terrestrial insects. Juvenile toads consume smaller prey, mostly springtails, aphids and insect larvae. On warm or rainy evenings, you may find Fowler's toads actively stalking their prey along the waters edge. Fowler's toads change their usual hopping to a slow crawl when approaching potential prey.



Fowler's toad stalking Stone flies

Interesting fact: Despite their burrowing behavior, Fowler's toads do not eat earthworms.

INTERESTING SURVIVAL TACTICS

There is no getting around it.
Toads are prey too!

All toads have two types of glands in their skin: microscopic mucous glands all over the body and large granular glands that appear as warts on the upper surface of the toad.

Mucous glands secrete a moist and slippery substance that keeps the skin of the toad moist, as well as making it difficult for a predator to hold onto the toad if it is caught.

The granular glands of the Fowler's toad contain a noxious and toxic substance that makes them very distasteful as a potential meal for a predator. The toad's largest granular glands are the paratoid glands behind the eyes.

Fowler's toads generally taste bad or noxious to most potential predators but some snakes, such as Hognose snakes, Garter snakes and Northern Water snakes are known to be tolerant of the Fowler's toad's toxins. Raccoons will avoid the glandular skin toxins by eating through the non-toxic bellies of Fowler's toads, leaving the skin. Fish such as Largemouth bass and birds such as Ring-billed Gulls, Shrikes, Bitterns and Owls, have been seen taking a Fowler's toad, but it is unknown whether or not they will eat it or just spit it right back out again! Since Fowler's toads cannot always count on being associated with a distasteful or unpleasant meal, they must depend on not being seen or escaping from their predators.

THEIR SENSATIONAL SKIN



Fowler's toad hidden in sand



Fowler's toad hidden in sand

Fowler's toads are camouflaged by the pattern and colour of the skin. Their skin is specially adapted to ensure it is very difficult for predators to see them.

They absorb water through their skin without having to drink it in order to keep hydrated. This is why they are rarely found far from moisture and will certainly completely dehydrate when no moisture can be found.

Although most amphibians have fully developed lungs for getting oxygen for respiration from the air, they can also get oxygen for respiration by diffusion through their moist skin!

Oxygen is necessary for metabolism, which generates energy for life's activities such as hopping, feeding, breeding and escaping predators. When the toads are less active, they use less energy and less oxygen is consumed. If an amphibian's metabolism becomes slow enough, such as during hibernation, very little energy is used and little oxygen is needed. In this way, they can acquire all of their respiratory needs through their sensational skin.

POP-UP EYES

Fowler's toads spend most of their waking time at night and rely on their night vision to hunt. They have well-developed motion detectors in the retinas and are capable of seeing some colour at very low light conditions. Their "pop-up" eyes enable them to look around without needing to move their head. When a toad catches its food it will withdraw its eyes into the roof of its mouth to push the food down its throat. That is why a toad will blink after catching a bug.

They can even "wink" at you because they have eyelids to protect their eyes from sand and dirt.



Fowler's toad eye

DIGGING AND BURROWING ABILITY



Fowler's toad digging

Fowler's toads have a number of ways to get around. They can hop, crawl, swim and dig because their bodies, their feet in particular, are designed specifically so that they can move around their habitat efficiently. The feet of the Fowler's toad have boney like spades for better burrowing ability in the sand.

STICKY TONGUE

Toads have great tongues that are specially designed for grabbing ants and beetles from the ground or even in mid-flight. When a toad hunts for an insect, it rapidly flicks out its sticky tongue and grabs the insect and quickly draws its tongue back into its mouth.

TOADS ARE COOL



Telemetry toad in burrow

They must avoid freezing, stay moist, hide from predators and keep out of the way of Lake Erie's storms. They do this by digging down deep into the sand dunes, until they reach the water table but they are not totally submerged within it. It is amazing that many toads survive at all.

As the summer days shorten and temperatures cool down, the toads also slow down and take advantage of some big energy savings.

Hibernation is also called winter dormancy. It's all about location! Toads have only one chance to be in the right location to survive the harsh winters along the Lake Erie shoreline.

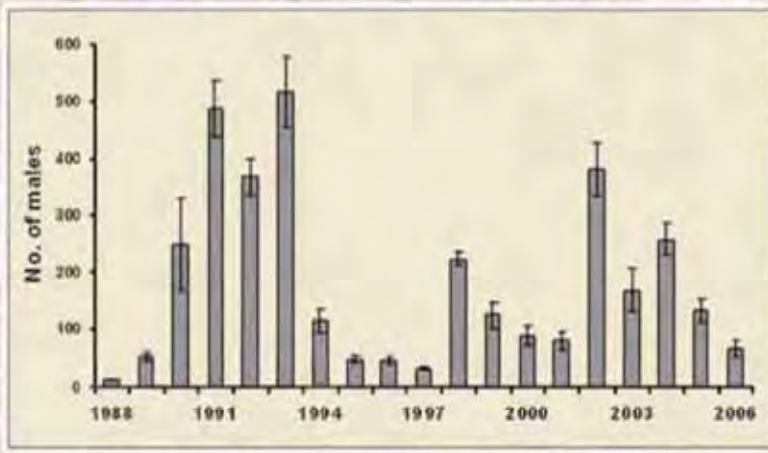


Fowler's toad in Lake Erie

Interesting fact: During hibernation, they burrow deep into the sand dunes and stay dormant (not active) for up to eight months of the year. They must burrow deep enough to be below the frost line because they are not freeze-tolerant like some frogs. They also cannot be totally submerged in the ground water, which could cause them to bloat or drown. Frost can go quite deep in the soft sandy dunes (over 1 meter frost depth has been measured) and that's a lot of digging.

TOAD TRIP

The high water levels and storms of the mid 1980's resulted in the disappearance of toads from some areas. As long as the habitat remained high in quality, toads could re-colonize these sites between the extreme lake cycles and storms. The re-colonization process is possible because of dispersal or movement of toads back into suitable habitats. Toads have adapted to local population disappearances by producing large quantities of eggs, which in turn provides offspring to recolonize a site. However; all life cycle and habitat cycle requirements must be met. Site recolonization is only possible if the specific habitat and pathway to the habitat remains.



Estimated numbers of male Fowler's toads at the Long Point study site over 20 years (D. Green)

Fowler's toads live in small home ranges. A home range is the area an individual toad moves around in, during its ordinary activities. Fowler's toads can move over 500 meters between their hiding, feeding or breeding areas, but the feeding area is rarely much greater than 8 meters of shoreline. They are not territorial in any way. Adult and juvenile toads are equally likely to disperse. It is not certain whether Fowler's toads tend to occupy the same home range year after year.

Although Fowler's toads don't generally disperse long distances, they are capable of doing so. Approximately 2% of Fowler's toads have been observed to disperse over 10 kilometers in a year and one toad was even reported to have moved 35 kilometers in one year!

Interesting fact: Fowler's toads are also able to return to their home range from over 1.25 kilometers away by using smell and taste (these are called olfactory cues).

EVERY SEASON HAS A HABITAT TYPE

The Fowler's toad is an amphibian and therefore needs both water and dry land habitats to meet its life cycle requirements. The Fowler's toad uses different habitat types during different times of the year. All habitat types are required for the survival of the Fowler's toad. Habitats for this species includes sandy beaches in close proximity to dunes which are used for winter hibernation and spring, summer and fall daily shelter. Shallow, open rocky pools, backshore wetlands, sandy bottomed pools, ponds, streams and river mouths are used in spring and early summer for breeding and tadpole development. Shoreline areas are used in the spring, summer and fall for nightly feeding and hydration.



Pleasant Beach, Port Colborne, Ontario: An example of an area where all of the life cycle needs are met for the Fowler's toad.



Wetlands, **pools, ponds, stream and river mouths** for breeding and tadpole growth during the spring and summer months.



Pond



Rocky pool



Stream mouth

WHERE DO THEY LIVE?

Toads have two life stages and need two sorts of habitats: an aquatic or water habitat where they can develop from eggs to tadpole and a terrestrial or land habitat for the toadlets, juveniles and adults. Each life stage needs specific habitat features and toads need to move between these features to complete their life cycle successfully.

Aquatic habitat features include ponds, marshes, backshore wetlands, rocky pools, sandy bottomed pools and creek or drain outlets in beach areas. Terrestrial habitat features are beaches, shorelines and sand dunes. All of these features lie within the dynamic influence of Lake Erie, which is important because the lake's occasional storms help maintain the quality and quantity of toad habitat.



Shallow pool area



Sand dunes at Long Point

Lake cycles of low and high water, storms and high winds help to maintain toad habitat even though they may periodically cause local extinctions of toad populations. These disturbances are necessary to keep breeding areas clear of vegetation and keep dune areas open and moving. Once a dune is hardened by vegetation or once a pond is filled in with plants, the toads disappear from the area. In this sense, the Fowler's toad requires dynamic habitats that are in early stages of succession .

Interesting fact: Fowler's toads prefer ponds that have sandy bottoms, gradually sloping banks and very little vegetation aside from sedges and bulrushes. Ponds must be periodically created or restored by disturbances so that they don't overgrow with vegetation and become unsuitable.

BENEFITS OF OPEN BEACH AND DUNE HABITATS

Open beach and dune habitats are used by a variety of wildlife species to meet part or all of their life cycle needs. Several turtle species use this habitat for nesting such as the Midland Painted turtle, Snapping turtle, Northern Map turtle, Blanding's turtle and Eastern Spiny Softshell turtle.

Adult female turtles find dry, open, sandy, south facing dune areas, the turtles then dig down about half their body length and lay their eggs, which hatch in about 90 to 120 days. The Northern Map turtle has a status of Special Concern. Blanding's turtle and the Eastern Spiny Softshell turtle are Threatened species.



Blanding's turtle (Status Threatened) nests in open dune beach habitat along the Lake Erie shoreline.



Bank swallow nesting colony located in the face of a dune along the Lake Erie shoreline

Other species that benefit from open beaches and dunes include the Bank swallow, which digs their nest into the dune face where the soil is more compact. Bank swallows are considered common in Ontario. They eat flying insects such as midges and mosquitoes, which are abundant along the shoreline.

Shoreline stop-over areas are very important for migratory bird species such as the Ruby-throated Hummingbird and several species of warblers.

Shorebirds such as the Spotted Sandpiper can often be seen feeding along the water's edge.

OTHER SPECIES AT RISK FOUND WITHIN THE LAKE ERIE BEACH AND DUNE ENVIRONMENT



Five-lined Skink
Endangered- Carolinian population



Prickly Pear Cactus
Endangered



Eastern Hognose Snake
Threatened



**Monarch Butterfly on Butterfly
Milkweed, Special Concern**



American Water-willow
Threatened



Common Hoptree
Threatened

**OTHER RARE SPECIES OR SPECIES AT RISK FOUND WITHIN THE
LAKE ERIE BEACH AND DUNE ENVIRONMENT**



Spotted turtle
Endangered



Milk snake
Special Concern



Blanding's turtle
Threatened



Map turtle
Special Concern



Swamp Rose-mallow
Special Concern



Biennial Gaura
Rare

THE NATURAL LAKE ERIE ENVIRONMENT

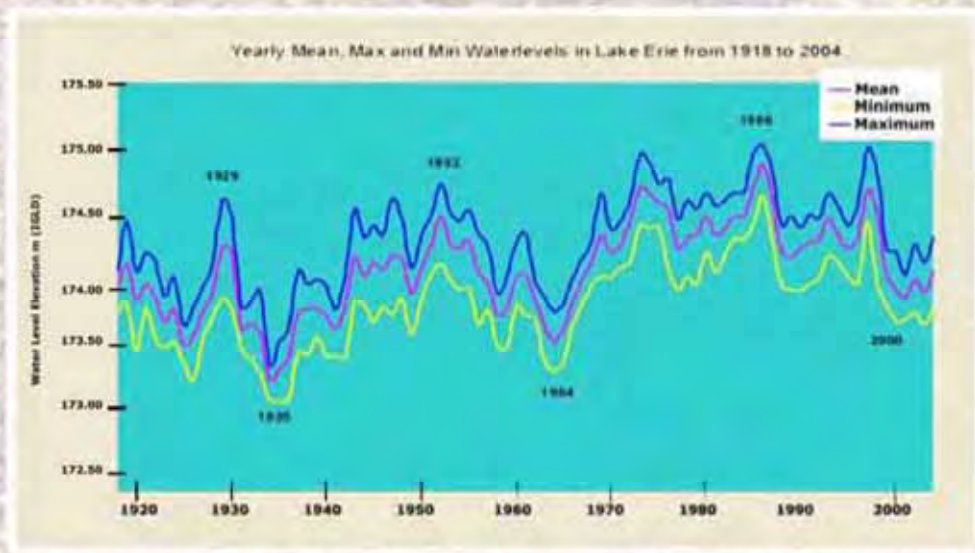
LAKE ERIE COASTAL PROCESSES AND BEACH FORMATION

A dynamically stable shoreline exists when the amount of sand moved offshore or downshore equals the amount of sand replaced from upshore beaches. This natural process is called the "littoral drift process".

Shoreline erosion occurs when this process is interrupted and the amount of sand reaching a beach is not enough to replace the amount that was lost. The interruption can be part of a naturally occurring cycle of high water levels or it can be caused by human activity. During cycles of high lake levels waves break further inshore causing beaches to erode. These water level cycles are then followed by periods of low lake levels and beaches increase in size. Therefore the beaches are naturally maintained between these cycle periods.

Human activities such as the creation of piers (groynes) which jut out into the lake disrupt the littoral drift process causing a build up of sand on one side and the erosion of sand on the other. Other activities such as building shoreline protection structures in front of dunes, locks up sand sources from becoming part of the littoral drift process and less sand is available to restore downshore beaches. Over time beaches become smaller and starved of the sand that we all enjoy.

LAKE ERIE WATER LEVEL CYCLES



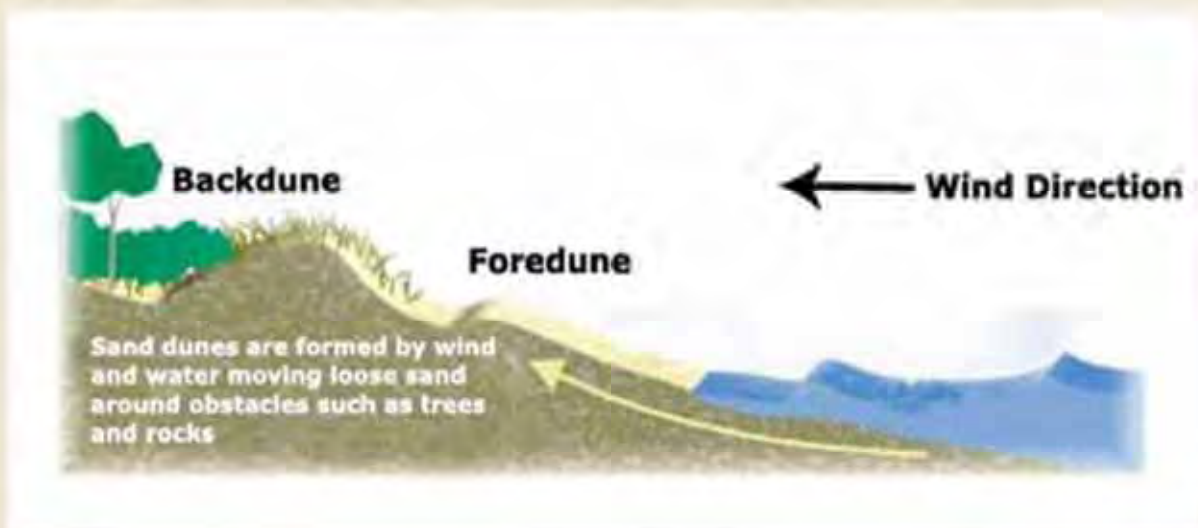
Environment Canada Water Levels for Lake Erie from 1918-2004

Lake Erie water levels, cycle between extreme highs and lows every 6 to 22 years. The full cycle high to high, or low to low, ranges from 23 to 36 years. For the toad population, when lake levels are low more beach and dune habitat is available for hiding or hibernation and breeding sites shift to nearshore areas. When lake levels are high, less beach is available for hiding and breeding. Therefore, hiding and breeding sites shift to backshore ponds, wetlands and marshes.

SAND DUNE FORMATION

Dunes are formed from wind-blown sand. Foredunes are deposited immediately behind sandy beaches. In order for dunes to actively form, four criteria must be met.

1. A plentiful supply of loose sand from beaches, dunes, or shallow sand bars in the lake.
2. Enough energy to move this sand supply by wind or water
3. An obstacle around which sand accumulates such as a tree roots or rocks
4. Dry sand because wet sand is too sticky for wind to move and it is also conducive to excessive plant growth, which makes dunes unsuitable for toads to dig into.



Interesting fact: Beach sand originates from the gradual wearing away of bedrock formations of sandstone and limestone.



LAKE ERIE SAND SPIT FORMATIONS

Rondeau and Long Point are sand spit formations that are dynamically maintained by Lake Erie storms, water levels, and littoral drift processes.



Satellite photograph of Long Point sand spit

Long Point is sand spit located on the north shore of Lake Erie, in Norfolk County, Ontario, Canada. It is approximately 40 km long and is about a kilometer wide at its thickest point. Approximately half of the land in Long Point is privately owned.



Satellite photograph of Rondeau sand spit

Rondeau is a crescent shaped sand spit formation located west of Long Point, in Essex County, Ontario, Canada. The Rondeau peninsula stretches out into Lake Erie for almost 8 km. Rondeau Provincial Park has over 3200 ha of natural habitat for wildlife of all sorts. Much of the protected land in Rondeau is rare and unique in Ontario and home to many species at risk, including the Fowler's toad.

LAKE ERIE HEADLAND BAY FEATURES



Satellite photograph of the Niagara Area Shoreline. Note the "scalloped" look of the shoreline.

Storms are a fact of life on Lake Erie. Major storms, often accompanied by high water levels, can drastically alter the shoreline. Beaches and dune systems in the Niagara area are maintained somewhat differently from a sand spit that extends into Lake Erie. Beach and dune systems in Niagara form within bays located between two rocky headlands. Sand erosion and sand deposition rates are controlled by the size, length and structure of each rocky headland feature. Sand that originates from rivers or along the coast is deposited in bays and then wave and wind action pushes the sand forward onto the beach. Wind picks up loose dry sand from the beach and deposits it onto the dunes. During storms, sand that is eroded from the dunes and beaches is carried along the shore and is deposited in neighbouring bays. Many of the large Niagara dune features are quite ancient. They were formed during the post-glacial period.

Interesting fact: Fowler's toads require loose, well-drained, gravelly or sandy soils that are sparsely vegetated. In Canada, these conditions are found on the North Shore of Lake Erie.

HEADLAND BAY SHORELINE



Headland bay, beach and dune system

Erosion caused by wave and wind action has the most impact on headland areas. Sand is deposited in the bay areas where there is less wave action. Thus the best beaches are found between two headland features.

STORM EVENTS ON NATURAL DUNE AND BEACH SHORELINES

Dune blowouts caused by storms are an important source of the open, sandy habitat preferred by Fowler's toads. During times of low water levels and quiet waters, the same dune and beach areas accumulate sand. Fowler's toads have adapted to this changeable environment and these natural processes are not a threat to the toad.

Interesting Fact: If Fowler's toads inhabit your beach, they indicate that the habitat or beach quality is good. On the other hand, when toads disappear from an area it means that the beach quality is poor.

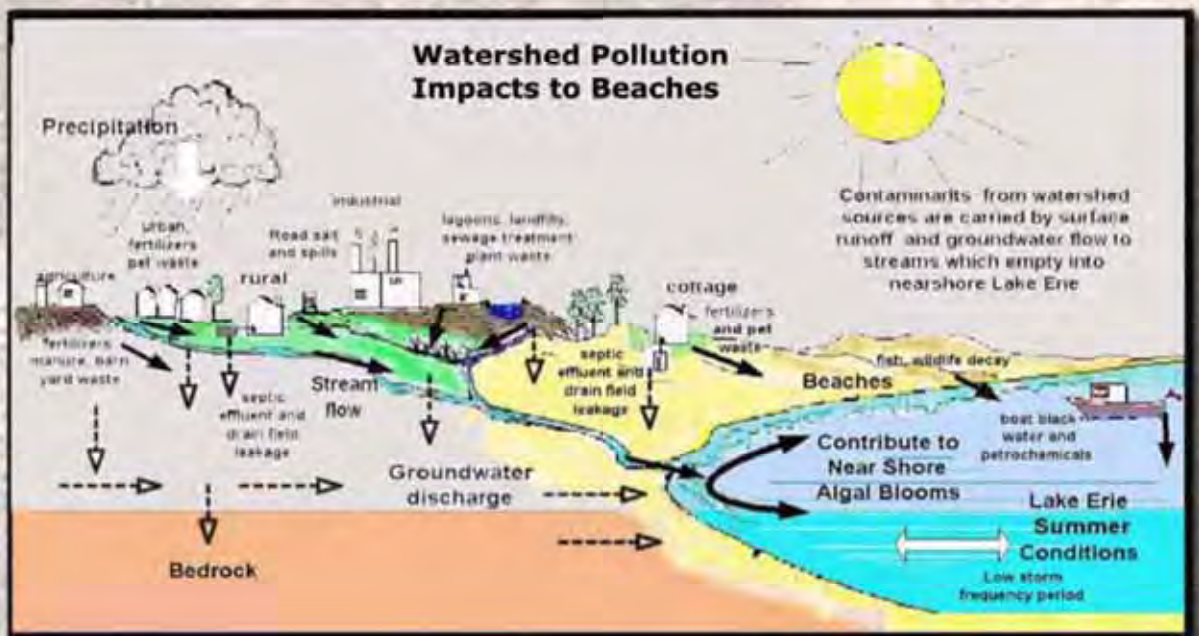


THE LAKE ERIE WATERSHED

THE WATERSHED, YOUR WATERSHED

A watershed or catchment is an area of land bounded by hills or ridges where all surface water flows to the same low point. There are numerous watersheds that empty into Lake Erie. When it rains or when snow melts, any water that doesn't soak into the ground flows over the surface of the land until it drains into the nearshore area of Lake Erie. As it goes, it picks up materials of many sorts and transports it all through sewers, wetlands, drains, creeks, streams and rivers to the lake.

WATERSHED LINKAGES, EVERYONE CONTRIBUTES



Cross section of pollutant flow through watershed to beach

Shoreline residents, visitor and all of us living in towns, cities and rural areas upstream of the lake, contributes contaminants to the Lake Erie environment.

Contaminates and pollution include loose soil, vegetation, leaf litter, fertilizers, bacteria, pet waste, chemicals, oils, grease, pesticides, herbicides and anything that is put on your lawns, streets and driveways.

ALGAE AND THE FOWLER'S TOAD



Fowler's toad sitting on Algae Mat

Fertilizers contribute to algae blooms along the shoreline when they are transported to our water ways and lakes. Nutrients come from sewage treatment plants, landfills, lagoons, agricultural fields, pastures, septic tanks and leachate fields, urban lawns and gardens, wildlife and pet waste. The result is an explosion of green algae growth that covers our beautiful sandy beaches.

In some areas the algae form large, extensive mats that become smelly when they decay. In addition, blue-green algae also contribute to the algae mat. This particular algae smells bad even in small amounts and it produces toxins that can cause skin rashes in humans and has been known to kill livestock that consumed infected water.



Gull on algae mat



Thick algae mat

Many public and private beaches with algae mat problems attempt to remove the algae from the near shore areas using bulldozers and tractors. It is this activity that impacts Fowler's toads.

When large algae mats form along beaches people respond by clearing the mats, usually with heavy machinery. This commonly occurs just before a nice long weekend when people want to party on the beach without any smelly algae.

Unfortunately for the toad, this coincides with the last stages of tadpole development when toadlets are just making their first appearances. This can happen during the day or night. The toadlets are very small and quite delicate.



Nearshore algae mat



Algae and sand piles resulting from "cleaning" algae mats in the nearshore area

The beach and algae "cleaning" also occurs any time during the day or night and these toadlets get scraped up with the algae and die.

There are some simple toad friendly alternatives found in the pages ahead that everyone living in the watershed or visiting the beach can do to assist in the protection and recovery of Fowler's toads.

Interesting Fact: Many people believe that the "green stuff" on the beach is seaweed; really it is algae. Algae is formed when there is an overload of nutrients such as phosphorus and nitrogen in the water.

THREATS TO HABITAT

Life as a toad is not easy to begin with, even in the most perfect natural conditions. Toads must withstand extreme temperatures, find suitable places to feed, breed and hibernate, all the while trying to stay moist and avoid being a bite-size meal for a slew of predators! All of these things are even more difficult to accomplish in areas where natural processes have been modified by human activities. These changes to their habitat threaten the recovery of this species in Canada.

Toads need dunes and beaches for hibernating and hiding, shorelines for feeding and rehydrating and rocky pools, ponds and marshes for breeding and tadpole growth. They also need the ability to move freely between these habitat features.

All of these features have been impacted by human activities. The good news is that most of these activities can be altered to protect the toad. Remember that toads are beach lovers! If the toad population is doing well on your beach then the quality of the beach must also be good.

BEACH DISTURBANCES: VEHICLES



Sherkston Shores



Fowler's toad killed by vehicle

We are accustomed to parking on some beaches. The result is hard compacted sand suitable for cars but not for toads. Fowler's toads can no longer dig into the sand to hide or escape predation. The Recovery team is working with landowners to help solve parking issues.

Occasionally, toads become road kill without even trying to cross a road! Luckily this does not happen often because most of the toads are active at night and very few vehicles are on the beach at night.

Stewardship Tip #1: If Possible Park and Walk!

BEACH DISTURBANCES: GROOMING

Beach grading and grooming are popular human activities along the shoreline, especially at public beaches. Beach owners do this because the visiting public wants the beach to look "clean". This activity has the potential for direct mortality of toads, because they are hiding just under the beach surface during the day. This activity may be the reason why toads are no longer found on certain beaches.



Fowler's toad hiding just under the sand surface (Niagara radio telemetry project)



Beach Grooming Device



Groomed beach, Erieau, Ontario

Stewardship Tip #2: Help pick up garbage on your beach! Reduce the demand for machine grooming.

BEACH DISTURBANCES: CLEANING ALGAE

Scraping and clearing of algae from the nearshore and beach areas has become almost a daily summer time activity at some public beaches. This activity has the potential for killing two very delicate toad life stages, tadpoles and toadlets.



Toadlet



Algae mat extending out into the nearshore area, Port Colborne, Ontario.



Tractor pulling algae onto beach to dry, which is later scraped up with sand into piles by bulldozers, Port Colborne, Ontario

Stewardship Tip #3: Algae is a symptom of a watershed problem! Let's work together to solve this one. We can all be a part of the watershed solution! Read on!

EXCESSIVE DUNE DISTURBANCES

Excavating dune sand to spread onto the beach to make the beach "fluffier" (beach volleyball) or leveling the dunes to create a larger parking area is a direct impact on adult and juvenile toads hiding or hibernating in the dunes. On the other hand, dumping sand and algae back onto the dunes buries the toads underneath.



Adult Fowler's toad "popping" out of the beach



Foredune excavations and removal of sand, Port Colborne, Ontario



Foredune dumping of scraped beach sand and algae, Port Colborne, Ontario

Stewardship Tip #4: There are less invasive ways to improve your beach or dune areas. Read on!

STABILIZATION OF DUNES AND BEACHES: EROSION PROTECTION

Historically, cottage developments had very little impact on Fowler's toad habitat. However, following the severe storms of 1985 and 1986 many landowners constructed hard shoreline structures, to prevent further erosion of their property. With advances in shore protection came the re-development of cottages into highly valuable rural estates. In order to protect their investment, people are constructing breakwalls in front of the sand dunes. This has reduced the amount of hibernation habitat for Fowler's toads and has affected the quality of open dune and beach habitat. Protection suitable for both the toad and development would include development set back from the shoreline, dunes and wetlands.



Breakwall in front of dune near Nickel Beach, Port Colborne, Ontario



Dune hardened by rocks and vegetation, McGeachy Beach, Ontario



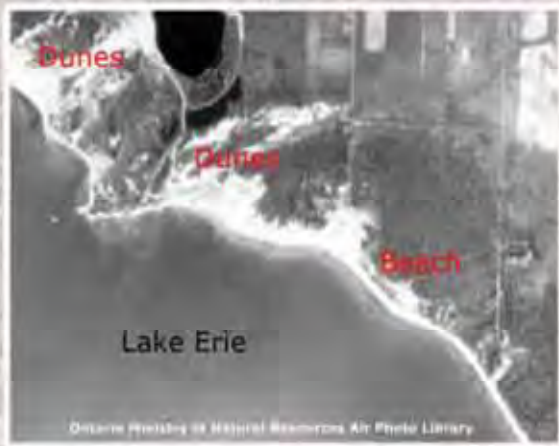
Breakwall in front of dune near Lorraine Rd. Port Colborne, Ontario



Concrete wall in front of dunes at Crescent Rd. beach near Fort Erie, Ontario

Stewardship Tip #5: It may be possible to improve the quality of open dune and beach habitat in similar areas. Read on and see what others have done!

BEACHES AND DUNES BEFORE SHORELINE DEVELOPMENT



1955 Air photo of Sherkston, Ontario, Canada during high water level cycle



1965 Air photo of Sherkston, Ontario, Canada during low water level cycle

A comparison of air photos taken when water levels were high in 1955 and low in 1965 shows an increase in amount of dune and beach habitat near the water's edge before shoreline development in 1965. The white areas are open dune and sand beaches.

BEACHES AND DUNES AFTER SHORELINE DEVELOPMENT



1955 Air photo of Sherkston, Ontario, Canada during high water level cycle



1989 Air photo of Sherkston, Ontario, Canada during high water level cycle

In 1989, when water levels were once again high and shoreline development was completed a decrease in the amount of open dune and sandy beaches occurred. The loss of open sandy beach and dune habitat coincides with an increase in shoreline development and breakwall construction. In 1989, there are less white areas, which shows the loss in the amount of open dune and beach habitat.

DUNE AND BEACH STABILIZATION

Dunes are naturally stabilized by vegetation. However, storm events during times of high water levels will erode these areas and remove some of the vegetation on the dunes. Open dune and beach areas are excellent Fowler's toad habitat. Once a dune is stabilized with either vegetation or shore protection- the result is the same, toads disappear from the area.



Sand dune stabilized by vegetation at Rock Point Provincial Park, near Dunnville, Ontario



Sand dune partly stabilized by vegetation, near Long Beach, Ontario



Beach hardened for vehicle parking area, Nickel Beach, Port Colborne, Ontario



Sand dune stabilized by lawn grasses at Centennial Park near Port Colborne, Ontario

Stewardship Tip #6: There are some easy solutions to increase open areas within the sand dunes and increase the quality of the beach areas. Read on!

LOSS OF BREEDING SITES



Dyked marshes are separated from Lake Erie storms to prevent erosion. These marshes become overgrown with vegetation and are no longer be used by Fowler's toads.

At Long Point and Rondeau toads breed in the open marsh areas and pools along the sand spit beaches. Natural processes of pond creation maintains populations for long periods of time. In Niagara, during periods of low lake levels, toads breed in the shallow rocky pool habitat found within the headland areas and in creek outlet areas in beaches. However, during times of high water levels, headland rocky pool habitats are flooded and the toads are forced inland to find suitable breeding sites. Most of these wetlands have been drained, filled in or separated from the lake by roads and shoreline protection. Once breeding sites are lost, the Fowler's toad population declines.

The natural processes of erosion and deposition along the shoreline create and fill in breeding sites on a regular basis. These temporary sites are very important.

There are also long term-breeding sites that function year after year and others that function only during extreme lake level events. For each toad population a full range of breeding sites is needed.



Breeding sites are naturally filled in by vegetation during low lake level cycles



Rocky pool breeding site used by Fowler's toads during low lake levels

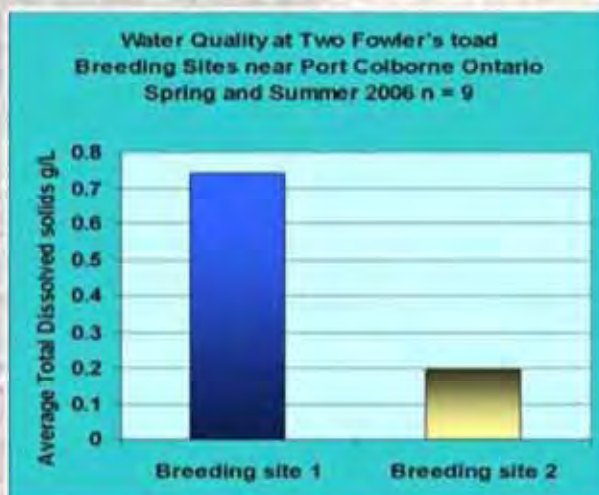
Interesting fact: Breeding sites naturally fill in with sediments and wetland plants over time, unless they are periodically disturbed by a storm. Once a breeding site is vegetated Fowler's toads no longer use it.

POLLUTION OF BREEDING AND TADPOLE REARING SITES

The use of chemicals within watersheds may have contributed to the decline in toad populations in southwestern Ontario. They have been extirpated from the Point Pelee and Pelee Island area. Tadpoles and adults are susceptible to poisoning by pesticides such as DDT.

The effects of contamination by heavy metals such as Nickel, Cobalt, Cadmium, Aluminum, Copper and Arsenic are effectively unknown although a potential concern at Nickel Beach in Port Colborne, Ontario.

Guess which site produces more toadlets? If you guessed Breeding Site 2 then you are correct! Breeding site 2 has lower levels of dissolved solids.



Technician gathering water quality data

Although specific contaminate levels are unknown, preliminary water quality testing shows higher levels of dissolved solids in breeding site 1 compared to breeding site 2 as shown in the graph above.

Stewardship Tip #7: Everyone can reduce the amount of lawn fertilizer used by mulching their grass clippings.

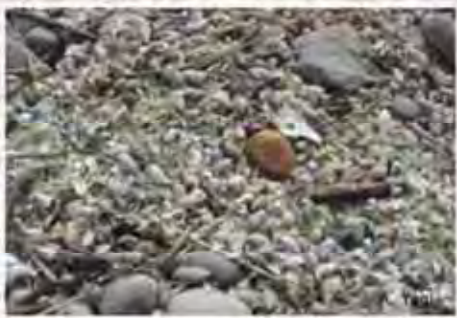
EXOTIC / INVASIVE SPECIES



Purple loosestrife is an exotic species which has a rigorous root mass able to stabilize wetland breeding sites rendering them unsuitable for Fowler's toads.



Jimsonweed is an exotic species found in wet sandy disturbed sites. It is highly poisonous and lethal to humans and wildlife.



Zebra mussel shells found up to 1 meter thick filling in rocky pool and headland breeding areas along the Niagara shoreline rendering them unsuitable for Fowler's toads.



Phragmites found in rocky pool and shoreline areas along the Lake Erie shoreline rendering them unsuitable for Fowler's toads. Picture taken near Port Rowan, Ontario



White or Silver Poplar is an exotic highly invasive species found in sandy dune habitats. It out competes native species and exhibits vigorous vegetative growth. Management of this species is recommended.



Kentucky blue grass is an exotic grass which creates a dense thick root mat. It is a common grass species used to grow lawns in urban areas. When lawns are grown on dunes, it stabilizes the dune and Fowler's toads can not dig into the dune.

LIVING WITH FOWLER'S TOADS

Fowler's toads have coexisted with humans for hundreds of years. It has only been in the last 50 years that the human impact has been the greatest and the species has declined. The following section explains how we can learn to live with toads!

PROTECTED AREAS

The majority of Fowler's toad habitat in the Rondeau and Long Point areas are protected within a Provincial or National park. The Recovery team is working with each park to improve our understanding of how the toad is using the park and adjacent private lands and making recommendations on how to improve habitat for the toad.

In the case of Point Pelee National Park and Turkey Point where the toads no longer exists, there is little hope for natural re-colonization. The Recovery team is working with the park staff to determine whether the habitat remains suitable for a reintroduction project at some future time.

In the Niagara Area, the majority of Fowler's toad habitat is on private land. The only crown land that supports Fowler's toads is James N. Allen Provincial Park, this crown land accounts for less than 1 % of the habitat for Fowler's toad in Niagara. They were historically found at Rock Point Provincial Park until the dunes became overly vegetated. Habitat Stewardship projects are currently underway in these areas. Recently, a few Fowler's toads have been found in two Conservation areas, Long Beach Conservation Area and Morgan's Point Conservation Area. Stewardship projects are also underway in these areas.

There is still much work to be done!

In the next section of this guide, the Recovery team has designed a way for landowners to determine whether they should pursue a habitat stewardship project on their land. Within some protected areas and private lands there are habitat features that could be improved or created to better meet the needs of the Fowler's toad.

Stewardship Tip #8: Landscape naturally by converting dense sod, such as non-native Kentucky blue grass to native dune grasses.

HOW CAN YOU HELP?

#1: ARE YOU LIVING WITHIN THE RANGE OF FOWLER'S TOAD IN CANADA?



Fowler's toad populations exist in three general areas known as Rondeau, Long Point and Niagara. They are no longer found at Point Pelee, Pelee Island and Turkey Point.

#2. IDENTIFY YOUR HABITAT STEWARDSHIP AREA COLOUR ?



MAP 1: Amherstburg, Essex County to Selkirk Haldimand County



MAP 2: SELKIRK, HALDIMAND COUNTY TO WELLAND CANAL



MAP 3: WELLAND CANAL TO FORT ERIE (UPPER NIAGARA RIVER)

3: FIND YOUR FOWLER'S TOAD STEWARDSHIP ACTIVITY DESCRIPTIONS FOR YOUR AREA IN THE FOLLOWING CHART

FROM MAP

STEWARDSHIP ACTIVITY DESCRIPTION

ALL AREAS IN GREEN

FOWLER'S TOADS ARE USING THE HABITAT FEATURES IN THESE AREAS.

Consider further habitat protection through conservation easements. Contact Nature Conservancy of Canada at www.natureconservancy.ca or 1-800-465-0029 for more information.

Consider alternative shoreline protection, some examples are included in the following sections.

Get involved! Volunteer with your local nature club, stewardship council and provincial park to help restore and/or enhance Fowler's toad habitat.

Attend workshops, seminars and "toad nights" hosted within your area.

Lake Erie shoreline is a special place for wildlife. Learn more about wildlife in your area (See Regional Information in this guide).

ALL AREAS IN YELLOW

IF YOU LIVE OR VISIT ANY OF THESE AREAS THE RECOVERY TEAM NEEDS YOUR HELP IN MONITORING FOR FOWLER'S TOADS. LEARN HOW TO IDENTIFY THEM AND LEARN THEIR UNIQUE CALL. REPORT OBSERVATIONS TO THE MNR NHIC WEB SITE OR THE NEAREST MNR OFFICE (SEE REGIONAL INFORMATION IN THIS GUIDE).

ALL AREAS IN RED

THE LAKE ERIE SHORELINE IS A SPECIAL PLACE FOR WILDLIFE. LEARN MORE ABOUT OTHER WILDLIFE IN YOUR AREA. (SEE REGIONAL INFORMATION IN THIS GUIDE).

STEWARDSHIP AT WORK

VOLUNTEERS CONDUCTING A FOWLER'S TOAD SURVEY



Volunteers helping with toad survey

Increased public awareness of Fowler's toad can be greatly improved with educational activities such as presentations and park interpretive programs focusing on Fowler's toad and beach and dune communities. Public volunteer activities such as toad surveys are hands-on and fun for the whole family. Contact your local Recovery team representative to find out about these activities in your area.

EDUCATION AND AWARENESS

Public educational workshops are available for residents and visitors of the Lake Erie area. Find out more about Fowler's toad and other Lake Erie species at risk. For more information check out the regional information in this guide.



Fowler's toad in hands



Stewardship Coordinators at work

By increasing public awareness and knowledge of the problems faced by Fowler's toads, we are placing their recovery in your hands! People can make a difference. Check out the next section and see what others have already done.

HABITAT ENHANCEMENT: BEACHES, DUNES AND PONDS

A few dune and pond enhancement projects are underway along the Niagara area shoreline.

The Niagara Peninsula Conservation Authority has added snow fencing and removed some invasive species to enhance the dunes at Morgan's Point Conservation Area. A pond was added for amphibian breeding.



Morgan's Point pond

At the former Easter Seal Camp Lakewood property in Wainfleet, two ponds were created and dune quality was improved for Fowler's toads. First, grape vines and other weedy vegetation was removed by hand along 100 metres of the dune area to release the sand and allow wind movement. Then, one pond was made behind the dunes (backshore) and another was created between the dunes (interdunal).

Several amphibian species, including Fowler's toads, were found using the new ponds. Other wildlife were observed, too, including monarch butterflies, deer, mallard ducks, snakes and turtles. In addition, the quality and functioning of the dunes were improved. Snow fencing was added in the front and interdunal areas to capture sand moved by wind. This sand movement and capture will create open areas so that toads can bury themselves. The sand size will be sorted by the wind so that it makes it easier for toads to dig!



Easter Seal Camp dunes before vegetation removal



Easter Seal Camp dunes after vegetation removal



Snow fence with sand collection

Rock Point Provincial Park once supported Fowler's toads. Their disappearance coincides with the regrowth of vegetation on the dunes following the storms of 1985 and 1986.

Recently, park staff removed some patches of vegetation to create some sand movement and placed some snow fences on the dunes to recapture the sand. Monitoring to detect the presence of toads is underway.

Monitoring during 2006 at the Easter Seal Camp Lakewood property in Wainfleet has shown an increase in the number of juvenile toads using the beach and dunes since vegetation was removed and snow fence was installed.



Rock Point Provincial Park vegetation removal and snow fence

IMPROVING YOUR SHORELINE NATURALLY



New dune starting with wind blown sand

When Lake Erie water levels are low, landowners can improve their shoreline dune and beach quality by capturing some of the wind blown sand using some simple low-cost techniques.

Some landowners have placed tree stumps or large branches in the foredune areas of their property, and have successfully grown dunes! Within a few years the dune, pictured left, increased in height by nearly six feet!

Remember, dune formation will only work in areas with abundant loose sand that is dry and moving around. If you are not sure about trying this on your property, give your local Stewardship Council a call.

LANDOWNER CONTACT

Our landowner contact project also includes providing information to park visitors and private landowners. Packages consist of Fowler's toad recovery team stickers and magnets, an identification CD and a brochure. You can find this material at your nearest Provincial Park, Conservation Authority, municipal office and private park office.



Toadally Cool
stickers and magnets



Landowner contact brochure

SCIENTIFIC RESEARCH



D. Green and T. Markle examining a
Fowler's toad at Long Point Provincial Park

Bit by bit, scientific research has helped us unfold the mysteries surrounding Fowler's toad in Canada. However there are many more questions to answer. Leading the charge, is Dr. David Green and his biology students from the Redpath Museum of McGill University.

SURVEYS AND MONITORING

Standard surveys and monitoring are underway for the three population areas. This includes presence and absence surveys, detailed mark recapture studies, radio-telemetry and habitat mapping. Survey and monitoring data collection is necessary to assess whether stewardship projects are aiding the recovery of the species.



Toad measurement of snout to vent length during a mark recapture survey



First Radio tracking project for this species was tested in Niagara in 2002



Technicians tracking toads



Fowler's toad with transmitter

Stewardship Tip #9: If you live in an area where Fowler's toads were historically found you can listen for the males calling each spring to see if they have returned.

TOAD FRIENDLY ALTERNATIVES

New housing developments should be set back away from crest, fore dune and beach areas. Houses should be built away from backshore wetlands.



Dunes are kept open on this shoreline property in Wainfleet, Ontario



Instead of breakwalls, this new estate development is set back from the shoreline. This home is near Port Colborne, Ontario.

Removal of non-native Kentucky blue grass and replacing with native dune grasses will help maintain the quality of the dune feature and still allow toads to dig into the loose sand dune, provide cover and protection for Fowler's toads and other species.



Enhance natural dune area, Nickel beach, Port Colborne, Ontario



Dune grass on a sand dune, Port Colborne, Ontario

Stewardship Tip #10: There are habitat features that can be made toad friendly, such as the examples on this page.

SEPTIC SYSTEMS: MAINTAIN OR REPLACE

There are approximately one million septic systems in Ontario. Septic systems that are old and not working properly can cause human health and environmental problems including contamination of well water and nutrient overload in a watershed.



Surface view of a sand filtration septic system

Sand filtration septic systems and wetland treatment areas are beneficial for nutrient management. Any nutrients that can be managed by filtration before they enter creeks, drains and streams and flow into the lake and produce algae is beneficial for humans as well as Fowler's toads. Systems such as the one pictured to the right will filter contaminants and nutrients before they reach waterways.

Some care and maintenance tips include minimizing the amount of water used within the house; directing all surface water including roof run off and hoses away from the septic bed. Discarding large amounts of household cleaners, solvents or anything not biodegradable such as paints, pesticides, latex, pharmaceutical and over the counter drugs, fertilizers, fuels, etc. into the septic bed may leach further into the ground and cause chemical contamination of the soil, ground water and surrounding surface water.

Scientists are currently assessing whether these contaminants are linked to birth defects, deformities, cancers and hormonal imbalances.



Sand filtration septic system during construction

LAWS TO HELP SPECIES AT RISK

In 1996, federal, provincial and territorial governments signed the National Accord for the Protection of Species at Risk in Canada. There are several federal and provincial agencies and laws that protect native wildlife, such as the Fowler's toad. Federal and provincial laws include the Federal Species at Risk Act (SARA), the Ontario Fish and Wildlife Conservation Act and the Ontario Endangered Species Act (Bill 184, June 2008).

Other federal and provincial laws that help protect Species at Risk and their habitat include the Ontario Planning Act, Public Lands Act, Ontario Parks Act, Conservation Authorities Act, Migratory Birds Act, Ontario Water Resources Act and Ontario Source Water Protection Act.

Please refer to the useful web site sections listed at the back of this guide for more information.

THINK GLOBAL, ACT LOCAL



The status of Species at Risk is determined globally by the International Union for the Conservation of Nature and Natural Resources (IUCN), nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and provincially by the Committee on the Status of Species at Risk in Ontario (COSSARO). Species that are at risk of becoming endangered, extirpated or extinct are reviewed by these committees, these committees are made up of a group of experts, both government and non-government, that review information and expert opinion to determine the conservation status for native species in the world, Canada and Ontario.

Status Classifications are very similar throughout each committee:

Extinct (X): A species that no longer exists anywhere in the world

Extirpated (XT): A species that no longer exists in the wild in a certain area, for example does not exist in Canada, but occurs elsewhere in the world

Endangered (E): A species facing imminent extirpation or extinction

Threatened (T): A species that is likely to become endangered if limiting factors are not reversed.

Special Concern (SC): A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

Data Deficient (DD): A wildlife species for which there is inadequate information to make a direct or indirect assessment of its risk of extinction.

Not At Risk (NAR): A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

REGIONAL INFORMATION

NIAGARA AREA

Ontario Ministry of Natural Resources
Niagara Area Office
P.O. Box 5000
4890 Victoria Avenue North
Vineland Station, ON
L0R 2E0
905-562-4147
Web site: www.mnr.gov.on.ca

Land Care Niagara
76 Division Street, Unit 103,
Welland, ON, L3B 3Z7
905-714-0723
Web site: <http://www.landcareniagara.com>

AYLMER DISTRICT

Ontario Ministry of Natural Resources
Aylmer District Office
615 John St. North
Aylmer, Ontario
N5H 2S8
519-773-9241

Long Point Provincial Park
Box 99
Rowan, Ontario
N0E 1M0
519-586-2133
Web site: www.ontarioparks.com

KENT REGION

Rondeau Provincial Park
R.R. #1 (Hwy. 15)
Morpeth, ON
N0P 1X0
519-674-1768
Web site: www.ontarioparks.com

ESSEX REGION

Point Pelee National Park
407 Monarch Lane
R.R. #1 Leamington, ON
N8H 3V4
519- 322-2365
Web site: www.pc.gc.ca/pn-np/on/pelee



LEARN MORE ABOUT SPECIES AT RISK

Canadian Wildlife Services
c/o Environment Canada
Ottawa, ON
K1A 0H3
Web site: www.cws-scf.ec.gc.ca

Ontario Ministry of Natural Resources
P.O. Box 7000
300 Water St.
Peterborough, ON
K9J 8M5
Web site: www.mnr.gov.on.ca

Committee on the Status of Endangered
Wildlife in Canada (COSEWIC)
c/o Canadian Wildlife Services
Environment Canada
Ottawa, ON
K1A 0H3
Web site: www.cosewic.gc.ca

The Toronto Zoo
361-A Old Finch Ave.
Scarborough, ON
M1B 5K7
Web site:
www.torontozoo.com/adoptapond

Niagara Peninsula Conservation Authority
250 Thorold Road West; 3rd Floor
Welland, ON L3C 3W2
905-788-3135
Web site: www.conservation-niagara.on.ca

Find your local conservation authority at: Conservation Ontario
Web site: www.conservation-ontario.on.ca

Find your local stewardship council at: Ontario Stewardship
Web site: www.ontariostewardship.org

USEFUL WEB SITES

www.cosewic.gc.ca
www.sararegistry.gc.ca
www.cws-scf.ec.gc.ca
www.mnr.gov.on.ca
www.speciesatrisk.gc.ca
www.ec.gc.ca
www.ontarionature.org
www.e-laws.gov.on.ca
www.ontarioparks.com
www.landcareniagara.com
www.ontariostewardship.org
www.torontozoo.com
www.pc.gc.ca
www.ebr.gov.on.ca



Fowler's toad metamorph

GLOSSARY

Amphibian: A cold-blooded, vertebrate, such as a toad or salamander, that characteristically hatches as an aquatic larva with gills. The larva then transforms into an adult having air-breathing lungs.

Amplexus: The mating embrace of frogs and toads, during which the male claps the female and fertilizes the eggs that she releases.

Aquatic stage: Living or growing in, on, or near the water: aquatic animals and plants.

Camouflage: The method or results of concealing oneself from a predator by making them appear to be part of the natural surroundings.

Contaminants: To make impure or unclean by contact or mixture.

Defense: The act of defending against attack, danger, or injury.

Dehydrate: To dry, to be depleted of water.

Ectotherm: An organism that regulates its body temperature by exchanging heat with its surroundings. Example: toad, snake, turtle. "Ecto" means from the outside and "therm" refers to temperature.

Endotherm: An organism that generates heat to maintain its body temperature, typically above the temperature of its surroundings. Example: human, dog, elephant. "Endo" means from the inside and "therm" refers to temperature.

Erosion (shoreline): occurs through the action of currents and waves on soil.

Fertilization: The act or process where the male gamete penetrates the egg and the resulting fusion of genetic material develops into an embryo.

Foraging: The act of looking or searching for food.

Glands: A cell, a group of cells, or an organ that produces a secretion for use elsewhere in the body.

Headland: an area of land adjacent to water on three sides.

Hibernation: To pass the winter in a dormant or torpid state. It is an inactive or dormant state.

Hormone: A chemical substance secreted by an organ, which is transported to another organ causing a change.

Hybridization: When two organisms from two different species mate and produce offspring with characteristics of both species.

Hydration: To take up water, in order to restore or maintain fluid balance.

Insect larvae: The newly hatched, wingless, often wormlike forms of many insects before metamorphosis.

Invertebrates: An animal, such as an insect or mollusk, that lacks a backbone or spinal column.

Littoral drift (longshore drift): Is the movement of sand along the shoreline from one site to another by wind or water currents.

Metabolism: Physical and chemical processes occurring within a living cell or organism that are necessary for the maintenance of life.

Metamorphose: To change into a wholly different form or appearance.

Metamorphosis: A change from the larvae to the adult form. This occurs in insects and amphibians.

Microscopic: Is too small to be seen by the naked eye.

Noxious substance: Something that tastes or smells bad.

Olfactory cues: A stimulus received through the nose that causes an organisms to change its behaviour.

Parasite: To live on or in a host taking nourishment from the host organism.

Paratoid gland: A large gland behind the eye and above the ear in toads and some frogs, which secretes a noxious and/or toxic substance.

Predator: Any animal that lives by preying on other animals.

Prey: An animal hunted or caught for food.

Propulsion: The process of driving or propelling.

Resorbed: To absorb again.

Respiration: The act or process of inhaling and exhaling; breathing.

Sediment transportation: The movement of debris via wind or water that has eroded from rock or sediment formations. Particle sizes can vary from a sand particle to a boulder.

Shoreline: The edge of a body of water and land, where land and water meet.

Stabilization: Is an action that stops change in soil erosion.

Spiracle: Is an opening through which air or water passes during respiration in tadpoles.

Terrestrial stage: Living on land; not aquatic.

Toxic: Any substance that causes harm or death to an organism.

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http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=281
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R. Tervo

**In Memory of their dedication to Resource
Management and Conservation in the Niagara
and Haldimand Area from 1978 to 2006.**



**Conservation Officer Nelson Denyes and
Conservation Officer Bob Prashaw who
collectively spent over 50 years helping
to promote good fish and wildlife conservation
practices and conserve habitat for Ontario's
wildlife.**



**FOWLER'S TOAD...
...THEY LEAVE AN IMPRESSION!**



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