

Photo: Sam Brinker



Fowler's Toad

(Anaxyrus fowleri) in Ontario

Ontario Recovery Strategy Series

Recovery strategy prepared under the *Endangered Species Act, 2007*

February 2011

Natural. Valued. Protected.

About the Ontario Recovery Strategy Series

This series presents the collection of recovery strategies that are prepared or adopted as advice to the Province of Ontario on the recommended approach to recover species at risk. The Province ensures the preparation of recovery strategies to meet its commitments to recover species at risk under the Endangered Species Act, 2007 (ESA, 2007) and the Accord for the Protection of Species at Risk in Canada.

What is recovery?

Recovery of species at risk is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

What is a recovery strategy?

Under the ESA, 2007, a recovery strategy provides the best available scientific knowledge on what is required to achieve recovery of a species. A recovery strategy outlines the habitat needs and the threats to the survival and recovery of the species. It also makes recommendations on the objectives for protection and recovery, the approaches to achieve those objectives, and the area that should be considered in the development of a habitat regulation. Sections 11 to 15 of the ESA, 2007 outline the required content and timelines for developing recovery strategies published in this series.

Recovery strategies are required to be prepared for endangered and threatened species within one or two years respectively of the species being added to the Species at Risk in Ontario list. There is a transition period of five years (until June 30, 2013) to develop recovery strategies for those species listed as endangered or threatened in the schedules of the ESA, 2007. Recovery strategies are required to be prepared for extirpated species only if reintroduction is considered feasible.

What's next?

Nine months after the completion of a recovery strategy a government response statement will be published which summarizes the actions that the Government of Ontario intends to take in response to the strategy. The implementation of recovery strategies depends on the continued cooperation and actions of government agencies, individuals, communities, land users, and conservationists.

For more information

To learn more about species at risk recovery in Ontario, please visit the Ministry of Natural Resources Species at Risk webpage at: www.ontario.ca/speciesatrisk

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DECLARATION

The recovery strategy for the Fowler's Toad has been developed in accordance with the requirements of the *Endangered Species Act, 2007* (ESA). This recovery strategy has been prepared as advice to the Government of Ontario, other responsible jurisdictions and the many different constituencies that may be involved in recovering the species.

The recovery strategy does not necessarily represent the views of all of the individuals who provided advice or contributed to its preparation, or the official positions of the organizations with which the individuals are associated.

The goals, objectives and recovery approaches identified in the strategy are based on the best available knowledge and are subject to revision as new information becomes available. Implementation of this strategy is subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy.

RESPONSIBLE JURISDICTIONS

Ontario Ministry of Natural Resources
Environment Canada, Canadian Wildlife Service - Ontario
Parks Canada Agency

EXECUTIVE SUMMARY

Although widespread throughout the eastern United States, Fowler's Toad (*Anaxyrus fowleri*) has been found in Canada only on the shores of Lake Erie in Ontario, formerly occurring along most of the northern shore. Populations are now known from only three peninsulas: Rondeau, Long Point, and Niagara. In these areas the Fowler's Toad is sympatric with the American Toad (*Anaxyrus americanus*). Fowler's Toad no longer occurs in any localities along the shoreline of western Lake Erie. The species is listed as endangered on the Species at Risk in Ontario (SARO) List under the *Endangered Species Act, 2007*, and was classified as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

In Canada, Fowler's Toad is found on sandy or rocky points, sand dunes, and beaches along Lake Erie, where it breeds in sandy-bottomed ponds or rocky pools in early successional habitats. Because of this, it is profoundly affected by, but adapted to, changes brought about by the lake. Both juveniles and adults are capable of dispersing up to ten kilometres and can re-colonize habitats after local extirpations. However, steep bluffs along much of the Lake Erie coastline can impede movements along the beach. Required habitats include dunes for hibernation, beaches for hiding, shorelines for feeding and hydrating, rocky or sandy shoreline pools for breeding and tadpole development, and corridors for movement.

Limiting factors include a high mortality rate, short life span, and low genetic variability.

Most threats to the species in Ontario are related to intensive human use of the Lake Erie shoreline. This includes industrial, commercial, housing, road development, and recreational activities. These developments interrupt the natural processes of erosion and deposition necessary to maintain habitat features for all of the Fowler's Toad's life stages. Intensive alterations to nearshore, beach, and dune areas for human recreation activities and aesthetics can cause direct mortality of all life stages and loss of habitat features. Pollution may have been responsible for eliminating Fowler's Toad from parts of its historic range and could have continuing impacts. Spread of the invasive European Common Reed (*Phragmites australis*) and of other invasive species can also eliminate habitat.

The recovery goal is to maintain the three extant populations of Fowler's Toad in Ontario, in the Rondeau area, on the Long Point peninsula, and along the Niagara Peninsula, and to re-establish self-sustaining populations in other suitable areas, where feasible.

The following objectives, each having a set of approaches, have been established:

1. Protect existing populations and habitats of Fowler's Toad.
2. Gather more data about Fowler's Toad, about human impacts on populations and habitat, and about how to mitigate these impacts.

3. Mitigate existing human impacts on Fowler's Toad populations and habitat, reduce risks of predicted or impending impacts, and improve habitat.
4. Determine the feasibility of reintroduction of Fowler's Toad in suitable areas.
5. Re-establish self-sustaining populations of Fowler's Toad in suitable areas, where feasible.
6. Extend current monitoring programs to re-established populations and all areas with suitable habitat.

Within the three areas of current Ontario occurrence, and within 0.5 km of the Lake Erie shoreline,

- all sand beaches,
 - all sand dunes,
 - all sandy-bottomed ponds and marshes, rocky shoals, and seasonal pools, and
 - all shorelines associated with or linking these features,
- should be prescribed as habitat in a habitat regulation.

Because the species can disperse and re-populate areas where it has disappeared, all areas of historic Fowler's Toad occurrence should be monitored for re-appearance. If at any time individuals of the species re-appear or are re-introduced, the four habitats (described above) in that area should be prescribed as habitat in the habitat regulation.

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1.0 BACKGROUND INFORMATION

1.1 Species Assessment and Classification

COMMON NAME: Fowler's Toad

SCIENTIFIC NAME: *Anaxyrus fowleri*

SARO List Classification: Endangered

SARO List History: Endangered (2010), Threatened (2004)

COSEWIC Assessment History: Endangered (2010), Threatened (2000),
Threatened (1999), Special Concern (1986)

SARA Schedule 1: Threatened (June 5, 2003)

CONSERVATION STATUS RANKINGS: GRANK: G5
NRANK: N2 SRANK: S2

The glossary provides definitions for the abbreviations above.

Fowler's Toad is listed as a specially protected amphibian under the *Fish and Wildlife Conservation Act*.

1.2 Species Description and Biology

Species Description

Fowler's Toad is a medium-sized member of the family Bufonidae. The adult body is 50 to 80 mm in length, excluding legs, with females slightly larger than males. The back is gray or buff coloured, with darker patches and numerous small dark brown warts on a granular textured skin. There are usually three or more small warts per dark dorsal spot; however, while diagnostic, this character is not always useful as the spots may be small and indistinct in some specimens, particularly in Canada. The under surface is white or cream coloured and is either without spots or with a single dark pectoral spot situated between the forelimbs. The throat is dark in males but white in females. The snout is short and blunt and the bony cranial crests on the head are weak (Wright and Wright 1949).

The mating call of the male Fowler's Toad has been described as a "prolonged and rather shrill scream" (Green 2004). Call characteristics vary with temperature: as the temperature goes up, call pulse rate increases and call duration declines (Zweifel 1968). Dominant frequency (pitch, in MHz) is closely correlated with body size. Males also issue a grumbling, vibrating release call when handled, whether by humans or by other toads, to announce their gender (Brown and Littlejohn 1972). Females are silent.

Species Biology

The Fowler's Toad has a complex life cycle, which in Ontario involves the use of both aquatic (egg and larval development) and terrestrial (juveniles and adults) habitats within close proximity to Lake Erie. Toads hibernate during the winter months and congregate in late spring to breed.

The Fowler's Toad lives no longer than 5 years (Kellner and Green 1995) and suffers high levels of mortality at all life stages, despite producing noxious and toxic skin secretions. Hybridization with the sympatric American Toad is known to occur (Green 1984).

In Ontario, populations naturally fluctuate, locally and lake-wide, based on Lake Erie storm events and water level cycles. Both juveniles and adults can disperse up to ten kilometres and can recolonize habitats after local extirpations, provided there are no barriers. Fowler's Toad repopulated Big Creek National Wildlife Area at Long Point in 1991 after an absence of a few years (Smith and Green 2006).

Fowler's Toad plays the role of small insectivore, specializing in ants and beetles (Judd 1957, Bush and Melnick 1962). Tadpoles are significant detritivores in small ponds, rocky pools, and embayments. No other anurans in the Great Lakes region habitually and primarily forage along lakeshores and dunes. In turn, higher-level carnivores including snakes, birds, fish, mammals, and other frogs are the primary predators of Fowler's Toad.

1.3 Distribution, Abundance and Population Trends

Fowler's Toad inhabits much of North America east of the Great Plains, excluding the southern Atlantic coastal plain from the Carolinas to the western panhandle of Florida (Figure 1).



Figure 1. Range of Fowler's Toad in North America (Conant and Collins 1991).

The species is not listed as a species of concern federally in the United States or in any of the states adjacent to Ontario. However, populations along the south shore of Lake Erie in Pennsylvania and Ohio may be imperilled. These populations are disjunct from the species' primary range and recent evidence indicates that they are related to, and possibly derived from, Canadian populations on the north shore of the lake, and are subject to the same threats (Smith 2004, Smith and Green 2004).

Fowler's Toad is documented in Canada from only 28 sites, including historical records, all of which are in extreme southern Ontario, on sandy or rocky points and sandy beaches along the northern shore of Lake Erie. To date, no verified records have been documented at locations greater than half a kilometre from the Lake Erie shore [OMNR, based on data from the Natural Heritage Information Centre (NHIC)] (Figure 2).

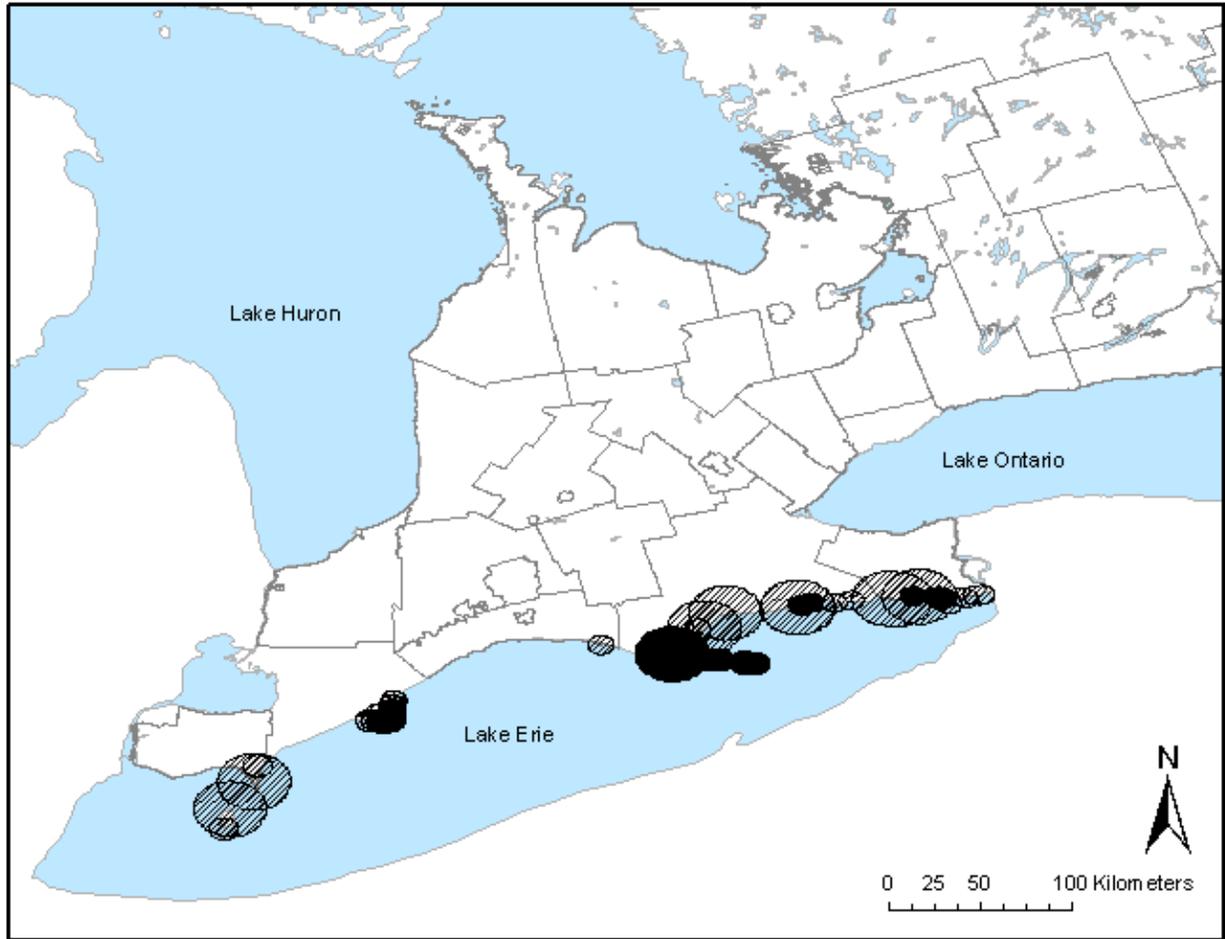


Figure 2. Distribution of Fowler's Toad in Ontario (based on NHIC data).

Fowler's Toad has not been recorded on the Point Pelee peninsula since 1949 or on Pelee Island since 1960. The species no longer occurs in any localities along western Lake Erie, where it is considered extirpated. Only three populations remain (Figure 3):

- on and near the Rondeau Peninsula, numbering about 400 individuals (Dobbyn 2008),
- on the Long Point peninsula, numbering over 1000 toads (Green and Summerfield 2008) and,
- on the south shore of the Niagara Peninsula, numbering over 3000 individuals (Yagi 2008), where disjunct populations occupy the shoreline from the Grand River to the Niagara River, including Rock Point and James N. Allen Provincial Parks, Morgan's Point and Wainfleet Long Beach Conservation Areas (owned by the Niagara Peninsula Conservation Authority), and Nickel Beach (owned by the International Nickel Company and leased to the City of Port Colborne).



Figure 3. Locations around Lake Erie where Fowler's Toad populations currently exist. (Oldham and Weller 2000).

1.4 Habitat Needs

Five types of habitat are needed by the Fowler's Toad to complete its life cycle and to continue to persist (Yagi and Tervo 2008):

- hibernation - sand dunes (open to moderately vegetated) and sufficiently deep sand areas where the toads can successfully dig below the frost line to just above the water table and remain over winter (7 to 8 months from mid September to mid May);
- breeding, egg laying, and tadpole development - early successional wetlands, drains and stream mouths that open onto sand beaches, bedrock pools, shallow bays, and ponds within the full range of Lake Erie water levels; such breeding sites need either a sand or bedrock substrate, and must have sparse vegetation;
- feeding and re-hydration habitat - shorelines, including bedrock outcrop areas, dunes, and beaches;
- daytime retreat and aestivation - open to moderately vegetated beaches and dunes with rocks, woody debris, and other objects that provide cover along the shore;
- dispersal corridor - contiguous beach and dune sand shoreline habitat, without barriers such as solid-wall piers or groynes, solid shorewalls or breakwalls, canals, deep or fast-flowing water, or roads. These linkage requirements are similar for all life stages, and are used for:
 - active migration from hibernation to breeding sites by adults as well as active movements from day time refugia to shorelines for feeding and re-hydration (adults and juveniles);
 - passive dispersal of tadpoles and toadlets, initiated by natural processes, from growth and development sites to shoreline emergence areas;

- active dispersal of toadlets, juveniles, and adults to new sites.

1.5 Limiting Factors

High Mortality and Short Life Span

Fowler's Toad lives no longer than five years (Kellner and Green 1995) and suffers high levels of mortality at all life stages (Green 2004).

Low Genetic Variability

The Canadian populations of Fowler's Toad are known to be genetically less variable in comparison to sympatric populations of American Toad and are likely less variable than Fowler's Toad populations in the United States (Masta et al. 2002). This low genetic variability has unknown consequences.

1.6 Threats to Survival and Recovery

Habitat Loss and Degradation

Specific threats (Green 2000) include:

- Dune and beach stabilization from the installation of breakwalls which removes access to hibernation sites, interferes with natural maintenance of beaches, and leads to colonization of the dunes by plants.
- Vegetation succession can cause over-vegetation of dunes by both native and non-native plants, which eliminates open sand areas. This has been observed in Fowler's Toad habitat at Morgan's Point Conservation Area, Rock Point Provincial Park, and Nickel Beach in Port Colborne. Over-vegetation of dunes may also directly occur due to human activities.
- Dune, beach and nearshore disturbances can remove cover objects, kill toads, and compact beach soils. Such activities include beach grooming, vehicle use, and the removal of dunes for housing developments and for regular road and property maintenance activities. In the Point Pelee area, historic sand dredging operations off of the tip, and shoreline protection measures on either side of the national park resulted in reduced sediment delivery to the shoreline, and may have contributed to the extirpation of the Fowler's Toad there.
- Loss of breeding sites, which may be caused by climate-related changes in lake levels, drainage of wetlands (such as in the Point Pelee area between the national park and Hillman Marsh Conservation Area), accumulation of shells of the invasive alien Zebra Mussel (*Dreissena polymorpha*) in rocky pool habitat, and the draining, filling, or isolation of backshore wetlands by roads or infrastructure. Roads and houses can shield breeding sites from storms and allow them to be overgrown with vegetation.
- Elimination of habitat, including breeding sites, by the spread of the European Common Reed (*Phragmites australis* subsp. *australis*) and by the invasive aliens Silver Poplar (*Populus alba*), Crown Vetch (*Securigera varia*), and Kentucky Blue Grass (*Poa pratensis*).

- Pier or groyne construction and maintenance, which can change sand drift and deposition processes and prevent natural dispersal of toads.

Lack of Connectivity and Population Rescue Effect

Each of the three remaining populations of Fowler's Toad is a separate and distinct population (Smith and Green 2004). There is little or no chance of a rescue effect among them or from populations in the United States; the distances between these populations are too great for individuals to traverse and there is no suitable intervening habitat. Steep lakeshore bluffs along much of the Lake Erie coastline in Ontario significantly limit movements and dispersal.

Pollution

Fowler's Toad tadpoles and adults are known to be susceptible to chemicals for agriculture and mosquito control (Ferguson and Gilbert 1968, Sanders 1970). These chemicals may have contributed to the loss of Fowler's Toad from Pelee Island and Point Pelee National Park. Hecnar and Hecnar (2005) report that contaminant threats persist at the national park. Contamination by heavy metals (e.g., from the smelter near Nickel Beach) may constitute a significant threat due to the known sensitivity of Fowler's Toad to such pollutants (Birge and Black 1977).

Predation

Predation is a normal threat which would not affect normal populations, but it could have negative impacts in smaller, disjunct areas. Near human settlements, an artificially increased population of the Raccoon (*Procyon lotor*), a toad predator, could be a threat, but domestic cats are not a threat due to the toad's bad taste.

Hybridization

Hybridization with the sympatric American Toad does occur, but this was assessed and determined not to be a threat (Green 1984).

1.7 Knowledge Gaps

- More information on the magnitude of human impacts on Fowler's Toad habitat is needed to determine the most severe threats and whether these threats can be mitigated.
- An assessment of the effectiveness of habitat creation projects is lacking.
- Habitat mapping and modeling across the entire Canadian range of this species, including all lake water level and storm regimes, is currently lacking. Mapping would assist in recovery by determining whether suitable but currently unoccupied habitat is present within the province.
- Biological data (survivorship, fecundity, recruitment and hybridization) is lacking for the Niagara and Rondeau populations. Most of the existing biological data comes from the Long Point population and may not accurately reflect other populations.

- Predator-prey dynamics, including those involving the Raccoon near human settlements, are not well understood.
- The impact of low genetic variability in the Canadian Fowler's Toad population is unknown.
- The impact of the heavy metal contamination at Nickel Beach is unknown.
- Information is needed to determine the feasibility of translocation projects, including on the availability of genetically similar individuals from elsewhere throughout the species' range.

1.8 Recovery Actions Completed or Underway

The Fowler's Toad Recovery Strategy Development Team was first formed in January 2003 and meets annually to discuss recovery projects. Population data collection began in 1986 at Long Point, in 2001 at Niagara, and in 2004 at Rondeau. The data are collected in a standardized way (Green and Summerfield 2008) for input into a population viability analysis (PVA) model to assist in assessing an overall measure of recovery action success (COSEWIC 2010).

Habitat mapping has been initiated using criteria established by the recovery team. An element occurrence database for Aylmer and Niagara areas has been created and sent to each OMNR administrative district for submission to NHIC. This database should help determine habitat similarities and differences across the range. A geographic information system (GIS) application of this information will help resource managers make appropriate land use decisions along the shoreline.

At Point Pelee National Park a thorough repatriation study was completed for Parks Canada Agency; the current assessment for reintroduction of Fowler's Toad is negative (Hecnar and Hecnar 2005). Habitat management tests are underway at Morgan's Point Conservation Area, Wainfleet Long Beach Conservation Area, James N. Allen Provincial Park, Nickel Beach, and Rock Point Provincial Park (D. M. Green, M. A. Smith, A. R. Yagi, pers. obs. 2010). These tests include:

- erecting snow fence to capture wind-blown sand and create dunes for hibernation habitat,
- creating breeding sites by digging ponds,
- removing exotic species (Silver Poplar, Crown Vetch, Kentucky Blue Grass, European Common Reed) to release successional dunes and to improve dune quality,
- ending the removal and landfilling of groomed sand from beaches,
- piling sand at the west end of beaches in order that wind and storms can move the sand naturally and replenish beaches and dunes downwind.

The termination of beach grooming to remove algae has increased toadlet abundance by the provision of additional escape cover in algae mats. Juvenile toad numbers in fringe areas increased after dune and beach quality improvement projects (A. R. Yagi, pers. obs. 2010).

Radio-tracking at Morgan's Point (Yagi and Mills 2003) and at Long Point (Green 2008) has confirmed that toads require beaches for evening activity and sparsely vegetated dunes for day-time retreats and long-term dormancy. A management plan with recommendations was produced for Nickel Beach (Limnoterra 2006). Habitat mapping and testing of habitat mapping guidelines has been done at Nickel Beach and Morgan's Point Conservation Area (Yagi and Tervo 2008).

Outreach, education and habitat enhancement project publications produced by the recovery team include an identification compact disc, post cards, stickers, posters, pamphlets, a stewardship guide, a landowner contact brochure, a workshop presentation for adults and children, and other educational material. Several articles were written for Rock Point, Long Point, and Rondeau Provincial Parks, focusing on beach and dune communities and three species that inhabit them, including Fowler's Toad. These items were printed in park magazines and newsletters, and are offered to the public during the summer season. They are available from the Niagara Area Office of OMNR in Vineland Station and may be accessed online from Land Care Niagara (www.landcareniagara.com).

2.0 RECOVERY

2.1 Recovery Goal

Maintain the three extant populations of Fowler's Toad in Ontario, in the Rondeau area, on the Long Point peninsula, and along the Niagara Peninsula, and re-establish self-sustaining populations in other suitable areas, where feasible.

2.2 Protection and Recovery Objectives

Table 1. Protection and recovery objectives

| No. | Protection or Recovery Objective |
|-----|---|
| 1 | Protect existing populations and habitats of Fowler's Toad. |
| 2 | Gather more data about Fowler's Toad, about human impacts on populations and habitat, and about how to mitigate these impacts. |
| 3 | Mitigate existing human impacts on Fowler's Toad populations and habitat, reduce risks of predicted or impending impacts and improve habitat. |
| 4 | Determine the feasibility of reintroduction of Fowler's Toad in suitable areas. |
| 5 | Re-establish self-sustaining populations of Fowler's Toad in suitable areas, where feasible. |
| 6 | Extend current monitoring programs to re-established populations and all areas with suitable habitat. |

2.3 Approaches to Recovery

Table 2. Approaches to recovery of the Fowler's Toad in Ontario

| Relative Priority | Relative Timeframe | Recovery Theme | Approach to Recovery | Threats or Knowledge Gaps Addressed |
|--|--------------------|---|---|--|
| 1. Protect existing populations and habitats of Fowler's Toad. | | | | |
| Critical | Ongoing | Protection, Stewardship | 1.1 Protect habitat through land acquisition, stewardship agreements, conservation easements, and pertinent legislation, policies, and guidelines. | <ul style="list-style-type: none"> Habitat loss and degradation |
| Critical | Ongoing | Protection, Stewardship, Education and Outreach, Communications | 1.2 Inform stakeholders of their potential role and of the need for habitat protection. Distribute resource materials and develop working relationships. | <ul style="list-style-type: none"> Habitat loss and degradation |
| Critical | Ongoing | Protection, Stewardship, Education and Outreach, Communications | 1.3 Contact landowners within the existing range of the species and distribute education materials. | <ul style="list-style-type: none"> Habitat loss and degradation Death of toads |
| 2. Gather more data about Fowler's Toad, about human impacts on populations and habitat, and about how to mitigate these impacts. | | | | |
| Necessary | Short-term | Inventory, Monitoring and Assessment, Research | 2.1 Continue to collect standardized population data and its spatial extent for input into PVA modeling. | <ul style="list-style-type: none"> Inadequate data |
| Necessary | Short-term | Inventory, Monitoring and Assessment, Research | 2.2 Design an amphibian-specific PVA model to assess the effectiveness of recovery actions and to re-assess recovery goals and actions. | <ul style="list-style-type: none"> Inadequate data |
| Necessary | Short-term | Inventory, Monitoring and Assessment, Research | 2.3 Determine habitat use for input into GIS habitat modeling. | <ul style="list-style-type: none"> Inadequate data |

Recovery Strategy for the Fowler's Toad in Ontario

| Relative Priority | Relative Timeframe | Recovery Theme | Approach to Recovery | Threats or Knowledge Gaps Addressed |
|-------------------|--------------------|--|--|--|
| Necessary | Ongoing | Inventory, Monitoring and Assessment, Research | <p>2.4 Investigate the following aspects of Fowler's Toad ecology to inform recovery:</p> <ul style="list-style-type: none"> – identify dune and beach features that require protection – identify pier or groyne structures of concern – identify dispersal corridors and barriers between and within population areas – assess watershed impacts on breeding sites, impacts of predation on range extension, and impacts of human activities on habitat – improve understanding of limiting factors affecting colonization and dispersal – identify existing and potential breeding sites through the full range of Lake Erie water levels – identify pollution discharge areas of concern and determine effects – determine whether specific shoreline stabilization designs affect habitat use – determine whether shore disturbances are limiting populations – determine whether existing structures are limiting dispersal mechanisms or affecting natural sand erosion and deposition processes – examine predator-prey relationships at all life stages – assess vegetation dynamics in dune and beach systems | <ul style="list-style-type: none"> • All knowledge gaps |

Recovery Strategy for the Fowler's Toad in Ontario

| Relative Priority | Relative Timeframe | Recovery Theme | Approach to Recovery | Threats or Knowledge Gaps Addressed |
|--|--------------------|------------------------|---|--|
| 3. Mitigate existing human impacts on Fowler's Toad populations and habitat, reduce risks of predicted or impending impacts, and improve habitat. | | | | |
| Critical | Short-term | Protection, Management | 3.1 Develop a prioritized list of areas for implementation of management activities. | <ul style="list-style-type: none"> Habitat loss and degradation |
| Critical | Short-term | Protection, Management | 3.2 Prepare habitat management plans for public and private lands, including habitat improvement projects. | <ul style="list-style-type: none"> Habitat loss and degradation |
| Critical | Ongoing | Protection, Management | 3.3 Implement management plans, carry out enhancement projects and mitigate impacts: <ul style="list-style-type: none"> remove invasive species, including European Common Reed and Zebra Mussel shells in breeding sites, and invasive plants on dunes remove barriers, especially shorewalls, in dynamic dune areas stop beach grooming and algae removal stop vehicle use on beaches, especially at night | <ul style="list-style-type: none"> Habitat loss and degradation Death of toads |
| Necessary | Ongoing | Protection, Management | 3.4 Establish new protected areas to encompass Fowler's Toad habitat when and where feasible. | <ul style="list-style-type: none"> Habitat loss and degradation |
| 4. Determine the feasibility of reintroduction of Fowler's Toad in suitable areas. | | | | |
| Beneficial | Short-term | Management, Research | 4.1 Determine whether habitat suitable for future reintroductions exists. | <ul style="list-style-type: none"> Feasibility of translocation |
| Beneficial | Short-term | Management, Research | 4.2 Investigate translocation options, including decision mechanisms and protocols for the source and receiving sites. | <ul style="list-style-type: none"> Feasibility of translocation |
| Beneficial | Short-term | Management, Research | 4.3 Evaluate the effectiveness of existing habitat improvement projects. | <ul style="list-style-type: none"> Habitat loss and degradation |

Recovery Strategy for the Fowler's Toad in Ontario

| Relative Priority | Relative Timeframe | Recovery Theme | Approach to Recovery | Threats or Knowledge Gaps Addressed |
|---|---------------------------|---------------------------|---|--|
| Beneficial | Short-term | Management, Research | 4.4 Prepare re-introduction plans. | <ul style="list-style-type: none"> • Feasibility of translocation |
| 5. Re-establish self-sustaining populations of Fowler's Toad in suitable areas, where feasible. | | | | |
| Beneficial | Long-term | Management | 5.1 Implement re-introduction plans. | <ul style="list-style-type: none"> • Feasibility of translocation |
| 6. Extend current monitoring programs to re-established populations and all areas with suitable habitat. | | | | |
| Necessary | Ongoing | Monitoring and Assessment | 6.1 Extend current population monitoring programs to re-established populations. | <ul style="list-style-type: none"> • Inadequate data |
| Necessary | Ongoing | Monitoring and Assessment | 6.2 Monitor suitable habitat in all areas, including all areas of historic Fowler's Toad occurrence. | <ul style="list-style-type: none"> • Habitat loss and degradation |
| Necessary | Ongoing | Monitoring and Assessment | 6.3 Monitor management projects and results | <ul style="list-style-type: none"> • Habitat loss and degradation |

2.4 Area for Consideration in Developing a Habitat Regulation

Under the ESA, a recovery strategy must include a recommendation to the Minister of Natural Resources on the area that should be considered in developing a habitat regulation. A habitat regulation is a legal instrument that prescribes an area that will be protected as the habitat of the species. The recommendation provided below by the recovery team will be one of many sources considered by the Minister when developing the habitat regulation for this species.

The map in Figure 2 shows the extent of Lake Erie shoreline within which Fowler's Toad may occur, either currently or historically. Within the three areas of current Ontario occurrence, and within 0.5 km of the Lake Erie shoreline,

- all sand beaches,
 - all sand dunes,
 - all sandy-bottomed ponds and marshes, rocky shoals, and seasonal pools, and
 - all shorelines associated with or linking these features,
- should be prescribed as habitat in a habitat regulation.

Monitoring of all areas of historic Fowler's Toad occurrence is recommended as a recovery approach in this strategy. Re-establishing Fowler's Toad is also recommended. If at any time individuals of the species re-appear or are re-introduced, the four habitats (described above) in that area should be prescribed in the habitat regulation.

Areas within 500 m of the Lake Erie shoreline where Fowler's Toad currently occurs, but which lack suitable habitat or which have had their habitat permanently altered, should not be considered Fowler's Toad habitat. Such areas include:

- bluffs,
- canals,
- marinas,
- piers.

GLOSSARY

Aestivation: A behavioral strategy of inactivity used by reptiles and amphibians to escape extreme summer temperatures or dry conditions.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): The committee responsible for assessing and classifying species at risk in Canada.

Committee on the Status of Species at Risk in Ontario (COSSARO): The committee established under section 3 of the *Endangered Species Act, 2007* that is responsible for assessing and classifying species at risk in Ontario.

Conservation status rank: A rank assigned to a species or ecological community that primarily conveys the degree of rarity of the species or community at the global (G), national (N) or subnational (S) level. These ranks, termed G-rank, N-rank and S-rank, are not legal designations. The conservation status of a species or ecosystem is designated by a number from 1 to 5, preceded by the letter G, N or S reflecting the appropriate geographic scale of the assessment. The numbers mean the following:

- 1 = critically imperilled
- 2 = imperilled
- 3 = vulnerable
- 4 = apparently secure
- 5 = secure

Detritivore: One that feeds on detritus (organic particles).

Disjunct: Separated.

***Endangered Species Act, 2007* (ESA):** The provincial legislation that provides protection to species at risk in Ontario.

Extirpated: Eliminated from a portion of its range.

Fecundity: Fertility or the capacity to produce young.

Groyne: A structure built out from shore to protect the shore from erosion, to trap sand, or to direct a current

Oligotrophic: Low in nutrient levels.

Refugia: Plural of refugium – a place of sheltered habitat.

Re-hydration: To take up water in order to restore fluid balance.

Species at Risk Act (SARA): The federal legislation that provides protection to species at risk in Canada. This act establishes Schedule 1 as the legal list of wildlife species at risk to which the SARA provisions apply. Schedules 2 and 3 contain lists of species that at the time the Act came into force needed to be reassessed. After species on Schedule 2 and 3 are reassessed and found to be at risk, they undergo the SARA listing process to be included in Schedule 1.

Species at Risk in Ontario (SARO) List: The regulation made under section 7 of the *Endangered Species Act, 2007* that provides the official status classification of species at risk in Ontario. This list was first published in 2004 as a policy and became a regulation in 2008.

Sympatric: Occurring in the same area.

Toadlet: A toad that has recently transformed from the tadpole stage, i.e., young of the year, and is thus still very small.

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