



Attachment 1- Additional Documentation



Effects of Barriers on Species At Risk Along the Upper Thames River



UPPER THAMES RIVER
CONSERVATION AUTHORITY

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Wildlife Found Along The Thames River

The Thames River is one of Canada's most southern watercourses. The river and its many tributaries are rich in aquatic life, with approximately:

- 90 species of fish
- 30 species of freshwater mussels and
- 30 species of reptiles and amphibians
- Countless birds, mammals and invertebrates also depend on the existence and health of the Thames River

Fishes At Risk and Game Fish

- The Thames River is home to the most diverse fish fauna in Ontario, with more than 90 fish species recorded in the Thames River Watershed
- Ten species of fish found in the Thames are at-risk
- Generally, species that prefer clear, fast flowing water are declining, while more common species that favour turbid (less clear) conditions are increasing

Threats to fish populations include:

- pollution
- impoundments (dams, weirs)
- siltation/sedimentation
- habitat alteration and destruction
- invasive species (e.g., common carp)
- disease

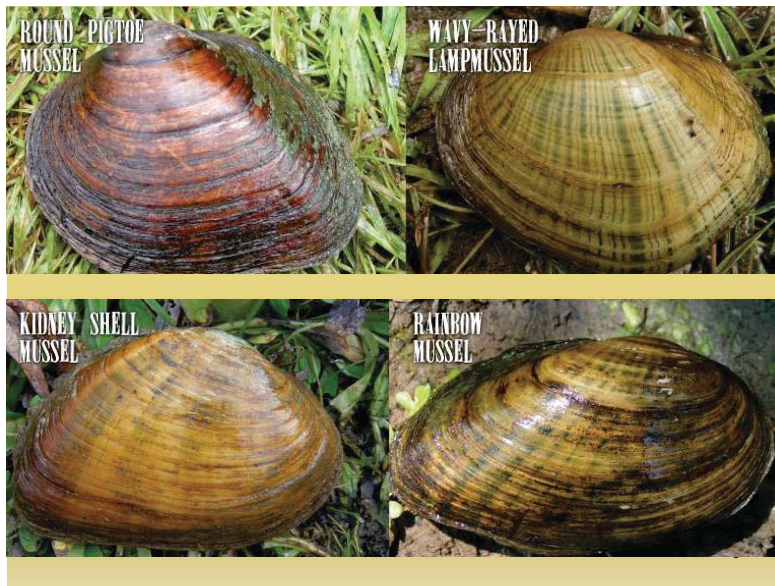


Freshwater Mussels At Risk

- Historically, the Thames River supported one of the richest communities of freshwater mussels in Canada, though there has been a significant decline in freshwater mussel diversity in recent years
- The mussel species that have disappeared were characteristic of a healthy aquatic environment, so their loss is an indication that conditions in the river may be deteriorating.

Threats to mussel populations include:

- pollution, sedimentation and siltation
- impoundments (dams, weirs)
- invasive species (e.g., zebra mussels)
- channelization
- loss of larval host species (e.g., fish, mudpuppy)
- habitat loss, fragmentation and alteration

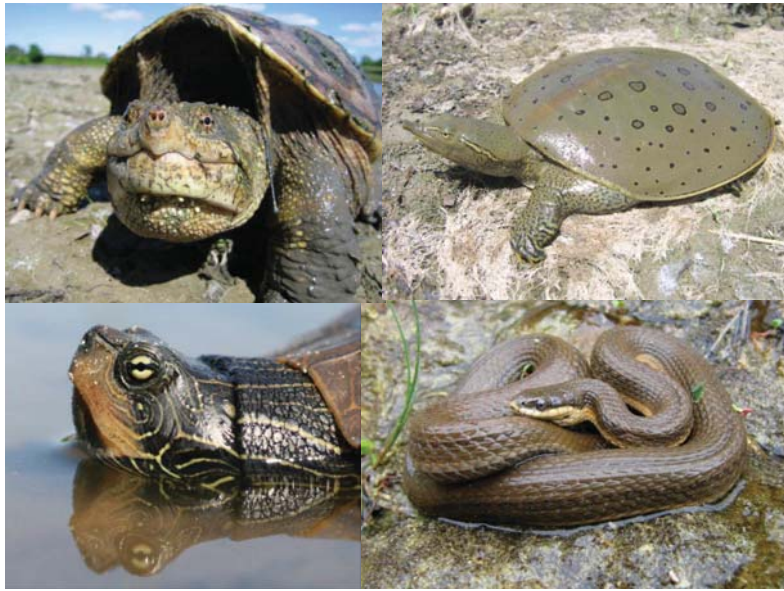


Reptiles At Risk

- Globally, many reptiles are experiencing rapid declines.
- In Ontario, 7 of our 8 native turtles and 11 of our 18 native snakes are listed as at-risk both provincially and federally.
- Of Ontario's 26 snakes and turtles, 17 can be found along the Thames River Watershed, 12 of these are listed at-risk.
- In April 2016, COSEWIC up-listed the Spiny Softshell Turtle from Threatened to Endangered, due to significant declines across the species' limited range in Canada.

Threats to reptile populations include:

- habitat loss, fragmentation and alteration
- road mortality
- invasive species (e.g. European Reed, Zebra Mussel)
- impoundments (dams)
- pollution, siltation and sedimentation
- collection for food or as pets
- persecution



Threats to Wildlife

- Species at risk are sensitive to human-caused environmental changes. Aquatic species at risk require clean water and a healthy river to survive. River-adapted species are especially susceptible to change, including alteration of critical habitat features necessary for survival.
- Habitat loss, alteration and fragmentation are primary threats for most wildlife in this region, though many other threats also exist.

Research and Recovery Efforts: Populations, Movement, Reproduction, Habitat Selection, Threats and Behaviour





Spiny Softshell Turtle Threatened/Endangered

- **Approximately 1000-2000 adults are thought to remain in Canada**
- **The Thames River is the stronghold for the species in Canada, maintaining the bulk of the population, this is due in part to recovery work over the past 23 years**
- **The Spiny Softshell Turtle only occurs in pockets along the Thames River, one of which is within the City of London**
- **Lake Erie populations appear to have declined by between 30 and 50% over the past 20 years.**
- **Habitat loss is a primary factor in Spiny Softshell Turtle decline**
- **UTRCA runs the largest and longest-running research and recovery program for the species in North America**

Barriers and Species At Risk



Spiny Softshell Turtle 1994-2006

- UTRCA's Spiny Softshell Turtle Research began in 1994, including regular surveys throughout the City of London
- Habitat throughout the Springbank Reservoir area was generally not appropriate for most reptiles at risk due to the Springbank Dam and associated reservoir
- Unnatural water fluctuation caused by Springbank Dam resulted in the loss of nesting, thermoregulation, foraging, brumation and nursery habitats for the Spiny Softshell Turtle and the dam blocked movement during the active season.
- Secondary issues caused by reservoirs include changes in water temperature, clarity, quality, and species diversity

Spiny Softshell Turtle 2007-2016

- **With the failure of Springbank Dam in 2006, water levels decreased, and more natural flows returned within the footprint of the former reservoir.**
- **This has resulted in a significant increase in turtle habitat availability over the past decade**
- **Spiny Softshell observations have increased ten-fold throughout the area and well-established nesting, brumation, thermoregulation, foraging and nursery habitats now exist**
- **The changes in this 8km stretch of river have been exceptional, and have greatly benefitted recovery efforts for the Spiny Softshell Turtle in Canada**

Spiny Softshell - Future Potential

- **If the Springbank Dam were put back into operation, Spiny Softshell Turtle recovery efforts would be significantly impacted**
- **Nesting, Nursery, Foraging, Brumation and Thermoregulation Habitats would be lost and individuals would be lost outright or their survival greatly compromised due to unnatural water depths, changes to flow and loss of critical/significant habitat features**
- **Over a decade of habitat renaturalization would be lost and a barrier to movement would again limit important migratory opportunities and potential for population expansion.**
- **Downstream habitats would again be unnaturally influenced by a barrier and impacts from the reservoir**

Spiny Softshell – Future Potential

- **Artificial compensation of habitat is not viewed as feasible with this species in this area, as a mosaic of interconnected habitat types are necessary for survival, some of which would be impossible to replicate in this area.**
- **Timing dam operations around critical activities, such as nesting, cannot be effectively accomplished since nesting, incubation and hatching times can extend from May to October.**
- **Current nesting sites would be lost if the dam were in operation, and any nests laid before the water levels increased would be lost due to flooding.**

Other Species

- **Reptiles, Fish, Mussels and a variety of other wildlife species benefit from more natural, unimpeded flows within the City of London**
- **Provincial and Federal Status Reports and Recovery Strategies clearly illustrate the negative impact of barriers on wildlife**

Wavy-rayed Lampmussel Threatened

- Inhabits clear rivers and streams with steady flows and stable substrates and is typically found in gravel or sand substrates in and around riffle areas.
- Occupied habitats in Ontario are generally characterized as clean sand/gravel substrates, often stabilized with cobble or boulders, in steady currents at depths of up to 1 metre.

- Damming of the stream channel has been shown to detrimentally affect mussels in many ways.
- Reservoirs alter downstream flow patterns and disrupt the natural thermal profiles of the watercourse while impoundments act as physical barriers potentially separating mussels from their host fish.
- Impoundments also act to increase water retention times thereby making river systems more susceptible to invasion by exotics such as the zebra mussel.

Fawnsfoot Mussel Endangered

- It is important to ensure that planning and management agencies recognize the importance of fluvial processes, the flow and substrate composition requirements of Fawnsfoot, as well as the ecological needs of its host fish(es) when planning development activities.
- Dams/barriers can result in direct loss of habitat or fragmentation, which can limit the reproductive capabilities of mussels by eliminating or decreasing the number of hosts available.

Black Redhorse Threatened

- In Ontario, availability of suitable habitat, including breeding habitat, is the main limiting factor to the Black Redhorse. It requires clean, clear water and does not do well in rivers that are muddy or polluted.
- Dams and other barriers that can limit fish movement are also considered a threat.

Silver Shiner Threatened

- **Silver Shiner populations in the Grand and Thames river watersheds are fragmented by dams.**
- **Across North America, hydrological and ecological changes associated with dams have contributed to the loss or reduction of migratory and smaller - bodied riverine fish.**
- **Habitat changes, such as altered downstream water temperatures and the creation of reservoir lakes, also favour the invasion or introduction of exotic species**

Northern Map Turtle Special Concern

- **Construction of dams presents a serious threat to map turtles in several ways.**
- **Female map turtles exhibit nest fidelity, and water levels that are artificially raised could flood and destroy traditional nesting sites**
- **Flow regulation also reduces the availability of sandbars and beaches, and map turtle declines have been noted in the Missouri River due to loss of such habitats.**

- Dams could also change the temperature and depth requirements of hibernation sites and cause earlier ice-off dates which may lead to premature emergence from hibernation
- Furthermore, given this species' preference for shallow water areas and a dietary preference for benthic invertebrates, dams could greatly reduce the quality of foraging habitat and food availability as a result of changes in sedimentation and increased water depths

Queensnake Endangered

- Although legally protected in Missouri, the Queensnake has been extirpated from the state due to habitat loss from the construction of dams.
- Dams, urban discharge, water use and other anthropogenic alterations can cause changes in the hydrology of southern Ontario rivers, likely affecting all riparian species through reduced base - flows and/or rapid influx of water.
- Dams may permanently fragment suitable habitat and /or create a barrier for Queensnake to access suitable habitat.

- Alteration of the hydrology through the creation of dams or other water control structures may lead to degradation or elimination of hibernacula, thermoregulation, gestation, and live - birthing sites.
- High water levels can temporarily or permanently saturate various suitable habitats affecting the possibility of their use by Queensnakes.









Barriers and Impoundments

- **Not appropriate for many river-adapted species that occur along the Thames River**
- **Aquatic wildlife that migrate are either permanently blocked or seasonally blocked by barriers, which can result in decreased population viability and eventual extirpation**
- **Artificially raised water caused by dams can change the thermal properties of the water, can limit flushing of toxins and changes or destroys the aquatic and terrestrial habitats necessary for the survival of many species.**

Barriers, Impoundments and Low Flow

Waterways without dams and impoundments maintain natural riffles and pools which produce an oxygenated substrate that supports abundant life, including microbes and invertebrates, which form the basis of the food chain.

Dams and impoundments often favour tolerant “common” species, including many invasive species such as Zebra Mussel and Eurasian Carp.

A flowing system without a dam can serve as a natural biological water filter, better able to metabolize pollutants and nutrients as it flows.

Barriers, Impoundments and Low Flow

Barriers tend to partition habitat, often eliminating species or reducing population levels.

Low water levels are common throughout much of the Upper Thames River, and it is the natural process of low water periods and relatively short high water periods, that the countless species that use the Thames River have evolved with and require to survive.

People often associate fish and other aquatic wildlife with deep water, though in reality areas of highest biodiversity are often more closely associated with shallow water systems.

Barriers, Impoundments and Low Flow

Creating artificial reservoirs along the river is contradictory to natural processes, which can result in significant disturbance and mortality to aquatic and semi-aquatic species that depend on the river for survival.

Barriers are not appropriate for river-adapted wildlife, especially species at risk within the watershed. Thus, it is important to limit the number of such barriers to only those that are deemed essential.

Questions?

