

Aquatic Speciesat Risk.....

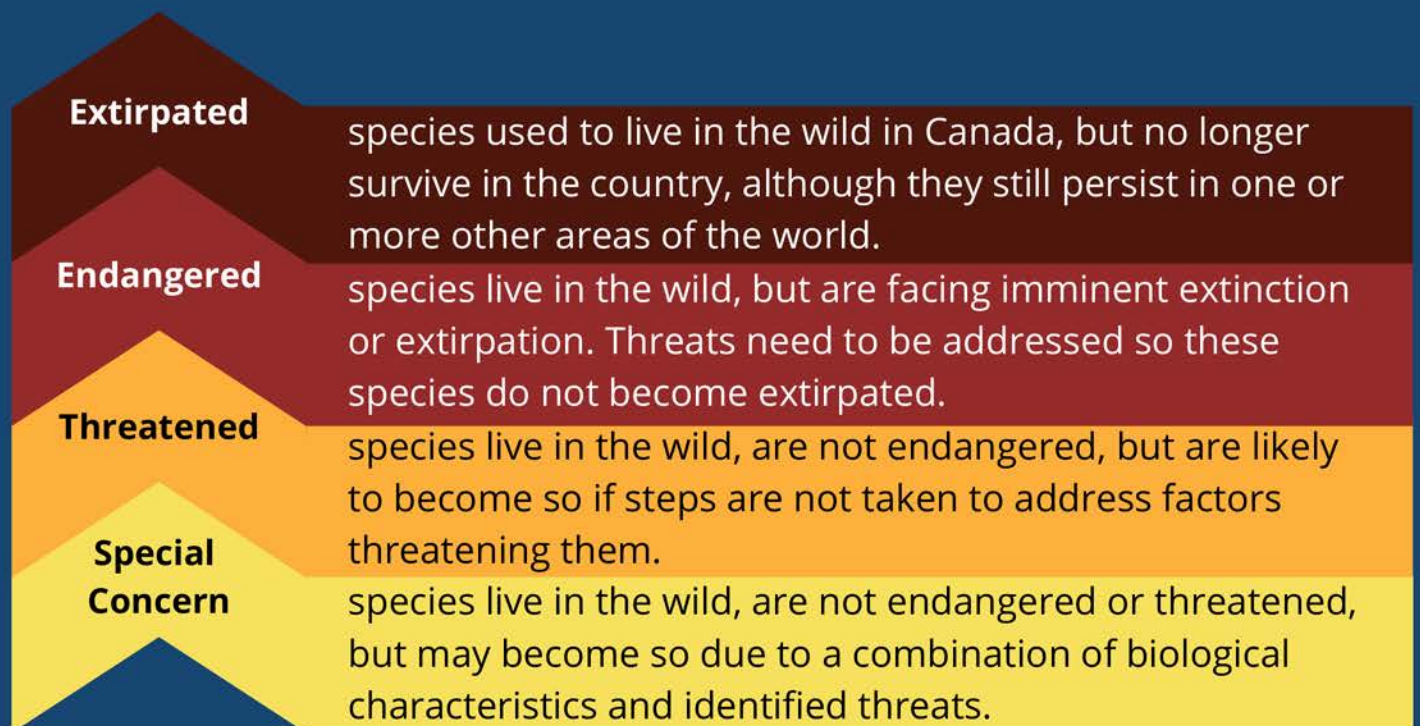
Threats Guidebook

Lower Thames Valley Conservation Authority Watershed



Species at Risk

Many species of mussels and fish in the Lower Thames Valley Conservation Authority (LTVCA) are considered to be species at risk (SAR). Taking action to reduce threats to these sensitive species can help improve their survival and recovery.



The LTVCA watershed is home to 104 different species of fish and 36 species of freshwater mussels.

- 42% of the mussel species and
- 17% of fish species in the LTVCA are at risk.

LTVCA monitors fish, mussels and areas with high potential threats to assist in the recovery of aquatic SAR. Work includes seine netting, timed mussel surveys, habitat assessments, eDNA sampling and surveys to identify threats.

Habitat Loss & Degradation

If there isn't enough suitable habitat for a SAR to complete their life cycle then they will no longer exist in that location. Habitat degradation and loss can occur through watercourse channelization, dredging, drain maintenance and removal of streamside and/or instream vegetation and structure (e.g. logs), as well as through sediment, nutrient and contaminant loading.



Wetlands provide important habitat. Over 20% of SAR depend on them for survival. However, these habitats are disappearing. In southwestern Ontario, 85% of wetland habitats have been lost.¹

Protecting and restoring wetlands and riparian buffers can help combat habitat loss and degradation.

Funding may be available to restore these features.

Visit the LTVCA's *Grants for Landowners* webpage:



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1. Corkum, Ron. 2015. Who Will Stand up for Wetlands? Ontario Nature.

Sediment Loading

Sediment loading occurs when erosion washes soil from fields into a nearby waterbody. This causes water turbidity and the siltation of habitats.



Turbidity happens when sediment becomes suspended in water, causing the water to be cloudy.

Turbidity can make it difficult for fish to see. Some fish rely on clear waters to find food and a mate. Suspended sediment can also coat the gills of both fish and freshwater mussels, making it difficult for them to breathe.



Siltation is the build up of fine sediment on the bottom of a waterbody.

When suspended sediment particles settle they can cover and degrade habitats. Some species require specific habitat types to live, lay their eggs and/or reproduce.

By installing grassed waterways, riparian buffers, rock chutes and/or other erosion control structures, the amount of sediment entering the water can be reduced. This keeps soil on the land where it is needed most.

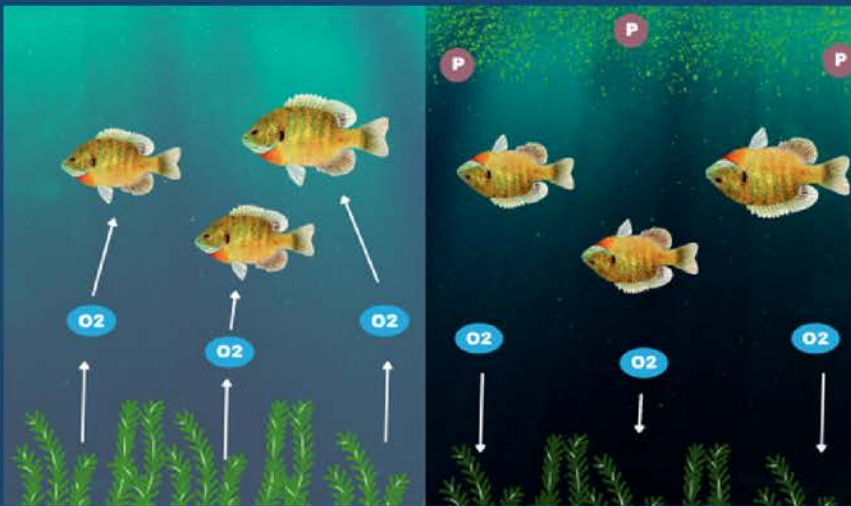
Nutrient Loading



Nutrient loading is often associated with agricultural and urban runoff (e.g. fertilizers) and sediment loading (nutrients are often attached to soil particles). Faulty septic systems can also contribute. When nutrients enter a stream they stimulate

aquatic plant development, including algal growth. Algae can be toxic, causing skin irritation in humans. However, the increase in algae can also cause die-offs of aquatic species.

- Nutrients cause algae to grow on the water surface.



- Sunlight can't reach plants on the bottom.
- Aquatic vegetation starts to decompose, using up oxygen.
- Oxygen is unavailable for aquatic species to breathe.
- Aquatic species perish.

Examples of mitigation measures include:

- using conservation tillage and/or precision agriculture,
- applying soil amendments only when/where needed and
- reducing sediment loading with erosion control structures.

Water Pollution



In addition to sediment and nutrient runoff, toxic substances like herbicides, pesticides, road salts, gasoline, motor oil, pharmaceuticals and fire retardants can all be harmful to aquatic species. These toxins can come from industries, urban properties, farmland, roads and wastewater treatment plants.



While feeding, mussels filter nutrients and contaminants in the water. Contaminants can harm, or even be toxic, to mussels. When mussels are impacted, their ability to filter water is reduced. This allows both contaminants and nutrients to build up, degrading water quality.

You can reduce how much road salt enters waterbodies. The effects of road salts on freshwater mussels and tips on road salt application can be found on the following pages.

Road Salt



When salt is used to melt ice, it mixes with meltwater and finds its way into groundwater, storm drains and waterways.

Freshwater mussels, many of which are SAR, are the most sensitive species to salt concentrations. The chloride found in salt alters the water's conductivity, interfering with basic life processes such as feeding.



Some salt products may be labelled as eco-friendly or pet friendly. However, these products may still contain chloride and are damaging to water quality and aquatic species. Alternative products may contain potassium, which is ten times as toxic as chloride-based products.

Road Salt Smarts

The LTVCA has been working with local municipalities to increase awareness about how to reduce road salt use, while still keeping communities safe. You can use the following tips to reduce the amount of salt you use in order to protect aquatic SAR.

You can eliminate the need for salt application by preventing ice from forming in the first place. Try:



- removing snow before ice forms and
- directing eavestroughs and drains away from driveways and walkways to prevent ice buildup.

Other benefits of reducing road salt applications include:

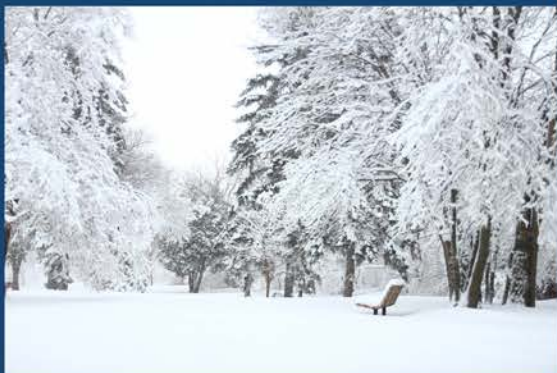
- less money spent on salt products,
- less salt-stained winter boots,
- fewer building repairs needed as a result of salt damage,
- protected drinking water,
- happier dogs and fewer sore paws,
- healthier soil, trees and landscaping,
- healthier turtles, frogs and birds.



For more information you can visit the *Smart About Salt* website at:



Road Salt Smarts



Salt works best between 0 and -10°C. Below these temperatures, it is too cold for salt to be effective.

When temperatures fall outside of this range, try:

- breaking up the ice,
- using sand, grit or non-clumping kitty litter for traction and
- letting the sun melt the ice if temperatures are rising.

For salt to work effectively, only 1 tablespoon needs to be applied per square meter of ice.



When temperatures fall between 0 and -10°C, you can reduce the amount of salt you apply by:

- using a finer-grained salt,
- sweeping up excess or spilled salt to use another time,
- giving salt time to work before applying more and
- only using salt in icy areas.

Invasive Species

The following are a few examples of invasive species affecting aquatic SAR in the LTVCA. More information can be found through *Ontario's Invading Species Awareness Program*.



Zebra and Quagga Mussels attach to mussels, interfering with feeding, breathing and growth. They have extirpated many native mussels from areas of the Great Lakes.

Round Goby displace bottom-dwelling fishes, outcompete them for food, predate their eggs and young and eat freshwater mussels.



Rusty Crayfish eat large amounts of invertebrates and vegetation. This reduces resources and habitat for native species. They also prey on the eggs of fish.



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Learn to identify and report invasive species on
iNaturalist or EDDMapS apps
AND



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clean, drain and dry your equipment, trailers and boats before moving between waterbodies to stop the spread.

Invasive Species



Goldfish stir up mud where they feed, increasing turbidity. They can also carry disease like the Koi herpesvirus, which can infect and harm local fish populations.

Chinese and Banded Mysterysnails outcompete native snails for habitat and food, spread diseases and parasites, prey on fish eggs and block water-intake pipes.



Water Lettuce (left) and Water Hyacinth (right) form dense mats that block water flow and sunlight, preventing the growth of oxygen-producing native plants. Reduced oxygen can harm fish populations. Large mats can interfere with boating, swimming and fishing and can provide a breeding habitat for mosquitos.

Never release aquarium or water garden species into the wild!

Many invasive species issues arise from the rapid spread of these species in local waterbodies following their release.

Invasive Species



Golden Clams alter nutrient regimes which can lead to excessive plant growth. This can modify food chains and reduce native biodiversity.

Common Carp uproot vegetation, damaging food and shelter for other fish species. This increases water turbidity and degrades wetland and coastal habitats.



Other invasive carps (Grass, Black, Bighead and Silver Carp),

Black Carp



Bighead Carp



also damage aquatic habitats, uprooting vegetation and stirring up sediment. They can spread diseases and compete with native species for food.

Grass Carp



Silver Carp



Do not release these species back into the wild if captured!

Many invasive species were introduced into North American waters through the release of ballast water from ships or the escape of captive fish raised for food or sport.

Thermal Effects



Warming air temperatures raise water temperatures. This stresses aquatic species and can reduce the amount of oxygen dissolved in the water. The warming effect is amplified by the removal of streamside (riparian) vegetation, which provides shade to combat surface heating.

Maintain streamside vegetation to shade watercourses, improve water quality, enhance habitat and provide food for aquatic species. Funding may be available.



Incidental Harvest

Many SAR can be difficult to identify and may be incidentally harvested as baitfish. Apps like *Baitfish Primer* can help identify SAR or other fish that are illegal to collect and use as baitfish.

Buy your bait from a trusted source. Return any suspected SAR safely to the water where they were caught.



Altered Water Flow



Changes in water flow can occur due to drainage works, dams and industrial processes. These practices alter natural water flow patterns. Some can even cause watercourses to become dry. This leaves aquatic populations isolated from one another. Tile drains, on the other hand, increase the speed that water drains

from the land. This can create high flows and flooding. High flows can dislodge species and can increase water turbidity and siltation.

Earthen berms and inlet risers, or water and sediment control basins (WASCoBs), intercept and slowly release water runoff to a subsurface drain pipe.

Barriers To Movement

Some SAR need to migrate to reproduce. Structures like dams and perched culverts create barriers, limiting movement. This can separate fish populations and limit the availability of fish hosts for mussel populations that rely on them.



More information on mussels and their fish hosts can be found in the LTVCA's *Aquatic Species at Risk Mussel Guidebook*.

Bottom photo: www.pebblescience.org/Pebble-Mine/fisheries.html



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Threats to Mussels

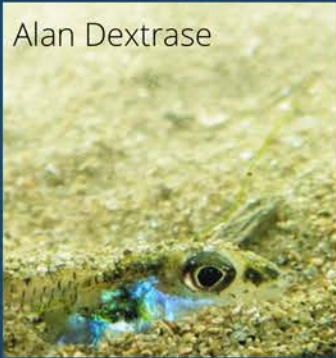
ISOLATED POPULATIONS

Since mussels are not overly mobile, they can become isolated as populations decline. This limits their ability to reproduce. They can be even further impacted if barriers limit the movement of their fish hosts.



FISH HOSTS

Alan Dextrase



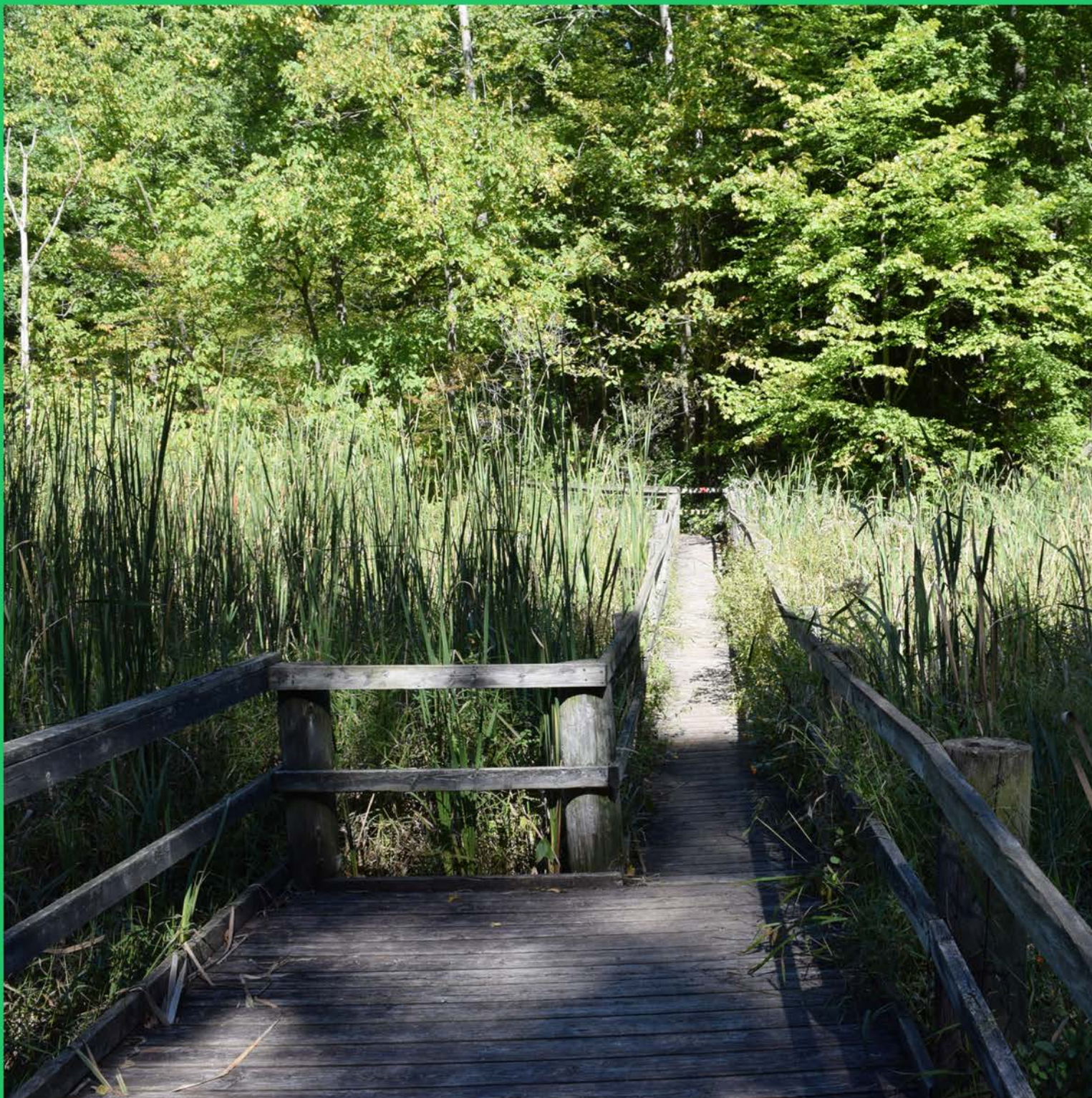
Mussels rely on specific fish host species to complete their life cycle. Some, like the Round Hickorynut, a SAR, depend on at risk fish, like the Eastern Sand Darter, for survival. Declines in host fish populations affect the survival of dependent mussel populations.

ACCESS TO STREAMS

Launching canoes and kayaks, using off-road vehicles and wading in streams can damage or destroy fish and mussel habitat. These activities, along with livestock accessing watercourses, can crush freshwater mussels and/or dislodging them from their habitat.



Excluding livestock from watercourses can help prevent streambank erosion and protect SAR. For technical expertise on exclusion fencing, water crossings and alternate watering systems contact stewardship@ltvca.ca.



Cover photo credits: Philippe Blais (Hickorynut), DFO (Lilliput), Vicki McKay (Snuffbox), Todd Morris (Rainbow), Joachim S. Mueller (Spotted Gar), Todd Stailey (Lake Sturgeon), Shawn Staton (Northern Riffleshell) and Brian Zimmerman (Lake Chubsucker, Silver Chub and Warmouth).



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Lower Thames Valley Conservation Authority
100 Thames Street, Chatham, ON, N7L 2Y8
www.ltvca.ca | 519-354-7310