



CHAPTER 10 – INVASIVE SPECIES

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In the 2018 Muskoka Watershed Report Card, we listed nine invasive species of concern in the Muskoka watersheds. Those species are still here and still proving damaging to our environment. One feature of invasives is that they are particularly difficult to eradicate once they have established themselves in a new location.

An invasive species is a non-native species which has dispersed, or been introduced, to a region and which is damaging to the continued well-being of at least some native species present there. Invasives are mostly introduced to new regions through human activity, intentionally or otherwise, and many aquatic invasives in Ontario have arrived here from Europe or western Asia via ballast water transported by commercial vessels that enter the Great Lakes. Many terrestrial invasives are small species easily transported unintentionally by road. Many species arrive and some become established, but to be called an invasive they must also out-compete, be an effective predator of, or in other ways damage native species they come in contact with.

Invasive species pose a particular threat to the Muskoka region because of the popularity of outdoor recreation making use of its natural environment. Increased tourist traffic and recreational activities such as boating, off-roading, and hiking act as potential pathways heightening the risk of introduction or spread of invasive species. In addition, since aquatic invasive species are frequently spread initially via ballast water from international freighters, parts of Muskoka in proximity to Georgian Bay and Severn River are at a higher risk for aquatic invasive species than some inland lakes.

Beyond their impacts on native species, and therefore on the ecological systems they invade, invasive species can be economically damaging in many ways, and the costs of efforts to remove or control them can be substantial. While we are fortunate that the Zebra mussel cannot occur in the calcium-poor waters of Muskoka, the economic costs of its invasion of the Great Lakes

region, via ballast water from Europe, have been enormous. Its economic impacts in the Great Lakes are due chiefly to the tendency it has to obstruct water intakes vital to many aspects of our industrial economy. It also has deleterious effects on fishery yields. In 2012, the Great Lakes Commission estimated its economic cost at US\$300–\$500 million annually in damages to power plants, water systems, and industrial water intakes in the Great Lakes region. And in 2022, Haubrock et al. calculated that the zebra mussel and its close relative the quagga mussel had a cumulative economic cost across North America since 1980 of US\$49.9 billion. The zebra mussel continues to spread through waterways of North America, and the cost of keeping water intake pipes open and free-flowing continues to grow.

The zebra mussel is not uniquely economically costly. A recent global study by Anna Turbelin and others (2023) reports that the cumulative global economic cost of all invasive species since 1980 (US \$1.2 trillion) is now second only to the cumulative cost of damage due to storms (US \$1.9 trillion), and well ahead of costs for drought (US \$244 billion) or wildfire (US \$138 billion, all costs at 2020). Invasive species have important impacts both on our environment and on our economic well-being.

In the Muskoka watersheds, significant efforts and costs have been expended in attempts to control certain invasive species. *Phragmites* (*Phragmites australis subsp. australis*) is an invasive wetland plant that can out-compete native sedges, grasses, and other plants. It forms dense monocultures and can grow 4.5 metres tall, impeding movement of wildlife and reducing property values as well. It is often seen as small clumps in the drainage ditches along roadways as its seeds are spread on vehicles. From these roadside ditches it can spread into nearby wetlands. *Phragmites* is a well-established invasive, particularly in the western part of the Muskoka watersheds and along the shore of Georgian Bay.

The largest control program in our region has been undertaken by Georgian Bay Forever (GBF) with several partners over the last decade (Carpenter, 2022). Their approach is to cut *Phragmites* stems below the water level thereby drowning and killing the roots. This labor-intensive, but pesticide-free approach has been proving successful. In 2019 GBF developed a 5-year plan to aim for 90% eradication by 2025 of a set of 588 mapped stands. These include 514 sites in Georgian Bay Township and 69 sites in the Township of the Archipelago as well as sites further south. In 2022, all but eight Township of the Archipelago sites, and 65 of the Township of Georgian Bay sites were under treatment (being cut, or already cut and being monitored). GBF is on track to eliminate *Phragmites* from these 588 stands by 2025. The Muskoka Conservancy also regularly mounts volunteer efforts to remove *Phragmites* from wetland areas in the properties it

manages. Such removal, whether by a municipality or by an NGO, is labour-intensive and therefore costly, but there are few alternatives for removing this species.

INVASIVE SPECIES IN OUR WATERSHEDS

The nine invasive species of particular concern in the Muskoka watersheds are listed in Table 16. Each is well distributed in the region, but data on the true distribution of invasives is sparse and biased by the fact that records depend largely on citizens reporting their sightings.

Consequently, reports are more numerous in those parts of the watersheds most frequented by people. For that reason, we do not attempt a quaternary-scale analysis of distribution for this Report Card. The effective management of invasive species, like that of species at risk, depends on sightings being reported. All residents and visitors can help by downloading the relevant app and uploading their sightings of these species.

Table 16. The invasive species of greatest concern in the Muskoka watersheds.

Species Name	How It Got Here	Year First Sighted in Muskoka	Ecological Impacts
Spiny Waterflea	Ballast water of ships from Eurasia; spread through our watersheds on improperly cleaned recreational vessels and fishing gear.	1968	Since their main diet is other zooplankton and they are avoided as food by fish, they reduce food supplies for small fish including juvenile sport fish.
Rusty Crayfish	Introduced from other areas by anglers dumping bait	1975	They compete with native crayfish for food and resources and reduce spawning and nursery habitat for native fish.
Round Goby	Ballast water of ships from Europe	1999	They reduce populations of sport fish by eating their eggs and young and by competing for food sources. They are also linked to outbreaks of botulism type E

Species Name	How It Got Here	Year First Sighted in Muskoka	Ecological Impacts
Rainbow Smelt	Intentional stocking in Michigan	1968	They compete with native fish for food and eat the young of other species. They cause a reduction in native fish species such as yellow perch, walleye, whitefish and lake trout.
Purple Loosestrife	Intentionally introduced as an ornamental garden species	2004	It reduces plant biodiversity, degrades habitat for native birds and insects, clogs irrigation canals, and degrades farmland.
Phragmites	Unknown but native in Eurasia	2001	It decreases native plant biodiversity, provides poor habitat and food supply for wildlife, and increases fire hazards.
Japanese Knotweed	Intentionally introduced as an ornamental species and planted for erosion control	2004	It degrades wildlife habitat, reduces plant biodiversity, and its aggressive root system can break through concrete.
Giant Hogweed	Brought from southwest Asia as a garden ornamental	2009	It shades out native plants and can cause severe skin rash (phytodermatitis).
Eurasian Water Milfoil	International aquarium trade or ballast water of ships	1969	It reduces biodiversity, reduces oxygen levels in water, and its thick mats can hinder recreational activities such as swimming, boating and fishing.

INVADING PATHOGENS ARE INVASIVE SPECIES TOO

In addition to the invasive species in Table 16, several pathogens have arrived in the Muskoka watersheds in recent years. Disease-causing microorganisms are also invasive species, although not readily detectable until they are well-enough established to be causing disease. In many cases, the arrival of novel pathogens appears to be a consequence of climate change: a warmer climate is permitting species to extend their ranges northward.

Lyme disease is caused by one such invading pathogen, the bacterium *Borrelia burgdorferi*. This pathogen is carried by the blacklegged tick *Ixodes scapularis*. A person bitten by an infected tick is at risk for developing Lyme disease. District health units in Ontario are monitoring the spread of blacklegged ticks which are expanding their range northward as climate ameliorates.

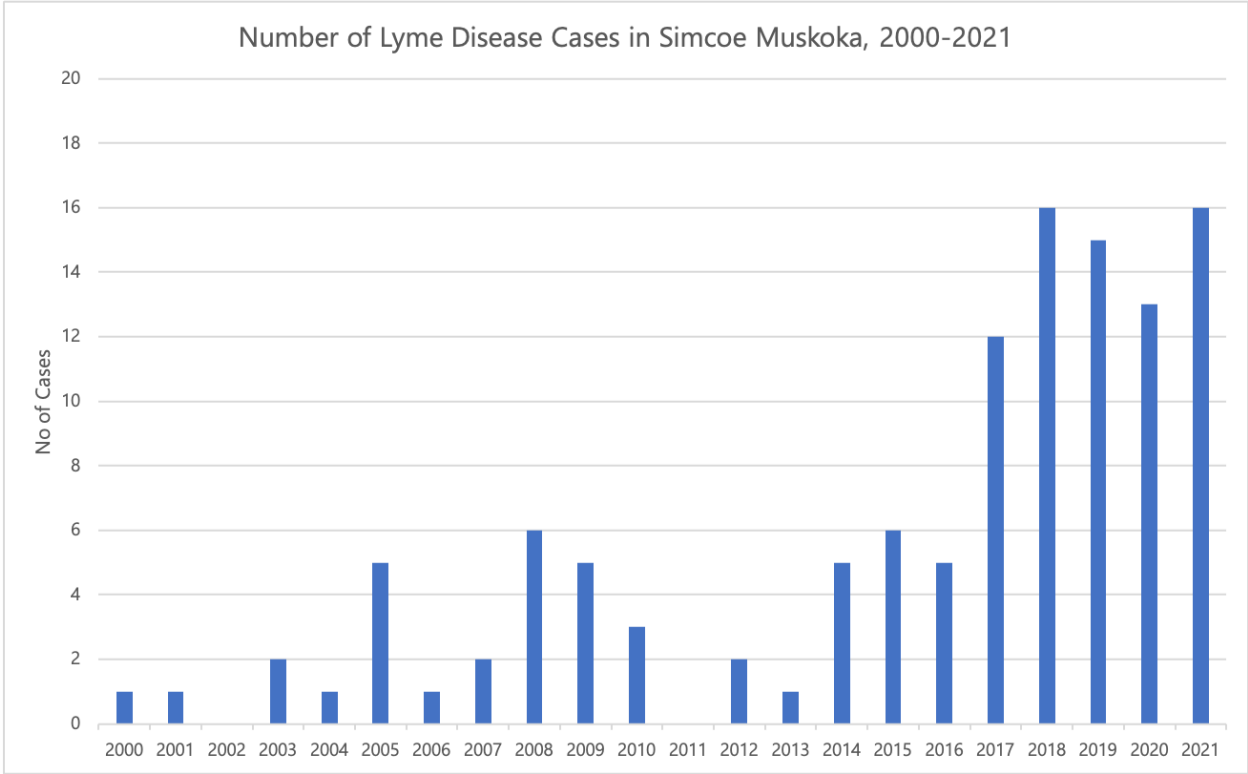


Figure 18. The incidence of reported cases of Lyme disease within Simcoe County and District Municipality of Muskoka. The incidence remains low (3 per 100,000 people per year in 2021) and the great majority of cases are in Simcoe County, but there is a clear trend with the incidence more than doubling since 2016.

Data Source: Integrated Public Health Information System (iPHIS) [2000-2021]. Ontario Ministry of Health, extracted 26 Jul 2022.

Note: Includes confirmed and probable cases. Case definition changed in 2009 and 2015.
<https://www.simcoemuskokahealthstats.org/topics/infectious-diseases/i-p/lyme-disease>

As of 2023, data suggest that Lyme disease has probably now arrived in Muskoka. The Simcoe Muskoka District Health Unit (SMDHU) mostly aggregates the data for the District Municipality of Muskoka (DMM) and Simcoe County, but while the overall incidence remains low (16 cases of Lyme disease, 3 per 100,000 people in 2021), it has more than doubled since 2016 and 36% of

cases appear to have been contracted within this region (Figure 18). The great majority of cases have come from Simcoe County rather than Muskoka and the 2021 Ontario Lyme Disease Map shows only Simcoe County and not District of Muskoka as a 'risk area' for Lyme disease. Because Lyme disease takes up to a month to develop it can be difficult to determine where a person acquired the infection.

If Lyme disease is now entering the Muskoka watersheds, West Nile virus is a pathogen not far behind. West Nile virus is carried by mosquitoes and has a reservoir in bird populations. A mosquito which has fed on an infected bird can deliver the virus to a human. The SMDHU actively tracks cases of West Nile virus, but the incidence is even lower than that for Lyme disease. Apart from 2017, when 7 cases were recorded, the number of cases per year has been three or less since 2002, and many years, including the two most recent, record no cases. The higher incidence in 2017 was believed to be caused by a warm, wet summer which facilitated survival of both mosquitoes and the virus. The SMDHU anticipates that climate change will favour further increases in the prevalence of this pathogen in our region (SMDHU 2022).

HOW SHOULD WE INTERPRET THE OCCURRENCE OF INVASIVE SPECIES IN OUR WATERSHEDS?

Invasive species have been a fact of life for all regions occupied by humans ever since we began to move widely about the planet. At the turn of the 20th Century, European colonists actively introduced species in the belief they would 'improve' the environment. They brought garden plants, songbirds, rabbits, and foxes with them, hoping to make their new colonies a bit more like home. That is why there are rabbits in Australia, starlings in North America, and invasive flowering plants everywhere.

Humans slowly learned that introductions carried enormous economic and ecological risks, but with our global transportation systems in place, we remain the transport vector for the vast majority of long-distance invasions. We also continue to actively introduce, often with the intention of providing a predator or pathogen to control an earlier unfortunate introduction, and sometimes these introductions are themselves problematic. In the Muskoka watersheds there is a constant risk of introduction of invasive fish species by misguided anglers who believe they can improve the fishing by illegally dumping fish into lakes where they do not already occur. There is also the risk of inadvertent introductions by otherwise law-abiding boaters who forget to rinse and clean their boats when moving from one lake to another. These short-distance transport systems provide the final mile ensuring that once an invasive species has got to a region, it can rapidly get to most suitable habitats within that region.

But invasive species rarely improve an ecosystem, and they are one of the major threats to biodiversity as they out-compete native species. Sometimes they can prove substantially costly to control, interfering not only with ecosystem integrity but also with elements of the human economy. They can seldom be eliminated once established, so their costs become a permanent cost for the community.

The Muskoka watersheds have modest numbers of invasive species largely because the region is relatively lightly populated, and because individuals and municipalities have mostly done what they can to avoid introducing and to report sightings of introduced species. The growing intensity of human use of our watersheds increases the risk of invasions if we are careless. On the other hand, the growing number of eyes on the lookout for invasive species across our watersheds enhances our ability to detect invasions early when the chances of successful eradication are greater. We all have a part to play.

Climate change is now altering the rules making it easier for some species to invade and making it more difficult for some native species to resist: a warmer, wetter world does not make life easier and to the same degree for all species. Reducing the risk of invasions is the flip side of caring for species at risk. The more we can act to retain the integrity of our ecosystems by sustaining native species and battling invasives, the healthier our watersheds will be.

WHAT CAN YOU DO?

There are many ways you can help prevent the introduction and spread of invasive species in Muskoka.

When boating or fishing;

- Clean, drain and dry your boat each time you leave a lake.
- Never move live fish from one waterbody to another.
- Never dump your extra bait in the water.

When hiking or camping;

- Stay on the trail and keep your pet on a leash.
- Check your hiking gear at the end of your outing for plants and mud that might be carrying invasive plant seeds.

Buy and burn local firewood

When hunting;

- Inspect equipment and remove aquatic plants, animals, and mud that are attached to decoy lines or anchors.
- Switch to elliptical, bulb shaped, or strap anchors on decoys, which avoid collecting submersed and floating aquatic plants.

When gardening;

- Dispose of invasive plants in the garbage. Do not put them in the compost.
- Buy and plant native plant species from reputable garden suppliers.

Learn to identify invasive species that are a threat to Ontario and report your sightings to EDDMapS (www.eddmaps.org), or contact the Invading Species Hotline at 1-800-563-7711.