

Invasive Alien Species in Nova Scotia

What is an invasive alien species?

An invasive alien species is one introduced outside its normal distribution, whose establishment and spread can affect ecosystems, habitats, or other species.

About species introduction in Nova Scotia

Nova Scotia has a long history of species introductions. Up to a third of the plants in our province are comprised of exotic species introduced by humans — first by First Nations people, then by European settlers, and now by global trade and travel.

Some species were introduced on purpose, such as medicinal plants brought by Acadians and fish introduced for sport, like the smallmouth bass and the chain pickerel.

Some species were introduced by accident. The invasive fungus *Pseudogymnoascus destructans* likely arrived from Europe on the

clothing of an unwitting tourist. The invasive European green crab entered Atlantic Canadian waters via ship ballast.

When species are introduced into a non-native range, only a small fraction becomes established. Of that fraction, an even smaller portion tends to become invasive. However, that small portion can have devastating consequences for biodiversity.

Some invasive species can even directly harm human health. The giant hogweed (*Heracleum mantegazzianum*), for example, can cause skin irritation and severe burns.

Invasive species threaten biodiversity

Invasive species are one of the top three threats to biodiversity worldwide, along with habitat loss and climate change. Invasive species reduce biodiversity by displacing or otherwise harming native species, and, as a consequence, transform native ecosystems.

A large number of native species and ecosystems in Nova Scotia are threatened by invasive organisms. This factsheet discusses a few of them.

Giant hogweed
(*Heracleum
mantegazzianum*)



Marine invasive species

Changes and threats arising from invasive alien species form a critical issue in the marine environment.

International trade and tourism have increased the risk of accidental introduction of invasive species.

25 invasive species have invaded the Gulf of St. Lawrence – 9 arrived only two decades ago

22 introduced or invasive species can be found in the waters of the Scotian Shelf

Marine Invader: European green crab

In the Maritimes, invasion of the aggressive European green crab (*Carcinus maenas*) is considered a significant threat to eelgrass and other components of the intertidal community. The European green crab arrived in Atlantic Canada in the 1980s and has since spread throughout the region. This particular crab is considered an **ecosystem engineer** because of its ability to significantly modify ecosystem structure and dynamics.



Eelgrass (*Zostera marina*) meadows are one of the most productive ecosystems in the world. Like other sea grass, eelgrass provides important nursery grounds for many fish species, as well as habitat and food for invertebrates, fish, and marine mammals. Disturbance of eelgrass has greater ecosystem consequences than equal disturbance of other species that are associated with this ecosystem, and because of the importance of this species in the intertidal community it is considered an **ecologically significant species**. An experiment in Newfoundland showed that removal of eelgrass resulted in an 80 per cent decline in fish abundance and biomass.

Status and Trends: Eelgrass Ecosystems

- ▶ In 2001 and 2002, several estuaries along the Nova Scotia coast of the Gulf of St. Lawrence, including the estuary at Antigonish Harbour, experienced **significant declines** of eelgrass. The declines have been attributed to the European green crab, which was first detected in the southern Gulf of St. Lawrence in the mid-1990s.
- ▶ At Antigonish Harbour, a 50 per cent decline in migrant Canada geese (*Branta canadensis*) and common goldeneye (*Bucephala clangula*) followed a **95 per cent decline** in eelgrass. Canada geese feed directly on eelgrass, while common golden-eye eat invertebrates associated with eelgrass. Both birds have historically used the Antigonish estuary as a staging area.
- ▶ The Little Port Joli estuary at Kejimikujik Seaside Adjunct has experienced more than a **98 per cent decline** in eelgrass since 1987, as a result of green crab invasion in the area. Neighbouring St. Catherine's estuary lost all of its eelgrass by 2001, and has yet to begin recovering from this loss. In 2010, Parks Canada began culling green crab populations from the Little Port Joli estuary. After three years of fishing to reduce green crab numbers, the population of eelgrass **increased to 20 per cent** of its 1987 population size.

Freshwater Invaders: smallmouth bass and chain pickerel

Smallmouth bass (*Micropterus dolomieu*) were legally introduced to a handful of Nova Scotian lakes in the 1940s; since then, they have spread into at least 188 lakes and rivers. Chain pickerel (*Esox niger*) were illegally introduced into three lakes in 1945 and are now in at least 95 lakes. Both have spread either through further intentional introduction between watersheds or via natural dispersal within watersheds.



Smallmouth bass and chain pickerel transform freshwater ecosystems by occupying the niche of top fish predator. Although smallmouth bass is a favourite of anglers, it directly consumes small-bodied fish or out-competes them for food. Chain pickerel and smallmouth bass rapidly displace native speckled trout (*Salvelinus fontinalis*), along with other species favoured by sport fishers. Chain pickerel is a voracious predator, and few soft-bodied fish can co-exist with this species. Besides its effect on fish populations, the ecological changes caused by chain pickerel could negatively impact birds and mammals, such as mergansers, cormorants, kingfishers, eagles, mink, and otter.

Think of the Speckled trout!

Chain pickerel and smallmouth bass are important recreational fish for the province. But what impact do they have on native ecosystems and species like the speckled trout? The speckled trout – a native species highly prized for sportfishing – is being displaced by chain pickerel and smallmouth bass. We must stop the illegal transfers of chain pickerel and smallmouth bass if we want to maintain populations of speckled trout and other native species.

Status and Trends: spread of freshwater invaders

- ▶ Smallmouth bass spread into about 10 new lakes each year, while chain pickerel claim about 5 lakes per year.

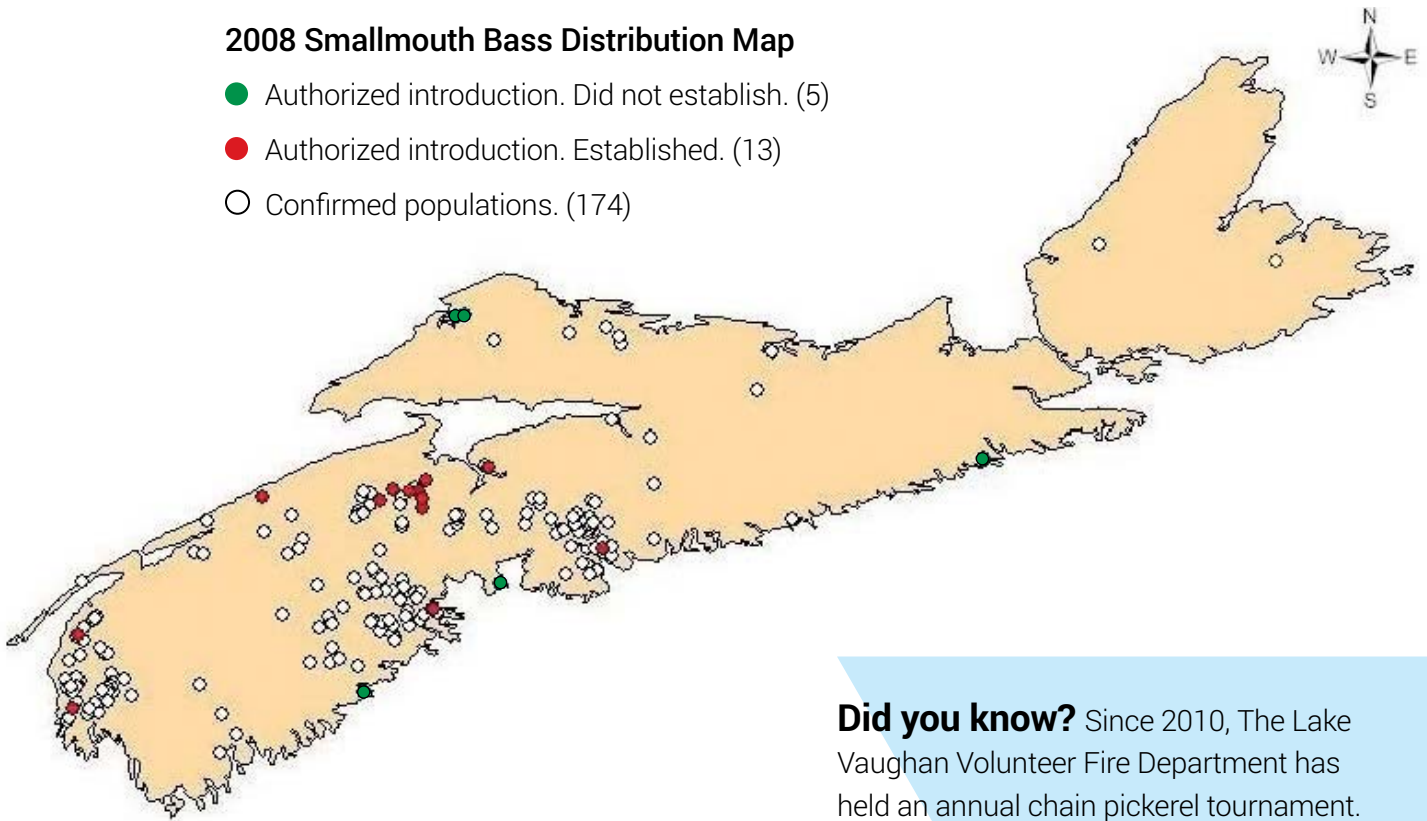
Accurate identification of the number and location of lakes these species have invaded is limited. Lakes that presently report to contain pickerel and smallmouth are likely five years behind what the actual current distribution is. This is due to the number of stages these fish must go through before they can be caught and then reported. Furthermore, capacity to investigate every angler report of smallmouth bass or chain pickerel is limited, and likely contributes to underestimation of the number and location of lakes that have been invaded.

- ▶ In 2013, chain pickerel were detected in the Petite Rivière Lakes, which contain the only population of Atlantic whitefish (*Coregonus huntsmani*) in the world. An emergency mitigation strategy was proposed soon after the discovery, and actions are being taken by governmental and non-governmental organizations to further protect the endangered Atlantic whitefish.

- ▶ Despite stewardship and education, smallmouth bass and chain pickerel continue to spread through illegal transfers between watersheds.

2008 Smallmouth Bass Distribution Map

- Authorized introduction. Did not establish. (5)
- Authorized introduction. Established. (13)
- Confirmed populations. (174)



Did you know? Since 2010, The Lake Vaughan Volunteer Fire Department has held an annual chain pickerel tournament. Besides helping raise awareness about the chain pickerel invasion in the Tusket Falls area, the tournament raises funds that go towards paying for the fire department's new pumper truck.

Fungus Invader: deadly to bats

White-nose syndrome, caused by the invasive fungus *Pseudogymnoascus destructans*, has all but decimated cave hibernating bats in Nova Scotia and much of eastern North America. The fungus interferes with hibernation by forcing bats to awaken too early. Unable to find food, the bats quickly use up bodily fat reserves and die of starvation and exposure. The fungus manifests itself as white “fuzz” on the wings and around the noses of the bats – hence the name white-nose syndrome. The fungus is native to Europe, where it does not seem to affect native bats.



Status and Trends:

Bat populations

► Since being identified in Nova Scotia just four years ago, white-nose syndrome has already killed **90 to 95 per cent** of mainland Nova Scotia’s tri-coloured bat, northern long-eared myotis, and little brown myotis populations. All three bat species are now listed as endangered, and are protected under the Nova Scotia Endangered Species Act. Significant mortality has also been observed in the provinces of New Brunswick, Quebec, and Ontario.

► In August 2013, the Government of Nova Scotia and the Mersey Tobeatic Research Institute launched the **Nova Scotia Bat Conservation Program** to encourage the public to help track bat population and health in the province. The program allows Nova Scotians to report bat sightings either through a telephone hotline or an online reporting form. In three years almost 2000 unique bat sightings have been reported.

► Surveys by the Department of Natural Resources indicate that small numbers of bats may persist in atypical non-cave habitats. This provides a slight ray of hope for bats. Even if some bats survive or a cure for the disease is found it would take many decades for bats to recover as they have very slow reproductive rates.

Plant Invaders: giant hogweed and garlic mustard

Nova Scotia's long history of settlement has resulted in a long line of exotic plant introductions, some of which are invasive. Some of these were introduced intentionally for medicinal use, for food, or as an ornamental.

One such example is the giant hogweed (*Heracleum mantegazzianum*). Originally from Asia, it was introduced into North America for ornamental purposes. Direct contact with the plant's sap can cause severe burns of the skin and eyes, and can even result in blindness.

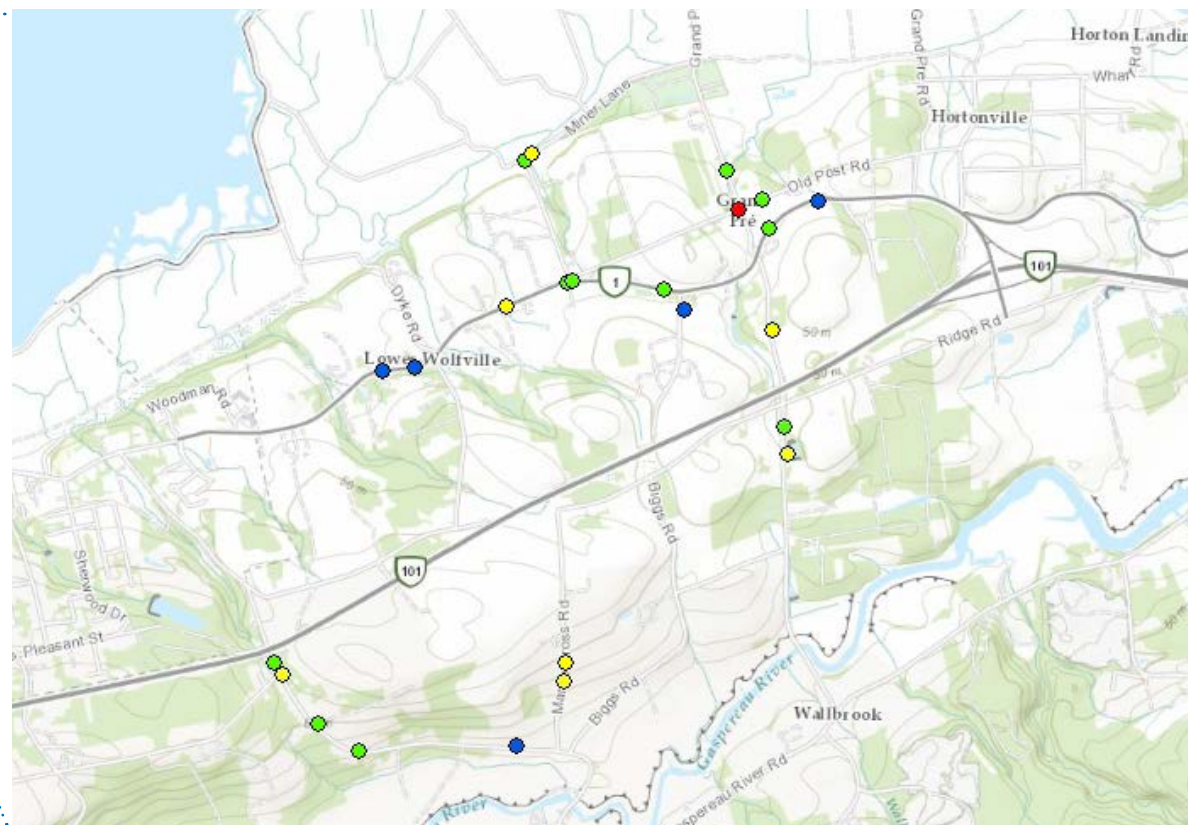
Garlic mustard (*Alliaria petiolata*) was also introduced intentionally into North America, specifically for use as a culinary herb. It has since become an aggressive forest invader. Garlic mustard produces chemicals that inhibit the growth of native forest trees, and as a result can alter forest community composition. This can have significant consequences for forest biodiversity.

Status and Trends: Invasive Flora

- ▶ As of 2008, **333 invasive alien plants** have been identified in Nova Scotia by the Canadian Food Inspection Agency.
- ▶ In the 1980s giant hogweed was identified only in Baddeck in Cape Breton Island, but has since spread throughout the province.
- ▶ Garlic mustard was reported from only one site in the province — Grand-Pré in the Annapolis Valley, in 2002. Since then, the invasive plant has been reported in the Grand-Pré National Historic Site, Hantsport, Kentville, Canning, Port Williams, and Truro.
- ▶ Nova Scotia's Agricultural Weed Control Act deals with invasive alien plants and came into effect in 1967 to specifically protect agricultural land from noxious weeds. Currently, 10 noxious weeds are regulated by this act.

2016 Garlic Mustard Distribution Map

- Original collection
- Year 1 distribution
- Year 2 distribution
- Year 3 distribution



Key Findings

Inventory and monitoring of invasive species

Gaps exist: Invasive species pose a serious and widespread threat to biodiversity and options to coordinate the varied efforts to inventory and monitor invasive organisms in the province are being considered.

A coordinated, province-wide program would enhance capacity to investigate reports of invasive species such as chain pickerel and smallmouth bass.

The current status and trend of **inventory and monitoring** is:



Status impaired
Trend baseline

Control of invasive species through legislative tools

Gaps exist: While there is no overall invasive species legislation, the province has an Agricultural Weed Control Act which protects agricultural land from noxious weeds. Additionally, a 2013 addition to the Fisheries and Coastal Resources Act now makes it difficult to move invasive fish species to new watersheds.

The current status and trend of **control through legislative tools** is:



Status impaired
Trend baseline

Illegal transfer and movement of invasive species



Despite existing stewardship and education programs, illegal transfer and movements of certain invasive species, such as smallmouth bass and chain pickerel, continue.

The current status and trend of **illegal transfer and movement** is:



Status impaired
Trend deteriorating
Data confidence: low to medium

Status and Trend Symbols

-  Status healthy
-  Status concerning
-  Status impaired
-  Status undefined
-  Trend improving
-  Trend baseline
-  Trend deteriorating
-  Trend no change

Therefore this symbol means

-  Status impaired / Trend baseline