



# **DRAFT:**

## Ontario Invasive Species Strategic Plan

For Review

Ontario 

# Draft Ontario Invasive Species Strategic Plan (2025)

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# Introduction

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Invasive species affect us all. They threaten the natural environment, the economy, and the well-being of the people who live in Ontario and their resiliency.

Invasive species are a main cause of biodiversity loss in Ontario and around the world. Ontario's commitment to protecting nature recognizes that healthy, biodiverse ecosystems are essential to our health, well-being, and long-term prosperity. These ecosystems deliver essential environmental, economic, and social benefits. These benefits include clean air, water and soil, food, shelter, protection from natural hazards and extreme weather, raw materials and cultural and recreational opportunities.

Invasive species are a complicated issue. By investing in the maintenance and enhancement of resilient ecosystems and taking coordinated action against invasive species, we are protecting communities and securing a sustainable future for generations to come in Ontario.

## About the Strategic Plan

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The Ontario Invasive Species Strategic Plan (2025) (the Strategic Plan) provides policy direction and commitments to protect Ontario from the impacts of invasive species, with a focus on prevention as the most beneficial and cost-effective solution.

The Strategic Plan includes putting people first by supporting communities and ensuring that they have access to knowledge and tools to minimize the introduction and spread of invasive species.

Achieving an ambitious vision requires collaboration and contributions from all of society. The Strategic Plan is intended to inspire all levels of government, Indigenous communities and organizations, the private sector, groups and individuals to take actions that prevent and manage invasive species impacts.

## **Building on past success**

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The Strategic Plan builds on the solid foundation established by the [first Strategic Plan](#) released in 2012 and the achievements of the past decade, as highlighted in the [Ontario Invasive Species Strategic Plan: Review of Progress 2012-2022](#).

Valuable lessons have been learned about managing invasive species since the first plan was released. This updated version reflects an improved understanding about the growing risks associated with invasive species and incorporates the best available science. The new vision, updated goals and priority actions are necessary to safeguard Ontario from the impacts of invasive species and protect the economy and the well-being of people who live here.

## **Invasive species in Ontario**

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***Invasive species are plants, animals and other organisms that are not native to the province or an area of the province and whose introduction or spread harms or is likely to harm the natural environment, society, or economy.***

The diverse economy, growing population and geographic location of Ontario, puts the province at heightened risk of new and expanding invasive species. Ontario has had more invasive species establish within its borders than any other province or territory in Canada. Their impacts are complex, costing as much as \$3.6 billion annually. Actions to prevent and manage invasive species in the province are necessary to protect our strong economy and communities that depend on it.

## **Invasive species and the natural environment**

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Invasive species negatively impact the natural environment by causing local and even global species extinctions, creating soil degradation and erosion and altering forest fire cycles. They compete with native species for essential resources such as space, light, water and food. Some also prey on native species or transmit diseases and parasites. These impacts threaten the survival of native species, leading to biodiversity loss.

Biodiversity loss, including plants and trees, can result in less shade for forest plants, reduced nutrients for microorganisms and cascading effects on terrestrial and

aquatic ecosystems. It also disrupts critical ecosystem services, such as clean air, flood control and erosion prevention.

## **Invasive species and the economy**

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The financial costs of invasive species are massive and rising with global economic losses (over \$1 trillion collectively over a 40-year period) that are similar in magnitude to those of natural hazards, including storms, earthquakes and floods.

In Ontario alone, the estimated economic impacts of invasive species are approximately [\\$3.6 billion annually and rising](#). Ontario municipalities and conservation authorities spend more than \$50 million every year to control invasive species. Many of the sectors that underpin our economy face serious financial impacts caused by invasive species, like tourism and recreation, agriculture, fisheries and forestry. The total economic toll of invasive species is doubling every six years, and many impacts cannot be monetized - for example, the value of an extinct species or ecological services that are reduced or eliminated.

By controlling the introduction and spread of new invasive species and managing those already established, we can help protect our competitive, resilient and self-reliant economy. Supporting and investing in invasive species control and restoration efforts can help create jobs and stimulate economies, such as planning, research, innovation, conservation, consulting, as well as landscape and construction activities.

## **Invasive Species and Fisheries**

Ontario is home to more than 250,000 lakes and 490,000 kilometers of rivers. These vast biodiverse aquatic areas provide anglers with extensive fishing opportunities that are culturally, socially and economically significant to the people in the province. However, these valuable ecosystems and activities are under threat from aquatic invasive species. Their impacts can be widespread leading to decreased revenues for businesses, such as aquaculture, recreational fisheries and tourism. Additionally, costs associated with invasive species surveillance, monitoring and control activities are substantial.

### **Invasive Carp**

Species such as invasive carp, a term which describes four invasive species of fish - Black, Bighead, Grass and Silver Carps - would have serious harmful impacts if introduced and established in Ontario waters. In the United States, invasive carp have already replaced native species in areas of the Mississippi River and its tributaries. Invasive carp reproduce quickly and outcompete native fish by eating their food supply and crowding them out of their natural habitat. A decline in native fish populations would have serious adverse effects on commercial, recreational and culturally significant fishing in Ontario. It is estimated that the introduction of Grass Carp would cost Canadian Great Lakes commercial fisheries \$244 million in 10 years and \$1.3 billion in a further 40 years. Its impacts on the \$1.7 billion provincial recreational fishery could be as high as \$345 million in 10 years and \$2.6 billion in 40 years. The establishment of invasive carp in the Great Lakes would also significantly affect other sectors, including recreational boating, use of lakefront and beach areas and wildlife viewing.

## **Invasive Species and Forestry**

Invasive species threaten the important ecological services, social well-being and economic benefits provided by forests and urban trees. Ontario has over 70 million hectares of forest – 2% of the world's forest and 20% of Canada's forests – contributing \$4.4 billion to the provincial Gross Domestic Product and more than 145,000 jobs. Invasive species outbreaks can reduce wood supply costing forest companies heavily and impacting the communities that rely on them. In Canada, it is estimated that \$165 million could have been saved annually by preventing the introduction and establishment of four high profile invasive forest insects and diseases (Asian longhorn beetle, emerald ash borer, Sirex wood wasp and sudden oak death disease) and over \$34 million could be saved annually by preventing the establishment of just one new invasive species.

### **Mountain Pine Beetle**

Mountain pine beetle is a small bark beetle that relies on a host tree, preferably native lodgepole pine trees, to feed and lay its eggs. An outbreak of mountain pine beetle is ongoing in British Columbia and Alberta where the ecological value of millions of hectares of forest has been impacted. British Columbia's forestry industry has suffered more than \$57 billion in losses. Alberta has invested more than \$450 million in curbing the beetle's eastern spread.

If introduced and established, mountain pine beetle would devastate the boreal forests causing huge losses in biodiversity, wildlife habitat and impacts to watershed management. Economic damages to the forest industry related businesses would be significant. Preventing mountain pine beetle from becoming established in Ontario is the most effective way to manage it. Mountain pine beetle is regulated under the Invasive Species Act, 2015. Prohibitions are in place to avoid spreading mountain pine beetle in the province and to protect the expansive forest landscapes.

### **Invasive Species and Agriculture**

Agriculture and the agri-food sector are important components of the economy and environment in Ontario. The province is home to more than half of the highest quality farmland in Canada, with an agri-food sector that contributes more than \$45 billion annually to the provincial economy and provides more than 800,000 jobs. Invasive animals, plants and pathogens pose a persistent and growing threat to these sectors by causing significant losses in crop yields and added expenses for farmers (for example, by increasing the need for pesticides). The annual economic impact of invasive species to agriculture in Canada is significant - estimated at \$2.2 billion.

## **Spotted Lanternfly**

Spotted lanternfly is an invasive insect that feeds on economically important plants, including grape vines, tender fruits, apples and maple trees. Although spotted lanternfly has not yet spread to Ontario, it is established in areas of the United States, including neighbouring New York state. In Pennsylvania, where the species was first established in North America, impacts on the agricultural industry have been significant – costing over \$40 million (primarily to grape growers). The species spreads readily over long distances by hitchhiking or laying eggs on vehicles and products transported between jurisdictions. This puts the province's agricultural economy, particularly our \$5.9 billion wine, \$43 million tender fruit and \$60 million apple industries, at heightened risk.

## **Invasive Species and Recreation and Tourism**

Invasive species affect the well-being and ability of the people who live in Ontario to enjoy wildlife viewing, shoreline properties and recreation activities such as swimming, boating, fishing and hunting. They can also impact tourism by reducing navigability of lakes and rivers and a loss of ecosystem values that support water filtration and regulation, resiliency to climate change, disease prevention, biodiversity protection and can cause a decline in real estate property values. Invasive species would have significant impacts on Ontario's strong tourism sector which contributes more than \$34 billion in annual GDP and generates 360,000 jobs.

## **Invasive Phragmites**

*Phragmites australis* (Phragmites) is a non-native, invasive perennial grass that grows in wetlands and along roads. It is aggressive, out-competing native plants and reducing biodiversity. Invasive *Phragmites* negatively impacts tourism, recreation, agriculture and even property values. It can impact wildlife habitat and movement, ecosystem services of wetlands through the blockage of water, road safety and increases fire hazards due to the large amount of dry dead stalks.

Ontario is taking strong action to address the ecological and economic impacts of invasive *Phragmites*. Ontario regulated *Phragmites* as a restricted species under the *Invasive Species Act, 2015* in 2016 and works in partnership with the Long Point Phragmites Action Alliance, Nature Conservancy of Canada, Canadian Wildlife Service and others to develop new approaches to control the species. For example, Ontario has invested in integrated approaches to manage invasive Phragmites, including chemical, mechanical and biological control options. To date, close to 2,000 hectares of invasive *Phragmites* have been successfully controlled on both private and Crown land, and native plants and wildlife are returning.

Ontario is building on this success by working with key partners to expand this work across the province and support communities and organizations working to control invasive *Phragmites*. With Ontario's \$11 million investment in 2024, over three years to the Invasive Phragmites Control Fund, the province is partnering with the Nature Conservancy of Canada and the Invasive Species Centre to help municipalities, Indigenous communities and organizations and others to restore wetlands, protect vital infrastructure and protect Ontario's tourism and recreation economy from this invasive plant.

## **Invasive species and society**

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There is a high-risk of invasive species entering the province of Ontario and becoming established. Our industrialized and urbanized society, characterized by high population density and significant local and global mobility, increases the likelihood of introduction.

Geographically, Ontario's proximity to the Great Lakes- St. Lawrence Seaway – a major international shipping channel – and multiple land and water entry points along its borders further heightens these risks. Economically, the province's large volume of imports and significant goods-producing industry provide numerous opportunities for invasive species to enter. When ecological regions, habitats and ecosystems are degraded, they become more vulnerable to any invasions.

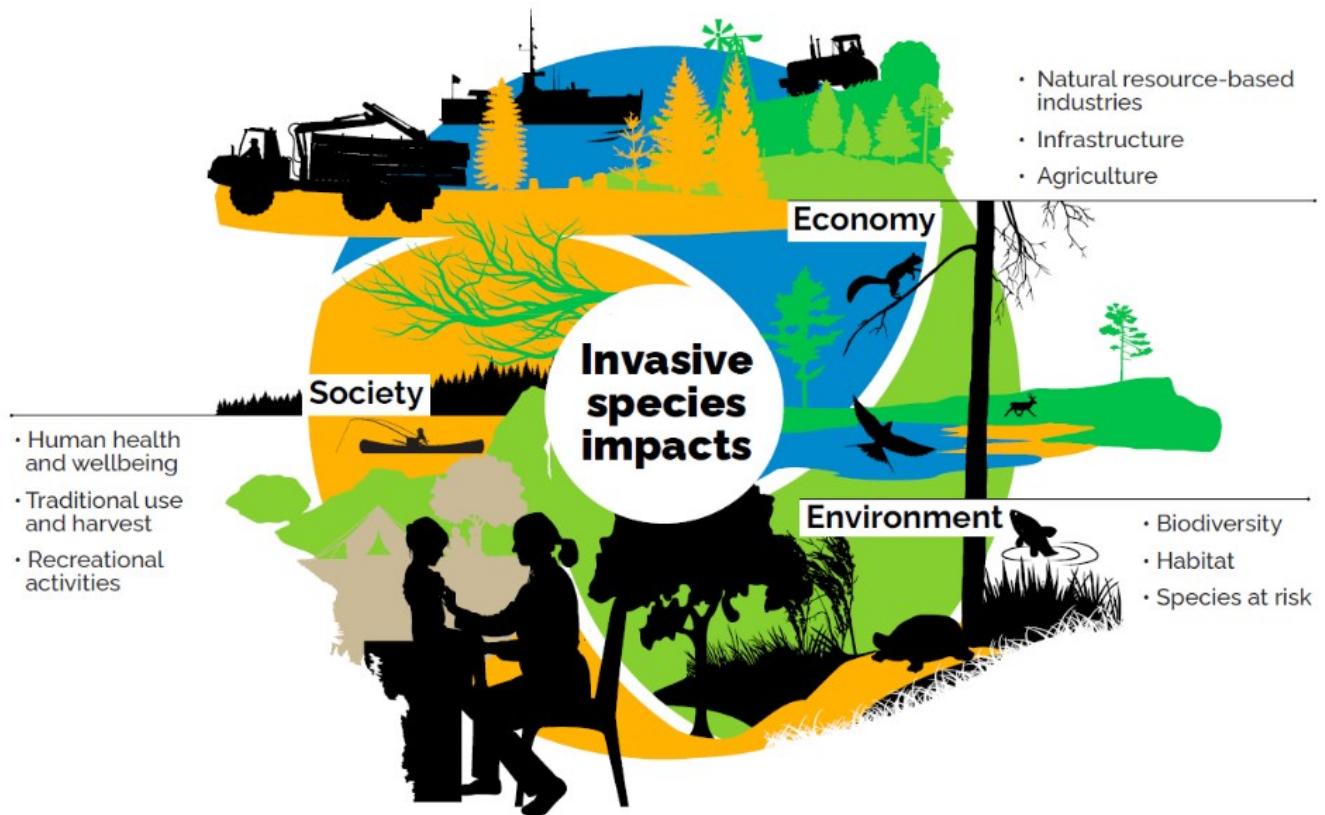
Invasive species can cause multiple negative impacts to society, including reduced access to waterbodies for recreational and traditional harvesting opportunities, damage to irrigation infrastructure for agriculture and risks to human health due to an increase in the spread of pathogens and parasites.

## **Invasive species and climate change**

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Climate change is shifting how we think about invasive species and the ways they spread. Climate change is also causing more frequent and extreme weather events that provide opportunities for invasive species to spread by wind and water. Milder winters and longer growing seasons create favourable conditions for sleeper species (species already here but not yet invasive) and are speeding up the spread of invasive species northward into areas where they previously would not have been able to survive.

Climate change and invasive species are both complex issues. Together they can cause bigger impacts than they would on their own, affecting social, economic and environmental factors. As 'threat-multipliers', climate change and invasive species have the ability to increase the risk or harm associated with pre-existing conditions of a particular ecosystem. Climate change can make ecosystems more vulnerable to invasive species, and invasive species can worsen the impact of climate change.



*Figure 1: Invasive species impacts. Invasive species can cause harm directly or indirectly. They can impact the natural environment, the economy and society, including cultural and Indigenous peoples' traditional relationships with native plants and animals.*

## ***The Invasive Species Act, 2015***

The [\*Invasive Species Act, 2015\*](#) provides authority for the prevention and response powers necessary to address the threat of invasive species to the natural environment, including:

- the ability to ban activities that can introduce or spread certain high risk invasive species (for example, possess, transport, release or deposit, propagate and buy, sell, lease or trade)
- restrictions on carriers of invasive species to address the threat of pathways for introduction and spread
- response actions to address urgent threats
- enforcement measures and inspections to support compliance with prohibitions
- promotion of partnerships and shared accountability for managing invasive species

The tools and regulations under the [\*Invasive Species Act, 2015\*](#) focus on prevention. Preventing the introduction, establishment and spread of invasive species is far more cost effective than managing the species after it has become established. The species listed under the [\*Invasive Species Act, 2015\*](#) present a risk to the natural environment, as shown by a science-based risk assessment process. Ontario continues to evaluate species for future regulatory consideration.

There are two categories of regulated species under the Act, prohibited and restricted species. The prohibited species designation is generally used to prevent species from being introduced to the province. The restricted species designation is generally used for species that are already in the province and are actively being managed to prevent spread.

All high-risk invasive species are important to consider for prevention, detection, response and management. The Strategic Plan applies to all invasive species, not only those that are regulated under the [\*Invasive Species Act, 2015\*](#).

## Are there other ways to think about invasive species?

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The Strategic Plan acknowledges the diverse cultural values and knowledge in Ontario, including different perspectives on invasive species terminology and management. It encourages a variety of approaches to adapt to community-specific needs. Communities and organizations are encouraged to explore approaches that address the risk of invasive species that are based on their legal responsibilities, local and traditional knowledge and perspectives.

While the term 'invasive species' is widely used, alternative wording, such as 'non-local beings', can also apply. Not all non-native species are considered invasive. Many non-native species found in Ontario are benign have become naturalized or provide ecosystem services or cultural and societal benefits. For example, native pollinators like butterflies can use non-native flowers as an important food source.

The potential harm caused by introduced or non-native species may not always be noticeable. Actions that address invasive species and focus on the protection of native species will help to keep ecosystems naturally resilient

# Ontario: A vision for the future

***The natural environment, communities and economy are protected from the harm caused by invasive species.***

Five **goals** will help achieve a vision for the future:

1. **Prevent** introductions and spread of invasive species
2. **Share knowledge** to empower people to minimize introductions and the spread of invasive species.
3. **Detect** and **respond** to invasive species
4. **Manage** invasive species to minimize their impacts
5. **Build resilience** against the harm caused by invasive species

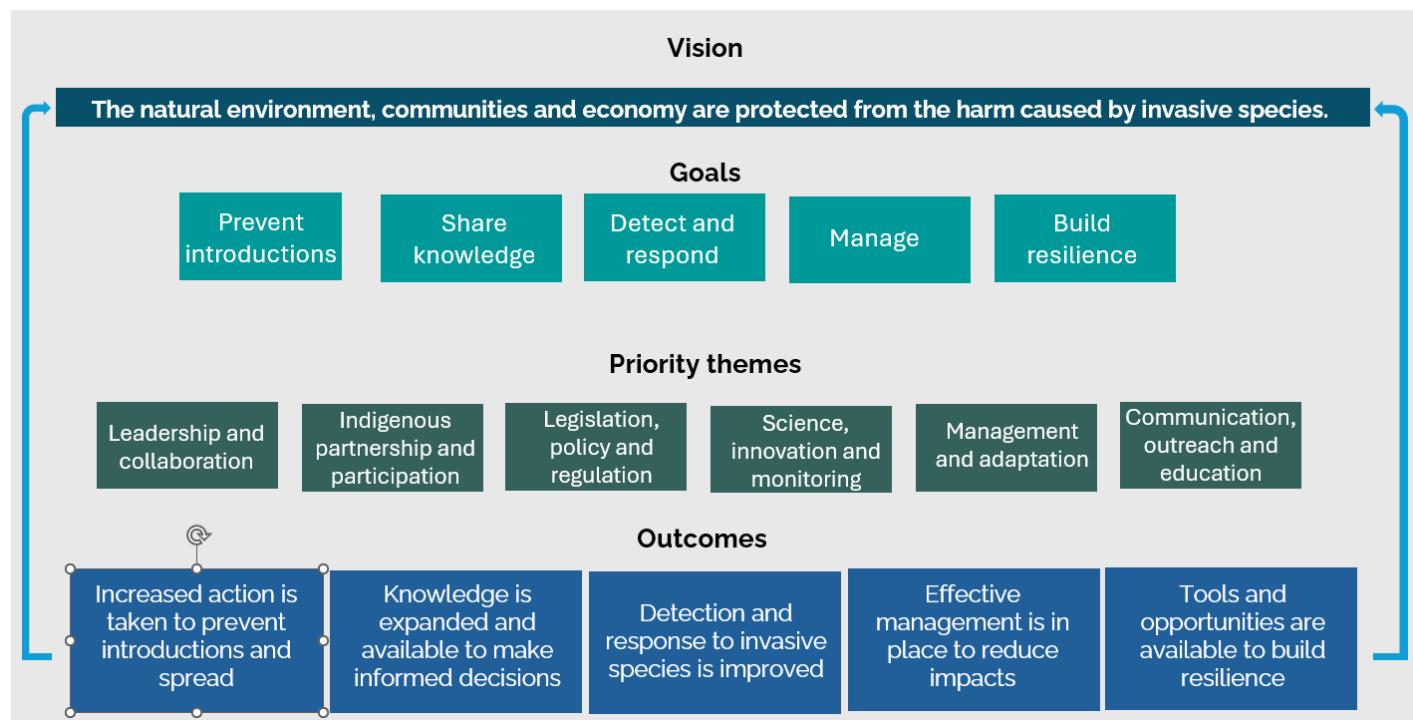


Figure 2. Relationship between vision, goals, themes and outcomes

## Priority actions

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To achieve the vision and goals of the Strategic Plan, priority actions will inspire, empower and direct planning, decision-making and implementation by all levels of government, the private sector, organizations, Indigenous peoples and individuals.

The priority actions are categorized into six themes in Figure 3, including leadership and collaboration; Indigenous partnership and participation; legislation, policy and regulation; science, innovation and monitoring; management and adaptation; and communication, outreach and education.



*Figure 3. Invasive species priority themes*



## 1. Leadership and collaboration

No single government or organization alone can address the spread of, and the harm caused by invasive species – everyone has a role to play in implementing this Strategic Plan.

Successful leadership is characterized by federal and provincial governments overseeing species assessments, legislation, regulatory and funding approaches; groups, including Indigenous communities, non-government organizations and governments undertaking on-the-ground actions; and individuals and businesses making choices to prevent the introduction and spread of invasive species.

In Ontario, multiple government agencies are responsible for invasive species. As such, collaboration and coordination are key to achieving the greatest benefits. Appendix 1 clarifies the roles and responsibilities of different governments for invasive species prevention and management in Ontario.

### ***Leadership and collaboration: Invasive wild pigs***

Many invasive species pose issues that cross geographical borders, economies and interests. This is the case with invasive wild pigs. Invasive wild pigs are not established in the province, and strong coordination within and between governments, and collaboration with key industry and stakeholder partners, is integral to preventing them in the province.

Any pig that is not contained is considered a wild pig. Once established, they are 'ecological train wrecks' because of the extent and magnitude of damage they cause. In addition to impacts to the natural environment, they are a risk to human health and safety and can devastate agricultural industries. They impact almost any crop and pastures, damage equipment and infrastructure, and prey on livestock. One of the most concerning impacts is their potential to transmit disease, including African Swine Fever (not currently in North America, but considered the largest threat to Ontario's \$1.04 billion pork industry). To address this risk, Ontario continues to prevent their establishment by working within and across governments, and with the support of key agricultural and conservation organizations.

## **Priority Actions:**

- 1.1 Coordinate actions among all levels of government, including Indigenous governments and non-government organizations to address high-risk invasive species and pathways.
- 1.2 Articulate roles and responsibilities, leverage expertise and best available science and knowledge, and increase collaboration and capacity across all levels of government.
- 1.3 Enhance and diversify funding opportunities to build capacity to take action.
- 1.4 Protect border crossings against introductions of invasive species by harmonizing efforts across federal and provincial government agencies

## **What do we mean by 'high-risk' invasive species?**

The province uses a [risk-based approach](#) to prioritize prevention and response actions to invasive species. In general, risks to the natural environment, society and the economy are assessed by weighing the likelihood of impacts such as: the likelihood of a species arriving and surviving in the province or an area of the province as well as severity of impacts.

The severity of impacts can be affected by geography. An invasive species may be considered low risk in one area of the province and high-risk in another. For example, the level of risk and magnitude of impacts an invasive species has in undisturbed areas in northern Ontario could be completely different compared to their risk and impacts in more urbanized areas in southern Ontario. Another consideration is the scale of impact, where some invasive species have limited impacts while others cause multiple impacts to biodiversity, tourism, agriculture, human health, etc.



## 2. Indigenous partnership and participation

world-wide.

In Ontario, many Indigenous communities have observed an increase in the prevalence and severity of invasive species across their traditional territories. Invasive species impact traditional ceremonies, practices, cultural sites and sustenance in multiple ways. For example, in some areas of the province invasive *Phragmites* is displacing native medicinal plants used for healing, impacting native species used for traditional crafts and art, and competing with traditional food sources. Similarly, flowering rush and Eurasian water milfoil shade and crowd manoomin (wild rice) - a traditional food source.

Indigenous communities maintain valuable knowledge about the plant and animal species in their surrounding ecosystems. This knowledge, passed down through generations, provides insights into ecological relationships, seasonal changes and habitat dynamics. It enhances the detection, management and prevention of impacts related to invasive species.

### Priority Actions:

- 2.1 Listen to, learn from and grow partnerships with Indigenous peoples, communities and organizations on invasive species as part of Ontario's commitment to support reconciliation.
- 2.2 Undertake meaningful engagement with Indigenous governments, communities and people by providing time, opportunities and support for conversations and knowledge sharing.
- 2.3 Increase capacity for Indigenous innovations, practices and knowledge, including Two-Eyed Seeing approaches, to address invasive species prevention and management.

### What is Two-Eyed Seeing?

Two-Eyed Seeing is described as learning to see from one eye with the strengths of Traditional Ecological Knowledge and ways of knowing, and from the other eye with the strengths of western knowledge and ways of knowing and using both eyes together, for the benefit of all.

### 3. Legislation, policy and regulation



In Ontario, there are various legislative and policy tools to address the complex nature of invasive species. Provincial ([Invasive Species Act, 2015](#), [Fish and Wildlife Conservation Act, 1997](#), [Animal Health Act, 2009](#) and [Crown Forest Sustainability Act, 1994](#)) and federal ([Aquatic Invasive Species Regulations](#) and the [Fisheries Act](#)) legislation and regulations provide legal frameworks that can address the issue of invasive species.

Ontario's [Invasive Species Act, 2015](#) is a cornerstone of provincial invasive species prevention and management, particularly for invasive species that harm the natural environment. The Act provides tools to prevent and control invasive species, such as through prohibitions or restrictions on importing, possessing, depositing, releasing, transporting, breeding/growing, buying, selling, leasing or trading in invasive species.

Regulatory efforts under the [Invasive Species Act, 2015](#) prioritize actions that minimize the introduction and spread of high-risk new species into the province (across provincial boundaries).

#### ***Assessing the risk of invasive species for regulation under the Invasive Species Act, 2015***

Ontario uses a [risk assessment process](#) to help decide which species should be classified under the [Invasive Species Act, 2015](#). The risk-informed process considers the species' biology and dispersal abilities, harm the species is causing or could cause on the natural environment, and cultural, social and economic impacts of the species, as well as climate change considerations. Ontario is committed to using the best available information for risk assessments and works collaboratively to improve and expand knowledge to support planning and decision making, including the consideration of Aboriginal and treaty rights, traditional practices and Traditional Ecological Knowledge.

**Regulation may not always be the right solution:** Regulating invasive species under the Act may effectively prevent new introductions, however, it may not be as effective against species that are already well established in the province. Some invasive species and pathways are more effectively addressed through management, science, education or other approaches.

Ontario's efforts to address international invasive species introductions and spread, including pathways, focus on encouraging strong federal action (Appendix 1) to ensure a consistent national approach.

### **Priority Actions:**

- 3.1 Assess the current and emergent risk of invasive species to identify high-risk invasive species and prioritize actions.
- 3.2 Regulate high-risk invasive species and carriers under relevant legislation, including the *Invasive Species Act, 2015*, for which prohibitions would effectively prevent or manage introduction and spread.
- 3.3 Review and improve policies to ensure current and future invasive species issues are effectively addressed.
- 3.4 Prioritize inspection and enforcement activities to prevent, detect and reduce the spread of invasive species and to promote compliance throughout Ontario under applicable legislation.



## 4. Science, innovation and monitoring

Science, innovation and monitoring underpin invasive species prevention and management. The impacts and management of invasive species are complex and cause complicated issues.

Ongoing surveillance and monitoring can detect new invasive species so that action can be taken to prevent establishment and limit spread. They are critical components of a proactive response. Ontario uses a risk-based approach to prioritize resources for surveillance, research and monitoring of invasive species in the province.

Science can help fill species-specific knowledge gaps, improve surveillance and detection (for example, environmental DNA, also known as eDNA) and advance management (for example, biocontrol). Additional research is needed to understand people's behaviour and attitudes towards invasive species and approaches to prevent their introduction and spread. Moreover, ongoing scientific advancements will continue to inform actions within our complex world influenced by rising human population density, evolving species pathways and climate change.

Increasing our understanding of invasive species within the complexities of today's world requires an integrated approach that values and harmonizes multiple types of knowledge (for example, Indigenous, cultural, and local knowledge and western science) to find solutions for multifaceted invasive species problems. Through a holistic approach, the expertise and ideas of many are integrated to gain a comprehensive understanding of an issue, encompassing its components, interconnections and broader implications.

### **Priority Actions:**

- 4.1 Strengthen invasive species detection by collaborating with partners to promote public participation in reporting and detection.
- 4.2 Assess and improve tools and techniques used to detect and manage invasive species.
- 4.3 Support, invest in and research new solutions to respond to the growing urgency of invasive species prevention in the face of climate change and biodiversity loss.

## 5. Management and adaptation



Ontario has the highest risk of invasive species arriving and becoming established in Canada, with the greatest risk in the densely populated areas in the south. This risk is tied to many factors including our large human population, an economy based on importing goods and our geography with multiple land and water borders.

Management actions help prevent, detect and respond to invasive species and include measures to restore or enhance the resilience of ecosystems. Ontario uses an adaptive management approach, integrating flexibility to update strategies and response efforts as conditions change or new information emerges. This approach relies on regular monitoring and feedback to anticipate changes, reduce uncertainty and assess the effectiveness of actions.

Natural areas with thriving and diverse native species are better able to cope with disturbances such as invasive species. Integrated pest management approaches use a mix of complementary approaches to address invasive species. For example, integrated initiatives that combine chemical and mechanical invasive species removal along with targeted information sharing and communication efforts are more successful than any single approach.

Ontario's management focus is on species and pathways that fall under provincial jurisdiction and pose the greatest risk. Ontario encourages strong action and collaborates with relevant international jurisdictions and federal agencies. For example, certain management approaches, such as biocontrol, benefit from multi-jurisdictional investments, require rigorous testing, and are highly regulated federally. Ontario's management efforts will continue to have a strong focus on preventing new, high-risk invasive species from arriving and establishing in the province, while also limiting their spread within the province. Unfortunately, eradication is not feasible in every circumstance. For example, efforts to manage established invasive species may more effectively focus on preventing their spread, adapting to their presence and/or reducing their impacts.

### **Priority Actions:**

- 5.1 Promote and invest in management solutions for high-risk invasive species and key pathways of introduction and spread.
- 5.2 Work with provincial and federal regulatory agencies to streamline authorization and approval processes for activities to control invasive species.
- 5.3 Collaborate and invest in responsible control options, including mechanical, biological and chemical methods.

- 5.4 Promote and support investments in the development and implementation of regional and local invasive species plans.
- 5.5 Enhance ecosystem resilience to the impacts of invasive species through research, restoration and other conservation efforts.

## 6. Communication, outreach and education



The behaviour changes required to address invasive species are fundamentally driven by recognizing the impacts of invasive species and understanding how humans influence their spread. Communications and outreach efforts are important tools to inspire and encourage organizations, communities and individuals to act. Research indicates that sharing information about invasive species and their pathways through traditional or social media can increase invasive species reporting. To ensure that outreach and education efforts are successful, all involved must play a role, including municipalities, non-government organizations, Indigenous communities and organizations, academics, industry, businesses, stakeholders and individuals. Consistent, long term communication campaigns and educational programming, including the use of best management practices and sharing accessible scientific information are needed to support ongoing surveillance programs, build knowledge and to encourage efforts to lessen the introduction, spread and impacts of invasive species.

### **Priority Actions:**

- 6.1 Expand outreach and education initiatives to reflect the growing urgency, cost and evolving invasive species priorities.
- 6.2 Enhance opportunities for communities and organizations to develop and share consistent messaging on invasive species.
- 6.3 Promote compliance by implementing invasive species communication campaigns and educational programs that are accessible and reflect the cultural diversity of the province.

## Measuring progress

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Continuous learning, monitoring and evaluating are essential to support the ambitious priority actions outlined in this strategy, and to address the complexities of preventing and managing invasive species in Ontario. The Ministry of Natural Resources will continue efforts to track and report on outcomes and progress made towards achieving the Strategic Plan's goals.

As the Strategic Plan is implemented, the Ministry of Natural Resources is committed to working with partners to empower ongoing improvement, coordinated action and information sharing to measure progress and adapt priorities and actions where required. These partners include provincial ministries (for example, Ministry of Environment, Conservation and Parks; Ministry of Transportation; Ministry of Agriculture, Food and Agribusiness), organizations in Ontario, the federal government and other jurisdictions, and Indigenous communities and organizations.

Table 1 in Appendix 3 outlines Strategic Plan outcomes to be used to assess the effectiveness of the Strategic Plan in reaching its intended goals.

## Conclusion: A path forward

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Everyone has a role in protecting the natural environment, our communities and the economy from the threat of invasive species. The renewed Strategic Plan is the foundation for collaborative and coordinated actions that we can take at all levels of government and society to help prevent the introduction of new invasive species, manage established species already here and minimize the harm invasive species can have on our province.

The Strategic Plan builds on past actions and achievements with an emphasis on working collaboratively towards implementing priority actions and committing to the necessary steps to address future risks, including those created by our changing climate.

Key aspects of this Strategic Plan include rigorous policy and legislative tools, a focus on science and Traditional Ecological Knowledge, coordinated actions, fostering new relationships, enhancing resilience in the natural environment, education and communication. In addition, the Strategic Plan highlights the importance of listening to, learning from and empowering leadership, partnerships and coordination with Indigenous peoples in Ontario.

Invasive species threaten many aspects of our environment, quality of life, health and economy in Ontario, but we can address them by working together. The Government of Ontario invites everyone to get involved and commits to working towards achieving this vision where the natural environment, communities and economy are protected from the harm caused by invasive species.

# Appendix 1: Government roles and responsibilities

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All levels of government share the overall responsibility to prevent and manage the spread of invasive species, including federal, provincial and municipal governments. Together they work collaboratively on invasive species prevention and management, while also carrying out their own role within each level of government.

The following descriptions summarize the roles and responsibilities of each level of government that contributes to invasive species prevention and management. The information below is not exhaustive and our understanding and response to invasive species continues to grow.

## **Government of Ontario**

Ontario is responsible for managing the impacts and halting the introduction and spread of invasive species within the province. Many introductions occur from international sources such as introductions across our shared border with the United States of America. Strong coordination and collaboration with federal and bi-national (federal and state) agencies is an important aspect of preventing arrival into the province.

The impacts of invasive species in Ontario are varied and far-reaching, affecting natural environments, agricultural and urban/rural landscapes, human health and the economy. Many provincial ministries have mandates and responsibilities where invasive species and their pathways intersect with their ministry's business.

The summaries below identify the roles and responsibilities of ministries that play a key role in the prevention and management of invasive species in Ontario.

## **Ministry of Natural Resources**

Protecting Ontario's biodiversity while promoting economic opportunities in the resource sector and supporting outdoor recreation opportunities.

Responsibilities related to invasive species include:

- leads provincial ministry for the implementation of the Ontario Invasive Species Strategic Plan and coordination of the Ontario government's approach to invasive species.

- oversees the [\*Invasive Species Act, 2015\*](#), to prevent introductions and respond to invasive species and pathways of introduction that impact the natural environment. The Act provides a suite of tools, including options to regulate high-risk species and their carriers, ban activities that introduce or spread invasive species, response actions and enforcement measures.
- leads the development of risk assessments for high-risk invasive species.
- prevents and manages the introduction and spread of invasive species through activities related to natural resource use and outdoor recreation.
- addresses impacts of invasive species on the natural environment, including biodiversity, forests, fisheries, wildlife, natural heritage, crown lands and waters.
- integrates climate resilience and biodiversity conservation considerations into invasive species management.
- responsible for managing fisheries and working to mitigate the impacts of invasive species on important commercial and recreational fisheries, including overseeing regulation of invasive fish (i.e., under the [\*Fish and Wildlife Conservation Act, 1997\*](#) and federal [\*Fisheries Act\*](#)) and rules for removing invasive aquatic plants (i.e., [\*Public Lands Act\*](#)).
- leads policies and regulations limiting the risk of invasive species introduction and spread through pathways associated with natural resource use (for example, [\*sustainable bait fish management\*](#), [\*sustainable forest management under the Crown Forest Sustainability Act, 1994\*](#), aquaculture and overland transport of watercraft).
- leads policy development and administration of the [\*Fish and Wildlife Conservation Act, 1997\*](#) to support healthy and sustainable populations of native wildlife, including but not limited to restrictions on the import or release of certain wildlife and the ability to take action to prevent or respond to wildlife disease threats.
- provides conservation officer training and awareness relating to invasive species to support provincial inspection and enforcement activities.
- monitors the health of ecosystems (aquatic and terrestrial, including forests) to assess impacts of invasive species on biodiversity.
- conducts scientific research on aquatics, wildlife and forests in the province, including the interaction between invasive species and climate change, biodiversity, forest fire monitoring, pests (insect and disease identification) and remote sensing to inform policy, management, the public and other scientists.
- leads and supports innovative research on invasive species and pathways (for example, overland movement of watercraft), including techniques to enhance surveillance and monitoring and management.
- collaborates with other levels of government and others to respond to high-risk invasive species threatening the natural environment.

- partners with key industries and sectors to collaboratively address pathways of introduction.
- works to advance behavioural change by increasing awareness and education through communications shared on invasive species webpages and social media, and by supporting partners in reporting and outreach campaigns.
- maintains formal partnerships with provincial, federal and international governments to address shared interests in invasive species prevention and management:
  - Co-leads the aquatic invasive species commitments under the [Canada-Ontario Agreement on the Great Lakes Water Quality and Ecosystem Health](#) in partnership with the federal Department of Fisheries and Oceans.
  - [Great Lakes St. Lawrence Governors and Premiers](#).
  - Critical Plant Pest Management Committee with provincial and federal governments to deal with issues respecting invasive terrestrial plant pests that warrant regulatory action.
- invests in non-government partnerships to implement education and on-the-ground invasive species actions (for example, [Invasive Species Action Fund](#), [Invasive Phragmites Control Fund](#) and the [Eastern Habitat Joint Venture](#)).

## **Ministry of Agriculture, Food and Agribusiness**

Helping to create a stronger economy for the province by growing Ontario's agri-food sector and supporting rural communities.

Responsibilities related to invasive species include:

- leads and supports monitoring initiatives, including proactive surveillance of high-risk invasive species that threaten livestock, soil health and crops (for example, field, fruit, vegetable and specialty crops).
- prevents, detects and responds to animal diseases and other potential animal health impacts, including invasive species, through administration of the [Animal Health Act, 2009](#).
- undertakes applied research on approaches to monitor and manage agricultural pests, including invasive species, including working with growers to develop and deliver best management practices, providing important information to relevant audiences about how to identify and manage invasive species on their properties.
- administers the implementation of legislative and regulatory tools, including

but not limited to:

- the [Weed Control Act](#), enabling the control of designated noxious weeds that threaten agricultural production, many of which are invasive plants. Works collaboratively with local weed inspectors to administer and enforce the [Weed Control Act](#) which requires the destruction of noxious weeds that negatively impact agricultural or horticultural lands.
- the [Bees Act](#) with the primary purpose of protecting the health of honey bees from pests and diseases, including invasive species.
- the [Drainage Act](#) which can require drainage maintenance, including the removal of invasive species such as *Phragmites*.
- works with various partners to prevent the establishment of invasive species, including all levels of government, industry, research institutions, stakeholders and growers.

## **Ministry of the Environment, Conservation and Parks**

Protecting Ontario's air, land and water, leading to healthier communities and economic prosperity.

Responsibilities related to invasive species include:

- manages the province's provincial parks and conservation reserves, under the [Provincial Parks and Conservation Reserves Act, 2006](#). Provincial parks and conservation reserves are managed to maintain or restore their ecological integrity, including managing invasive species to reduce their impacts on native species and ecosystems. Site-specific actions to prevent the introduction of invasive species, detection, monitoring and control are undertaken on a case-by-case basis.
- responsible for the administration of the [Pesticides Act](#) which regulates the sale, use, storage, transportation and disposal of pesticides in Ontario.
- responsible for the [Endangered Species Act, 2007](#), which provides for the protection and recovery of species at risk, including actions that address the risk of invasive species when identified as a threat to species at risk and their habitat. For example, actions to prevent and manage invasive species may be enabled through provincial species at risk authorizations and registrations and the [Species at Risk Stewardship Program](#).
- directs important initiatives to create and restore wetlands in priority areas across the province. This is fulfilled through partner programs and often involves invasive species management (for example, *Phragmites* control).

## **Ministry of Transportation**

Moving people and goods safely, efficiently and sustainably across Ontario to improve quality of life and support a globally competitive economy.

Responsibilities related to invasive species include:

- manages invasive species along provincial highways which are an important pathway facilitating both the introduction and spread of invasive species.
- conducts monitoring and develops best management practices to guide invasive species control (for example, chemical and manual removal), primarily through capital and maintenance contracts.
- invests in research and habitat restoration to strengthen ecosystems against the impacts of invasive species.

The ministries listed above are those primarily addressing the threats from and response to invasive species in the province, however, being such a broad issue, invasive species can also impact other provincial ministries (i.e., Ministry of Health has many existing health programs addressing invasive species affecting human health).

## **Government of Canada**

The federal government leads and coordinates invasive species prevention and response across provinces and territories and manages the spread of invasive species across international borders. The responsibility of invasive species management as well as meeting and reporting on international commitments is integrated across multiple federal departments and agencies. With increasing trade and tourism, the Canada Border Services Agency plays an active role by enforcing the [Customs Act](#), as well as legislations from other federal departments to impede invasive species from entering Canadian ecosystems. Other departments and agencies lead and implement several initiatives to prevent the introduction and spread of invasive species.

The following descriptions outline the roles and responsibilities of federal departments and agencies with a primary role in invasive species prevention and management.

### **Environment and Climate Change Canada**

Protects and conserves Canada's natural heritage, predicts environmental conditions and promotes a sustainable environment for present and future generations.

Responsibilities related to invasive species include:

- federal lead for invasive alien species policy coordination efforts and management in federally protected areas in Canada and responsible for the federal [\*Species at Risk Act\*](#).
- leads development and implementation of strategic biodiversity frameworks for Canada, including [\*Canada's 2030 Nature Strategy\*](#) and international agreements such as the [\*United Nations Convention on Biological Diversity\*](#).
- coordinates a national approach for addressing the risk of invasive species through [\*An Alien Invasive Species Strategy for Canada 2004\*](#) and the Invasive Alien Species National Committee.
- coordinates monitoring and reporting of known invasive species in Canada.
- national lead on the [\*Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act\*](#), which applies to animal and plant species including those whose introduction into Canada could impact native species and their ecosystems.
- federal lead for the [\*Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health\*](#) which supports restoration and protection of the Great Lakes basin ecosystem, including commitments to motivate actions to address invasive species and the [\*Great Lakes Water Quality Agreement\*](#) – an agreement between the United States and Canada to restore and protect the waters of the Great Lakes with commitments on prevention, control and eradication of invasive species.

## **Canadian Food Inspection Agency**

Dedicated to safeguarding food, animals and plants, which enhances the health and well-being of Canada's people, environment and economy.

Responsibilities related to invasive species include:

- lead authority for the protection of terrestrial plant life and the agricultural and forestry sectors of the Canadian economy through prevention, detection, regulation and eradication of federally regulated plant pests, including terrestrial invasive species.
- works to continually improve program design and delivery in animal health and plant resources to minimize and manage risks with a focus on plant pests that are federally regulated and protection of environmental biodiversity.
- establishes and maintains [\*policies and standards for the horticulture industry\*](#) to prevent the introduction and spread of regulated pests into Canada.
- administers and enforces the [\*Plant Protection Act\*](#), [\*Plant Protection Regulations\*](#) and specifically the [\*pests regulated under the authority of the Plant Protection Act\*](#), as well as various [\*directives\*](#) associated with federally-regulated invasive species.

- performs public consultation and develops [risk management documents](#) in-line with the [International Plant Protection Convention](#) and its [International Standards for Phytosanitary Measures](#), which include a summary of findings of pest risk assessments and proposed management processes.
- oversees the Ontario Critical Plant Pest Management Committee and technical subcommittees to develop and deliver species-specific response and management programs. The committee includes participants from Natural Resources Canada, Agriculture/Agrifood Canada, Ontario Ministry of Agriculture, Food and Agribusiness and Ontario Ministry of Natural Resources.
- engages with relevant jurisdictions and networks, including the public on surveillance and outreach.

## **Fisheries and Oceans Canada**

Protects Canada's fisheries, aquatic species and marine and freshwater ecosystems from the negative impacts of humans and aquatic invasive species.

Responsibilities related to aquatic invasive species include:

- administers the [Aquatic Invasive Species Regulations](#) under the [Fisheries Act](#) and coordinates their enforcement with provinces, territories, Canada Border Services Agency, or other Canadian federal departments and agencies (for example, Parks Canada Agency), to help prevent the introduction and spread of aquatic invasive species into Canadian waters, and to help manage them if introduced.
- leads operations to increase early detection and response activities to prevent invasive carps and Sea Lamprey from entering and spreading in Canadian waters of the Great Lakes.
- administers the [Aquatic Invasive Species Prevention Fund](#) to support projects and partnerships focused on on-the-ground preventive actions.
- administers the Aquatic Invasive Species Contribution Program, providing funding to organizations to conduct activities related to outreach and early detection of invasive carp.
- co-leads aquatic invasive species commitments under the [Canada-Ontario Agreement on the Great Lakes Water Quality and Ecosystem Health](#) in partnership with provincial Ministry of Natural Resources.
- delivers the binational Sea Lamprey Control Program in Canadian waters of the Great Lakes and the U.S. portion of Lake Ontario under the Convention on Great Lakes Fisheries, administered by Great Lakes Fishery Commission.
- leads aquatic invasive species management in most tidal waters and federal Crown land not under management of Parks Canada.
- contributes to research to advance knowledge and understanding of the spread, establishment and impacts of invasive species.
- leads the Regional Aquatic Invasive Species Compliance Strategy, including outreach and education and implementing compliance and enforcement priorities related to the [Aquatic Invasive Species Regulations](#).

## **Natural Resources Canada's Canadian Forest Service**

Natural Resources Canada ensures the country's abundant natural resources, including forests, are sustainable and healthy.

The Canadian Forest Service collaborates closely with academia, industry and Canada's provinces and territories to ensure forests are sustainable and healthy.

Responsibilities related to invasive species include:

- leads national efforts to maintain healthy forests by managing native pest disturbances and preventing entry and spread of invasive forest pests into the country, including working internationally to develop and implement standards to address risk of wood packaging as a carrier of invasive species.
- federal lead for implementation of [An Invasive Alien Species Strategy for Canada](#).
- conducts scientific research on Canada's forests, covering climate change, biodiversity, forest fire monitoring, pests (insect and disease identification) and remote sensing to inform forest management planning and policy decisions and to assist forest industry, the public and other scientists.
- provides scientific and technological support on forest pest matters to relevant jurisdictions, including federal agencies such as Canadian Food Inspection Agency and Environment and Climate Change Canada.
- works cooperatively with Ontario and other jurisdictions on matters related to forest health, insects and diseases.

## **Parks Canada**

Protects and presents nationally significant examples of Canada's natural and cultural heritage and fosters public understanding, appreciation and enjoyment in ways that ensure their ecological and commemorative integrity for present and future generations.

Responsibilities related to invasive species include:

- management, monitoring, control, regulation and enforcement of invasive aquatic species, within the lands and waters under its administration (for example, national parks, national marine conservation areas and national historic sites across Canada, including designated historic waterways).
- works collaboratively with partners and leading-edge techniques to protect and restore ecosystems and species at risk from invasive species through prevention, control and habitat restoration.
- leads invasive species monitoring and management, including integrated biological, mechanical and chemical approaches to limit the introduction and spread of invasive species in priority Parks Canada sites.

- encourages collaboration with regional and national partners on communications and outreach campaigns.
- sets management objectives through policy (for example, management, action and adaptation plans) and implements site-specific prohibitions related to priority pathways such as the movement of firewood.
- oversees mitigation measures involving invasive species that impact navigation within national historic waterways and national marine conservation areas in coordination with Department of Fisheries and Oceans and provincial and territorial governments.
- restores ecological communities impacted by invasive species in federally protected areas and relationships with iconic Canadian species, such as salmon and bison, in partnership with Indigenous peoples.

## **Municipal governments**

Municipalities provide important services to meet needs of residents and have a key role in invasive species management and prevention. Invasive species impact municipalities in many ways, including infrastructure, municipal services, ecosystems, human health and safety and the economy.

Responsibilities related to invasive species include:

- manage invasive species that impact community well-being (for example, health and safety) and municipal infrastructure, goods and services.
- develop and implement action plans, strategies and policies to provide strategic direction and guidance to address the issue of invasive species at a local level.
- leverage funds, collaborate and foster relationships with partners to effectively manage invasive species.
- can implement bylaws and regulations under the [\*Municipal Act, 2001\*](#) to address impacts and movement of invasive species in their community.
- understand existing invasive species within municipal boundaries to inform maintenance plans and increase greenspace resilience by planting native and diverse plants.
- educate and engage with the public to help detect, monitor, report and manage invasive species.

## **Conservation Authorities**

Conservation Authorities in Ontario develop and deliver local, watershed-based resource management programs which may include the prevention and management of invasive species, on behalf of the province and municipalities.

Activities related to invasive species may include:

- consider invasive species prevention and management into regional watershed plans.
- restore ecosystems damaged by invasive species to support biodiversity
- track and monitor invasive species in land and water, helping guide management decisions.
- raise awareness and build partnerships through public programs and encourage community action.
- offer advice and technical support to landowners and organizations on managing invasive species.

## Appendix 2: Definitions – common language for collaboration

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Invasive species are complex, and so are the different ways they can create harmful impacts. Dealing with invasive species is a job for all of us including governments, Indigenous Peoples, organizations, practitioners, researchers, businesses, industry, media and the public. Using a common language can help us collaborate more effectively. The following definitions explore invasive species concepts and terms.

### What is an invasive species?

Invasive species are described in many different ways: alien species, exotic species, non-native species, etc. We use the term *invasive species* in this Strategic Plan for simplicity, consistency and its applicability across all taxa.

*Invasive species are plants, animals and other organisms that are not native to the province or an area of the province and whose introduction or spread harms or is likely to harm the natural environment, society, or economy.*

Under the [\*Invasive Species Act, 2015\*](#), invasive species are defined as:

- a species that is not native to Ontario, or to a part of Ontario, and,
  - (a) is harming the natural environment of Ontario or of the part of Ontario in which it is present, or
  - (b) is likely to harm the natural environment of Ontario or of a part of Ontario, regardless of whether it is present in Ontario or in a part of Ontario.

Invasive species can be plants, animals and other organisms, including genetically distinct lineages. An invasive species may be a sub-species, variety of plant, breed of animal, hybrid, fungus, bacteria, or virus. For example, white-nose syndrome is a condition caused by an invasive fungus that is responsible for killing millions of bats in eastern North America, including species at risk.

In some cases, all individuals within a group of closely related species (i.e., genus) may be invasive. Regulating all species within a genus as invasive under the [\*Invasive Species Act, 2015\*](#) is effective when the species share characteristics that make them invasive, and the species are difficult to distinguish.

## What is a forest pest?

A forest pest is an insect or disease, either native or non-native, that severely infests, damages or destroys large areas of healthy forests. Examples of forest pests are spongy moth, spruce budworm, Mountain pine beetle and Dutch elm disease.

## What is a noxious weed?

A noxious weed is a plant species regulated under the [Weed Control Act](#). Noxious weeds are plants that impact agriculture and can include both invasive plant species (for example, non-native species such as Dog strangling vine), as well as native plants (for example, poison ivy). Noxious weeds are difficult to manage on agricultural land and can reduce the yield and quality of crops. They can also harm the health and well-being of livestock and cause health risks to agricultural workers.

## What is a native species?

Different terms can be used to describe what is native (for example, Indigenous or local) or non-native (for example, alien). Native species have adapted over thousands of years, becoming an important part of the local ecosystem. Invasive species do not have a historical geographical distribution in the region or ecosystem that they threaten and may be native to one region of the province and invasive in another.

Many invasive species have become naturalized species in parts of Ontario. Naturalized invasive species are introduced species with self-sustaining populations unlikely to be eradicated that continue to pose a threat to our natural environment, society or economy. Managing naturalized invasive species involves measures to prevent their spread beyond existing ranges, developing techniques to adapt to their presence and finding ways to reduce their impacts.

Many domesticated non-native species exist in the province to support human livelihood and quality of life. These species are typically not considered invasive when they are contained or under human control (for example, pets, gardens and agricultural fields). However, these species can be invasive in the wild. For example, invasive wild pigs wreak havoc in several nations worldwide where they have escaped containment and become established in the wild.

## What is a pathway?

A pathway is a way in which an invasive species can arrive or spread from one geographical location to another, such as Ontario. Pathways occur primarily through human activity but can also occur naturally (Table 2). It can consist of a carrier, such

as a plant, animal or organism capable of being a host to an invasive species, or as a conveyance, such as a boat, bike or car which can move an invasive species from one place to another.

Human activity is the primary driver of invasive species introduction and spread. Common pathways include undetected stowaways in shipping and transportation, contaminated goods, horticultural trade and the escape and release of non-native species. These pathways can be intentional or unintentional, and some species spread through multiple pathways. In some situations, the origin of an introduction remains unknown. Climate change also plays a role, as a warming climate can increase environmental stresses, leading to less resilient ecosystems that are more susceptible to invasion by non-native species.

**Table 2.** Examples of pathways of introduction and spread including both human assisted and natural pathways. \*Not intended to be an exhaustive list.

<b>Human assisted pathways</b>	
<b>Shipping, ballast water and canals</b>	Canals and water diversions; ballast water
<b>Watercraft and watercraft equipment</b>	Movement of aquatic invasive plants, animals and algae from watercraft, including equipment and any vehicle or trailer used to transport them between water bodies
<b>Movement of firewood</b>	Movement of forest pests in firewood, pallets and wood packaging materials
<b>Horticulture</b>	Ornamental plants or associated contaminants (for example, fungus, diseases, critters, seeds from other plants) on plants or in soil escaped or moved from their intended location (for example, gardens)
<b>Trail use</b>	Hitchhiker contaminants on clothing, footwear, gear, vehicles/ATVs, pets, etc.
<b>E-commerce</b>	Selling and purchasing of species online
<b>Movement of soil</b>	Movement of gravel, sediment, topsoil without decontamination
<b>Movement of contaminated organisms</b>	Movement of diseased wildlife parts as a source of introduction of wildlife diseases
<b>Improper disposal of live bait</b>	Dumping bait; bait movement
<b>Pet release</b>	Pet owners releasing pets into a natural environment
<b>Illegal release</b>	Deliberate and intentional release of invasive species
<b>Cultural release</b>	Introduction of invasive species as part of traditional or cultural practices
<b>Natural pathways</b>	
<b>Wind</b>	Gusts of wind can carry and spread seeds, insects or spores of invasive diseases
<b>Currents</b>	Water currents including marine debris

<b>Wildlife</b>	Spores of invasive species or fungus can cling to insects or animal's fur and be spread to new areas
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## What is Traditional Ecological Knowledge?

Traditional Ecological Knowledge is evolving knowledge held by First Nations and Métis peoples, acquired through direct contact with the environment and is unique for every community.

## What do we mean by 'harm'?

Under the [\*Invasive Species Act, 2015\*](#), harm to the natural environment includes any adverse effect to biodiversity or ecological processes or to natural resources and their use.

## Appendix 3:

### Table 1: Goal descriptions and outcome statements

Goals	Description	Outcomes
<b>Prevent</b> introductions and spread of invasive species.	Prevention requires a variety of activities, such as predicting which invasive species are likely to become introduced and survive in the province and how they could arrive. Risk assessments, proactive surveillance, education and regulatory approaches are key parts of preventing introductions and spread.	Increased action is taken to prevent invasive species introductions and spread in Ontario.
<b>Share knowledge</b> to empower people to minimize introductions and spread of invasive species.	Creating and sharing knowledge widely will mobilize and empower communities, industry and individuals to make informed decisions that help prevent the introduction and spread of invasive species.	Knowledge about invasive species is expanded and available to make informed decisions.
<b>Detect</b> and <b>respond</b> to invasive species.	Despite our best efforts to ensure prevention, new introductions and the spread of existing invasive species will occur. In these cases, tools to identify, detect, plan for and respond to invasive species are critical. Swift action may be necessary to prevent establishment depending on the species and pathway of spread.	Detection and response to invasive species is improved through science, collaboration and innovation in Ontario.
<b>Manage</b> invasive species to minimize their impacts.	In Ontario, many invasive species are already widely established, making eradication costly and unfeasible. Targeted adaptive management efforts can reduce impacts to the natural environment, economy and society. In some cases, this may include adapting how we think about, or deal with the invasive species.	Effective management is in place to reduce impacts of invasive species.
<b>Build resilience</b> against the harm caused by invasive species.	Biodiverse ecosystems are less vulnerable to invasive species. Efforts that maintain and improve biodiversity, ecosystem function, structure and processes can improve resistance to invasive species establishment.	Tools and opportunities are available to build ecosystem and community resilience