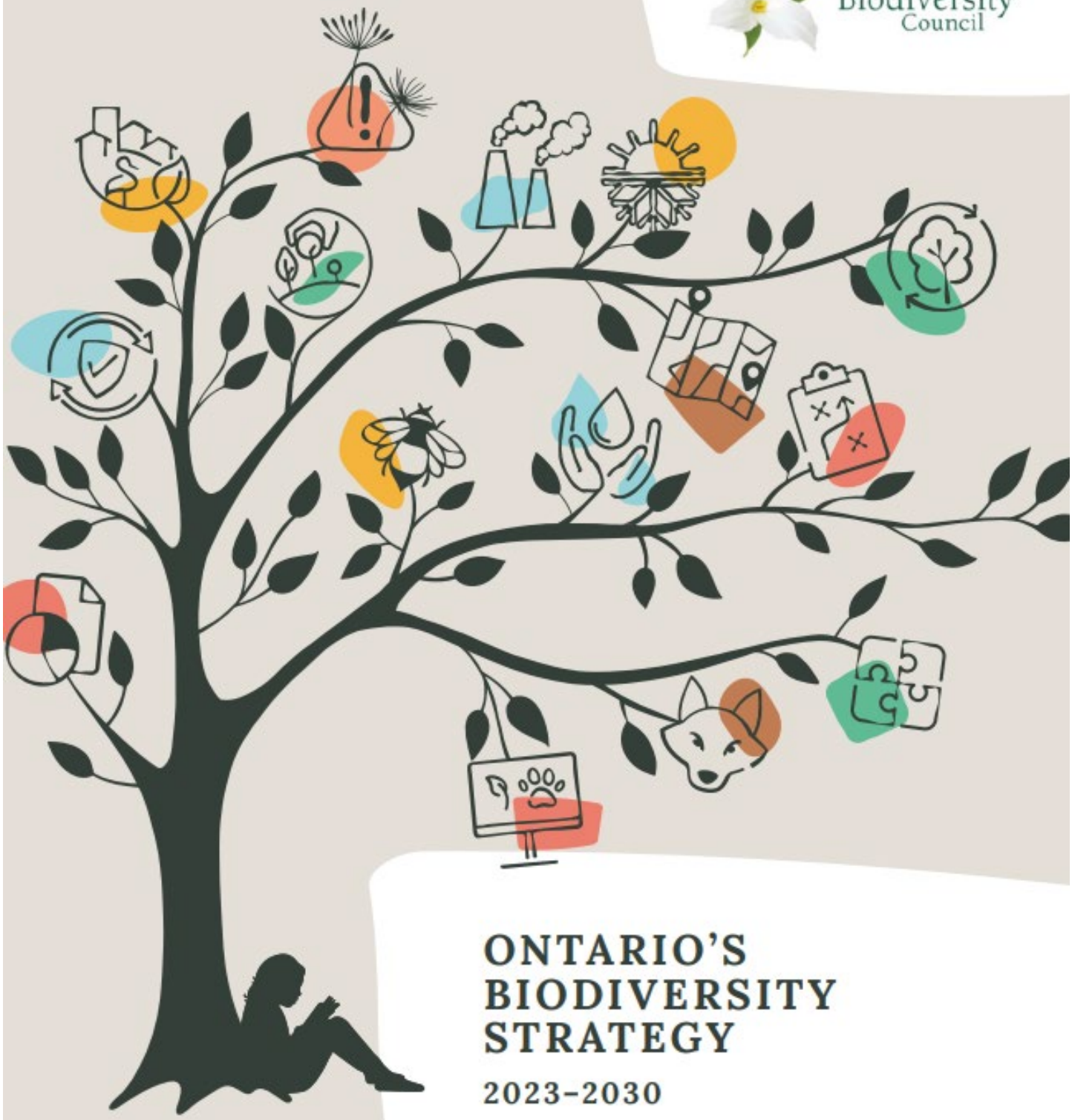
Ontario Biodiversity Council



ONTARIO'S BIODIVERSITY STRATEGY

2023–2030

Summary

Ontario's Biodiversity Strategy (OBS) guides conservation across the province. It's like a 'to-do' list to help us take actions that will benefit biodiversity, address climate change, improve human health, make our communities stronger and safer, and support the economy.

Ontario's Biodiversity Strategy is made up of:

- A **vision, mission** and **goals** that set the context of what the OBS can accomplish and what we hope the future looks like in Ontario.
- **Targets** to explain what we want to achieve. They include ways to measure our progress, and timing for when we want to achieve them.
- **Actions** to outline activities, programs and other work we can do to help meet the targets. Some actions are aimed at specific groups or sectors and others are for all of us.

The Ontario Biodiversity Council leads the implementation of Ontario's Biodiversity Strategy. It's a group of 40+ conservation, academic, Indigenous and industry organizations and government that work together on common biodiversity goals.

This updated strategy builds on the 2005 and 2011 versions and will guide our efforts until 2030.

Everyone has a role to play in conserving biodiversity. We can stop the loss of biodiversity and protect it for future generations if we work together across all sectors to take urgent actions to protect what sustains us.

Ontario's Biodiversity Strategy, 2023 Targets

1. By 2025, sectors have developed action plans in support of Ontario's Biodiversity Strategy and by 2030 those plans are being implemented.

2. By 2025, the capacity for people to conserve biodiversity is increased and by 2030 people are taking action to protect and care for biodiversity in their daily lives.

3. By 2030, biodiversity conservation programs and actions are inclusive, equitable and reflect Indigenous knowledge and diverse perspectives.

4. By 2030, land use planning approaches to maintain and enhance biodiversity, such as natural heritage systems, are implemented at local, regional, and provincial levels.

5. By 2030, the harmful impacts of invasive species on biodiversity are further reduced.

6. By 2030, the release of ecologically damaging pollutants is reduced to a level that is not harmful to biodiversity and ecosystem services.

7. By 2030, the impacts of climate change on biodiversity are minimized and biodiversity is enhanced to support climate mitigation and adaptation.

8. By 2030, Ontario's per-capita resource consumption and waste generation is reduced and is within Ontario's biocapacity limits.

9. By 2025, priority restoration areas are identified and by 2030 efforts are underway to restore biodiversity to at least 30 per cent of priority areas.

10. By 2030, at least 30 per cent of terrestrial and aquatic ecosystems are conserved through well-connected networks of protected areas and conservation lands.

11. By 2030, the conservation of species and ecosystems in Ontario is improved.

12. By 2030, Ontario's biodiversity research, monitoring and reporting framework is improved, accessible and reflects diverse knowledge systems and perspectives.

13. By 2030, biodiversity considerations are integrated into the public and private sectors including through budgeting, funding, investments and financial disclosure.

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Introduction

Biodiversity is the variety of life on Earth. All living things, ourselves included, rely on biodiversity to survive.

Ontario is made up of more than one million square kilometres of land and water and is one of the most biodiverse provinces in Canada. It includes:

- more than 30,000 known species
- more than 250,000 lakes
- 500,000 kilometres of streams
- many different types of habitat in four distinct ecozones, including tundra in the north to Carolinian forests in the south

The natural bounty of plants and animals, land, lakes and rivers, forests and other ecosystems provide us with a healthy environment, clean air, productive soils, nutritious foods, and safe, clean water.

The benefits we get from biodiversity are called ecosystem services and they keep us healthy, help make our homes and families safe from natural disasters like floods, strengthen and feed our communities, and power our economy.

This natural infrastructure also supports our forest, farming, fishing and recreation and tourism industries.

The importance of Indigenous perspectives and leadership

The Ontario Biodiversity Council recognizes that Indigenous Peoples are essential partners in biodiversity conservation and commits to “recognize and respect the contribution of Indigenous and local knowledge to the conservation and sustainable use of biodiversity and ecosystems” (UNEP/IPBES.MI/2/9, Appendix 1, para. 2 [d]).

First Nations, Métis Peoples and Inuit have cared for and depended on biodiversity for thousands of years. Colonization disrupted generations of Indigenous communities, and the tragic impacts of residential schools prevented the transfer of cultural knowledge to

today's young people. Canada's policies and power imbalances deprived Indigenous Peoples of the ability to exercise their rights on traditional territories, undermining the Indigenous knowledge systems and practices that have protected nature since time immemorial.

There is a need to create more space for Indigenous leadership and participation in conservation.

- The 1987 World Commission on Environment and Development emphasized the importance of preserving traditional knowledge, while the Canadian Biodiversity Strategy reinforced the need to respect, preserve and maintain the knowledge, innovations and practices of Indigenous communities and to seek community-based local responses.

- The 1992 Convention on Biological Diversity agreed to "respect, preserve, and maintain the knowledge, innovations, and practices of Indigenous Peoples relevant for the conservation of biological diversity and to promote their wider application with the approval of knowledge holders and to encourage equitable sharing of benefits arising out of the use of biological diversity."

- The 2007 United Nations Declaration on the Rights of Indigenous Peoples recognizes that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment.

Indigenous lands make up around 20 per cent of the Earth's territory, containing 80 per cent of the world's remaining biodiversity — a sign Indigenous Peoples are the most effective guardians of the environment (International Institute for Sustainable Development).

Council values, and is motivated by the work done by Indigenous communities and organizations to protect and restore biodiversity, share knowledge, and inspire actions.

Council will strive to promote, support, and generate opportunities to increase Indigenous leadership and participation in conservation in Ontario and will:

- work to create an ethical space where knowledge systems interact with mutual respect, value, and cooperation,
- promote knowledge that supports the development of Indigenous Protected Areas (IPCAs) and other Indigenous-led projects,
- respect the rights and assertions of Indigenous Peoples.

We understand that this is only one step in our journey towards reconciliation and a stronger relationship with Indigenous Peoples that benefits biodiversity and builds a better future.

About the strategy

"Protecting the diversity of life on Earth — of which we humans are an integral part — requires broad societal consensus and participation. It is a challenge not for some of us, but for all of us (Ontario's Biodiversity Strategy, 2005)*."*

Ontario's Biodiversity Strategy, 2023 is our call to action and road map to conserve the genetic, species and ecosystem diversity for this and future generations. We hope the strategy will:

- build on the good work already being done,
- raise awareness about the importance of biodiversity,
- coordinate activities through collaboration and partnerships, and
- support and encourage the efforts of communities and individuals to conserve Ontario's biodiversity.

The **vision, mission** and **goals** set the context of what the strategy can accomplish and what we hope the future looks like in Ontario.

Five **strategic directions reflect the** key components required to conserve biodiversity:

- Empower people
- Enhance resilience
- Reduce threats
- Improve knowledge
- Transform investments

Each strategic direction includes targets and actions to focus our efforts and guide actions and activities from all sectors.

Targets: identify what we want to achieve and include ways to measure our progress. and timing for when we want to complete them.

Actions: outline activities, programs and other work we can do to help meet the targets. Some actions are aimed at specific groups or sectors and others are for all of us. Actions can help achieve more than one target.

The targets have end dates of 2025 and 2030, because that's when we will report on our progress via the State of Ontario's Biodiversity. Work towards achieving them can and should take place as quickly and effectively as possible.

The targets and actions are not a complete list of everything that needs to be done in Ontario. The Ontario Biodiversity Council acknowledges that more specific actions may be required to address local or regional conservation priorities.

A strategy for all of us

To successfully protect biodiversity, we need a 'whole of society approach'. This means all of us — the private sector, non-governmental organizations, Indigenous Peoples and local communities, individuals, and all levels of government, work together to implement this strategy.

By finding unique ways to collaborate, and by creating new partnerships to focus on common goals, we can address the causes of biodiversity loss and begin to reverse the damage already done.

Urgency to act

We can't live without nature's help; and nature can't live without our help. We must protect our planet's biodiversity to safeguard the future of our ecosystems, our climate, our health — and our humanity. - United Nations Foundation

Biodiversity sustains us and enriches our lives — and we need to protect it.

Globally, we are losing biodiversity at an alarming rate. It is estimated that wildlife populations around the world have declined by 69 per cent since 1970, and up to one million species are threatened by extinction (WWF Living Planet Report 2022).

Scientists around the world are calling for immediate, transformative, and urgent actions to address the causes of biodiversity loss, climate change, and ecosystem degradation. It will require changes on many fronts including a more integrated response to achieve the multiple benefits we seek for biodiversity, climate and human well-being and prosperity. We need to break-down the silos of our conventional approaches.

In Ontario, we are losing biodiversity faster than we are conserving it (SOBR 2021). Some of our efforts to protect and restore biodiversity are having a positive impact, but more effort is needed to reverse this trend.

Biodiversity loss isn't just an environmental issue. It impacts our families, our neighbourhoods, our economy, our workplaces, and our physical and mental health. It impacts food security, the climate, the air we breathe and the water we drink.

We know that most people in Ontario understand what biodiversity is, and recognize its importance to their lives. It's now time to turn that awareness into urgent action, to protect what sustains us.

Supporting national and international efforts

Working together across diverse groups to achieve this strategy will also contribute to national and international efforts such as Canada's Biodiversity Strategy and the goals and targets set out in the Kunming-Montreal Global Biodiversity Framework (2021–2030).

Biodiversity doesn't know borders. As we implement Ontario's Biodiversity Strategy we are part of a larger global effort to acknowledge the importance of biodiversity to our lives and take steps to protect it. Ontario's Biodiversity Strategy embraces the objectives that have been set out in the United Nations Convention on Biological Diversity (CBD) which are:
1) the conservation of biodiversity
2) the sustainable use of biodiversity, and
3) the fair and equitable sharing of the benefits arising from the use of biodiversity.

The CBD states, "The conservation of biodiversity is a common concern for humankind."

Subnational and regional governments and organizations have an important role to play in helping to deliver biodiversity goals and targets set at national and international levels. The Edinburgh Declaration outlines the critical role of subnational governments, cities, and local authorities in managing biodiversity. The Ontario Biodiversity Council has officially endorsed the Declaration.

Building on past success

Ontario's Biodiversity Strategy, 2023 builds on the positive efforts of the 2005 and 2011 versions.

The Ontario Biodiversity Council led the renewal process, with support provided by the Ontario Ministry of Natural Resources and Forestry.

The renewal team used several sources to ensure the strategy is based on the best available knowledge. These included the State of Ontario's Biodiversity 2020 report, the Global Post-2020 Biodiversity Framework, priority actions identified during the 2021 Ontario Biodiversity Summit, the 2030 Agenda for Sustainable Development, the Edinburgh Declaration and others.

Broad public engagement helped make sure that many different perspectives were considered, including seeking feedback from a wide geographic and demographic range. People were invited to submit their comments using an online workbook and by participating in a free webinar. Many Council members hosted information sessions to encourage and collect feedback.

More than 1,100 comments were considered following the public engagement, and the draft mission, vision, goals, targets and actions were updated to incorporate what we heard.

Measuring progress

In order to protect biodiversity we have to understand it. Ontario's Biodiversity Strategy includes commitments to report on the State of Ontario's Biodiversity and on progress in achieving biodiversity targets every 5 years. The targets in this Strategy have end dates of 2025 or 2030 to align with this reporting schedule.

Council has reported on the state of Ontario's biodiversity in 2010, 2015 and 2021.

The reports are available online on the State of Ontario's Biodiversity website and include:

- 45 indicators that summarize data from monitoring programs to evaluate progress in achieving Ontario's biodiversity targets.
- Status and trends in three biodiversity theme areas:
    - pressures on biodiversity
    - state of ecosystem, species and genetic diversity; and
    - conservation and sustainable use.

You can access all of the past biodiversity reports here:

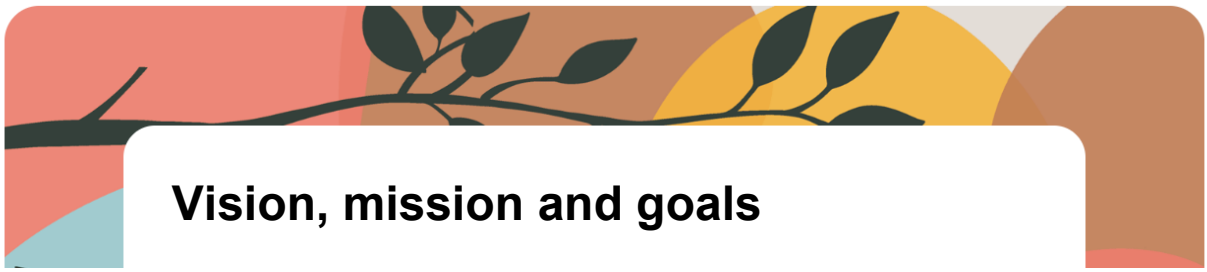
- State of Ontario's Biodiversity 2010 report
- State of Ontario's Biodiversity 2015 report
- State of Ontario's Biodiversity 2021 report

About the Ontario Biodiversity Council

The Ontario Biodiversity Council is a group of volunteers from environmental and conservation organizations, government, academia, industry, and Indigenous communities and organizations. Since its creation in 2005, Council has worked to guide and drive the implementation of Ontario's Biodiversity Strategy.

We recognize that no single government, organization, or sector can do it alone and that we must work together to make the changes required to conserve the biodiversity found in our province.

> "Protecting the diversity of life on Earth requires broad societal consensus and participation. It's a challenge not just for some of us, but for all of us."
>
> *Ontario Biodiversity Strategy, 2005*



Vision, mission and goals

2050 Vision

Biodiversity is valued, conserved and restored, and people live in harmony within nature.

2030 Mission

To take urgent action to halt and reverse biodiversity loss for the benefit of all living things, including people.

Goals

Empower all people to value, respect and take steps to conserve, recover and sustainably manage biodiversity.

Protect, restore and recover ecosystem, species and genetic diversity and the benefits that biodiversity provides for all living things.

Manage biodiversity sustainably in an inclusive and equitable way.

Mobilize human and financial resources to scale-up actions to conserve biodiversity.

Listen to and learn from Indigenous People and pursue reconciliation through biodiversity conservation.

Unique approaches to conservation

There are many different ways to conserve biodiversity. It takes a variety of people and approaches to protect all aspects of biodiversity. Though we hear a lot about environmental and conservation organizations who work to conserve and protect nature, there are many other groups that are addressing this issue in their own unique ways.

Youth

Youth will inherit the earth and will be the most impacted by the decisions we make and actions we take today. Many young people believe they are part of

the solution to reverse the damage being done to biodiversity, and youth-led activism is growing. Youth are actively increasing the ways they engage and participate to ensure their voices and opinions are heard. Programs like the Canadian Youth Biodiversity Network and the Emerging Leaders for Biodiversity (ELB) are amplifying young voices in the work for a more sustainable future.

Community science

Everyone can participate in science! Community science initiatives are a great way for anyone with an interest in nature to participate in collecting and sharing information to help get a better understanding of what is happening on the landscape. Apps and events, like iNaturalist and local bioblitzes have been developed over the last decade to help identify and monitor plants and animal species. These programs help empower anyone to be a part of research efforts, regardless of their background or geographic area.

Faith-based organizations

With a better understanding of how biodiversity underpins our lives, faith-based organizations are taking it upon themselves to promote sustainable living and restoration of ecosystems. The UN decade on ecosystem restoration 2021-2030 is exploring the role of faith actors in restoring ecosystems through their Faith for Earth Initiative, seeking to harness their enormous social and political influence. In Ontario there are a number of different faith-based groups who are working to be good stewards of the land and deepen their connection between their faith and a healthy natural world.

Empower people

Society is more aware of the importance of biodiversity and its main threats. While awareness is growing, we are still not doing enough to stop biodiversity loss in Ontario.

To succeed, our behaviours and actions need to change, we will need to:

- design policies and action plans that encourage people to make informed and responsible choices,
- share information and develop tools and training that support equitable participation in conservation,
- create more and different opportunities for people to get involved in stewardship, and
- increase our appreciation and understanding about biodiversity so that it is valued and considered in our everyday decision-making.

This strategic direction includes ways to encourage more active and inclusive participation in biodiversity conservation, and integrate biodiversity values into all sectors of the economy.

Targets	Priority actions
By 2025, sectors have developed action plans in support of Ontario's Biodiversity Strategy and by 2030 those plans are being implemented.	1. Develop and implement plans to incorporate biodiversity values into all levels of government, and across business, health, education, industry, not for profit, and natural resource sectors. 2. Adapt governance systems, including enhancing law and policy, to support biodiversity action.

	3. Explore creative ways to achieve positive biodiversity outcomes, such as recognizing the Rights of Nature.
By 2025, the capacity for people to conserve biodiversity is increased and by 2030 people are taking action to protect and care for biodiversity in their daily lives.	4. Support and expand biodiversity stewardship and guardianship by Indigenous communities, landowners and local communities. 5. Support Indigenous communities to identify, preserve and protect cultural keystone species and their habitats. 6. Continue to develop and share information about how biodiversity links to human health, climate change, and the economy. 7. Continue to integrate biodiversity education into all levels and all types of curricula, including in non-formal education and non-traditional subject areas such as business, engineering, health and public policy. 8. Increase availability of tools and training to support actions for biodiversity.
By 2030, biodiversity conservation programs and actions are inclusive, equitable and reflect Indigenous knowledge and diverse perspectives.	9. Encourage equitable and meaningful participation of biodiversity decision-making and conservation, at all levels including engaging with youth, new Canadians, Indigenous communities and other under-represented groups. 10. Collaborate with and support Indigenous communities and organizations to develop and lead biodiversity conservation initiatives.

Working across sectors

This strategy is for everyone who lives and works in Ontario. We hope all people and organizations see actions and a role for themselves within it. When we say 'sectors' we mean everyone. Examples of sectors include those that:

- operate in the public, private, or non-profit realms,
- extract and harvest raw materials, such as aggregates, mining, forestry and agriculture,
- build or make products using raw materials to make finished goods, like construction of homes and businesses, manufacturing and processing,
- offer services such as recreation, tourism, retailer, entertainment, transport and financial companies,
- include knowledge and intellectual pursuits such as research, consulting and education.

What is mainstreaming biodiversity?

Mainstreaming biodiversity means integrating biodiversity into decision making so that it becomes everyone's business and is part of our day-to-day lives. As individuals and citizens, we are responsible for taking good care of the resources we use and upon which we depend. From the purchases we make at the grocery store to the flowers we plant in our gardens and the decisions made in managing our businesses or providing services in our communities, we all impact biodiversity. Our choices and actions will ultimately determine the state of biodiversity now and in the future.

Reduce threats

To conserve biodiversity we have to address ways that humans destroy and degrade it, in Ontario and around the globe.

To successfully reduce threats, we must:

- improve land use planning to prevent habitat loss and encourage growth in areas capable of sustaining it,
- prevent the introduction, establishment, and spread of invasive species,
- increase our efforts to reduce waste and pollution,
- reduce our ecological footprint and encourage the sustainable use of nature, and
- use nature-based solutions to help mitigate and adapt to climate change.

This strategic direction includes ways to improve the condition of species and ecosystems and help prevent further biodiversity loss by reducing and removing the threats to biodiversity and their impacts.

Targets	Priority actions
By 2030 land use planning approaches to maintain and enhance biodiversity, such as natural heritage systems, are implemented at local, regional, and provincial levels.	11. Implement integrated land use planning approaches that conserve biodiversity in terrestrial and aquatic ecosystems. 12. Identify Key Biodiversity Areas and improve their management and conservation. 13. Maintain and expand natural infrastructure on municipal and private lands to support biodiversity and enhance climate resilience within cities and communities.

By 2030, the harmful impacts of invasive species on biodiversity are further reduced.	14. Develop and implement prevention strategies for main pathways of introduction of invasive species. 15. Develop and implement innovative surveillance and control tools for high-risk invasive species. 16. Collaborate and grow partnerships among Indigenous and local communities, conservation organisations, and governments across jurisdictions to manage invasive species. 17. Continue and enhance efforts to control, manage, and remove harmful invasive species.
By 2030, the release of ecologically damaging pollutants is reduced to a level that is not harmful to biodiversity and ecosystem services.	18. Review, strengthen and implement strategies to reduce harmful pollution in the environment. 19. Develop and implement approaches that leverage biodiversity's ability to reduce pollutants and improve air and water quality and soil health. 20. Support strategies, such as integrated pest management and nutrient management, that reduce pollutants, support biodiversity and maintain and enhance food security.
By 2030, the impacts of climate change on biodiversity are minimized and biodiversity is enhanced to support climate mitigation and adaptation.	21. Develop, use and integrate tools and approaches that build the resilience of biodiversity to climate change. 22. Promote and implement nature-based solutions and/or ecosystem-based approaches to enhance climate mitigation and adaptation.

By 2030, Ontario's per-capita resource consumption and waste generation is reduced and is within Ontario's biocapacity limits.	23. Report on Ontario's Ecological Footprint and Biocapacity and promote the use of this information in decision-making. 24. Raise awareness and access to information related to consumption and waste (e.g., food, water, plastics). 25. Support and encourage priority actions to reduce levels of resource consumption and waste generation to be well within Ontario's biocapacity.

What are the main threats to biodiversity?

Habitat loss and land use change have the largest and most immediate negative impact on terrestrial and freshwater ecosystems. Less habitat can reduce a species' population size as well as the genetic diversity within a species. The pace at which urban areas are growing and spreading also has major impacts to the land and natural areas. Loss of ecosystems such as forests, wetlands and grasslands affect ecosystem services (e.g., clean air, water, carbon sequestration, etc.) and can result in an increased risk of flooding, poorer air and water quality and increased carbon emissions.

Invasive species can be any plant, animal or micro-organism that is introduced by human action outside of its natural past or present distribution and whose introduction or spread threatens the environment, the economy or society, including human health. When introduced into new ecosystems, invasive species can become novel predators, competitors, parasites, hybridizers, and diseases of native plants and animals. Once established, the ecological effects of invasive species can be irreversible, the costs of control are significant, and even with sustained efforts eradication may not always be possible.

Population growth is one of the main pressures on Ontario's biodiversity. Ontario's population is estimated at 15.3 million in 2023 (Statistics Canada, 2023) and is predicted to grow to 20.4 million by 2046 (OMOF, 2022). Population growth increases our ecological footprint - the demand we place on nature. Most population growth will occur in southern Ontario, where the Mixedwood Plains Ecozone is already under

significant stress. Urban sprawl, fragmentation of natural areas, increased greenhouse gas emissions, loss of prime agricultural land, and increased consumption of natural resources are all caused by population growth. Without hard work to reduce these pressures, both individually and collectively, biodiversity will continue to be eroded by our growing population.

Pollution needs to be reduced from all sources to levels that are not harmful to biodiversity and ecosystem functions and human health. This includes reducing nutrients lost to the environment, pesticides and eliminating the discharge of plastic waste as well as air, light and noise pollution.

Overconsumption and unsustainable use negatively affect biodiversity. Over-using or wasting food and products (e.g., a large ecological footprint) requires more land, leaving less space for healthy natural areas. Making products and food that are thrown away unnecessarily increases pollution and depletes healthy ecosystems.

Climate change is an increasing threat to biodiversity. Climate change affects biodiversity through changes in air and water temperatures, changes to precipitation patterns and extreme weather which can make habitats unsuitable for native species. Climate change is also compounding the impacts of other threats to biodiversity such as by increasing the spread and range of invasive species and diseases.

Nature-based solutions

Nature-based solutions are activities that use nature to help address big societal problems, such as climate change, loss of biodiversity, and protecting human health and wellbeing. Nature-based solutions are different from typical conservation actions, because they tackle multiple problems at the same time by working with nature, usually at a lower cost, and creating multiple benefits for people and the planet. Using nature as a solution can help us sustainably manage, restore and protect ecosystems and land to reduce biodiversity loss and mitigate and adapt to climate change. They harness the power of natural systems and biodiversity and provide many benefits that support human health and well-being. This includes food and water security, air and water quality, outdoor recreational opportunities, and job creation.

Nature-based solutions like restoring ecosystems and protecting natural areas can help to mitigate climate change by removing carbon from the atmosphere and storing it in plants and soil. They can help us adapt to climate change by enhancing ecosystem and landscape resilience to natural hazards such as flooding, drought, and erosion.

Reducing our ecological footprint

The carbon emissions we produce are the single largest contributor to the ecological footprint. Reducing our use of fossil fuels for heating, electricity and transportation can greatly reduce our ecological footprint while moving towards a zero carbon economy. We can further reduce our ecological footprint by adopting the 5 Rs.

‘Reduce, reuse and recycle' is a common slogan in many homes and businesses. But two more Rs have been added to the list — refuse and re-purpose. By including a few more steps to our daily consumption habits, and becoming more conscious with our product choices, we can significantly reduce the amount of waste created. Recycling, though a great tool, still causes impacts to our environment.

Consider these five steps to reduce your ecological footprint:

1. **Refuse** to buy wasteful products from the start and be conscious of where they are coming from, how far did they travel to get to you
2. **Reduce** the amount of wasteful, non-recyclable products we use
3. **Reuse** products where possible and consider investing in reusable items rather than using their single-use counterparts (e.g., plastic utensils)
4. **Repurpose** or upcycle products for another purpose
5. **Recycle** the products that don’t fall into the categories above.

Enhance resilience

Diverse ecosystems are more resilient to change. A healthy ecosystem can better withstand and recover from disturbance and stresses such as flooding, drought, extreme heat, invasive species and pollution. This helps maintain ecosystem services, like the regulation of air and water quality and protection from hazards and extreme events and also supports human health and well-being.

To boost the resilience of species and ecosystems, we'll need to:

- incorporate biodiversity into land use planning,
- preserve existing intact wilderness areas, including the expansion of priority protected and conserved areas,
- restore degraded and damaged ecosystems and make sure that these ecosystems are connected,
- conserve and recover species and the genetic diversity of species, and
- Sustainably manage the working landscape for both resource and biodiversity values.

This strategic direction includes ways to maintain, restore and recover ecosystem function and protect species diversity.

Targets	Priority actions
By 2025, priority restoration areas are identified and by 2030 efforts are underway to restore biodiversity to at least 30 per cent of priority areas.	26. Increase availability of appropriate native species for restoration projects that are adapted to their growing environment now and in the future.

	27. Identify, prioritize, and undertake ecological restoration of terrestrial and aquatic ecosystems, in urban, rural and wilderness areas.
By 2030 at least 30 per cent of terrestrial and aquatic ecosystems are conserved through well-connected networks of protected areas and conservation lands.	28. Support and use diverse and novel approaches (e.g., Key Biodiversity Areas, Other Effective Area-based Conservation Measures, and Indigenous Protected and Conserved Areas) to increase area-based protection and conservation of biodiversity on Crown and private land, such as land trusts, institutional and corporate lands. 29. Identify and conserve ecological corridors and landscape connectivity in urban, rural and wilderness areas. 30. Identify, protect and develop management plans for climate refugia in Ontario.
By 2030, the conservation of species and ecosystems in Ontario is improved.	31. Report on the status of species and ecosystems to prioritize conservation activities. 32. Assess species and ecosystems vulnerabilities to threats (e.g., climate change, invasive species) and create and implement policies and management plans to reduce vulnerabilities. 33. Develop and implement a genetic resource management strategy for wild species (e.g., a native seed strategy). 34. Promote multi-species approaches to the recovery of species at risk.

Why is resilient biodiversity important?

A high level of biodiversity makes species and ecosystems stronger and more stable. For example, an ecosystem with a high amount of diversity can adapt better to a wide variety of conditions, like climate change, disease, and extreme weather.

The ability of an ecosystem or species to bounce back from a disturbance like a flood, insect infestation, or forest fire and return to a balanced state is what makes it resilient. A healthier and more diverse ecosystem tends to be more resilient, meaning it will cope with change and recover more quickly.

Human health and biodiversity

Our understanding of the links between health and biodiversity is increasing.

- Biodiversity promotes good health by providing clean air and water and creating opportunities for outdoor recreation and exercise.
- Biodiversity acts as a buffer to protect humans, animals and plants from disease. Biodiversity loss can trigger zoonotic diseases, like avian flu, that harm human health, and our communities and economy.
- Children who spend time in nature are happier and healthier and less likely to be diagnosed with attention disorders or depression.
- Studies show that people who can observe nature have faster recovery times from illness.
- Researchers have found links between the increased availability of green spaces in urban settings and lower rates of violence and aggression.

The One Health approach recognizes that the health of people is connected to the health of animals and the environment and works across sectors and around the world to improve human health, prevent the outbreak of zoonotic disease, improve food safety and security, and protect biodiversity. Many of the actions included in this strategy will protect and promote human health, while also conserving biodiversity.

Rights of Nature

There is a growing movement within the conservation community to protect biodiversity by granting it rights. Assigning rights to nature, or Mother Earth, would help to protect it legally, the same way that humans are protected by human rights laws.

Recognizing nature as an entity that needs to be protected could help shift our legal and financial systems from operating on the belief that nature is a resource for humans to own and exploit, to a more balanced and respectful approach that ensures sustainable use of natural resources, and would hold governments and corporations accountable for harming biodiversity.

Some efforts have been successful to grant legal rights to mountains, trees, rivers, or regions. In 2021, the Innu Council of Ekuanitshit and Quebec's Minganie Regional County Municipality declared the Mutuhekau Shipu river a legal person. The river now has nine rights including: the right to live, exist, and flow, maintain biodiversity, be free from pollution, and to sue.

Many groups have argued that environmental degradation also impacts human rights, including the right to life, health, and water with court cases being heard in Australia, the Netherlands, and the United Nations. The United Nations Human Rights Council has declared that access to a "clean, healthy and sustainable environment" is a human right and the United Nations General Assembly declared that "everyone on the planet has a right to a healthy environment" and encouraged its member countries to include the right to a healthy environment in national constitutions, regional treaties, and laws.

Whether or not the rights of nature are formally recognized in Ontario in the future, it's still a concept that is valuable to help frame our conservation decisions. As explained in the Universal Declaration on the Rights of Nature, "every human being is responsible for respecting and living in harmony with Mother Earth".

Improve knowledge

Indigenous Peoples have been learning from and living within the land for millennia. They continue to build and accumulate understanding and knowledge of the natural world. Scientific inquiry and study has been ongoing for centuries, and has also helped to build an understanding of biodiversity in Ontario.

While there is still much to learn, improving and bridging the information from both science and traditional knowledge can help us to better understand how the many plants, animals and microorganisms in Ontario contribute to ecological functions and to the health of the environment.

To improve knowledge and understanding, we need to:

- improve research and monitoring systems and make sure they reflect traditional and community based knowledge,
- invest in long-term research and monitoring and establish strategic partnerships to address knowledge gaps,
- interpret and share data and information with a wider audience, and
- communicate information clearly and make it accessible so that we can all use it when making decisions.

This strategic direction includes ways to improve and share biodiversity knowledge, implement monitoring and evaluation, and better understand what motivates individuals and sectors to begin working towards biodiversity conservation.

Target	Priority actions
By 2030, Ontario's biodiversity research, monitoring and reporting framework is improved, accessible and reflects diverse knowledge systems and perspectives.	35. Respect, preserve and invest in the knowledge, innovations and practices of Indigenous Peoples to support biodiversity conservation.

	36. Support and expand community-based monitoring and reporting programs relevant to the conservation of biodiversity. 37. Regularly review and update the status of knowledge about Ontario's biodiversity. 38. Continue and improve reporting on the state of Ontario's biodiversity and biodiversity targets at five-year intervals and share and expand access to biodiversity data and information. 39. Investigate and support the development of Ontario's Living Planet Index.

Ethical space in biodiversity conservation

Achieving common ground can be hard when language, power levels, ownership, scale and timeframes differ. An approach that could be helpful in this context is the creation and maintenance of "ethical space" where asymmetrical power is balanced and diverse worldviews are respectfully engaged.

"Ethical space involves creating a place for knowledge systems to interact with mutual respect, kindness, generosity, and other basic values and principles. It is based on the belief that all knowledge systems are equal." - *We Rise Together, Indigenous Circle of Experts.*

Creating a collaborative space within conservation work can provide new insights and approaches in environmental stewardship, and can challenge the prevailing conservation management systems. Unlike Western approaches, which focus mainly on human perspectives, ethical space in conservation can help ensure that the well-being of all creatures is considered.

Transform investments

While our understanding of the importance of biodiversity has increased, a fundamental shift in how we value it is long overdue. Biodiversity has to be included in balance sheets and the cost of inaction must be calculated so that we better understand and manage biodiversity and its role as the foundation for our economy and our communities.

To transform the way we value biodiversity and fund its conservation, we must:

- modernize our financial systems to account for biodiversity,
- collaborate within the financial sector to promote favourable biodiversity outcomes,
- eliminate, phase out or reform subsidies which are harmful for biodiversity, while incentivising positive biodiversity outcomes, and
- distribute the costs and benefits of biodiversity conservation equitably across relevant sectors.

This strategic direction includes new and innovative ways to improve the ways we value biodiversity, generate economic growth, and fund conservation.

Target	Priority actions
By 2030, biodiversity considerations are integrated into the public and private sectors including through budgeting, funding, investments and financial disclosure.	40. Investigate how biodiversity financing can be further developed. 41. Review and strengthen economic tools, such as incentives, that encourage conservation and increase private investments like green bonds.

	42. Expand accounting and disclosure principles and make data available to integrate the economic value of biodiversity and ecosystem services into decision making. 43. Work with and within financial institutions to create positive biodiversity and climate resilient outcomes as a condition of financing, for example, for land development and resource extraction.

Biodiversity and the economy

Biodiversity provides ecosystem goods and services that we rely on everyday, however the values they provide are often missed or hidden unless they are a marketable product, e.g., timber, fishing. However, non-marketable outputs, e.g. clean air, are just as important and evidence suggests that leaving biodiversity out of the economic valuation and accounting has eroded economic opportunities and contributed to negative costs and impacts to society and the environment.

Investing in biodiversity has positive economic benefits and can stimulate demand for products and services of local businesses (e.g., plant nurseries, aggregates, equipment). Cooperation between the Ontario government, non-government organizations and the private sector, for example, has resulted in an increased consideration of biodiversity values in land management (for example, sustainable forest management).

Another way to invest in biodiversity is through job creation. Creating jobs in conservation helps the transition to a green economy, since these jobs will be beneficial to nature and the economy in the long run, rather than being phased out or outright destructive.

Conclusion

Everyone has a role to play if we are to succeed in conserving the wealth of biodiversity in Ontario, both now and in the future.

The actions and targets contained in Ontario's Biodiversity Strategy provide a framework for coordinating biodiversity conservation across the province, but much more is possible.

In addition to the actions we take as individuals, this document should inspire Ontario's sectors and groups to think creatively about biodiversity and to take responsibility for developing their own implementation or action plans for biodiversity conservation.

What you can do to help conserve biodiversity

- Get outside and discover biodiversity! Share your passion for nature with others.
- Lower your Ecological Footprint at school, home and work: refuse, reduce, reuse, repair, and recycle.
- Buy locally grown produce, farm products and other goods and services.
- Drive less! Try walking, riding your bike or using public transit to get around.
- Use less energy and water: you'll lower your energy bills and conserve natural resources.
- Share your talents and time - volunteer and participate in biodiversity stewardship activities.
- Watch out for invasive species. Learn about and help prevent the spread.
- Help monitor biodiversity in your backyard, neighbourhood or community by becoming a community scientist.
- Get your hands dirty — plant native trees and flowers in your garden or grow your own food.

What's next? Moving to implementation

Action or implementation plans are road maps for progress created by industry, government, business, organizations, community groups, municipalities, educational institutions and others. These plans adopt the vision and goals outlined in Ontario's Biodiversity Strategy and identify specific actions to help achieve them.

Create an implementation plan, and become a champion for achieving the targets and actions in Ontario's Biodiversity Strategy. Together, we can identify and implement solutions that will protect what sustains us.

Supporting information

What is biodiversity?

Biodiversity (or biological diversity) is the variety of life on earth.

Biodiversity exists at three levels.

- Ecosystem diversity is the variety of habitats, ecological communities and associated ecological processes.
- Species diversity is the variety of species.
- Genetic diversity is the variety of genetic information contained within individuals of a particular species.

The variety at each level (e.g., the number of species), the distribution of diversity on the landscape (e.g., corridors connecting habitats) and the interactions between genes, species and ecosystems and their environment are all very important.

Species diversity

A lot is known about many Ontario species, especially mammals, birds, reptiles, amphibians, fishes and vascular plants (those with roots, stems and leaves). Yet we have much to learn about the majority of species found here, such as beetles, moths and other insects, spiders and fungi. And new species are still waiting to be discovered. Ecologists and naturalists regularly find native species that have not been previously documented in Ontario. Recent fieldwork has uncovered several insect and lichen species that are new to the province and one undescribed species of lichen that is new to science.

Genetic diversity

Genetic diversity is the foundation that underpins biodiversity. Individual genes (segments of DNA molecules) provide the code that enables organisms to survive, grow and reproduce. Genes are also the basis for the traits that are passed on from parents to their offspring. Diversity at the genetic level allows species to adapt to environmental stressors, such as habitat change, new diseases and climate change, and to persist through time. Populations of most species are genetically adapted to local conditions and climate.

Research in Ontario has shown the importance of using locally adapted genetic strains in the management of species such as Eastern White Pine and Lake Trout and of maintaining genetically diverse populations of common and widespread species. When a species' genetic diversity declines through a decrease in population, isolation from other populations and inbreeding, the resulting reduction in survival and reproduction rates can lead to a loss of populations. In some cases, unique genetic resources may be lost forever. Connectivity of landscapes is critical for species movement and gene flow, helping them to be more adaptable and resilient to disturbance.

Monitoring the genetic diversity of Ontario's species is a huge task but is essential for effective biodiversity conservation. Through collaborative research and monitoring by government agencies, scientists, non-government organizations, businesses and members of the public, our knowledge of Ontario's genetic diversity will continue to improve.

It is estimated that Ontario has approximately 30,000 species and is ranked among the provinces with the highest diversity of known species in Canada (CESCC, 2022). The majority of species are insects, followed by thousands of different species of plants and hundreds of vertebrate species — mammals, birds, reptiles, amphibians and fishes.

While new species are being discovered every year and our knowledge is growing, some groups, especially naturally occurring fungi and microorganisms, are far from complete. Although most of Ontario's native species are secure, many are of conservation concern due to their rarity or because their populations have declined in response to various threats. Some species found in our province, such as Juniper Sedge and Northern Madtom (a small catfish), are globally at risk, so we have a responsibility to the rest of the world for their conservation. For other more secure species, such as Muskellunge, Ontario has the majority of the world's populations, so we also have a global responsibility for their conservation. Most Ontario species consist of many different populations. Breeding between members of adjacent populations can be important for a species' survival. Maintaining the distribution of species on the landscape depends on the existence of healthy local populations.

Ecosystem diversity

Ecosystem diversity is the third level of biodiversity. An ecosystem can be very small, such as a pond, or very large, like the Hudson Bay Lowlands, which comprise about one-quarter of Ontario. An ecosystem is characterized by what grows, lives and dies within that space and by the interactions of air, water, soil, rock and living organisms. These interactions create important ecosystem processes, such as primary production, decomposition and cycling of nutrients and energy.

Ontario's rich diversity of ecosystems includes a significant portion of the global boreal forest, an expansive forested ecosystem that crosses Canada. Other smaller ecosystems are also important. For example, the tallgrass prairie and savannah habitats in southern and northwestern Ontario support unique communities of plants and animals. Impressive coastal dune ecosystems are found on the shores of the Great Lakes, and alvars (flat open limestone ecosystems on the landscape) provide the essential habitat for maintaining the genetic diversity and long-term future of Ontario's species, as well as the continued benefits to humans from ecosystem services.

Sustainable management of Ontario's diverse ecosystems also helps to provide enduring benefits from biodiversity.

Ecosystem services

Biodiversity is the foundation upon which we derive benefits called ecosystem services that we rely on every day. These benefits can come from species, such as bees that pollinate crops, or from a complex ecosystem, like a wetland that provides habitat, absorbs carbon and cleans and stores water.

Ecosystem services are usually categorized as:

- provisioning services that provide essential raw materials, such as food, water, timber and fibre;
- regulating services that maintain basic life-support systems, such as climate, flood and disease prevention, waste treatment and water quality;
- supporting services that are vital for the ecosystem to function, such as soil formation, photosynthesis and nutrient cycling;
- and social/cultural services that provide recreational, aesthetic and spiritual benefits.

Loss of biodiversity can eliminate or diminish the services that nature provides.

Biodiversity and human health

Most of us know that spending time in nature is good for our physical and mental health. A long walk in a green space can lower our blood pressure and heart rate and there's even evidence that patients in hospitals recover more quickly if they have windows that have a view of trees and nature.

Biodiversity is a:

- Filter: Ecosystems like wetlands and forests filter and clean the water we drink and the air we breathe.

- Medicine cabinet: Many of the drugs we rely on to cure disease and treat cancers and infections come from plants — and there is untold potential for other medicines to be created from natural sources. When we lose species, we also lose the cures they might contain.
- Buffer: As biodiversity is lost, the number of zoonotic diseases is increasing. When we lose nature, the interactions between humans and wild species grow, leading to higher risks of diseases spreading between species. Conserving biodiversity is a key step to reduce zoonotic diseases.
- Brain booster: Did you know that nature can benefit your mental health? Studies show that spending time in natural spaces can reduce depression, anxiety and stress levels and can improve mood and concentration.
- Meal ticket: Without biodiversity and ecosystem services like pollination, we would not have food! Our agricultural systems provide us with the nutritious, sustainable, and healthy food we need to survive.
- Protector: Having strong and healthy biodiversity keeps our communities safer. As biodiversity is lost from threats like climate change or invasive species, the risks of wildfires and flooding can increase.

Our understanding about the importance of biodiversity to our lives and to our health is increasing. Humans live within nature — we are a part of biodiversity — and our health is very closely linked to the health of our environment. Taking steps to keep our natural spaces healthy will keep us healthy too.

The diverse values of nature

We all understand and value nature differently, depending on our cultures, knowledge systems and environments. In some worldviews, people are a part of nature, while in others they are separate. The way we value nature impacts the decisions we make.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2022), there are four main ways that people see themselves in relation to nature. These are,

- People see themselves as ***living from*** nature. They feel that nature provides the resources required to sustain livelihoods, and the needs and wants of humans.

- People see themselves as ***living with*** nature. They value its life-supporting processes as well as their connection with nature and other living things.

- People see themselves as ***living in*** nature and value the importance of nature as the setting for their lives, practices and cultures.

- People see themselves as part of nature or in terms of ***living as*** nature, perceiving it as a physical, mental and spiritual part of themselves.

Our society can make better decisions about biodiversity when we value it appropriately. To do that we can:

- recognize that nature is valuable in many ways, not just economic,
- embed the value of nature into our decision-making,
- adjust our policies and regulations to include the value of nature, and
- change our beliefs and goals to align with objectives that use nature sustainably and equitably.

Intrinsic value of nature

Aside from all the benefits biodiversity brings to our lives, it deserves to be recognized, appreciated and protected in its own right.

Ontario's 30,000 known species live in interconnected ecosystems that have evolved over thousands of years. This is a truly amazing wealth of life, from tiny fungi to vast northern forests, from Piping Plovers to Polar Bears.

Often, when we think about the value of nature, we understand it best when thinking about how it impacts our lives, keeps us healthy, fuels our economy, and builds our communities. However, it's important to remember that we are a part of nature - not apart from it and the actions we take to conserve it should be taken for our own benefit, and also for biodiversity itself.

Biodiversity's economic value

Traditionally, development is based on a model of economic growth, without considering the ecological costs. We measure our collective success primarily by economic indicators, such as the gross domestic product. And although a strong business case can be made to live within the means of nature — because healthy ecosystems sustain healthy people and a healthy economy — we do not incorporate nature into the balance sheets of companies, communities or countries.

Our economic measures focus on income, not on the state of the natural capital that is the underpinning of our communities and economy. As a result, biodiversity losses are not accounted for as a decline in economic wealth. However, many companies, communities and countries are now realizing the value of healthy natural ecosystems. Research has shown that the ecosystem services arising from biodiversity in southern

Ontario alone, such as pollination, water storage and purification, are worth many billions of dollars that are missing from the balance sheets that inform our decisions.

In addition to providing us with the necessities of life, biodiversity fuels our economy, and despite its critical role in our individual and collective prosperity, its economic value is largely un-accounted for. Tourism, fishing, agriculture, forestry and many other industries rely on biodiversity. Ontario's agricultural sector employs more than 67,000 people; this sector contributed $9.2 billion to the provincial economy in 2021 accounting for 1.2 per cent of Ontario's total GDP (Government of Canada, 2022). Ontario's forestry industry is responsible for over 149,000 direct, indirect and induced jobs across the province (2020 data), with total revenue of the forest sector at $18 billion in 2020 (OMNRF, 2022).

In the past, we did not assign an economic value to nature unless it produced a commodity that could be bought and sold in the marketplace. We now have better tools to help us understand the value of the added benefits from nature: its "ecosystem services." Evidence suggests that leaving biodiversity out of economic valuation and accounting has eroded economic opportunities and contributed to negative costs and impacts to society and the environment.

It has been estimated that the total annual value of ecosystem services provided by southern Ontario landcover is 50.2 billion/year. Taking into account the true value of biodiversity in every form will improve our ability to make sound conservation and development decisions to protect these precious services.

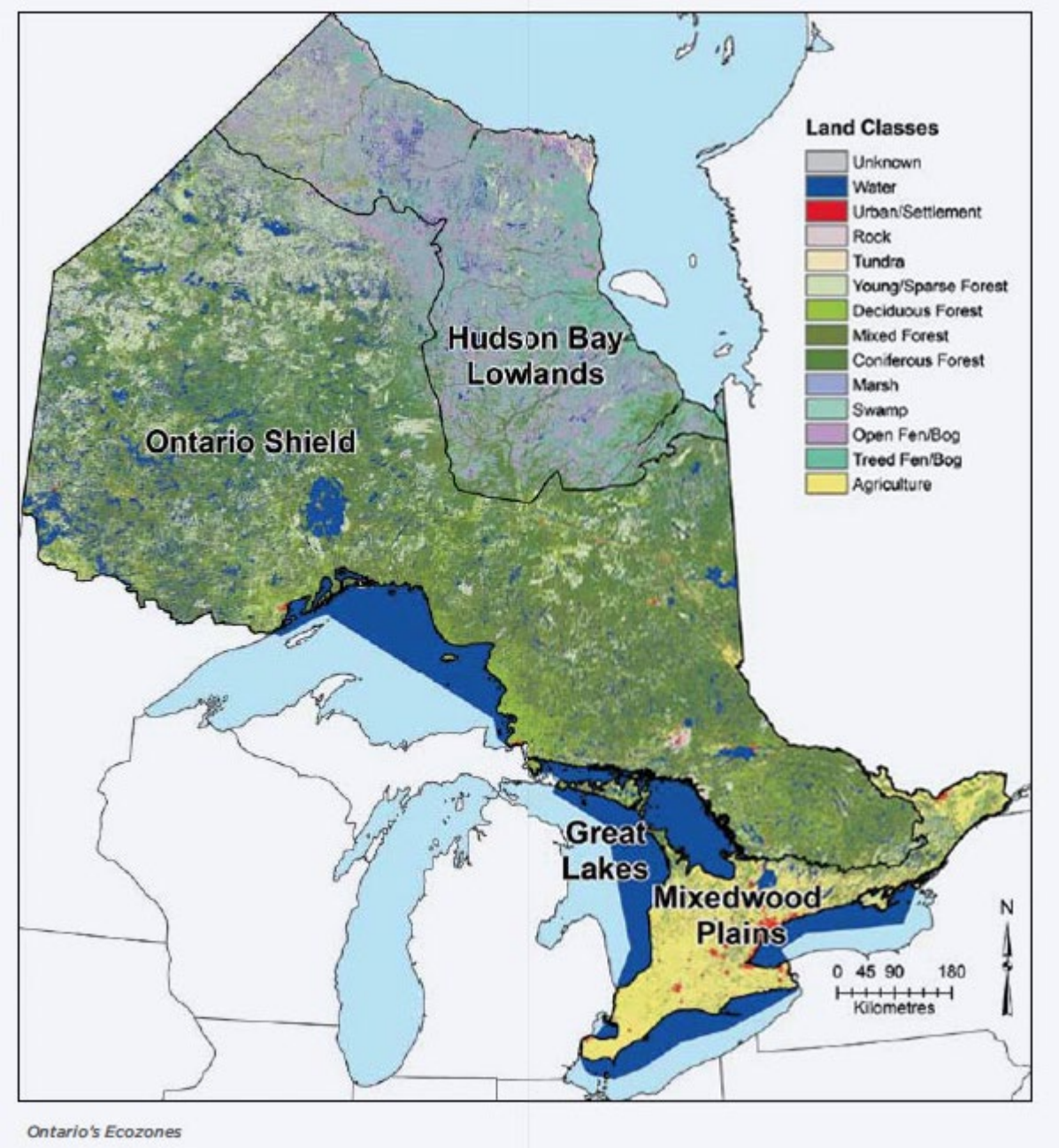
The conservation of biodiversity in the province will be greatly strengthened when these true values are incorporated into the everyday decision making of governments, business, communities, and individuals, creating a nature-positive economy. Incentive programs to reward biodiversity conservation efforts will be helpful in this regard, as will consumer choice for environmentally friendly and sustainably sourced products.

Investing in biodiversity

Efforts to protect and restore Ontario's biodiversity have increased over the past decade due to the greater involvement of people, groups and businesses in private-land stewardship programs and some small increments in government funding.

Unfortunately, these conservation efforts have not been able to halt the continued loss of the province's biodiversity. Given the economic value of biodiversity and its importance in supporting the health of Ontario's communities and economy, government and non-government sectors must allocate greater resources to protect, maintain, restore, understand and monitor biodiversity.

Ontario's ecozones



Based on ecology, climate and topography, Ontario can be divided into four ecozones (Figure 1. Ontario ecozones), and each is shared with other provinces and/or US states. Ontario's four ecozones are summarized here from information contained in the State of Ontario's Biodiversity 2010 report (OBC, 2010b).

The Hudson Bay Lowlands is the northernmost ecozone in Ontario and covers 23 per cent of the province. It is mostly wetlands but also supports boreal and subarctic forests, tundra, tidal marshes and numerous rivers and lakes. Its extensive wetlands provide essential migratory and breeding habitats for birds such as Snow Goose. In addition, the wetlands act as “carbon sinks,” storing large amounts of carbon. Polar Bear, Lake Sturgeon, Gray Wolf, Woodland Caribou and Wolverine are all found in this ecozone. Less than one per cent of Canada’s population (approximately 10,000 people) live here, and most of the landscape is undeveloped. Major human activities in this region include fishing, hunting and trapping. Mining and forestry are conducted in the Hudson Bay Lowlands and are likely to increase in the future.

The Mixedwood Plains is Ontario’s smallest ecozone. Although it covers only 8 per cent of the province, it is where the majority of Ontario’s population live. Its rich soils, moderate climate and central location attracted early settlers. Over the past few hundred years, this ecozone has been changed from forests, wetlands, prairies and alvars to a landscape dominated by agriculture and settlement. Despite this transformation, the Mixedwood Plains is still Canada’s most biologically diverse area, with species such as Sugar Maple, Fowler’s toad, fisher and white-tailed deer. The Carolinian zone (the most southerly portion of this ecozone) has many species that are not found in the rest of Canada. In addition to its substantial population density, the Mixedwood Plains has a high concentration of industry and agriculture and generates more than 25 per cent of Canada’s agricultural production, including many fruits, vegetables and products grown nowhere else in Canada.

The Ontario Shield is our largest ecozone, covering 61 per cent of the province. About 68 per cent of the area is forested, while lakes, ponds and wetlands make up almost 23 per cent. Its varied topography supports a large variety of ecosystems and species, including moose, American black bear, beaver and ring-necked duck. Coniferous forests of black spruce, balsam fir, jack pine and tamarack dominate in the northern region. In the south, mixed forests and deciduous forests of tolerant hardwoods (e.g., sugar maple and American beech) are more frequent. Less than 10 per cent of Ontario’s population live in this ecozone. Mining, logging, fishing, trapping, hunting and camping are major activities here.

The Great Lakes Ecozone, made up of five large lakes and their connecting waterways, containing nearly 20 per cent of the fresh surface water on the planet. Parts of four of these lakes lie in Ontario and are shared with the United States; the exception is Lake Michigan, which is wholly contained within the United States. Shaped by glaciers more than 10,000 years ago, each of the Great Lakes reflects that history differently, with coastal areas that are variously composed of bedrock, cobble beaches, sand dunes or alvars. The Ontario portion of the Great Lakes represents 8 per cent of the province.

The Great Lakes provide drinking water to 48 million Canadians and Americans (Great Lakes Commission 2020) and includes cold deepwater habitats, shallower nearshore habitats, islands and coastal wetlands. Transportation, fishing and cottaging are the primary human activities on the Great Lakes, and most of the province's major industries are located on or near their shores. The Great Lakes Ecozone is one of the most ecologically diverse regions in North America, but the biodiversity of the area has been adversely affected by its high population and associated industries.

Natural ecosystems are dynamic and resilient, continually evolving in response to a variety of forces and factors. But they are limited in their ability to adapt to rapid change, such as that introduced through human activities. Humans disrupt and degrade biodiversity directly in six basic ways: habitat loss, introduction of invasive species, population growth, pollution, unsustainable use and climate change. Our growing population combined with our rising levels of resource consumption drive these threats to biodiversity. Recently, an assessment of pressures on Ontario's biodiversity showed that many threats are increasing (OBC, 2021).

Threats to biodiversity

Habitat loss

Loss of habitat is the primary threat to biodiversity in Ontario. Habitat loss is most serious in southern Ontario, where urbanization, agriculture and road density are greatest — and where some of the province's rarest biodiversity is found, such as alvars and tallgrass prairies.

Plant and animal species are less resilient to external pressures when the ecological communities of which they are a part of are changed, when populations become isolated from one another or when humans interfere with natural ecological processes (e.g., prevention of natural disturbances such as forest fires or insect and disease outbreaks). Habitat loss, including destruction, alteration and fragmentation, affects the well-being and survival of individual populations, as well as species, and can affect the function of entire ecosystems and the ecosystem services on which we depend.

Resource extraction, hydroelectric power development and the construction of roads and bridges can all impact biodiversity through habitat changes and degradation of local water bodies. Intensive recreational activities can also harm local vegetation, pollute waterways and disturb wildlife. The cumulative impact of a series of seemingly small habitat losses can be significant.

Population growth

One of the main pressures on Ontario's biodiversity is our growing human population (estimated at 14.53 million in 2023), which is predicted to 20.4 million by July 1, 2046 (OMOF, 2022). Population growth increases our ecological footprint - the demand we place on nature. Most population growth will occur in southern Ontario, where the Mixedwood Plains Ecozone is already under significant stress. As the population grows, more prime agricultural land and natural habitats will be converted to urban areas. Poorly planned development can result in urban sprawl and, with it, a continually increasing network of roads and the destruction or fragmentation of natural habitat. In general, population growth increases our total emission of greenhouse gases and pollutants, as well as our consumption of natural resources, which are already in high demand. Without hard work to reduce these pressures, both individually and collectively, biodiversity will continue to be eroded by our growing population.

Overconsumption

Ontario residents place high demands on the planet's natural resources. The average per-person consumption of natural resources in Ontario, as measured by the Ecological Footprint, is very high. Ontario's per-capita Ecological Footprint (of consumption) in 2015 ranked the 12th highest in the world when compared to other Countries, while Canada ranked 6th (Miller, et al., 2021). We are currently consuming our natural resources at a rate four times the global average and are at the limit of the province's biocapacity. Our large and growing human population coupled with our high Ecological Footprint are a major impediment to the conservation of Ontario's biodiversity and have impacts beyond our borders. To reduce negative impacts on biodiversity, we must individually and collectively limit our Ecological Footprint by lowering our consumption and the waste we generate to "fit" within Ontario's borders.

Unsustainable use

Unsustainable use is the harvesting of species at a rate higher than can be sustained by the natural reproductive capacity of the population being harvested. Unsustainable use can affect genetic diversity, local populations and ecosystems and, in turn, our economy and society. Historically, unregulated and unsustainable harvest was a major threat to several species in Ontario. The development of natural resources management programs, the regulation of harvests through education and effective enforcement and a commitment to conservation among the fishing, hunting and trapping communities have led to sustainable harvest of fish and wildlife species today. The legislative and policy framework for the management of Crown forests also ensures their sustainable harvest.

Programs to manage harvests have been largely successful. Unregulated, unsustainable and/or illegal harvest of some species remains a concern. Outside of protected areas, the harvest of most Ontario plant species is not regulated. For example, the harvest of wild American ginseng, which is used for medicinal purposes, is one of the main threats to this endangered species. Harvest of wild populations is now illegal under Ontario's Endangered Species Act. Several of Ontario's protected reptile species are harvested illegally for the pet trade. Although this may not be a widespread problem, the combined effects of illegal harvests and other stressors, such as habitat loss and road mortality, are taking their toll on these species.

Ecological footprint and biocapacity

The Ecological Footprint is widely recognized as an important first measure of environmental sustainability that is used by governments and institutes worldwide. It measures how much of the Earth's land and water is required to meet the human demand for natural resources and to assimilate our waste, and it reveals whether our collective consumption levels are approaching or exceeding the Earth's ecological limits. It is expressed in "global hectares" (gha), standardized units that take into account the differences in biological productivity of the various ecosystems impacted by our consumption activities.

We can determine the Ecological Footprint for an individual or a given population by measuring consumption in four categories: carbon (home energy use and transportation); food; housing; and goods and services.

The Ecological Footprint is directly compared with the region's biocapacity — the extent and productivity of the key ecosystems to provide materials on a sustainable basis and to absorb carbon dioxide emissions. We can also see how our consumption habits compare with global averages and how they affect cropland, pastureland, forestland and fisheries.

On a per-person basis, Ontario residents' footprints are high by global standards, ranking 12th when compared to other countries placing the greatest demand on the planet's natural resources. We are exceeded by Canada which is ranked at number 6. In 2015, the average Ecological Footprint in Ontario was 7.02 gha per-person, which is almost equal to the province's biocapacity (Miller, et al., 2021).

Climate change

Ontario's climate is changing. Ontario is experiencing warming air and water temperatures, increased frequency of extreme weather events, and changing precipitation patterns. Parts of the province have become slightly wetter, and more

winter precipitation is falling as rain. Drier summer conditions are being felt in some regions because of reduced snow accumulation, soil moisture, spring runoff and rising temperatures. Many plant and animal species are moving, leading to new species interactions, spread of diseases and declining health.

The impacts are leading to unprecedented and transformative changes to the natural environment, and many changes may be irreversible. Ontario's ecosystems, communities and resource economies are vulnerable.

We are already observing impacts to Ontario's biodiversity from a changing climate. For example:

- **Lakes are changing —** ice cover in the Great Lakes and inland lakes has declined and lakes are warming.
- **Permafrost is thawing —** warming temperatures are leading to spring melt flooding and a changing landscape in northern Ontario.
- **New invasive species are arriving and more are expanding —** the spread of invasive Phragmites in wetlands and coastal Great Lakes as low water exposes new areas.
- **Impacts to the health of forests —** earlier budding from more variable spring temps cause freeze damage, affecting tree species' survival and growth
- **More frequent and larger wildfires —** warm, drier conditions have led to more extreme fire conditions and longer fire seasons.
- **Extreme weather events including flooding and extreme heat days —** flooding can affect coastal ecosystems, cause shoreline erosion and result in property damage. Extreme heat can impact human health and place stress on species and ecosystems.
- **Species are on the move —** water temperatures are warming causing multiple Ontario fish species to shift northwards.
- **Species are interacting differently —** less snow and warmer winters has enabled some species to shift north leading to new interactions and an increased risk of spreading disease, and mismatch in species interaction, e.g., pollinators migrating north but their food/habitat plant source is not able to shift northward at the same rate.

Pollution

We release pollution into the air (e.g., sulphur and nitrogen oxides, particulate matter), soil (e.g., pesticides and heavy metals) and water (e.g., nitrates and phosphates). Tens of thousands of pollutants are currently circulating through the Earth's ecosystems, and many of them are having significant, large-scale impacts on biodiversity. For example,

pollution is responsible for causing acid rain falling on boreal and deciduous forests and associated aquatic ecosystems.

Pollution can also disrupt ecological processes. Manufactured chemicals and other pollutants contribute to a variety of health issues in both wildlife and humans, including cancer, birth defects, behavioural changes and chronic illness. Synthetic chemicals that block, mimic or interfere with natural hormone production (known as endocrine disruptors) can cause abnormalities in reproduction, growth and development, particularly in fish and amphibians. Some chemicals deplete the ozone layer, which allows more ultraviolet (UV) radiation to reach the Earth. UV rays can be especially damaging to ecosystems in the early spring, when vegetation is young and fish and frogs are laying their eggs in shallow water. Humans and some food crops are also at risk from higher levels of UV radiation (e.g., skin cancer in humans). Our urban and industrial development has increased the amount of light falling on ecosystems and there is a growing concern about this light pollution and its impacts on biodiversity — the disorientation of migrating birds, for instance, or changes in amphibian behaviour and disruptions in plant dormancy.

While the levels of many contaminants have decreased in Ontario, associated with regulatory controls and industry efforts, the deposition of excessive nutrients, as well as metals and other substances remains a concern for many of our ecosystems. Ground-level ozone in the southern portion of the province continues to rise, posing a risk to human health and to the vegetation communities that are fundamental to our biodiversity.

Invasive species

An invasive species can be any plant, animal or micro-organism that is introduced by human action outside of its natural past or present distribution and whose introduction or spread threatens the environment, the economy or society, including human health. When introduced into new ecosystems, invasive species can become novel predators, competitors, parasites, hybridizers, and diseases of native plants and animals. Once established, the ecological effects of invasive species can be irreversible, the costs of control are significant, and even with sustained efforts eradication may not always be possible.

Invasive species are one of the main threats to biodiversity at the global and national levels and are also a significant ecological threat to Ontario. The impact of invasive species to Ontario’s biodiversity is second only to habitat loss. Through their impacts to the natural environment, they pose a significant risk to Ontario’s natural areas and the outdoor recreational activities that they support. Not only do these impacts affect the

well-being and ability of Ontarians to enjoy nature, but they also represent a significant threat to Ontario's economy.

Examples of invasive species that have had negative ecological impacts in Ontario include: Invasive Phragmites which has caused considerable habitat losses for wetland–dependent wildlife, including numerous species at risk; Zebra and Quagga Mussels which have led to significant changes to aquatic ecosystems within the Great Lakes and beyond; and Emerald Ash Borer, an invasive wood-boring beetle that has already caused extensive damage to ash tree populations in Ontario.)

Ontario has had more non-native species establish within its borders than any other Canadian province or territory and will continue to be susceptible to invasive species introductions and spread. This is in part because Ontario has a large, diverse population that is both locally and globally mobile, and supports an active, growing economy that imports goods from all over the world. In addition, much of the habitat in southern Ontario has been altered or disturbed, further increasing susceptibility to new invasions. Finally, climate change also poses an additional threat that could facilitate new invasions into Ontario and promote the spread of invasive species that are already established.

Cumulative impacts of threats

Pressures on Ontario's biodiversity are often treated as if they act in isolation. In reality, Ontario's species and ecosystems often face several threats at the same time, and in many cases, these threats are inextricably linked. This can involve multiple instances of the same type of threat (e.g., numerous water withdrawals in one watershed) or different threats acting on the same system (e.g., fragmentation of forest habitat along with invasive species). When combined, these threats to biodiversity have a far greater negative effect than any one threat on its own. Multiple threats impact both aquatic and terrestrial ecosystems and can result in a slower recovery time following disturbance.

The broad range of threats to biodiversity requires an integrated, adaptive conservation approach that involves all sectors of society. The loss or degradation of biodiversity not only affects ecosystem function but also damages society's ability to generate wealth and support livelihoods. Individuals, businesses and agencies, therefore, have a role to play in biodiversity conservation.

Glossary

5 Rs: a system for waste management that suggests a hierarchical order of actions that include: **Refuse** (refuse to buy or use wasteful products), **reduce** (reduce the amount of wasteful products), **reuse** (reuse products where possible rather than single-use products), **repurpose** (upcycle or use products for another purpose), and then **recycle** (if the product needs to be disposed of recycle it).
Action plans (or implementation plans): are road maps for action created by industry, government, businesses, organizations, community groups, municipalities, educational institutions and others. These plans adopt the vision and goals outlined in Ontario's Biodiversity Strategy, 2023 and identify specific actions to help achieve them.
Adaptive management: an ongoing systematic process for improving management policies and practices by learning from the outcomes of operational programs and incorporating new information.
Biocapacity: the capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management regimes and extraction technologies. Biocapacity is usually measured in global hectares (gha).
Biodiversity (or biological diversity): the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
Climate change: any change in climate over time due to natural variability or as a result of human activity.
Climate change adaptation: the ability to respond and adjust to actual or potential impacts of changing climate conditions to moderate harm or take advantage of any positive opportunities such changes may afford.
Climate change mitigation: an intervention intended to reduce adverse human influence on the climate system; it includes strategies to lower greenhouse gas emissions and to enhance greenhouse gas sinks.
Conservation: the maintenance of the Earth's resources in a manner that sustains ecosystem, species and genetic diversity and the evolutionary and other processes that shaped them. Conservation may or may not involve the use of resources; that is,

certain areas, species or populations may be excluded from human use as part of an overall landscape/waterscape conservation approach, while in other areas, the sustainable use of biological resources may be permitted.
Ecological footprint: a metric that assesses the human demand for certain natural resources and identifies whether our collective consumption levels and waste generation are approaching or exceeding the Earth's ecological limits. The Ecological Footprint provides an indicator of the pressure on biodiversity by measuring the competing level of ecological demand that humans place on the biosphere.
Ecological integrity: the quality of a natural unmanaged or managed ecosystem in which the ecological processes are sustained, ensuring genetic, species and ecosystem diversity for the future.
Ecological processes: the interactions and connections between living and non-living systems, including the movement of energy, nutrients and species.
Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their physical environment functioning as an ecological unit.
Ecosystem based approaches: resource planning and management activities that take into account the relationships among and between all organisms, including humans, and their environment.
Ecosystem diversity: the variety of habitats, plant and animal communities and associated ecological processes.
Ecosystem health: the ability of an ecosystem, through its structure and functions, to sustain biological diversity, biotic integrity and biological processes over time.
Ecosystem resilience: the capacity of an eco- system to adapt to changes and disturbances and still retain its basic functions and structures.
Ecosystem services: the services that humans derive from ecological functions such as photo- synthesis, oxygen production, water purification and so on.
Ecozone: an area of the Earth's surface that represents a large ecological zone with characteristic natural features and climate. Ecozones are distinguished from one another by their unique mosaics of plants, wildlife, climate, landforms and human activities.
Education: the guiding of learning processes in the form of instruction, experience or example. This includes formal, non-formal and informal education.

Environmentally harmful subsidies: subsidies that increase production or use of a product or substance with harmful environmental effects (CBD).
Environmental management system: a systematic approach to dealing with the environmental aspects of an organization. It is a tool that enables an organization of any size or type to control the impact of its activities, products or services on the natural environment. It is a process of plan, do, check, review and where necessary revise in the spirit of continual improvement. For the purposes of this document, we are referring to ISO 14001, environmental certification systems (e.g., Forest Stewardship Council, EcoLogo) and corporate social responsibility practices.
Ethical space: Indigenous knowledge keeper Willie Ermine defines the ethical space of engagement as " dialogue between human communities" and that "ethical space is formed when two societies, with disparate worldviews, are poised to engage each other." Ethical space is collaboration between Indigenous and non-indigenous partners to create the opportunity for knowledge systems to interact with mutual respect, kindness, generosity and other basic values and principles. It is founded on the belief that all knowledge systems are equal; no single system has more weight or legitimacy than another (adapted from the We Rise Together report).
Food security: when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
Genetic diversity: the variety of genetic information contained within individuals of a particular species. It improves a species' ability to cope with environmental stresses such as climate change.
Genetic resources: genetic material of actual or potential value.
Green/natural infrastructure: strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and function, and provide associated benefits to humans.
Guardianship: an approach to biodiversity protection and conservation based on the concept that people should speak and act on behalf of species and ecosystems that can't speak for themselves. Guardianship is built on the concepts of the interconnectedness of nature, sustainability, and reciprocity.
Integrated land use planning: a strategic way to allocate land for different uses to balance environmental, social, and economic values.

Integrated pest management (IPM): is a process to solve pest problems (such as infestations of harmful insects that damage agricultural crops, native species, or our homes) while minimizing risks to people and the environment. IPM can be used to manage pests in urban, agricultural, wildland or natural areas.
Intrinsic value: something valued for its own sake, not for what it can be fashioned into or produce.
Invasive species: an alien species whose introduction or spread threatens the environment, the economy and/or society, including human health.
Key biodiversity areas: are terrestrial and aquatic sites that are "contributing significantly to the global persistence of biodiversity" (IUCN). They must meet a globally agreed upon criteria which is outlined in the Global Standard for the Identification of Key Biodiversity Areas (IUCN 2016).
Landscapes: complexes of ecosystems in geographically defined areas.
Living in Harmony within Nature: is the concept that all living things including humans are interconnected and that we should live peacefully alongside all elements of nature even though we may need to exploit or use other organisms to some degree. (IPBES)
Living Planet Index: a measure of the state of the world's biological diversity based on population trends of vertebrate species from terrestrial, freshwater and marine habitats (Living Planet Index).
Mainstreaming: the informed inclusion of relevant environmental concerns in the decision making for all activities of individuals and institutions.
Mental health: a state of wellbeing in which an individual realizes their own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to their community (World Health Organisation, 2018).
Natural capital: indispensable resources and benefits, essential for human survival and economic activity, provided by the ecosystem.
Natural heritage: natural features consisting of physical and biological formations or groups of such formations, which are of outstanding value from the aesthetic or scientific point of view.

Nature positive: a term used to describe reversing the declines in biodiversity so that the species and ecosystems are regenerating rather than declining.
Other Effective Area-based Conservation Measures (OECMs): Other effective area-based conservation measures are geographically defined areas that are governed and managed over the long-term in ways that achieve the in-situ conservation of biodiversity even when conservation is not the primary goal. They can consider local cultural, spiritual, and socio-economic values.
Pollution: generally refers to contaminants from a source created by human activities. Major forms of pollution include air, light, water, noise and plastic pollution, soil contamination, radioactive contamination, as well as fugitive pesticides.
Protected area: a clearly defined geographic space, recognized, dedicated and managed through legal or effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Protection: a commitment to protect individuals, a population or subpopulation or an ecosystem (or portions of one) from adverse impacts that may result in their loss.
Rare species: small populations that are not currently endangered, threatened or of special concern but may be at risk. These species are usually localized within restricted geographical areas or habitats or are thinly scattered over a more extensive range. Rarity can be defined locally, regionally, provincially or territorially, nationally or globally.
Recovery: an action that is taken to reduce or eliminate a condition or circumstance that causes a species to be listed as threatened, endangered or extirpated.
Rehabilitation: the return of a species, a population or an ecosystem to a healthy, functioning state.
Resilience: see Ecosystem Resilience
Restoration: the return of a species, a population or an ecosystem to its state prior to a disturbance.
Species diversity: the variety of species found in a given region or habitat.
Species or ecosystems of conservation concern: a species or an ecosystem that is in decline, rare or scarce in the wild.

Species at risk: any wild plant or animal threatened by or vulnerable to extirpation or extinction in Ontario. Species at Risk are assigned a designation to represent the degree of imperilment (Special Concern, Threatened, Endangered or Extirpated).
Stewardship: an ethic that embodies cooperative planning and management of environmental resources in which individuals, organizations, communities and other groups actively engage in the prevention of habitat loss, as well as the facilitation of resource recovery and/or replenishment, usually with a focus on long-term sustainability.
Sustainable: the potential for long-term maintenance of well-being, which has environmental, economic and social dimensions.
Sustainable use: the use of natural resources in a way and at a rate that conserves an ecological balance without depleting or permanently dam- aging them, thereby maintaining the potential for future generations to meet their needs and aspirations. Sustainable use in this Strategy refers to consumptive uses of biological resources.
Threatened species: species that are likely to become endangered if the natural and/or human pressures limiting them are not reversed.
Traditional knowledge: knowledge gained from generations of living and working within a family, community or culture.
Unsustainable use: using natural resources at a rate that cannot be sustained over the long term.
Urban biodiversity: the variety and richness of living things, including genetic, species and ecosystem diversity, found in and around cities and towns and other currently or previously developed areas.
Watershed: the area of land that drains into a river, lake or other water body.
Wetlands: land that is saturated with water long enough to promote biological activity adapted to a wet environment. Wetland ecosystems provide ample food sources for a range of plants, insects, microbes, waterfowl and wildlife. They protect us from flooding, drought and climate change. They protect wildlife by providing hundreds of species with safe places to eat, sleep and raise young. They give us natural places to play, learn and explore. They also clean the water we enjoy at beaches, lakes and rivers.

Wilderness areas: Wilderness or wildlands are natural environments on Earth that have not been significantly modified by human activity

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