2011-2020
United Nations Decade on Biodiversity

## Renewing Our Commitment

# Ontario's Biodiversity Strategy 2011

*Protecting What Sustains Us*

Ontario Biodiversity Council

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## Ontario Biodiversity Council

**Formed in 2005 to guide the implementation of Ontario's first biodiversity strategy, the Ontario Biodiversity Council is a group of volunteers from environmental and conservation groups, government, academia, Aboriginal organizations and industry.**

**The Ontario Biodiversity Science Forum, the Biodiversity Education and Awareness Network and the Stewardship Network of Ontario all work alongside the Council to guide the implementation of Ontario's Biodiversity Strategy.**

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# A Message from the Ontario Biodiversity Council

Ontario has the largest economy in Canada and a high quality of life that attracts people from around the world. Our wealth and prosperity, our quality of life and our well-being are directly tied to the province's biological diversity—or biodiversity.

Biodiversity—the variety of life—is the province's rich natural bounty of plant and animal species, land, lakes and rivers, forests and other ecosystems that provide us with a healthy environment, clean air, productive soils, nutritious foods, and safe, clean water. This natural infrastructure also supports our forest, farming, fishing and recreation and tourism industries.

The Ontario Biodiversity Council recognizes the importance of biodiversity and is taking steps to conserve it as an essential part of building a strong and prosperous future for our province. Ontario's Biodiversity Strategy, 2011 provides a renewed commitment to safeguard Ontario's variety of species and ecosystems and puts forward an ambitious but practical conservation agenda.

Through the development of this strategy, the Ontario Biodiversity Council has been encouraged and inspired by the level of participation from all sectors, government and individuals who came together to share ideas, knowledge and a vision for the future.

Council recognizes that no single government, conservation organization or sector can deliver the scale of change required but, together, we can build upon the progress made and renew our commitment to conserving our wealth—our biodiversity.

**"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)."**



*Tree planting to commemorate release of Ontario's Biodiversity Strategy, 2011 (Steve Hounsell and Jon Grant).*

# Executive Summary

Ontario's Biodiversity Strategy, 2011 is the guiding framework for coordinating the conservation of our province's rich variety of life and ecosystems. It builds on the positive achievements of Ontario's 2005 Strategy and sets out new and updated direction for the next 10 years. The Ontario Biodiversity Council led the renewal process, with support provided by the Ontario Ministry of Natural Resources. The front half of this document provides context on Ontario's biodiversity and the threats acting upon it. The second half outlines the strategic framework for the conservation of Ontario's biodiversity over the next decade.

Biodiversity is the variety of life on Earth. It includes all living things and the ways in which they interact with one another and their environment. Simply put, biodiversity is life. There are three levels of biodiversity:

- genetic diversity—the variety of genetic information contained in individual plants, animals and micro-organisms
- species diversity—the variety of species
- ecosystem diversity—the variety of habitats, ecological communities and ecological processes

Conserving Ontario's biodiversity is very important because healthy ecosystems sustain healthy people and a healthy economy. We derive benefits from the ecosystem services provided by biodiversity including food, fibre and medicines, clean air and water and outdoor recreation that nourishes our physical and mental health. Ontario's biodiversity also has inherent value and deserves to be recognized, appreciated and conserved for its own sake.

Ontario residents are stewards of more than one million square kilometres of land and water, and this landscape is home to a rich diversity of life. Although the ecosystems that support this diversity are dynamic and resilient, they are limited in their ability to respond to rapid change. A recent province-wide assessment showed that many threats to biodiversity are increasing and that biodiversity losses are occurring, particularly in southern Ontario. Similar results have been found in countries around the world. There are six main threats to Ontario's biodiversity:

- habitat loss
- invasive alien species
- population growth
- pollution
- unsustainable use
- climate change

These threats to biodiversity often act together to produce a much greater negative effect than they do on their own. In addition to the identified threats, there are several challenges that must be addressed to conserve Ontario's biodiversity. There are also opportunities associated with the wealth of natural capital that remains and with the conservation frameworks that have been established.

The vision of this Strategy ***is a future where biodiversity loss is halted and recovery is advanced. People value, protect and enhance biodiversity and the ecosystem services essential for human health and well-being.***

Three goals define the conservation path proposed in this Strategy:

**Goal 1: Mainstream biodiversity by incorporating biodiversity considerations into decision-making across the province, in different sectors and in our homes, workplaces and schools.**

**Goal 2: Protect, restore and recover Ontario's genetic, species and ecosystem diversity and related ecosystem functions and processes.**

**Goal 3: Use Ontario's biological assets sustainably.**

The Strategy highlights four strategic directions that reflect the critical components required to conserve Ontario's biodiversity:

- Engage People
- Reduce Threats
- Enhance Resilience
- Improve Knowledge

Each of the strategic directions is supported by long-term objectives, outcomes and key actions. The success of this Strategy will be tracked through 15 specific targets representing key areas of focus for biodiversity conservation in Ontario. The progress will be monitored and assessed over a 10-year time frame to encourage people across all sectors to take on ambitious actions—actions that we hope will ultimately lead to securing and maintaining Ontario's biodiversity.

## Ontario's Biodiversity Strategy, 2011 Targets

1. By 2015, biodiversity is integrated into the elementary, secondary and postsecondary school curricula, including schools of business.
2. By 2015, 50 per cent of Ontarians understand biodiversity and its role in maintaining their health and well-being.
3. By 2015, the number of Ontarians who participate in biodiversity conservation activities is increased by 25 per cent.
4. By 2015, all sectors have initiated the development of implementation plans in support of Ontario's Biodiversity Strategy, and by 2020, those plans are implemented.
5. By 2020, all relevant policies and programs integrate biodiversity values.
6. By 2015, plans for climate change mitigation are developed and implemented and contribute to Ontario's target to reduce greenhouse gas emissions by 6 per cent below 1990 levels.
7. By 2015, strategic plans are in place to reduce the threats posed to biodiversity by invasive species.
8. By 2015, the release of pollutants harmful to biodiversity is reduced.
9. By 2020, the growth of Ontario's per-capita resource consumption and waste generation is halted and reversed.
10. By 2015, the status of species and ecosystems of conservation concern in Ontario is improved.
11. By 2015, the proportion of private lands in Ontario that are managed for biodiversity is increased.
12. By 2015, natural heritage systems plans and biodiversity conservation strategies are developed and implemented at the municipal and landscape levels.
13. By 2020, at least 17 per cent of terrestrial and aquatic systems are conserved through well-connected networks of protected areas and other effective area-based conservation measures.
14. By 2020, programs and policies are in place to maintain and enhance ecosystem services.
15. By 2015, a long-term monitoring and reporting system for assessing the state of Ontario's biodiversity is established and operating.

*Indigo Bunting*

Photo: Brendan Toews

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*Pond in rock barren, southeast of Arden*

Photo: Wasyl D. Bakowsky, NHIC Archives

# Introduction

All living things, ourselves included, rely on biodiversity to survive, so it is in our best interest to conserve the incredible variety of plant and animal species and the ecosystems they inhabit.

**Biodiversity is the variability among living organisms from all sources, including, among other things, 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 (CBD, 1992).**

Simply put, biodiversity is the variety of life on Earth.

## The Importance of Biodiversity

We depend on biodiversity for the necessities of life. For example, biodiversity provides us with clean air and water and the fertile soil in which to grow the food we eat. Wood, fibre and other raw materials all come from the natural world. Conserving Ontario's biodiversity is key to ensuring a healthy environment, strong communities and a thriving economy.

Biodiversity is the foundation upon which we derive benefits called ecosystem services. These benefits can come from species, such as bees that pollinate crops, or from a complex





### Biodiversity = Biological Diversity

There are three levels of biodiversity: genetic, species and ecosystem. Each level is important in its own way. **Genetic diversity** is the variety within the same species. In humans, for example, our genes determine such characteristics as hair and skin colour. Genetic diversity improves a species' ability to cope with environmental stresses such as climate change. **Species diversity** refers to all the different types of species within a region or habitat. More than 30,000 species can be found in Ontario. **Ecosystem diversity** is the variety of habitats and communities of plants and animals found in a certain area. Our province has many different ecosystems, including tundra, prairies, wetlands and forests.

*Ruby-throated Hummingbird*

Photo: David J. Hawke, OMNR

**Ecosystem Services**

| PROVISIONING | REGULATING | SUPPORTING | SOCIAL/CULTURAL |
|---|---|---|---|
|  |  |  |  |
| Food | Climate | Water cycling | Recreation |
| Raw materials | Flood prevention | Soil formation | Culture |
| Water supply | Pollination | Habitat | Mental health |

Photo credits (L–R): Heather Bickle, OMNR; Don Sutherland; NHIC Archives; Ontario Tourism

ecosystem, like a wetland that provides habitat, absorbs carbon and cleans 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.

In addition to providing us with the necessities of life, biodiversity fuels our economy. Tourism, fishing, agriculture, forestry and many other industries rely on biodiversity. Ontario's agricultural sector employs more than 164,000 people; our farm production contributed $22 billion in gross economic stimulus to Ontario in 2009 alone (JRG, 2010). Ontario's forestry industry is responsible for over 200,000 jobs across the province, with the value of forestry products estimated at $14 billion in 2008 (OMNDMF, 2011).

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 tools to help us understand the value of the added benefits from nature: its "ecosystem services." It has been estimated that southern Ontario's ecosystem services provide billions of dollars worth of economic benefits including those related to water and air purification and storm-water management (Troy and Bagstad, 2009). 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.

**"Our personal health, and the health of our economy and human society, depends on the continuous supply of various ecological services that would be extremely costly or impossible to replace." (CBD, 2010a)**

Nature also keeps us healthy. Biodiversity promotes good health by breaking down and recycling wastes, providing clean air and water and creating opportunities for outdoor recreation and exercise. Recent evidence also suggests that biodiversity may act as a buffer to protect humans from disease. Changes in biodiversity can increase the risk of infectious disease in plants and animals, as well as humans (Chivian and Bernstein, 2008; Keesing et al., 2010). When forests become fragmented into smaller patches, for example, the diversity of forest-dwelling species decreases, allowing populations of White-footed Mouse, the most

competent host for the bacteria that cause Lyme disease, to increase (Allan et al., 2003). This, in turn, can increase the risk of humans contracting Lyme disease (Schmidt and Ostfeld, 2001). This buffering effect provided by biodiversity may also apply to other agents that can infect humans, such as the West Nile virus (Ezenwa et al., 2006; Swaddle and Calos, 2008; Allan et al., 2009).

Medical research relies on biodiversity to answer many important questions. The Polar Bear's unique physiology, for instance, may hold clues for preventing and treating osteoporosis, kidney failure and type 2 diabetes, among other things. Over half of our most commonly prescribed drugs are derived from natural sources, including medicines used to treat infections and cancer, and scientists estimate that we have identified no more than 1 in 10 of all species on Earth (Chivian and Bernstein, 2008). As biodiversity is lost, so too, is the potential for new discoveries that could save or improve the lives of millions.

Biodiversity also nourishes our minds and spirits by providing a wealth of natural spaces for amazing outdoor experiences. With more than 400 Conservation Areas and 329 Provincial Parks and millions of hectares of Crown land in Ontario, the opportunities to explore and enjoy nature are immense. It is impossible to put a price on the value of this benefit. Canoeing in Quetico Provincial Park, fishing and boating on the Great Lakes or hiking along a Greenbelt trail are just a few of the ways we can enjoy the natural world that surrounds us.

**"The beauty of nature is something many people are enthralled by. There is something within the natural environment which people really connect to, and gives them an immense sense of satisfaction when they experience nature. For some there are cultural or spiritual meanings attached to the landscape, whereas for others it is simply the aesthetic quality of the natural environment which they enjoy so much." (DEFRA, 2007)**

Increasingly, research is showing that opportunities to explore and experience the natural world not only provide the physical health benefits of activity and exercise but also have psychological and developmental benefits. There are, for example, studies indicating faster recovery times from illness in patients with the ability to observe nature (Bowler et al., 2009). Other studies link reduced violence and aggression with the increased availability of green space in urban settings. In a recent study in the United Kingdom, the restorative quality of



## Biodiversity and Medicine

**Canada Yew, a coniferous shrub that grows in mature forests around the Great Lakes and in the central and northeastern parts of the province, is important for wildlife. White-tailed Deer and Moose eat yew, and songbirds feed on its red false-fruits.**

**Although extremely toxic if eaten by humans, Canada Yew has become highly valued by the pharmaceutical industry for its medicinal qualities. It is currently being used to produce drugs that fight ovarian, breast and non-small cell lung cancers.**

*Canada Yew*

Photo: Bob Dunlap

city parks was shown to increase with greater diversity of plant and animal species (Fuller and Gaston, 2009). Pioneering work in the United States also shows that our contact with nature is fundamental to our development. This work suggests that children with opportunities to get outside and freely explore nature are less inclined to show attention disorders and depression and are more likely to be physically and emotionally healthy (Louv, 2005).

Biodiversity defines who we are as a province and a people. We are and have always been shaped by our natural environment. Think about the iconic images of Ontario immortalized in paintings by the Group of Seven, who captured the stark beauty of our wilderness. First Nations art and culture, such as the Petroglyphs, are defined by a strong connection to nature and Ontario's plants, animals and environment. Our literature is also influenced by nature. The writings of early settlers like Susanna Moodie and modern authors such as Margaret Atwood draw inspiration and meaning from the wild and rural landscapes that are Ontario.

**"Writing about the natural world around us helps us to better understand how we can take an active role in conserving our precious natural resources, from the water we drink to the plants and animals in our local environments. By going outside and developing a basic knowledge of biodiversity, we can all respond creatively to the need for change in the way we live, work, learn and grow—especially in relation to our neighbours of other species."**

*— Margaret Atwood, speaking on the Get to Know Program (Get to Know Your Wild Neighbours, 2010).*

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. It is our responsibility, as citizens of Ontario, to conserve the species and ecosystems that are found in our province, for their own sake, for biodiversity's sake and for future generations.

***Original artwork by artist Franklin Carmichael, Group of Seven***

**Franklin Carmichael (1890–1945)**
**Mirror Lake 1929, watercolour over graphite on paper, 51 x 68.7 cm**
**Gift of Mrs. R.G. Mastin**
**McMichael Canadian Art Collection 1976.8**

## The Global Context

Ontario's Biodiversity Strategy, 2005 complemented international and national agreements and initiatives focused on maintaining the diversity and well-being of life and ecosystems on Earth. Our renewed Strategy continues this linkage to national and international efforts and aligns with new and emerging biodiversity initiatives within Ontario, elsewhere in Canada and in the global community.

At the national level, Ontario's activities support the Canadian Biodiversity Strategy, developed in 1995 through the collaboration of federal, provincial and territorial governments. At the international level, Ontario's activities advance the 1992 United Nations Convention on Biological Diversity and the global biodiversity strategy for 2011–2020 (Aichi Biodiversity Targets).

The increasing attention to biodiversity conservation around the world gives us reason to celebrate and remain hopeful that our efforts will achieve results. The United Nations recognized the importance of biodiversity by declaring 2010 the International Year of Biodiversity and 2011–2020 the United Nations Decade on Biodiversity. Both work to raise global awareness and understanding of biodiversity and its connection to human health and well-being. World leaders, G8 ministers and civic officials are recognizing that business as usual is not in the interests of the planet or the species that coexist here. Banks, insurance companies, industries and many other sectors are joining the conservation community in identifying biodiversity as the foundation upon which we live healthy, vibrant and secure lives.

*Green Sea Turtles, Bora Bora*

Photo: Michele Benoy-Westmorland

## Milestones for Biodiversity Conservation

**1980**
World Conservation Strategy is created.

**1987**
*Our Common Future* by the World Commission on Environment and Development (known as the Brundtland Commission) is released.

**1991**
The World Conservation Union (IUCN), the United Nations Environment Programme and the World Wildlife Fund update the 1980 World Conservation Strategy with *Caring for the Earth: A Strategy for Sustainable Living*.

**1992**
The United Nations Convention on Biological Diversity is completed at the Earth Summit in Rio de Janeiro, Brazil.

**1992**
The World Resources Institute, the World Conservation Union (IUCN) and the United Nations Environment Programme sponsor the *Global Biodiversity Strategy: Guidelines for Action to Save, Study, and Use Earth's Biotic Wealth Sustainably and Equitably*, which complements the Convention.

**1992**
Canada is the first industrialized nation to ratify the Convention on Biological Diversity.



### New International Commitment to Biodiversity Conservation

**Under the 1992 Convention on Biological Diversity, 193 parties work to sustain the diversity and well-being of life and ecosystems on Earth. In 2002, as a contribution to poverty alleviation and to the benefit of all life on Earth, Parties to the Convention set a target date of 2010 to achieve a significant reduction of the current rate of biodiversity loss at the global, regional and national levels. In 2010, the participating countries reported that this goal had not been met and that a new approach was required. At a meeting of the Parties to the Convention in October 2010, a new global strategy was established for 2011–2020 (CBD, 2010b). It will be the overarching framework on biodiversity under the Convention as well as biodiversity-related conventions dealing with wetlands (Ramsar Convention), migratory species, endangered species (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and natural and cultural heritage (UNESCO-Man and the Biosphere Programme). This new strategic plan, for the first time establishes five global strategic goals and 20 biodiversity targets to be achieved by 2015 and 2020.**

**1995**

Canada publishes the *Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity*. Its vision is "a society that lives and develops as a part of nature, values the diversity of life, takes no more than can be replenished and leaves to future generations a nurturing and dynamic world, rich in its biodiversity."

**2005**

*Protecting What Sustains Us, Ontario's Biodiversity Strategy, 2005* is released.

**2008**

*Interim Report on Ontario's Biodiversity 2008* is released.

**2010**

United Nations declares International Year of Biodiversity to raise global awareness and understanding of biodiversity.

*Canadian Biodiversity: Ecosystem Status and Trends 2010* is released by the Canadian Councils of Resource Ministers.

**2010**

The United Nations Conference of the Parties to the Convention on Biological Diversity agrees on a new global biodiversity strategy for 2011–2020 at Nagoya, Japan (Aichi Biodiversity Targets).

*State of Ontario's Biodiversity 2010* and *Ontario's Biodiversity Strategy Progress Report 2005–2010* are released.

**2011**

*Ontario's Biodiversity Strategy, 2011: Renewing Our Commitment to Protecting What Sustains Us,* is released.

## Renewing Ontario's Biodiversity Strategy

Building on the positive achievements of the 2005 Strategy, Ontario's Biodiversity Strategy, 2011 sets out new and updated direction for the next 10 years. The Ontario Biodiversity Council led the renewal process, with support provided by the Ontario Ministry of Natural Resources.

Over the past six years, conservation and environmental groups, government departments and agencies, educators and academics, industry associations, landowners and other parties have worked to implement Ontario's Biodiversity Strategy and achieve its goals. Many of those efforts are documented in the Council's *Ontario's Biodiversity Strategy Progress Report 2005–2010* (OBC, 2010a).

In Ontario we are also working to improve our knowledge of biodiversity. The Council's *State of Ontario's Biodiversity 2010* report (OBC, 2010b) provides an assessment of the health of biodiversity and conservation efforts in our province and reveals, as do reports from around the world, that biodiversity is under threat despite increasing conservation efforts.

In Ontario, many people marked the International Year of Biodiversity by becoming involved in stewardship activities, sharing their passion of natural history with others and taking steps to reduce their Ecological Footprint. Ontario's Biodiversity Strategy, 2011 confirms the province's commitment to maintain course and to accelerate our efforts to protect what sustains us. It represents Ontario's response to the new global strategic plan under the United Nations Convention on Biological Diversity and to provincial and national reports that show we must do more to conserve biodiversity.

*Tri-coloured Bumble Bee*

**With more than 30,000 species, Ontario is ranked among the provinces with the highest diversity of known species in Canada. Over two-thirds of these species are insects.**

Photo: Larry Watkins, OMNR

# Ontario's Biodiversity

We are stewards of more than one million square kilometres of land and water. Our province supports a wide range of ecosystems, from the Carolinian forests in the southernmost part of Ontario to the tundra of the Hudson Bay Lowlands in the Far North. More than half the province is forested. We have over 250,000 lakes, 500,000 kilometres of streams and large portions of the Great Lakes, representing a significant proportion of the world's freshwater resources.

Our landscape is home to a rich diversity of life. This biodiversity exists at three levels. **Genetic diversity** is the variety of genetic information contained within individuals of a particular species. **Species diversity** is the variety of species. **Ecosystem diversity** is the variety of habitats, ecological communities and associated ecological processes. 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.

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



## Ontario's Biodiversity—Ours to Discover

**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.**

*New lichen species found on the Niagara Escarpment*

Photo: Chris Lewis

most species are genetically adapted to local conditions and climate. Recent 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. 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.

With more than 30,000 species, Ontario is ranked among the provinces with the highest diversity of known species in Canada (OBC, 2010b). Over two-thirds of these species are insects, and there are more than 800 vertebrate species (mammals, birds, reptiles, amphibians and fishes) and over 5,500 species of plants. And new species are being discovered every year. Our knowledge of some groups, especially naturally occurring fungi and micro-organisms, is far from complete. Although most of Ontario's native species are secure, a few 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 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



### Reservoir for the Future

**Just over 14,000 years ago, Ontario was deeply buried under glacial ice. As the glaciers retreated northward, plants and animals from the south gradually colonized the area. The genetic, species and ecosystem diversity found in Ontario today is the result of this colonization. A loss of biodiversity in regions south of Ontario will affect the potential for future colonists. Our rich array of biodiversity provides resilience and is an important reservoir for coping with such future stresses as climate change.**


Photo: Terese McIntosh, OMNR

Great Lakes, and alvars (flat open limestone barrens with thin soil) occur on Manitoulin Island and in several locations in southern Ontario. Ecosystems are dynamic—constantly changing in response to the interactions between living organisms and their physical environment, and the effects of natural forces such as wildfires and flooding. A diverse pattern of healthy, functioning ecosystems on the landscape provides 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.

## Ontario's Ecozones

Based on ecology, climate and topography, Ontario can be divided into four 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).

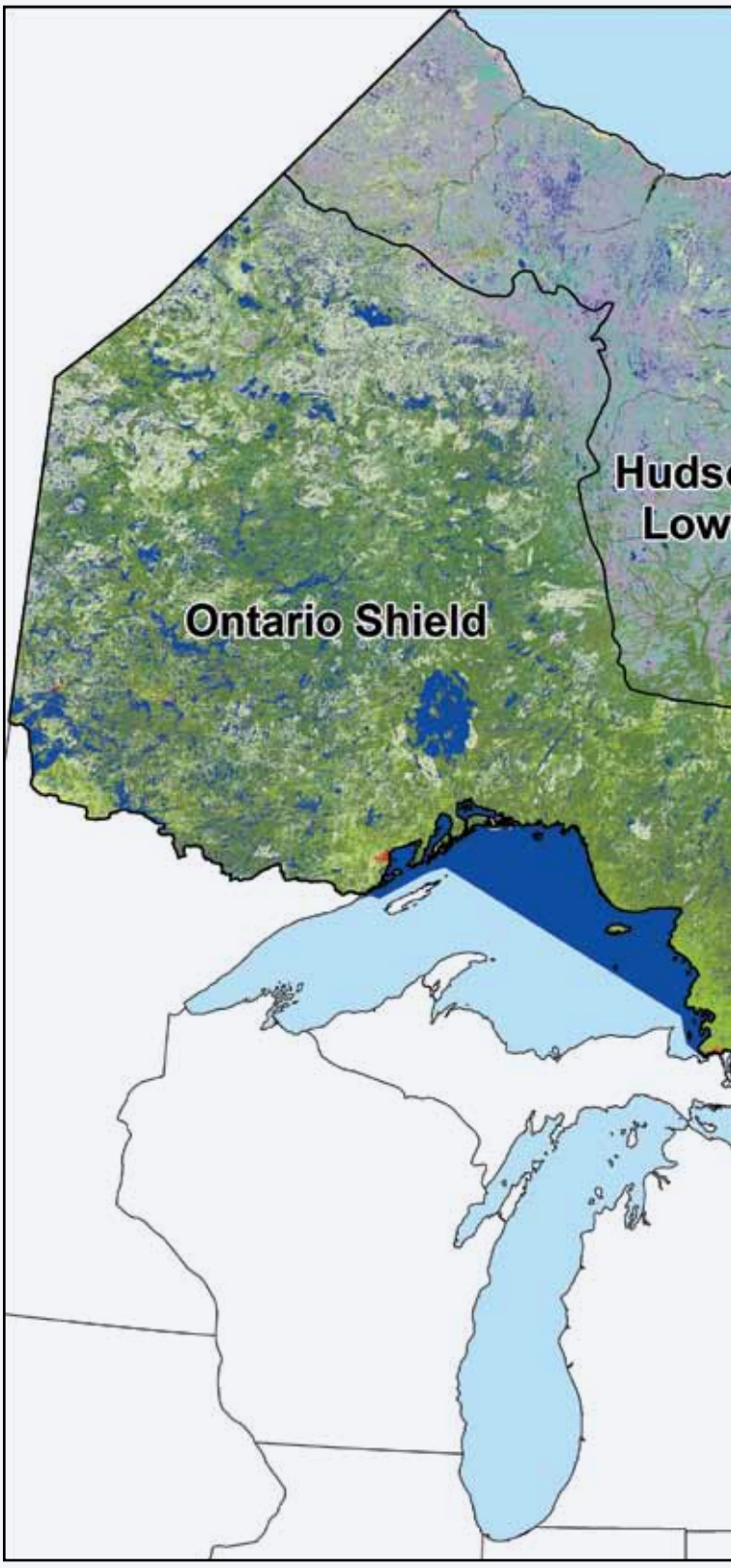
**What is an ecozone?** It is an area of the Earth's surface that represents a broad ecological unit with characteristic natural features and climate. Ecozones are distinguished from one another by landforms, soil, vegetation, climate, water and human factors.

### Urban Biodiversity

**Ontario's cities, towns and other urban areas are often overlooked for their biodiversity. Many cities contain a richness of habitat types and support a wide variety of resident species. They are also important stopovers for migratory songbirds and butterflies. In addition, urban biodiversity provides beneficial ecosystem services. For example, our city trees act as natural air conditioners, cooling our neighbourhoods in the summer; urban creeks and rivers absorb heavy rains and help prevent flooding; and parks and other natural habitats provide educational opportunities and recreational spaces that improve our physical and emotional health and well-being. Many cities now view biodiversity as an essential element of community infrastructure and are taking action to ensure that urban biodiversity is protected and maintained.**

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. Only about 0.03 per cent of Ontario's population (4,275 people in 2006) 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. It is also likely that hydroelectric and wind power projects will be developed.

The **Mixedwood Plains** is Ontario's smallest ecozone. Although it covers only 8 per cent of the province, it is home to about 35 per cent of Canada's population and 92 per cent of Ontario's population. 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.




*Ontario's Ecozones*


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. About 8 per cent of Ontario's population (943,313 people in 2006) 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, contains 18 per cent of the world's supply of surface fresh water. 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. This ecozone supplies 85 per cent of Ontario's drinking water 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.

*Manitoulin Island*

Photo: Ontario Tourism

# Threats

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, 2010b).

## Habitat Loss

Plant and animal species are less resilient to external pressures when the ecological communities of which they are a part 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 functioning of entire ecosystems and the ecosystem services on which we depend.

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. 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.

Photo: Ontario Tourism

## Invasive Alien Species

Any plant, animal or micro-organism that is accidentally or deliberately introduced into a habitat outside its normal range is an alien species. An invasive species is a harmful alien species whose introduction or spread threatens the environment, the economy or society, including human health. It can originate on another continent, in an adjacent country or in another ecosystem within Ontario or the rest of Canada.

Without the predators and competition found in its native range, an invasive species can quickly reproduce and spread. It can infest, damage, displace or destroy native species and ecosystems (e.g., Emerald Ash Borer), agricultural crops (e.g., Plum Pox Virus), wetlands (e.g., Purple Loosestrife) and lakes and rivers (e.g., Zebra Mussel), causing significant ecological and economic damage. Once established, invasive species are extremely difficult and expensive to control and are usually impossible to eradicate.

More than 1,000 alien plant species can be found in Ontario, of which 441 are considered to be invasive (CFIA, 2008). In 2009, there were 186 alien aquatic species in the Great Lakes. Although the rate of Great Lakes invasions increased from the 1940s to 2000, the rate appears to have declined over the past decade. This may be related to new ballast-water regulations.


*Zebra Mussels on buoy*

## Population Growth

One of the main pressures on Ontario's biodiversity is our growing human population (estimated at 13.1 million in July 2009), which is predicted to increase by 4.8 million by 2036 (OMOF, 2010). Most of this growth will occur in southern Ontario, where the biodiversity of the Mixedwood Plains Ecozone is already under significant stress. As the population grows, more prime agricultural land and natural habitats will

### Pollinators

**All the world's flowering plants require pollination, and many rely on animals to perform this service. About 35 per cent of the world's food supply comes from crops that are dependent on animal pollinators such as bees, wasps, butterflies, moths, birds and bats. Recently, scientists have noticed that pollinating species are in decline around the world. In North America, for example, the Honey Bee is being threatened by parasitic mites and colony collapse disorder—a poorly understood occurrence in which an entire colony of worker bees disappears from the hive. Other causes of pollinator decline in Ontario could be the result of habitat loss and fragmentation, introduced pathogens and parasites, pesticides and climate change (NRC, 2007).**

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, Ontario's biodiversity will continue to be eroded by our growing population.

## 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.


*Illegal dumping on Crown land*

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 disrupters) 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.

## Unsustainable Use

Unsustainable use is the harvest 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.

## Climate Change

Climate change is an increasingly important factor in biodiversity conservation. It threatens the composition of ecosystems we associate with Ontario land and waterscapes, because individual species vary in their ability to disperse or adapt to a changing climate. Climate change may increase the viability of certain pest species and facilitate the spread of invasive species. It can also affect the way species interact. For example, earlier flowering times could mean that flowers bloom before pollinating insects have emerged for the season. As a result, ecosystem functions may be impaired and the survival of certain species may be threatened.




*Common Five-lined Skink*

**Figure 6.A**

**Climatic conditions of ecoregion 6E 1971-2000**

100 0 100 200 300 400 500km

- Settlement
- Provincial / State Boundary
- Ecoregion Boundary
- Full Climate Envelope
- Core Climate Envelope

Notes:
D.W. McKenney, J.H. Pedlar, K. Lawrence, P.A. Gray, S. Colombo, and W.J. Crins. 2010. Current and Projected Future Climatic Conditions for Ecoregions and Selected Natural Heritage Areas in Ontario. Ontario Ministry of Natural Resources, Applied Research and Development Branch, Climate Change Research Report CCRR-16. Sault Ste. Marie ON.

Climate information derived from spatial climate data provided by Natural Resources Canada, Canadian Forestry Service, Sault Ste. Marie.

Published February, 2010, © 2010, Queen's Printer for Ontario. This map is a product of the Applied Research and Development Branch, Ontario Ministry of Natural Resources and the Canadian Forest Service. Produced By: The Provincial Geomatics Service Centre, PGSC. Project ID: #8411. Projection: Lambert Conformal Conic. Datum: North American Datum 1983. This map is intended for the purposes of illustration and discussion only. It shows one of a range of possible future projections of Ontario's climate. Predictions of future climate may vary from those shown here due to uncertainty in the rate of global release of greenhouse gases due to human activity, unknown or inaccurately quantified feedback responses releasing/absorbing greenhouse gases from land and water ecosystems, and shortcomings associated with climate modelling. Do not rely on this map for legal administrative purposes. This map may contain cartographic errors or omissions.

N

Ontario


**Figure 6.D**

**Migration of the climatic conditions of ecoregion 6Ebased on projections from CGCM2 under emissions scenario A2 2071-2100**

100 0 100 200 300 400 500km

- Settlement
- Provincial / State Boundary
- Ecoregion Boundary
- Full Climate Envelope
- Core Climate Envelope

Notes:
D.W. McKenney, J.H. Pedlar, K. Lawrence, P.A. Gray, S. Colombo, and W.J. Crins. 2010. Current and Projected Future Climatic Conditions for Ecoregions and Selected Natural Heritage Areas in Ontario. Ontario Ministry of Natural Resources, Applied Research and Development Branch, Climate Change Research Report CCRR-16. Sault Ste. Marie ON.

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*Projected changes in climatic conditions found in ecoregion 6E (top: climatic conditions 1971–2000; bottom: movement of climatic conditions projected for 2071–2100).*

Recent work by the Canadian Forest Service and the Ontario Ministry of Natural Resources illustrates the strong likelihood that climate conditions associated with each ecoregion will shift northward faster than the species within the region can migrate, particularly trees and other plants (McKenney et al., 2010). Add to this the complication of natural barriers to dispersal, and Ontario's biodiversity faces an uncertain future.

We are already seeing climate-related changes in the distribution of many Ontario species, and there has been a reduction in ice cover on the Great Lakes and some inland water bodies. The declining condition of Ontario's Polar Bears and the survival of their population have been associated with reduced ice cover and access to prey (seals) in Hudson Bay and James Bay.

Climate change models based on moderate greenhouse gas reductions suggest that Ontario's average annual air temperature will increase by 2.5 to 3.7 Celsius degrees by 2050 over 1961–1990 levels. These increases will be greatest in the north. Biodiversity will also be affected by changes in precipitation patterns and an increase in frequency or severity of extreme weather events associated with climate change.

## 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 alien plant 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.

### Climate Change and Biodiversity

**The relationship between biodiversity and climate change runs in two directions. While climate change poses a serious threat to Ontario's biodiversity, conservation of biodiversity can play an important role in mitigating climate change (reducing greenhouse gas concentrations) and in adapting to climate change (tolerating or coping with the impacts). Ecosystems such as forest and wetlands, for example, are important carbon sinks that help reduce greenhouse gas concentrations. Maintaining or restoring habitat corridors and intact natural habitats, as well as preserving genetically diverse populations, will provide the opportunity for some native species to adjust their distribution as ecoregions move northward. The conservation of protected areas and other natural habitats that favour high biodiversity is especially important in this regard. Although efforts are required for climate change mitigation, adaptation efforts probably have a stronger relevance to biodiversity conservation, since we are already seeing some of the impacts of climate change.**

# Challenges to Conserving Ontario's Biodiversity

There are several challenges to conserving Ontario's biodiversity. Although not specifically identified as threats in the previous section, these challenges are, to a large extent, the overarching drivers that are eroding Ontario's biodiversity. By confronting these challenges head-on, we can conserve the natural capital that sustains us.

## Consumption Patterns

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. 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.

## Valuing Biodiversity

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 ecosystems 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. 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. Incentive programs to reward biodiversity conservation efforts will be helpful in this regard, as will consumer choice for environmentally friendly and sustainably sourced products.

## Investment of Resources and Funding

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

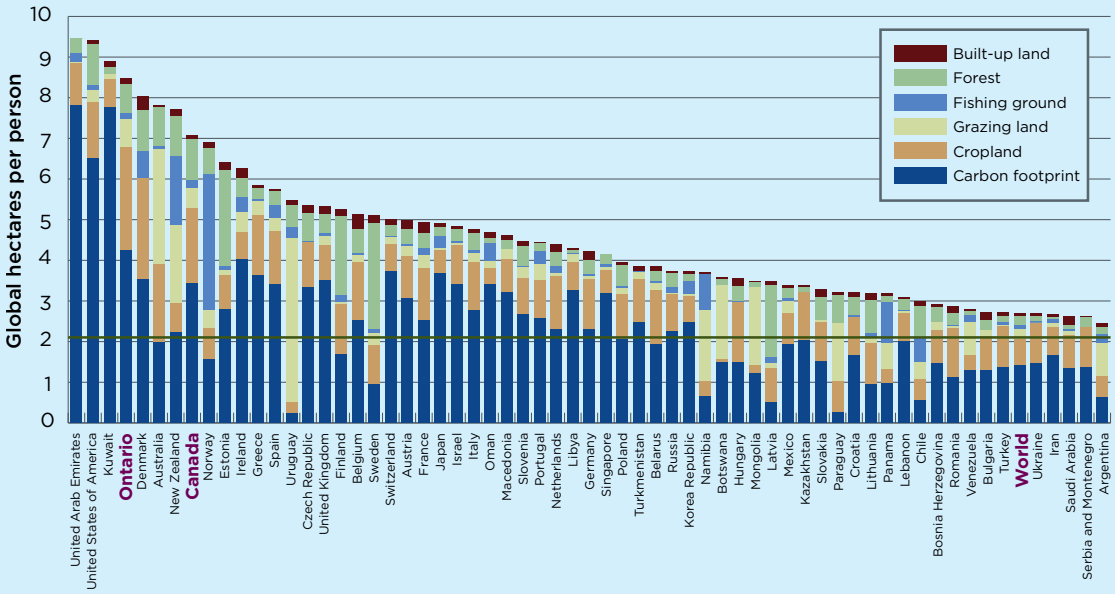
## Ontario's Ecological Footprint

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 rank among the top four global populations placing the greatest demand on the planet's natural resources. We are exceeded only by the United Arab Emirates, the United States and Kuwait. In 2005, the average Ecological Footprint in Ontario was 8.5 gha per person, which is equal to the province's biocapacity. This is also considerably higher than the average Canadian Ecological Footprint of 7.1 gha. For more information, visit www.footprintnetwork.org.




*Ontario's Ecological Footprint compared with the Ecological Footprints of a selection of countries with available data, 2005 (Stechbart and Wilson, 2010).*
*The green line represents the global average biocapacity of 2.1 gha per person.*

efforts have not been able to prevent the continued loss of the province's biodiversity. Currently, funding of the three provincial ministries whose mandates include biodiversity (Environment; Natural Resources; Agriculture, Food and Rural Affairs) is about 2 per cent of the provincial budget, less than 0.5 per cent of the provincial gross domestic product (not all of the budget allocations of these ministries is spent on biodiversity conservation). 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.

## Understanding

Most of us agree that protecting the environment and conserving natural resources are good things to do. Why, then, do our actions continue to impact biodiversity and the life-support systems it provides? We need to understand the linkage between our everyday activities and decisions, their collective impact on our natural world and how these affect our health, our communities and our economy. We need to realize that biodiversity conservation is in our own best interest—and that of our children and grandchildren.

Despite significant biodiversity research and monitoring, our knowledge of the state of genetic, species and ecosystem diversity and of the complex interactions and processes they embody is far from complete. A recent assessment of the state of Ontario's biodiversity has identified several important knowledge gaps that must be addressed (OBC, 2010b). These include the need to adopt new monitoring programs, update stale information, analyze existing data sets and develop research programs to deal with important biodiversity questions. To succeed in conserving our biodiversity, it is important that we improve our understanding of what motivates individuals and organizations to become involved in biodiversity conservation. Expanding our knowledge base will require additional investment and collaboration. Sharing and improving access to this information is equally important. At the same time, the precautionary approach must be incorporated into our decision making when there are threats to Ontario's biodiversity but a lack of scientific certainty.


*Angler with Northern Pike, Toronto Islands*

## Collaboration

Many Ontario public and private agencies, organizations and institutions are involved in biodiversity conservation. While the overall goals of these groups may be similar, they do not always work in concert. And, in some cases, the activities, policies and programs of certain sectors may inadvertently be harmful to our biodiversity. Our renewed Strategy encourages all sectors to examine their activities and to develop implementation plans to reduce the ecological impacts of their operations. It also encourages cooperation across governments, agencies, sectors and jurisdictions, including the identification of new opportunities and new partners for collaboration. In many cases, the management of species and ecosystems is shared among levels of government within Ontario, as well as with the governments of other provinces, states and countries. Increased collaboration will ensure that the limited resources available for biodiversity conservation are used most effectively. Not only is biodiversity an environmental issue, it is also an important issue to human health and the health of our communities and economy.

*Backus Woods*



**There is a strong network of individuals and organizations implementing stewardship projects to conserve Ontario's biodiversity. We can build on Ontarians' interest in the environment and biodiversity to create support and momentum for this strategy.**

Photo: Jean-Francois Bergeron

# Opportunities

There are serious threats and challenges to biodiversity conservation in Ontario, but there are also opportunities to identify and implement solutions. Efforts to reduce risks and conserve biodiversity have increased since the release of Ontario's Biodiversity Strategy, 2005. The opportunities described here are presented as starting points or foundational elements for achieving the goals of the 2011 Strategy and, in particular, for placing biodiversity on the public agenda. This is not a comprehensive listing but includes some examples of important actions or achievements on which we can build.

## Ontarians Care

We care about the environment, and many of us participate in efforts to conserve biodiversity.

While biodiversity may not yet be a household term, Ontario residents care about clean air and water, wildlife and parks. We are concerned about the smog that not only blankets our large cities but also blows northward, affecting lands, waters and communities far from the sources of pollution. We are increasingly appreciating the importance of protecting our water supply. Ontario households participate actively in 3Rs programs (Reduce, Reuse, Recycle) to try to control our production of garbage. Issues like climate change have captured considerable public attention in recent years. There is a growing appetite among consumers to purchase locally grown Ontario agricultural products. We can build on this environmental concern and commitment to support biodiversity conservation

### Stewardship

**We have shown our commitment to conserving biodiversity by participating in a variety of stewardship activities. Between 2006 and 2008, more than 33,000 Ontario residents volunteered annually for biodiversity conservation projects, ranging from protecting bird habitat to supporting on-farm environmental projects through the Canada-Ontario Environmental Farm Plan. Landowners actively participate in government initiatives such as the Managed Forest Tax Incentive Program, which, by 2008, had over 11,000 participating properties covering 728,434 hectares. Stewardship is a growing trend in Ontario, as more and more people take an interest in the environment and in protecting Ontario's biodiversity. Engagement through stewardship remains critical to ensuring the success of Ontario's Biodiversity Strategy.**

*Solar farm at sunset*

Photo: Stewart Stick



and the goals of this Strategy. Ontario has many organizations dedicated to environmental and conservation issues, and a strong network of individuals and organizations is implementing stewardship projects to conserve Ontario's biodiversity.

## A Solid Foundation

Ontario has a foundation of legislation and policy on which to build actions to protect biodiversity and to sustainably use biological assets. The province's current legislative and policy framework supports biodiversity conservation on numerous fronts, including sustainable forest management on Crown lands, clean air and water, local planning, private land stewardship and environmental assessment.

This framework has been strengthened considerably since the 2005 Strategy through a number of new laws and policies, including the Endangered Species Act, the Far North Act, the Provincial Parks and Conservation Reserves Act, the Greenbelt Act, the Greenbelt Plan, the Clean Water Act, the Places to Grow Act and Ontario's Action Plan on Climate Change. We need to build on, strengthen and integrate this foundation through the implementation of our renewed Strategy.

## The Ontario Biodiversity Council

The formation of the Ontario Biodiversity Council and its working groups in 2005 was a major step in coordinating our efforts to conserve Ontario's biodiversity. In addition to guiding implementation activities for Ontario's Biodiversity Strategy, the Council has issued reports on the state of Ontario's biodiversity (OBC, 2010b) and on the progress of the 2005 Strategy (OBC, 2008; OBC, 2010a). It also provides an established forum where a wide range of stakeholders can come together to address biodiversity conservation challenges—an important advantage in implementing a renewed Strategy.

## A Legacy for the Future

Ontario has a wealth of natural capital. Despite documented biodiversity losses, particularly in southern Ontario, more than 90 per cent of the province has natural cover in the form of forests, wetlands, lakes and streams, and there are still intact, self-sustaining ecosystems populated with a variety of native species. Compared with many other places on Earth, we are fortunate to have so much natural capital remaining. It provides a strong basis for ecosystem restoration and for reconnecting habitats that have been fragmented by human activity. Globally, the cumulative and increasing impacts of multiple threats, including climate change, have made biodiversity conservation an urgent priority. We are at a critical point in Ontario if we are going to keep what we have. But this challenge is also an opportunity to take action now and in the near future to ensure that we can pass on Ontario's immense natural wealth to our children and grandchildren.

Photo: Ontario Federation of Anglers and Hunters

*Water Chestnut removal on the Ottawa River in Voyageur Provincial Park*

*North of Piwabiskau River, Cochrane District*

Photo: Sam Brinker

# Ontario's Biodiversity Strategy

Ontario's Biodiversity Strategy is based on working together—within and across communities, organizations and sectors—to attain mutually beneficial goals and outcomes for biodiversity. The challenge is to coordinate our efforts so that we can achieve greater success in a more efficient and effective manner.


*Moose*

*Hilton Falls Conservation Area*

Photo: Ontario Tourism

# Vision

*Our vision is a future where biodiversity loss is halted and recovery is advanced. People value, protect and enhance biodiversity and the ecosystem services essential for human health and well-being.*

We seek a future where:

- Together, we have halted biodiversity loss and have advanced recovery. In key areas under threat from human development, we have restored ecological integrity and brought species at risk of extinction back to self-sustaining levels.
- All people recognize that we must live within nature's means, that the Earth does not have an endless capacity to tolerate and absorb the impacts of human activity. We place a high value on our natural heritage and the many benefits that it provides. We are determined to pass our rich natural heritage on to future generations.
- Sustainable living is a priority and is regarded as a responsibility by all sectors of society—government, business and industry, communities, institutions and organizations and individuals.
- Ontario has a sustainable economy in which human needs are met but human consumption and production do not deplete biodiversity. Ecological assets are included in our indicators of environmental, social, cultural and economic well-being.
- The health of species, including humans, and ecosystems has improved. We have removed some of the most harmful substances that have been systematically accumulating in nature, and we have reduced pollutants in our water, air and land.
- Urban sprawl has been contained, farmland is no longer being lost, and our communities are healthy.
- Ontario's Biodiversity Strategy is part of a strong global effort to protect biodiversity and ensure sustainable use of biological assets.

Such fundamental changes can happen if we capture the imagination and inspire the commitment of all people. Ontario's biodiversity can be conserved, if our attitudes and behaviours change. This renewed Strategy is meant to continue to stimulate interest, involvement and action.

# Goals

Three goals define the conservation path proposed in this Strategy:

## Goal 1:

Mainstream biodiversity by incorporating biodiversity considerations into decision making across the province, in different sectors and in our homes, workplaces and schools.

## Goal 2:

Protect, restore and recover Ontario's genetic, species and ecosystem diversity and related ecosystem functions and processes.

## Goal 3:

Use Ontario's biological assets sustainably.

Our goals will not be achieved quickly or easily. Many threats and obstacles lie ahead, as well as opportunities. This Strategy sets out long-term direction and practical steps that can be achieved, measured and reported on over the next 5 to 10 years. Where possible, it identifies groups that can lead the effort to develop solutions.


*Silent Lake Provincial Park*

### What is Mainstreaming?

**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.**

# Principles

This Strategy is guided by core principles that build on the Canadian Biodiversity Strategy (MSSC, 1995) and Ontario's Biodiversity Strategy, 2005 (OBS, 2005). They establish important concepts, values and approaches that form the basis for the renewed Strategy and its implementation.

## ECOLOGICAL PRINCIPLES

**To protect biodiversity, we must understand and apply key ecological concepts, such as:**

- All species, including humans, are connected.
- Maintaining the integrity, dynamics and resiliency of natural systems is critical.
- Habitat connectivity is essential at local, regional and wider scales.
- Biodiversity is best conserved in natural habitats at all levels: genetic, species and ecosystem.

## SOCIETAL PRINCIPLES

**To help mainstream biodiversity, people must understand and believe that:**

- Biodiversity has ecological, economic, social, cultural and intrinsic value.
- We each depend on biodiversity for our health and well-being and have a responsibility to contribute to its stewardship.
- Biodiversity is a valuable asset, and it is important that all people become involved in making decisions about the use of our air, water, land and other natural resources.

## MANAGEMENT PRINCIPLES

**The conservation and sustainable use of biodiversity requires:**

- An ecosystem approach for the integrated management of land, water and living resources.
- Maintaining biodiversity as the first priority in conservation initiatives, because it is far more cost-effective and less risky than are recovery and restoration activities.
- Adaptive management and long-term monitoring of ecosystem health and function, given the complex and dynamic nature of ecosystems and the uncertainty about climate change.
- The support, involvement, knowledge, innovations and practices of Aboriginal and local communities.
- Development decisions that integrate ecological, economic, social and cultural values within the broader context of conserving biological diversity.
- Cooperation and sharing of knowledge among governments and organizations at all levels.
- Application of the "precautionary approach."

## Adaptive Management

"Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Its most effective form—"active" adaptive management—employs management programs that are designed to experimentally compare selected policies or practices, by evaluating alternative hypotheses about the system being managed." (BC MFLNRO, 2011)

Adaptive management focuses on learning and adapting as our knowledge base improves, through partnerships of managers, scientists and stakeholders who learn together how to conserve sustainable ecosystems.


*Adaptive Management Framework (Government of Canada, 2010).*

## The Precautionary Approach

The precautionary approach is a response to uncertainty in the face of risks to our environment. It involves acting to avoid serious or irreversible potential harm, despite lack of scientific certainty as to the likelihood, magnitude or cause of that harm. Applying precaution is a fundamental component of biodiversity conservation.

# A Framework for Action

The purpose of this Strategy is to provide guidance and a common focus for biodiversity conservation in Ontario. It aims to build on the good work already being done, raise awareness of biodiversity values, facilitate the coordination of activities through synergies and partnerships and support and encourage the efforts of communities and individuals to conserve Ontario's biodiversity.

Four strategic directions reflect the critical components required to conserve Ontario's biodiversity:


Each of the strategic directions is supported by long-term objectives and outcomes to focus our efforts, provide aspirations for achievement and establish a flexible framework through which all sectors can plan their biodiversity conservation activities.

This Strategy identifies the key actions needed to conserve Ontario's biodiversity. Each action relates to one or more specific objectives and outcomes and contributes to achieving the Strategy's vision and goals. This is not an exhaustive list; the actions that are taken will depend on provincial, regional and local priorities, availability of funding, opportunities to build on local experience and capacity and existing biodiversity conservation initiatives. The Ontario Biodiversity Council acknowledges that more specific actions may be required to address local or regional conservation priorities.

This Strategy also identifies broad roles and responsibilities for groups involved in implementing the recommended actions. These groups include all levels of government (federal, provincial, municipal, agencies), non-government organizations, sectors including business, health, education and science, the public and the Ontario Biodiversity Council and its three working groups: Biodiversity Education and Awareness Network, Stewardship Network of Ontario and Ontario Biodiversity Science Forum.

The success of this Strategy will be tracked through 15 specific targets representing key areas of focus for biodiversity conservation in Ontario and supporting national and international initiatives (e.g., Aichi Biodiversity Targets). We have chosen to monitor and assess progress over a 10-year time frame to encourage ambitious actions that are planned and coordinated across sectors; actions that will ultimately lead to significant improvements in the state of Ontario's biodiversity.

*Ontario's Biodiversity Strategy, 2011 is the guiding framework for conservation of Ontario's rich biodiversity over the next decade*

## VISION

Our vision is a future where biodiversity loss is halted and recovery is advanced. People value, protect and enhance biodiversity and the ecosystem services essential for human health and well-being.

## GOALS

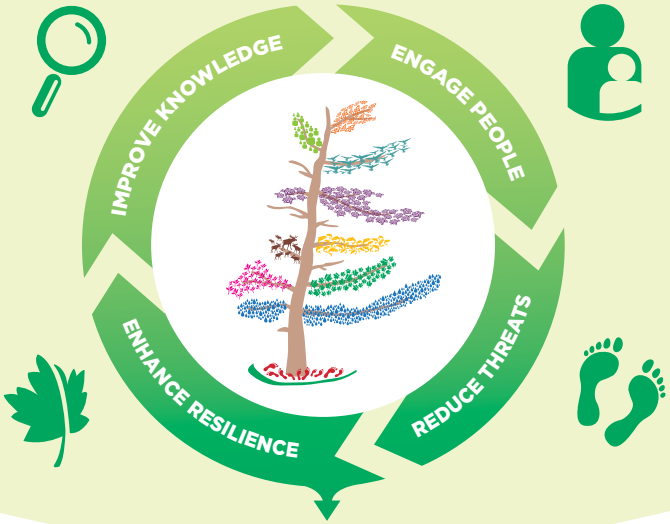
Mainstream Biodiversity.

Protect and restore Ontario's biodiversity.

Use Ontario's biological assets sustainably.

## STRATEGIC DIRECTIONS

Critical components of change required




**OBJECTIVES** ▸▸ **OUTCOMES** ▸▸ **KEY ACTIONS**

Provide clear focus for our efforts — What we want to achieve — Things we can do to achieve outcomes

## TARGETS

How we will measure progress

Photo: Ontario Tourism

*Kawartha Lakes*

Photo: David Hintz, OMNR

*Eagle Canyon northeast of Thunder Bay*

Photo: Ontario Tourism

Photo: David Hintz, OMNR

# ENGAGE PEOPLE

Individually and collectively, our decisions and actions are crucial to the conservation of biodiversity in Ontario. We are not doing enough to halt the decline of Ontario's biodiversity. To succeed in this Strategy, our attitudes and behaviours must change so that we value biodiversity appropriately and include it in our everyday decision making. Therefore, this strategic direction includes ways to improve biodiversity education, encourage active participation in biodiversity conservation through volunteerism and stewardship activities and integrate biodiversity values into all sectors through effective policies, programs and legislation.

## Objective: Inspire and empower people to value and protect biodiversity

### Outcomes: What we want to achieve

- All people learn about biodiversity through integrated and experiential education approaches.
- People value biodiversity and understand its importance to human health and well-being.
- The capacity of the public, landowners and voluntary and private sectors to contribute to biodiversity conservation through stewardship is enhanced.
- People, individually and collaboratively, are investing and actively participating in biodiversity conservation and stewardship.

## Objective: Mainstream biodiversity across all sectors

### Outcomes: What we want to achieve

- Ontario has a strong foundation of policy and legislation to conserve biodiversity.
- Responsibility for the conservation of biodiversity is fully recognized and accepted by all.

| Key Actions | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|
| 1. Employ strategies to effectively communicate the relevance of biodiversity to the public. | All sectors | Ontario Biodiversity Council and working groups |
| 2. Continue to integrate biodiversity education into all levels and all types of curricula. | Provincial government and education sector | Biodiversity Education and Awareness Network and non-government organizations |
| 3. Develop and implement a Children's Outdoor Bill of Rights. | Provincial government | All sectors |
| 4. Develop a strong network of partners engaged in acquiring a deeper understanding of the linkages between biodiversity and human health and well-being. | All governments and health sector | Non-government organizations |
| 5. Develop and provide decision-making tools for effective biodiversity conservation. | All governments and Canadian Business and Biodiversity Council | Ontario Biodiversity Council and working groups |
| 6. Develop implementation plans to incorporate biodiversity values into the government and business sectors. | All governments and business sector | Ontario Biodiversity Council and Canadian Business and Biodiversity Council |
| 7. Review and enhance Ontario's policy and legislative framework to maximize alignment with Ontario's Biodiversity Strategy and support ecological sustainability. | Provincial government | All sectors |
| 8. Integrate the economic value of biodiversity and ecosystem services into decision making. | All sectors | |
| 9. Investigate economic tools that encourage biodiversity conservation (e.g., incentives, removal of disincentives, markets). | All governments and business sector | |
| 10. Support the involvement of Aboriginal communities in shared stewardship for biodiversity conservation. | All sectors | |
| 11. Support and enhance biodiversity stewardship activities and partnerships with local communities and landowners. | All sectors | |

| Key Actions | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|
| 12. Provide opportunities for all people to become involved in biodiversity conservation, with a focus on youth and new Canadians. | All sectors | |
| 13. Recognize achievement and innovation in biodiversity conservation. | All sectors | Ontario Biodiversity Council and working groups |

## Targets: How we will measure our progress

- By 2015, biodiversity is integrated into the elementary, secondary and postsecondary school curricula, including schools of business.
- By 2015, 50 per cent of Ontarians understand biodiversity and its role in maintaining their health and well-being.
- By 2015, the number of Ontarians who participate in biodiversity conservation activities is increased by 25 per cent.
- By 2015, all sectors have initiated the development of implementation plans in support of Ontario's Biodiversity Strategy, and by 2020, those plans are implemented.
- By 2020, all relevant policies and programs integrate biodiversity values.

*Biking on Bruce Peninsula*
Photo: Ontario Tourism

*Prairie Smoke*

Photo:Wasyl D. Bakowsky, NHIC Archives

*Chandos Lake*

Photo: David Hintz, OMNR

# REDUCE THREATS

The management and reduction of threats to biodiversity are essential to conserving Ontario's biodiversity. We can improve the condition of species and ecosystems and help prevent further biodiversity loss by reducing the extent of significant threats to biodiversity and the impacts of existing threats. Reducing threats will also help to enhance the resilience of our ecosystems and protect the services they provide, which are so vital to our health and well-being. Critical components of this strategic direction include reduction of both direct and indirect pressures on Ontario's biodiversity, as well as the sustainable use of our natural assets.

## Objective: Reduce pressures on biodiversity

### Outcomes: What we want to achieve

- The loss and degradation of natural habitats in Ontario are decreased.
- The growth of Ontario's Ecological Footprint is halted and reversed.
- Plans for climate change mitigation to reduce greenhouse gas emissions are developed and implemented.

## Objective: Promote sustainable use of biological assets

### Outcome: What we want to achieve

- The use of Ontario's biological assets is sustainable.

| Key Actions | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|
| 14. Develop and implement plans to reduce urban sprawl and encourage growth in areas capable of sustaining it. | Provincial and municipal governments | Business sector |
| 15. Place priority on efficient transportation of people and goods, and encourage growth and redevelopment along selected corridors and centres that are well served by transit. | All sectors, including individuals | Business sector |
| 16. Develop and implement policies and programs to reduce greenhouse gas emissions and energy consumption by promoting energy conservation, efficiency strategies and sustainable energy supplies. | All governments | All sectors, including individuals |
| 17. Develop and implement strategies to mitigate against the effects of climate change by sequestering and storing carbon in ecosystems. | All governments | Public, science and business sectors and non-government organizations |
| 18. Develop and implement policies and programs to reduce water use and promote water conservation and efficiency strategies. | All sectors, including individuals | |
| 19. Promote biodiversity in all environmental management and reporting systems. | All governments and business sector | |
| 20. Continue and enhance measures for prevention of, early detection of, rapid response to and effective management of invasive species. | Federal and provincial governments | Individuals, science sector and non-government organizations |
| 21. Continue and enhance strategies to reduce the release of pollutants harmful to biodiversity, including air, water, soil and light pollution. | All sectors, including individuals | Science and health sectors |

## Targets: How we will measure success

| | |
|---|---|
| T | By 2015, plans for climate change mitigation are developed and implemented and contribute to Ontario's target to reduce greenhouse gas emissions by 6 per cent below 1990 levels. |
| T | By 2015, strategic plans are in place to reduce the threats posed to biodiversity by invasive species. |
| T | By 2015, the release of pollutants harmful to biodiversity is reduced. |
| T | By 2020, the growth of Ontario's per-capita resource consumption and waste generation is halted and reversed. |

*Niagara-on-the-Lake*
Photo: Ontario Tourism

*Niagara Region*

Photo: Ontario Tourism

*Coastal wetland inventory, Parry Sound*

Photo: OMNR-2007 COA/Jason Mortlock

# ENHANCE RESILIENCE

Complementing our efforts to reduce threats to biodiversity, enhancing the resilience of our ecosystems (i.e., increasing their capacity to cope with change) is another important part of the Strategy. A resilient ecosystem is able to withstand and recover from stresses such as climate change, invasive species and pollution.

To effectively enhance the resilience of our ecosystems and support the directions outlined in this Strategy, we need to invest strategically to yield the greatest benefits to biodiversity, since resources for biodiversity conservation are finite. The costs and benefits of biodiversity conservation should be distributed equitably across relevant sectors.

Strategic investments, partnerships and stewardship are also an increasingly important way of identifying, prioritizing and achieving biodiversity conservation goals. 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 (e.g., sustainable forest management).

## Objective: Maintain, restore and recover ecosystem function

### Outcomes: What we want to achieve

- The connectivity of fragmented landscapes in Ontario is increased, and currently intact landscapes are maintained.
- Adaptation plans to cope with the effects of climate change are developed and implemented.
- Ecosystem services are maintained and have been restored or enhanced in previously degraded habitats.

## Objective: Protect Ontario's genetic, species and ecosystem diversity

### Outcomes: What we want to achieve

- The protected-areas system is representative of Ontario's terrestrial and aquatic ecosystems.
- Fewer species and ecosystems are of conservation concern in Ontario, and their status is improved.
- A proactive approach to maintain common species and common ecosystems is adopted.

## Objective: Invest resources and funds strategically

### Outcomes: What we want to achieve

- Critical priorities, partnerships and actions to conserve biodiversity are identified and acted upon.
- Cities and towns invest in the management and restoration of urban biodiversity.
- There is sustainable long-term investment for biodiversity conservation in Ontario.

| Key Actions | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|
| 22. Set targets for natural cover with respect to ecosystem type and geographic location throughout the province. | All governments | Science sector and non-government organizations |
| 23. Expand the protected areas system of ecologically representative and ecologically significant areas in Ontario. | All governments | Non-government organizations and individuals |
| 24. Integrate biodiversity values into growth management plans. | Provincial and municipal governments | |
| 25. Adopt landscape conservation planning and comprehensive land use planning approaches at all scales. | All governments | Non-government organizations |
| 26. Increase the proportion of private lands that are managed for biodiversity. | All sectors, including individuals | |
| 27. Develop and implement urban biodiversity and green infrastructure strategies for Ontario's cities and towns. | Municipal governments, non-government organizations and public sector | |
| 28. Develop and implement a genetic resource-management strategy for wild species in Ontario. | All governments and science sector | |

| Key Actions | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|
| 29. Assess species and ecosystem vulnerability to climate change, and develop and implement adaptation plans. | All governments and science sector | |
| 30. Implement recovery strategies for species and ecosystems of conservation concern. | All governments | Science and business sectors and individuals |
| 31. Continually improve sustainable management of harvested species. | Federal and provincial governments | Individuals, science sector and non-government organizations |
| 32. Establish sustainable funding mechanisms to support biodiversity conservation in Ontario. | All sectors | Ontario Biodiversity Council and working groups |

## Targets: How we will measure success

- By 2015, the status of species and ecosystems of conservation concern in Ontario is improved.
- By 2015, the proportion of private lands in Ontario that are managed for biodiversity is increased.
- By 2015, natural heritage systems plans and biodiversity conservation strategies are developed and implemented at the municipal and landscape levels.
- By 2020, at least 17 per cent of terrestrial and aquatic systems are conserved through well-connected networks of protected areas and other effective area-based conservation measures.
- By 2020, programs and policies are in place to maintain and enhance ecosystem services.

*Great Spangled Fritillary*
Photo: Karen L. Anderson

*Charleston Lake Provincial Park*

Photo: S. McIntosh, OMNR

*Northern Map Turtles*

Photo: Doug Hamilton





# IMPROVE KNOWLEDGE

Decades of scientific inquiry and study have expanded our understanding of Ontario's biodiversity, but there is still much to learn. In particular, we need to better understand how Ontario's many plants, animals and micro-organisms contribute to broader ecological functions and to the health of our environment. We also need to understand what motivates individuals and sectors to begin working toward biodiversity conservation. Long-term investment in research and monitoring and the establishment of strategic partnerships to address these knowledge gaps are essential to achieving our biodiversity goals.

In addition, biodiversity information must be interpreted for a wider audience and communicated clearly so that it can be used in decision making. Everyone must understand how their actions and choices can have an impact on biodiversity.

## Objective: Improve and share biodiversity knowledge

**Outcome: What we want to achieve**

- Essential knowledge for conserving biodiversity is accessible to a wide audience and is used to make good decisions.

## Objective: Implement biodiversity monitoring, reporting and evaluation

**Outcome: What we want to achieve**

- The ability to assess and report on the state of Ontario's biodiversity is improved.

| Key Actions | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|
| 33. Establish long-term investment in science-based biodiversity programs, including priority inventories and integrated ecosystem monitoring. | All governments, non-government organizations and science sector | |
| 34. Invest in biodiversity-related social science research. | All governments, non-government organizations and social science sector | |
| 35. Regularly review the status of knowledge about Ontario's biodiversity, including revision of research questions and strategies, identification of knowledge gaps and development of strategic partnerships. | Federal and provincial governments and science sector | Ontario Biodiversity Science Forum |
| 36. Establish an information system to collect, assemble, manage and share data. | Federal and provincial governments and science sector | Ontario Biodiversity Council and working groups |
| 37. Review and refine a suite of indicators for measuring the state of Ontario's biodiversity, including Ontario's Ecological Footprint and Living Planet Index. | Provincial government and Ontario Biodiversity Council | Ontario Biodiversity Council working groups and science sector |
| 38. Report on the state of Ontario's biodiversity at five-year intervals, using best available science and information. | Ontario Biodiversity Council | Ontario Biodiversity Council working groups |
| 39. Review and report on targets established in Ontario's Biodiversity Strategy at five-year intervals. | Ontario Biodiversity Council | Ontario Biodiversity Council working groups |

## Target: How we will measure success

**T** By 2015, a long-term monitoring and reporting system for assessing the state of Ontario's biodiversity is established and operating.

*Small White Lady's-slipper*
Photo: Alan Dextrase, OMNR

*Monarch roost*

Photo: Brett Groves, OMNR

# Implementing Ontario's Biodiversity Strategy

Everyone has a role to play if we are to succeed in conserving Ontario's wealth of biodiversity, both now and in the future. The objectives, outcomes, actions and targets contained in Ontario's Biodiversity Strategy, 2011 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 plans for biodiversity conservation.

The creators of Ontario's Biodiversity Strategy, 2005 understood that the successful implementation of the Strategy would require that people work together. Through specific actions in the Strategy, organizations and individuals were asked to come together and champion the Strategy and advance biodiversity education and science. One of the benefits of this cooperation and collaboration was the formation of the Ontario Biodiversity Council, the Biodiversity Education and Awareness Network and the Ontario Biodiversity Science Forum. Additionally, the Stewardship Network of Ontario, already active within the province, took on the role of fostering biodiversity stewardship, another action recommended in the 2005 Strategy. *Ontario's Biodiversity Strategy Progress Report 2005–2010* documents the achievements of each of these organizations.

Ontario's Biodiversity Strategy, 2011 identifies major roles and responsibilities for biodiversity conservation actions. The Ontario Biodiversity Council will continue to guide the implementation of the Strategy and encourage all sectors to help attain the outcomes and goals. We hope that this renewed Strategy will also spur additional collaboration and partnerships focusing on particular actions or opportunities. In some cases, this may include integrating existing environmental strategies and action plans.

Aboriginal peoples have depended on Ontario's biodiversity for food, shelter and cultural and spiritual inspiration for thousands of years. Aboriginal communities continue their relationship

### Implementation Plans

**Implementation plans are road maps for action 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, 2011 and identify specific actions to help achieve them.**

with the land and its resources today, and their involvement in this Strategy is critical to its successful implementation. The 1987 World Commission on Environment and Development emphasized the importance of preserving traditional knowledge, while the Convention on Biological Diversity and the Canadian Biodiversity Strategy reinforce the need to respect, preserve and maintain the knowledge, innovations and practices of Aboriginal communities and to seek community-based local responses to the Strategy. The existing rights of Aboriginal peoples are recognized by the Canadian Constitution and affirmed by the Supreme Court of Canada, and they must be respected in implementing this Strategy.





## Act Now to Conserve Ontario's Biodiversity

*White Trilliums*

Photo: Rick Stankiewicz, OMNR

**Biodiversity sustains us and enriches our lives—and we need to protect it. Ontario's Biodiversity Strategy, 2011 is our new call to action and our road map to safeguard Ontario's genetic, species and ecosystem diversity for this generation and the generations that follow.**

**While the Strategy contains many actions and targets that require cooperation and coordination by our institutions and organizations, each of us acting individually or together in our communities, on our farms and at our schools and places of work can make a difference. We will achieve the goals and realize the vision of Ontario's Biodiversity Strategy, 2011 if people across the province answer this call to action.**

**What you can do to help conserve Ontario's biodiversity:**

- ✔ Get outside and discover Ontario's rich biodiversity.
- ✔ Share your passion for nature with others.
- ✔ Lower your Ecological Footprint at school, at home and at work:
  - ✔ Reduce, Reuse and Recycle.
  - ✔ 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.
  - ✔ Live local by purchasing locally grown produce, farm products and other goods and services.
- ✔ Share your talents by volunteering and participating in biodiversity stewardship activities.
- ✔ Watch out for invaders. Learn about and help prevent the spread of invasive species.
- ✔ Help monitor biodiversity in your backyard, neighbourhood or community by becoming a citizen scientist.
- ✔ Get your hands dirty—plant native trees and flowers in your garden.

# Monitoring and Reporting Progress

For Ontario's Biodiversity Strategy, 2011 to succeed, we must track the progress toward meeting the Strategy's goals and outcomes. When we find that current approaches are not working, we must revise them. The Ontario Biodiversity Council commits to monitoring and reporting on progress every five years using the 15 biodiversity targets set out in the strategy. Baselines for some targets have been established, while for others they will need to be developed.

From an ecological perspective, 10 years is a very short time frame, and few of the issues identified in this Strategy can be fully addressed in that time. New issues will emerge and priorities will change over the next 10 years. As we learn more about Ontario's biodiversity and society's ability to conserve it, outcomes and targets will be refined and new actions will be identified. It is essential that we all have access to consistent and reliable information as this process unfolds. The Ontario Biodiversity Council commits to providing that information through its website, including access to this Strategy, implementation plans, reports and opportunities for involvement.



*Rosyface Shiner*
Photo: Alan Dextrase, OMNR

# Glossary

**Adaptive Management:** an ongoing systematic process for improving management policies and practices by learning from the outcomes of operational programs and incorporating new information.

**Alien Species:** species of plants, animals and micro-organisms introduced by human action outside their natural past or present distribution.

**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 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 Approach:** 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 ecosystem 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 photosynthesis, 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.

**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., FSC, EcoLogo) and corporate social responsibility practices.

**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 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.

**Habitat:** an area on which a species depends, directly or indirectly, to carry out its life processes, such as reproduction, rearing, hibernation, migration or feeding.

**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.

**Landscapes:** complexes of ecosystems in geographically defined areas.

**Mainstreaming:** the informed inclusion of relevant environmental concerns in the decision making for all activities of individuals and institutions.

**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.

**Precautionary Approach:** making decisions about the environment when risks are suspected but not known with certainty. The 1992 Declaration on Environment and Development states: "In order to protect the environment, the precautionary approach shall be widely applied by States [i.e., jurisdictions] according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

**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). Note: Six species formerly found in Ontario are now extinct (i.e., no longer exist anywhere): Macoun's Shining Moss, Lake Ontario Kiyi, Blue Pike, Deepwater Cisco, Passenger Pigeon and Eastern Elk.

**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 damaging 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.

# Appendix

**ONTARIO'S BIODIVERSITY STRATEGY, 2011 STRATEGIC FRAMEWORK**
Strategic Direction: Engage People

| OBJECTIVES | OUTCOMES | KEY ACTIONS | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|---|---|
| Inspire and empower people to value and protect biodiversity | • All people learn about biodiversity through integrated and experiential education approaches.<br>• People value biodiversity and understand its importance to human health and well-being.<br>• The capacity of the public, landowners and the voluntary and public sectors to contribute to biodiversity conservation through stewardship is enhanced.<br>• People, individually and collaboratively, are investing and actively participating in biodiversity conservation and stewardship. | 1. Employ strategies to effectively communicate the relevance of biodiversity to the public.<br>2. Continue to integrate biodiversity education into all levels and all types of curricula.<br>3. Develop and implement a Children's Outdoor Bill of Rights.<br>4. Develop a strong network of partners engaged in further understanding the linkages between biodiversity and human health and well-being.<br>5. Develop and provide decision-making tools for effective biodiversity conservation.<br>6. Develop implementation plans to incorporate biodiversity values into the government and businesses sectors. | All sectors<br>Provincial government; education sector<br>Provincial government<br>All governments, health sector<br>All governments, Canadian Business and Biodiversity Council<br>All governments, business sector | Ontario Biodiversity Council and working groups<br>Biodiversity Education and Awareness Network, non-government organizations<br>All sectors<br>Non-government organizations<br>Ontario Biodiversity Council and working groups<br>Ontario Biodiversity Council, Canadian Business and Biodiversity Council |

| OBJECTIVES | OUTCOMES | KEY ACTIONS | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|---|---|
| Mainstream biodiversity across all sectors | • Ontario has a strong foundation of policy and legislation to conserve biodiversity.<br>• Responsibility for the conservation of biodiversity is fully recognized and accepted by all. | 7. Review and enhance Ontario's policy and legislative framework to maximise alignment with Ontario's Biodiversity Strategy and support ecological sustainability. | Provincial government | All sectors |
| | | 8. Integrate the economic value of biodiversity and ecosystem services into decision making. | All sectors | |
| | | 9. Investigate economic tools that encourage biodiversity conservation (e.g., incentives, removal of disincentives, markets). | All governments, business sector | |
| | | 10. Support the involvement of Aboriginal communities in shared stewardship for biodiversity conservation. | All sectors | |
| | | 11. Support and enhance biodiversity stewardship activities and partnerships with local communities and landowners. | All sectors | |
| | | 12. Provide opportunities for all people to become involved in biodiversity conservation, with a focus on youth and new Canadians. | All sectors | |
| | | 13. Recognize achievement and innovation in biodiversity conservation. | All sectors | Ontario Biodiversity Council and working groups |

| Strategic Direction: Reduce Threats | | | | |
|---|---|---|---|---|
| **OBJECTIVES** | **OUTCOMES** | **KEY ACTIONS** | **LEAD RESPONSIBILITY** | **SUPPORT** |
| Reduce pressures on biodiversity | • The loss and degradation of natural habitats in Ontario are decreased.<br>• The growth of Ontario's Ecological Footprint is halted and reversed.<br>• Plans for climate change mitigation to reduce greenhouse gas emissions are developed and implemented. | 14. Develop and implement plans to reduce urban sprawl and encourage growth in areas capable of sustaining it. | Provincial, municipal governments | Business sector |
| | | 15. Place priority on efficient transportation of people and goods, and encourage growth and redevelopment along selected corridors and centres that are well served by transit. | All sectors, including individuals | Business sector |
| | | 16. Develop and implement policies and programs to reduce greenhouse gas emissions and energy consumption by promoting energy conservation, efficiency strategies and sustainable energy supplies. | All governments | All sectors, including individuals |
| | | 17. Develop and implement strategies to mitigate against the effects of climate change by sequestering and storing carbon in ecosystems. | All governments | Public, science and business sectors, non-government organizations |
| Promote sustainable use of biological assets | • The use Ontario's biological assets is sustainable. | 18. Develop and implement policies and programs to reduce water use and promote water conservation and efficiency strategies. | All sectors, including individuals | |
| | | 19. Promote biodiversity in environmental management and reporting systems. | All governments, business sector | |
| | | 20. Continue and enhance measures for prevention, of early detection, of rapid response to, and effective management of invasive species. | Federal, provincial governments | Individuals, science sector and non-government organizations |
| | | 21. Continue and enhance strategies to reduce the release of pollutants harmful to biodiversity including air, water, soil and light pollution. | All sectors, including individuals | Science and health sectors |

| Strategic Direction: Enhance Resilience | | | | |
|---|---|---|---|---|
| **OBJECTIVES** | **OUTCOMES** | **KEY ACTIONS** | **LEAD RESPONSIBILITY** | **SUPPORT** |
| Maintain, restore, and recover ecosystem function | • The connectivity of fragmented landscapes is increased and currently intact landscapes are maintained.<br>• Adaptation plans to cope with the effects of climate change are developed and implemented.<br>• Ecosystem services are maintained and have been restored or enhanced in previously degraded habitats. | 22. Set targets for natural cover with respect to ecosystem type and geographic location throughout the province. | All governments | Science sector, non-government organizations |
| | | 23. Expand the protected areas system of ecologically representative and ecologically significant areas in Ontario. | All governments | Non-government organizations, individuals |
| | | 24. Integrate biodiversity values into growth management plans. | Provincial, municipal governments | |
| | | 25. Adopt landscape conservation planning and comprehensive land use planning approaches at all scales. | All governments | Non-government organizations |
| | | 26. Increase the proportion of private lands that are managed for biodiversity. | All sectors, including individuals | |
| | | 27. Develop and implement urban biodiversity and green infrastructure strategies for Ontario's cities and towns. | Municipal governments, non-government organizations, public sector | |
| Protect Ontario's genetic, species and ecosystem diversity | • The protected area system is representative of Ontario's terrestrial and aquatic ecosystems.<br>• Fewer species and ecosystems are of conservation concern in Ontario, and their status is improved.<br>• A proactive approach to maintain common species and common ecosystems is adopted. | 28. Develop and implement a genetic resource management strategy for wild species in Ontario. | All governments, science sectors | |
| | | 29. Assess species and ecosystem vulnerability to climate change and develop and implement adaptation plans. | All governments, science sectors | |
| | | 30. Implement recovery strategies for species and ecosystems of conservation concern. | All governments | Science and business sectors, individuals |

| OBJECTIVES | OUTCOMES | KEY ACTIONS | LEAD RESPONSIBILITY | SUPPORT |
|---|---|---|---|---|
| Invest resources and funds strategically | • Critical priorities, partnerships, and actions to conserve biodiversity are identified and acted upon.<br>• Cities and towns invest in the management and restoration of urban biodiversity.<br>• There is sustainable long-term investment for biodiversity conservation in Ontario. | 31. Continually improve sustainable management of harvested species.<br>32. Establish sustainable funding mechanisms to support biodiversity conservation in Ontario. | Federal, provincial governments<br>All sectors | Individuals, science sector, non-government organizations<br>Ontario Biodiversity Council and working groups |

| Strategic Direction: Improve Knowledge | | | | |
|---|---|---|---|---|
| **OBJECTIVES** | **OUTCOMES** | **KEY ACTIONS** | **LEAD RESPONSIBILITY** | **SUPPORT** |
| Improve and share biodiversity knowledge | • Essential knowledge for conserving biodiversity is accessible to a wide audience and used it to make good decisions. | 33. Establish long-term investment in science-based biodiversity programs, including priority inventories and integrated ecosystem monitoring. | All governments, non-government organizations, science sector | |
| | | 34. Invest in biodiversity related social science research. | All governments, non-government organizations, social science sector | |
| Implement biodiversity monitoring, reporting, and evaluation | • The ability to assess and report on the state of Ontario's biodiversity is improved. | 35. Regularly review the status of knowledge about Ontario's biodiversity, including revision of research questions, identification of knowledge gaps, revision of research strategies, and development of strategic partnerships. | Federal, provincial governments, science sector | Ontario Biodiversity Science Forum |
| | | 36. Establish an information system to collect, assemble, manage, and share data. | Federal, provincial governments, science sector | Ontario Biodiversity Council and working groups |
| | | 37. Review and refine a suite of indicators for measuring the state of Ontario's biodiversity, including Ontario's Ecological Footprint and Living Planet Index. | Provincial government, Ontario Biodiversity Council | Ontario Biodiversity Council working groups and science sector |
| | | 38. Report on the state of Ontario's biodiversity at 5 year intervals, using best available science and information. | Ontario Biodiversity Council | Ontario Biodiversity Council working groups |
| | | 39. Review and report on targets established in Ontario's Biodiversity Strategy at 5 year intervals. | Ontario Biodiversity Council | Ontario Biodiversity Council working groups |

## Ontario's Biodiversity Strategy, 2011 Targets

1. By 2015, biodiversity is integrated into the elementary, secondary and postsecondary school curricula, including schools of business.
2. By 2015, 50 per cent of Ontarians understand biodiversity and its role in maintaining their health and well-being.
3. By 2015, the number of Ontarians who participate in biodiversity conservation activities is increased by 25 per cent.
4. By 2015, all sectors have initiated the development of implementation plans in support of Ontario's Biodiversity Strategy, and by 2020, those plans are implemented.
5. By 2020, all relevant policies and programs integrate biodiversity values.
6. By 2015, plans for climate change mitigation are developed and implemented and contribute to Ontario's target to reduce greenhouse gas emissions by 6 per cent below 1990 levels.
7. By 2015, strategic plans are in place to reduce the threats posed to biodiversity by invasive species.
8. By 2015, the release of pollutants harmful to biodiversity is reduced.
9. By 2020, the growth of Ontario's per-capita resource consumption and waste generation is halted and reversed.
10. By 2015, the status of species and ecosystems of conservation concern in Ontario is improved.
11. By 2015, the proportion of private lands in Ontario that are managed for biodiversity is increased.
12. By 2015, natural heritage systems plans and biodiversity conservation strategies are developed and implemented at the municipal and landscape levels.
13. By 2020, at least 17 per cent of terrestrial and aquatic systems are conserved through well-connected networks of protected areas and other effective area-based conservation measures.
14. By 2020, programs and policies are in place to maintain and enhance ecosystem services.
15. By 2015, a long-term monitoring and reporting system for assessing the state of Ontario's biodiversity is established and operating.

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# Notes

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