

CLIMATE CHANGE *and* WILDLIFE



CAN YOU IMAGINE ONTARIO WITHOUT WILDLIFE?

Probably not. However, when we think about climate change, we often just consider the effects on people. We don't think as much about how climate change may affect the other living creatures – such as wild plants and animals.

Some species of wildlife are adapting to the changing climate already. Some animals are migrating earlier or later, or extending their migration patterns in search of suitable habitat. In spring, some plants and animals – like the American Robin – are appearing in the northern portion of their ranges earlier in the season, or extending their ranges into places where they have not been seen before.

Climate change is one of the most serious environmental

challenges our planet faces today. Yet, a changing climate isn't anything new. Our climate is naturally variable, so it is always in the process of change. Over millions of years, the area we know as Canada has been covered at different times by glaciers, lush rain forests, fresh-water lakes, and even saltwater seas.

The problem isn't just that our climate is changing, but also the rate of change. Since the Industrial Revolution in the 1800s, global temperatures have warmed faster than at any other time in the previous 1,000 years. As a result, the places that wildlife rely on for survival – habitats – are changing, too.

All living species need habitat, including plants, insects, frogs, turtles, fish,

birds, and mammals. Habitat is the place where a particular species can find the food, water and shelter needed for survival, and to raise the next generation. When wildlife habitat changes or disappears, the species that depend on it must find new ways to survive.

Not all animals are able to adapt quickly. For example, wildlife scientists are concerned about decreasing populations of amphibians and reptiles. Wildlife populations are linked together in a food web. When smaller animals fail to thrive, there is less food available for the larger animals. Through the web of life, factors that damage one population will eventually have an impact on other populations – even humans.

Change affects us all.



WHY IS GLOBAL WARMING A HOT ISSUE?

Over the next 100 years, climate change is expected to cause the mean annual temperature in Canada to rise between 5 and 10°C. Warmer temperatures may not sound so bad. We may focus on what we think of as "good things" that a warmer climate might bring, such as shorter winters and less snow to shovel.

Think again! In Canada, climate change is also likely to bring an increase in the number of extreme hot days, and extreme weather events such as droughts and heavy rain storms. Other projected effects include coastline flooding and increased incidence of forest fires.

WHAT IS CLIMATE CHANGE?

People often confuse climate and weather. Weather refers to hourly or daily atmospheric phenomena, such as temperature, precipitation and wind. Climate refers to the weather conditions for a given area over several years, expressed using statistics such as averages and extremes. Ontario's climate varies across the province, from season to season and from year to year.

How does the greenhouse effect work? The natural balance of complex gases that surround our planet help to keep the temperature in a range that supports life on earth. Our atmosphere is primarily made up of nitrogen and oxygen. There are small quantities of a few key gases in the atmosphere, known as greenhouse gases, that trap the sun's heat and warm the earth and the lowest layers of the atmosphere. Without these



Forest

gases, the sun's warmth would escape into space and Earth would be too cold to support life.

Water vapour is the most common greenhouse gas. Others include methane, nitrous oxide, and carbon dioxide, which are also produced by human activities. The problem today is that humans are producing a swiftly increasing amount of these gases, mainly by burning fossil fuels: oil, natural gas, and coal. Burning fossil fuels accounts for 80 to 85 per cent of carbon dioxide emissions.

The resulting increase in the amount of greenhouse gases is causing more and more heat to be trapped close to the planet. This is referred to as global warming. This warming is responsible for setting in motion other alterations in the atmosphere, known collectively as climate change.



Raccoon



Long-eared Owl



Snapping Turtle



National Wildlife Week in Ontario

A great way to kick off spring ... and a great way to show that you care.

National Wildlife Week is held the **second week of April**, enacted by Parliament in 1947 as a tribute to one of Canada's influential naturalists – the late Jack Miner.

Ask yourself how you can make changes in your own life to protect and enhance our natural environment – at home, at work, and at school. Learn about important issues that affect wildlife, like climate change – and take action!

Contact us

By phone: (416) 739-5830

By e-mail: Wildlife.Ontario@ec.gc.ca

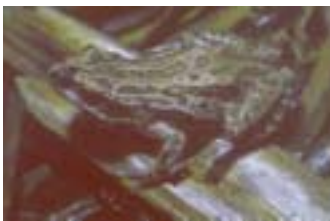
www.wildlifeweek.org

Habitat Loss .Habitat Change

Habitat loss is a principal cause of the depletion of wildlife species today, both locally and on a global scale. Many human activities, such as transportation, logging, home-building, agriculture, and pollution, have altered or destroyed wildlife habitat – particularly in areas with large human populations. There is simply less and less habitat available to wildlife.

Climate change is expected to cause further disturbance to habitat conditions. Plants and animals will have to adapt to the new conditions, or relocate permanently. Many species are expected to move northward. Trees and other vegetation will colonize new areas, where the climactic conditions are right for their growth needs. If connecting channels dry up, some lakes may lose their fish populations. As well, fish communities will change as water temperatures increase, which could have a profound impact on commercial fisheries and recreational angling.

In Ontario, the wild plants and animals that rely on the Great Lakes and surrounding



John Mitchell

Western Chorus Frog

water systems could experience major habitat changes in coming years. The warmer temperatures that climatologists predict for the next decades would increase the rate of evaporation from land and water systems. If there is no corresponding increase in precipitation, Great Lakes water levels in the lakes, rivers, and wetlands could lower significantly, which would alter the landscape around the region.

New beach areas would appear. Water temperatures would rise. Wetland areas could disappear, produce different vegetation, or appear in new places. Areas that have been set aside for wildlife conservation may no longer suit the communities they were intended to support.

Wildlife that rely on a certain kind of habitat would have to adapt to the changes, while continuing to find food, water, shelter, and breeding partners. That's quite a challenge. Instinct will lead wildlife to search for areas that can fulfill their biological needs. If wildlife – including plants, animals, birds and all other wild species – cannot find the food, water, and shelter they require to sustain them, they will not survive. People can help by protecting and rehabilitating a wide variety of existing wildlife habitat.

Wildlife Monitoring: A snapshot in time



Pete Ewins

Monitoring an Osprey nest

Protecting habitat in its natural state and monitoring wildlife are among the most important actions that we can take to conserve the natural environment. Every year all across Ontario, volunteers go out into the field with their binoculars, tape recorders and notebooks, on the lookout for signs of the wildlife they are monitoring: frogs, salamanders, worms, birds, or sometimes plants. This important information provides wildlife biologists with a “snapshot” of the abundance and distribution of different species, a powerful tool for future wildlife conservation plans.

There are many programs you can join, most of which are active in early spring. Visit the websites listed below for more information. You can also call the **Canadian Wildlife Service** at: (416) 739-5830.

Canadian Wildlife Service web page – overview of wildlife monitoring programs:

www.on.ec.gc.ca/wildlife/newsletters/choose-e.html

Ecological Monitoring & Assessment Network web site – overview of ecological monitoring programs:

www.eman-rese.ca

Bird Studies Canada web site – bird monitoring programs:

www.bsc-eoc.org/ontario.html

Association for Canadian Educational Resources web site helps schools get involved in forest ecosystem monitoring:

www.acer-acre.org

Wildlife on the Move

Not all wildlife migrate, but you might be surprised to learn how many do. Similar to the ducks and geese that we see flying overhead in spring and autumn, many other animals migrate – fish, insects, mammals, reptiles, and amphibians. Migrating wild animals travel from one habitat to another, finding their way by instinct. Migration patterns are often cyclic, predictable and very specific. Sometimes, the same individuals return to a habitat year after year. Some short-lived individuals are replaced by the next generation from season to season, or year by year – yet the new generation repeats the migration cycle.

At each change of season, natural cues signal to animals who migrate that they must move on. These cues include changes in food sources, a new life phase, or variations in weather patterns. Other indicators are a rise or fall in temperature, and longer or shorter days.



Mallard Ducks

Habitat is the vital key to successful migration, providing food or resting opportunities at each end of the journey, and along the way. Migrating wildlife rely on instincts developed over thousands of years to find their way to seasonal habitat. If habitats are altered due to the changing climate, instinct may guide migrating wildlife to places where they used to find food – only to find that those places are no longer able to provide the essentials for survival.



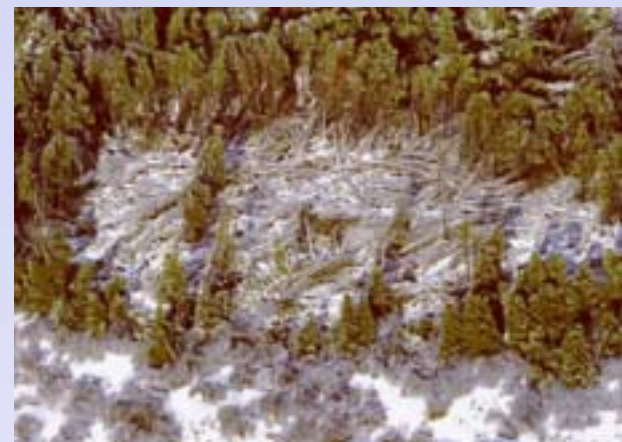
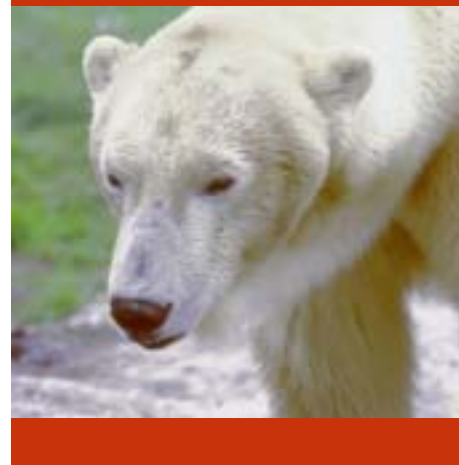
Tim Hagen

Migrating Monarch Butterflies

MIGRATION and climate change

More than 5,000 years ago, during the most recent retreat of the glaciers, wild plants and animals followed the retreating ice, colonizing new habitats as the climate changed. Recently, a climate change model – a computer program which projects what might happen to our climate in the future – estimated that the rates of migration could be as much as ten times higher! Wild species that cannot adapt, or colonize new, suitable habitat, may not survive. Species loss is expected to be highest in Arctic and mountain habitats, where losses may reach up to 20 per cent of the total number of species.

(For more information see Global Warming and Terrestrial Biodiversity Decline, World Wildlife Fund. Full report available on-line: www.panda.org/resources/publications/climate/)



These trees collapsed during an ice storm (1998)

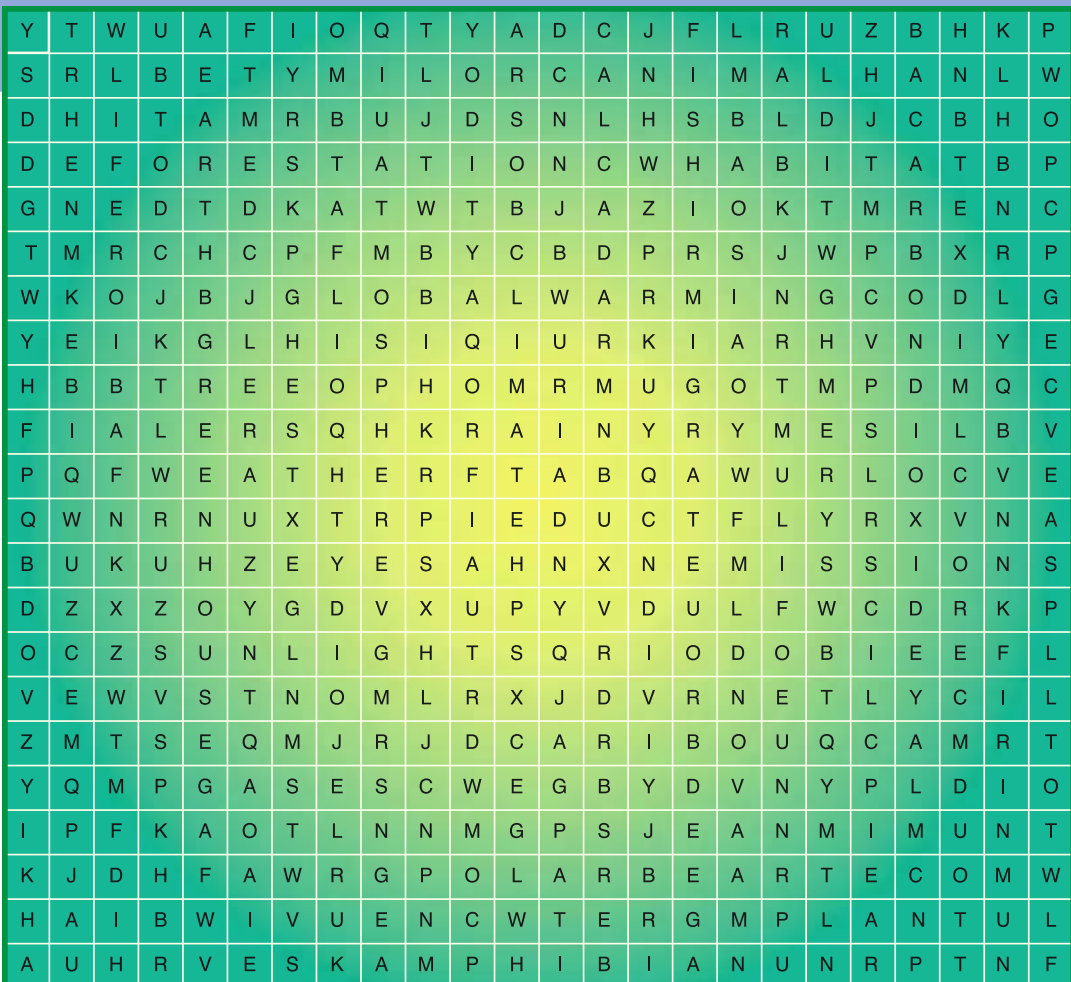
Dave Chan (Courtesy Ottawa Citizen)

Extreme Weather Events

Climatologists project that climate change could result in an increase in extreme weather events such as heat waves, droughts and floods. Rising global temperatures will increase evaporation from the land and water, and lead to additional moisture in the atmosphere. In some regions, this increased atmospheric moisture could lead to more precipitation. In other areas, high rates of evaporation could combine with regional decreases in precipitation to increase the frequency and severity of droughts.

In warmer climates, mounting atmospheric moisture could result in heavier rain storms. In colder climates it could increase the intensity of winter storms. Such intense storms can be damaging to everything in their paths. For instance, migrating birds on their way to seasonal habitat could be blown far off course by intense winds.

Another example: Do you recall the big ice storm in January of 1998? Across eastern Canada and the northeastern United States, a thick coating of ice covered the landscape for many days. The storm and its aftermath were very difficult for people. Wildlife, too, were affected by the storm. It is estimated to have caused serious damage to 17 million acres of forest – essential habitat for many thousands of plants and animals.



Climate Change Word Search



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|----------------|----------------|------------|------------------|
| CARBON DIOXIDE | DEFORESTATION | EARTH LIFE | AMPHIBIAN |
| HABITAT | ATMOSPHERE | MIGRATE | RAIN |
| CARIBOU | ENVIRONMENT | PLANT | GREENHOUSE GASES |
| SNOW | BIRD | WATER | SUNLIGHT |
| CLIMATE | FISH | POLAR BEAR | WATER |
| WEATHER | ANIMAL | | TREE |
| | GLOBAL WARMING | | EMISSIONS |

(Source: Canadian Wildlife Service, Ontario Region)

Space for Species www.spaceforspecies.gc.ca



Space for Species helps you track migration patterns through the technology of satellite telemetry, remote sensing, astronaut observations, and weather satellites. Create migration maps, and record climatological and habitat data. This is a great project to work on with your friends, your class at school, or your community group.

(Source: Canadian Space Agency, Canadian Wildlife Federation, The Canada Centre for Remote Sensing, Canadian Wildlife Service)

Every year, human activities release 28 billion tonnes of carbon dioxide into the atmosphere sky; half of which remains in the atmosphere.

(Source: Meteorological Service of Canada, Environment Canada)

CLIMATE CHANGE ACTION

You might think that climate change is such a big problem that you can't do anything about it. Not true! We can all take action in our own lives to make a difference ... for ourselves and for wildlife. Share what you have learned about wildlife and climate change with your friends and family.



Volunteers assist with habitat rehabilitation

Toronto and Region Conservation Authority



A wild garden can shelter and feed wildlife right at your home

Federation of Ontario Naturalists

Canadian Climate Change Calculator

www.climcalc.net

You can start to make a difference by measuring the carbon dioxide emissions that you produce in your own life. With the on-line calculator, you can estimate the emissions your lifestyle generates. You might find you need a little help from your parents or teachers, but it's worth the effort.

You can compare your energy usage emissions to the average for your province or territory, and find hints and tips to reduce emissions.

(Source: Sustainable Development Research Institute, University of British Columbia)

Things to do at home

1. Reduce, reuse, recycle. That means: use less, use more than once, and put it in the recycle box rather than the garbage!
2. Turn off the water while you brush your teeth.
3. Turn off your lights, computer, TV, stereo, and appliances when you're not using them.

4. Walk, bike, or roller blade, instead of driving, whenever possible. Help start a car pool for trips to after-school lessons or sports practices.
5. Turn down the heat or air conditioning at night, and when no one is home. You'll reduce energy consumption and save money.
6. Join a naturalization project in your community, and bring a stream, wetland or field back to its natural state.

Things to do at school

1. Reduce classroom waste. Use both sides of paper, use a solar powered calculator, and start a composter for food scraps.
2. Start or join an environmental club. Invite local naturalists, outdoor educators, and wildlife biologists to speak to your club.
3. Start or join a "Walk to School" club – walk to school as a group at least once a week.

4. Organize an environmental fair.
5. Choose "Climate Change and Wildlife" as a topic for a school project or letter to your local newspaper.
6. Join a volunteer wildlife monitoring program as a class or club.

Things to do for wildlife

1. Plant native trees with your family, class, or community group. Trees absorb carbon dioxide and filter out pollution, and provide habitat and food sources for wildlife.
2. Visit a local wetland with friends and discover the unique plants and animals that live there.
3. Create a wild garden to shelter and feed wildlife at your home, work or school.
4. Learn about Canada's Species At Risk and teach someone else what you've discovered about wildlife.
5. Ask your local field naturalist group to host a bird and birdsong identification walk in your community.
6. Visit a local wild area and draw the animal tracks you find there. Go to the library and identify the animal tracks.

You'll find more ideas to help wildlife at the National Wildlife Week web site for Ontario: www.wildlifeweek.org. Click on "20 Things You Can Do for Wildlife", and scroll down to Wildlinks to learn how to turn ideas into reality. You can also call the Canadian Wildlife Service at: (416) 739-5830.



Great Blue Heron / Eric Dresser

Web Links and Resources

Web Links on Climate Change

www.climatechangesolutions.com

Climate Change Solutions is an on-line resource centre on how to reduce greenhouse gas emissions, for individuals and families, and other sectors.

www.ec.gc.ca/climate

Environment Canada's climate change web site provides resources, information, ideas and approaches to address climate change.

www.ec.gc.ca/climate/ccs

Environment Canada hosts Canada Country Study: Climate Impacts and Adaptation, a unique national assessment of potential climate impacts in Canada.

<http://adaptation.nrcan.gc.ca/posters/>

Natural Resources Canada hosts Climate Change – Impacts and Adaptation, which includes a series of seven posters depicting the regional impacts of climate change in Canada.

www.climatehotmap.org

Union of Concerned Scientists and its partners host the web site, Global Warming: Early Warning Signs, featuring a Fingerprints and Harbingers map that foreshadows the types of impacts likely to become more frequent and widespread.

www.panda.org/climate

Visit World Wildlife Fund's action-oriented web site to learn about causes, impacts and solutions for climate change.

www.davidsuzuki.org/Climate_Change

David Suzuki Foundation offers a variety of climate change resources to help Canadians become informed and involved.

Web Links for Schools

www.climatechange.gc.ca/english/actions/what_are/schools.shtml

The Government of Canada's climate change web site offers climate change information. Visit the Schools and Campuses section for information on "greening" your school.

<http://wildspace.ec.gc.ca>

Canadian Wildlife Service hosts WILDSpace™, a web site that gathers some of CWS' 50 years of research on the temporal and spatial distribution of Ontario's wildlife.

www.ontarionature.org/educate/schoolground.html

Visit the Federation of Ontario Naturalists' Teaching Naturally, an on-line guide that offers a fun and educational way to naturalize schoolgrounds.

www.wildeducation.org

Visit the Canadian Wildlife Federation's Wild Education web site for a variety of curriculum-linked classroom activities and outdoor projects.

www.city.toronto.on.ca/taf

Toronto Atmospheric Fund offers project-related ideas to fight climate change and improve the "green factor" at schools.

www.acer-acre.org

Association for Canadian Educational Resources helps schools get involved with monitoring forest ecosystems, using international biodiversity protocols. Visit the web site to find a monitoring plot near you.

www.pembina.org

Pembina Institute has resources for students and teachers on-line, including a Climate Change Awareness and Action education kit.

Other Resources

Adapting to Climate Variability and Change in Ontario, Volume IV of the Canada Country Study: Climate Impacts and Adaptation. Prepared by Environment Canada. To order free printed copies, call 1-800-668-6767 or e-mail enviroinfo@ec.gc.ca.

Climate Change and Canada's National Park System. Prepared by Environment Canada. To order free printed copies, call 1-800-668-6767 or e-mail enviroinfo@ec.gc.ca.

Impacts of Climate Change and Variability on Unmanaged Ecosystems, Biodiversity and Wildlife. Responding to Global Climate Change, Volume VII of the Canada Country Study: Climate Impacts and Adaptation. Prepared by Environment Canada. To order free printed copies, call 1-800-668-6767 or e-mail enviroinfo@ec.gc.ca.

Native Plant Nurseries and Seed Companies. A list of sources for non-exotic plants and seeds. Prepared by Ontario Parks Association. Available free on-line at www.opassoc.on.ca/comparkseed.asp.

Planting the Seed: A Guide to Establishing Aquatic Plants.

A guide to planning, implementing and maintaining aquatic planting projects. Prepared by Environment Canada. To order free printed copies, call (416) 739-5830 or e-mail Wildlife.Ontario@ec.gc.ca.

Planting the Seed: A Guide to Establishing Prairie and Meadow Communities in Southern Ontario. A guide to planning, implementing and maintaining prairie and meadow planting projects. Prepared by Environment Canada. To order free printed copies, call (416) 739-5830 or e-mail Wildlife.Ontario@ec.gc.ca.

Wildlife in Jeopardy Education Kit. Hands-on, classroom-ready activities and lesson plans for teachers and students, keyed to the Ontario curriculum for grades 4-10. Prepared by the Federation of Ontario Naturalists. Cost: \$39.95. To order the kit, call 1-800-440-2366.



G.W. Beyersbergen

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About Climate Change and Wildlife

Environment Canada would like to thank those who generously provided comments on earlier versions of this fact sheet: Alice Casselman (Association for Canadian Educational Resources); Helen Gault (Federation of Ontario Naturalists); Liz Lundy (World Wildlife Fund Canada); Rochelle Strauss (Earth Rangers). Climate change expertise was provided by Joan Klaassen and David Broadhurst (Atmospheric Science Division, Environment Canada).

Climate Change and Wildlife is available on-line at the following web sites: www.wildlifeweek.org and www.on.ec.gc.ca/wildlife.

All publications are available in both HTML and PDF format, for the purposes of accessibility and convenience.

To order printed copies, contact: Environment Canada Canadian Wildlife Service 4905 Dufferin Street Downsview, Ontario M3H 5T4 Tel: 416 739-5830 Fax: 416 739-5845 E-mail: Wildlife.Ontario@ec.gc.ca

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Aussi disponible en français.



Educators' Reference

General Educational Themes

Climate change
Extreme weather
Global warming
Habitat loss
National Wildlife Week
Wildlife migration

Association for Canadian Educational Resources
www.acer-acre.org



Canadian Wildlife Federation
www.cwf-fcf.org



Canadian Wildlife Service (Ontario Region)
www.on.ec.gc.ca/wildlife

Discovery Kids
www.discoverykids.ca



Ducks Unlimited Canada
www.ducks.ca



Earth Rangers
www.earthrangers.ca



Federation of Ontario Naturalists
www.ontarionature.org



Ontario Parks Association
www.opassoc.on.ca



Ontario Science Centre
www.ontariosciencecentre.ca



Ontario SPCA
www.ospca.on.ca



Royal Botanical Gardens
www.rbg.ca



Royal Ontario Museum
www.rom.on.ca



Science North
www.sciencenorth.on.ca



Toronto & Region Conservation Authority
www.trca.on.ca



Toronto Atmospheric Fund
www.city.toronto.on.ca/taf



Toronto Zoo
www.torontozoo.com



TVOntario
www.tvo.org



TFO
www.tfo.org



World Wildlife Fund Canada
www.wwf.ca

