



General Resources

Harvard Implicit Association Test

- <https://implicit.harvard.edu/implicit/canada/>

Citizen Science Portals

- SciStarter
 - <https://scistarter.org/>
- National Geographic Citizen Science Projects
 - <https://www.nationalgeographic.org/idea/citizen-science-projects/?page=1>
- Government of Canada Citizen Science Portal
 - http://science.gc.ca/eic/site/063.nsf/eng/h_97169.html
- NatureWatch
 - <https://www.naturewatch.ca/>
- Journey North
 - <https://journeynorth.org/>
- CitizenScience.org
 - <https://www.citizenscience.org/>
- Zooniverse
 - <https://www.zooniverse.org/>
- NASA Science Citizen Science
 - <https://science.nasa.gov/citizenscience>

Biodiversity Citizen Science Databases

- NatureLynx
 - <https://naturelynx.ca/>
- iNaturalist
 - <https://www.inaturalist.org/>

Citizen Science Toolkit

- **California Academy of Sciences**
 - <https://www.calacademy.org/educators/citizen-science-toolkit>

This is a great resource that provides lessons, readings and worksheets that equips you to communicate the value of citizen science to your students. Be aware that this was created using Next Generation Science Standards (NGSS) as well as Common Core State Standards (CCSS), both of which are American standards.



Grade 1

Topic B: Seasonal Changes

General Learner Expectations

- Students will:
 - 1–6 Describe seasonal changes, and interpret the effects of seasonal changes on living things.

Specific Learner Expectations

- Students will:
 - * Describe the regular and predictable cycle of seasonal changes: • changes in sunlight • changes in weather.
 - * Identify and describe examples of plant and animal changes that occur on a seasonal basis: • changes in form and appearance • changes in the location of living things • changes in activity; e.g., students should recognize that many living things go into a dormant period during winter and survive. under a blanket of snow as a seed, egg or hibernating animal • production of young on a seasonal basis.
 - * Identify human preparations for seasonal change and identify activities that are done on a seasonal basis.
 - * Record observable seasonal changes over a period of time.

Examples of Citizen Science Projects

Community Collaborative Rain, Hail & Snow Network (CoCoRaHS)

- <https://www.cocorahs.org/Canada.aspx>
- Precipitation can vary even over short distances. Precipitation measurements are essential for public safety, agriculture, forestry, and flood monitoring, just to name a few. Every time it rains, hails or snows in your neighbourhood, you record measurements of precipitation and report them to the website.
- You will need a CoCoRaHS approved rain gauge (their website shows you where to get them).

GLOBE Observer: Clouds

- <https://observer.globe.gov/>
- NASA and The GLOBE Program are asking people to take photographs of clouds and record sky observations to help scientists track changes in clouds in support of climate research.
- You will need a smartphone with internet connection.

Journey North

- <https://journeynorth.org/>
- This site has a number of different citizen science projects dealing with seasonal changes and migration that require the help of citizen scientists.
- Hummingbirds, Monarch Butterflies, American Robins, Tulip Test Gardens, Sunlight and Seasons, Symbolic Migration, Weather and Songbird Migration, Mystery Class, Bald Eagle, Earthworms, Orioles, Leaf-Out, Ice-Out, Common Loons, Red-winged Blackbird, Frogs, Barn Swallow, Whooping Cranes, Gray Whales.
- Projects require that you have a computer with internet connection. A smartphone or a camera where you can capture and then upload onto their internet database is required as well.

Below are some examples of projects in Journey North:

- **Sunlight and Seasons**
 - <https://journeynorth.org/sunlight-seasons>
 - Seasonal changes in sunlight affect the entire web of life. Record data, take photos and make drawings. Look for patterns of seasonal change, and note webs of connections.



- **Mystery Class**
 - <https://journeynorth.org/mclass/index.html>
 - Mystery Class is a global game of hide-and-seek. Students track seasonal changes in sunlight and then investigate other clues to find ten secret sites around the world. Guide includes instructions and handouts.
- **Ice Out**
 - <https://journeynorth.org/ice/index.html>
 - Ice-out is the event when the ice cover melts from lakes, rivers, ponds and oceans. This is when spring emerges. Help scientists record when the ice begins to melt in your area so that they can track the changes from year to year.



Grade 2

Topic E: Small Crawling and Flying Animals

General Learner Expectations

- Students will:
 - 2–10 Describe the general structure and life habits of small crawling and flying animals; e.g., insects, spiders, worms, slugs; and apply this knowledge to interpret local species that have been observed.

Specific Learner Expectations

- Students will:
 1. Recognize that there are many different kinds of small crawling and flying animals, and identify a range of examples that are found locally.
 3. Recognize that small animals, like humans, have homes where they meet their basic needs of air, food, water, shelter and space; and describe any special characteristics that help the animal survive in its home.
 5. Describe the relationships of these animals to other living and non-living things in their habitat, and to people.

Examples of Citizen Science Projects

Never Home Alone: The Wild Life of Our Homes

- <https://www.inaturalist.org/projects/never-home-alone-the-wild-life-of-homes>
- This project aims to document the species that live indoors with humans, including but not exclusive to arthropods (insects and their kin).
- You will need a computer and access to the internet to upload data. You can also add a photo to your observations so a smartphone/tablet with a camera, or a camera itself would be helpful.

Lost Ladybug Project

- <http://www.lostladybug.org/index.php>
- Ladybug species composition is constantly changing across North America. In some places, they have greatly increased their numbers and range. This is happening very quickly, and scientists don't know how, why, or what impact it will have on ladybug diversity. Since ladybugs feed on plant-feeding insects, this could drastically change the density of those insects and could be devastating to certain plants.
- This project requires you to find, collect and photograph ladybugs. You will upload the photo, along with a completed submission form (time, date, location and habitat). You will need access to a smartphone or camera and a computer with internet connection.

WormWatch

- <https://www.naturewatch.ca/wormwatch/>
- Worms are an indicator of soil biodiversity. The number of worms in a specific volume of earth can tell us a lot about how the habitat is being managed, because earthworms are very sensitive to soil disturbance. Learning more about the distribution of earthworm species can be used to help improve soil health and reclaim degraded sites. Gardeners, naturalists, farmers, schoolchildren, everyone can participate in WormWatch. This project invites participants to collect data on earthworm species and habitats. You will need access to a smartphone or camera and a computer with internet connection.

Grade 3

Topic E: Animal Life Cycles

General Learner Expectations

- Students will:

- Students will:

1. Classify a variety of animals based on observable characteristics (e.g., limbs, teeth, body covering



Examples of Citizen Science Projects

Nature's Notebook

- https://www.usanpn.org/natures_notebook
- This project focuses on observing life cycles of different plants and animals. This site also provides resources to teachers at different grade levels, offering sample lesson plans and curriculum ideas.
- You can input data using their app on a smartphone or tablet, or you can record data on hardcopy data sheets and input data through a computer with internet access.

WormWatch

- <https://www.naturewatch.ca/wormwatch/>
- Worms are an indicator of soil biodiversity. The number of worms in a specific volume of earth can tell us a lot about how the habitat is being managed, because earthworms are very sensitive to soil disturbance. Learning more about the distribution of earthworm species can be used to help improve soil health and reclaim degraded sites. Gardeners, naturalists, farmers, schoolchildren, everyone can participate in WormWatch. This project invites participants to collect data on earthworm species and habitats.
- You will need a smartphone or tablet and/or a camera and computer with internet access.

Grade 4

Topic E: Plant Growth and Changes
General Learner Expectations

- Students will:
 - 4–10 Demonstrate knowledge and skills for the study, interpretation, propagation and enhancement of plant growth.

Specific Learner Expectations

- Students will:
 - 2. Identify and describe the general purpose of plant roots, stems, leaves and flowers.
 - 6. Recognize that a variety of plant communities can be found within the local area and that differences in plant communities are related to variations in the amount of light, water and other conditions.

Examples of Citizen Science Projects

Questa Game

- <https://questagame.com/the-game>
- This is a fun interactive game that allows your class to participate in bioblitzes. This project asks you to take pictures and upload them into the database. You will then receive points for each of the submissions you upload. Points are dependent on the rarity of the species in that area (according to recent biodiversity studies). The photos you submit will be shared with the national and global biodiversity databases for scientific research.
- You will need a tablet or phone with a built-in camera and internet access to play the game.

PlantWatch

- <https://www.naturewatch.ca/plantwatch/>
- For this project, you get to record flowering times for selected plant species and report these dates to researchers. Being able to track flowering times can help scientists to identify ecological changes that may be affecting our environment.
- You will need a smartphone with internet access to participate.

Topic D: Weather Watch
General Learner Expectations:

- Students will:
 - 5–8 Observe, describe and interpret weather phenomena; and relate weather to the heating and



Grade 5

Examples of Citizen Science Projects

RinkWatch

- <https://www.rinkwatch.org/>
- This project asks you to submit information about skating conditions of outdoor rinks and ponds. This information can help environmental scientists monitor winter weather conditions and study long-term impacts of climate change.
- You will need a computer with internet access and a rink within observable distance.

Community Collaborative Rain, Hail & Snow Network (CoCoRaHS)

- <https://www.cocorahs.org/Canada.aspx>
- Precipitation can vary even over short distances. Precipitation measurements are essential for public safety, agriculture, forestry, and flood monitoring, just to name a few. Every time it rains, hails or snows in your neighbourhood, you record measurements of precipitation and report them to the website.
- You will need a CoCoRaHS approved rain gauge (their website shows you where to get them).

GLOBE Observer: Clouds

- <https://observer.globe.gov/>
- NASA and The GLOBE Program are asking people to take photographs of clouds and record sky observations to help scientists track changes in clouds in support of climate research.
- You will need a smartphone or tablet (with internet access) to access the GLOBE Observer app to take pictures of clouds and record sky observations.

Snow Tweet

- <http://snowtweets.uwaterloo.ca/>
- Help snow and ice researchers at the University of Waterloo study snow and ice across North America!
- All you have to do is tweet with the hashtag #snowtweet to indicate the depth of snow in your area (wherever you are!)
- You will need a computer with internet access and a twitter account.

Grade 6

Topic E: Trees and Forests
General Learner Expectations

- Students will:
 - 6–10 Describe characteristics of trees and the interaction of trees with other living things in the local environment.

Specific Learner Expectations

- Students will:
 - 2. Describe kinds of plants and animals found living on, under and among trees; and identify how trees affect and are affected by those living things.
 - 4. Identify general characteristics that distinguish trees from other plants, and characteristics that distinguish deciduous from coniferous trees. Science (Elementary) B.34 (1996)
 - 5. Identify characteristics of at least four trees found in the local environment. Students should be familiar with at least two deciduous trees and two coniferous trees. Examples should include native species, such as spruce, birch, poplar, and pine and cultivated species, such as elm and crab apple.
 - 6. Describe and classify leaf shapes, leaf arrangements, branching patterns and the overall form of a tree.

Examples of Citizen Science Projects

Leaf Out

- <https://journeynorth.org/leaf/index.html>
- Record when the leaves start coming out of your adopted tree and measure the leaves. Gathering this information helps scientists understand seasonal changes.
- You will need a tree that you can easily and frequently access and a computer with internet access to upload the data.

iNaturalist

- <https://www.inaturalist.org/>
- Bioblitz project: This is an event that aims to identify as many species as possible in a specific place in a short amount of time. You can focus your efforts on plants if you'd like.



- iNaturalist provides resources such as classroom activities to walk you through a bioblitz and to talk about biodiversity prior to the bioblitz event.
- This project requires students to have a smartphone and wifi or data connection to upload observations.
- Since a bioblitz takes place over a short period of time, this is a really easy way to introduce citizen science to students in a very accessible and easy way.

GLOBE Trees

- <https://observer.globe.gov/toolkit/trees-toolkit>
- This project aims to collect data on the heights of trees. Tree height and circumference are indicators of how well an ecosystem can grow trees. By collecting this data, you can help scientists understand how carbon moves through ecosystems.
- You will need a smartphone with access to the GLOBE Observer app to upload data.



Grade 6

Topic C: Sky Science

General Learner Expectations

- Students will:
 - 6–7 Observe, describe and interpret the movement of objects in the sky; and identify pattern and order in these movements.

Specific Learner Expectations

- Students will:
 - 6. Describe seasonal changes in the length of the day and night and in the angle of the Sun above the horizon
 - 11. Identify technologies and procedures by which knowledge, about planets and other objects in the night sky, has been gathered.
 - 12. Understand that Earth, the Sun and the Moon are part of a solar system that occupies only a tiny part of the known universe.

Aurorasaurus

- www.aurorasaurus.org
- This project asks participants to document details about an aurora borealis sighting (colors, type, location, how active it was, etc.)
- All you need is a smartphone or laptop and an aurora! You can also make reports by tweeting @TweetAurora or emailing aurorasaurus.info@gmail.com.
- Currently, experts cannot reliably and accurately predict auroras (created by geomagnetic storms), so with the help of local, real time information on where the auroras are, we can help scientists learn more about conditions around aurora sightings. Kids will need an adult with a smartphone or computer to make the report. Tweets on the site are content filtered, but may not be suitable for children. Caregivers can turn off unverified tweets by clicking “Legend” then “Unverified Tweet” at the bottom right of the map.

Grade 7



Examples of Citizen Science Projects

FrogWatch

- <https://www.naturewatch.ca/frogwatch/>



- Frogs and toads can be used as indicator species, because they are vulnerable to changes in the atmosphere, the land, or the water. Tracking changes in the population of frogs and toads in Canada, their geographic range, and the beginning and ending of their calling season can help us understand what is happening in their environment.
- You will need a smartphone or tablet and/or a camera and computer with internet access.

WormWatch

- <https://www.naturewatch.ca/wormwatch/>
- Worms are an indicator of soil biodiversity. The number of worms in a specific volume of earth can tell us a lot about how the habitat is being managed, because earthworms are very sensitive to soil disturbance. Learning more about the distribution of earthworm species can be used to help improve soil health and reclaim degraded sites. Gardeners, naturalists, farmers, schoolchildren, everyone can participate in WormWatch. This project invites participants to collect data on earthworm species and habitats.
- You will need a smartphone or tablet and/or a camera and computer with internet access.

Project FeederWatch

- <https://feederwatch.org/about/project-overview/>
- A winterlong (November-April) survey of birds that visit feeders across North America. You will be responsible for periodically counting birds that you see at your feeder. New participants are sent a research kit (bird ID poster, calendar, etc.) with complete instructions for participating.
- A donation to Birds Canada is suggested to help support the distribution of the research kit.
- You will need to purchase bird seed and bird feeder to participate in this project. (Idea: if you have a fabrication/woodworking/design class offered at your school, building a bird feeder may be a good student project so that a few classes can participate by having their own feeder)
- Kerrie Wilcox (kwilcox@birdscanada.org) is the contact person for this project if you have any questions.

Grade 8

Unit E: Freshwater and Saltwater Systems

Key Concepts:

- Ocean basins
- Climate
- Glaciers and icecaps

Outcomes for Science, Technology and Society (STS) and Knowledge

1. Describe the distribution and characteristics of water in local and global environments, and identify the significance of water supply and quality to the needs of humans and other living things
 - Describe, in general terms, the distribution of water in Alberta, Canada and the world; and interpret information about water characteristics (*e.g., identify glaciers, snow, polar icecaps, groundwater and oceans as components of Earth's water; interpret graphical information on the availability of potable water*)
2. Investigate and interpret linkages among landforms, water and climate
 - Investigate and describe stream characteristics (*e.g., describe the slope, flow rate and stream profile characteristics of a model stream on a stream table*)
3. Analyze factors affecting productivity and species distribution in marine and freshwater environments
 - Investigate life forms found in freshwater and saltwater, and identify and interpret examples of adaptations to these environments (*e.g., describe and interpret examples of fish and invertebrate species found in a local freshwater environment*)
 - Investigate and interpret examples of seasonal, short-term and long-term change in populations of living things found in aquatic environments (*e.g., algal blooms, changes in local freshwater fish populations, cod and salmon stock depletion*)
 - Analyze relationships between water quality and living things, and infer the quality of water based on the





- Scientific Inquiry
 - Students will be encouraged to:
 - Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (*e.g., seek data that is accurate and based on appropriate methods of investigation; consider observations and ideas from a number of sources before drawing conclusions*)
- Stewardship
 - Students will be encouraged to:
 - Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (*e.g., consider immediate and long-term consequences of personal and group actions; objectively identify potential conflicts between responding to human water and needs and protecting the environment*)
- Safety
 - Students will be encouraged to:
 - Show concern for safety in planning, carrying out and reviewing activities (*e.g., select safe methods and tools for collecting evidence and solving problems; readily alter a procedure to ensure the safety of members of the group*)

Examples of Citizen Science Projects

IceWatch

- <https://www.naturewatch.ca/icewatch/>
- IceWatch engages citizens to record ice events - the freeze and thaw dates of lakes and rivers. This information helps scientists understand the freeze-thaw cycles of Northern water bodies and how they're changing.
- You will need a smartphone or tablet and/or a camera and computer with internet access.

FreshWater Watch

- <https://freshwaterwatch.thewaterhub.org/content/animation>
- This project aims to build a global water quality database to assess the health of freshwater ecosystems all over the world.
- You will need a testing kit (which you can purchase from them), and it includes instructional videos, research tests and a web page for your school. You will need to have a computer with internet access.



Grade 9

Unit A: Biological Diversity

Key Concept:

- Biological diversity
- Habitat diversity
- Populations

Outcomes for Science, Technology and Society (STS) and Knowledge

- Students will:
 1. Investigate and interpret diversity among species and within species, and describe how diversity contributes to species survival
 - Observe variation in living things, and describe examples of variation among species and within species
 - Investigate and interpret dependencies among species that link the survival of one species to the survival of others
 - Identify examples of symbiotic relationships
 4. Identify impacts of human action on species survival and variation within species, and analyze related issues for personal and public decision making
 - Describe the relative abundance of species on Earth and in different environments (e.g., note the overall abundance of insect species)
 - Describe ongoing changes in biological diversity through extinction and extirpation of native species, and investigate the role of environmental factors in causing these changes

Skills Outcomes

- Initiating and Planning
 - Students will:
 - Ask questions about the relationships between and among observable variables, and plan investigations to address those questions
 - Identify questions to investigate arising from science-related issues
- Performing and Recording
 - Students will:
 - Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data
- Communication and Teamwork
 - Students will:
 - Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results

Attitude Outcomes

- Interest in Science
 - Students will be encouraged to:
 - Show interest in science-related questions and issues, and confidently pursue personal interests and career possibilities within science-related fields
- Mutual Respect



Examples of Citizen Science Projects

NatureLynx

- <https://naturelynx.ca>
- NatureLynx has a free app that can be easily downloaded to your smartphone or tablet where you submit your observations directly to the platform.
- You will need a smartphone with internet access.

iNaturalist

- <https://www.inaturalist.org/>
- Bioblitz project: This is an event that aims to identify as many species as possible in a specific place in a short amount of time.
- iNaturalist provides resources such as classroom activities to walk you through a bioblitz and to talk about biodiversity prior to the bioblitz event.
- This project requires students to have a smartphone with internet access.
- Since a bioblitz takes place over a short period of time, this is a really easy way to introduce citizen science to students in a very accessible and easy way.

Digital Fishers

- <https://www.oceannetworks.ca/learning/get-involved/citizen-science/digital-fishers>
- Ocean Networks Canada has a number of cameras recording deep-sea videos in the Pacific Ocean. They have created a game that allows citizen scientists to help identify and characterize the footage which in turn helps scientists answer fundamental questions such as:
 - What environmental factors influence the distribution of species in the deep?
 - What is the biodiversity associated with deep-sea environments?
 - How do species interact with each other and with their environment?
- You will need a computer with internet access.

Project FeederWatch

- <https://feederwatch.org/about/project-overview/>
- A winterlong (November-April) survey of birds that visit feeders across North America. You will be responsible for periodically counting birds that you see at your feeder. New participants are sent a research kit (bird ID poster, calendar, etc.) with complete instructions for participating.
- A donation to Birds Canada is suggested to help support the distribution of the research kit.
- You will need to purchase bird seed and bird feeder to participate in this project. (Idea: if you have a fabrication/woodworking/design class offered at your school, building a bird feeder may be a good student project so that a few classes can participate by having their own feeder)
- Kerrie Wilcox (kwilcox@birdscanada.org) is the contact person for this project if you have any questions.



Grade 10-12

Aurorasaurus

- www.aurorasaurus.org
- This project asks participants to document details about an aurora borealis sighting (colors, type, location, how active it was, etc.) All you need is a smartphone or laptop and an aurora! You can also make reports by tweeting @TweetAurora or emailing aurorasaurus.info@gmail.com. Currently, experts cannot reliably and accurately predict auroras (created by geomagnetic storms), so with the help of local, real time information on where the auroras are, we can help scientists learn more about conditions around aurora sightings. Kids will need an adult with a smartphone or computer to make the report. Tweets on the site are content filtered, but may not be suitable for children. Caregivers can turn off unverified tweets by clicking “Legend” then “Unverified Tweet” at the bottom right of the map

Foldit

- <https://fold.it/portal/>
- This project takes the form of a computer game. It allows participants to explore different ways a protein can be structured since there can be so much variation. It’s important for scientists to know the structure of a protein before they can create drugs to target it, so by playing the game, you can be part of collecting data on ways in which proteins can be structured to aid scientists in their further studies.
- You’ll need a computer with internet access.