Guide to Scout
Personal Achievement Badges

"Do not discount what you can learn from touch and from careful observation."

DGM

Written by Guy Morey

Scouts Earth

Objective: I will explore environment, nature, research and/or leisure pursuits as they relate to the Earth.

Earth Adventure Idea 1 – Natural Disasters (page 12)

1. Research the history of a 1954 natural disaster that happened in southern Ontario.
2. Define the term watershed and investigate the origin and direction of water flow in a watershed.
3. Understand the purpose of wetlands and the impacts from a natural disaster on the aquatic organisms in a wetland.
4. Discover why hurricanes often lead to an increase in fish kills.
5. Visit a local wetland (pond or marsh), or, a creek and take several photographs of the surrounding area of the site you have visited. Predict and describe what would happen to the surrounding area in the event the wetland or creek was flooded out.

Earth Adventure Idea 2 – Compasses (page 24)

1. Discover how a compass is used to help find bearings or sense of direction.
2. Learn how to make a compass with minimal materials in the wild.
3. Learn simple tricks to find north when you do not have a compass.
4. Learn how to determine distance on the ground using the scale of a map.
5. Practice calculating distance on the ground using a 1:5000 scale map.

Earth Adventure Idea 3 – Edible Wilds (page 31)

1. Appreciate the value of eating edible wilds.
2. Learn to identify three (3) common edible wilds found in Ontario. Research where these edible wilds are typically found.
3. Learn the "beginner" rules and foraging tips for collecting edible wilds.
4. Name five poisonous plant species in southern Ontario.
5. Challenge yourself (with the help of an expert) to collect and cook some edible wilds.

Scouts Air

Objective: I will explore the environment, nature, research, and/or leisure pursuits as they relate to air.

Air Adventure Idea 1 – Aerial Locomotion in Animals (page 35)

1. Learn about the adaptations required to move an animal through the air and the four (4) forces that must be overcome in order for movement to occur.
2. Identify the specific force that an animal using powered flight is required to overcome in order for movement to occur.
3. Identify the specific force that an animal using soaring flight is required to overcome in order for movement to occur.
4. Identify the specific force that gliding animals are required to overcome in order for movement to occur.
5. Lead your fellow Scouts in an activity that simulates birds flapping their wings.

Air Adventure Idea 2 – Particulate Study (page 41)

1. Learn what particulates are and their sources in the environment.
2. Conduct an experiment to examine and identify particulates accumulated in areas where different amounts of particulates would fall.
3. Record all observations and try to identify environmental particulates.
4. Identify health concerns associated with particulates and come up with strategies that a Scout could encourage his family to do to reduce the amount of airborne particulate matter in their house.
5. Present your findings to your Patrol.

Air Adventure Idea 3 – The Water Cycle (page 47)

1. Learn about the water cycle, and recognize its three (3) most important processes: evaporation, condensation, and precipitation.
2. Conduct an experiment to observe how water cycles through the environment.
3. Use the results from the experiment to explain how the water cycle functions in nature.
4. Recognize the importance of the Sun to power the water cycle and the Sun's profound effect on wildlife.
5. Draw and label a picture of the water cycle.

Air Adventure Idea 4 – Birding (page 53)

1. Introduce yourself to birds and learn what makes them one of the most successful vertebrate groups on Earth.
2. Learn five (5) different ways to identify birds.
3. Obtain a field guide and a pair of binoculars to identify birds in your area. Take pictures and keep a log of your observations.
4. Identify three (3) bird species that are protected under Ontario's Endangered Species Act (ESA) and learn why they are endangered.
5. Build a winter bird feeder and hang it in your yard.

Scouts Hobby

Objective: I will explore a new creative pursuit or take a hobby I already have to new levels.

Hobby Adventure Idea 1 – Wildlife Conservation as a Hobby (page 67)

1. Introduce yourself to the concept of wildlife conservation and learn about turtle conservation in Ontario.
2. Familiarize yourself with turtle biology.
3. Recognize the impacts of poaching and the illegal wildlife trade of Ontario's turtles.
4. Get involved in a wildlife conservation project - make a turtle nest protector.
5. Find out what a Scout can do to help contribute to turtle conservation.

Hobby Adventure Idea 2 – Recreational Hunting in Ontario (page 80)

- Introduce yourself to hunting and learn how you can get involved in one of the most deeply-rooted conservation traditions in Ontario.
- Learn what is required of you to legally hunt in Ontario, including licences and regulations.
- Understand the biology, ecology, and conservation measures used to determine hunting seasons and learn the game species that you can legally hunt in Ontario.
- Discover waterfowl hunting and small (upland) game bird hunting in Ontario and learn how to distinguish puddle ducks from diving ducks.
- Obtain Hunters accreditation and an Outdoors Card. Other sources for hunting in Ontario: The Ontario Federation of Anglers and Hunters in Peterborough, Ontario.

Scouts Water

Objective: I will explore environment, nature, research and/or leisure pursuits as they relate to water.

Water Adventure Idea 1 – French River Canoe Trip (page 95)

1. Research the historical significance of the French River.
2. Integrate a challenge that fits with the history of your route. For example, First Nations and early European explorers would prepare their meals over campfires – not on camp stoves. Plan to cook your meals without the aid of stoves.
3. How is the water route a source of food as well as a means of travel? Identify and sample wild edible plants (especially blueberries) on your outing. Be safe; eat only what you are sure is edible. Bring fishing gear to try to catch walleye and northern pike.
4. The French River faces significant environmental stresses. Find out which ones you can minimize while on your trip.
5. Create a log of your journey by taking photos, recording video, drawing pictures, taking notes, or, in some other way.

Water Adventure Idea 2 – Natural Disasters Related to Water (page 97)

1. Research the history of a 1954 natural disaster that happened in southern Ontario.
2. Find out whose responsibility it is in Ontario to manage flood risks, to protect life and property, and maintain ecological health by enforcing laws and regulations.
3. Learn the steps to prepare yourself for a natural disaster.
4. Devise a disaster scenario and hone its response skills. Create a plan for this emergency.
5. Present your findings to your Patrol.

Water Adventure Idea 3 – Make a Closed Aquatic Ecosystem in a Jar (page 103)

1. Research and identify the biotic (living) and abiotic (nonliving) components of an aquatic ecosystem and find out how the biotic components are dependent on each other and on the abiotic factors around them.
2. Set up a closed aquatic ecosystem in a jar.
3. Record daily observations of the ecosystem in a journal for six (6) weeks.
4. Draw conclusions on how the biotic components are dependent on each other and on the abiotic factors around them.
5. If your closed aquatic ecosystem is successful, take it to a meeting one night to show your Patrol and present your findings to them. Be very careful when transporting it! If it is not successful, you can still present your findings to your Patrol. Explain why it was not successful. A failed ecosystem is every bit as good as a successful one.

Water Adventure Idea 4 – Recreational Fishing in Ontario (page 109)

1. Introduce yourself to fishing and learn what makes it one of the most fun recreational sports in Ontario.
2. Understand what is required of you to legally fish in Ontario, including licences and regulations.
3. Learn to identify six (6) of the most popular game fish in Ontario.
4. Identify different types of artificial lures and live bait and discover how they are used.
5. Develop the skills required to clean and cook a fish.

Scouts Space

Objective: I will explore the environment, nature, research and/or leisure pursuits as they relate to space.

Space Adventure Idea 1 – Constellations (page 129)

1. Learn about constellations, making sure to understand their placement in the night sky, remembering the time of the year is important for locating certain constellations.

2. Locate The Pleiades, Orion the Hunter, and Cassiopeia. Observe exactly when and where each constellation appears in the night sky, and research how each constellation was named, and the stories behind them.
3. Design a constellation of your own and give it a name. Create a story to explain how your constellation got its name and how it got in the night sky.
4. Understand, and be able to explain, the concept of a light-year.
5. Plan a star gazing night with your Patrol.

Space Adventure Idea 2 – Survival on the Moon (page 137)

1. Research some background information about the Moon on your own to present to your Patrol.
2. Introduce the problem of crash-landing on the Moon. Follow the four assumptions listed if you did crash-land on the Moon.
3. Divide the group into teams, depending on the number in your Patrol.
4. Allow each team time to discuss the items and rank them in order.
5. Review and assess the results, according to the "expert". Find out who would have survived as a group and who would have survived on their own.

Scouts Home

Objective: I will explore what it means to be a contributing member of my home.

Home Adventure Idea 1 - Determining Heat Loss from Your Home (page 140)

1. Research on the internet a "Home Energy Audit" in Ontario to gain knowledge and understanding of why an audit is necessary.
2. In discussion with your parents/guardians, decide which room(s) you are going to conduct the audit on.
3. Find a family member who can help you conduct the audit.
4. Conduct the audit, ensuring to make consistent, accurate measurements so you can obtain reliable results. Record observations, complete calculations, and answer questions.
5. Consider the results of your audit. Discuss with your parents about making suggestions to improve the energy efficiency of your home.

Scouts Canada

Objective: I will explore what it means to be an active and contributing citizen of my country, Canada.

Canada Adventure Idea 1 - Exploring Canada's Endemic Species (page 144)

1. Discover Canada's unique endemic species.
2. Find out why British Columbia has the highest number of endemic species of any province in Canada.
3. Understand the significance of the "Spirit bear" holding a prominent place in the oral traditions of the First Nations People of British Columbia.
4. Find out why Newfoundland has the highest number of introduced mammal species in Canada.
5. Familiarize yourself with the official bird and flower symbols of Canada's ten provinces and three territories. Research their scientific names and learn their meanings. What species are familiar to you? Share your knowledge with your Patrol.

Canada Adventure Idea 2 – Addressing Endangered Species in Canada (page 158)

1. Read and understand the principles of sustainable use of wildlife.
2. Learn 15 current, critically endangered species in Canada.
3. Learn the five (5) threats contributing to population declines in Canada.
4. Name ten (10) invasive species of Ontario.
5. What can a Scouter do to take action in wildlife conservation?

Scouts Science

Objective: I will explore and discover in one of the many areas of scientific pursuit.

Science Adventure Idea 1 - Animal Communication (page 179)

1. Increase your awareness of the sounds you hear outside by visiting a local Conservation Area and listening to the sounds of the forest (or wetland). Familiarize yourself with the sounds and calls of the animals you hear. Take a notebook and record what you find.
2. Understand that animals communicate many different ways for many different reasons.
3. Learn a new term "zoomusicology" and discover what animals make musical sounds in nature.
4. Demonstrate to your Patrol some ways animals communicate with each other.
5. Revisit your local Conservation Area (or go to a different area) to continue familiarizing yourself with the sounds and tones of the animals you hear. Look for further evidence to evaluate hypotheses about why birds communicate.

Science Adventure Idea 2 - Aquatic Invertebrate Identification (page 185)

1. Start by reading all the background information provided to understand the complexity of a stream ecosystem.
2. Gather all the necessary equipment on the listed provided.
3. Locate a stream that you would like to sample. Find another Scout, friend, or family member to help you collect, identify, and record your collection on the data sheets provided. Learn the characteristics of eleven different Orders of aquatic invertebrates.
4. Understand, by providing examples, some terms related to aquatic ecology.
5. Analyze your findings and determine if there are any current or proposed human activities and/or surrounding land use(s) that you feel would have a negative impact on the stream. Present your findings to your Patrol.

Science Adventure Idea 3 - Twig Collection (page 201)

1. Start by learning all the key background information on identifying deciduous trees provided on the "Identifying Deciduous Trees" page. Review the three "Winter Twig Identification" sheets.
2. Locate an area that you would like to collect. Find another Scout, friend, or family member to help you collect, identify, and record your collection on the data sheets provided.
3. Collect 10 different live species of twigs from the list provided of deciduous trees from their favourable habitat.
4. Record your collection and identify the value each tree species has to wildlife and the effects of harvesting the trees on plant and animal communities.

Name: _____

Part 1. **Natural Disasters**

The following activity may require extensive research on your part.

1. On October 15, 1954, the most famous natural disaster in Canadian history struck southern Ontario. Name this natural disaster.

_____

2. When and where did this natural disaster originate?

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3. Briefly describe some of the devastation this natural disaster left behind.

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Part 2.

4. What is a watershed?

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5. We live within the Central Lake Ontario Conservation Authority's watershed jurisdiction, an area that spans 639 square km and includes twenty-two (22) creeks.

   a. Where do all these creeks drain from?

   _____

   b. What direction do all these creeks flow?

   _____

   c. Where does all the water flow to?

   _____

6. What two factors determine the direction a creek will flow?

- _____
- _____

Part 3.

7. Wetlands, such as marshes or ponds, serve many functions within a watershed. They are particularly effective in urban, rural, and shoreline areas, often reducing flood-related damage by up to 38% in urban settings. Name two (2) functions of wetlands.

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- _____

  _____

8. The term "invasive carp" includes four species:

- bighead carp - *Hypophthalmichthys nobilis*
- silver carp - *Hypophthalmichthys molitrix*
- grass carp - *Ctenopharyngodon idella*
- black carp - *Mylopharyngodon piceus*

Invasive carp did not arrive in North America on their own. In the 1960s and 1970s, the aquaculture industry in the southern United States imported these fish to manage aquatic plants in their facilities. These four invasive species are now a major threat to aquatic ecosystems in Ontario's Great Lakes. Find out how these detrimental fish found their way into Ontario's aquatic ecosystems.

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9. One of the most detrimental environmental impacts from a hurricane on a wetland is heavy rainfall. Heavy rainfall leads to flooding which leads to erosion. Briefly describe how this sequence of events affects the aquatic organisms in the wetland.

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Part 4.

10. Given the destructive force and extreme conditions that define a hurricane, perhaps it is no surprise that hurricanes can also have significant impacts on fish populations. Studies have now shown that in the weeks following a storm, large-scale fish kills have been reported throughout the watershed of the affected area. State two (2) reasons why hurricanes often lead to an increase in fish kills.

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11. Water chemistry in aquatic ecosystems refers to the composition, interactions, and behavior of dissolved substances such as nutrients, gases, and minerals that determine water quality and the overall health of the ecosystem. Key factors like dissolved oxygen, water temperature, and nutrients (nitrogen/phosphorus) determine biological productivity, species survival, and nutrient cycling. Even the slightest changes or shifts in water chemistry can drastically affect ecosystems. Briefly describe how the following three (3) water chemistry factors are impacted by a hurricane and the effect the impacts have on aquatic life.

- dissolved oxygen levels: _____

  _____

  _____

  _____

- water temperature: _____

  _____

  _____

  _____

- nutrients: _____

  _____

  _____

  _____

Part 5.

12. Visit a local wetland (pond or marsh), or, a creek and take several photographs of the surrounding area of the site you have visited. Predict and describe what would happen to the surrounding area in the event the wetland or creek was flooded out.

Answers:

1. On October 15, 1954, the most famous natural disaster in Canadian history struck Southern Ontario. Name this natural disaster.

   Hurricane Hazel.

2. When and where did this natural disaster originate?

   Hurricane Hazel was first identified on the afternoon of October 5, 1954, about 75 kilometres east of the island of Grenada in the West Indies. The storm tracked along the coast of Venezuela before suddenly swerving northward towards Haiti.

   By October 14, Hazel was battering the Carolina coast, with estimated wind speeds of 240 km/h, and a tidal surge of 4 metres. After moving inland from the Carolina coast, Hazel seemed to diminish over the Alleghenies, where American meteorologists predicted its dissipation. Here, however, the storm was re-energized by a low-pressure system and broke loose towards Lake Ontario and Toronto. By 4:30 P.M. on October 15, rain began to fall heavily on Toronto.

3. Briefly describe some of the devastation this natural disaster left behind.

   Hurricane Hazel now ranks as one of the most catastrophic hurricanes in North America in the 20th century. The cost of lost property, and recovery costs amounts to 1.59 billion in today's dollars. It struck the Toronto area on October 15/16, 1954, with devastating results. It was Canada's worst hurricane and Toronto's worst natural disaster. During the storm, winds reached 124 km/h and over 200 millimetres of rain fell in just 24 hours. This horrific storm left 81 dead and nearly 4000 families homeless. The greatest destruction resulted from flooding. Much of the Humber River drainage basin was deforested, which allowed water to quickly flow into the river. The flood plains, already saturated by days of rain, simply could not contain the downpour.

4. What is a watershed?

A watershed is an area of land that channels rainfall and snowmelt into creeks, streams, and rivers, ultimately draining into a shared outlet, such as a lake, ocean, or reservoir. Known also as a drainage basin or catchment, it acts like a funnel, collecting all water within its boundaries and including both surface water and groundwater. Everything within a watershed, including forests, farms, cities, and animals, is connected. Watersheds come in all shapes and sizes and can vary from millions of acres, like the land that drains into the Great lakes, to a few acres that drain into a pond.

5. We live within the Central Lake Ontario Conservation Authority's watershed jurisdiction, an area that spans 639 square km and includes twenty-two (22) creeks.

   a. Where do all these creeks drain from?

      The Oak Ridges Moraine.

   b. What direction do all these creeks flow?

      South.

   c. Where does all the water flow to?

      Lake Ontario.

6. What two (2) factors determine the direction a creek will flow?

A creek flows primarily due to gravity, which pulls water from areas of higher elevation to lower elevation, however, the specific path it takes is determined by the shape of the surrounding terrain (topography), as water naturally flows in the path of least resistance.

7. Wetlands, such as marshes or ponds, serve many functions within a watershed. They are particularly effective in urban, rural, and shoreline areas, often reducing flood-related damage by up to 38% in urban settings. Name two (2) functions of wetlands.

- *Wetlands are like sponges. They are designed as low-lying areas or depressions that store excess runoff, preventing it from overwhelming stormwater infrastructure. They typically display irregular shapes, with shallow, marshy edges and deeper, central pools to manage varying water levels. Wetlands can absorb large quantities of water into their soil and vegetation.*
- *Wetlands slow the flow of water: Deep-rooted plants, shrubs, and trees are planted to slow the speed of water flow, increase infiltration into the soil, and prevent erosion. Vegetation creates friction, hence, slowing down fast-moving water.*
- *Wetlands divert water: Because they are connected to other surrounding water sources (rivers, streams) they divert water, allowing it to spread out across a wide area, thereby reducing depth and velocity of the runoff.*

8. The term "invasive carp" includes four species:

- bighead carp - *Hypophthalmichthys nobilis*
- silver carp - *Hypophthalmichthys molitrix*
- grass carp - *Ctenopharyngodon idella*
- black carp - *Mylopharyngodon piceus*

Invasive carp did not arrive in North America on their own. In the 1960s and 1970s, the aquaculture industry in the southern U.S. states imported these fish to manage aquatic plants in their facilities. These four invasive species are now a major threat to aquatic ecosystems in Ontario's Great Lakes. Find out how these detrimental fish found their way into Ontario's aquatic ecosystems.

Invasive carp were introduced to the Southern U.S. in the late 1960s and 1970s for use as biological control in aquaculture facilities based on their specific diets. Flooding in the U.S. contributed to at least three of the four species (bighead, silver, and black carps) to escape these facilities and eventually make their way into the Mississippi and Illinois rivers, expanding their range north towards the Great Lakes. Bighead carp and silver carp are the species that have spread the most aggressively and can be considered one of the greatest threats to the Great Lakes.

Hurricanes and flooding have been known to spread invasive plants and animals. Wind and water can move exotic plants to new areas and invasive fish that were concentrated in a small area may ride floods to new locations.

9. One of the most detrimental environmental impacts from a hurricane on a wetland is heavy rainfall. Heavy rainfall leads to flooding which leads to erosion. Briefly describe how this sequence of events affects the aquatic organisms in the wetland.

Hurricanes have a profound impact on aquatic habitats including the physical destruction of wetland vegetation and massive sediment disruption which lead to long-term ecological shifts. One of the primary effects of a hurricane is heavy rainfall, which can cause the water level in a wetland to rise rapidly. This may lead to flooding and subsequent erosion of the surrounding areas, drawing sediment into the waterbody. In the short term, this influx of sediment can increase turbidity of the water (reduced clarity). Suspended sediments from land erosion can smother benthic (bottom-dwelling) organisms and cause difficulty for gill-breathing fish. In the long term, erosion can lead to the development of bottom muck that reduces overall depth and volume – intensifying the flooding during the next storm.

While ecosystems are often adapted to handle occasional storms, the increasing intensity of hurricanes due to climate change is hindering the ability of these habitats to recover, which can take years or even decades.

10. Given the destructive force and extreme conditions that define a hurricane, perhaps it is no surprise that hurricanes can also have significant impacts on fish populations. Studies have now shown that in the weeks following a storm, large-scale fish kills have been reported throughout the watershed of the affected area. State two (2) reasons why hurricanes often lead to an increase in fish kills.

- *<u>fish get stranded</u> – rising waters may flood areas that do not normally contain water. Fish may become trapped in these areas and when the water levels recede, they may be stranded.*

- *<u>habitat disruption</u> – hurricanes can destroy or severely damage aquatic habitats, which force fish populations to relocate or struggle to find food and shelter in the weeks following a storm.*

- *<u>turnover</u> – in small lakes or ponds, strong winds may push surface water to one side of the lake. Water from the bottom then comes up to fill in space at the surface, bringing sediments and decayed organic matter with it. The water from the bottom is naturally low in oxygen and it also contains hydrogen sulfide gas (H_2S), which in high concentrations, can kill fish. This is called "turnover" because the bottom literally becomes the top.*

- *<u>several cloudy days</u> – microscopic organisms (algae) and aquatic plants produce oxygen for all gill-breathing organisms through photosynthesis. Photosynthesis requires sunlight and extended cloudy day periods restricts photosynthesis. Without photosynthesis, oxygen levels can quickly be depleted thereby killing fish.*

11. Water chemistry in aquatic ecosystems refers to the composition, interactions, and behavior of dissolved substances such as nutrients, gases, and minerals that determine water quality and the overall health of the ecosystem. Key factors like dissolved oxygen, water temperature, and nutrients (nitrogen/phosphorus) determine biological productivity, species survival, and nutrient cycling. Even the slightest changes or shifts in water chemistry can drastically affect ecosystems.

Briefly describe how the following three (3) water chemistry factors are impacted by a hurricane and the effect the impacts have on aquatic life.

- *Massive freshwater runoff can drastically decrease dissolved oxygen levels. The churning can bring low-oxygen, nutrient-rich water from the deep to the surface, creating "dead zones" where fish are unable to obtain the required amount of oxygen necessary for metabolism.*

- *Hurricanes can also cause rapid changes in water temperature. A storm's high winds and heavy rainfall may cause the warm surface of a marsh/pond to mix with cooler deep water. This sudden change in temperature can stress fish and other aquatic organisms, impairing the natural food chain within the ecosystem.*

- *Runoff from flooded land brings toxins, fertilizers, and sewage into waterways, which create harmful algae blooms. Heavy rainfall and flooding can bring nutrients such as nitrogen and phosphorus from the surrounding areas into the pond. These may be in the form of debris like yard waste, trash, and animal waste, or through runoff containing fertilizers, motor oil, cleaning detergents, and agricultural pesticides. In the days and weeks following the storm, these nutrients can stimulate nuisance pond weeds and algae, which may initiate a cycle of growth, die-off, and decay that further elevates nutrient levels over time. This process, called eutrophication, depletes dissolved oxygen (DO) levels.*

In essence, the chemical composition of water acts like a backbone for aquatic ecosystems; any changes can ripple through the food web, affecting everything from microscopic plankton to large fish species, ultimately influencing the overall health and resilience of an aquatic habitat.

©Scouts Earth – Adventure 2

Name: _____

Part 1. Compasses

In Scouting, a compass is used to help find your bearings or sense of direction. It is a tool that shows the four cardinal directions (north, east, south, west) used for navigation and geographic orientation. It commonly consists of a magnetized needle which always aligns itself with magnetic north. The magnetic needle swings around the compass as you move, but the red end of the magnetic needle will ALWAYS point in the direction of north and the white end of the magnetic needle will always point in the direction of south.

When reading a compass, never use the directions "go right" or "go left". These are relative directions and differ depending on your location and direction. The four cardinal directions, north, east, south, and west, are constant directions and do not change.

The direction halfway between north and east is an intercardinal point and is called northeast. The other three intercardinal points are southeast, southwest, and northwest.

A compass works because of the composition of the Earth. It works by using a small, magnetized needle that pivots freely to align itself with the Earth's magnetic field. Because the Earth acts as a giant magnet with its own magnetic north pole, the north-seeking end of the needle is attracted to it, allowing for navigation.

Part 2. Making a Compass Needle

Being able to improvise a compass can make a huge difference in navigating your way out of an outdoor emergency if you have lost your normal navigation equipment. This activity will teach you how to make your own do-it-yourself compass. There are many different variations or materials that can be used to make your own compass. The following directions demonstrate how to do it with minimal materials, in the wild, in a survival situation.

What You Need:

- sewing needle
- small bowl
- steel or iron object
- a leaf that the needle can sit on
- magnet (optional)

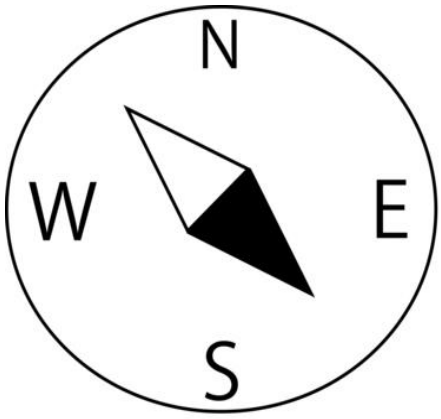
What You Do:

1. Fill the bowl with water.

2. To magnetize the needle, tap the steel or iron object against the end of the needle. It works best by sticking the sharp end of the needle into a block of wood and tapping the free end. Tap the needle at least 50 times to magnetize it. If you have a magnet, rub the magnet 20 to 30 times against the needle going in the same direction all the time. The needle becomes a compass needle when it is magnetized.

3. Place your leaf in the bowl. Make sure the leaf floats. Lay the needle on the leaf. Do not allow wind to hit the leaf. If no wind is allowed to hit the leaf, the needle should pull the floating leaf clockwise or counter-clockwise to orient itself north-south. The Earth's magnetic pull steers the needle into a north-south orientation.

4. You will have to use something like the Sun, Moon, stars, geography, etc. to find north. Once you have that, mark your compass needle with a pen, pencil, marker, or a scratch to show which side is pointing to the north.



Part 3. Simple Tricks to Finding North When You Do Not Have a Compass

There are five simple ways to figure out direction that only require your observation skills. These ways are 100% practical and rarely change in nature. Find someone (another Scout or family member) who you can go out with to verify these simple tricks.

- Finding the North Star in the Northern Hemisphere:
  This one you have to do at night. The North Star (Polaris) points true north. It is the last star in the handle of the Little Dipper. If you cannot find that, find the Big Dipper. The outer stars of the cup in the Big Dipper point right to Polaris. Finding the North Star will give you true north. *Be careful in the dark.*

- Pay close attention to the Sun:
  In the Northern Hemisphere, the Sun rises in the east and sets in the west so this will tell you which way is north and which way is south. In the Northern Hemisphere, the Sun's highest point every day is directly south. The Sun will get higher in the summer sky than in the winter sky, but each day the highest point of its curve is always going to be exactly south.

- Pay close attention to trees:
  In the Northern Hemisphere, deciduous trees tend to grow on the south side of slopes; coniferous trees tend to grow on the north side of slopes. Use cautiously – not guaranteed.

- Pay close attention to moss on trees:
  In the Northern Hemisphere, particularly in deciduous forests, moss will tend to grow more on the north side of a tree trunk. Moss thrives in damp conditions. A north-facing trunk gets the least amount of Sun and consequently will be the dampest area. Use cautiously – not guaranteed.

- Pay close attention to flowing water:
  In Ontario, *all streams and creeks flow south.* If you find a stream or creek, start walking in the direction the water is flowing (south). By following this route, you will eventually come to a town, and in the best-case scenario – Lake Ontario.

Part 4. Determining Distance on the Ground Using Scale on a Map

What is Scale on a Map?

Scale gives you the ratio of a distance on a map to the corresponding distance on the ground. Simply put, it tells you how far apart two objects are on the ground.

The easiest scale on a map to understand and use is the representative fraction (RF) scale; sometimes called a unitless scale. This scale is represented as a ratio of one unit to another (the units ARE ALWAYS the same). One unit on the map (between two points) represents the second number of the same unit on the ground (between two points). The unit can be any unit of measurement, or, any object for that matter. Whatever is used and measured on the map is measured on the ground. So, if you are using a map with a scale of 1:50 000, then:

1 cm on the map represents 50 000 cm on the ground, or
1 foot on the map represents 50 000 feet on the ground, or
1 pencil on the map represents 50 000 pencils on the ground, or
1 shoe lace on the map represents 50 000 shoe laces on the ground

Small-scale maps show a larger geographic area with few details on them. The smaller the scale of the map, the less detail will be shown. A small-scale map expressed as a ratio will have a *larger* number to the right of the ratio. For example, a small-scale map could have a RF scale of 1: 1 000 000. Small-scale maps are typically used to show the extent of an entire country, region (such as a topographic map), or a continent.

Large-scale maps show a smaller amount of area with a greater amount of detail. The larger the scale of the map, the better the features can be detailed. A large-scale map expressed as a ratio will have a *smaller* number to the right of the ratio. For example, a large-scale map could have a RF scale of 1: 1000. Large-scale maps are typically used to show neighbourhoods, small towns, or campgrounds.

Here is an example:

Pretend these are two points on a map. The map scale is 1: 5000. Take a ruler and measure how far apart the flagpole is from the tent.

● tent

● flagpole

Scale 1: 5000

We want to find out how far away the flagpole is from the cabin, on the ground:

The flagpole and the tent are 7.0 cm apart *on the map*. This means that the flagpole is 3500 cm (7 cm x a scale of 5000) away from the tent *on the ground*. There are 100 centimetres in a metre. If you divide 3500 by 100, this means that the flagpole is 35 metres away from the tent on the ground. It does not seem that far away now. That is why it better to use large-scale maps.

Part 5.

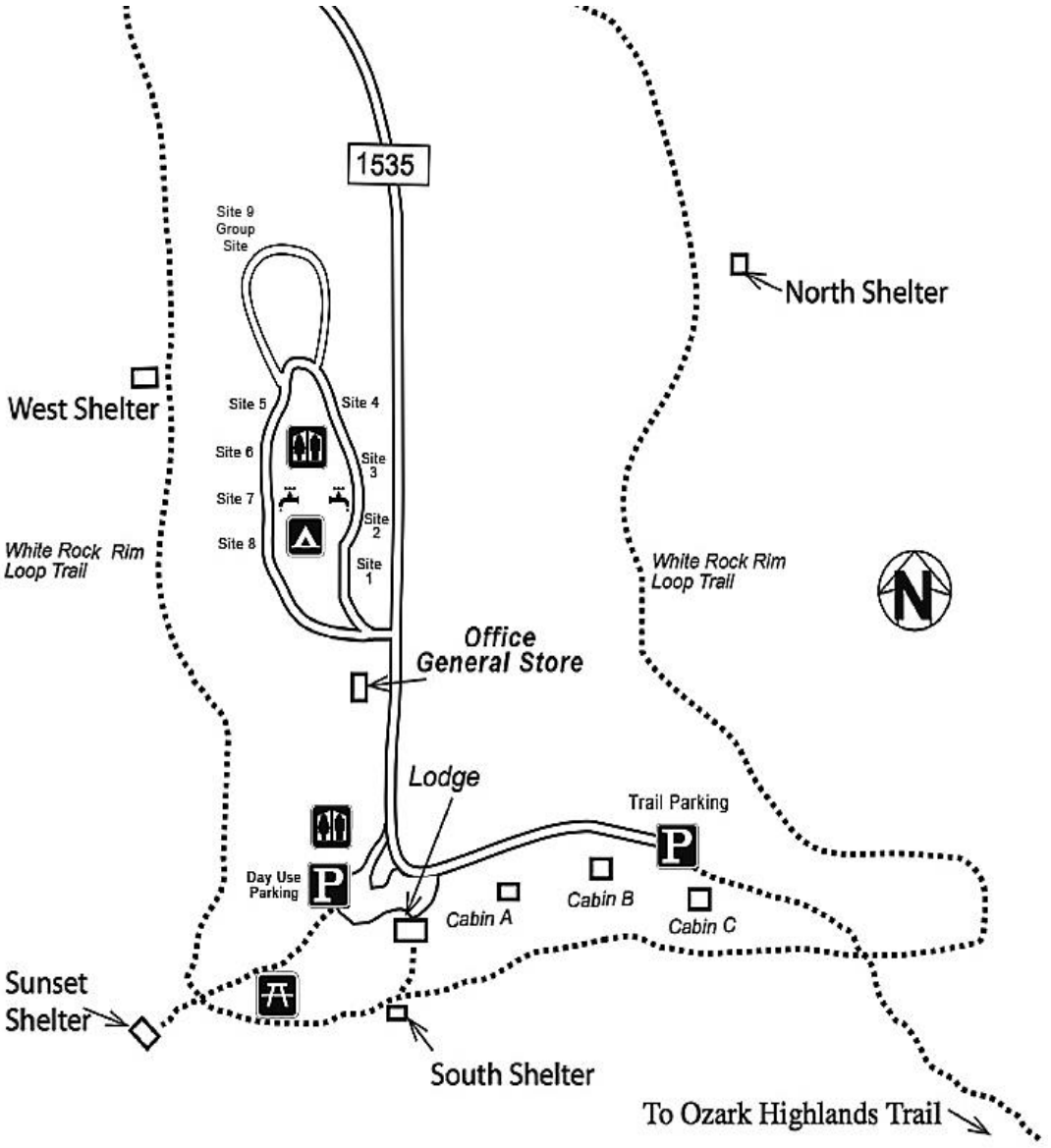
1. In map reading, what does the phrase "as the crow flies" mean?

_____

_____

_____

2. Use the following map to determine the values for the distance on the ground. The scale of the map is 1: 5000. Measure all distances in metres.



WHITE ROCK MOUNTAIN

Ozark National Forest - Arkansas

Phone: (479) 369-4128
Email: whiterockrecreation@gmail.com

a. How far is the west shelter from the north shelter? _____

b. How far is the Sunset Shelter to the Office General Store? _____

c. How far is Cabin A from Cabin C? _____

Answers:

1. When using a map, what does the phrase “as the crow flies” mean?

   "As the crow flies" is a saying that describes the most direct, straight-line distance between two points, ignoring obstacles like mountains, rivers, or road detours. It represents the shortest possible path.

2. Use the following map to determine the values for the distance on the ground. The scale of the map is 1: 5000. Measure all distances in metres.

   How far is the west shelter from the north shelter? *400 m*

   How far is the Sunset Shelter to the Office General Store? *275 m*

   How far is Cabin A from Cabin C? *125 m*

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Name: _____

Part 1.

Edible Wilds

As more and more Scouts take to the trails, or go canoeing into the back country, a knowledge of what wild plants can be eaten and which ones cannot should be of great value. This could allow each Scout to travel more lightly and vary their diet with items that have a different taste.

For some, the gathering of wild plants evokes the same excitement as stream fishing for trout. Like fishing, you become immersed in your surroundings, acutely aware of the plants and the processes that affect them. You anticipate what plants will be present, and where. Of course, the joy does not end with the discovery, or, in fishing with the catch. Beyond lies the satisfaction of preparing the food and eating it.

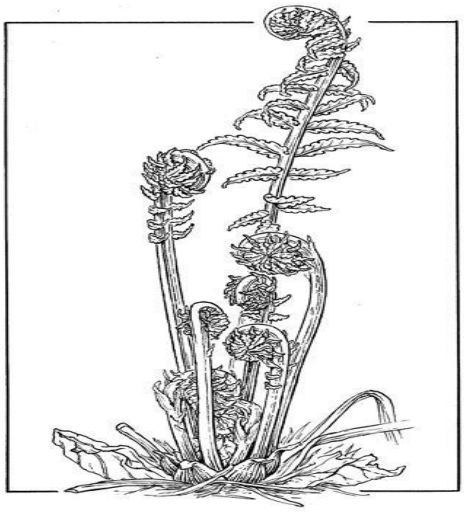
Being able to identify and forage for wild edibles can be a great skill for any Scout to acquire. Always do your research and never eat a plant that you are not 100% sure is edible. There are numerous benefits to eating wild edibles, such as:

- they are free;
- most edible plants are more nutritious than store-bought produce;
- they are beneficial for the immune system;
- picking your own means you get exercise, Vitamin D (sunshine), and get to be in a natural, relaxed setting.

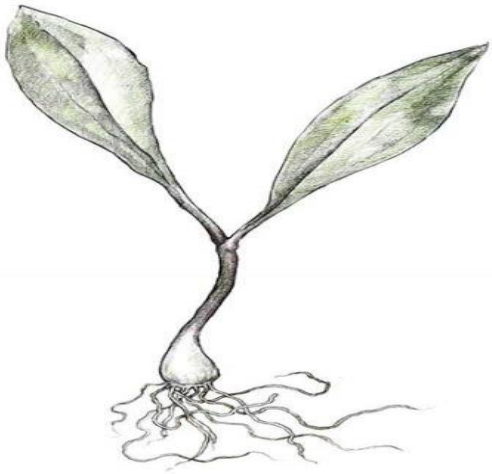
Ontario's forests, meadows and waters provide an incredible range of nutritious and delicious edible wild plants. There are too many edible wilds in Ontario to list here. Three of the more common edible plants to find in the wild for beginners are fiddleheads (*Pteretis pensylvanica*), wild leeks (*Allium tricoccum*), and the giant puffball (*Calvatia gigantea*). They are very common in Ontario, very tasty, and easy to identify.

Be sure you know what you are picking! And eat only plants that you can POSITIVELY identify as edible. It is best to go out and spend time with an expert. An "Edible Wilds" book in your pocket and a basket DOES NOT MAKE YOU AN EXPERT!

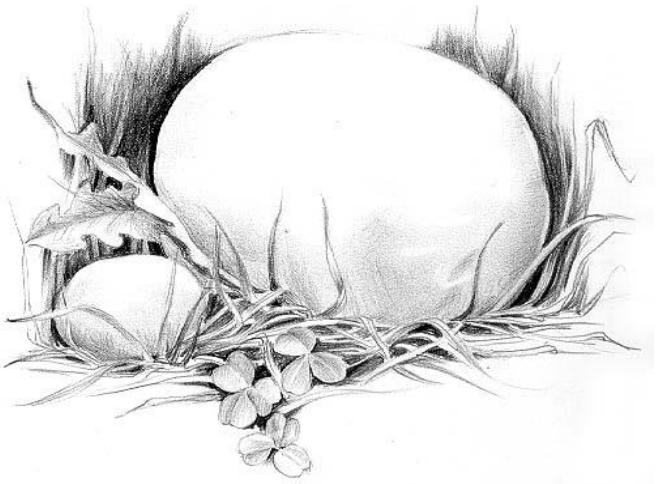
Part 2.



fiddleheads



wild leek



giant puffball

<u>Foraging for wild edibles must be done under close supervision by a knowledgeable and skilled Scout leader or community specialist.</u>

While berries are the most popular edible wilds, tubers (roots), leaves, flowers, and stems of many plants found in the forest or water are also edible. Some can be eaten raw, while others need to be boiled or roasted. Both Indigenous Peoples and settler communities have long traditions of harvesting edible wilds. They are an important part of our forest and freshwater ecosystems.

Visit a local forest community with someone "who knows his stuff" and start enjoying a "free lunch" today. Prepare a small snack for your Patrol.

Part 3. Five Basic Rules for Beginner Foragers

Many edible wilds do not always grow in abundance. This is what makes them such a treat when you find them in the wild. Also, the majority of edible wilds have an "edible timeline". Some can only be found and foraged at certain times of the year.

Edible wilds, and the places they grow, should be treated with care and respect. Like all living organisms, they have their limitations. Follow the simple rules for beginner foragers to help you to understand their limitations and provide a lifetime of enjoyment for "eating out". The simple rules are:

Rule 1. Some wild plants can be potent so it is best to start by eating small amounts of them. Begin by nibbling a taste of a common edible plant and slowly introducing it into your body and taste buds.

Rule 2. Make sure you can identify a plant with 100% certainty before touching or consuming it. Seek the guidance of a local plant expert who can help you identify the subtle differences between various plant species. Referencing field guides or edible wild websites will help you.

Rule 3. Look for common simple plants first that are easy to identify. Fiddleheads, wild leeks, giant puffballs, dandelions, nettle, and other weeds are great to eat, and it is unlikely that you will deplete them by taking your fill.

Rule 4. Do not forage in unfamiliar areas. Study the area you plan to forage. Avoid places near factories, golf courses, or places where water and soil could be contaminated. If a plant is discolored or curls downward in an unnatural way it may best to harvest elsewhere. Be careful where you step when venturing off trails in search of plants and be aware of trampling other plants as you go. Be respectful of private property.

Rule 5. Just because these plants are "free", does not mean you can take all you want. You should learn to harvest responsibly. Take only what you need. Follow the "rule of thirds". Never take the whole plant. It's a good ethic to forage only one-third of any plant that is available; that could be one-third of the plants in a certain place, or one-third of the berries of an individual tree or plant.

Five Tips for Beginner Foragers

- Your sense of small, taste, and sight will all help with identification and will sharpen as you become more experienced.
- Use the right tools to harvest plants and clean them after every use to avoid the spread of invasive seeds or disease to a new area.
- Clip leaves and plants with a sharp knife for minimal damage and to allow the plant to continue growing.
- Plastic containers are not recommended to collect plants. Once the lids are on, plastic containers will suffocate your plants and potentially cause mildew. Collect plants in a breathable cotton sack, basket, or your shirt.

Part 4. Five Poisonous Plants of Southern Ontario You Should Avoid

There are five poisonous plant species in southern Ontario that can cause serious health issues if touched or ingested. These plants may look harmless and sometimes even beautiful, but contact with these plants can cause symptoms ranging from severe itching, or painful rashes, to extreme pain if ingested, and even possible death. You do not have to look far to find them; in public parks, conservation areas, camp grounds, or hiking/biking trails. Take preventative measures and learn how to identify, avoid, and treat reactions from the following five poisonous plants common to southern Ontario. Poison oak is NOT found in Ontario.

- poison ivy (*Rhus radicans*)
- giant hogweed (*Heracleum mantegazzianum)*
- wild parsnip (*Pastinica sativa*)
- pokeweed (*Phytolacca americana*)
- water hemlock (*Conium maculatum*)

Part 5. Challenge yourself (with the help of an expert) to collect and cook some edible wilds.

Name: _____

Part 1.

Aerial Locomotion in Animals

Aerial locomotion in animals includes powered flight, soaring flight, and gliding. Key adaptations include wings, membranes, and specialized body shapes designed to lift the animal through the air.

Animals with powered flight actively flap their wings to generate lift and thrust, distinguishing them from gliders. This group features a specialized anatomy like lightweight skeletons and strong breast muscles to overcome gravity and drag.

Animals with soaring flight conserve energy by soaring on rising air currents (thermals) with minimal flapping. They typically possess long, broad wings designed to minimize drag and maximize lift, allowing them to stay aloft for hours.

Gliding animals have specialized membranes, or flattened body parts to soar between trees without the high energy cost of powered flight. These animals are primarily arboreal and use a type of unpowered flight that is considered a controlled fall, usually with greater forward motion than downward motion.

Key Terms

Lift – is the upward aerodynamic force made by an object (like a wing or rotor) moving through the air, acting perpendicular to the direction of motion. It overcomes the force of gravity (weight) to enable flight by creating lower pressure on the top surface and higher pressure on the bottom.

Drag – is a force that opposes the relative motion of an object through the air. Drag is overcome by thrust.

Gravity – is the fundamental force of attraction between all objects with mass or energy, pulling them toward each other.

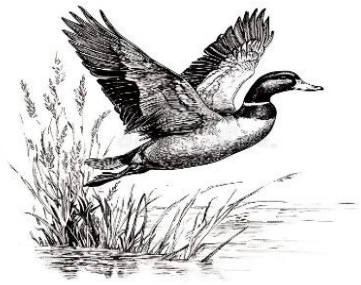
Thrust – is a force that moves an object forward. It occurs when a system accelerates in one direction, causing an equal and opposite force to propel an object forward.

Part 2. **Powered Flight**

Read the following behaviours and adaptations about birds in the first column. The other four columns list the forces that act on any flying object. Birds have these behaviours and adaptations to overcome these forces. Place a checkmark under the force you think is being overcome with the behaviour or adaptation.

Behaviour/Adaptation	Lift	Drag	Gravity	Thrust
In order to take off, birds face into the wind.				
Flapping their wings causes air to flow.				
Birds have hollow bones.				
Birds tuck their legs under their bodies while flying.				
Bird's feathers help create a large surface area.				
Primary feathers, at the end of the wing, push the air.				
Bird's feathers are light and strong.				
Birds fly in a V-formation to decrease air resistance.				
A Peregrine Falcon dives at 280 km/h with its wings tucked in.				
To fly higher, birds change the angle of their wings.				

* Used by nearly all bird species for take-off.



Part 3. **Soaring Flight**

Read the following behaviours and adaptations about birds in the first column. The other four columns list the forces that act on any flying object. Birds have these behaviours and adaptations to overcome these forces. Place a checkmark under the force you think is being overcome with the behaviour or adaptation.

Behaviour/Adaptation	Lift	Drag	Gravity	Thrust
All birds have curved wings.				
Birds have large, strong chest and shoulder muscles.				
Birds have streamlined bodies.				
Birds that soar over water have long and narrow wings.				
An albatross's wingspan can reach 3.5 m.				
Birds have ears inside their heads.				
Soaring birds rise by using air currents called thermals.				
A bird can make "slots" in its wings that reduce air resistance.				

***** Soaring birds, including vultures, eagles, albatrosses, storks, and pelicans.

Part 4. **Gliding Animals**

Read the following behaviours and adaptations about gliding animals in the first column. The other four columns list the forces that act on any flying object. Gliding animals have these behaviours or adaptations to overcome these forces. Place a checkmark under the force you think is being overcome with the behaviour or adaptation.

Behaviour/Adaptation	Lift	Drag	Gravity	Thrust
All gliding animals have streamlined bodies.				
Flying squirrels have flaps of skin connected to their front and back legs.				
A flying snake's rib cage can expand.				
Most gliding animals jump from higher up and descend while gliding.				
The tail of a flying fish provides propulsion to launch it out of water.				
For every metre a flying squirrel descends, it moves 3 m forward.				
The flying fish will hold its tail up during flight.				
The flying squirrel uses its tail to steer.				
The flying lizard extends its ribs to create its "wings".				
The flaps on a flying squirrel have flaps of cartilage to strengthen it.				

***** Notable examples include mammals like colugos, flying squirrels, and sugar gliders, as well as reptiles like flying lizards (*Draco* sp.) and snakes.

Part 5.

Not all birds fly in the same way. Turkey Vultures soar for hours without much wing movement, while hummingbirds flap their wings over 70 times a second.

Have Scouters in your Patrol hold their arms out like wings. Ask them to practice flapping. See how long they can keep up an easy flapping pace, about one flap per second, before they get tired. Ask if their arms ache a bit from flapping. The Scouters should notice that their outer chest muscles and arm muscles are tired. Explain that since humans walk to get around, our leg muscles are often more fully developed than our chest muscles. Some birds, like turkeys, chickens, ostriches, and other walking birds also have well-developed leg muscles.

Study or show the different wing beats of birds in the following table on a board or on chart paper. Ask Scouters to decide which rate of wing beat they think they can match. Start with the flapping rate of an American Crow, an American Robin, then a Rock Pigeon. By the time they get to the European Starling, Scouters should find it impossible to keep up. Divide the group into pairs and have one Scout keep time while the other flaps. Then, have them change jobs.

Wing Beat Table

Bird Species	Wingbeats/10 seconds
American Crow	20
American Robin	23
Rock Pigeon	30
European Starling	45
Black-capped Chickadee	270
Ruby-throated Hummingbird	700

Answers:

Behaviour/Adaptation	Lift	Drag	Gravity	Thrust
In order to take off, birds face into the wind.	X			
Flapping their wings causes air to flow.				X
Birds have hollow bones.			X	
Birds tuck their legs under their bodies while flying.		X		
Bird's feathers help create a large surface area.	X			
The primary feathers, near the end of the wing, push the air.				X
Bird's feathers are light and strong.			X	
Birds fly in a V-formation to decrease air resistance.		X		
A Peregrine Falcon can dive at 280 km/h with its wings tucked in.		X		
In order to fly higher, birds change the angle of their wings.	X			

Behaviour/Adaptation	Lift	Drag	Gravity	Thrust
All birds have curved wings.	X			
Birds have large, strong chest and shoulder muscles.				X
Birds have streamlined bodies.		X		
Birds that soar over water have long and narrow wings.	X			
An albatross's wingspan can reach 3.5 m.	X			
Birds have ears inside their heads.		X		
Soaring birds rise by using air currents called thermals.	X			
A bird can make "slots" in its wings that reduce air resistance.		X		

Behaviour/Adaptation	Lift	Drag	Gravity	Thrust
All gliding animals have streamlined bodies.		X		
Flying squirrels have flaps of skin connected to their front and back legs.	X			
The flying snake's rib cage can expand.	X			
Most gliding animals jump from higher up and descend while gliding.			X	
The tail of a flying fish provides propulsion to launch it out of water.				X
For every metre a flying squirrel descends, it moves 3 m forward.			X	
The flying fish will hold its tail up during flight.		X		
The flying squirrel to use its tail to steer.			X	
The flying lizard extends its ribs to create its "wings".	X			
The flaps on a flying squirrel have flaps of cartilage to strengthen it.	X			

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Name: _____

Part 1.

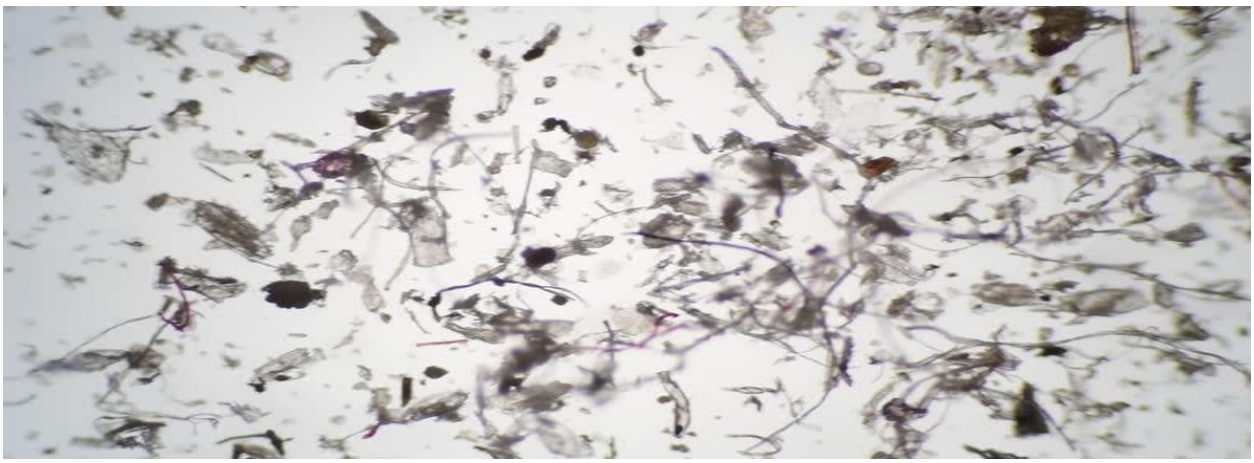
Particulate Study

Particulates are tiny particles of solids and/or liquids 1/1000 of a millimetre in size, that remain suspended in the air. Such particles include carbon, metal fragments, oil particles, and rubber. Sources of most particulates include:

- automobiles – produce 10% of carbon particles.
- industry – through incomplete combustion of fossil fuels (lack of oxygen to break it down). They contribute carbon and sulphur dioxide particles.

Particulates have their greatest effect on human health. Although it is difficult to control outdoor particulate matter, control measures must all be dealt with at the source. Indoor particulates are tiny solid or liquid particles suspended in air.

There is no safe level of particulates. Worldwide, exposure to particulates contributed to 7.8 million deaths in 2021, and of which 4.7 million from outdoor air pollution and the remainder from household air pollution. Overall, ambient particulate matter is one of the leading risk factors for premature death globally.



Sample slide of indoor particulates.

Particulate Study

Part 2.

Purpose: To examine and identify particulates accumulated in areas where different amounts of particulates would fall.

What You Need:
flashlight
Vaseline
2 microscope slides (or any piece of flat, clear glass)
hand lens, or magnifying glass
microscope (if possible)

What You Do:

1. Take one of the microscope slides and smear a thin layer of Vaseline on the slide. Place the slide somewhere in your house where you feel particulates are most abundant, where the slide will not be disturbed.

2. Take the other microscope slide and smear a thin layer of Vaseline on the slide. Place the slide somewhere outside where you feel particulates are most abundant, where the slide will not be disturbed. (Do not worry about rain or snow).

3. Leave both slides for 7 days. <u>Check on occasion to see that they have not been disturbed</u>.

4. After 7 days, collect both slides and try to identify what has accumulated on the slides. Look at them with oblique light (shine the flashlight on the sides for colors). Make a sketch of both slides, identifying what you see. <u>Be very careful not to smear the slide</u>.

5. Observe each slide under a microscope, or with a hand lens, or magnifying glass and try to identify what has accumulated. Sketch each slide and try to label what you can.

6. Answer the four (4) questions.

Part 3 Observations:

Indoor slide

Outdoor slide

Part 4.

1. What are some serious health problems humans can incur from the exposure to indoor and outdoor particulates?

   _____

   _____

   _____

2. What two (2) things can governments do to reduce the amount of outdoor particulate matter?

   - _____
   - _____

3. Name three (3) common sources of indoor particulates.

   - _____
   - _____
   - _____

4. What are two (2) strategies that a Scouter could encourage his family to do to reduce the amount of airborne particulate matter in their house?

   - _____
   - _____

Part 5. Present your findings to your Patrol.

Answers:

1. What are some serious health problems humans can incur from the exposure to indoor and outdoor particulates?

   In general, particulates clog your respiratory system, by preventing cilia (hair-like structures throughout the respiratory system) from sweeping out disease-causing bacteria. Particulates from tobacco smoke are carcinogenic, and can lead to serious health problems. Suspended particles can damage cells, and cause issues like heart disease, lung disease, cancer, and allergies.

2. What two (2) things can governments do to reduce the amount of outdoor particulate matter?

   - *Pressure automobile makers to make more efficient car engines;*
   - *putting strict regulations on industries that release particulate matter into the environment.*

3. Name three (3) common sources of indoor particulates.

   - *<u>Cooking Activities:</u> Frying, broiling, grilling, and gas stoves are major sources.*
   - *<u>Combustion & Burning:</u> Candles, incense, fireplaces, wood stoves, and tobacco smoke.*
   - *<u>Biological Contaminants:</u> Pollen, mold spores, pet dander, dust mites, and skin flakes.*
   - *<u>Household Activities:</u> Cleaning, vacuuming (stirring up dust), and hobby materials.*
   - *<u>Materials & Products:</u> Pressed wood, asbestos fibers, lead paint dust, and consumer sprays.*

   Poorly ventilated homes can have particle levels significantly higher than acceptable standards.

4. What are three (3) strategies that a Scouter could encourage his family to do to reduce the amount of airborne particulate matter in their house

- *Use kitchen exhaust fans while cooking;*
- *Improve ventilation;*
- *Use air purifiers to remove suspended matter;*
- *Reduce the use of candles and incense.*

Name: _____

The Water Cycle

Part 1.

The water cycle (hydrologic cycle) is the continuous, solar-powered movement of water above, on, and below the Earth's surface, changing between liquid, solid (ice), and gas (vapor). The water cycle is powered by the Sun. Water vapor enters the atmosphere through transpiration from vegetation and by evaporation from soil and bodies of water. In the cool upper atmosphere, this vapor condenses forming clouds. Water collects in the clouds to cause precipitation, where it falls back to the Earth. Once water reaches the ground it runs off into bodies of water and eventually evaporates again, while some water seeps into the ground and absorbed by the roots of plants. As plants make food, they give off water vapor through their leaves. This water vapor returns back up into the atmosphere and the cycle continues.

Modelling the Earth's Water Cycle

Part 2.

Purpose: To observe how water cycles through the environment.

What You Need:

large jar	marble or small weight
plastic wrap	dilute salt solution
lamp or heat source	small jar that fits in the large jar

What You Do:

1. Pour the salt solution to a depth of about 2 cm into a large jar.
2. Place a small jar upright in the large jar.
3. Cover the top of the large jar with plastic wrap, held loosely in place with a rubber band.
4. Put a small marble in the centre of the plastic wrap.
5. Leave the jars in direct sunlight or under a lamp for several hours.

Part 3.

1. What two processes moved the water from the large jar to the small jar?

   - _____
   - _____

2. Fill in the following blanks to describe the relationship that exists between temperature and the two processes mentioned in Question 1.

In order for _____ to occur, temperature must _____.

In order for _____ to occur, temperature must _____.

3. What supplies the energy for the water cycle?

_____

4. What part of nature does the plastic wrap symbolize in this experiment?

_____

5. Whether you get your drinking water from a tap, from a well, or from bottled spring water, it is all recycled. Explain why.

_____

_____

_____

Part 4.

6. Many human activities affect processes in the water cycle, creating problems for people, plants, and animals. Give and explain an example of how air pollution in one place can produce water pollution in another place some distance away.

_____

_____

_____

_____

_____

_____

7. Not only does the Sun power the water cycle, but the Sun is also responsible for the overall productivity of a habitat. What natural process is responsible for all productivity in an ecosystem?

_____

8. The Sun also has a profound effect on wildlife. Basking is a form of thermoregulation necessary for the survival of reptiles, amphibians, and insects. Why is basking in the Sun necessary to the survival of these animals?

_____

_____

_____

_____

Part 5.

9. Draw a picture of the water cycle. Make sure your drawing has a title and label the three (3) most important parts: evaporation, condensation, and precipitation.

Answers

1. What two processes moved the water from the large beaker to the small beaker?

   Evaporation and condensation

2. Fill in the following blanks to describe the relationship that exists between temperature and the two processes mentioned in Question 1.

   In order for *evaporation* to occur, temperature must *increase.*

   In order for *condensation* to occur, temperature must *decrease.*

3. What supplies the energy for the water cycle?

   The Sun.

4. What part of nature does the plastic wrap symbolize in this experiment?

   Clouds.

5. Whether you get your drinking water from a tap, from a well, or from bottled spring water, it is all recycled. Explain why.

   Water is constantly cycled in nature. The water cycle purifies water. The ability of water to disappear and reappear somewhere else is part of this cycle.

6. Many human activities affect processes in the water cycle, creating problems for people, plants, and animals. Give and explain an example of how air pollution in one place can produce water pollution in another place some distance away.

   Acid rain is caused by dissolved sulfur dioxide and nitrogen oxides in the atmosphere. These gases combine with water vapour in the atmosphere to form sulfuric and nitric acids. Winds carry atmospheric pollution from industrial areas to areas of lakes and forests where acid rain can slowly kill or damage plants and animals.

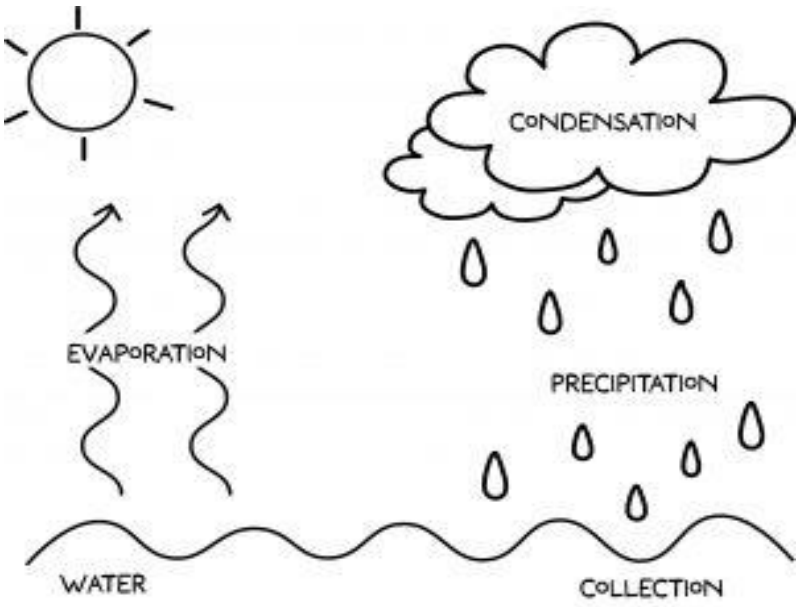
7. Not only does the Sun power the water cycle, but the Sun is also responsible for the overall productivity of a habitat. What natural process is responsible for all productivity in an ecosystem?

Sunlight drives photosynthesis, which creates the foundation of a food chain, supporting the vegetation that herbivores eat and on which ecosystems rely.

8. The Sun also has a profound effect on wildlife. Basking is a form of thermoregulation necessary for the survival of reptiles, amphibians, and insects. Why is basking in the Sun necessary to the survival of these animals?

Basking is crucial for ectotherms (cold-blooded animals) so they can become active (move more efficiently), and digest their food.

9. The Water Cycle



Name: _____

Birding

Birds are a very large, successful group of vertebrate animals. Their success is based on the number of species, their adaptations to a variety of habitats, and their distribution throughout the world. Most birds are capable of flying. Only the ostrich, emu, penguin, and the kiwi do not. The ability to fly is a great advantage. It enables birds to move over great distances to avoid unfavourable climate changes or food shortages. Many birds are at home on land, water, and in the air. No other vertebrate animal occupies such a variety of environments. About 8 500 species of birds exist.

Part 1. Do You Know Birds?

1. Determine whether the following statements about birds are "True" or "False" by wring the letter "T" or "F" in the space provided beside each statement.

a. Birds are the only living animals that have feathers. _____ _____

b. All birds have two wings. _____ _____

c. Birds lose and replace their damaged feathers. _____ _____

d. All birds have thick, heavy bones needed to fly. _____ _____

e. Birds have poor eyesight. _____ _____

f. All birds lay eggs. _____ _____

g. All birds sing. _____ _____

h. All birds migrate. _____ _____

i. All birds are warm-blooded. _____ _____

j. Birds cannot fly backwards. _____ _____

k. Birds do not hibernate. _____ _____

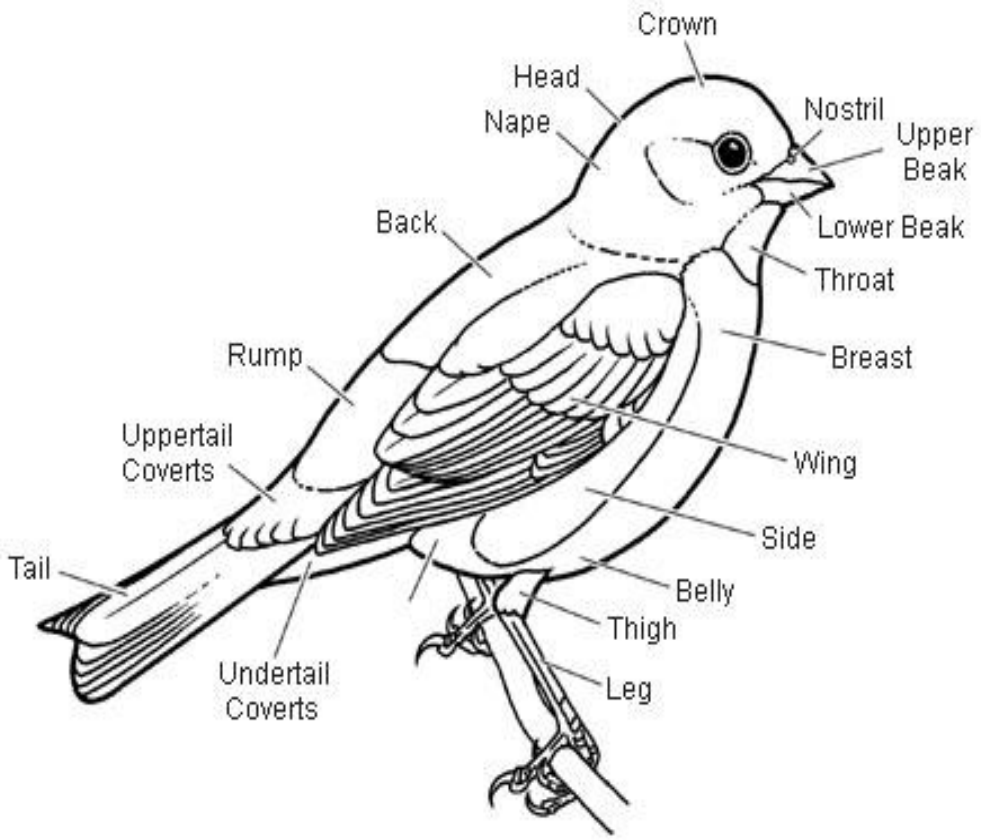
l. Male and female birds of the same species look different. _____ _____

Part 2. **Identifying Birds**

- In North America, 1 out of every 20 people is a "birder";
- North America is a better than average place to study and enjoy birds;
- About 1780 species of birds, representing 97 bird families, live and breed in North America;
- North America is home to approximately 10% of all known birds – this number represents 20 billion birds, a fifth of the world's total.

Birds are a joy to watch, but they can be tricky to identify. Learning the parts of a bird will get you started to improve your bird identification skills. The clues to identifying any bird are basically the same: silhouette, plumage (unique field marks), flight pattern, range and habitat, behavior, and song.

The Parts of a Bird



The following criteria will be useful in identifying birds:

1. Silhouette – each bird has a characteristic size and shape.

    a. size – three standards are commonly used for comparisons. Comparing the size of the unknown bird to that of common ones such as a sparrow, robin, or crow is helpful. This is known as finding a relative size.

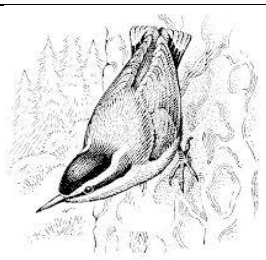
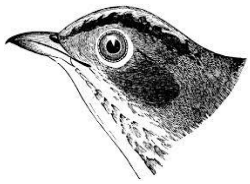
Sparrow Size	Robin Size	Crow Size
		
13.3 cm, tail to beak	21.6 cm, tail to beak	42.5 cm, tail to beak

    b. shape – four shapes are commonly used for comparisons. Observe live birds to become familiar with these shapes.

 chunky as a meadowlark	 plump as a grouse
 slender as a swallow	 bulky as an owl

2. Plumage – characteristic markings; these are known as "field marks".
    - key field marks are often concentrated on the head;
    - identification of the bird can also be made by observing the tail;
    - plumages may vary, depending on season and the bird's age and sex.

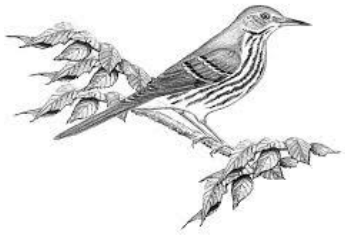
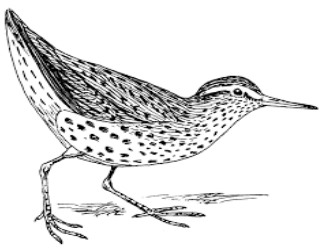
a. Does the bird have an eye stripe or an eye ring?

	
eye stripe Red- breasted Nuthatch	eye ring Ovenbird

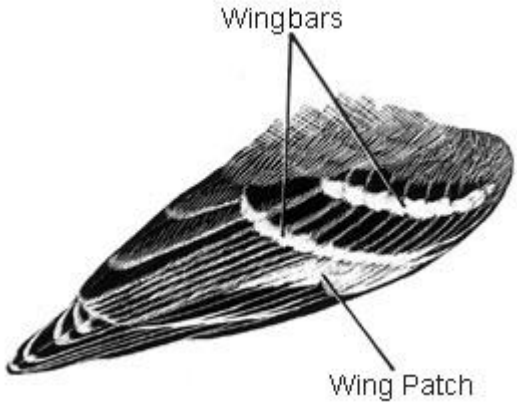
b. Does the bird's head have a crest, crown patch, or stripes?

		
crest Blue Jay	crown patch White-breasted Nuthatch	stripes White-crowned Sparrow

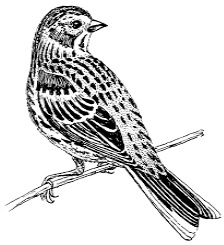
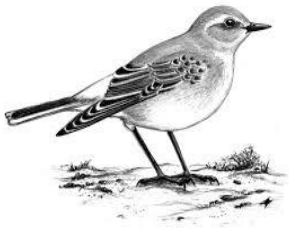
c. Is the breast striped, spotted, or unmarked??

		
striped Brown Trasher	spotted Spotted Sandpiper	unmarked American Goldfinch

d. Does the bird have wing bars or a wing patch?



e. Does the tail have:

outer, white tail feathers	white tail tips	tail band	white rump patch
			
Vesper Sparrow	Northern Shrike	Eastern Kingbird	Northern Wheatear

3. <u>Behaviour</u> – many species, and sometimes entire families, exhibit unique mannerisms or behavioural quirks as they perch, fly, or hunt for food.

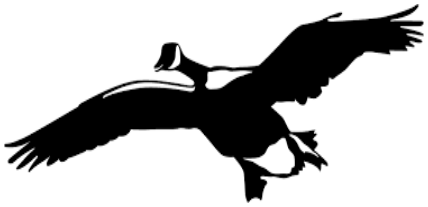
- Does the bird have an undulating (up and down) flight like the American Goldfinch?
- Does the bird "teeter" or "bob" like a Spotted Sandpiper?
- Does the bird have a habit of cocking its tail and dropping it slowly when perched like the Hermit Thrush?
- Does the bird climb down a tree headfirst like the White-breasted Nuthatch?
- Does the bird ascend a tree spirally from the base like a Brown Creeper?

4. Flight Pattern – most birds use a combination of at least two of these types of flight patterns:

   a. flapping - many birds use flapping flight in which both wings beat up and down together. Example, American Robin, Blue Jay, Great Blue Heron.

   b. soaring – some birds travel great distances without any visible wing action. They ride on updrafts of air. Example, vultures, hawks, and eagles.

   c. gliding – when ducks or geese decide to land, they often descend in a long, gliding motion.



   d. hovering – this type of flight needs help from a fresh headwind. The bird appears to stand still in the air, tail fanned out with wings moving. Example, Rough-legged Hawk, Belted Kingfisher, and American Kestrel.

e. fluttering – this is like hovering, but the bird remains fixed in one place without the help of a headwind. Example, Ruby-throated Hummingbird.

5. Range and Habitat - all birds have specific geographic ranges from which they seldom stray. Within that range, each bird has its own specific habitat where it spends most of its time. This habitat contains the right kind of food for the bird.

Bird	Habitat
American Robin	urban areas, around home
Red-winged Blackbird	marshes, wet areas
Red-tailed Hawk	open field areas
Belted Kingfisher	lakes, waterways
Brown Creeper	forested areas
Eastern Meadowlark	open field areas

6. Song – each species of bird has its own specific song/call. Typically, bird families have similar sounds. Example, the nagging cries of jays, the flute-like whistle of thrushes, the rattle of kingfishers.

FUN FACT: All bird names are spelled with capital letters.

Part 3.

Visit a local Conservation Area. Take along with you a "bird book" and a pair of binoculars (10x50 binoculars are good). The best "bird book" is the *Peterson Field Guide to Birds of North America.* Explore as many different habitat types within the Conservation Area as possible; pond, deciduous trees, coniferous trees, stream bank, field. Record your findings. Do not be discouraged when you first start out. It takes a lot of practice to properly identify birds. You rarely see them as they appear in the field guide. That's because birds don't read books! Take pictures and keep track of your sightings. A good suggestion would be to start an on-going "diary" or checklist of all your sightings in a notebook with the following headings. For example:

Bird Species	Date	Location
White-throated Sparrow	June 25, 2025	French River
Red-bellied Woodpecker	March 7, 2026	Lynde Shores
Great Gray Owl	July 26, 2026	Thickson's Woods

Part 4.

2. The Ontario's Endangered Species Act (ESA) currently protects fourteen (14) species of birds and their habitats in Ontario. Identify three (3) birds that are protected in Ontario and state why they are endangered.

- _____

_____

- _____

_____

- _____

_____

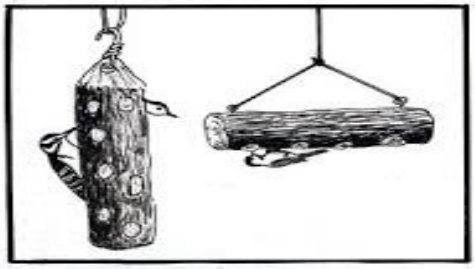
Part 5. Build a Winter Bird Feeder

Attracting birds in your backyard over the winter can be a lot of fun. Despite many species of birds migrate south in the winter, several other species typically remain behind. Sometimes, your backyard will provide the natural food and cover that birds prefer. But as the weather turns cold and natural food sources become scarce, our feathered friends are sure to appreciate access to an accessible food (and water) source. Being able to watch and study birds close-up adds immeasurably to our everyday lives and contributes to a sense of well-being.

During the winter months, your provision of food will help ensure birds make it through the winter. Once you begin to put out food, it is important to maintain the feeding, as birds become accustomed to this food source. Neglecting to put out food could result in birds dying, especially if temperatures become extremely cold. Birds require enough food to maintain their high metabolic rates which keep them warm. When spring rolls around, newly hatched insects and budding plants will attract many of the birds away from your feeder. At this time, their diet is now replaced by more valuable food sources offered by nature.

Sample Winter Birds You Will See in Ontario

Species	Feeding Level	Preferred Food
Blue Jay	ground, window, pole	sunflower seeds, peanuts
Black-capped Chickadee	window, pole	sunflower seeds
Northern Cardinal	ground, window, pole	sunflower seeds
Rufous-sided Towhee	ground, window, pole	sunflower seeds
House Sparrow	ground	all seeds
White-throated Sparrow	ground	all seeds
Evening Grosbeak	pole	sunflower seeds
American Goldfinch	hanging, pole	niger seeds
Pine Siskin	hanging, pole	niger seeds
Purple Finch	window, pole	sunflower seeds
House Finch	window, pole	sunflower seeds
Dark-eyed Junco	ground	millet, small seeds
Hairy Woodpecker	tree trunk	suet
Downy Woodpecker	tree trunk	suet
Red-breasted Nuthatch	pole, tree trunk	sunflower seeds
White-breasted Nuthatch	pole, tree trunk	sunflower seeds



Suet Log Feeder

This feeder will attract chickadees, nuthatches, woodpeckers, and Blue Jays from late September to March. The suet (animal fat) chunks can be easily cut and packed into the holes of your feeder. Birds become dependent on the high energy content of this food so be sure to add suet to your feeder often.

Materials: tree log approximately 10 cm across and 30 cm long (birch or maple)
$\frac{3}{8}$-inch diameter dowels, 10 cm long (4 to 6)
$\frac{3}{8}$-inch diameter drill bit
$\frac{3}{4}$-inch or 1 inch diameter drill bit
drill
eye-screw
15 cm piece of wire
hammer
suet

Obtain Suet

- Purchase beef fat trimmings from a local butcher. It is inexpensive, or the butcher might even give it to you at no charge.
- Save bacon and pork meat drippings to create your own suet. This will be softer than rendered beef fat but is still suitable for the birds.
- Buy lard at the grocery store. Lard is typically found shelved near the butter or margarine products.
- Buy vegetable shortening in place of animal fat. This is a preferred choice for many vegan or vegetarian birders who prefer not to use animal products, and it is still suitable for the birds. Vegetable shortening is typically found with baking supplies.

Preparation of Suet

Suet recipes do not need to be complicated in order to attract a range of hungry birds. Before offering the suet to the birds, however, it should be rendered to help it maintain its shape more easily.

To Render Suet

1. Chop the fat into small pieces or run it through a meat grinder. If you are getting the fat from a butcher, they may be willing to do this for you. Be sure all traces of meat are removed.

2. Heat the chopped fat on low until it is liquefied. Do not use higher temperatures to melt the suet more quickly, as this could lead to fires or scorching.

3. Strain the liquid fat through cheesecloth or a fine mesh to remove any particles or contaminants. The suet should be strained several times so it is as pure as possible.

4. Pour the fat into molds or containers and allow it to cool. The cakes can be chopped or cut to be fed to the birds, or you may choose to use containers that are the appropriate size to fit your suet feeders.

Once the suet is rendered, it can be fed to the birds as-is or you can choose to add simple ingredients to make it more appetizing to a wider range of birds.

Easy Suet Recipe

- 1 cup of rendered suet;
- 1 cup of chunky peanut butter;
- 3 cups of stone-ground cornmeal;
- ½ cup of white or wheat flour.

Melt the suet and peanut butter together until they are smooth and liquid. Add the cornmeal and flour, mixing well. Allow the mixture to cool slightly to thicken and then pour it into molds or containers to use. Refrigerate or freeze suet until it is firm and you are ready to use it.

What Else You Can Add to Suet

While a simple bird suet recipe is useful, adding different ingredients to the mixture before it cools can make it more attractive to birds. Popular ingredients to customize a suet recipe include:

- chopped, unsalted nuts;
- dried fruit bits;
- birdseed;
- honey;
- kitchen scraps.

These are the easiest items to add to simple suet to make it even more tempting for your birds. Take the time to experiment with adding other ingredients to discover what your birds find most appetizing, and you will soon have plenty of suet-eaters at your backyard buffet.

Making the Log Feeder

1. Obtain a log that is approximately 10 cm across and 30 cm long. The log does not have to be perfectly straight.

2. Starting at the top of the log using the 1-inch diameter drill bit, randomly drill 5-6 holes around the log that are evenly spaced apart. Drill the holes at least 2 cm deep.

3. With the $\frac{3}{8}$-inch diameter drill bit, drill a perch hole $\frac{1}{4}$-inch below the 1-inch holes that hold the suet. Drill the holes at least 2 cm deep. Insert the perches and tap with a hammer until snug. Perches should be at least 8 cm in length.

4. Attach eye-screw and wire to the top of the log.

5. Fill all 1-inch diameter holes with suet.

6. Hang it up near a tree or somewhere that birds have easy access to.

Part 1 Answers:

1.

a. Birds are the only living animals that have feathers.
True. *All birds have feathers. Some birds have highly modified feathers to fit particular functions, such as the fancy feathers on a peacock's tail.*

b. All birds have two wings.
True. *All birds have two wings.*

c. Birds lose and replace their damaged feathers.
True. *Birds can replace old and damaged feathers through molting. Molting generally occurs after nesting or before migration when the bird has enough resources and energy.*

d. All birds have thick, heavy bones needed to fly.
False. *Most birds adapted for flight have very light but strong bones. A few flightless birds, like penguins, have solid bones.*

e. Birds have poor eyesight.
False. *Birds generally have very good sight. Many birds can see color; some can even see light ranging in the ultraviolet spectrum that humans cannot see.*

f. All birds lay eggs.
True. *All bird species do lay eggs. Male birds do not.*

g. All birds sing.
False. *While not all birds sing the beautiful songs we commonly think of, most are capable of making a variety of sounds. They be calls, chip notes, or pecking against a tree. Males do more singing in many song birds.*

h. All birds migrate.
False. *Not all birds migrate; for example, the Rock Pigeon is one species which remains in one area all year round. Many birds, especially those that eat insects, must migrate to find food.*

i. All birds are warm-blooded.
True. *All birds are warm-blooded, or endothermic. This means that birds are able to regulate their body temperature through various internal means.*

j. Birds cannot fly backwards.
False. Only one exception; *a hummingbird can fly backwards.*

k. Birds do not hibernate.
False. Only one exception; *the Common Poorwill is the only bird known to hibernate, with body temperatures potentially dropping to 5° C (41°F).*

l. Male and female birds of the same species look different.
True. *There are many species where the males and females look different from each other. One example is the Red-winged Blackbird. The male plumage matches his name, but the female is a dull brown with no red patches on her wing.*

2. Species at Risk in in Ontario (SARO List)

- Acadian Flycatcher (*Empidonax virescens*)
- American White Pelican (*Pelecanus erythrorhynchos*)
- Bald Eagle *(Haliaeetus leucocephalus)*
- Barn Owl (Eastern population) (*Tyto alba*)
- Eskimo Curlew (*Numenius borealis*) – most likely extinct
- Golden Eagle (*Aquila chrysaetos*)
- Henslow's Sparrow (*Ammodramus henslowii*)
- King Rail (*Rallus elegans*)
- Kirtland's Warbler (*Setophaga kirtlandii*)
- Loggerhead Shrike (*Lanius ludovicianus*)
- Northern Bobwhite (*Colinus virginianus*)
- Peregrine Falcon *(Falco peregrinus)*
- Piping Plover (*Charadrius melodus*)
- Prothonotary Warbler (*Protonotaria citrea*)

Many bird species are at risk in Ontario primarily due to severe habitat loss, degradation, and fragmentation driven by urban sprawl, intensive agriculture, and industrial development. Key threats include the decline of aerial insects, collisions with buildings/vehicles, cats, and climate change, with over 100 species facing weakened provincial protections under recent legislation changes.

©Scouts Hobby – Adventure 1

Name: _____

Part 1. Wildlife Conservation as a Hobby

Wildlife conservation is a term that emphasizes the use, management, and protection of plants, animals, and their habitats. By conserving wildlife, we are ensuring that future generations can enjoy our natural world. These incredible species that live within our world will not be degraded or unnecessarily wasted. To help protect wildlife, it is important to understand how species interact within their ecosystems, and how they are affected by environmental and human influences.

Wildlife conservation, as a hobby, involves engaging in activities that study, protect, and restore local ecosystems and species. Hobbyists can contribute significantly through local volunteering in projects such as wildlife monitoring, habitat restoration, building bird/nest boxes, or creating local "backyard habitats". All these projects offer hands-on experience, networking opportunities, and a way to support environmental health.

It all starts by focusing locally. Start by studying and conserving the nature within your own community. Find an organization near you and get involved. One of the most significant projects in wildlife conservation to get involved in is turtle conservation.

Turtle Conservation in Ontario

Southern Ontario is the turtle capital of Canada. Ontario is home to eight different species of turtles. The greatest variety of Canadian turtles live in Ontario. They can be found in many different habitats such as lakes, ponds, rivers, and marshes.

There are strict laws under the Ontario Endangered Species Act and Fish and Wildlife Conservation Act that protect all turtle species in Ontario. Adherence to these laws must be followed. Do not assume you can make up your own rules.

In Canada, all eight native fresh-water turtle species are now listed as Species at Risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Wildlife in Canada is designated as endangered, threatened, species of special concern, or not at risk. Since a species in Canada can have a population that is healthy in one province but not another, the status can be different provincially vs federally. All of Ontario's turtles are granted some level of protection. The designations are defined as:

Endangered – a species that faces imminent extirpation or extinction (extirpation means that the species no longer exists in Canada but does exist elsewhere).

Threatened – a species likely to become endangered if nothing is done to reverse the factors leading to extirpation or extinction.

Special Concern – a species that may become threatened or endangered because of a combination of biological characteristics or identifiable threats.

The following table lists the eight species of turtles found in Ontario, their designated status, and their habitat preference.

Species	Designation in Ontario	Designation in Canada	Habitat Preference
midland painted turtle	not listed	special concern	ponds, rivers, and lakes
western painted turtle	not listed	not listed	shallow, ponds, marshes, lakes, and slow-moving streams
northern map turtle	special concern	special concern	large lakes and rivers
eastern musk turtle (stinkpot)	special concern	special concern	quiet waters of lakes, slow streams, marshes, and ponds
snapping turtle	special concern	special concern	large lakes and rivers
Blanding's turtle	threatened	endangered	shallow, marshy waters, and ponds
spiny softshell turtle	endangered	endangered	prefers shallow places where it can bury itself
spotted turtle	endangered	endangered	prefers small, shallow ponds; also in the woods or wet, grassy areas
wood turtle	endangered	threatened	ponds, streams, and damp woodlands

**It is illegal to keep ANY native turtle as a pet in Ontario.

Part 2. **Turtle Biology**

Turtles belong to a group of ectothermic ("cold-blooded") vertebrate animals known as reptiles. Turtles are unique among animals because their body is encased in a shell. This shell, which acts as a protective armour, may in part account for their long survival on Earth. The shell varies in shape according to the species, or way of life of the turtle. The top shell of a turtle is known as the carapace; the lower shell as the plastron. Both are fused together at the sides. The horny plates or shields of the carapace and plastron are called scutes (these are lacking in the carapace of the eastern spiny softshell turtle).

Most turtles live in water nearly all the time. (One exception is the wood turtle, which is Ontario's most terrestrial turtle.) All of Ontario's turtles hibernate underwater in ponds, marshes, lakes, and rivers.

All species of turtles lay eggs on dry land. Turtle eggs will die if laid in water. Every year between April and October, both male and female turtles are on the move preparing for the breeding season. Females will travel great distances to locate the "perfect" spot for which to lay her eggs. The "perfect" spot must be an open area with sandy or gravelly soil that is easy for her to dig, far enough or high enough from water to prevent the nest from being flooded out. The eggs must receive the correct amount of moisture so the eggs do not get too dry or too moist during incubation.

The number of eggs laid in a nest varies from species to species. For example, the eastern midland painted turtle will lay between 3-14 eggs, while the snapping turtle will lay between 30-40 eggs. Unlike birds, turtles do not tend to their nests or care for the hatched turtles. This leaves the nest open to predation by predators such as crows, raccoons, skunks, foxes, and coyotes. Even after hatching, the young are easily preyed upon. Less than 1% of all turtle eggs laid will hatch and grow into an adult turtle. It can take 8-25 years (depending on species) before a turtle reaches maturity.

Eggs generally hatch in late summer or early fall. With most turtles, the sex is determined by the temperature during incubation. With an optimum temperature of 28°C (82°F.), a clutch yields equal numbers of males and females. Hotter temperatures will produce more females while cooler temperature produce more males.

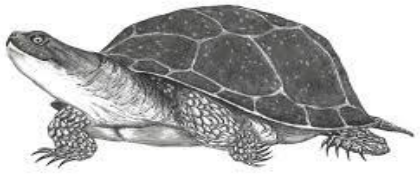
Estimating Age and Determining Sex of a Turtle

Unless you know when a turtle was born, it is nearly impossible to tell its age. But you can get a rough "guesstimate" by counting the annual growth rings on the turtle's shell scutes. A scute is a hard scale that makes up a turtle's shell. Scutes are pieces of keratin (similar to fingernails) that provide protection to the turtle's shell. Look for the rings. Similar to trees, turtle scutes develop rings. Count the rings on a scute, bearing in mind that two rings often represent one year (a wide, light ring for summer growth and a narrow, dark ring for winter). Remember, you don't want to count scutes, as scutes do not reflect the turtle's age. Rather, you want to look at the rings within the scutes. This method is less accurate after age 15-20 as rings get too close together.

It is probably easier to say that a turtle is "young" or "old". To tell the difference between a "young" turtle and an "old" turtle, young turtles have brighter colors and sharper, more defined ridges on their shells. Older turtles often have smoother, worn-down shells due to years of activity and environmental wear.

Here are the key physical differences to look for to determine if a turtle is male or female, usually only visible in mature adults (typically 4+ inches).

Identifying Feature	Male	Female
tail size and shape	long, thick, sturdy	short, thin, and stubby
plastron shape	concave or slightly curved inward	flat or convex
claw length	very long front claws	short, neat front claws
overall size	often smaller	noticeably larger
cloaca (vent) location	well past the edge of the carapace, further down the tail	closer to the base of the tail, near the edge of the plastron.



Blanding's turtle

1. Many of the reasons for turtle population declines in Ontario are due to human activity, especially in densely populated areas. The following lists the main threats to Ontario's turtle populations. Fill in the blanks for the number one and number two threats.

- _____
- _____
- human subsidized predation
- environmental pollution
- poaching for the pet trade
- climate change
- increased predator densities due to urbanization (skunks, raccoons, foxes)

2. The life history strategy of a turtle relies on an adult turtle surviving for a long time, anywhere from 25-100 years. Give two (2) reasons why it is believed turtles live such a long time.

- _____
- _____

3. The stinkpot turtle is found in shallow bays or ponds. This highly aquatic turtle is rarely seen unless basking in the Sun out of water. Why is basking in the Sun necessary to the survival of all species of turtles?

_____

_____

_____

_____

4. The snapping turtle is often regarded as a villain, acquiring an undeserved reputation for being a threat to swimmers and ducklings alike. It is big and has powerful jaws. Without a doubt, the snapping turtle appears aggressive when encountered on land but in the water, appears timid and will avoid swimmers. Why does the snapping turtle behave so differently in these two situations?

_____

_____

_____

_____

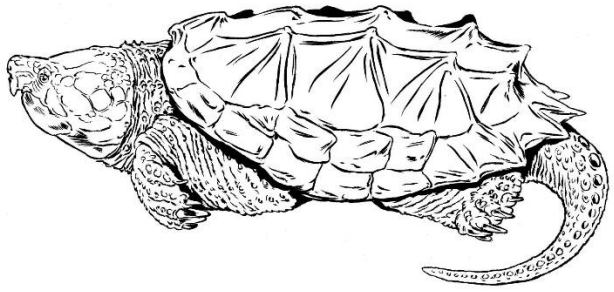
_____

5. When recognizing the snapping turtle's ecological niche, "garbage collection is an important business to the snapping turtle". What does this mean?

_____

_____

_____



snapping turtle

Part 3: Poaching and the Illegal Wildlife Trade of Ontario's Turtles

Turtle populations in southern Ontario are under extreme pressure by poachers who sell the turtles on the black market as pets for aquariums, or, for the dinner plate. Turtles are considered a favourite among Asian markets for delicacies such as turtle soup. And Ontario's once plentiful turtle populations are quickly disappearing as poachers capture the reptiles for sale on the illegal pet trade market. Most of the turtles end up for sale in China and Japan. The spotted turtle, native to Ontario, is frequently sold in markets in Jakarta, Indonesia.

Historically, Ontario's laws and enforcement have often left turtles unprotected. Snapping turtles, for example, are listed as a species of special concern, but they could still be caught (and eaten) by anyone in the province with a fishing license. It has been a long time coming, but the Ontario government has now finally announced its decision to terminate the legal hunting of snapping turtles. Scientific data indicated that snapping turtles could not be sustainably hunted. It is now illegal to hunt or trap snapping turtles in Ontario. As of April 1, 2017, the Ministry of Natural Resources and Forestry banned the hunting of snapping turtles, ending the previous regulation that allowed for a small, daily harvest. Studies showed that taking just one or two adults from a population on a yearly basis was leading to declines. Hunting or possessing a snapping turtle illegally in Ontario can now result in significant fines.

Currently, Ontario is home to eight turtle species. The biological drawback to maintaining turtle populations is that most turtle species take a long time before they are capable of breeding. The wood turtle, for example, does not start breeding until it is 17 years or older, thereby making populations extremely vulnerable when even a few turtles are poached.

Legal trade in Ontario does not involve native turtle species, so if you see an Ontario turtle in a pet store, restaurant, or market, notify the authorities. It is highly unlikely that it was obtained legally. Does it really happen? Yes, it does!

- in 2013, a Scarborough restaurant, Fortune Seafood, was fined for serving eastern spiny softshell turtles on the menu;
- in 2014, two Canadian men, Kai Xu and Lihua Lin, were arrested at Pearson International Airport after they tried to ship 200 live turtles to China;
- in 2015, a Canadian man, Kai Xu, tried to cross the border at Windsor into Detroit with 51 live snapping turtles taped to his body.

Part 4: Conservation Project: Make a Turtle Nest Protector

If you see a turtle digging in an area for hours, you will know it's a female ready to lay her eggs. It is best to leave her alone at this time. After the nest is dug, she will deposit the eggs, cover them up, and then leave.

It is illegal to disturb or interfere with a natural turtle nest. The nest environment cannot be altered in any way, or, if a man-made nest protector utilized does not allow the hatchlings to leave on their own. Setting up effective nest caging takes a lot of time and consideration, so please think carefully before taking on this responsibility.

A Scout can boost the odds of turtle survival by building a nest protector and placing it on private property, or, simply by encouraging others to do the same. Making a turtle nest protector increases the odds of the survival rate of any newly hatched turtles. A properly constructed nest protector requires little cost and effort. It is easy to make and can provide a valuable learning experience to help turtles at risk.

What You Need: one 8-foot untreated 2X4
eight 3-inch screws or nails (2 per corner)
$\frac{1}{2}$-inch galvanized mesh (2 square feet)
4 washers
four 10-inch nails (spikes)
metal staples (as needed)
jigsaw
tape measure
small flag (optional)

What You Do:

1. Cut the 8-foot 2X4 into 4 equal lengths (2-feet each).

2. Screw (or nail) the 2-foot lengths together to make a 2-foot square frame.

3. Make an escape route for the newly hatched turtles by cutting a 2-inch by 1-inch notch in the middle on the bottom edge of each side of the frame,

4. Staple the galvanized mesh on the top of the four sides of the frame.

5. When you spot a nesting turtle, give the female turtle enough time to lay her eggs. Once done, place the nest protector over the nest. Use the washers and stake the four corners of the frame into the ground to prevent predators from getting at the nest.

6. Check that the exit holes and the top of the nest protector are free of any vegetation (or obstructions) to ensure the hatchlings can escape and proper sunlight and water can get through.

7. Attach a small flag to mark the nest protector. This is a visual reminder for people to avoid this area as much as possible.

NOTE: Sometimes, people may get impatient and begin to worry if they have not seen the eggs hatch or young turtles come out, so people will dig up the nest. That is a big mistake. On occasion, the eggs will hatch, but the young turtles will not emerge until the next spring. Let things be. Turtles have been doing this for a *very* long time. They know what they are doing!

What Not to Do:

- Never take a turtle from the wild as a pet, as this contributes to the decline of the population.
- Never move a turtle to a new "better" location; they have a home range and will spend their life trying to return, often getting hit on the road.
- Never release pet turtles into the wild, as they can carry diseases and establish populations to out-compete native species.

Part 5: What To Do

There are many ways that a Scout can contribute to turtle conservation and help prevent declines of our local turtle populations.

- Keep an eye out for turtles on the road:
  When safe to do so, always move turtles off the road in the direction that they were going.

- Volunteer with a local conservation project:
  There are numerous projects, especially in Ontario, that work to improve the survival of turtle nests by deploying nest protectors, collecting and incubating eggs laid in precarious locations, head-starting hatchlings, and increasing public education and awareness.

- Prioritize habitat protection:
  To enhance turtle habitats on your own property, consider planting native and removing invasive species of vegetation, maintaining fallen logs and debris for basking sites, creating artificial nesting mounds, and building nest protectors.

- Report your sightings:
  Recording and submitting your turtle observations to community science projects is a simple, yet valuable way to contribute to conservation efforts, such as identifying hot spots of road mortality, determining the extent of a species' geographic range, or even discovering previously unknown populations to be protected.

How to Help and Report Suspicious Activity

Do not confront individuals; safely document details (location, time, license plate) and report to authorities. If you suspect any of the following:

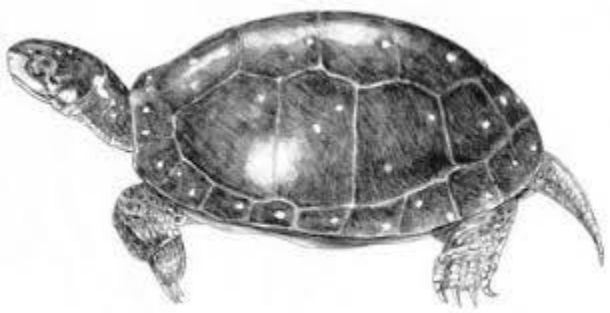
• someone illegally taking turtles from the wild;
• someone fishing for turtles;
• the illegal sale of turtles or turtle parts.

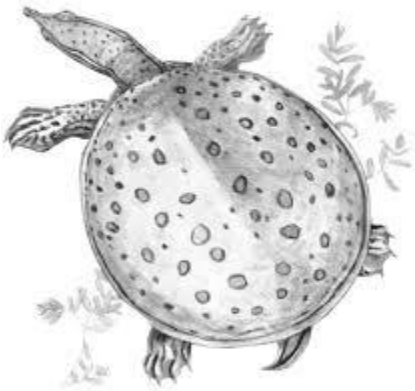
Then Contact:

Ministry of Natural Resources & Forestry:	1-877-847-7667.
Crime Stoppers:	1-800-222-8477 (anonymous).
Sightings:	iNaturalist Canada or the Toronto Zoo's Turtle Tally

If you are out and find an injured turtle anywhere, contact the Ontario Turtle Conservation Centre immediately at 705-741-5000.

spotted turtle





eastern spiny softshell turtle

Answers:

1. Many of the reasons for turtle population declines in Ontario are due to human activity, especially in densely populated areas. The following lists the main threats to Ontario's turtle populations. Fill in the blanks for the number one and number two threats.

- *The destruction and fragmentation of wetland habitats in favour of development and road networks.*

- *Road mortality due to vehicle collisions, especially for females when travelling on land to reach their nesting sites.*

2. The life history strategy of a turtle relies on an adult surviving for a long time, anywhere from 25-100 years. Give two (2) reasons why it is believed turtles live such a long time.

- *<u>Protective Shells:</u> Their hard, bony shells (carapace) act as armor, providing a significant defense against predators and reducing mortality rates from environmental threats.*

- *<u>Hibernation:</u> They can survive long periods without food or water, entering low-energy states like hibernation in mud. This reduces stress on their bodies and while hibernating over winter, they avoid all mortality factors.*

3. The stinkpot turtle is found in shallow bays or ponds. This highly aquatic turtle is rarely seen unless basking in the Sun out of water. Why is basking in the Sun necessary to the survival of all species of turtles?

Basking is crucial for ectotherms (cold-blooded animals) to increase their body temperature so they can become active, move more efficiently, and digest their food.

4. The snapping turtle is often regarded as a villain, acquiring an undeserved reputation for being a threat to swimmers and ducklings alike. It is big and has powerful jaws. Without a doubt, the snapping turtle appears aggressive when encountered on land but in the water, appears timid and will avoid swimmers. Why does the snapping turtle behave so differently in these two situations?

On land, the snapping turtle will not hesitate to attack. It is handicapped to some extent as its head and limbs cannot withdraw completely into its shell for protection unlike other turtles. The plastron is very much reduced and offers little protection to the limbs and flanks. The turtle's only protection, when not in the water, is to adopt a threatening posture and try to bite its attacker. Once in the water, its behaviour changes. The now frightened turtle will dive to the bottom and stay there until it feels safe enough to swim away.

If improperly handled, a large specimen would be capable of biting off a finger or inflicting other serious wounds. If it is necessary to carry a snapper, it should be picked up by the base of the tail and held at arm's length, well away from the body.

5. When recognizing the snapping turtle's ecological niche, "garbage collection is an important business to the snapping turtle". What does this mean?

A snapping turtle is beneficial to any aquatic ecosystem as the resident scavenger. Their ecological niche does not go unnoticed. That being, to clean up lake bottoms. Snappers are the "garbage collectors" of ponds and lakes. They are attracted to the smell of carrion. They will crawl about the bottom in search of, and to feed on, dead or easy-to-catch, slow-moving prey.

©Scouts Hobby – Adventure 2

Name: _____

Part 1. Recreational Hunting in Ontario

Ontario is a vast and beautiful province, with an abundance of natural resources. Our province offers a unique experience for hunters to connect with nature. Hunting is a deep-rooted tradition in Ontario. It provides food, brings friends and family together, and strengthens bonds across generations. Hunting is a major contributor to wildlife conservation. It also boosts Ontario's economy and is a significant part of Canadian culture for many.

Hunters are good stewards of the land, recognizing the importance of protecting Ontario's natural resources for generations to come. Hunters in Ontario help to maintain plant and animal biodiversity, sustain healthy wildlife populations, and preserve Ontario's hunting heritage.

To hunt in Ontario as a resident, <u>you must</u>:

- be at least 16 years old (or 15 with written parental consent);
- have successfully taken the Ontario Hunter Education Program (or an Ontario-recognized equivalent accreditation) and have submitted valid documentation to have hunter accreditation added to your Fish and Wildlife Licensing Service account;
- follow all federal firearm regulations and carry appropriate documentation with you if you are hunting with a gun;
- have a valid Outdoors Card;
- have the required hunting licence(s) and tag(s) for the game you wish to hunt.

Ontario residents who are 12 to 14 years old are eligible to participate in Ontario's Hunter Apprenticeship Safety Program.

Any person hunting in Ontario must follow all rules related to hunting in Ontario, including where and when you hunt, the type of firearm that you are using, and the clothing you are required to wear when hunting.

A hunting licence is required to hunt in Ontario. All licences are specific to the game you wish to hunt and will be listed on your licence summary. To get a resident hunting licence in Ontario, most people need to pass the Ontario Hunter Education Course, including an exam. A valid Outdoors Card is also required.

A valid Outdoors Card is required before you can purchase hunting products. You must follow all federal firearm regulations and carry appropriate documentation if you are hunting with a gun.

It is your responsibility to know the type of season and open season dates for the species you wish to hunt along with any other hunting rules that may apply.

Part 2. Ontario Outdoors Card

To legally hunt in Ontario, you need a valid Outdoors Card and a valid hunting licence. An Outdoors Card is a plastic, wallet-sized identification card issued by the ministry that allows you to hunt.

You are required to carry this card with you at all times while hunting.

Hunter Apprenticeship Safety Program (Ages 12-14)

Residents aged 12–14 in Ontario can legally hunt through the Hunter Apprenticeship Safety Program, for which they:

- must pass the Ontario Hunter Education Course and exam;
- must possess a federal Minor's Licence or proof of completing the Canadian Firearms Safety Course;
- be under direct and immediate supervision of a mentor 18+ with a valid license;
- cannot apply for big game (e.g., moose, elk) tags;
- must possess an Outdoors Card (with parent/guardian consent);
- must share a firearm and bag limit with their mentor, though they can purchase select licenses to have their own bag limit.

Hunter Education Course

The ministry offers two options to take Ontario's Hunter Education Course:

- in-person, instructor-led course;
- online course, self-directed learning.

Ontario residents must take the course through the Ontario Hunter Education Course and pass the exam to:

- buy hunting licences and tags;
- participate in the Ontario Hunter Apprenticeship Safety Program.

Canadian Firearms Safety Program

If you want to hunt using a gun, you must have successfully completed the Canadian Firearms Safety Course, and hold one of the following:

- a valid possession and acquisition licence;
- a valid minor's licence;
- proof of completing the course.

Wildlife Management Units (WMUs)

The province of Ontario is subdivided into 95 Wildlife Management Units (WMUs). Each WMU has customized hunting regulations for the:

- game you can hunt;
- open season dates;
- permitted methods of hunting.

It is the hunter's responsibility to:

- know which WMU you are hunting in;
- know and follow the hunting regulations for that WMU.

The Hunter's Code of Ethics

The hunter's code of ethics is to always:

- practice safe firearm or bow handling, and positively identify the target before shooting;
- give wild animals a reasonable chance to escape; avoiding technology for an unfair advantage;
- strive for a quick, clean kill, and make every effort to retrieve wounded game; use all harvested meat;
- obtain permission on private land, leave gates as they were found, and avoid damaging crops or livestock;
- treat other hunters, hikers, and non-hunters with courtesy; do not interfere with another's hunt, and keep firearms and harvested game out of sight when not in the field;
- obey laws and report poachers or illegal hunting activities to authorities;
- act as a responsible steward of the environment to maintain a positive public image.

The Hunter Rules of Personal Conduct

A hunter strives to:

- only take shots within their effective range to avoid wounding animals;
- avoid shooting from vehicles or public roads;
- teach others, particularly youth, how to hunt ethically;
- remove all garbage and leave the land better than you found it.

Hunting on Crown Land vs Private Property in Ontario

In Ontario, roughly 87% of land is Crown land. The remaining 13% is privately owned land. Regardless of where you hunt, all hunting rules and regulations apply. The following lists the key differences and regulations between hunting on crown land versus private property:

- Crown land is generally open to the public, though some areas are restricted (e.g., provincial parks). Private land requires explicit permission from the landowner.
- On Crown land, hunters must identify land boundaries and check for seasonal restrictions. On private land, the onus is on the hunter to find out who owns the land and secure access.
- It is illegal to shoot from or across a public road, or too close to dwellings on both, but private land often has higher concerns regarding livestock and buildings.
- If a wounded animal crosses into private property, you must seek permission to retrieve it.
- Crown Land often has higher hunting pressure, requires more scouting, and navigation of vast, remote areas. Private land requires explicit landowner permission and requires building relationships with landowners to gain exclusive access, better management potential for game, but stricter trespassing rules.

Always check the local provincial regulations for specific, updated rules regarding access.

Ammunition Types

- In Ontario, you can hunt with a variety of ammunition types, with regulations heavily dependent on the species, area, and season. A hunter must use center-fire rifles (no minimum caliber, but generally .243 or higher recommended) for big game like deer, moose, and bear. Shotguns for big game must be 20 gauge or larger, using slugs or shot size SG (no. 1 buck) or larger.

- In Ontario, a hunter can hunt small game with a pellet gun but it is not permitted for big game. Air guns and pellet guns are considered firearms if they exceed 500 feet per second (fps) or 5.7 joules, both requiring a PAL. You must hold a valid Outdoors Card and appropriate hunting license, and adhere to local municipal bylaws regarding discharge. Always check local municipal bylaws, as many areas prohibit discharging any air gun, even on private property. You cannot hunt migratory birds with a pellet gun.

- In Ontario, handguns cannot be used for hunting.

- In Ontario, you can hunt with a compound bow, recurve bow, longbow, and crossbow, provided they meet specific minimum draw weight and arrow length requirements. While no special archery license is required, you must have completed the Ontario Hunter Education Program. A hunter does not require a PAL (Firearms License) for any bow in Ontario.

- In Ontario, licensed hunters must wear solid "hunter orange" clothing (vest, coat, or overall) and a head cover during gun seasons for deer, moose, or elk. The garment must cover at least 400 square inches (2 580 cm^2) above the waist, be visible from all sides, and cannot be camo or mesh. Hunter orange clothing is not required when hunting migratory birds.

<u>Always consult the latest Ontario Hunting Regulations Summary for precise rules and regulations in your specific Wildlife Management Unit (WMU).</u>

Part 3. Hunting Seasons and Why They Exist

As much as you would probably love to grab your firearm or bow and hit the woods in search of game any time you have a free weekend, in Ontario, hunters must follow designated hunting seasons for each game animal. The Ontario government regulates the timing and duration of hunting activities, ensuring sustainable population management.

A hunting season is a time frame during which it is legal to hunt and harvest a particular kind of animal. Limiting hunting to specific periods and seasons allows animal populations to reproduce and replenish, maintaining an ecological balance. Hunting seasons also coincide with natural behaviors like mating and migration, enhancing the fairness and challenge of the hunt. It is crucial to know and understand *when* you can hunt!

Seasons promote responsible hunting practices, preventing overexploitation and supporting biodiversity. Furthermore, they contribute to local economies through tourism and recreation. Ultimately, seasonal regulations preserve the tradition of hunting while safeguarding wildlife habitats, ensuring future generations can also enjoy the thrill and benefits of hunting.

Wildlife management authorities typically implement hunting regulations and seasons to ensure sustainable populations of game animals. In Ontario, depending on the game species, a Spring hunt occurs between April and May and a Fall hunt occurs between September and December. Hunting NEVER occurs in the summer months for the following reasons:

- Hunting during the summer could remove some of the healthiest animals that are necessary for reproduction, potentially leading to a decline in overall population numbers.

- During the summer months, most game species often have young offspring. Hunting during this time could leave dependent young vulnerable and at risk of starvation or predation.

- Hunting in the summer may present safety issues due to higher temperatures, increased vegetation, and potentially higher human activity in recreational areas. Implementing hunting seasons helps minimize the risk of accidents and ensures the safety of both hunters and non-hunters.

For those who are against hunting, we as humans living in Ontario have displaced or eradicated many if not most of our natural predators. If we did not hunt to keep population levels within a healthy range, the game animals would become overpopulated and would die slow deaths of starvation and disease.

For most animals, a significant portion will die over the winter. If the population is high, the food will be spread more thinly, and more will die, even some who might have survived. The idea behind most hunting seasons is to humanely thin out the population so fewer will starve in the winter.

Poaching

Poaching refers to the illegal hunting, capture, or harvesting of wild animals and protected plant species. This activity has significant ecological impacts, leading to steep declines in various animal populations, some of which are left without viable breeding groups. Economic motivations primarily drive poaching, with individuals often targeting species for food, traditional medicine, or high-value body parts.

Acts of Poaching

The following violations and offenses are considered acts of poaching, resulting in serious criminal fines:

- Hunting, killing or collecting wildlife that is listed as endangered by the International Union for Conservation of Nature (I.U.C.N) and protected by law such as the Endangered Species Act, the Migratory Bird Treaty Act of 1918, and the *Convention on International Trade in Endangered Species (*C.I.T.E.S.).

- Fishing and hunting without a license.

- Capturing wildlife outside legal hours and outside the hunting season; usually the breeding season is declared as the closed season during which wildlife is protected by law.

- Prohibited use of machine guns, poison, explosives, snare traps, and nets.
- Prohibited use of baiting with food, decoys, or recorded calls in order to increase chances for shooting wildlife.
- Hunting from a moving vehicle or aircraft.
- Shining deer with a spotlight at night to impair its natural defenses and thus facilitate an easy kill is considered animal abuse.
- Taking wildlife on land that is owned by, or licensed to somebody else.

Effects of Poaching

Poaching causes various negative effects. Its most direct impact is extinction, either globally or within a given locality. The conclusion is, that no matter the reason why an animal is killed, all types of over-hunting or poaching have led to the extinction of a species, and if uncontrolled, many more animals will become extinct. The detrimental effects of poaching can include:

- Loss of forests: predators, herbivores, and fruit-eating vertebrates cannot recover as fast as they are removed from a forest; as their populations decline, the pattern of seed predation and dispersal is altered; tree species with large seeds progressively dominate a forest, while small-seeded plant species become locally extinct.
- Reduction of animal populations in the wild and possible extinction.
- The effective size of protected areas is reduced as poachers use the edges of these areas as open-access resources.
- Wildlife tourism destinations face a negative publicity; those holding a permit for wildlife-based land uses, tourism-based tour and lodging operators lose income; employment opportunities are reduced.

Game Species You Can Legally Hunt in Ontario

Game species are grouped into four general categories:

- big game
- small game
- upland game birds
- migratory birds

Small Game Hunting

While small game hunting, you are required to carry:

- a valid Outdoors Card;
- a licence summary listing your valid small game hunting licence (unless your small game licence is printed on the back of your Outdoors Card);
- federal firearms accreditation (for example, your Possession and Acquisition Licence, minor's licence) if you are hunting with a gun;
- any associated tags if applicable (such as Wild Turkey or wolf/coyote tags).

Small Game Species You Can Hunt in Ontario

- eastern cottontail, European hare, snowshoe hare
- Ruffed Grouse, Sharp-tailed Grouse, Spruce Grouse
- gray squirrel, fox squirrel
- Gray (Hungarian) Partridge
- Ring-necked Pheasant
- Willow Ptarmigan, Rock Ptarmigan
- raccoon
- red fox, Arctic fox
- striped skunk
- short-tailed/long-tailed weasel (trap)
- Virginia opossum
- American Crow
- groundhog
- porcupine
- Wild Turkey
- gray wolf, coyote
- migratory game birds (a federal migratory game bird hunting permit is required in addition to your small game licence)

Big Game Hunting

While big game hunting, you are required to carry:

- a valid Outdoors Card;
- a licence summary listing the licence of the species you are hunting;
- federal firearms accreditation (for example, your Possession and Acquisition Licence) if you are hunting with a gun;
- any associated tags (note: all big game species have tag requirements);

Big Game Species You Can Hunt in Ontario

- American black bear
- moose
- white-tailed deer
- American elk

Tags

A tag is a specific component of a hunting licence. The tag authorizes the hunter to hunt the game species indicated on the tag (such as a Wild Turkey), subject to conditions listed on the tag (such as season, animal type, or firearm).

A tag is required to hunt:

- moose
- white-tailed deer
- gray wolf/coyote (only in certain Wildlife Management Units)
- Wild Turkey
- American black bear
- American elk

Tags can be purchased:

- online using the Fish and Wildlife Licencing Service;
- at a licence issuer;
- at a participating Service Ontario location.

<u>It is the hunter's responsibility to know the tagging requirements for the species being hunted. Tags must be protected, intact, and legible at all times.</u>

Part 4. Waterfowl Hunting in Ontario

Possibly no other group of birds has been more intimately connected with people through the ages than waterfowl (ducks, geese and swans). They are probably the most written about, in the scientific and popular wildlife literature, of any other group of birds.

Waterfowl are classified as migratory game birds, hunted each year, subject to federal regulations (except the Mute Swan and Trumpeter Swan which are under strict protection at all times), and periodically, certain ducks and geese whose numbers may in some years become too low because of environmental changes or poor nesting seasons.

Waterfowl hunting in Ontario includes a variety of puddle ducks and diving ducks, five species of geese (*Branta* and *Anser* sp.), American Coot (*Fulica americana*), Common Gallinule (*Gallinula galeata*), and the Common Snipe (*Gallinago gallinago*). Seasons generally extend from September to January.

Canada produces up to 70% of North America's waterfowl. The Prairie Pothole region in Manitoba, Saskatchewan, and Alberta is where the largest production occurs. Here, larger, more open marshes occur with clumps of reeds or cattails. The most productive areas in Ontario are marshes along Lake St, Clair and the south shore of Lake Abitibi. Each year, biologists at the Canadian Wildlife Service and provincial wildlife agencies decide on numbers to be harvested based on pertinent data collected the previous year.

Waterfowl hunting in Ontario requires a federal Migratory Game Bird Hunting Permit, a Wildlife Habitat Conservation Stamp, and an Ontario Outdoors Card. Seasons for ducks and geese generally begin in September, with specific dates varying by district (Northern, Central, Southern).

<u>Note: waterfowl hunting regulations are subject to annual changes.</u>

Ducks may be separated into two distinct groups, which are recognized by the following differences:

Puddle Ducks (Dabblers)	Diving Ducks (Pochards)
• occupy lakes, ponds, and small bodies of water bordered by trees or aquatic plants where open water is limited	• occupy large areas of open water (Great Lakes)
• feed in shallow water by tipping up their body and tail to reach below the surface for food	• dive deeply for food
• spring upward off the water with strong vertical take-offs within a limited space	• need a running start over a considerable distance before rising into the air (they run or "skitter" across the water surface)
• because of their short legs and positioning on their body, they walk with a distinct waddle	• their short legs are located farther to the rear of their body making it very difficult to walk on land
• large, blunt wings result in slower flight (this however, allows them to drop with more precision in a smaller area)	• smaller, more pointed wings are aerodynamic resulting in swifter flight
• possess a coloured speculum (wing patch); except Gadwall	• speculum is typically white in all birds
• tail is held clearly above water when swimming	• tall is held close to water when swimming

Puddle ducks are highly prized for their abundance, sporting nature, and superior taste.

Diving ducks are prized for their speed, beauty, and table quality.

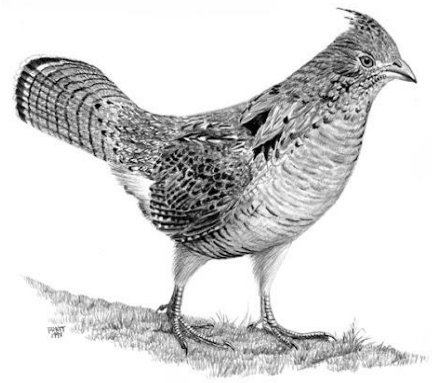
The five most desirable and commonly hunted puddle ducks and diving ducks in Ontario are listed (in order of preference) below.

	Puddle Duck	**Diving Duck**
1.	Mallard Duck	Canvasback
2.	Wood Duck	Redhead
3.	American Black Duck	Greater & Lesser Scaup
4.	Green-winged Teal	Common Goldeneye
5.	Northern Pintail	Bufflehead

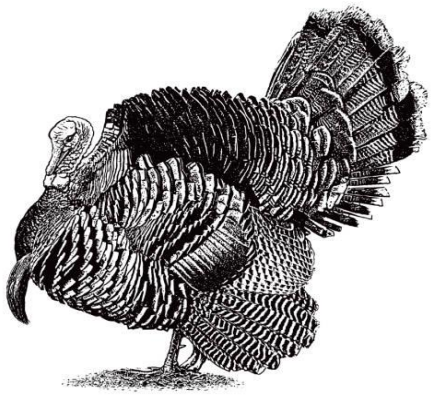
Small (Upland) Game Bird Hunting in Ontario

Upland game birds are excellent choices to harvest for new hunters. These birds are wide-spread, offer an exciting shooting challenge, and are easy to process and cook.

Upland game bird hunting in Ontario offers diverse opportunities for Ruffed Grouse, Spruce Grouse, Sharp-tailed Grouse, Willow Ptarmigan, Rock Ptarmigan, Ring-necked Pheasant, Gray (Hungarian) Partridge, American Woodcock, Mourning Dove, Bobwhite, and Wild Turkey. A small game license is required, along with a valid Outdoors Card, with specific tags for Wild Turkey for spring and fall seasons.



Ruffed Grouse



Wild Turkey

Part 5. Obtain Hunter's Accreditation and Outdoors Card

If you are considering the opportunity to hunt in Ontario, begin your hunting journey with the essential guides and resources. Contact the Ontario Federation of Anglers and Hunters in Peterborough, Ontario. The staff at their office can guide you along the way to answer any questions you may have to enjoy a responsible hunting experience for generations to come.

Name: _____

Planning a Canoe Trip

What better way to teach a Scout *about* the environment, than to actually be *in* the environment. By allowing any Scout a first-hand experience with the outdoors, that Scout can come away with a better understanding of natural processes.

Direct experience enables a Scout to make connections by actively constructing knowledge through direct interaction with the elements. They remember what they experience much longer than what they are told or what they read. One can read about connections, however, in the outdoors, a Scout can live and be part of the connections. In the outdoors, these connections can be seen, felt, smelled, tasted, and heard – morning, noon, and night. It offers a 24-hour learning experience!

The French River - Background Information

The French River is located in northern Ontario, 60 kilometers south of Sudbury and approximately one hour north of Parry Sound. Its headwaters are Lake Nipissing, where it then flows west 110 kilometres (68 mi) under Highway 69 until it empties into Georgian Bay. Its mighty flow is evident in the picturesque landscape that it has sculpted.

The French River conjures up images of the Voyageurs – toiling over the portages, hauling their birch bark "canots de maitre" past the rapids and waterfalls, singing as they paddle past glacier-polished rock. This river formed a vital link in the fur trade route from Lachine (Montreal) to Lake Superior and the Northwest. It was the royal road, the highway to adventure. It became known to Europeans as the "French River" because it became associated with French explorers of the 17th century. Champlain called it the "River of Sorcerers", after Indigenous Peoples claimed supernatural powers lived on its banks. It was down this river that Brébeuf came, and it was up this river that his bones were carried after his death at the hands of invading Iroquois. Here, also passed Brulé, La Salle, and Radisson.

It seems inconceivable that you can canoe the very waters, pass the same trees, and possibly camp in the same locations from which in the old days, fur pirates used to descend upon traders and trappers hurrying by way of the French River to distant Quebec.

The French River became a designated Canadian Heritage River in 1985. It offers campsites made up of beautiful pink granite outcrops, pine forests, numerous wildlife species, along with excellent fishing. The serenity of each site will allow Scouters to forget the rush of modern life and discover that it is fun and rewarding to slow down and enjoy the surrounding, natural beauty.

The French River watershed in northern Ontario was created more than ten thousand years ago when the last ice-age receded and left a maze of rivers and small lakes. Most of it's shores from Lake Nipissing to the Georgian Bay, except for the land occupied by the Dokis First Nation between the Upper, Middle and Lower French River, have been protected and designated as a provincial waterway park. There are 230 undeveloped back-country campsites available in the park along the river.

The French River continues to attract canoeists who enjoy the picturesque campsites, superb fishing, great swimming, rocky shores, and pine growth forests.

Name: _____

Part 1. Natural Disasters Related to Water

The following activity may require some extensive research on your part.

1. On October 15, 1954, the most famous natural disaster in Canadian history struck southern Ontario. Name this natural disaster.

_____

2. When and where did this natural disaster originate?

_____

_____

_____

3. Briefly describe some of the devastation this natural disaster left behind.

_____

_____

_____

_____

_____

_____

_____

Part 2.

4. What provincial organization was developed as a result of the devastation?

_____

5. What provincial regulations were developed by this organization in response to the devastation?

_____

_____

_____

_____

6. Conservation authorities in Ontario are mandated by legislation to regulate development on floodplain areas. Why is this so?

_____

_____

_____

_____

7. Why were so many people unprepared for the devastation in 1954?

_____

_____

_____

_____

Part 3.

8. Name three (3) steps that you could do to prepare yourself when a hurricane watch or warning is issued.

- _____
- _____
- _____

9. Name three (3) things that you should do if you are caught in a hurricane.

- _____
- _____
- _____

10. Name three (3) things that you should do if you are caught in a flood.

- _____
- _____
- _____

Part 4. Devise a disaster scenario and hone its response skills. Create a plan for this emergency.

Part 5. Present your findings to your Patrol.

Answers:

1. On October 15, 1954, the most famous natural disaster in Canadian history struck Southern Ontario. Name this natural disaster.

   Hurricane Hazel.

2. When and where did this natural disaster originate?

   Hurricane Hazel was first identified on the afternoon of October 5, 1954, about 75 kilometres east of the island of Grenada in the West Indies. The storm tracked along the coast of Venezuela before suddenly swerving northward towards Haiti.

   By October 14, Hazel was battering the Carolina coast, with estimated wind speeds of 240 km/h, and a tidal surge of 4 metres. After moving inland from the Carolina coast, Hazel seemed to diminish over the Alleghenies, where American meteorologists predicted its dissipation. Here, however, the storm was re-energized by a low-pressure system and broke loose towards Lake Ontario and Toronto. By 4:30 P.M. on October 15, rain began to fall heavily on Toronto.

3. Briefly describe some of the devastation this natural disaster left behind.

   Hurricane Hazel now ranks as one of the most catastrophic hurricanes in North America in the 20th century. The cost of lost property, and recovery costs amounts to 1.59 billion in today's dollars. It struck the Toronto area on October 15/16, 1954, with devastating results. It was Canada's worst hurricane and Toronto's worst natural disaster. During the storm, winds reached 124 km/h and over 200 millimetres of rain fell in just 24 hours. This horrific storm left 81 dead and nearly 4000 families homeless. The greatest destruction resulted from flooding. Much of the Humber River drainage basin was deforested, which allowed water to quickly flow into the river. The flood plains, already saturated by days of rain, simply could not contain the downpour.

4. What provincial organization was developed as a result of the devastation?

The Toronto and Region Conservation Authority was created after the storm to manage the area's floodplains and rivers.

5. What provincial regulations were developed by this organization as a result of the devastation?

Hurricane Hazel served as a catalyst for change, revealing the urgent need for an overhaul of flood management practices. In response, Hurricane Hazel highlighted the dangers of allowing development in flood plains, leading to a shift in land use planning practices intended to keep vulnerable areas free from new buildings or homes. Regulations enacted since Hurricane Hazel restrict new development in flood plains, allowing rivers to flow naturally and reducing the risk to people and their property during flooding. The Conservation Authorities Act was developed as a comprehensive plan for flood control and water conservation to significantly reduce the risk to life and property posed by extreme weather events. and *enforced to prevent future tragedies.*

6. Conservation authorities in Ontario are mandated by legislation to regulate development on floodplain areas. Why is this so?

Residents of floodplains face the very real risk of flooding and the devastation that it can cause. Homes can be damaged or destroyed. property can be ruined. If you live in a floodplain, you can avoid or at least minimize the damage by planning today for flooding that might occur tomorrow.

7. Why were so many people unprepared for the devastation in 1954?

There was significant rainfall in the Toronto area in the two weeks prior to Hazel, so the ground was already saturated. Few people in Canada had any experience with hurricanes and were unaware of how to prepare, leaving them vulnerable to the storm's power. It was unheard of for hurricanes to travel as far north and inland as Toronto. This was the unknown, the unfamiliar, the totally unexpected crisis. Hurricanes belonged in the tropics.

8. Name three (3) steps that you could do to prepare yourself when a hurricane watch or warning is issued.

- *keep well informed by listening to the latest warnings and advisories on the radio and television;*
- *move children, and other young or helpless people and livestock to safe ground;*
- *board up windows or protect them with storm shutters;*
- *secure anything that might be blown away or torn loose;*
- *store drinking water in tubs and jugs;*
- *buy food that needs little or no refrigeration or cooking;*
- *check flashlights and battery-operated equipment;*
- *make sure that there is enough gasoline in the car.*

9. Name three (3) things that you should do if you are caught in a hurricane.

- *remain indoors during a hurricane; it is extremely dangerous to travel or move about when the winds and tides are whipping your area;*
- *keep track of the storm's progress through radio and television reports;*
- *avoid the eye of the hurricane. If the calm storm centre passes directly over your region, there will be a lull in the wind and a sudden calm that may last for a few minutes to half an hour or more. Stay in a safe place during this time, and remember the second half of the circular storm will soon sweep over the region.*

10. Name three (3) things that you should do if you are caught in a flood.

- *turn off basement furnaces and the outside gas valve;*
- *shut off the electricity; if the area around the fuse box or circuit breaker is wet, stand on a dry board and shut off the power with a dry wooden stick;*
- *never try to cross a flood area on foot; the fast water could sweep you away;*
- *if you are in a car, try not to drive through flood waters; fast water could sweep your car away. However, if you are caught in fast rising waters and your car stalls, leave it and save yourself and your passengers.*

©Scouts Water – Adventure 3

Name: _____

Part 1. Make a Closed Aquatic Ecosystem in a Jar

In this activity, you will make a closed ecosystem in a jar. A closed ecosystem is one in which nothing from the outside is added to the jar after it is set up, except light. If the ecosystem is set up properly, it will maintain itself, and result in a healthy, balanced ecosystem. The living components are plants and animals, and are referred to as the biotic component. Some of the non-living components include oxygen, carbon dioxide, water, and soil, and are referred to as the abiotic component. Being in balance suggests there are the correct number of biotic components and all the abiotic components required are present This activity will demonstrate how living things are dependent on each other and on the abiotic factors around them.

What You Need:

- large jar (with a lid)
- clean sand
- gravel
- small, lined notebook
- aquatic plants
- 3 guppies
- 8-10 small snails

***** Note: The jar should be at least 4 litres in size and it must have a lid. It can be glass (preferably) or plastic. Jars this big can be obtained at restaurants, sub shops, deli shops, or concession stands.

Part 2. What You Do:

Step 1: Place a small amount of sand and gravel in the bottom of the jar and fill the jar with water (allow the water to sit for 48 hours so all chlorine in the water will gas off).

Step 2. Add a few strands of an aquatic plant such as *Elodea*, and if available, a few spoonfuls of a small aquatic floating plant such as duckweed.

Step 3. Place the snails and the fish in the water.

Step 4. Put the lid on the jar and place in a well-lit area, away from direct sunlight. Keep conditions constant.

Step 5. Record daily observations of your ecosystem in a journal for 6 weeks. Entries must include a date, and any noticeable changes to the biotic and abiotic components of your closed ecosystem. Each page of your observations should have the following titles:

Part 3.

Date: _____

Biotic Components: _____

_____

_____

_____

_____

Abiotic Components: _____

_____

_____

_____

_____

Part 4.

1. What is the purpose of the plants to obtain a healthy, stable ecosystem?

_____

_____

_____

2. What is the purpose of the fish to obtain a healthy, stable ecosystem?

_____

_____

_____

3. What is the purpose of the snails to obtain a healthy, stable ecosystem?

_____

_____

_____

4. Why is it important to place your ecosystem in a well-lit area?

_____

_____

_____

5. This is one of the most important chemical equations found in nature. What is it called?

$$CO_2 + H_2O \xrightarrow[\text{light energy}]{} C_6H_{12}O_6 + O_2$$

_____

6. There are other abiotic factors that are important for maintaining a healthy, stable, aquatic ecosystem. Name two (2).

- _____
- _____

7. What would happen to a balanced ecosystem if you added more fish? Why would this happen?

_____

_____

_____

8. If organisms died, what factors may have contributed to their death?

_____

_____

_____

_____

Part 5. Present your findings to your Patrol.

Answers:

1. What is the purpose of the plants to obtain a healthy, stable ecosystem?

   The plants produce the oxygen that the fish require to breathe.

2. What is the purpose of the fish to obtain a healthy, stable ecosystem?

   The fish release the carbon dioxide that the plants require for photosynthesis.

3. What is the purpose of the snails to obtain a healthy, stable ecosystem?

   The snails remove the wastes from the fish.

4. Why is it important to place your ecosystem in a well-lit area?

   Sunlight is essential for photosynthesis to occur.

5. This is one of the most important chemical equations found in nature. What is it called?

   Photosynthesis: carbon dioxide + water → glucose (food) + oxygen

6. There are other abiotic factors that are important for maintaining a healthy, stable, aquatic ecosystem. Name two (2).

   - *water temperature*
   - *pH*
   - *total dissolved solids*

7. What would happen to a balanced ecosystem if you added more fish? Why would this happen?

Extra fish would put stress on all fish and the ecosystem. The fish are now competing for food, space, and oxygen. The extra wastes produced by the fish would cause a lower pH (water would become more acidic which makes it harder for fish to breathe) and an increase in dissolved carbon dioxide would occur.

8. If organisms died, what factors may have contributed to their death?

Any of these factors (or combination of) could result in an unstable ecosystem:

- *increase in water temperature;*
- *increase or decrease in pH;*
- *not enough space for fish;*
- *not enough food for fish;*
- *build-up of waste material;*
- *increase in carbon dioxide levels*;
- *not enough sunlight*.

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Part 1. Recreational Fishing in Ontario

Fishing is steeped in tradition, with one generation handing down knowledge to the next. Today, there are many great resources to help families that are new to fishing enjoy this popular pastime. Studies have shown that recreational fishing is a major outdoor activity, and plays an important part in natural resource-based tourism of Ontario.

Ontario has approximately 250 000 lakes and thousands of kilometres of streams and rivers. More than 140 different fish species inhabit these waters. This establishes Ontario as one of the largest freshwater fisheries in the world. Clearly, this renewable resource is both economically and socially important as it supports commercial, recreational, and food fishing activities to people of Ontario. The following lists the top five (5) reasons why people like to fish:

- for relaxation;
- to get away;
- to enjoy nature;
- for family togetherness;
- for challenge and excitement.

Part 2. Ontario Outdoors Card

To fish in Ontario, you need a valid Outdoors Card and a valid fishing licence. An Outdoors Card is a plastic, wallet-sized identification card issued by the ministry that allows you to fish.

<u>You are required to carry this card with you at all times while fishing.</u>

If you buy a 1-year or 3-year fishing licence at the same time you renew or buy an Outdoors Card, this licence will be printed on the back of the card.

Ontario Fishing License and Regulations

Ontario fishing licences are categorized into two categories:

- sportfishing - this license allows anglers to retain and possess the maximum number of fish allowed per zone.

- conservation - this license has a limit to the number of fish retained and possessed by an angler based on angling zone and species.

Canadian residents between 18 and 65 need a fishing licence, whereas residents under 18 and over 65 do not. All non-residents over the age of 18 require a licence. Ontario fishing fees vary depending on the licence duration and types of fishing (conservation versus sport). Sport licenses cost a little more. Conservation licences are practical if you plan to release the majority of the fish you catch.

A great thing about fishing licences in Ontario is that 100% of the proceeds go towards making sure Ontario's fish populations survive and thrive. Fish research, monitoring, and conservation programs are all funded by these licence fees.

In Ontario, there are four times in the year when Canadian and Ontario residents are permitted to fish without a license. These are:

- Family Fishing Weekend → February 14–16, 2026
- Mother's Day Weekend → May 9–10, 2026
- Father's Day Weekend → June 20–21, 2026
- Family Fishing Week → June 27–July 5, 2026

Ontario has twenty (20) designated fisheries management zones (FMZs). FMZs help the province manage the individual needs and nature of each zone by customizing catch limits and seasons to:

- allow more fishing in thriving fisheries;
- protect vulnerable fisheries;
- re-establish fish populations;
- adjust fishing seasons for different climates.

Each zone has its own rules that you must follow. It is YOUR responsibility to know the rules of the zone you are fishing in. Different zones have different rules.

Slot Sizes

Slot size refers to a certain length of fish, within the limits, one can keep. Slot sizes for fish in Ontario vary significantly by species and the Fisheries Management Zone (FMZ) being fished. The purpose of the slot size is to protect breeding stock while allowing the harvest of smaller, or, sometimes larger trophy-sized fish. Common regulations include protected slots for walleye, northern pike, muskellunge, and lake trout. Always consult the official Ontario Fishing Regulations Summary for the specific zone and waterbody.

The slot size works this way. If you catch a walleye and the slot size for walleye is between 46–58 cm (18.1–22.8 inches), you *cannot* keep a walleye measuring between 46–58 cm (18.1–22.8 inches). Depending on the FMZ, you can keep one (or more) under 46 cm (18.1 inches) but you can only keep one over 58 cm (22.8 inches). To determine slot size, the fish is measured from the tip of the nose to the tip of the tail (total length). The number you keep is determined by the license you own.

1. Why is there a slot size for walleye, northern pike, muskellunge, and lake trout in Ontario?

_____

_____

_____

2. Why are there no slot sizes for panfish, such as yellow perch, rock bass, pumpkinseed, or crappie?

_____

_____

_____

3. A Scouter named Colter goes fishing for walleye with his Dad in Bancroft (FMZ 15). Colter has a sport license and he catches four fish. His Dad has a conservation license and he catches two fish. The rules stipulate that only one of the walleye they keep can be over 46 cm (18.1 inches). Two weeks later, Colter and his Dad go walleye fishing on the French River (FMZ 10) with Colter's cousin Ben and his Dad. All four have licenses and they catch 10 fish, but the rules stipulate that no walleye over 46 cm (18.1 in.) can be kept. Give two (2) reasons why there are different size restrictions in different FMZs regarding the fish they can keep.

- _____

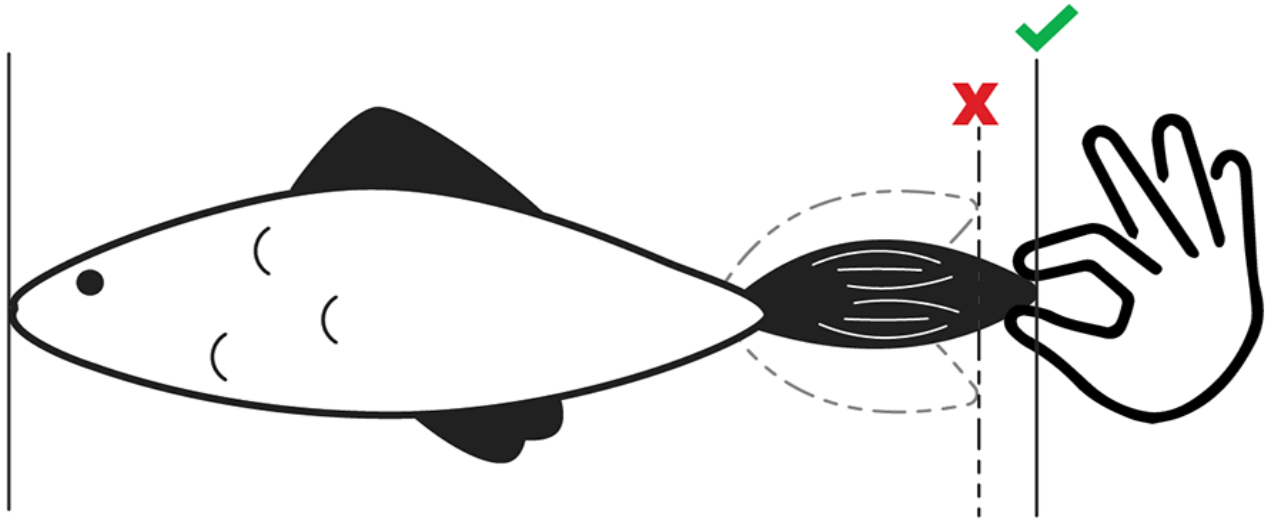
  _____

- _____

  _____

To measure slot size:

Lay the fish flat on a, preferably wet, measuring board with its snout against the 90-degree "bump" stop. With the mouth closed, measure in a straight line (not over the body's curve) to the tip of the tail, often pinching the tail lobes together to determine the maximum total length.



Squeeze the tail fin together to obtain the maximum overall length.

Selective Live Release

Fisheries management regulations are designed to allow young fish to grow and mature, therefore requiring anglers to catch-and-release under-sized fish. These minimum size regulations are a prime tool for managing a healthy, sustainable, recreational fishery.

In Ontario, 70% of anglers practice selective live release for walleye, northern pike, and largemouth/smallmouth bass. An angler can harvest only specific sizes while releasing others, provided a live-well is used with a working mechanical aerator. You must comply with all size restrictions (e.g., slot sizes) and not exceed your daily catch and possession limit (e.g., 4 walleye with a sport license, 2 walleye with a conservation license). If you are practicing live release, follows these guidelines:

- use barbless hooks;
- keep fish in the water as much as possible, especially during hot weather;
- use wet hands or gloves and avoid touching gills or eyes.

Three Reasons to Practice Selective Live Release

- as more and more people begin to fish, it provides everyone with the opportunity to catch fish;

- selective live release helps maintain a stable population density, so the more fish in the water, the more likely you are to catch one;

- selective live release maintains the structure of a fish population, as different age or size classes are released back, it ensures there are stable numbers of both large and small fish (removing all the large fish significantly alters the population structure, resulting in an unbalanced population).

4. Why is it important to use barbless hooks when practicing live release?

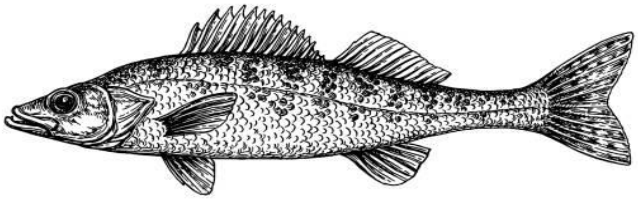
_____

_____

_____

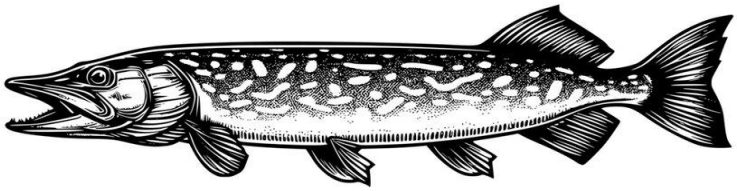
Part 3. **Six Popular Game Fish in Ontario**

walleye (pickerel)



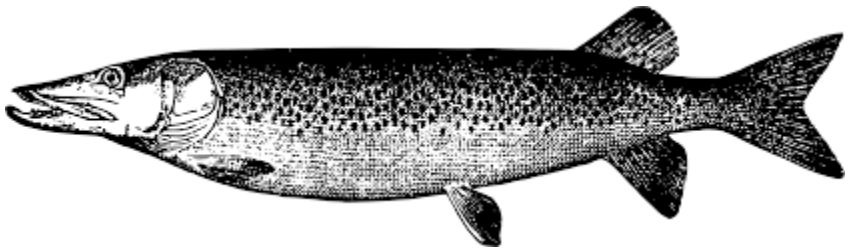
The most sought-after game fish, known for its excellent taste. Found in large, shallow lakes.

northern pike

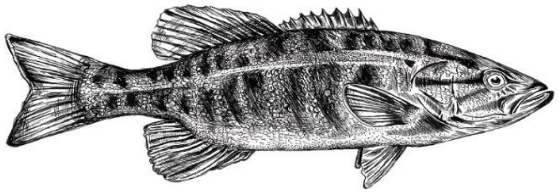
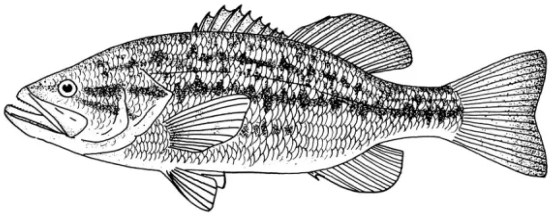
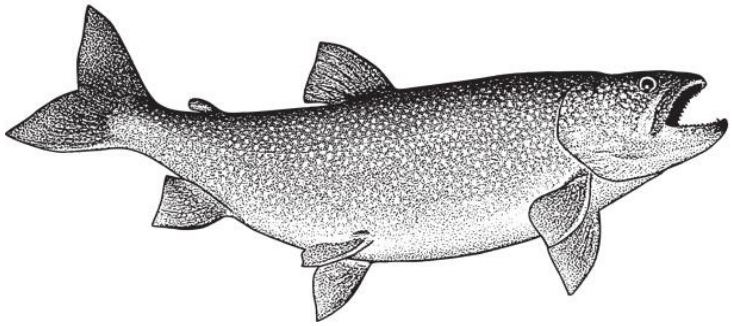


A major, aggressive predator found in weedy areas, popular for its hard fight.

muskellunge (muskie)



Known as the "fish of 10,000 casts" for being difficult to catch, but highly prized for its size.

smallmouth bass	largemouth bass
	
Both extremely popular, with smallmouth bass inhabiting rocky lakes with clear water and largemouth bass inhabiting shallow lakes with weeds.	
lake trout  A cold-water, deep-dwelling fish popular in northern, deep lakes.	

5. Part of being a responsible angler is knowing how to identify the fish you catch. List two (2) identification features of the above six listed fish.

walleye

- _____

  _____

northern pike

- _____

  _____

muskellunge

- _____

_____

smallmouth bass

- _____

_____

largemouth bass

- _____

_____

lake trout

- _____

_____

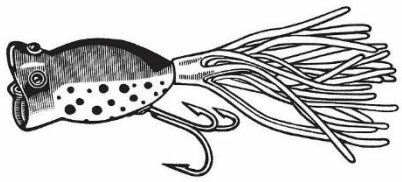
Part 4. Artificial Lures vs. Live Bait

Because fish can be selective with what they eat (feeding on one type of food for over a long period of time), anglers try to figure out what fish are eating on a particular day so they can offer a lure that represents the same kind of food. In doing so, understanding the natural food source present and the varying depths at which fish feed is very important, as each lure is designed to fish at a specific depth in the water. These lures are classified as either floating (for surface-feeders), sinking (for open-water feeders), or jigging (for bottom feeders). Each lure imitates a natural food source for fish in the water.

Several factors can contribute to the use of these lures. Cloud cover, water clarity, time of day, water colour, water surface condition, depth of water, presentation, and method of retrieval all contribute to the effective use of a lure.

Obviously, you want to present the fish with a lure that best represents the natural conditions that suits the fish's feeding requirements. For example, a quiet night with calm water in a weed-bed. These are ideal largemouth bass conditions that would allow you to use a surface lure such as a jitterbug. This lure floats, and when retrieved, imitates a frog swimming across the top of the water. Even if you do not catch a largemouth bass, a northern pike may not resist it. You cannot assume that any one particular lure will catch only one type of fish. Fish don't read books.

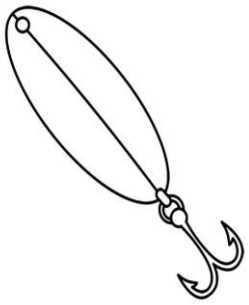
Types of Artificial Lures



6. The two lures shown above are surface lures. Fish cannot hear under water. Instead, they sense vibrations through their lateral line located on both sides of their body that lead them to food. Both these lures, when used correctly, make a "popping" or "splashing" sound on top of the water. What type of natural fish food do you think these surface lures are imitating?

_____

7.

 A.	 B.

Both the two lures shown above are made of metal, are thin, and very shiny.

a. Lure A is not perfectly flat so when it moves through the water, it wobbles from side to side. What might a hungry fish think this lure is?

_____

b. Lure B is perfectly flat, and the blade spins quickly around as the lure is retrieved through the water. What might a hungry fish think this lure is?

_____

8. If you plan to selectively live release fish, why is it best to use artificial lures?

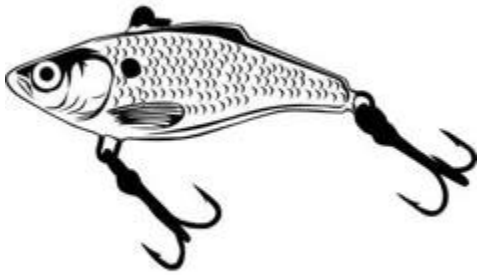
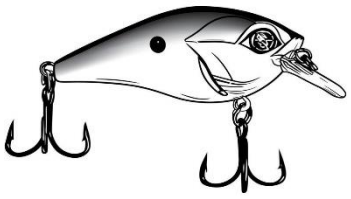
_____

_____

_____

_____

9.

Lipless Crankbait	Lipped Crankbait
	

Both the two lures shown above are known as crankbaits. Lipless and lipped crankbaits are designed differently resulting in a different presentation to fish as they are retrieved through the water. Describe the design of each crankbait and how each one is used most effectively to catch fish.

Lipless _____

_____

_____

_____

_____

Lipped _____

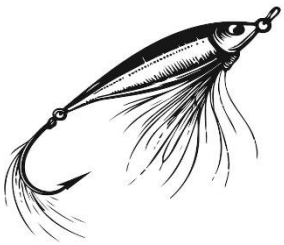
_____

_____

_____

_____

10.

Both the two lures shown above are used for jigging. Jigging is a highly effective, active fishing technique that consists of a single hook with a lead or metal sinker molded onto it, often featuring soft plastic tails, feathers, or skirts. Explain how to jig a lure.

_____

_____

_____

_____

11. Name three (3) different fishing methods.

- _____
- _____
- _____

Live Bait

Fishing with live bait is one of the most productive ways to fish. The most common live baits used by anglers in Ontario are frogs, minnows, worms, and leeches. Fishing with live bait in Ontario is allowed for licensed anglers but heavily regulated by Bait Management Zones (BMZs) with very strict regulations. Anglers can only use certain baits outlined within the Bait Management Zones. Anglers must carry receipts for purchased bait, and follow species-specific limits. The capture and use of live bait is not allowed in some waters.

Always check the rules for using live bait in the waterbody that you intend to fish.

12. It is illegal to bring any live fish, leeches, or salamanders into Ontario from the United States or other provinces. Why?

_____

_____

_____

13. Frogs are a popular choice to use as live bait, especially for smallmouth and largemouth bass. There are eleven (11) different species of frogs in Ontario and yet the northern leopard frog (*Rana pipiens*) is the only legal frog that can be used as bait. Why?

_____

_____

_____

14. Toads are everywhere in Ontario. Why can't toads be used as bait?

_____

_____

_____

Part 5.

How to Fillet a Fish

Filleting a fish involves using a sharp, flexible knife to cut behind the pectoral fin/gill plate at an angle down to the backbone, then slicing along the spine towards the tail to remove the fillet. You cannot assume however, that every species of fish is filleted the same way. Moreover, every person has their own particular method for filleting a fish, and their method will vary from fish to fish. The best way to learn is to watch someone who knows what they are doing. Otherwise, google "how to fillet a fish".

How to Cook a Fish

Cooking a fish fillet generally involves high heat for a short time to achieve a tender, flaky texture with a golden exterior. To start, pat the fish completely dry with paper towels. Excess moisture causes steaming instead of searing, preventing a crispy crust. Use your favourite seasonings. The fish is done when it is white (opaque) throughout and the meat flakes easily with a fork (internal temperature of 60°C (140° F – 145° F).

There are five (5) popular ways to cook your fish. Each method requires different ingredients, different heat, and different equipment.

- pan-seared (crispy);
- baked (easy/healthy);
- breaded;
- beer battered (restaurant style);
- barbequed.

Now that you are aware of <u>some</u> of the rules and regulations for fishing in Ontario, find another Scout, friend, or family member to go fishing with. There are several accessible places within the Durham region where you can fish. Visit Gagnon's Sporting Goods store at 385 Bloor St. W. in Oshawa. Here you will find all the fishing supplies that you will need for your fishing adventure. After your fishing adventure, present all your new-found knowledge (and fishing tales) to your Patrol.

Answers:

1. Why is there a slot size for walleye, northern pike, muskellunge, and lake trout in Ontario?

   Slot sizes for fish in Ontario are a fisheries management tool used by the ministry of Natural Resources to ensure sustainable, healthy fish populations by controlling which sizes are harvested.

   By requiring the release of mid-sized fish, the regulation allows more fish to reach trophy size, while encouraging the consumption of smaller fish, thus balancing the overall population. The minimum size protects young fish to ensure they mature and spawn at least once while the maximum size protects larger, older breeders.

2. Why are there no slot sizes for panfish, such as yellow perch, rock bass, pumpkinseed, or crappie?

   In Ontario, there are no slot sizes for panfish because they generally have high reproductive rates, fast growth, and widespread abundance. Managers prioritize managing these species through liberal daily catch and possession limits, often 30–50 or more, to control population density, rather than specific size restrictions.

3. A Scouter named Colter goes fishing for walleye with his Dad in Bancroft (FMZ 15). Colter has a sport license and he catches four fish. His Dad has a conservation license and he catches two fish. The rules stipulate that only one of the walleye they keep can be over 46 cm (18.1 inches). Two weeks later, Colter and his Dad go walleye fishing on the French River (FMZ 10) with Colter's cousin Ben and his Dad. All four have licenses and they catch 10 fish, but the rules stipulate that no walleye <u>over</u> 46 cm (18.1 in.) can be kept. Give two (2) reasons why there are different size restrictions in different FMZs regarding the fish you can keep.

   Different size restrictions are tailored to specific fisheries management zones or lakes, based on scientific, survey-based data to ensure sustainable, species-specific, and location-specific management, often tailored to:

- *<u>water productivity & growth</u>: fish in colder or less productive waters (north) may take longer to reach maturity compared to warmer, nutrient-rich waters (south), requiring different minimum sizes for the same species;*
- *<u>fishing pressure</u>: heavily fished areas may require stricter, higher minimum size limits or protected "slot" sizes (e.g., releasing all walleye between 35-50 cm) to prevent overharvesting;*
- *<u>spawning protection</u>: regulations are designed to protect fish until they have had the chance to mature and spawn at least once (minimum size) or to protect the most fertile, larger "brood" fish (maximum size/slot limit).*

4. Why is it important to use barbless hooks when practicing live release?

   Using barbless hooks reduces the chances of injury to the fish, plus, it reduces the handling time of the fish out of water.

5. Part of being a responsible angler is knowing how to identify the fish you catch. List two (2) identification features of the above six listed fish.

walleye

- *large, opaque, or pearlescent ("glassy") eyes that reflect light, designed for low-light hunting;*
- *a distinct white patch on the lower lobe of the tail fin;*
- *two separate dorsal fins, with a solid, dark, or black spot at the rear base of the first (spiny) dorsal fin;*
- *olive-green to brown back, fading to golden/brassy sides with a white underbelly.*

northern pike

- *elongated and slender body;*
- *white or yellowish bean-shaped spots on a dark green/olive back, the opposite of the muskellunge;*
- *a long, flattened, duck-bill snout packed with very sharp, needle-like teeth;*
- *the dorsal, anal, and caudal (tail) fins are placed far back.*

muskellunge

- *light-colored background (silver, white, or light green) with darker vertical bars, spots, or blotches; markings are never lighter than the body, distinguishing them from the northern pike;*
- *only the top half of the cheek and operculum (gill cover) is scaled; northern pike are fully scaled on the cheeks;*
- *tail lobes are pointed, unlike the rounded tail lobes of the northern pike.*

smallmouth bass

- *the upper jaw <u>does not</u> extend past the rear of the eye, unlike a largemouth bass;*
- *usually have 8-11 dark, vertical stripes or bars on their sides, which can become blotchy with age, and <u>no prominent horizontal band</u>;*
- *typically bronze, brown, or olive-green in colour with a lighter, whitish belly;*
- *often possess distinct reddish or orange eyes;*
- *two dorsal fins are connected, appearing as one continuous fin with only a <u>shallow notch</u> in between;*
- *often have three dark, horizontal stripes extending from the eye across the cheek.*

largemouth bass

- *when closed, the upper jaw extends <u>well beyond</u> the rear edge of the eye;*
- *the back has a <u>deep notch</u> separating the spiny front section from the soft back section.*
- *typically, olive-green to dark green on the back with a white/light-colored belly. A dark, jagged, or broken horizontal stripe runs along the side, rather than vertical bars;*
- *deep-bodied and thick.*

lake trout

- *strongly and deeply forked tail fin, distinguishing it from other trout;*
- *light-colored spots (white, cream, or pale yellow) on a dark grey, brown, or black background;*
- *lower fins have a white leading edge; adipose fin present;*
- *light, worm-like markings (vermiculations) are often present on the back and dorsal fin.*

6. The two lures shown above are surface lures. Fish cannot hear under water. Instead, they sense vibrations that lead them to food. Both these lures, when used correctly, make a "popping" or "splashing" sound on top of the water. What type of natural fish food do you think these surface lures are imitating?

   Frogs

7. Both the two lures shown above are made of metal, are thin, and very shiny.

   a. Lure A is not perfectly flat so when it moves through the water, it wobbles from side to side. What might a hungry fish think this lure is?

      A wounded fish.

   b. Lure B is perfectly flat, and the blade spins quickly around as the lure is retrieved through the water. What might a hungry fish think this lure is?

      A young fish quickly trying to escape a predator.

8. If you plan to selectively live release fish, why is it best to use artificial lures?

   Using artificial lures for selective live release significantly improves fish survival rates by reducing deep-hooking (gut hooking) and damage to gills. Unlike live bait, which fish often swallow, artificial lures (especially with barbless hooks) usually hook in the jaw or lip, allowing for fast, easy removal and minimal handling time.

9. Both the two lures shown above are known as crankbaits. Lipless and lipped crankbaits are designed differently resulting in a different presentation to fish as they are retrieved through the water. Describe the design of each crankbait and how each one is used most effectively to catch fish.

Lipless crankbaits are sinking, flat-sided lures that produce intense vibrations and noise via internal rattles, acting as a "search bait" to cover water quickly. They do not dive on their own but sink to a desired depth, allowing anglers to control their vertical position in the water column. They feature a tight, rapid wobble on a straight retrieve, which increases with speed often used in spring/fall to trigger aggressive reactions.

Lipped crankbaits work by using a plastic or metal bill (lip) at the front to dive and create a wiggling action when retrieved, simulating a swimming baitfish. They dive on their own due to water pressure on the lip that forces the lure down. The length, angle, and shape of the lip determine how deep the lure dives (shallow, medium, or deep). A steeper angle typically allows for faster, deeper diving. The lip forces the lure to wobble or wiggle, generating vibrations that attract fish. They are typically buoyant, floating when paused.

10. Both the two lures shown above are used for jigging. Jigging is a highly effective, active fishing technique that consists of a single hook with a lead or metal sinker molded onto it, often featuring soft plastic tails, feathers, or skirts. Explain how to jig a lure.

    Using a weighted, lure-tipped hook called a jig, jigging involves lifting and lowering the rod tip to make the lure jump or hop. Initially, line is let out to allow the bait to sink to the bottom. The rod is then repeatedly lifted sharply to attract fish throughout the water column. The repeated action of the "jerking" motion of the rod mimics injured or dying prey. This action entices predatory species like bass, trout, or walleye.

11. Name three (3) different fishing methods.

    - *stationary casting*
    - *trolling*
    - *jigging*

12. It is illegal to bring any live fish, leeches, or salamanders into Ontario from the United States or other provinces. Why?

This is to prevent the spread of invasive species (round goby) and diseases like viral hemorrhagic septicemia. VHS is a deadly fish virus and an invasive species that causes large-scale fish kills.

13. Frogs are a popular choice to use as live bait, especially for smallmouth and largemouth bass. There are eleven (11) different species of frogs in Ontario and yet the northern leopard frog (*Rana pipiens*) is the only legal frog that can be used as bait. Why?

Only the northern leopard frog (Rana pipiens) is legal for use as live bait in Ontario to prevent the overharvesting of other, declining frog populations. Many other frog species in Ontario are protected or at risk, whereas the northern leopard frog is generally considered more widespread.

14. Toads are everywhere in Ontario. Why can't toads be used as bait?

Toads cannot be used as bait in Ontario because they are not listed as an approved bait species under the Ontario Fishing Regulations; they specifically do not fit the legal definition of allowable bait.

More importantly, there are two species of toads in Ontario; the American toad, (Bufo americanus) and the Fowler's toad (Anaxyrus fowleri). There are very large numbers of American toads, whereas the Fowler's toad is considered a "specially protected amphibian" under the Ontario Fish and Wildlife Conservation Act. These two toads are extremely difficult to tell apart, hence, a Fowler's toad could be mistaken for an American toad if used as bait.

Name: _____

Part 1.

Constellations

Constellations are groups of stars that form recognizable patterns in the night-time sky. Since ancient times, people have imagined that groups of stars form pictures of animals, people, things, gods, and goddesses. The pattern of stars making up a constellation remains the same, night after night. Each civilization has named the constellations after important people or objects. Our modern naming system originates from Greek and Roman mythology. For example, Ursa Major means "Great Bear".

Although the individual stars look like they are close together, they are not. They are actually very far from each other and at different distances from Earth. Three recognizable constellations in the night sky are The Pleiades, Orion the Hunter, and Cassiopeia. Other constellations that are recognizable are the Big Dipper, the Little Dipper, Leo the Lion, and Libra the Balance.

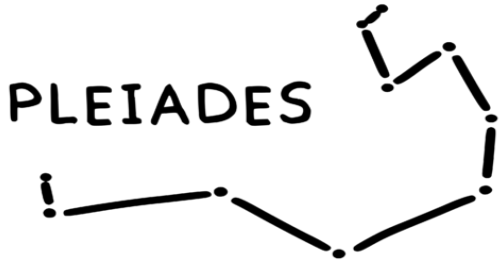
What You Do:

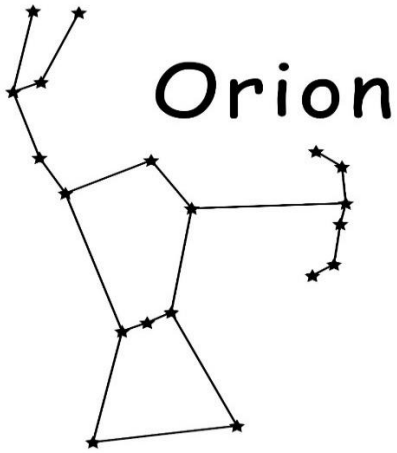
1. On a clear night, free from light pollution, find a place with someone to observe constellations in the night sky. Remember, time of the year is important for locating certain constellations. Even the time at night can influence the location of the constellation in the night sky.

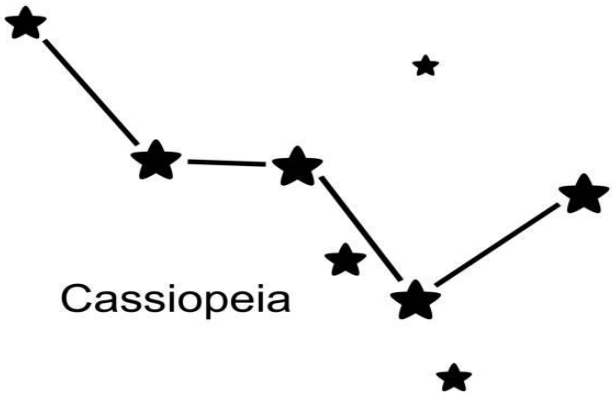
2. Locate The Pleiades, Orion the Hunter, and Cassiopeia. Research exactly when and where each constellation appears in the night sky, how each constellation was named, and the stories behind them.

3. Share what you have learned one night when your Patrol meets. Go outside and teach your fellow Scouts how to locate these three constellations.

Part 2.







Part 3.

Orion was in love with Diana, the goddess of the hunt. Her brother Apollo, God of the Archery. did not approve. He tricked Diana into shooting an arrow at a distant rock, which was actually the head of Orion, who was swimming in the water. Her arrow killed him. The god Jupiter gave Orion a place in the sky as a constellation.

Design a constellation of your own in the box provided and give it a name. Create a story to explain how your constellation got its name and how it got in the night sky.

Part 4.

Individual stars are unique. They differ in their mass, size, temperature, and luminosity (the amount of light they emit). A star's brightness to us on Earth may not be their actual brightness. Some stars that look dim are bright stars that are very far away. Scientists have developed a measurement called a light-year to measure a star's distance from the Earth. A light-year is the distance that light can travel in a vacuum in one year. One light-year is equal to about 9.5×10^{12} km (9.5 trillion km) or 6 trillion miles.

1. A light-year is a unit of distance, not time. Why do scientists use a light-year to measure distance?

_____

_____

2. Orion contains two of the ten brightest stars in the sky. Betelgeuse, the 8th brightest star in the night sky, makes up the right shoulder of the hunter. Rigel, the 6th brightest star in the night sky, forms the hunter's left knee. Betelgeuse is significantly larger than Rigel and closer to the Earth than Rigel but Rigel appears brighter and is further away than Betelgeuse. Provide an explanation for Rigel appearing brighter.

_____

_____

3. Provide a simple explanation that you could use to help a Beaver understand the concept of a light-year.

_____

_____

_____

_____

Part 5. Plan a star gazing night with your Patrol to observe constellations.

The Pleiades

The Pleiades, or "seven sisters", is a prominent, open star cluster visible to the naked eye as a small, bluish, dipper-shaped group. It is one of the nearest star clusters to Earth and the most obvious star cluster in the night sky. Although you can only see seven stars, the Pleiades, in fact, is made up of more than 1,000 stars.

In Greek mythology, the Pleiades were the seven daughters of Atlas. The sisters were named Maia, Electra, Alcyone, Taygete, Asterope, Celaeno, and Merope. According to legend, the Pleiades was once a single star; the brightest in the sky. Because this star brag about its beauty, a god smashed the star into pieces, creating the Pleiades star cluster.

The Pleiades are very close in proximity in the night sky to Orion. It is believed that the Pleiades were pursued by Orion after he fell in love with their beauty and grace. The reason why only six stars are usually visible suggests that one sister, Merope, left the stars after she fell in love with and married a mortal. As a result, Merope is the faintest of the stars.

The Pleiades are a prominent sight in the northern hemisphere. They are visible high in the southern sky in late fall or winter evenings from November to March. Their position in the night sky changes from hour to hour and night to night due to the Earth's rotation and its orbit around the Sun, so they are not always in the same spot in the sky. To find the Pleiades, look to the south and find the constellation Orion. Then find the three stars that make up Orion's belt, and use them as pointers. Follow them up and to the right, where you will find the bright star Aldebaran and then, just a bit further on from there, the Pleiades.

Orion the Hunter

In Greek mythology, Orion stood head and shoulders above any man and was by all accounts the greatest hunter who ever lived. The constellation is visible globally, recognized by its three-star belt.

The brightest star in Orion is Rigel, which marks his left knee. Rigel is the 6th brightest star in the entire sky. The second brightest star in Orion is Betelgeuse, which marks his right shoulder. Betelgeuse is the 8th brightest star in the entire night sky.

Orion the Hunter is best visible in the night sky during the winter months in the Northern Hemisphere and during the summer months in the Southern Hemisphere. In the Northern Hemisphere, Orion is best viewed in the south-western skies between January to April. In the Southern Hemisphere, Orion is found in the north-western skies.

Cassiopeia

The mythological Queen Cassiopeia is a favourite constellation formed by five bright stars. Astronomers and stargazers know Cassiopeia for her unmistakable shape in the night sky. Its five brightest stars form a distinct "W" shape, though depending on the season and time of night, that "W" can appear as an "M," a zig-zag, or even lying on its side. It never fully sets below the horizon.

In Greek mythology, Cassiopeia was a vain queen who offended everyone. She believed that her beauty was greater than anyone else's. The gods could not let her vanity go unpunished. The gods decreed that she should be placed in the sky as a constellation, seated forever on her throne, circling the heavens. Her punishment was fitting. In the course of her eternal rotation, she is forced to sit upright for half the night, and upside down for the other half – a cosmic reminder of her vanity and humiliation. Unlike constellations that remain consistently oriented in the sky, Cassiopeia seems to "fall off her throne" as she circles the celestial pole.

The constellation Cassiopeia is one of the easiest to find in the Northern Hemisphere. It can be found high in the northeastern sky on October and November evenings. It is near Polaris, the north star, and always opposite the Big Dipper.

The story of Queen Cassiopeia is yet another example of humans incurring the wrath of the gods and was told as a warning to Greek citizens to stay humble and always treat the gods with respectful worship. Queen Cassiopeia will spend all of her eternity in torture as a constellation because no mortal can claim to be better than a god and not face fierce retribution.

Answers:

1. A light-year is a unit of distance, not time. Why do scientists use a light-year to measure distance?

   A light-year is a unit of distance, not time, representing how far light travels in a vacuum in one year. It equals approximately 6 trillion miles (9.5 trillion kilometres). It is used to measure vast cosmic distances, such as the distance to stars and galaxies.

2. Orion contains two of the ten brightest stars in the sky. Betelgeuse, the 8th brightest star in the night sky, makes up the right shoulder of the hunter. Rigel, the 6th brightest star in the night sky, forms the hunter's left knee. Betelgeuse is significantly larger than Rigel and closer to the Earth than Rigel but Rigel appears brighter and is further away than Betelgeuse. Provide an explanation for Rigel appearing brighter.

   Rigel appears brighter than Betelgeuse primarily because it is significantly hotter and more luminous (brighter). Rigel is about 860 light-years away, while Betelgeuse is about 640 light-years, Rigel's blue-white, high-temperature surface radiates far more energy. It is a blue supergiant with roughly 120,000 times the Sun's luminosity, whereas Betelgeuse is a cooler red supergiant.

3. Provide a simple explanation that you could use to help a Beaver understand the concept of a light-year.

   To help understand the immense measure of distance in a light-year, if a Scout was standing on a star that was 10 light years away and waved to a Beaver standing on Earth, it would take 10 years before the Beaver on Earth would see the Scout on the star waving to him. So, when the Beaver on Earth waved back to the Scout on the star, it would take another 10 years before the Scout on the star would see the returned wave.

©Scouts Space – Adventure 2

Name: _____

Survival on the Moon

Part 1. The Problem

You are in a space crew originally scheduled to rendezvous with a mother ship on the light surface of the moon. Mechanical difficulties, however, have forced your ship to crash-land at a spot 200 kilometres from the rendezvous point. The rough landing damaged much of the equipment aboard. Since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200-kilometre trip. Below are listed 15 items left intact after landing.

You May Assume That:

1. The number of survivors is the same number on your team. Make up teams of three with all the Scouts.
2. You are the actual people in the situation;
3. The team has agreed to stick together;
4. All items are in good condition.

Step 1: Individually, without discussing the situation or the items with anyone else, your task is to rank the items in terms of their importance to your crew in its attempt to reach the rendezvous point. Place number 1 by the most important item; number 2 by the second most important, and so on through number 15, the least important. Include a reason for each of your rankings.

Step 2: After everyone has finished the individual ranking, rank the 15 items as a team.

List of Items	Reason	You	Team	Expert
box of matches				
food concentrate				
20 m of nylon rope				
parachute silk				
portable heating unit				
two .45 caliber pistols				
1 case powdered milk				
2 tanks of oxygen				
map of the stars				
life raft				
magnetic compass				
10 L of water				
signal flares				
first aid kit				
FM receiver-transmitter				

Answers:

Lost on The Moon – Ranking

(Source: NASA Scientists)

1. **Two oxygen tanks**: required for survival since the moon lacks oxygen
2. **10 L of water**: also required for survival
3. **Map of the stars**: needed for locating position and figuring out how to get to rendezvous point
4. **Food concentrate:** this is not as necessary as air and water, but definitely helpful in providing strength
5. **FM receiver-transmitter**: on Earth, powerful receivers could pick up messages which would then be relayed to the mother ship
6. **20 m of nylon rope**: this is needed for lunar mountain climbing
7. **First aid Kit**: needed for any possible injuries that may happen while in transit
8. **Parachute silk**: this offers excellent protection from sunlight and heat buildup
9. **Life raft**: this is a carry-all for supplies (the moon's gravity permits heavy loads to be carried), as a shelter, or a possible stretcher for the injured
10. **Signal flares**: these cannot burn in a vacuum, but they can be shot, therefore providing excellent propulsion for flying over obstructions
11. **Two .45 calibre pistols**: like the signal flares, these too will provide excellent propulsion
12. **1 case of dehydrated milk**: milk is heavy and relatively useless in this situation, therefore less valuable
13. **Portable heating unit**: on the moon, overheating is a problem, not the cold
14. **Magnetic compass**: the moon has no magnetic field so the compass is relatively useless
15. **Box of Matches**: these are the most useless due to their inability to burn without oxygen

©Scouts Home – Adventure 1

Name: _____

Determining Heat Loss from Your Home

Purpose: To conduct a home energy audit to see how much heat may be lost from the windows in your home.

Part 1. Research on the internet a "Home Energy Audit" in Ontario to gain knowledge and understanding of why an audit is necessary.

Part 2. In discussion with your parents or guardians, decide which room(s) you are going to conduct the audit on.

Part 3. Find a family member who can help you conduct the audit.

Part 4:

What You Need:

tape measure	pencil
calculator	help from a parent

What You Do:

1. Select a room in your home such as your living room, dining room, or rec room.

2. Calculate the area of the chosen room. To calculate area, measure the length of the room in metres and the width of the room in metres. Multiply the two numbers together. This will give you a value in m^2. For example:

   A living room is 5.5 m long x 3.5 m wide = 19.25 m^2

   Therefore, the total area of the living room is 19.25 m^2.

3. Calculate the area of each window present in the room using the same mathematical procedure as you did for calculating the area of the room. Find the total window area by adding together the total areas of the windows that are present and measured in the room.

4. Record all the values of your measurements in the "Observations" chart below.

Observations:

Room _____	Length (m)	Width (m)	Area (m^2)
Floor			
window A			
window B			
window C			
		Total Window Area (window A + window B + window C)	

Conclusions:

Experts have determined a mathematical formula that determines whether a large amount of heat could be lost through the windows of a room. Apply this formula to the data you collected.

$$\frac{\text{total window area}}{\text{floor area}} \times 100 = \%\ \text{heat loss}$$

The higher the percentage calculated from the formula, the greater the potential for heat loss from the room. Calculate the percentage heat loss from the room you selected.

Percentage Heat Loss: _____ %

1. Based on your calculations, how would you rate the room you selected for the potential for heat loss?

_____

_____

2. Why is energy conservation necessary?

_____

_____

_____

3. Many factors need to be considered when determining how energy efficient a person's home is. Some factors save a lot of energy, while others save only a little energy. Name three (3) ways that you could save energy in your home to make it more energy efficient.

- _____
- _____
- _____

4. In the attic of your home and in the walls of your home, you will find insulation. What is the purpose of insulation?

_____

_____

_____

5. What is a rebate?

_____

_____

_____

Part 5. Consider the results of your audit. Discuss with your parents about making suggestions to improve the energy efficiency of your home.

Answers

1. How would you rate the room you selected for the potential for heat loss?

   Answers will vary based on results.

2. Why is energy conservation necessary?

   We must practice good stewardship. Fossil fuel supplies will only continue to become more scarce.

3. Many factors need to be considered when determining how energy efficient a person's home is. Some factors save a lot of energy, while others save only a little energy. Name three (3) ways that you could save energy in your home to make it more energy efficient.

   - *window panes (single, double, triple);*
   - *add weather stripping;*
   - *increase insulation;*
   - *use high efficiency furnace;*
   - *add storm windows in winter;*
   - *turn off lights when not in use;*
   - *close closet doors so there is less space to heat or cool;*
   - *hang clothes to dry;*
   - *use full loads in dishwasher and washing machine;*
   - *use energy efficient appliances;*
   - *use energy efficient light bulbs;*
   - *turning off the faucet while brushing teeth or washing dishes.*

4. In the attic of your home, you will find insulation. What is the purpose of insulation?

   Insulation is a substance that does not allow heat to escape through it easily.

5. What is a rebate?

   A rebate is a return of part of a payment, acting as a retrospective refund or discount on goods or services. It serves as marketing incentive for consumers.

Name: _____

Exploring Canada's Endemic Species

Part 1.

Endemic species are organisms such as plants or animals found exclusively in one specific geographic location and nowhere else on Earth. Due to their restricted, specialized habitats, endemic species are highly susceptible to extinction from habitat loss, climate change, or introduced species, making them critical priorities for conservation.

Endemic species are often found in isolated areas like islands, rainforests, lakes, or high mountains, often possessing unique characteristics to suit their specific surroundings. As a result, they cannot migrate to new areas when their habitat is threatened.

Naming Species

All living organisms have a common name and a scientific name. The scientific name is precise and always refers to a very specific characteristic, such as the appearance of the organism, its behavior, where it is from, or its way of life. A scientific name is made up of two words. The first word is called the *genus*. The second word is called the *species*. A species is a group of organisms that can interbreed to produce fertile offspring. A species is the lowest, most specific rank in the classification system.

Most endemic organisms are subspecies. Sometimes, a subspecies can be used in biological classification to identify a slightly different population within a species. This organism typically lives in a different geographical area and possesses distinct physical or genetic traits that are different from the original species. A subspecies typically has a third part in their scientific name, as a subspecies is consistently different enough from a species to be classified separately by scientists.

There are over 300 species and subspecies of plants and animals that are uniquely Canadian and not found anywhere else in the world. The following chart recognizes twelve (12) of Canada's rarest endemic animal species and subspecies.

Animal	Place Found	Classification
Atlantic whitefish	Petite Rivière watershed in Nova Scotia	species (*Coregonus huntsmani*)
Banff Springs snail	Sulphur Mountain in Banff National Park	species (*Physella johnsoni*)
copper redhorse	St. Lawrence and Richelieu Rivers	species (*Moxostoma hubbsi*)
Cowichan Lake lamprey	Vancouver Island, British Columbia	species (*Entosphenus macrostomus)*
Sable Island sweat bee	Sable Island, Nova Scotia	species (*Lasioglossum sablense*)
salt marsh copper	marshes in eastern Quebec, New Brunswick & Nova Scotia	species (*Tharsalea dospassosi*)
Ungava collared lemming	northern tundra of Quebec & Labrador	species (*Dicrostonyx hudsonius*)
Vancouver Island marmot	Vancouver Island, British Columbia	species (*Marmota vancouverensis*)
Harris's Sparrow	boreal forest and Arctic tundra	species (*Zonotrichia querula*)
Peary caribou	Canadian Arctic Archipelago	subspecies (Rangifer arcticus pearyi)
Kermode ("Spirit") bear	British Columbia's Great Bear Rainforest	subspecies (*Ursus americanus kermodeii*)
American marten (Newfoundland pine marten)	mostly western Newfoundland	subspecies (*Martes americana atrata*)

Part 2. **British Columbia's Endemic Species**

British Columbia is home to more species of living things than any other Canadian province. Found nowhere else on the planet, the inland temperate rainforest of southeastern British Columbia, is home to a multitude of unique plant and animal species that are nourished by plenty of rain and an abundance of food. The productivity and diversity of this region allow wildlife to thrive. The rainforest ecosystem also provides many benefits to people and communities such as fresh air, drinking water, timber, and a host of ways to support human physical, mental, and spiritual well-being. More than 75 species of plants and animals are endemic to British Columbia.

1. Why does British Columbia have the most endemic plant and animal species compared to any other Canadian province?

2. What is the rarest endemic animal found in Canada?

_____

3. Where is the only place Canada's rarest endemic animal can be found?

_____

_____

Part 3. The "Spirit" Bear

The Kermode bear (*Ursus americanus kermodei*) also known as the "Spirit" bear, is a subspecies of the American black bear and native to British Columbia's Great Bear Rainforest. While most Kermode bears are black, the rare, white variant is caused by an extremely uncommon recessive gene, rather than albinism. To have a white coat, a bear must inherit the recessive gene from each parent. Even if both parents are black-coated, both parents must carry the gene to produce a white cub. The entire coat is cream or white, from the roots to the tips of their hair. Even the claws are white. The Kermode bear typically has pigmented skin, dark eyes, and a dark nose pad.

The Spirit bear holds a prominent place in the oral traditions of the First Nations people of the area and a spiritual significance to their culture. The Spirit bear is often kept hidden from outsiders to protect them. According to First Nations legend, every 10^{th} bear born was turned white to remind people of the last ice age.

Scientists believe the Kermode bear descended from bears that likely lived in ice-age free regions of the continental shelf during the last ice age. Scientists have wondered why their white coat has persisted long after the ice disappeared. It is likely due to genetic isolation, small population size, and the fact that they are more successful at catching salmon during the day than black bears.

It was not until 1905 that the Kermode bear was officially recognized and described by Science. Native peoples realized the need to keep these bears secret to protect them from fur traders and hunters. Prior to that time, they were believed to be a myth. William Hornaday, a zoologist, officially described and named the Kermode bear *Ursus americanus kermodei*, in honour of Frank Kermode, the curator at the British Columbia Provincial Museum. The name applies to both the black-coated bear and the white-coated bear, however, the name is more often associated with the white-coated bear.

The Kermode Bear was officially recognized as British Columbia's provincial mammal in April 2006. Today, fewer than 300 Kermode bears are believed to exist, making them rarer than the giant panda or sun bear. It is illegal to hunt or shoot a Kermode bear in British Columbia.

4. The Kermode bear's ecological niche is crucial to British Columbia's coastal rainforest ecosystem. What is the Kermode bear's ecological niche?

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5. Research shows that the Kermode bear's white fur provides a 35% higher success rate in catching salmon compared to black bears. What is the reason believed to account for this success?

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Part 4. The Ecological Niche Defined

Each organism has a specific role within an ecosystem. This is referred to as an organism's ecological niche. The niche of an organism is a specific job that is required by each organism to perform in nature to ensure that an ecosystem remains in balance. For example, the ecological niche of a moose is to:

- feed on grass and other plants;
- become food for wolves;
- provide blood for blackflies;
- fertilize the soil.

Every species occupies an ecological niche in its native ecosystem. Some species fill large and varied roles, while others are highly specialized. However, when introduced ("non-native") species arrive, they may exploit a vacant niche in a native ecosystem, or create a new niche that is not suitable or tolerable to the existing native ecosystem. When the introduced species becomes a major threat to the local environmental conditions, economy, society, and health, it now becomes an "invasive species". These invasive species do not have the natural competition, predators, and diseases to keep them under control. Without these controls to slow them down, invasive species reproduce very quickly and out-compete the native species for food, water, and space.

But the ecological niche of an introduced species can sometimes be beneficial. Not all introductions have negative impacts. An introduced species can be beneficial to an ecosystem when it fills an ecological niche successfully that was previously unoccupied. The brown trout was successfully introduced into Canadian streams and rivers from Europe and western Asia. Under normal circumstances, it competes to some extent with the brook trout, however, the brown trout can remain active and survive at slightly warmer temperatures than the brook trout. Therefore, both fish can coexist without any major impacts on each other.

The red fox was also successfully introduced into Canada during the 1600s by settlers for fox hunting. These introduced foxes were released to bolster populations for sport, with further introductions and escapes from fur farms continuing in later centuries. The red fox is an opportunistic predator, acting as a key regulator of rodent populations and limiting agricultural pests. As a result of their successful ability to fill this ecological "vacancy", they are now one of Canada's most widespread mammals, found in all provinces and territories.

Newfoundland's Introduced Species

Newfoundland has a significant number of introduced mammals due to the following three (3) reasons:

- a combination of intentional human introductions;
- the island's low initial biodiversity following the last ice age;
- a lack of natural predators for introduced species.

Newfoundland is home to only fourteen native mammals, no native amphibians or reptiles, and many rare plants. The island has more introduced species than any other place in North America. The following table lists ten (10) of most common introduced mammals to Newfoundland. These mammals were brought to Newfoundland by people, either on purpose or accidentally, after Europeans began exploring and settling the island, ultimately leading to widespread establishment. The impacts of these introductions have reshaped Newfoundland's ecology, in both positive and negative ways.

Mammal	Date Introduced	Reason
eastern chipmunk	1962	tourism and aesthetic appeal
snowshoe hare	1860	hunting
American mink	1934	fur farming
moose	1878	hunting
house mouse	late 1500s	accidental; ballast or stowaways
Norway rat	late 1500s	accidental; ballast or stowaways
American red squirrel	1963	food source for American marten
muskrat	early 1900s	fur trade
beaver	1950s	fur trade
southern red-backed vole	1998	possible food source for American marten

The most recent mammal introduction to Newfoundland was the southern red-backed vole (*Myodes gapperi*) in 1998. It is believed to have been a deliberate, unauthorized introduction to possibly provide a new abundant food source for the American marten. It is also been speculated that it was accidentally introduced by pulpwood imports. While it contributes to the recovery of the American marten, the southern red-backed vole acts as an invasive species by reducing native plant recruitment and creating competition with native meadow voles, reducing their distribution and population density.

The American Marten

The American marten (*Martes americana atrata*), also known as the Newfoundland pine marten, can only be found on the island of Newfoundland. It is a genetically distinct subspecies from the mainland species American marten (*Martes americana*) that is found across Canada in mature coniferous and mixed forests, the boreal forests of the north, and the provinces of British Columbia, Ontario, Quebec, and Atlantic Canada.

The American marten, on the island of Newfoundland, is a unique sub-species. Being a member of the weasel family (Mustelidae), it can be distinguished from all other mustelids by an orange throat patch (which is unique to this marten) and dark brown fur. It is one of only fourteen (14) species of land mammals native to the island. This subspecies has been geographically and reproductively isolated from the mainland American marten population for 7 000 years.

American marten populations have declined drastically in Newfoundland since the 1800s as a result of habitat loss from logging and over-trapping. New research shows, that accidental mortality of those caught in snares (set for snowshoe hares) is also a contributing factor. The American marten in Newfoundland was declared an endangered species in 1996 by the National Committee for the Status of Endangered Wildlife in Canada (COSEWIC). Today, The American marten population in Newfoundland is believed to be somewhere between 286 to 556 adults.

6. Name one (1) <u>ecological</u> reason that could possibly be contributing to the decline of the American marten population in Newfoundland.

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7. The scientific name, *Martes americana atrata* is precise, referring to very specific characteristics. What does this scientific name mean?

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8. The initial introductions of both the eastern chipmunk (1962) and the American red squirrel (1963) to Newfoundland was for aesthetic appeal. Today, little is known about the impacts of their introductions, but studies suggest the American red squirrel has caused severe ecological shifts. Name two (2) impacts that the American red squirrel has had on Newfoundland's ecosystems.

- _____

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- _____

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9. Why has there been a very limited, and largely unnoticeable ecological impact from the introduction of the eastern chipmunk into Newfoundland?

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Part 5.

10. Canada is home to a wide variety of birds and flowers. A select few have been recognized by each of Canada's ten provinces and three territories as their official bird and flower. Fill in the chart below with each province and territory's official, provincial bird and flower.

Province	Bird	Flower
Alberta		
British Columbia		
Manitoba		
New Brunswick		
NFLD & Labrador		
Nova Scotia		
Ontario		
P. E. Island		
Quebec		
Saskatchewan		

Territory	Bird	Flower
Northwest		
Nunavut		
Yukon		

Answers:

1. Why does British Columbia have the most endemic plant and animal species compared to any other Canadian province?

British Columbia has the highest number of endemic species in Canada because its geographic complexity has fostered unique evolution, resulting in many species found nowhere else.

Here are key factors contributing to high endemism in British Columbia:

- *Ice Age Refugia: During the last glaciation, many areas of British Columbia remained ice-free. These areas acted as safe havens, allowing plants and animals to survive and diversify while other areas were covered in ice.*

- *Geographical Isolation: Island environments like Haida Gwaii and Vancouver Island, and rugged secluded coastal mountains have isolated populations, leading to the development of distinct subspecies and unique species.*

- *Topographic & Ecological Diversity: B.C.'s varied landscape includes coastal rainforests, dry interior grasslands, and alpine tundra, all in close proximity. This variety supports a massive range of biodiversity, from mosses and insects to large mammals.*

- *Mild Coastal Climate: The temperate, wet climate along the coast provides a stable environment for species persistence.*

2. What is the rarest endemic animal found in Canada?

The Vancouver Island marmot (Marmota vancouverensis).

3. Where is the only place Canada's rarest endemic animal can be found?

As its name suggest, this species occurs only on Vancouver Island, British Columbia. They were once found in many parts of the island but have disappeared from about two-thirds of their historic natural range. Populations in 2003 suggest fewer than 30 wild marmots were recorded. It lives nowhere else in the world, making it uniquely Canadian.

4. The Kermode bear's ecological niche is crucial to British Columbia's coastal rainforest ecosystem. What is the Kermode bear's ecological niche?

The Kermode bear is a key nutrient mover. It drags salmon into the forest, which fertilizes the rainforest ecosystem with nitrogen-rich waste and carcasses.

5. Research shows that the Kermode bear's white fur provides a 35% higher success rate in catching salmon compared to black bears. What is the reason believed to account for this success?

A fish looking up from the water is less likely to see a white shape against the bright sky than a black shape.

6. Name one (1) <u>ecological</u> reason that could possibly be contributing to the decline of the American marten population in Newfoundland.

- *There is a high competition for a limited food supply;*
- *They have many predators;*
- *They are susceptible to diseases such as rabies and canine distemper virus.*

7. The scientific name, *Martes americana atrata* is precise, referring to very specific characteristics. What does this scientific name mean?

"mart-"– a root word denoting a type of animal with valuable fur
"americanus" – from "the Americas"
"atrata" – means "blackened" "or "darkened"

Literally translated, the name refers to a "furbearing animal from the Americas with darkened fur (compared to its lighter-colored relatives elsewhere).

8. The initial introductions of both the eastern chipmunk (1962) and the American red squirrel (1963) to Newfoundland was for aesthetic appeal. Today, little is known about the impacts of their introductions, but studies suggest the American red squirrel has caused severe ecological shifts. Name two (2) impacts that the American red squirrel has had on Newfoundland's ecosystems.

- *they can limit forest regeneration through seed consumption, eating up to 96% of black spruce cones in certain areas during low-yield years;*
- *they are known to compete with seed-eating finches and other granivores in coniferous forests for food;*
- *they are predators, accounting for up to 88% of the predation on songbird eggs and fledglings occurring during a season;*
- *they prey on the young of mammals, including snowshoe hares;*
- *they have been implicated as potential drivers of the decline of the Newfoundland Gray-cheeked Thrush and the Newfoundland Red Crossbill through nest predation and competition for black spruce seeds.*

9. Why has there been a very limited, and largely unnoticeable ecological impact from the introduction of the eastern chipmunk into Newfoundland?

The eastern chipmunk has not spread widely across the province, hence, a limited dispersal and distribution. Chipmunks prefer deciduous forests and bushy areas with dry, rocky ground for burrowing. Much of Newfoundland consists of coniferous (boreal) forests and wetter habitats, which are less suitable for them compared to the deciduous forests they inhabit in mainland Canada.

10. Canada is home to a wide variety of birds and flowers. A select few have been recognized by each of Canada's ten provinces and three territories as their official bird and flower. Fill in the chart below with each province and territory's official, provincial bird and flower.

Province	Bird	Flower
Alberta	*Great Horned Owl*	*wild rose*
British Columbia	*Stellar's Jay*	*Pacific dogwood*
Manitoba	*Great Gray Owl*	*prairie crocus*
New Brunswick	*Black-capped Chickadee*	*purple violet*
NFLD & Labrador	*Atlantic Puffin*	*purple pitcher plant*
Nova Scotia	*Osprey*	*mayflower*
Ontario	*Common Loon*	*white trillium*
P. E. Island	*Blue jay*	*lady's slipper*
Quebec	*Snowy Owl*	*blue flag iris*
Saskatchewan	*Prairie Sharp-tailed Grouse*	*western red lily*

Territory	Bird	Flower
Northwest	*Gyrfalcon*	*mountain avens*
Nunavut	*Rock Ptarmigan*	*purple saxifrage*
Yukon	*Common Raven*	*fireweed*

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Name: _____

Part 1.

Addressing Endangered Species in Canada

The last word in ignorance is the person who says of an animal or plant: "What good is it?" …. If the land mechanism as a whole is good, then every part of it is good, whether we understand it or not…. Harmony with land is like harmony with a friend; you cannot cherish his right hand and chop off his left.

ALDO LEOPOLD

It is easy to recognize that most Canadians rely on living things that come from such industries as agriculture, forestry, fishing, and tourism. A considerable amount of a person's income is likely to be spent on resources here in Canada. Hunting and fishing are popular activities, along with nature photography or bird watching. It is therefore important that all Canadians understand the impact that human's have on the environment when using its natural resources.

When the population of a species drops considerably to relatively a few numbers and its survival is seriously threatened, that population is said to be endangered. If all the members of a species die, the species becomes extinct. Today, in Canada, many species of living things are in danger of extinction and humans are the major reason for their possible extinction.

Canada is fortunate to be home to thousands of wildlife species and the vast areas of land and water on which they depend. Unfortunately, many of these species are in decline, due in part to human activities. There are currently more than 800 species of plants and animals at risk of becoming extinct in Canada. There isn't any one culprit, but rather a combination of factors that are leading to species decline.

Principles of Sustainable Use of Wildlife

In the early 1800s, bird expert Andrew Wilson watched a single migrating flock of Passenger Pigeons darken the sky for over four hours. He estimated that this flock was more than two billion birds strong, some 386 km long and 1.6 km wide. One hundred years later, the Passenger Pigeon would have disappeared forever. How could a species that was once the most common bird in North America become extinct in only a few decades?

Our ancestors saw Canada as a land of tremendous resources, and their exploitation of these resources has given us one of the highest standards of living in the world. The wealthiest 20% of people on Earth are presently enjoying a much higher quality of life than the remaining 80%, while imposing a far greater share of the stresses on the Earth's life-support systems. Individuals can do little about the decisions of governments or major corporations; they do, however, have control of their own personal lifestyle decisions.

Scientists contend that there in an inherent need to be concerned about the premature extinction of the world's biodiversity due to human activities. The world's biodiversity has economic, medical, scientific, ecological, aesthetic, and recreational value. Some environmentalists go further and contend that each species has an inherent right to play its role in the ongoing functioning of life on Earth until it becomes extinct without interference by humans.

Growing concern over wildlife and wild spaces issues is a current need for Canadians to work together to protect Canadia's wildlife. Effective environmental partnerships, all accountable to an informed and active public, are the keys to the sustainable use of wildlife.

For something to be sustainable, it must be used at a rate that will save plenty of it for the future. The Earth has a limited supply of resources, and humans are a part of nature. Therefore, humans must use their wildlife at a rate that leaves an adequate supply for future generations. To create a sustainable society, people need to adopt a new sustainable ethic – one that respects limits and seeks to ensure future generations of a species and the resources it needs to survive.

1. Who is Aldo Leopold?

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2. What is the difference between conservation and preservation?

conservation: _____

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preservation: _____

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3. Which has a bigger impact: human changes to ecosystems or changes caused by other living things. Explain your answer.

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Part 2: The 15 Most Critically Endangered Species in Canada

The following is a list of the most critically endangered species in Canada.

Mammals	Birds	Reptiles	Fish
Peary caribou	Burrowing Owl	leatherback sea turtle	Atlantic salmon
Vancouver Island marmot	Whooping Crane		bocaccio rockfish
wolverine	Eastern Loggerhead Shrike		lake sturgeon
beluga whale			
sea otter			
narwhal			
North Atlantic right whale			
northern swift fox			

4. What are the two (2) federal legislations that protect endangered species in Canada?

- _____
- _____

5. What is the Ontario's provincial legislation that protects endangered species in Canada?

_____

Part 3. The Five (5) Threats Contributing to Population Declines

Since the arrival of the first European settlers to Canada 500 years ago, at least thirteen (13) of Canada's plant and animal species have disappeared entirely from the Earth and at least twenty (20) are no longer found in Canada. The following are threats that continue to impact and limit Canada's biodiversity.

Pollution
Ecosystems can be exposed to many types of pollutants. From agricultural and industrial runoff to microplastics, contaminants can harm or kill plants and wildlife.

Climate Change
In Canada, the rate of warming has increased to nearly double the global average. A rapidly changing climate can make it more difficult for species to find food or migrate.

Habitat Loss and Fragmentation
Habitat loss is the greatest threat to species in Canada (and globally). Protecting and restoring natural habitats is one of the most effective ways to help wildlife.

Invasive Species
Introduced species compete with native species for space, food and other resources, thereby reducing our indigenous species. Some even prey on native species.

Unsustainable Harvest
Over-exploitation of wildlife can be:

a. direct

- unsustainable harvesting - the extraction of renewable natural resources at rates faster than they can naturally regenerate.
- poaching - the illegal hunting, killing, or capturing of wild animals; considered an environmental crime.

b. indirect

- bycatch (all life, usually aquatic) - catch that was not the intended target of the harvest, often resulting from non-selective fishing gear like gillnets, longlines, and trawls.

6. Select three (3) of the endangered species from the chart in Part 2 and research the specific threats that have caused each one to become endangered.

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7. Who (or what) is COSEWIC?

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8. Poaching is defined as an environmental crime, defining any activity as illegal that contravenes the laws and regulations established to protect renewable natural resources including the illegal harvest of wildlife with the intention of possessing, transporting, consuming or selling it and using its body parts. With such activity bringing in an estimated 6 billion dollars annually, poaching has become the world's second most profitable crime activity behind the illegal drug trade.

   List three (3) different types of poaching.

- _____
- _____
- _____

Part 4. Invasive Species

Invasive species are a major threat to Canada's environment, economy, society, and health. Invasive species can spread rapidly to new areas. They can move into a habitat and completely take it over, as they do not have the competition, predators, and diseases to keep them under control. Without these controls to slow them down, invasive species reproduce very quickly and out-compete the native species.

In 2015, the Ontario provincial government introduced the *Invasive Species Act*, which explicitly regulates the prevention and management of invasive species in Ontario. Thirty-one (31) species or similar groups of species are prohibited under this Act, meaning it is illegal to import, possess, transport, or release these species anywhere in Ontario.

9. Write each of the underlined numbers listed in the statements below in the place value chart. The first one (a) has been done for you.

a. there are as many as <u>1 800 000</u> identified species on Earth.
b. there are over <u>180</u> identified non-native species in the Great Lakes.
c. an estimated <u>800</u> plant species in Canada are exotic species.
d. one purple loosestrife plant can produce up to <u>3 000 000</u> seeds per year.
e. one zebra mussel can produce up to <u>1 000 000</u> eggs each year.
f. the sea lamprey has remained unchanged for the past <u>350 000 000</u> years.
g. the rusty crayfish can lay up to <u>575</u> eggs at one time.
h. adult female carp can lay <u>300 000</u> eggs in a single spawn.
i. dense stands of garlic mustard can produce more than <u>60 000</u> seeds/m^2.

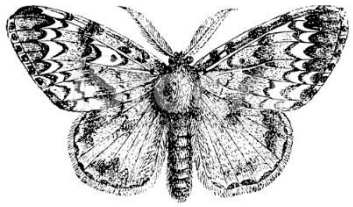
	Millions			Thousands			Units		
Statement	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
a			1	8	0	0	0	0	0
b									
c									
d									
e									
f									
g									
h									
i									

10. There have been numerous plant and animal introductions in Canadian aquatic ecosystems. These introductions have been either intentional or accidental. The effects of these introductions can be positive or negative, sometimes both. However, most introductions have negative impacts on the existing organisms in the ecosystem, which results in a cost of billions of dollars to control or minimize.

The following chart lists only some of the non-native species that have been introduced in Ontario, the year they were introduced, and where they came from. Determine if the introduction was intentional or accidental. When you decide, write the word intentional or accidental under the probable cause.

Species	Year Introduced	Origin	Probable Cause
zebra mussel	mid-1980s	Black Sea Caspian Sea	
rusty crayfish	1960	United States	
Norway maple	mid-1700s	Europe	
purple loosestrife (plant)	1800s	Europe & Asia	
round goby (fish)	late 1980s	eastern Europe	
Eurasian milfoil (plant)	1961	Europe & Asia	
House Sparrow	1850	Europe	
emerald ash borer (insect)	2002	Asia	
sea lamprey (fish)	1830s	Atlantic Ocean	
Asian long-horned beetle	early 1990s	Asia	
Ring-necked Pheasant	1856	Asia	
spiny water flea	1982	Europe & Asia	
gypsy moth	1969	Asia	
carp (fish)	1896	Asia	

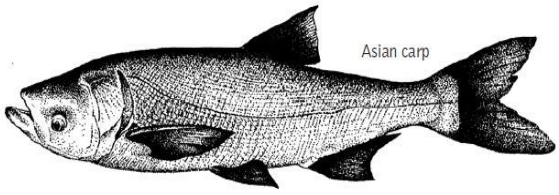
Common Invasive Species of Ontario



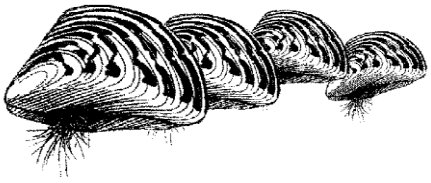
gypsy moth

common buckthorn

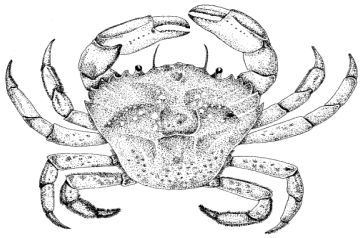
purple loosestrife



Asian carp

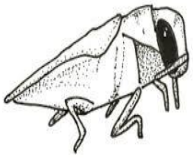


zebra mussel

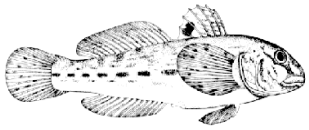


European green crab

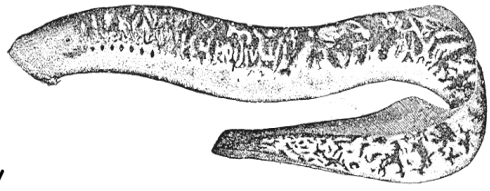
Asian long-horned beetle



emerald ash borer



round goby



sea lamprey

Learn more about some of the invasive species that are a concern for Ontario.

Part 5. What Can a Scout Do?

The involvement of a Scout, of any age, to "roll up their sleeves" and take action in wildlife conservation could help ensure that efforts are directed to the best possible solutions. Without actions, the principles of the sustainability are useless philosophy. Any Scout who is wondering how to get involved in the sustainable use of wildlife on a personal level, is to consider the following proven starting points:

- join an environmental, conservation, or natural history organization in your community;
- become informed by reading widely about the value of wildlife and the challenges facing Canada's plants and animals;
- volunteer time, energy, and money to assist local conservation efforts, such as cleanups of natural areas and enhancement or protection of wildlife habitat;
- set aside some land for wildlife, and take steps to make it attractive to native species;
- know and abide by laws established to protect wildlife and encourage your friends to do the same.

Through efforts undertaken by all sectors of Canadian society, conservation is on the forefront of many people's minds. There are several organizations that are proud to be part of the movement designed to create a brighter future for Canadian wildlife. Drawing on scientific knowledge, these organizations work to preserve the diversity and abundance of life in Canada, working to find long-term solutions that benefit both nature and Canadians. Through collaborative efforts in their approach, these organizations work towards following government policies through cooperative means, including increasing public awareness, youth education, stewardship, and partnership initiatives. The more we know about our Canadian species, the better we can protect them.

The number of endangered species in Canada is an important environmental concern to any Scout and all Canadians. Learn which species are critically endangered and why. Contact one (or more) of the following conservation organizations to learn more about the issue. Find ways to make a positive difference regarding the issue.

- Canadian Wildlife Federation
- World Wildlife Fund
- Ducks Unlimited
- The Ontario Federation of Anglers & Hunters
- The Nature Conservancy of Canada
- Ontario Nature

Answers:

1. Who is Aldo Leopold?

Aldo Leopold (1887–1948) was a pioneering American conservationist, ecologist, and writer widely considered the father of wildlife ecology and modern sustainability. He pioneered the idea that wildlife management should be based on ecological relationships rather than just managing single game species.

2. What is the difference between conservation and preservation?

Conservation is the responsible management, protection, and sustainable use of natural resources, such as water, wildlife, soil, and minerals, to ensure their availability for future generations.

Preservation specifically focuses on protecting natural resources from human interference or development, ensuring they remain in their original state. It is a stricter, "hands-off" or non-use approach that emphasizes protecting nature from any human intervention.

3. Which has a bigger impact: human changes to ecosystems or changes caused by other living things. Explain your answer.

Human changes to ecosystems have a bigger impact because these are changes that occur quickly and are not part of nature. Therefore, they can take many years to restore. Changes caused by other things are part of nature which is a natural process.

4. What are the two (2) federal legislations that protect endangered species in Canada?

- *Species at Risk Act (SARA)*
- *Migratory Birds Convention Act*

5. What is the provincial legislation that protects endangered species in Canada?

The Species Conservation Act, 2025 (recently replaced the Endangered Species Act, 2007).

6.

Peary Caribou ***(Rangifer arcticus pearyi)***

An animal that is found only in Canada, specifically in the Canadian Arctic Archipelago, the Peary Caribou looks akin to a reindeer where both females and males can grow antlers. This endangered species in Canada is being threatened by global warming temperatures as many of its predators, including wolves, cougars and coyotes, are able to travel and live further north into its range. Climate change is also impacting its population; the changes in timing of when Arctic ice melts and freezes is affecting their migration patterns and making it more difficult to forage for food (while increasing food competition with other animals). At the same time, consecutive harsh winters are also driving entire herds to starve. Other threats to the species include human settlement and industrialisation, where urban development is in the way of animal foraging. Latest estimates place there are about 13,200 mature individuals left in the wild.

Burrowing Owl ***(Athene cunicularia)***

One of the smallest owl species, measuring just about 19.0-25.5 cm (7.5-10.0 inches tall), the Burrowing owl can mostly be found in the prairie grasslands of Canada. As the species relies on dry, open areas with low vegetation where its prey such as squirrels, prairie dogs, and other small mammals congregate, habitat loss and fragmentation from land development have caused its population to decline over the past 30 years. Much of its historic range has been converted for crop production, where farmers often use pesticides to protect their crops. The burrowing owl has been known to indirectly invest it when they feed on animals, contributing to its mortality rates. Today, there are fewer than 1,000 pairs remaining in the country.

Leatherback Sea Turtle ***(Dermochelys coriacea)***

Named for its characteristic leathery shell, the Leatherback Sea turtle is a migratory marine animal that makes its way throughout the North Atlantic Ocean. About 1,000 turtles travel to the Canadian Atlantic Ocean in the summer every year to feed on jellyfish. However globally, this species is estimated to have declined by more than 70% as result of fisheries bycatch, coastal and offshore development, marine pollution, poaching of their eggs, changes to its nesting beaches, as well as climate change. However, one of the biggest culprits of its dramatic population decline is entanglement with fixed and discarded fishing gear, where turtles are either choked or prevented from swimming, causing them either to drown or starve to death. While it is considered an endangered species in Canada, its conservation requires international co-operation due to its migratory nature.

Vancouver Island Marmot ***(Marmota vancouverensis)***

As the name suggest, this animal is endemic to Vancouver Island and are found mostly in on rocky slopes with loose soils and plenty of sedimentation from rainwater., as well as sub-alpine meadows. The Vancouver Island marmot is a type of ground squirrel that has been losing much of its habitat due to human activities and development. Listed as Critically Endangered by the International Union for Conservation of Nature (IUCN) Red List and Endangered within Canada, the species has seen population numbers plummet down to as low as 30 individuals in 2007. However, thanks to conservation efforts, that number has climbed back up to 250-300 in 2015. But genetic variation within the species is still decreasing – leading to interbreeding, which makes it more vulnerable to disease or significant environmental variation – as well as large numbers of prey such as wolves, cougars, and the golden eagle, making it difficult for the species to fully recover.

Wolverine ***(Gulo gulo)***

This small, bear-like animal is capable of travelling long distances, but its historical range has shrunk rapidly since European settlement in Canada, where land conservation and urban development have severely reduced its natural habitat. The eastern population of wolverines has also been threatened by hunting practices; the animal is poached for its frost-resistant fur – ideal for lining parkas – while humans also hunt down wolverines' main food source, the caribou. The wolverine occurs mostly in the alpine tundra and arctic tundra from British Columbia to Ontario, but no observation has been verified in these provinces since an individual was last trapped in the late 1970s. The most recent data from 2013 estimates its population to be between 458 to 645 individuals.

Beluga Whale ***(Delphinapterus leucas)***

The beluga whale is most distinguishable by its prominent bulbous forehead, which is called a "melon," and its unique white colour. They live primarily in areas with Arctic Sea ice, where about two-thirds of the world's population (of approximately 136,000 whales) summer in Canadian waters. The marine mammal is culturally important to Inuit and Inuvialuit communities across the Canadian Arctic; its skin and outer blubber layers are an important food source. Considered an indicator species, the beluga whale is highly sensitive to environmental changes. Whales rely on sea ice for protection from purgatory killer whales; the animal has become more vulnerable as global warming is causing ice cover to reduce and change rapidly. Arctic oil and gas exploration, commercial fishing and shipping operations, and marine pollution are all threatening the survival of the species, particularly as noise pollution impacts the whale's ability to communicate, detect predators, find food, and care for their young.

Atlantic Salmon (***Salmo salar***)
Also known as the King of Fish, the Atlantic salmon lives in both fresh and saltwater. Aside from being a popular food source, the salmon is also important to forty First Nations and many Indigenous communities and is used for social and ceremonial purposes. Development such as dams and culverts block or impede the species' migratory movements, from spawning to rearing, while habitat degradation and foreign fisheries further contribute to its population decline. This is clearly evident as populations dropped to as low as 0.4 million in 1995 compared to 0.8-1.7 million between 1971-1985. As a result, the species has been the subject of conservation efforts in several countries, which appear to have been somewhat successful since the 2000s. Though it is listed as "Least Concern" by the IUCN, it remains to be considered an endangered species in Canada.

Sea Otter ***(Enhydra lutris)***
This adorable marine mammal was pushed to the brink of extinction due to the fur trade that began in the 1700s. By 1929, they were essentially gone from British Columbia. But thanks to considerable conservation efforts in Canada, as well as stringent protection measures, the sea otter population soared up to more than 6,500 individuals today. They can now be found along the west coast of Vancouver Island and part of the central coast of British Columbia. Globally however, sea otters are still considered endangered by the IUCN. Within Canada, new threats could impede its success story; bycatch, entanglement in active and abandoned fishing gear, marine pollution and oil spills all pose a threat to the species. The latter of which is detrimental to its survival as sea otters become highly susceptible to hypothermia if their fur comes into contact with oil.

Narwhal ***(Monodon monoceros)***
Also known as the unicorns of the sea for their unique long spiralled horn protruding from its forehead, the Narwhal is most commonly found in Canadian waters – two of three of its recognised populations occur in Canada while the third occurs in East Greenland. Much like most marine mammals in the region, the species is at risk due to marine pollution, commercial fishing and climate change. But Narwhal's preference for deep waters makes them less vulnerable to these factors than other animals The greatest threat to the species is in fact hunting, where their skin and ivory continue to be valuable on the market, and have social and cultural significance for some communities. Despite rare sightings of the animal, scientists estimate there are about 170,000 individuals in the wild.

North Atlantic Right Whale ***(Eubalaena glacialis)***

The North Atlantic right whale is one of the world's most endangered large whale species. By the early 1890s, commercial whalers had hunted North Atlantic right whales to the brink of extinction. (They got their name from being the "right" whales to hunt because they floated when they were killed.) Whaling is no longer a threat, but they have never recovered to pre-whaling numbers, and human interactions still present a danger to this species. Entanglement in fishing gear and vessel strikes are the leading causes of North Atlantic right whale mortality. Increasing ocean noise levels from human activities are also a concern because the noise may interfere with right whale communication and increase their stress levels. North Atlantic right whales have been listed as endangered under the Endangered Species Act since 1970. The most recent abundance estimate for the population is approximately 380 whales—an increase of approximately 20 individuals since 2020—and marks the third consecutive year that the population has shown signs of increasing.

Bocaccio Rockfish ***(Sebastes paucispinis)***

The bocaccio rockfish is one of over 35 species of rockfish found in marine waters off British Columbia. There has been limited research on bocaccio in British Columbia waters. Most of the biological information comes from studies done in California. Its low commercial importance has inhibited directed research. Off the west coast of Vancouver Island, numbers appear to have declined by more than 95% in the last two decades, and by more than 90% over the last 10 years. In neighbouring U.S. waters to the south, abundance is thought to have declined by over 90% over the last two decades. There is no specific protection or status for this species in Canadian waters. In U.S. waters, it has been petitioned for listing under the Endangered Species Act. It is considered to be critically endangered by the IUCN, and endangered the World Wildlife Federation. Discards have been reported in the hook-and line fisheries, but the extent is unknown. If significant, it would affect productivity as bycatch usually results in death due to expansion of the swim-bladder. The abundance of bocaccio is poorly known in British Columbia waters.

Whooping Crane ***(Grus americana)***

The only remaining, self-sustaining wild population of Whooping Cranes breeds in and near Canada's Wood Buffalo National Park, spanning the Alberta-Northwest Territories border. Although likely never an abundant species, the Whooping Crane was designated by COSEWIC in 1978 because of its rapid decline to very low abundance in the early 20th century. While the population is growing from a low of 18 birds in 1938 to over 300+ in the wild, they remain endangered. The original Whooping Crane decline has been largely attributed to the conversion of natural grasslands into agricultural fields, unregulated hunting, and destruction of important wetlands. Threats to over-wintering habitat during migration remain the main factor in limiting population recovery. Collisions with human-made structures such as power lines, especially during migration, and disease offer additional mortality risks. Both late maturity and small clutch sizes further limit population growth. Latest estimates place 100-500 breeding birds left in the wild.

Lake Sturgeon ***(Huso fulvescens)***

The lake sturgeon was commercially harvested across much of the fish's range between the late 1800s and mid-1900s. The St. Lawrence River in Quebec supports the only remaining commercial fishery. Caviar, made from lake sturgeon, is still highly prized. Lake sturgeon is also sought by trophy anglers (where permitted) in many locations. The majority of the lake sturgeon's populations in Canada declined over a period of approximately 150 years, beginning in the 18th century. While some of well-studied populations appear to be rebounding, a sizable portion of populations have yet to exhibit meaningful signs of population recovery, and th fish has disappeared from some formerly inhabited areas. The declining numbers over the years are the result of habitat fragmentation, over-harvesting, habitat alterations (primarily due to dams), barriers to migration (dams), invasive species, and pollution. It has also been noted that dams can unintentionally pull fish, eggs and larvae into water intakes, where they can be injured, killed or stranded. According to Parks Canada, the current population of lake sturgeon is perhaps just one per cent of what it once was.

Eastern Loggerhead Shrike ***(Lanius ludovicianus migrans)***

The Eastern Loggerhead Shrike is a medium-sized predatory songbird, slightly smaller than a robin. Because the Eastern Loggerhead Shrike lacks strong talons for grasping their meals, it impales its dead prey on the thorns of shrubs or barbed wire and then tears off manageable chunks with their beak. The causes of the persistent decline in numbers are poorly misunderstood. Historically, the greatest threat has been the loss and fragmentation of the short grassland they depend on. This is due to natural succession and natural changes in agricultural land use particularly the conversion of pastures and hay fields to grow crops, which involves removing the hedgerows, shrubs, and trees, which are essential to the shrike's lifestyle. Another potentially serious problem is motor vehicles. Shrikes often perch on fences and utility lines near roadways and sometimes collide with passing cars and trucks. The use of pesticides may also be a factor. However, the biggest factor contributing to their rapid declines seems to lie either on their migration routes or their over-wintering grounds, reducing the number of birds that return to breed in Ontario each spring. With fewer than 100 individuals remaining (an estimated 25–50 breeding pairs), the Eastern Loggerhead Shrike is restricted to small, isolated pockets in southern Ontario, specifically on the Carden Plain and Napanee Limestone Plain, and occasionally Quebec.

Northern Swift Fox ***(Vulpes velox)***

The northern swift fox was declared extirpated in the 1930s, but successful reintroduction programs in Alberta and Saskatchewan since 1983 have established a small, breeding population. The range of the northern swift fox encompasses some of the most modified landscapes in North America. A conversion of at least 70% native prairie to cropland agriculture has been implicated as a primary reason for the historical range contraction of this species. Current estimates indicate that only 19% of the Canadian prairies ecozone remains as grassland habitat. Accidental poisoning from the misuse of toxicants (rodenticides, predacides), road mortality from collision with vehicles, severe winters, and interspecific competition with and predation by other canids are currently among the most important threats to the northern swift fox in Canada. These threats and factors may act singly or synergistically to affect northern swift fox survival, reproductive success, and distribution.

7. Who (or what) is COSEWIC?

COSEWIC, created in 1977, stands for the Committee on the Status of Endangered Wildlife in Canada, an independent advisory panel of wildlife biology experts who meet each year to assess the risk of extinction for Canadian wildlife species. It classifies species as Extinct, Extirpated, Endangered, Threatened, or Special Concern.

8. Poaching is defined as an environmental crime, defining any activity as illegal that contravenes the laws and regulations established to protect renewable natural resources including the illegal harvest of wildlife with the intention of possessing, transporting, consuming or selling it and using its body parts. With such activity bringing in an estimated 6 billion dollars annually, poaching has become the world's second most profitable crime activity behind the illegal drug trade.

   List three (3) different types of poaching.

- *Hunting, killing or collecting wildlife that is listed as endangered by IUCN and protected by law such as the Endangered Species Act, the Migratory Bird Treaty Act of 1918 and international treaties such as CITES.*
- *Fishing and hunting without a license.*
- *Capturing wildlife outside legal hours and outside the hunting season; usually the breeding season is declared as the closed season during which wildlife is protected by law.*
- *Prohibited use of machine guns, poison, explosives, snare traps, nets and pitfall traps.*
- *Prohibited use of baiting with food, decoys or recorded calls in order to increase chances for shooting wildlife.*
- *Hunting from a moving vehicle or aircraft.*
- *Shining deer with a spotlight at night to impair its natural defenses and thus facilitate an easy kill is considered animal abuse.*
- *Taking wildlife on land that is restricted, owned by or licensed to somebody else.*

9. Write each of the underlined numbers listed in the statements below in the place value chart. The first one has been done for you.

Statement	Millions			Thousands			Units		
	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
a			*1*	*8*	*0*	*0*	*0*	*0*	*0*
b							*1*	*8*	*0*
c							*8*	*0*	*0*
d			*3*	*0*	*0*	*0*	*0*	*0*	*0*
e			*1*	*0*	*0*	*0*	*0*	*0*	*0*
f	*3*	*5*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
g							*5*	*7*	*5*
h				*3*	*0*	*0*	*0*	*0*	*0*
i					*6*	*0*	*0*	*0*	*0*

10.

Species	Year Introduced	Origin	Probable Cause
zebra mussel	mid-1980s	Black Sea & Caspian Sea	*accidental*
rusty crayfish	1960	United States	*accidental*
Norway maple	mid-1700s	Europe	*intentional*
purple loosestrife (plant)	1800s	Europe & Asia	*accidental*
round goby (fish)	late 1980s	eastern Europe	*accidental*
Eurasian milfoil (plant)	1961	Europe & Asia	*accidental*
House Sparrow	1850	Europe	*intentional*
emerald ash borer (insect)	2002	Asia	*accidental*
sea lamprey (fish)	1830s	Atlantic Ocean	*accidental*
Asian long-horned beetle	early 1990s	Asia	*accidental*
Ring-necked Pheasant	1856	Asia	*intentional*
spiny water flea	1982	Europe & Asia	*accidental*
gypsy moth	1969	Asia	*accidental*
carp (fish)	1896	Asia	*intentional*

Name: _____

Animal Communication

Part 1. Increase your awareness of the sounds you hear outside by visiting a local Conservation Area and listening to the sounds of the forest (or wetland). Time of year is important and time of day is important. Spring is the best time of year. Early morning and late evening are the best times for birds. Late evening is the best time for amphibians (frogs and toads). Familiarize yourself with the sounds and calls of the animals you hear. Take a notebook and write down what you find.

Part 2. Background Information

Most Scouters understand the different ways in which humans communicate. People who share a common language communicate by speaking or writing. But humans do not rely solely on "words" in their day-to-day communications. Non-verbal communications, body language, and gestures all convey information. In fact, some sources estimate that only 7% of communication is based on language and the remainder of the communication comes from the speakers' body language, facial expression, and vocal tone and pitch. Like humans, other species communicate with each other in different ways, some similar to humans and some different. Observing baboons provides an opportunity to observe body language and social behaviour. Even crocodiles communicate to each other by using body posture, slapping the water with their jaws, or blowing bubbles to reinforce status within their group.

Animals make sounds for different reasons. The most commonly heard animal sound is the breeding call which males emit to attract females, or, to claim territory during the breeding season. Females may produce a reciprocation call in response to the male's breeding call, to let him know she may be interested. Animals also have a distress call they emit when disturbed, threatened, or attacked.

There is another indirect type of communication that is obvious in different types of animals. Animals change color primarily to communicate intentions, such as attracting mates, displaying aggression, or signaling danger. They use specialized skin cells called chromatophores to instantly shift patterns, colors, and moods.

Part 3.

1. Animals make sounds that we humans consider musical. The study of this practice is called zoomusicology. Match the animal on the left with the "instrument that it plays" on the right by placing the correct letter in the appropriate space.

a. elephant	_____ drums
b. Hermit Thrush	_____ trumpet
c. Downy Woodpecker	_____ flute
d. Club-winged Manakin	_____ woodwind
e. elk	_____ violin
f. Anna's Hummingbird	_____ brass

2. Find out what the following animals are communicating when they change colour.

- octopus, squid, and cuttlefish:

_____

- male peacocks:

_____

- poison frogs:

_____

- golden tortoise beetles:

_____

- chameleons:

_____

- lizards:

_____

3. The Black-capped Chickadee (*Poecile atricapillus*) is one of the most common and approachable birds. While at a Conservation Area, try to locate some chickadees. Interpreting its many calls depends on the context and behavior of the bird. In most of North America, when the chickadee sings to a mate, the song is a simple, pure, two or three-note whistled "fee-bee" or "hey, sweetie." The Black-capped Chickadee uses three other calls, all for different reasons. Listen for these calls and try to determine what the chickadee is trying to communicate.

   - _____
   - _____
   - _____

Part 4.

Write the following examples of animal communication on individual pieces of paper. Place all the slips of paper into a hat or bag. Have a Scouter (or two together) act out what is written on their piece of paper. Other Scouters must guess what animal they are portraying. Give hints when necessary.

Here are some of the ways animals communicate with each other:

- chimpanzees greet each other by touching hands;
- white-tailed deer show alarm by flicking up their white tails;
- giraffes press their necks together when they are attracted to each other;
- gorillas stick out their tongues to show anger;
- kangaroos thump their hind legs to warn others of danger;
- prairie dogs bare their teeth and press their mouths together to determine if they are friend or foe;
- whales breach (leap out of the water) repeatedly to message other whales;
- swans entwine their long necks both to fight and to court;
- bees dance when they have found nectar; the scout bee will dance in the hive, and the dance directs other bees to the location of the nectar;
- beavers will slap their tails loudly on the water to warn other beavers of danger.

Part 5.

Revisit your local Conservation Area (or go to a different area) to continue familiarizing yourself with the sounds and tones of the animals you hear. Use your new gained knowledge to look for further evidence to evaluate hypotheses about why birds communicate.

Black-capped Chickadee

Answers:

1.

a.	elephant	*c.*	*drums*
b.	Hermit Thrush	*a.*	*trumpet*
c.	Downy Woodpecker	*b.*	*flute*
d.	Club-winged Manakin	*f.*	*woodwind*
e.	elk	*d.*	*violin*
f.	Anna's Hummingbird	*e.*	*brass*

2. Find out what the following animals are communicating when they change colour.

- *The octopus, squid, and cuttlefish change skin color show aggression.*
- *Male peacocks use their iridescent tail feathers to attract females.*
- *Poison frogs use bright colors to warn of high toxicity.*
- *The golden tortoise beetle shifts from gold to dull-red based on mood.*
- *Chameleons change color mainly to communicate mood (fear, anger), dominance, and breeding readiness.*
- *Lizards change color to communicate social status.*

3. The Black-capped Chickadee (*Poecile atricapillus*) is one of the most common and approachable birds. While at the Conservation Area, try to locate some chickadees. Interpreting its many calls depends on the context and behavior of the bird. In most of North America, when the chickadee sings to a mate, the song is a simple, pure two or three-note whistled "fee-bee" or "hey, sweetie." The Black-capped Chickadee uses three other calls, all for different reasons. Listen for these calls and try to determine what the chickadee is trying to communicate.

   - *<u>contact call</u>: a friendly call "chipping" to alert foraging with other birds;*

   - *<u>danger or alarm call</u>: when a predator is nearby. An increasing number of "dee" notes indicate an increasing level of alarm. In this call, you can hear several chickadees joining into the chorus of alarm. Interspersed with the "chickadee-dee-dee" call are scolding, high-pitched "see" notes;*

   - *<u>territorial "gargle" sound</u>: given when one chickadee intrudes on another chickadee's territory or when two chickadees in a flock get too close together or are "arguing" over food, usually given by the dominant bird.*

Name: _____

Aquatic Invertebrate Identification

Part 1. Background Information

Discovering what kind of invertebrates that can be found in a stream can be useful to determine how healthy the stream is. Species that are active, such as stonefly nymphs, have high oxygen requirements, while those that are less active, such as sludgeworms (*Tubifex* sp.), require much lower oxygen.

Those invertebrates that require high amounts of dissolved oxygen are said to be "sensitive" or "very sensitive" to pollution, meaning that they cannot live in polluted waters. Other organisms that have very low oxygen requirements are said to be "tolerant" or even "very tolerant" of polluted conditions. Most organisms range somewhere in between. A decrease in the diversity of species and species numbers is probably the best biological indicator of pollution.

Oxygen Level (mg/L)	Invertebrates Present
8.0 and above - high level of dissolved oxygen present	mayfly larvae, caddisfly larvae, stonefly nymph, beetles
6.0 and above – sufficient level of dissolved oxygen	few mayfly larvae, some beetles, leeches, sludgeworms (*Tubifdex*. sp.)
4.0 and below - critical level for most invertebrates	freshwater shrimp, many midge larvae, leeches, sludgeworms (*Tubifdex*. sp.)
2.0 and below - too low for fish	some midge larvae, some sludgeworms (*Tubifdex*. sp.)

Various equipment such as nets, scoops, or sieves can be used to find, gather, and collect invertebrates.

Physical Characteristics of a Stream

A stream is considered a lotic ecosystem (it has moving water). The type of stream bottom plays a large role in determining how productive the stream is. The major types of streambeds are bedrock, rubble (stones larger than gravel), gravel (coarse and fine pebbles), sand, mud, or silt.

The number and types of invertebrates you will find in a stream is influenced by the nature of the stream bottom. Sandy bottomed streams are the least productive because they offer little in the way of shelter or protection for invertebrates. Bedrock, although a solid substrate, is so exposed to fast currents that it offers little for invertebrates to cling and hold on to. Gravel and rubble bottoms support the most abundant life because they have the greatest surface area, thereby providing many sheltered and protective places for invertebrates to live.

Stream Invertebrates

Invertebrate life in moving water is abundant. Invertebrates can be found swimming, floating, attached to vegetation, buried in the bottom of the stream, or under rocks. Because of the wide range of habitats within the stream, invertebrates also have a wide range of adaptations that enable them to survive within these habitats.

A common adaptation for life in moving water is for small animals to attach themselves to the stream bottom. Larvae of blackflies and riffle beetles have sucker-like parts on the surface of their abdomens. Caddisfly larvae live in tube-like cases that can be secured to the bottom. Nymphs of stoneflies and mayflies are flattened and streamlined in shape and can attach themselves to the undersides of rocks without being swept away by the current.

If there is sand or silt on the streambed, invertebrates such as nymphs of mayflies and dragonflies bury themselves in tunnels for protection. Few invertebrates live on the surface of the water because the water is always moving.

Part 2. What You Need:

kitchen sieve (strainer)	clipboard & pencil
small butterfly net	clear, plastic containers for observation
clipboard	waterproof boots
hand lens	3 "Invertebrate Identification" Sheets
forceps (optional)	"Orders of Common Aquatic Invertebrates" Sheet

Part 3.

<u>You must collect Six (6) Different Species of Invertebrates.</u>

1. Choose a safe, shallow, stony-bottomed section of the stream. <u>Be very careful working near water. Wear a life jacket.</u>

2. Fill the clear, plastic observation basin $\frac{1}{4}$ full with water.

3. For collecting organisms on the stream surface, approach the stream quietly with proper footwear. Wade into the stream and secure a good foothold with a sieve or net in hand.

4. Run the net across the surface of the water. Any insects or surface dwellers could be caught. Empty your catch into a shallow, clear, plastic observation basin containing clear stream water. Examine the organisms using the forceps and a hand lens.

5. To collect organisms from the stream bottom, carefully kick the stream bed (rubble and gravel) immediately upstream of the net or sieve to dislodge aquatic organisms. They will drift into the net with the current. Or, pick up any rock off the stream bed and remove any aquatic organisms found on the rock. Place the rock back in the stream. Empty your catch into a shallow, plastic observation basin containing clear stream water. Examine the organisms using the forceps and a hand lens.

6. Using the "Invertebrate Identification Sheets", attempt to identify the invertebrates that you caught. Write the name of each invertebrate you caught on the "Stream Invertebrate Data Sheet." Check off where you found it in the stream and if the water was fast or slow.

7. <u>Carefully return all invertebrates to the stream</u> when your work is finished.

Stream Invertebrate Data Sheet

Name: _____

Date: _____

Location: _____

Name of Invertebrate	On the Shore	On the Surface	Free Swimming	On/Near Plants	On the Bottom	Fast	Slow

Make sure to check off each species collected on the "Orders of Common Aquatic Invertebrates Sheet". Try to collect six (6) <u>different</u> Orders.

Orders of Common Aquatic Invertebrates

Order	Invertebrate	Collected
Ephemeroptera	mayfly	
Tricoptera	caddisfly	
Plecoptera	stonefly	
Odonata	damselfly	
	dragonfly	
Decapoda	crayfish	
Megaloptera	alderfly	
	dobsonfly	
Amphipoda	side-swimmer	
Isopoda	aquatic sow bug	
Coleoptera	predacious diving beetle	
	water penny	
	whirligig beetle	
Hemiptera	water scorpion	
	water strider	
	giant water bug	
Diptera	blackfly	
	mosquito	
	cranefly	
	midge	

A Description of Eleven Different Orders of Aquatic Insects

The seven main taxonomic ranks for classifying organisms, listed from broadest to most specific, are Kingdom, Phylum, Class, Order, Family, Genus, and Species. The groups in an Order have more in common with each other than they do with other members of the same Class. An Order, then, is made up of several different Families, with each Family sharing their own specific characteristics.

Ephemeroptera is an order of aquatic insects commonly known as mayflies. Derived from the words *ephemeros* ("short-lived") and *pteron* ("wing"), this refers to the exceptionally short lifespan of the adults, which only live for a few hours to a few days.

Trichoptera is an order of aquatic insects commonly known as caddisflies. Derived from the words *trichos* ("hairy") and *pteron* ("wing"), this refers to the characteristic tiny, moth-like hairs covering the wings of adult caddisflies, distinguishing them from butterflies and moths, which have scales on their wings.

Plecoptera is an order of aquatic insects commonly known as stoneflies. Derived from the words *plekein* ("folded" or "braided") and *pteron* ("wing"), this refers to how they fold their hind wings flat against their backs when at rest.

Megaloptera is an order of insects commonly known as alderflies, dobsonflies, and fishflies. Derived from the words *megalo* ("large") and *pteron* ("wing"), they are recognized by their large, veined, roof-like wings and aquatic larvae, which are often called hellgrammites.

Coleoptera is an order of insects commonly known as beetles. Derived from the words *koleos* ("sheath**")** and *pteron* ("wing"), this refers to their distinguishing hardened front wings that form a protective, shell-like covering over their delicate flight wings. It is the largest animal order, comprising approximately 400,000 species.

Hemiptera is a massive order of over 80,000 insect species commonly known as "true bugs". Derived from the words *hemi* ("half") and *pteron* ("wing"), this refers to their partially thickened front wings. They are also characterized by piercing-sucking mouthparts.

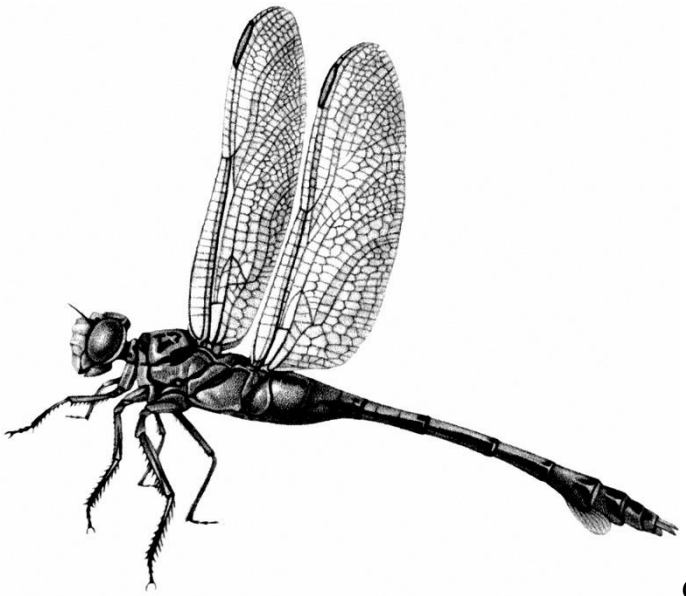
Diptera is an order of aquatic insects commonly known as "true flies". Derived from the words *di* (**"two")** and *pteron* ("wing"), referencing that "true flies" possess only one pair of functional flight wings, with the hind wings reduced to small balancing organs called halteres.

Odonata is an order of aquatic, predatory, flying insects commonly known as dragonflies and damselflies. Derived from the word *odōn* or *odous* ("toothed") referring specifically to their heavily toothed, sharp, and serrated mandibles (jaws).

Decapoda is an order of aquatic invertebrates that includes crustaceans such as shrimp, crabs, lobsters, and crayfish. Derived from the words *dekás* ("ten") and *poda* ("foot"), they are characterized by having five pairs of thoracic walking legs (10 legs total).

Amphipoda is an order of aquatic invertebrates that includes those crustaceans with no carapace and generally with laterally compressed bodies. Derived from the words *amphi* ("on both sides") and *poda* ("foot"), it translates literally to "feet on both sides".

Isopoda is an order of aquatic invertebrates that includes crustaceans having seven pairs of legs that are all roughly equal in size and similar in shape. Derived from the words *isos* ("equal" or "same") and *poda* ("foot"), all Isopods have rigid, segmented exoskeletons,



damselfly

Part 4.

1. Who is a limnologist?

_____

_____

_____

2. Investigate the body plan of a stonefly nymph to determine how its design makes it well adapted to life in a stream environment.

_____

_____

_____

3. In the world of ecology, what does the term "niche" mean?

_____

_____

_____

4. Name two (2) different invertebrates you collected and describe their niche in a stream ecosystem.

- _____

  _____

- _____

  _____

5. Do you think invertebrates are good indicators of water quality? Explain your reasoning with an example.

_____

_____

_____

6. Make a list of three (3) invertebrates that are helpful and a second list that are harmful. In what ways are humans harmful to invertebrates?

Helpful	Harmful

_____

_____

_____

7. Several orders of insects have the name "fly", but are not true flies (Order Diptera). What five (5) orders of aquatic insects does this apply to.

- _____
- _____
- _____
- _____
- _____

Part 5.

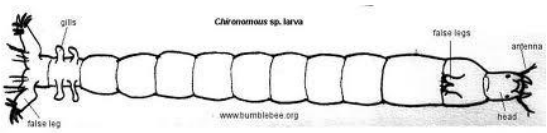
8. Take a close look around the land surrounding the stream. List any current or proposed human activities and/or surrounding land use that you feel would have the greatest negative impact on the stream and explain why.

Alderfly Larvae

Description: Larvae have 7 pairs of abdominal filaments, lack anal prolegs and have a central caudal filament.

Sensitive

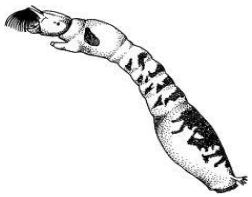
Aquatic Worm



Description: Long, thin segmented worm. Colour is usually red but may also be tan, black or brown.

Tolerant

Blackfly Larva



Description: Soft, shaped like a bowling pin, grub-like maggot. Head is usually black with tiny gills near it.

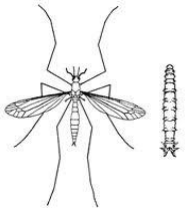
Tolerant

Caddisfly Larva

Description: Worm-like with 3 pairs of well-developed legs.t. Often found inside a case built from organic material.

Sensitive

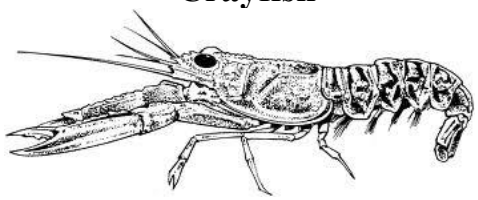
Cranefly



Description: Adult looks like a big mosquito. The larva has a segmented white body.

Somewhat Sensitive

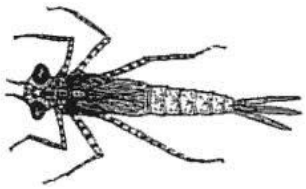
Crayfish



Description: This 10-legged crustacean has the front legs modified into large claws.

Somewhat Sensitive

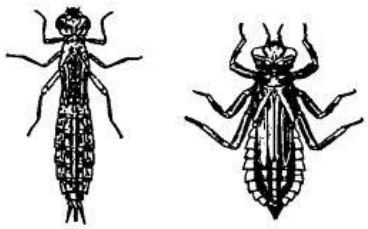
Damselfly Nymph



Description: Slender body with 3 long, tail-like gills at the end. The extendable jaws fold up under the head.

Somewhat Sensitive

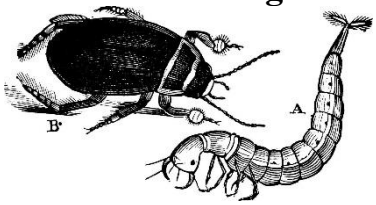
Dragonfly Nymph



Description: These nymphs have large eyes and a large scoop-like lower lip. The 6 segmented legs are located near the head. Has wing pads, but no wings.

Somewhat Sensitive

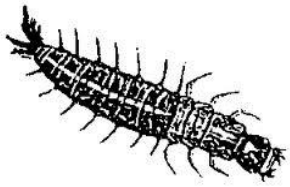
Predaceous Diving Beetle



Description: The larvae have segmented, streamlined bodies. The jaws can be larger than the rest of the head. Adult is smooth and oval. Back legs are paddle-shaped.

Sensitive

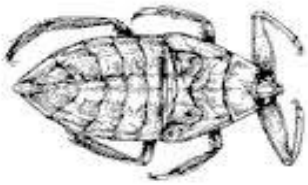
Dobsonfly Larvae



Description: Mouth has large, chewing pinchers. Body has 6 segmented legs on the middle section. Back end is forked with 2 short tails.

Sensitive

Giant Water Bug



Description: Flat, large body and flattened hind legs. The front legs are used to grab prey. It can inflict a painful bite.

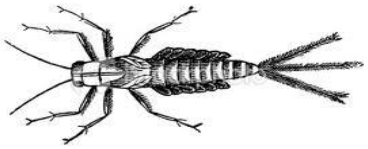
Sensitive

Leech

Description: Leeches are black/brown, flat, segmented, with a sucker on both ends.

Tolerant

Mayfly Nymph



Description: Usually have 3 long tails extending from their flat body. Some have leaf-like gills on their abdomen.

Very Sensitive

Midge Larva

Description: Possesses a long, thin cylindrical body. The digestive tract can be seen inside the body as a thin, dark line. Distinct, often dark head.

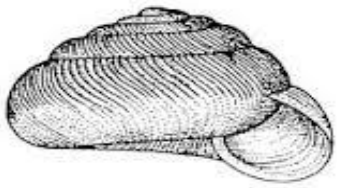
Tolerant

Clams & Mussels

Description: These bivalves have 2 hinged shells enclosing the soft body. Clams are round. Mussels are flat.

Somewhat Sensitive

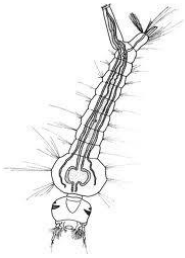
Freshwater Snails



Description: Inside the hard, spiral-shaped shell is a soft body. The shells are usually opened on the right side.

Very Sensitive

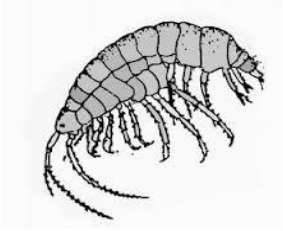
Mosquito Larva



Description: These "wrigglers" twist and squirm just below the water surface.

Tolerant

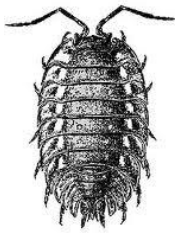
Sideswimmer (Scud)



Description: They swim on their sides, very quickly. They have 7 pairs of segmented legs, 2 pair of antennae.

Somewhat Sensitive

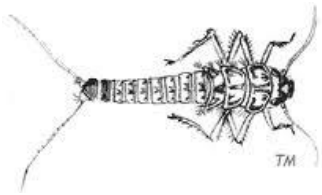
Aquatic Sowbug



Description: Thin and flat. The head is fused with the first two thoracic segments.

Tolerant

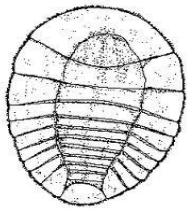
Stonefly Nymph



Description: 2 long antennae with 2 hair-like tails. 6 segmented legs on middle section of body. Each leg has 2 hook-like claws.

Very Sensitive

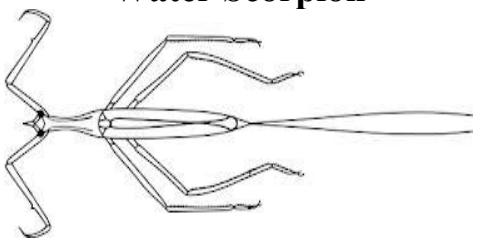
Water Penny Larva



Description: **I**nside the hard, spiral-shaped shell is a soft body. The shells are usually opened on the right side.

Sensitive

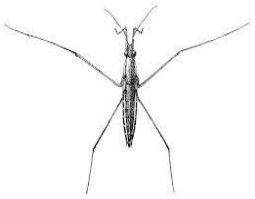
Water Scorpion



Description: known for their brown, stick-like or flattened bodies, and a long, two-parted, non-stinging, tail-like breathing tube (siphon).

Somewhat Sensitive

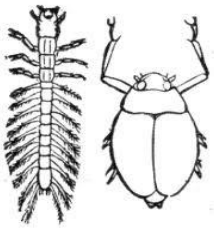
Water Strider



Description: Skates and slides along the surface of the water. The 2nd and 3rd pair of legs are almost twice as long as their body.

Somewhat Sensitive

Whirligig Beetle



Description: These beetles swim in circles. The 2 hind legs are flattened and function as oars. The larva is long and segmented with many legs.

Somewhat Sensitive

Answers:

1. Who is a limnologist?

   A limnologist is a scientist who studies inland aquatic ecosystems, such as lakes, rivers, streams, and wetlands. They analyze the physical, chemical, and biological components of these freshwater ecosystems, such as water flow, nutrient cycles, and aquatic life, to see how these systems interact and function to aid in their protection and management.

2. Investigate the body plan of a stonefly nymph to determine how its design makes it well adapted to life in a stream environment.

   Stoneflies have flattened, streamlined bodies. They also have muscular legs and "hooks" on their feet, enabling them to remain attached to the cobble and gravel in fast streams.

3. In the world of ecology, what does the term "niche" mean?

   Each organism has a specific role within an ecosystem. This is referred to as an organism's niche. The niche of an organism is a specific job that the organism performs to ensure that an ecosystem remains in balance. For example, the niche of a moose is to:

   - *feed on grass and other plants;*
   - *become food for wolves;*
   - *provide blood for blackflies;*
   - *fertilize the soil.*

4. Name two (2) different invertebrates you collected and describe their niche in a stream ecosystem.

   Most invertebrates are herbivores (1st order consumers) and are therefore important as a food source to other organisms in the stream, such as fish. Invertebrates such as dragonfly nymphs are carnivores, and therefore feed on other organisms. They can also be a food source to fish and frogs.

5. Do you think invertebrates are indicators of water quality? Explain your reasoning with an example.

Yes. Many invertebrates are sensitive to changes in water quality. For example, the stonefly is intolerant of warm, low oxygenated waters. A decrease in the diversity of species is probably the best biological indicator of pollution.

6. Make a list of three (3) invertebrates that are helpful and a second list that are harmful. In what ways are humans harmful to invertebrates?

Many invertebrates are directly or indirectly harmful or helpful through their ecological roles. Helpful invertebrates include:

- *sponges*
- *leeches (in medicine)*
- *shellfish (as a source of food)*
- *bees (by making honey)*

Harmful invertebrates include:

- *jellyfish*
- *tapeworms*
- *leeches (nonmedical)*
- *zebra mussels*
- *mosquitoes*
- *wasps*

Humans harm invertebrates by:

- *destroying their environments (habitat destruction)*
- *pollution*
- *pesticides*
- *overexploitation*
- *direct killing*

7. Several orders of insects bear the name “fly”, but are not true flies (Order Diptera). What five (5) orders of aquatic insects does this apply to.

   - *Ephemeroptera (mayfly)*
   - *Tricoptera (caddisfly)*
   - *Odonata (dragonfly, damselfly)*
   - *Megaloptera (alderfly, dobsonfly)*
   - *Plecoptera (stonefly)*

8. Take a close look around the land surrounding the stream. List any current or proposed human activities and/or surrounding land use that you feel would have the greatest negative impact on the stream and explain why?

   Run-off from urbanization into the stream is going to affect the quality of the water such as detergents from washing cars, or other forms of pollution/chemicals that enter into the stream either directly or from groundwater seepage.

   Golf courses put a lot of stress on a stream. The herbicides and fertilizers applied to them eventually find their way into a stream. Herbicides decrease the productivity of the water, while fertilizers add excess nutrients resulting in algae blooms.

   Golf courses are also manicured, usually right up to the edge of the stream. By removing this vegetation, valuable habitat for both aquatic and terrestrial organisms is lost.

Name: _____

Winter Twig Identification & Collection Activity

Part 1

Collect 10 twigs of different deciduous tree species. A list is provided of 14 very common tree species found in Ontario. Collect from this list, and/or, collect any species not on the list. Label each twig with its appropriate common name. Masking tape works well. Write the name of the tree species on the tape (about 10 cm) and then wrap the tape around the twig. If you have a shoe box, this is a great way to store them.

All twigs must be alive and at least 15 cm long. Do not remove the top liter of a tree. Twigs should be removed using a pair of snips or scissors. Do not break twigs off the tree. Once you have collected your individual twigs, enter the name of the twig, its scientific name, and its value to wildlife in the table provided. A sample tree species has been provided for you.

Fourteen Common Tree Species Found in Ontario (and at Camp Samac)

sugar maple	white ash
red oak	ironwood
white elm	trembling aspen
basswood	large-tooth aspen
American beech	balsam poplar
black cherry	willow
white birch	yellow birch

Trees Species:	**Scientific Name:**
shagbark hickory	*Carya ovata*
Value to Wildlife: The sweet nuts are a favourite food of squirrels, chipmunks, and black bears.	

Identifying Deciduous Trees

To learn to identify deciduous trees, it starts with the arrangement of the leaf, twig, and buds. This is the primary distinction of the most common tree species. You can eliminate major types of trees just by observing the tree's leaf, twig, and bud arrangement. Ideally, the twig is the most reliable and accurate method for identifying a deciduous tree. It remains consistent in appearance throughout the tree's life. When identifying deciduous trees in the winter, the terminal bud is the key to accurate identification.

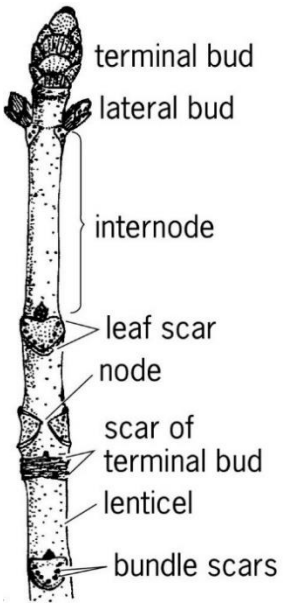
All deciduous trees and shrubs have either opposite or alternate arrangement with their leaves, twigs, and buds:

- Opposite arrangement occurs when the leaves, twigs, and lateral buds grow off a main branch in pairs opposite to each other.

  * *All maples, ashes, dogwoods, and Viburnum sp. have opposite arrangement.*

- Alternate arrangement occurs when the leaves, twigs, and lateral buds typically have an alternate placement along the stem.

  * *All other deciduous tree species have alternate arrangement.*



Twig Identification Sheet

Name: _____

Part 2.

1.Tree Species:	**Scientific Name:**
Value to Wildlife:	
2. Tree Species:	**Scientific Name:**
Value to Wildlife:	
3. Tree Species:	**Scientific Name:**
Value to Wildlife:	
4. Tree Species:	**Scientific Name:**
Value to Wildlife:	
5. Tree Species:	**Scientific Name:**
Value to Wildlife:	

6. Tree Species:	**Scientific Name:**
Value to Wildlife:	
7. Tree Species:	
Value to Wildlife:	
8.Tree Species:	**Scientific Name:**
Value to Wildlife:	
9. Tree Species:	**Scientific Name:**
Value to Wildlife:	
10. Tree Species:	**Scientific Name:**
Value to Wildlife:	

Part 3. Monetary Value of Trees

The market value of a hardwood species refers to the price a buyer is willing to pay for timber at a specific point in time, after it has been harvested and milled. Prices vary according to length, width, color matching, grain pattern of the board, availability, and amount sold.

The standing value of a hardwood species, is the estimated monetary worth of trees while they are still growing in the forest, before they have been harvested. It represents the price a landowner might receive in a timber sale. This value is not typically fixed; it is determined by the species' market demand, tree quality, size, and location.

Here, you will calculate how much money you could get by harvesting and selling the trees which are large enough to be legally sold. Calculate the standing value of each tree by multiplying the number of board feet by the standing value per board foot. These values only represent *one* tree, not the total trees in the woodlot.

Tree Species	Number of Board Feet	Market Value Per Board Foot	Standing Value Per Board Foot	Standing Value of Tree
sugar maple	560	$9.00	90¢	
black cherry	480	$9.80	98¢	
yellow birch	500	$8.00	80¢	
white ash	640	$5.50	55¢	
red oak	600	$3.00	30¢	
basswood	720	$8.00	80¢	
white birch	530	$6.00	60¢	
poplar sp.	840	$4.00	40¢	

Total Value of Marketable Trees: _____

Part 4. Effects of Harvesting on Plant & Animal Communities

Here, you will research and give one (1) reason how the following species may be affected by the harvesting.

Name of Organism	How Harvesting Affects It
gray squirrel	
white trillium	
white-tailed deer	
sapling sugar maple trees	
northern flying squirrel	
Ruffed Grouse	
poison ivy	
eastern red-backed salamander	

Part 5. Answer the following questions:

1. Name two (2) positive and two (2) negative changes that might happen to the harvesting of the woodlot.

Positive	Negative

2. Name two (2) recreational opportunities that might be affected for future generations by the harvesting of trees.

- _____
- _____

3. All the white ash, basswood, red oak, and hard maple can be legally harvested. What are two (2) possible consequences of harvesting *all* of these trees?

- _____
- _____

4. The market value of black cherry is more than two times that of poplar, however, poplar is the number one harvested hardwood tree in Ontario, and therefore the most valuable. Why do you think this is so?

_____

_____

_____

Answers: Part 2

1. sugar maple	***Acer saccharum***
The seeds, buds, and twigs feed deer, squirrels, and birds; squirrels use it a s a nesting site.	
2. red oak	***Quercus rubra***
The high-fat acorns are vital winter food for deer, bears, turkeys, and squirrels; the tree provides shelter, and nesting sites for hundreds of bird species.	
3. white elm	***Ulmus americana***
Provides nesting sites, particularly for the Baltimore Oriole, food for birds, small mammals, and numerous insects.	
4. basswood	***Tilia americana***
Provides edible seeds/buds for small mammals and birds, and browse (twigs/leaves) for deer; their tendency to form cavities also offers vital shelter and nesting sites for birds and raccoons.	
5. American beech	***Fagus grandifolia***
Crucial for its high fat and protein-rich nuts beechnuts**,** a staple food for black bears, squirrels, turkeys, and various birds; also hosts provides nesting cavities for mammals and birds.	
6. black cherry	***Prunus serotina***
Offers vital summer fruit for birds and bears; its structure provides nesting cover for hundreds of insects, birds, and mammals.	
7. white birch	***Betula papyrifera***
Its seeds, buds, and catkins feed birds (Ruffed Grouse) and small mammals, while moose, deer, and beavers browse its twigs.	
8. white ash	***Fraxinus americana***
Seeds provide food for birds and mammals, twigs provide browse for deer, and essential nesting cavities in mature trees.	
9. ironwood	***Ostrya virginiana***
Offers a winter food source (buds, catkins, nutlets) for Ruffed Grouse, turkeys, squirrels, and finches, while providing dense shelter and nesting sites.	
10. trembling aspen	***Populus tremuloides***
Offers high-quality forage (leaves, twigs, bark, buds) for deer, elk, moose, beaver, and grouse, while providing essential nesting sites, cover, and cavity homes for birds and small mammals.	
11. large-tooth aspen	***Populus grandidentata***
Offers year-round food, shelter, and nesting sites, particularly supporting Ruffed Grouse, beaver, moose, and deer; its bark, buds, twigs, and leaves are heavily browsed.	
12. balsam poplar	***Populus balsamifera***
The buds really stink so they are not usually eaten; beavers use the wood for dams; it helps stabilize riverbanks when growing in moist areas creating healthy aquatic edge habitats.	
13. willow	***Salix* sp.**
Deer, elk, moose, rabbits will feed on the buds/twigs; they are host plants for hundreds of moth and butterfly species.	
14. yellow birch	***Betula alleghaniensis***
Its seeds sustain birds like siskins and redpolls, while buds feed Ruffed Grouse, and twigs support deer, moose, and hares.	

Part 3: Monetary Value of Trees

Tree Species	Number of Board Feet	Market Value Per Board Foot	Standing Value Per Board Foot	Standing Value of Tree
sugar maple	560	$9.00	90¢	*$540*
black cherry	480	$9.80	98¢	*$470.40*
yellow birch	500	$8.00	80¢	*$400*
white ash	640	$5.50	55¢	*$352*
red oak	600	$3.00	30¢	*$180*
basswood	720	$8.00	80¢	*$576*
white birch	530	$6.00	60¢	*$318*
poplar sp.	840	$4.00	40¢	*$336*

Total Value of Marketable Trees: $ **3172.40**

Part 4: Effects of Harvesting on Plant & Animal Communities

Here, you will research and give one (1) reason how the following species may be affected by the harvesting.

Name of Organism	How Harvesting Affects It
gray squirrel	*decreases food supply and nesting sites*
white trillium	*reduces shade (required for growth) and moisture content of soil*
white-tailed deer	*decreases food supply and over-wintering places*
sapling sugar maple trees	*increases erosion; reduces shade (required for growth)*
northern flying squirrel	*removes trees that are necessary for gliding between*
Ruffed Grouse	*loss of cover for protection from predators and reduced food supply*
poison ivy	*it doesn't affect it at all; it actually benefits from it*
eastern red-backed salamander	*Increased sunlight and wind, which drastically alters the moisture levels and temperature. Since red-backed salamanders must remain moist to facilitate gas exchange through their skin, these changes can lead to suffocation or dehydration.*

Part 5: Answer the following questions:

1. List in chart form, the positive and negative changes that might happen to the harvesting of the woodlot.

Positive	Negative
source of income	*increased soil erosion*
new growth of plants	*loss of habitat*
new animal species	*decrease recreational activities*

2. Name two (2) recreational opportunities that might be affected for future generations by the harvesting of trees.

   - *reduced bird-watching*
   - *destruction of ski trails*
   - *destruction of hiking trails*
   - *loss of good camping spots*

3. All the white ash, basswood, red oak, and hard maple can be legally harvested. What are the possible consequences of harvesting *all* of these trees?

   - *no income for several years*
   - *substantial loss of habitat*

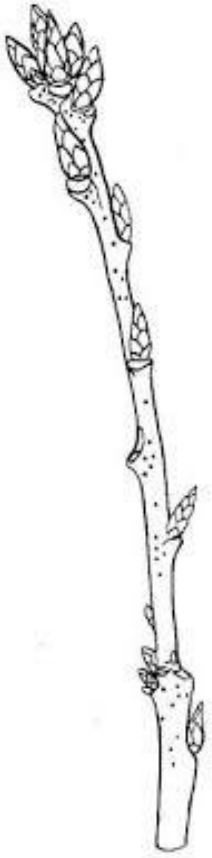
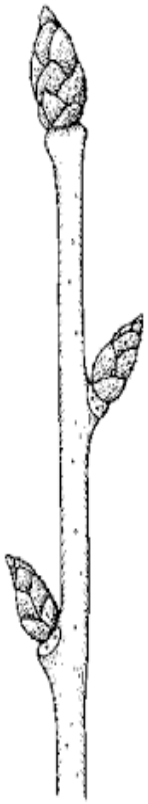
4. The market value of black cherry is two times that of poplar, however, poplar is the number one harvested hardwood tree in Ontario, and therefore the most valuable. Why do you think this is so?

   Large stands of black cherry are not common and the wood is very expensive to mill because the wood is very hard. Also, black cheery trees grow slowly. Large stands of poplar are very common and the wood is very cheap to mill because it is one of the "softest" hardwoods. Also, poplar trees grow quickly.

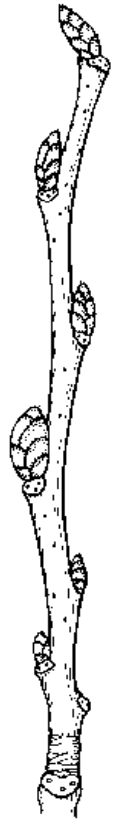
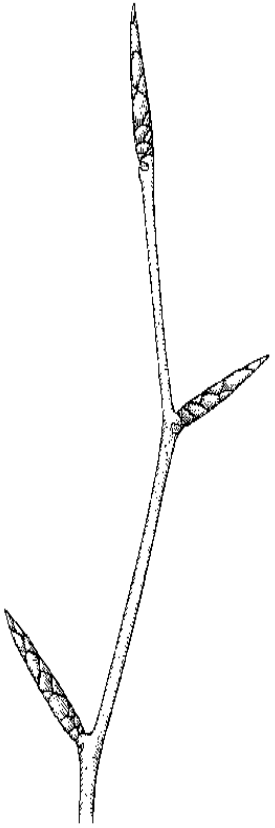
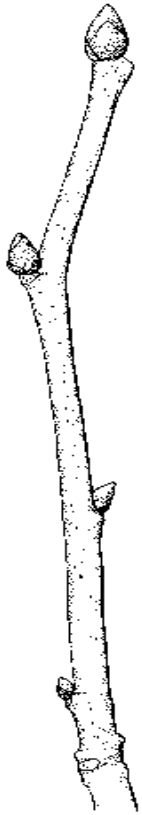
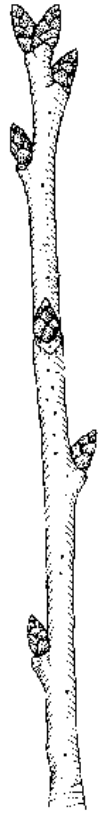
Winter Twig Identification

balsam poplar	**large-tooth aspen**
	
Twig: medium diameter, red-brown Bud: pointed, sticky, **really smells when you squish it between your fingers**	Twig: moderately stout, brownish gray Bud: pointed, **covered with a grayish down**

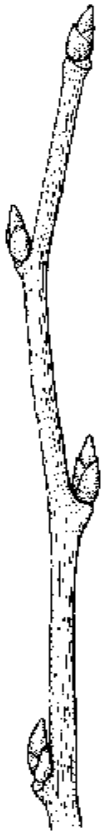
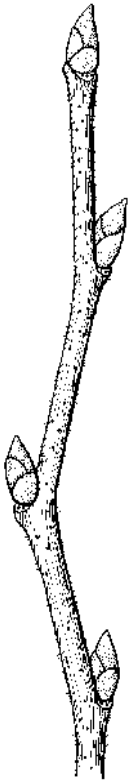
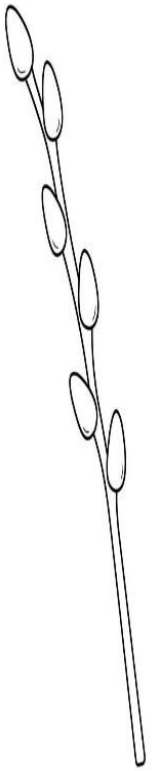
Winter Twig Identification

sugar maple	red oak	ironwood	white ash
			
Twig: slender, smooth, shiny, red-brown Bud: sharp-pointed	Twig: moderately stout, reddish-brown Bud: **clustered terminal buds**	Twig: brown, slender, **very fine appearance**. Bud: wider than twig and **sits on a 45° angle from the twig**	Twig: **very stout**, dark, blue-gray. Bud: **lateral buds tight to the terminal bud**

Winter Twig Identification

white elm	American beech	basswood	black cherry
			
Twig: slender, brownish, **almost always has a zigzag pattern.** Bud: **terminal bud is always crooked (45°)**	Twig: slender, **slightly zigzag** Bud: brown, long, slender, **pointed, with many scales in 4 rows, with a gray tip.**	Twig: stout, reddish, covered with grayish skin Bud: reddish-brown, plump, and **edible (tastes like raw, green peas)**	Twig: **smells and tastes awful** (scrape your thumbnail to remove some bark) Bud: very small, rounded

Winter Twig Identification

white birch	yellow birch	willow	trembling aspen
			
Twig: dull brown, slender, new growth is hairy, **bitter taste**. Bud: appears waxy or gummy, sticky	Twig: thin, mild, **sweet wintergreen smell** released when the twig is scraped or broken Bud: pointy, brownish	Twig: vivid green, brown, black, slender, **very flexible**. Bud: **one bud scale**	Twig: slender, red-brown, **shiny** Bud: **sharp, pointed, shiny**