

4-H Ontario Leader's Guide



**What can you do
to improve your
watershed?**

We want to hear your realistic
solution to a local environmental
concern.

**You can make it happen.
We can help.**

This workbook belongs to:

Name: _____

4-H Club: _____

Date: _____

<http://www.4-hontario.ca/>
www.CaringForOurWatersheds.com



Nutrien™

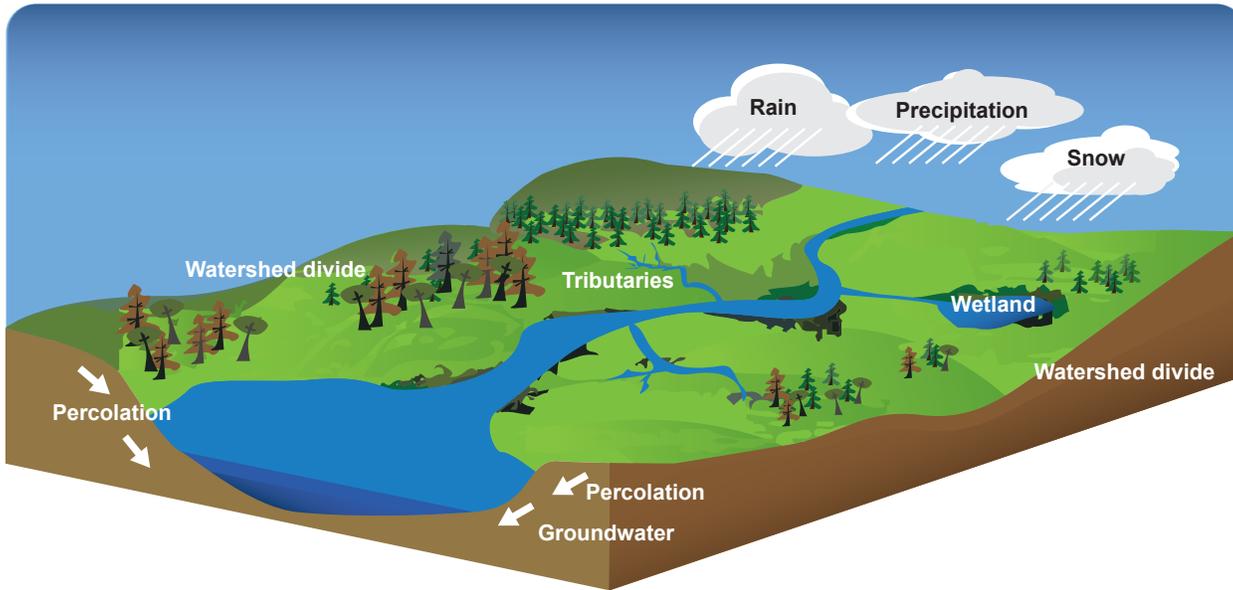
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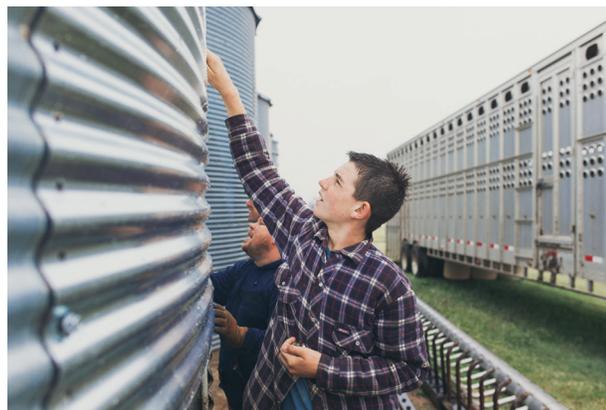
What is a watershed?

A watershed is all of the land that drains to the same location or body of water. People tend to think only of water bodies such as rivers, lakes and wetlands as being part of their watershed. However any upland whether it be a park, field, or even a parking lot, is also included.

Watersheds know no borders and whether national or international they are key to a healthy environment.



We all live in a watershed. Our actions impact our land, air and water. Farmers and ranchers are some of the best environmentalists in the world, working hard to ensure future generations are sustainable. The key to sustainability is implementing best management practices, innovating, learning and doing the right thing.



Overview

Taking care of our world requires more than simply talking about it. It calls for stewardship and a lighter footprint. Ontario 4-H has a long tradition of helping youth develop life skills tied to the four H's (Head, Heart, Health and Hands). As a result, Nutrien and 4-H are teaming up on an environmental contest for Grades 7-9 students called, "Caring for our Watersheds."

Caring for our Watersheds asks members to answer the question, "**What can you do to improve your watershed?**" Either individually or as a team, participants must research their local watershed, identify an environmental concern and come up with one realistic solution.

The goal of this guide is to provide 4-H leaders with a suite of tools designed to help incorporate concepts around local and provincial watershed health into their club activities. In keeping with 4-H traditions, all activities are designed to help build knowledge and key life skills while helping youth learn about local environmental issues. Members do not have to participate in the CFW contest to still complete the 4-H Caring for our Watersheds experience.

Benefits of Caring for our Watersheds to 4-H

To Members

- Develop independence, self-confidence, and responsibility
- Develop problem solving, decision making and goal setting skills
- Develop leadership and life skills
- Develop communication and public speaking skills
- Learn the value of community service
- Make a difference to themselves, their school, community and world
- Possibility of gaining high school credits
- Taking ownership of their projects by incorporating their own interests and ideas
- Hands-on, real-life, practical projects that will enhance your local watershed
- Prize money to implement 4-H member projects within your local club/area (if participating in Caring For Our Watersheds contest)

To Staff Leaders

- Learn more about local environmental issues
- Create a partnership with members by working and learning together on projects
- Less planning time required as 4-H resources are very well developed and inclusive
- Assist with developing relationships and leadership opportunities for members especially in cross graded programs
- Opportunity to work with multi-age members
- No formal grading or marking

To Schools

- Can become the option program
- Can be offered/scheduled in a variety of ways that suit each school
- Can be set up as a cross-curricular graded program
- Aspects of the 4-H program enhance curriculum outcomes
- Offers a creative way for members to develop leadership, life skills, responsibility, decision making and a variety of other skills

To the Community

- Brings school and community together
- Develops skills in youth that will later assist in the community
- Provides volunteer opportunities for community members to work with youth



Tasks and Deliverables

To successfully complete this project, 4-H club members are required to:

- Complete project records and have them signed by the club or project leader.
- Attend a minimum of 70% of club activities.
- Complete a final report that is:
 - prepared by the member
 - presented by the member in front of a group
 - at least three minutes in length
- Be involved in a club activity that is a benefit to your community.
- Participate in the club's achievement event. This could be Caring for our Watersheds or another community event.
- Above all - have fun!

Learning Objectives

Instilling environmental awareness and stewardship among the next generation to improve the quality of the watersheds within our communities.

Through this project, members will:

- Gain knowledge about watersheds, the environment and hydrologic cycles.
- Develop an interest and understanding of environmental sciences and sustainable practices and technologies.
- Develop research and writing skills
- Develop leadership and team-building skills
- Improve communication/public speaking skills
- Gain project management experience
- Achieve personal reward for having done something positive for the environment and your club.
- Building stronger relationships with other club members and your local community.
- Encouraging others to participate in the project.



Contest

Are you in Grades 7-9? Enter Nutrien's Caring for our Watersheds (CFW) environmental contest for a chance to win cash for your ideas and cash for your 4-H club!

CFW asks youth to submit a proposal that answers the question, "What can you do to improve your watershed?" Teams research their local watershed, identify an environmental concern and come up with one realistic solution. Across Ontario nearly \$10,000 will be awarded to students and schools or clubs who participate.

Club Prize - For every 10 entries win \$100 cash (based on the first 500 entries) and all finalists will win matching cash awards for their club. This means that if your 4-H team finishes in first place the team wins \$1000 and the club wins \$1,000. Plus, there is still money to implement the idea!

To qualify, a club must register online at www.CaringForOurWatersheds.com. All club members must select their club when they enter the contest.

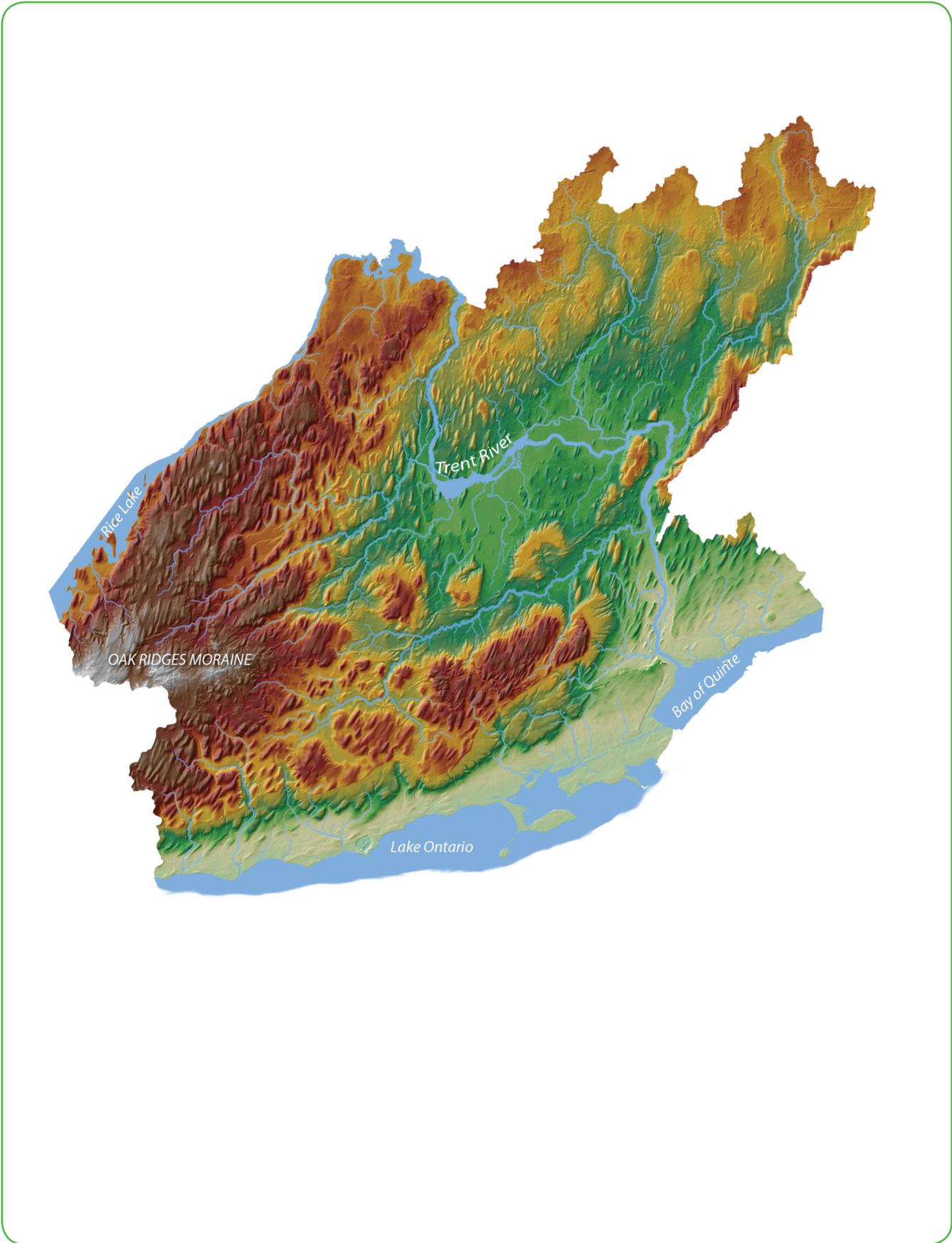


4-H Leader Time Commitment

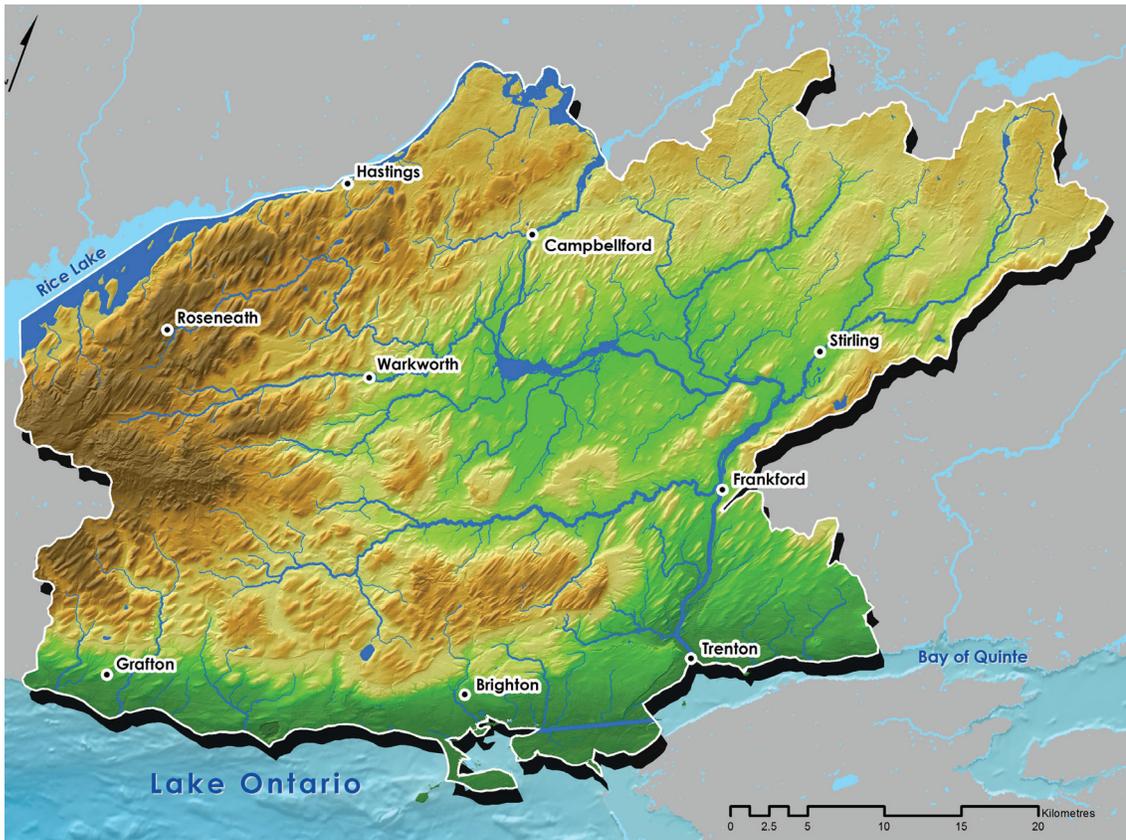
- **This contest can be a 4-H club activity**
4-H member's success directly relates to leaders assigning the contest and assisting members with their work. Giving members sufficient time to complete the contest assignment is more effective in producing quality projects.
- **Attend leader training (if applicable)**
- **Discuss and assign the contest**
 - 30 minutes
- **Assist members with ideas**
 - time commitment will vary depending on level of interest of members and leader
- **Remind members about contest entry deadline**
 - initially every other week – 10 minutes times six weeks
 - every week one month prior to deadline – 10 minutes times four weeks
- **Students may want to give a classroom presentation (optional)**
 - 5 minute time limit per presentation
- **If your member is selected as a finalist, help prepare them for their verbal presentation**
 - 2-4 hours
- **If your member is selected as a finalist, attend verbal competition and awards presentation**
 - 4 hours



Lower Trent Watershed Map



Lower Trent Watershed Terrain Map



Your Watershed Facts: Lower Trent Watershed



How big is your watershed?

The Lower Trent Conservation watershed region includes the furthest downstream section of the Trent River watershed and is divided into 12 watershed groupings encompassing approximately 2,121 square kilometres. The watershed region also includes a number of smaller watercourses that flow directly into Lake Ontario and the Bay of Quinte.

How many people live in it?

Approximately 75,000 people call the Lower Trent watershed home.

What are the main sources of water? i.e. rivers, lakes, aquifers, rainwater, glaciers.

Water in the Lower Trent watershed region originates from rivers, lakes, aquifers and rainwater.

What are the names of the major bodies of water?

Some of the major water bodies of water within the Lower Trent Watershed are Rice Lake, Trent River, Bay of Quinte and Lake Ontario.

Describe the land. i.e. desert, rocky, mountains, prairies, hills, forests, swamps, wetlands.

The Lower Trent Watershed encompasses a wide variety of ecosystems, including mixed forests, wetlands and remnants of tall grass prairies and savanna. The Oak Ridges Moraine is the most distinctive landform in the region, formed during the last ice age. The Oak Ridges Moraine is important for groundwater recharge and has been referred to as the rain barrel of southern Ontario.

What are the largest towns/cities?

The largest city is Trenton. Other sizable towns are Hastings, Campbellford, Warkworth and Brighton.

continued on next page



Your Watershed Facts: **Lower Trent Watershed**

Where does the water in your watershed come from? Where does it flow to?

The Trent River Watershed contains all of the land drained by the Trent River and is the largest watershed located entirely in southern Ontario, with its headwaters beginning in Algonquin Provincial Park. Water from over 200 lakes in the Haliburton Highlands flows through the Kawartha Lakes, down the Otonabee River and into Rice Lake. From there, the Trent River makes its way to the Bay of Quinte at Trenton. The Trent River system drains more than 12,000 square kilometres of central Ontario.

What are some of the main businesses in your watershed? i.e. Agriculture, Manufacturing, Oil and Gas, Recreation and Tourism.

The primary industries within the Lower Trent Watershed are agriculture, manufacturing, and recreation and tourism.



Did you know?

Ontario contains approximately one-fifth of the world's fresh water in more than 250,000 lakes across the province.



Project Examples

Stumped about what project to tackle? Here are some suggested topics to get you started:

- Shoreline cleanup of a river or lake in your watershed
- Reducing water consumption in your watershed
- Planting trees and wetland plants to improve riparian health
- Removing invasive plants (such as Dog Strangling Vine) in your watershed.
- Trail project highlighting the importance of water and watersheds in your community.
- Working with local farmers to prevent manure run-off or shoreline trampling by livestock.
- Composting program to reduce organic waste and improve soil health.

Need more inspiration? Here are some real project examples submitted by 4-H members just like you!

Green is Great

Sierra Harty, from Erle River High School, won first place at the Caring For Our Watersheds (CFW) Grade 7-9 Division.

Sierra had noticed the deterioration of the riverbanks leading to the water at popular canoe entry sites along the Milk River. After consulting with the County of Warner, she determined that a pathway made up of crushed gravel and highlighted by signs would direct the flow of recreational users to stay on the path.

Sierra created three trail signs, and worked with the County of Warner and Milk River Watershed Council of Canada (MRWCC) to develop key messages for each of the trail signs. Sierra also worked on the trail sign site logistics for relevant placements on the path.

The crushed gravel pathway, as well as the strategic placement of the signs that Sierra created, helped to direct the flow of traffic in and out of the river at two high traffic spots: Poverty Rock and Coffin Bridge. By keeping the recreationists stay on the path, it helps minimize the deterioration of the river banks.



Protecting Alberta's Cottonwoods

4-H member **Jalen Hulit** from Erle River High was in the finals for the Grade 7 -9 Division of Caring for our Watershed (CFW). Jalen had observed that cattle grazing and drinking along the banks of the Milk River were causing erosion of the riverbank. Jalen's project idea to improve the health of his local watershed was to wrap wire around the base of 50 young cottonwood seedlings to protect them from being trampled or browsed by livestock and people. This would help control erosion and improve the riparian health along the banks of the Milk River, as well as make the banks of the river stronger, thereby reducing erosion in vulnerable areas. About 30 cottonwood trees were wrapped. Jalen plans to continue wrapping trees and seedlings as needed to ensure the long term health of the cottonwoods and riparian areas along the river.



Construction material was donated by Alberta Conservation Association (ACA). Milk River Watershed Council of Canada (MRWCC) assisted in the implementation, as well as many volunteers to help in wrapping the cottonwood trees.

Riffle Crossing for Cattle

Growing up on a cattle farm, situated in a valley with a creek meandering through it, **Kendra Elliott** is familiar with the idea of livestock crossing through the water. With this, also comes the knowledge of the controversy surrounding the concept of farm animals being allowed in waterways. She proposed a structure called a Riffle crossing that is "positive for the environment, the farmers, and the animals".

Riffles are naturally occurring structures that are created when various rocks, stones, and gravel are present on the bed of a short section of shallow stream. By allowing livestock to cross over it, it becomes a riffle crossing. The rocky bed creates resistance, resulting in a lower velocity water flow, helping to reduce the severity of erosion and allowing sediment to settle. The tumbling of the water over the rough surface also increases the turbulence, aerating the water, resulting in a healthier aquatic environment.



A student at Virden Collegiate, Kendra won first place at the Manitoba Caring for Watersheds Competition. Her extensive knowledge on the topic of riffle crossings, as well as her excellent presentation skills, were instrumental in helping her win the CFW contest. With funding from Nutrien, Kendra was able to start implementing her project. Working with the West Souris River Conservation District, a plan was established to install a riffle crossing near Cromer, Manitoba. The Conservation District provided the work in kind and the materials and equipment needed was provided through a generous grant of \$8,000 made possible by Nutrien.

"This riffle crossing will help improve the health of the Pipestone Creek, downstream to Oak Lake. This beautiful valley and creek is where I've grown up – it is home. Hopefully projects like these will help maintain that natural appeal for many future generations to come. Even the riffle crossing adds aesthetic value. The easiest way to explain it is that it's a happy place - watching and listening as the water tumbles over the rocks. It makes me proud to know that I was involved in making this happen."



Project Activities

The following activities are designed to meet 4-H project learning objectives, while encouraging students to discover more about their watershed in a fun and interactive way. All activities can be modified for different age groups and can be completed individually or as part of a larger club activity.

Project 1: Get To Know Your Watershed: A Geocaching Activity

Activity Overview

The goal of the Get to Know Your Watershed activity is to encourage students to learn more about their local watershed and use geocaching to explore the importance of clean and safe water. Members will research their local watershed and work towards developing stories or information pamphlets about their watershed, and will also create items known as “trinkets” or “treasure” that will be used to build geocaches.

After creating their information pamphlets and items, members will then strategically hide these geocaches for the geocaching community to discover. This will allow them to share their watershed stories and help educate others about watersheds in a fun and engaging way.



Description of Activity

Geocaching is an outdoor activity that is similar to a scavenger hunt. The goal of the activity is to find hidden containers known as caches or geocaches using a handheld satellite navigation device called a Global Positioning System (GPS) receiver. Individuals who take part in this activity (generally referred to as cachers or geocachers) place a cache in an outdoor location and post the cache’s latitudinal and longitudinal coordinates on the Internet. Other geocachers then use their GPS devices to download the coordinates and cache descriptions from the Internet in order to find the caches. Once the participant has found the cache, they may log their findings on the Internet.

There are several different types of caches. Physical caches typically consist of a sturdy, weatherproof box with a logbook, pencil, and trade items (small objects left in the caches for geocachers to trade with one another – e.g. toys, key chains, etc.) left inside the box. Another type of cache is an earth cache, which highlights an area’s unique natural features. More information regarding different types of caches and geocaching in general can be found at:

- www.geocaching.com
- www.earthcache.org
- www.geocaching-qc.com (Available in French Only)



Project Checklist

This activity can be completed individually or in small groups. If working in a group, make sure that each team member has the opportunity to practice using the GPS device.



- Find out what watershed you live in. You can use the internet to do a search. A good website for this exercise is: www.ltc.on.ca
- Once you have determined what watershed you live in, spend an hour or two researching your watershed. How big is it? What are the major rivers or lakes located in it? Are there any special plants or animals found within watershed boundaries? Record your information, as you will use it to help you tell your watershed story.
- Using your research, create an educational information pamphlet that tells the story of your watershed. What would you like other people reading it to know about it? You can use drawings to help illustrate your pamphlets if you wish.
- Create a trinket that will be placed inside your geocaching box, if you plan to use them. You can also use a purchased item that you feel represents your watershed. What items you place in the cache are entirely up to you, so be creative!
- Global Positioning System (GPS) receiver such as Garmin (1 per group). If you cannot obtain a GPS, you can also download a free GPS app for a smartphone at: www.viewranger.com/en-gb
- Sturdy waterproof container to use as your geocache box. Tupperware containers with tight-fitting lids work well.
- Place your information pamphlet, trinkets, logbook and pencil, as well as any other items you feel should be included inside your cache.



Research Questions

Here are a few questions to help guide you in your watershed research. Remember that your goal is to share your knowledge about your watershed with others. Not everyone may know what a watershed is, so you might want to start off by learning some watershed basics.

- What is a watershed? Are there any other terms used to describe watersheds? Hint: watersheds can also be referred to as river basins.
- Why are watersheds important to human health and to the health of natural ecosystems?
- What are the main uses of water in your watershed? For example: agriculture, hydroelectric power generation, recreation.
- What are some of the challenges that your watershed is facing? For example: drought or flooding.
- Draw a map or a picture of your watershed. This is a great way of helping people understand the size and scale of your watershed.

Stashing Your Cache

There are a number of rules that you will need to follow when deciding where to place your geocaches. It is important to consider their placement very carefully, in order to ensure that all caches are places in a location that is safe for members and the general public to access and does not disturb any sensitive wildlife habitat.

Geocaching.com offers an excellent introduction to hiding your first geocache. It is available online at: www.geocaching.com/about/hiding.aspx

Once you have placed your geocaches, you will need to record their location using your GPS device. Your next steps are to register your caches on www.geocaching.com so that other geocachers will know where to look for them. Follow all the steps outlined on the [geocaching.com](http://www.geocaching.com) website and enter all your information. Then make your geocaches “live”! Be sure to check back and see who has found your caches.

References: www.pc.gc.ca/docs/pc/guide/geocache/geocache1.aspx

Note: Geocachers are also encouraged to visit the Leave no Trace website at <http://www.leavenotrace.ca>. This website offers helpful principles for planning safe and environmentally respectful outdoor recreation activities.



Project 2: Build a Nestbox

Activity Overview

This project encourages members to build nestboxes to attract wildlife to natural areas or farms, and to provide shelter and important nesting habitat for birds, bats and waterfowl. Members are encouraged to monitor the use of their nestboxes during the breeding season and will discover how to keep accurate records on each nestbox while learning about Alberta's birds and their habitat.

Members will learn more about managing wildlife and the balance of nature by researching the biology and habits of bluebirds, then building and installing nest boxes to attract the species. Adult assistance and supervision is recommended for this project, as it does involve the use of power tools and sharp implements.

Why nestboxes?

In the spring, some species of birds, such as robins, build an open nest, but others prefer to nest in hollow cavities in decayed trees or stumps. Cavity-dwelling birds, like wood ducks, chickadees, bluebirds and woodpeckers will substitute a nest box for a tree cavity. In many areas of Alberta, natural nest sites have disappeared as weakened or dying trees are removed from our landscape. Depending on other attributes in your landscape, providing an appropriately sized nest box may help attract some bird species to your yard. You can successfully attract birds by building an inexpensive, simple, six-sided box. Whatever the design or material used, the boxes must be strong, weatherproof, and securely fastened. Single-compartment nest boxes are the easiest to build and the most frequently used by birds. When you are building the box, be sure to allow easy access for cleaning and occasional observations. You can use the same basic box design for all species. Instructions on how to construct your nest box are listed below.



Tips to improve the nesting of these species:

Wood Ducks, Buffleheads and Mergansers prefer a nest box near (or standing in) water. The young leave the nest within 48 hours of hatching by climbing up from the floor to the entrance hole and tumbling to the ground. Horizontal sawcuts or a piece of hardware cloth stapled to the inside wall between the floor and the entrance are essential for these species.

Chickadees prefer their nest boxes to be located close to shrubs or bushes. They are very territorial and will not tolerate any other chickadees in the vicinity of their nest.

Mountain Bluebirds may attempt a second nesting during the breeding season and would benefit from the chance to lay their next clutch in a second box.

What type of wood should you use?

Cedar wood is recommended for use in this project because it is naturally resistant to insects and weather. But you can also use other materials such as pine or plywood to construct your nest boxes.



Project Checklist

To make one nest box, you will need the following supplies:

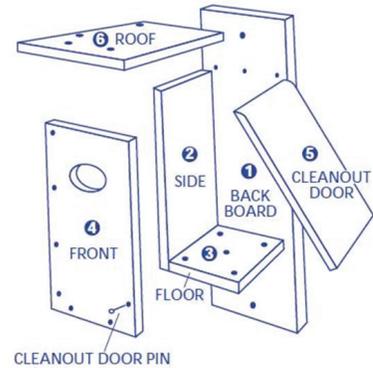
- ¼ sheet (2' x 4') ½" cedar lumber or outdoor grade plywood.
- 1" x 2" (0.75" x 1.75" finished) x 8' pine lumber (this is known as a furring strip).
- 20" x 22 ½" of 1/8" plastic mesh
- 30 to 40 1 and ¼" multipurpose drywall screws
- 5/16" staples
- 1 tube of acrylic caulking, such as Mono
- 1 quart of exterior latex paint

You will need the following tools to construct your nestbox:

- Table saw (should only be operated by a qualified adult)
- Caulking gun
- Power drill
- Phillips drill bit for drywall screws
- Staple gun
- Tape measure
- Paintbrush

Construction Procedure

1. Measure and cut plywood into three pieces: 26.5" x 24" 16.5" x 24" 5" x 24"
2. Measure and cut furring strip into one 24" and two 20 1/4" pieces.
3. Screw back to furring strips, caulking first. Start with 24" piece at top.
4. Staple the netting to inside surface of back, starting at the bottom. Be sure netting lies flat and does not pucker.
5. Screw front to furring strips, top piece first (don't forget to caulk along the edges). Leave 1/2" vent space between top and bottom front pieces.
6. Caulk around outside joints if needed to seal the roosting chamber.
7. Attach a 4" x 28" board to the top for a roof if desired.
8. Paint the exterior at least twice to ensure an even finish.
9. Depending on the species of waterfowl or birds in your area, you may also need to add wood shavings to the bottom of your nest box so that the birds have someplace soft to lay their eggs.



Where to Place Your Nestbox

Now that you've completed construction of your nest box, you need to consider where to install it. Be sure to place the box in a location that will be convenient for monitoring and annual maintenance.

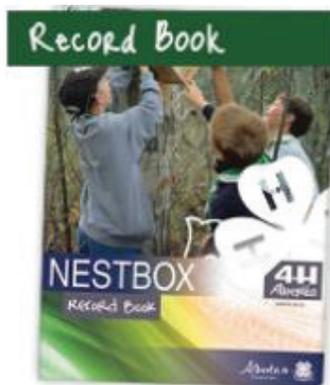
To increase the chances of your nest box being used by waterfowl, it should be located in an area that is attractive to cavity nesting ducks. You'll see these birds using wooded wetlands that contain water year round or, at least, throughout the summer. You'll also see them using trees along riverbanks and lake shorelines.

Nest box maintenance and monitoring

Once a cavity nesting bird starts using your box, you'll likely see many young waterfowl, known as broods, raised over the years. Nesting sites for these birds are limited in number. When they find a good nesting site, there is a very good chance they'll return in following years. When you put up a nest box you are committing yourself to maintaining that box. Fall and winter are the best times to remove old nesting material, tighten any loose screws and mounts, and add new wood shavings.

If you don't have any ducks using your box over the summer, don't worry. Waterfowl biologists have seen waterfowl migrating in the fall scope out potential nesting sites for next spring. This too is a good reason to keep your boxes in top condition. You never know when somebody might be popping in!

This information has been compiled from the Nest Box Guide for Waterfowl by Ducks Unlimited Canada (DUC) and the Canadian Wildlife Service, Environment Canada and is intended to complement the 4-H Nestbox Record Book.



Project 3: Make a Model Watershed

Activity Overview

Most watersheds are massive in size and scale. This activity is designed to help members learn more about how processes in their local watershed work through the construction of their own model watershed.

4-H members can work in teams to construct a model watershed.



Project Checklist

Each group of members will need the following items:

- A large bucket
- Different coloured felt markers.
- Food colouring (blue and green)
- Aluminum foil
- A watering can
- A spray bottle
- 4 Litres of water
- A shallow washbasin or dishpan. You can also use a disposable aluminum roasting pan.
- Small rocks (such as pea gravel), larger rocks, various sizes of wood, and/or boxes.
- Notepad and pen or pencil to record observations.



Next Steps

1. Take the washbasin and place the different sizes of rocks, wood, or boxes to create a mountain on one side of the basin-make sure that the materials are higher on one side of the basin than the other.
2. Cover the rocks with aluminum foil and push it down to secure it and create a miniature “landscape” in your washbasin. Make sure the edges of the foil remain inside the basin or else you will have a lot of water to clean up. Your model may look a bit lumpy, but don’t worry, that’s part of the fun!
3. Once you are happy with the placement of your foil, make different folds, rivers, ridges and valleys to give your “rainwater” a place to flow down different paths.
4. Use a blue marker to draw the lines of where you believe the main rivers will flow. You can also draw features such as rocks and trees onto your model to make it more realistic.
5. When you are satisfied with how your model looks, and your 4-H leader gives you the go-ahead to proceed, fill the spray bottle with water and add a few drops of blue food colouring to tint the water to represent rain. Fill the watering can with water, and add a few drops of green food colouring to represent the regular river flow. Have one person in your group spritz the water from the spray bottle over the model to make it “rain” over the landscape of your watershed, while another person pours “river water” from the highest point of your watershed.
6. Watch what happens when it rains. Where does the water go? Write down your observations.
7. Once each member has had a chance to observe what happens to the water in your watershed, remove the foil from the rocks, remove the rocks from the washbasin and empty the “rainwater” into a bucket.



Observations

- What happens when it begins to rain?
- How do streams form?
- Where do you notice streams forming?
- Where does the “rainwater” end up after the rainstorm?

Discussion

- What caused the water in your watershed to flow in a particular direction?
- What happened to your main river as other streams joined it?
- If this were a real watershed, where does your group think all the water would end up after a rainstorm?
- Try to make different watershed configurations and observe how the water flows.
- What do you think would happen if there was a flood in your watershed?

(Adapted from National Geographic water education modules)



Project 4: Watersheds and the Urban/Rural Interface

Activity Overview

Human uses and impacts on water quality and quantity differ in some significant ways in urban and agricultural areas, yet both share the same watershed. Understanding the urban/rural interface is important to understand how human activities from both urban and agricultural areas can have a multiplying effect on the environment. In this activity, youth will create a simulated watershed and observe how pollution from urban and agricultural areas mix.

Time Required

Approximately 20 minutes



Project Checklist

- One (1) roll of aluminum foil (18-inch width)
- One spray bottle per group
- Flip chart paper and writing implements
- A variety of different coloured water-soluble markers per group (at least two per group).

Before You Begin

- Cut a piece of aluminum foil for each group that measures approximately 18" x 18".
- Fill the spray bottles with water.
- Divide the youth into four groups of 3-4 individuals.
- Provide each group with 1-2 sheets of flip chart paper and writing implements.
- Provide each group with watercolour markers. Make sure each group has two different colours.

Opening Questions/Prompts

Ask the youth to share their answers to these questions either verbally or by recording their responses on the flip chart paper provided.

Explain what you know about different ways that water is used by humans who live in agricultural areas.

- a. Explain what you know about different ways that water is used by humans who live in urban areas.
- b. Discuss ways in which urban water use is similar to agricultural water use. Discuss ways they are different.
- c. Discuss the types of pollutants you think might be present in urban and agricultural areas. How do you think they might be similar? How do you think they might be different?

Procedure

1. Explain to the youth that the foil represents a large piece of land. Each square inch of the aluminum foil represents 10 square kilometers.
2. Instruct the groups to draw a line down the center of the foil using one of their markers.
3. Using one of the water color markers, draw pictures that depict an urban setting on one side of the piece of foil. Using the other water color marker, draw pictures that depict an agricultural setting on opposite side.
4. Have each group loosely crumple their piece of aluminum foil and then gently pull out all four corners of the square. This should return the foil to its approximate square shape, but still allow for the foil to have some "peaks and valleys" that represent different land forms.
5. Using a spray bottle to simulate rain, have the youth gently spray their foil. Spray water on the foil from a distance of approximately 10-12 inches above the foil. Spray the foil approximately 10 times consecutively to simulate a rain storm.
6. Instruct the youth to record their observations and make comparisons with other groups.



Sharing and Observing

Follow the lines of thinking developed by the youth as they share and compare their thoughts, observations, and procedures; if necessary, use more targeted questions or prompts to get to particular points. Specific questions might include:

1. Ask the youth to explain what happened when they sprayed their “land” with water.
2. Discuss the significance of the flow of water through their “land” with respect to the “urban” and “agricultural” areas they identified.
3. Discuss ways you think the movement of water across your land might impact the potential mixing of pollutants from urban and agricultural areas.

The goal is to have the youth develop concepts through their own exploration and define terms using their own words.

Adapted from 4-H There's No New Water Module 3



Project 5: Just Filter It: How does soil help filter water?

Activity Overview

4-H members will participate in a hands-on activity designed to illustrate the value of soil to filter, clean and store water. It is recommended that members are paired up in groups for this activity if possible, but it can also be completed individually. This activity will take approximately 45 minutes to 1 hour to complete.



Project Checklist

Per Team

- 2 funnels (cone-shaped paper cups could be used)
- Paper coffee filters (cut two 5cm squares of “fabric” from the filters)
- ½ cup each of dry, clean sand and dry soil (not potting soil)
- 4 cups in which the funnels will be placed
- 3 cups of water
- 3 cups of prepared Kool-Aid drink mix
- worksheet or notebook to record observations

Instructions

Step I – Creating the Filter System

1. Place the filter paper in the base of the funnel (if using cone-shaped paper cups, cut the tip off the cup), twist the paper through the funnel opening and having the paper also extend below the funnel (will help block the sand/soil).
2. Place the funnel in the cup (the cup will collect the liquid once poured)
3. Place ¼ cup of sand in one of the funnels and ¼ cup of soil in the other.

Step II – Creating the Plain Water Filter

1. Using the worksheet, record assumptions as to what will happen when the water is poured through each filter.
2. Measure two ½ cups of water.
3. At the same time, pour the water into each of the funnels.
4. Observe the speed of infiltration, noting any differences between the sand and the soil.
5. Once the water has seeped through the funnel, measure how much has been collected, noting any differences between the sand and the soil.
6. Update observations on worksheet.

Step III – Filtering Contaminants

1. Use the same materials (funnels/cups), removing the water from the cups.
2. Record assumptions as to what will happen when the grape drink is poured through each filter.
3. Measure two ½ cups of grape Kool-Aid drink mix.
4. At the same time, pour the grape drink mix into each of the funnels.
5. Note any differences in the colour of the liquid in the cup as well as the amount of time it takes to move through each filter.



Observations/Discussion

- Based on what you observed, can you think of some situations where a sandy soil would be ideal? Why is it not always ideal?
- What happens when the water is poured too quickly? What does this mean for a field? For a slope?
- For the Plain Water Filter: As you pour the water, which medium is faster?
- What is happening to the water initially when poured on the dry soil/sand?
- Are there any differences in the amount of water that is collected? (The sand should have more water seep through.)
- How can you tell that there is moisture in the soil? Is there any difference in the soil when it is dry?

Adapted from: Oregon Agriculture in the Classroom Foundation, Water Filtering & Soil.
www.aipc.oregonstate.edu

Project 6: Just Go With It!

Activity Overview

This fun and interactive water relay race will put 4-H members' skills to work, while also helping members learn about the value of water conservation. Divide the members up equally into two teams. This relay race will take about 30 to 60 minutes to complete, depending on the number of people taking part.



Project Checklist

- Two empty plastic or metal buckets
- Water
- Three sturdy place markers such as rocks or traffic cones that will not easily blow away
- A large field, park, or other suitable open space to play the game
- Three signs that read "Spin Cycle", "Shower", and "Leaky Faucet".
- A pair of dice
- Two ceramic coffee cups
- 2 plastic water bottles. Cut the neck of the bottles off and cut a small hole in the bottom of the bottle.
- A watch with a timer function. Or you can also use a cell phone with a timer.

Next Steps

1. Fill the two buckets with equal amounts of water. Then place the empty buckets at the far end of the playing field.
2. Take the three place markers and evenly space the markers between the two buckets and attach one of the signs to each of these stations. Place the cup with the hole at the station marked "shower". Place one of the ceramic cups inside each bucket of water.
3. Have each team roll the dice. Team members will go through the stations one at a time doing each activity the number of times they rolled on the dice. Once the player gets to the empty bucket, he or she will dump their water into the bucket and run back to hand the cup to the next person on their team.

How to Play

The objective of the water relay race is to get as much water as possible from the full bucket to the empty bucket at the other end of the playing area. Form two teams and have them line up behind one of the buckets of water. To increase the level of difficulty, enforce the rule that players are not allowed to cover the top of the cup they are using to transport water during the game. Decide how long you would like your game to last (for example 15 minutes) and choose one person to be the timer. Before the game begins, have each team member roll the dice and remember their number – this is how many times the player will need to complete the activity at each station.

Station 1: The Spin Cycle

At this station, you will need to spin in a circle just like a washing machine would. The higher the number you rolled on the dice, the more laundry you will do and the more you will spin around! For example if you rolled a five on the dice, you must spin around five times.

Station 2: The Shower

At this station, dump the water left in your cup into the cup with the hole in the bottom and then catch the water back in your original cup. Every pour represents a 10 minute shower. So, for example, if you roll a five on the dice, switch the water between the cups five times because you took a 50 minute shower.

Station 3: The Leaky Faucet

At this station you must hop on one foot for every 100 drops of water that gets wasted down the drain because of a leaky tap. So if you roll a five on the dice, you must hop on one foot 5 times because you lost 500 drops of water. After completing all three stations, place the water left in your cup into the empty bucket. Then run back to the start and pass the cup to the next team member. Have them fill it up and start the relay again, running through each of the three stations.





Observations/Discussions

At the end of the game, see which team managed to get the most water safely though the day and who managed to fill up the empty bucket. You may notice that the people who did less laundry, took shorter showers and had taps that leaked less also seemed to get more water to the end of the relay race! The same is true in real life. What other ways can your team think of to conserve water? See if you can make some small changes during your daily routine to help with water conservation at home.

Adapted from Go with the Flow, Conserve H2O- Ontario Ministry of Environment

Encourage members to **explore** their land and local area to **understand** the good, the bad and the ugly. If they have a **realistic idea** to make an improvement, **we can make it happen!**



Assessment Tool

After completing the activities outlined in the Student Workbook and accompanying Leader's Guide, members will be able to:

- ✓ Describe basic concepts such as watershed, aquifer, and basin
- ✓ Develop a general understanding of the interrelationships between land and water, as well as the role human activities play in watershed health in Ontario
- ✓ Describe the known industrial activities and potential environmental impacts taking place within their local watershed
- ✓ Develop the tools to examine the condition, and the reasons for that condition, of their local watershed
- ✓ Identify, research and investigate an issue of concern in their local watershed
- ✓ Assess a variety of positions on controversial issues
- ✓ Design and implement strategies to address community/regional/provincial problems or projects
- ✓ Compare ways of solving problems with other 4-H members
- ✓ Improve research and proposal writing skills
- ✓ Improve communication and public speaking skills
- ✓ Apply creative problem solving and innovative thought and actions, both independently and as part of a larger group
- ✓ Predict possible problems associated with choosing a particular solution or courses of action around the issue being investigated
- ✓ Plan and implement a course of action that addresses the problem, issue or inquiry initially identified, either independently or as part of a larger group
- ✓ Use a variety of media styles to effectively present information



Glossary of Terms

Aquatic Ecosystem

An aquatic area where living and non-living elements of the environment interact. This includes the physical, chemical, and biological processes and characteristics of rivers, lakes, and wetlands and the plants and animals associated with them.

Aquifer

An underground water-bearing formation that is capable of yielding water. Aquifers have specific rates of discharge and recharge. As a result, if groundwater is withdrawn faster than it can be recharged, the underground aquifer cannot sustain itself.

Basin

A basin is an area of land where surface water from rain and melting snow or ice converges to a single point, usually the exit of the basin, where the waters join another water body, such as a river, lake, reservoir, estuary, wetland, sea, or ocean. Other terms that are used to describe a drainage basin are watershed, catchment, catchment area, catchment basin, drainage area and river basin.

Biodiversity

A measure of the number and variety of different species found in an ecosystem. Biodiversity can also refer to the genetic variation within species, as well as the diversity of global ecosystems.

Biome

Natural region characterized by major communities of plants and animals with similar requirements or environmental conditions. Examples include the Boreal Forest and Rocky Mountains.

Bog

A wetland characterized by peat deposits, acidic water, and extensive surface mats of sphagnum moss. Bogs receive their water from precipitation rather than from runoff, groundwater, or streams, which decreases the availability of nutrients needed for plant growth. A bog is also referred to as muskeg or peatland.

Community

A collection of all living and non-living organisms in an ecosystem, including plants, animals, fungi and bacteria.

Confluence

A confluence is the meeting of two or more water bodies, and refers either to the point where a tributary joins a larger river, or where tidal or other non-riverine bodies of water meet.

Coniferous

Cone-bearing trees, such as pines, spruces, firs; which are usually evergreen. Notable exceptions include tamarack and larch.

Deciduous

Broad-leafed trees, such as aspen and maple, which shed their leaves every autumn.

Fen

A wetland characterized by slow internal drainage from groundwater movement and seepage from upslope sources. Fens are characterized by peat accumulation, but due to the seepage of nutrient-rich water, fens are typically less acidic and more nutrient-rich than bogs.

Groundwater

All water under the surface of the ground whether in liquid or solid state. It originates from rainfall or snowmelt that penetrates the layer of soil just below the surface. For groundwater to be a recoverable resource, it must exist in an aquifer. Groundwater can be found in practically every area of the province, but aquifer depths, yields, and water quality vary.

Glossary of Terms

Headwaters

The source and upper tributaries of a river or stream.

Hydrologic Cycle

The process by which water evaporates from oceans and other bodies of water, accumulates as water vapor in clouds, and returns to oceans and other bodies of water as rain and snow or as runoff from this precipitation or groundwater.

Invertebrate

An animal that lacks a backbone. Examples include arthropods, insects and sponges.

Marsh

A type of non-stagnant, shallow wetland which usually remain covered with water year-round.

Natural Region

A natural region is a large ecological unit that combines similar climate, topography, geology, vegetation and wildlife.

Non-native Species

Exotic species not native to a particular region; many alien species are invasive and out-compete native wildlife or plants. Examples of alien species include purple loosestrife, zebra mussels and dandelion.

Peatlands

Are wetlands with at least 40 cm of peat. Peat is made up of partially decomposed plant remains – usually from mosses and grass-like plants called sedges. Peatlands provide several ecosystem functions such as water quality improvement, water storage, runoff and stream flow regulation, and habitat for many wildlife species.

Riparian Zone

Riparian zones are those areas that surround water bodies in the watershed and are characterized by moist soils, water-loving plant species and their associated ecosystems. Riparian zones act as important protective buffers for many species of animals and fish.

Reservoir

A large natural or artificial lake used as a source of water supply.

Swamp

A type of flooded wetland characterized by standing trees.

Surface Runoff

Surface runoff is water, from rain, snowmelt, or other sources, that flows over the land surface, and is a major component of the water cycle.

Surface Water

Natural water that has not penetrated much below the surface of the ground. This includes rainwater, groundwater and spring water.

Sub-basin

Refers to a smaller basin, or watershed, within a larger basin.

Tributary

A stream or river which feeds into a larger river or lake.

Watershed

A watershed (or basin) is the area of land that catches snow and rain and drains it to a larger body of water, such as a marsh, lake, stream or river. Topography defines the entire watershed, as it shapes the course and speed of water moving through the area. Other terms used to describe a watershed are drainage basin, catchment basin or area, and river basin.



Additional Resources

Web Resources

Lower Trent Conservation

Lower Trent Conservation is a community-based non-profit environmental protection organization that protects, restores and manages the natural resources within the Trent River valley. Use this resource to learn about local events, conservation and watershed management specific to the Lower Trent watershed. www.ltc.on.ca

Ministry of Environment and Climate Change

Leading to healthier communities and economic prosperity through the protection of Ontario's air, land and water. Use this resource to navigate specific projects, plans and reports for the province of Ontario. www.ontario.ca/page/ministry-environment-and-climate-change

Ministry of Natural Resources and Forestry

Protecting Ontario's biodiversity while promoting economic opportunities in the resource sector and supporting outdoor recreation opportunities. Use this resource to navigate specific projects, plans and reports for the province of Ontario. www.ontario.ca/page/ministry-natural-resources-and-forestry

Caring for Our Watersheds

Features a number of resources to help engage students in preserving and improving their local watersheds. www.caringforourwatersheds.com

Parks Canada

With topics ranging from nature to history and culture, learn all about parks across Canada. www.pc.gc.ca

Ontario Parks

Use this resource to find information, available experiences, or locate a park in Ontario. www.ontarioparks.com

Ontario Federation of Anglers and Hunters

With a focus on conservation, this federation offers perspectives, advocacy, and community support on behalf of Anglers and Hunters in Ontario. www.ofah.org

Ducks Unlimited Ontario

Find specific information on the Ducks Unlimited projects taking place in Ontario. www.ducks.ca/places/ontario

Ducks Unlimited Canada: Take Action Booklet

This resource booklet gives you inspiring examples and step-by-step ideas on activities, from beginner to advanced, to take action. www.ducks.ca/assets/2012/06/TA-English-booklet-single-page-Sept-2012-for-screen-lo-res.pdf

Videos

Where is your Watershed Ontario?

Do you have your facts straight about your local watershed? Use this Caring for Our Watersheds' resource to learn about the Lower Trent watershed. www.youtube.com/watch?v=nSLz6BSOeM

Contact Information for Watershed Agencies

If you require additional information or assistance in completing your project, please contact the Watershed Advisory group in your region.

Conservation Ontario

www.conservationontario.ca

Conservation Authorities (Region Specific)

www.conservationontario.ca/about-us/conservation-authorities/ca-contact-list

Canadian Freshwater Alliance

www.freshwateralliance.ca/great_lakes

Finger Lakes – Lake Ontario Watershed Protection Alliance

www.flowpa.org

Lower Trent Conservation

www.ltc.on.ca



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Enter your local contest at: www.CaringForOurWatersheds.com

