



Lanark County
Stewardship Council



Watersheds
CANADA

FISH HABITAT ENHANCEMENT TOOLKIT Cold-Water Creek Enhancement

Prepared by Lanark County Stewardship Council &
Watersheds Canada

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Cold-Water Creek Enhancement in Ontario

Introduction

In many parts of Canada, cold-water fish populations have been declining for over 100 years, often due to changes in land use that impact their habitat. In the 1980s, it was estimated that 80% of the historical brook trout populations in Southern Ontario had already been lost. By 2050, impacts of climate change are predicted to eliminate half of those that remain.

Cold-water streams are significant in the proper functioning of natural ecosystems as they help to moderate temperatures of the larger rivers and lakes they flow into. Additionally, cold-water streams also provide nursery habitat for many fish species (including brook trout) which require the cold temperatures and high levels of dissolved oxygen characteristic of these types of watercourses.

Cold-water fish species such as brook trout are a highly prized sport fish and an important part of the biodiversity in many Ontario waterways. If these trout inhabit your river or creek, you may be able to help strengthen their populations by enhancing cold-water creek habitat.

This document outlines planning and implementation guidelines for cold-water creek enhancement projects. Watersheds Canada and the Lanark County Stewardship Council have produced a video demonstrating examples of this type of project (available to watch at watersheds.ca)

About

What is a cold-water creek?

Cold-water creeks are fed by groundwater and they remain cold all year. These creeks often flow during dry periods because they are not dependent upon precipitation or other surface water. Cold-water creeks are generally less than 19°C. Healthy cold-water creeks have native vegetation along their banks, fast flowing waters, and habitats such as riffles, pools and runs.¹

Cold-water creeks are important regulators within a watershed and help improve water quality and biodiversity by reducing excess nutrients and sediment from traveling downstream. They are a hub of biodiversity and support many fish species such as the brook trout and redbside dace who are cold-water restricted.²



Brook Trout

The brook trout (*Salvelinus fontinalis*) is the only native stream-dwelling trout in North America. Adult brook trout prefer permanently cold, clear spring-fed waters where cover, such as overhanging branches and logs, is available.^{3,4} They prefer a 1:1 pool-riffle ratio, well vegetated banks, abundant instream cover, and relatively stable water flows, temperatures and banks.⁴ They occur in well oxygenated creeks, small to medium sized rivers, and within lakes in areas containing a sand or gravel bottom and some vegetation present. Streams with cool, quiet pools between runs of fast water and rapids are ideal, with plenty of cover from overhanging branches, logs and rocks.⁷



Reproduction

Brook trout spawn in the fall when day length decreases and water temperatures fall below 16°C, with optimal spawning activity occurring at temperatures below 9°C. These conditions usually occur between October and December in Southern Ontario, and can be as early as late August or early September in Northern Ontario.⁵ Brook trout are able to spawn in both streams or lakes, with spawning activity occurring in proximity to upwellings or groundwater seepage. There is significant evidence that the presence of upwellings is more important to the female when she chooses the spawning site than the type of spawning substrate.^{8,9,10,11,12} While “pea” gravel (0.4 to 2.0 cm) is the preferred substrate for spawning, brook trout are known to use other loose bottom material if there is a strong upwelling or seepage.⁵



Spawning sites are generally located near shore,¹¹ in water depths of between 1.0 meter (m) or less⁸ and 2.4 m deep.⁶ Spawning sites can be identified by a depression or “nest” made in the creek bed and gravel known as a redd, adjacent to an upwelling or groundwater seepage.

Brook trout fry emerge between February and April. Young brook trout normally seek shelter in submerged aquatic vegetation, under rocks, under banks and/or protected shallow water areas near the shoreline.⁷

Water Temperature & Oxygen

Water temperature plays a critical role in the survival of this species. Optimal water temperatures are in the range of 11 to 16°C, but brook trout can tolerate 0 to 24°C.² Spring-fed creeks with an abundance of overhanging vegetation, which tend to offer the aforementioned preferred temperatures, are the most sought out habitat. Oxygen levels are another priority with required levels being >7 mg/L at 15°C⁴.

Cold-water creek enhancement projects should focus on improving and maintaining creek habitats that offer these optimal water temperatures and high oxygen levels. Focusing on naturalizing the shoreline and riparian zone will help improve these sensitive habitats.

Naturalizing the Shoreline

One of the easiest mitigation measures for improving temperature control in a cold-water creek is the planting of shoreline vegetation. About 50-75% midday shade is a good target for most small cold-water streams. Planting trees along the shoreline will help reduce solar heating of the waterbody and improve bank stability. In order for the newly planted trees to fully establish, they will need to be protected from vegetative competition and wildlife damage. Placing coconut fiber mats and cages around newly planted trees will help with this.

Choosing trees that are native to the area and appropriate for the soil, light, and drainage conditions found on the property are key. Areas along the cold-water creek where water temperatures increase should be identified and prioritized. This area plays a critical role in the health of a cold-water creek or stream. Maintaining continuous cold-water temperatures along large reaches of the creek are key to improving the habitat and production of brook trout.



A well vegetated shoreline also helps control erosion. A build-up of silt in riffles reduces embryo survival, food production, and cover for juveniles. In most cases, a vegetated strip about 30 m deep will provide adequate erosion control and maintain the undercut stream banks characteristic of good trout habitat. Overhanging and submerged vegetation, undercut banks, instream objects and rocky bottoms also provides excellent cover for the various trout life stages.





Planning

Fish habitat enhancement projects are a way for stewardship organizations, lake associations, fish and game clubs, Indigenous groups, and other groups to improve their local freshwater ecosystems. By working collaboratively with others, the community can rally together and enhance water quality and fish habitat.

Planning a cold-water creek enhancement project involves seven key steps:

1. Determine your Objective
2. Consult Experts and Key Stakeholders
3. Obtain the Necessary Permits
4. Choose your Project Site
5. Plan your Project
6. Fund your Project
7. Communicate your Project Plan

01. Determine your Objective

Determine the objective of your cold-water creek habitat enhancement project by considering:

- Is your project location an existing cold-water creek or a creek with cold-water potential?
- Is there a natural brook trout population present or is there an active stocking program in place?
- What are the mid-summer water temperatures?
- What issues need to be rectified, such as increased water temperatures or decreased water flows?
- Are there areas that need shoreline vegetation enhancement?
- Is the riffle to pool ratio fairly even in the creek?
- Has there been a decline in the number of small brook trout present in the river or creek?

Assess the current brook trout population by consulting experts and stakeholders, and by visiting prospective sites.



Find areas of the creek with ground water percolation – monitor the water temperatures of various locations mid-summer to determine these areas. Ideally water temperatures should be within 11 – 16°C range.



02. Consult Experts and Key Stakeholders

Fish habitat enhancement projects will be most successful if key stakeholders are supportive. While this document provides a guide to the groups you should consult for projects involving Ontario water bodies, be sure to identify the key stakeholders specific to your project before you begin. You may have to consult certain groups several times throughout the planning process.

Ontario Ministry of Natural Resources and Forestry

The Ontario Ministry of Natural Resources and Forestry (MNRF) is responsible for fisheries management planning in 20 fisheries management zones. These management plans help the province manage fish populations in specific bodies of water. Look up your fisheries management zone at Ontario.ca.

Consult with the local MNRF office to ensure that your project objective does not conflict with its fisheries management objectives and management plan for the waterbody in question. MNRF can also inform you about:

- Current cold-water creek locations
- The status of the brook trout population for the waterbody in which you plan to conduct your project
- Potential stocking programs in your area
- Dam operations that may affect water levels
- Required permits
- Environmental assessment requirements

Conservation Authorities

Consult the Conservation Authority for your area, if there is one, for information about required permits, management plans, dams, and fish habitat. Often Conservation Authorities are responsible for monitoring local cold-water creeks in partnership with the MNRF. A Conservation Authority permit may be required if the proposed project includes alterations to the bank or a wetland feature. Find your local Conservation Authority at conservationontario.ca

Fisheries and Oceans Canada

Fisheries and Oceans Canada (DFO) may require permit approval of your project as well. For more information visit DFO-MPO.gc.ca

Parks Canada

If your project occurs in a federal waterbody such as the Rideau Canal or Trent-Severn Waterway, consult Parks Canada for information about required permits, management plans, dams, and fish habitat. Visit PC.gc.ca for more information.



Local Fish and Game Clubs, Lake Associations, Stewardship Councils, Indigenous groups and Residents

Consult local fish and game clubs, lake associations, stewardship councils, Indigenous groups and neighbouring residents for their knowledge of fish habitat, populations and waterbody environment. These groups have valuable expertise and could be possible partners for your project.

Local County or Municipality

Consult with the local county or municipality if restoration areas are on public lands or if access to the waterbody will involve public roadways. They may require trained flag people to direct traffic in busy areas.

Other Experts

Consult the following experts if possible:

MNRF fisheries biologist (to determine if enhancement is required at your site)

Conservation Authority Biologist (to determine if the stream's water quality provides suitable cold-water habitat for brook trout)

03. Obtain the Necessary Permits

You may need permits from several different government agencies before conducting your project. MNRF, Conservation Authorities, DFO, and Parks Canada will provide guidance on what is required when applying for a permit. Be sure to consult with them early in the planning process as a permit can take up to 5 months to obtain.

The most common permits needed for brook trout are:

- MNRF work permits
- DFO alteration to fish habitat approvals
- Parks Canada approvals (if the project is in a federal waterway)
- Conservation Authorities alterations to a shoreline or wetland approval



Permit application forms may require detailed drawings of the proposed work site, including cross-sectional drawings and photos. Also, permits may take up to five months to obtain, depending on the agency and the number of applications it is reviewing.



This section provides additional detail about these permits and approvals. Keep in mind that you may require additional paperwork in order to proceed with your project.

Ministry of Natural Resources and Forestry (MNRF) Work Permit

Why do you need a work permit from MNRF?

The beds of most navigable water bodies are Crown land in Ontario and managed by MNRF. A MNRF work permit may also be required if your project is located on shore lands (i.e., lands covered or seasonally inundated by the water of a lake, river, stream, or pond).

What types of projects may require a MNRF work permit?

- Filling in shore lands or Crown land if project area exceeds 15 m²
- Certain types of docks and boathouses
- Certain types of dredging projects
- Removal of aquatic vegetation on the Canadian Shield

What must your MNRF work permit application contain?

- Completed application form (available online or at MNRF offices)
- Location map that includes lot, concession, township, lake or river name, and directions to the site
- A survey plan that shows property lines, water's edge, measurements of the spawning bed, and roads
- Two signed and dated work sketches:
 - One indicating where work will take place in relation to lot lines and the water's edge
 - One showing a side view of the proposed work, including construction techniques, mitigation measures, building materials, and measurements
- Two sets of shoreline photographs indicating the work area

Refer to www.ontario.ca/page/crown-land-work-permits for complete details

Where do you submit a MNRF work permit application?

Send your application to the local MNRF office.

How is a MNRF work permit application processed?

MNRF will review your application. In most cases, MNRF will also need your proposal to be submitted to DFO for fish habitat review, and to the Conservation Authority for review under their regulations. MNRF reviews comments received from these other agencies.

What happens if your application is approved?

If approved, MNRF issues a work permit or indicates that a permit is not required. A copy of the work permit should be kept at the work site. The permit may list times when in-water work may not take place in order to protect local fisheries.



Fisheries and Oceans Canada (DFO) Approval

Why do you need approval from DFO?

The Fisheries Act requires that projects avoid causing serious harm to fish and/or fish habitat unless authorized by the Minister of Fisheries and Oceans Canada. This applies to work conducted in or near water bodies that support commercial, recreational, or Aboriginal fisheries.

How do you submit an application for approval?

Visit DFO's Projects Near Water page DFO-MPO.gc.ca for guidance on how to submit your project for review.

Parks Canada Approval

Why do you need approval from Parks Canada?

Any work in the water or along the shoreline in a federal waterway such as the Rideau Canal or the Trent-Severn Waterway requires a permit from Parks Canada.

What types of activities may require Parks Canada approval?

Parks Canada has jurisdiction over in-water activities, shoreline works and related activities, including installation, repairs and replacements, modifications or additions and annual or sporadic maintenance.

How do you apply for a Parks Canada permit?

Visit PC.gc.ca for instructions on applying for a Parks Canada permit. This site also has information on working along the shoreline or in water on federal waterways.



04. Choose your Project Site

Consider the following when selecting a suitable site for cold-water creek enhancement:

- Is the creek cold-water or does it have cold-water potential?
- Is there upwelling or groundwater seepage upstream?
- Does this creek have a native or stocked brook trout population?
- Does the site have brook trout production potential?
- Can you access the site/have permission from landowners?
- Does this site need naturalization?
- Does this site show signs of impact from beaver or deer?
- Are there any blockages to creek flow such as beaver dams or log jams?



Your local Conservation Authority may already be collecting stream temperature data or may have electrofished the site for brook trout presence and aging.

Identify Existing Cold-water Creeks & Brook Trout Habitat

Consult MNRF, the local Conservation Authority, fish and game clubs, and local community groups for information about existing brook trout creeks and spawning sites. Obtain maps and water temperature and fish population data, if available.

Accessibility

When visiting sites, also consider accessibility for equipment and materials. Cold-water creek projects usually need a location to unload potted trees and rolls of heavy fencing. Having access to the use of an ATV and trailer will help move materials to remote locations without road access. Determine how to access either side of the creek; whether crossing the creek is an option or road access from either side is. Remember to always have permission from landowners first.

Visit Prospective Sites

Once potential sites are identified, visit each site to confirm if brook trout are present. Walking the creek will allow you to see first-hand if there are any obstructions to flow, areas in need of naturalization, any silt accumulation, etc. You will need to inspect potential sites multiple times: during spring to monitor high water levels and in mid-August when water levels are low to evaluate the condition of the substrate and amount of flow throughout the creek. Water



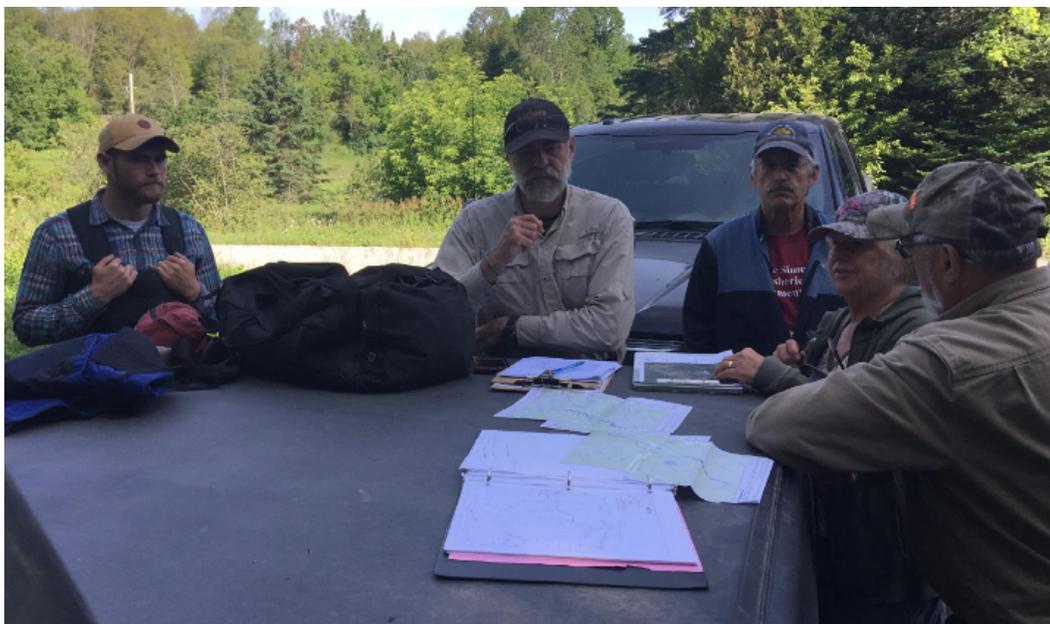
temperature should also be monitored throughout the summer to determine areas in need of riparian zone enhancement – areas where water temperatures start to increase. An additional visit in the fall may document if brook trout are naturally spawning in the area.

What you'll need:

- Permission from landowners to access sites
- Topographic maps with elevation contours and/or bathymetry maps that show water depths (available from MNRF)
- Aerial photography of the area, if available
- GPS device
- Camera or phone
- Thermometer
- Tape measure
- Kit for testing water chemistry – such as dissolved oxygen, pH (Note: Water Rangers provides water quality monitoring kits to volunteer groups waterrangers.ca)

Ideal brook trout habitat parameters include³:

- Water temperature: optimal 11 to 16°C; spawning begins below 9°C
- Water depth: < 7 m
- pH: 6.5 – 8.0
- Dissolved oxygen: > 7 mg/L (under optimal conditions)
- Water velocity: moderate to slow flowing waters



Meeting onsite with partners is important to determine the needs of the project.



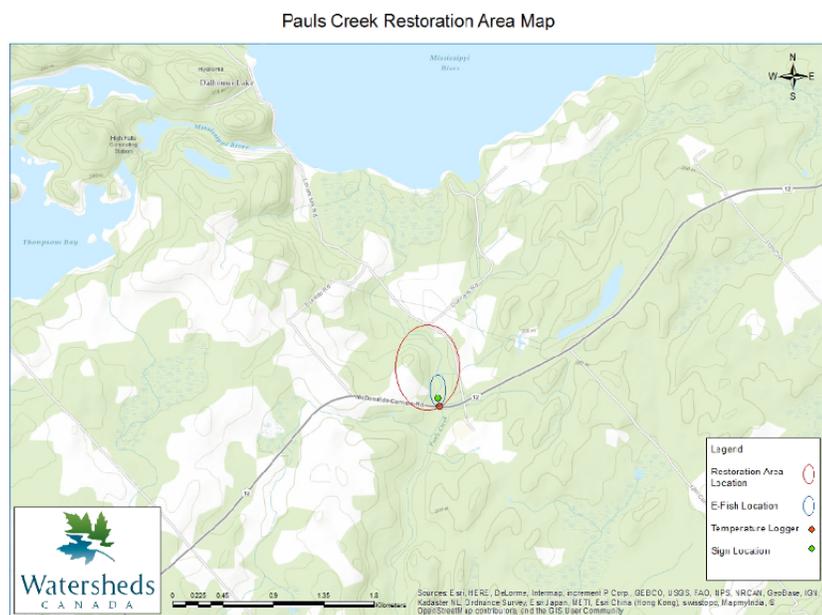
Create Maps

Clear and accurate maps are essential when communicating with local lake associations, agencies, and residents who may have concerns about your project.

Following the site visit, create a map showing the suitable locations for your project, indicating:

- Creeks (including the direction of water flow)
- Property lines and access roads
- Areas in need of enhancement
- Groundwater/spring percolation areas if known
- Water temperature monitoring areas
- Riffle-pool areas
- Obstructions to flow (ex. beaver dam)

Example of a location project map



05. Plan your Project

With community and MNRF support, a clear project objective, and suitable sites, create a timeline and budget for your project. Community collaboration and site information will strengthen any grant applications you may submit to fund the project.

Timelines

Several factors will affect your project's timeline:

- **Restriction periods:** certain areas have restriction periods during which no work is allowed. For example, no work is allowed in some warm-water lakes from mid-March to the beginning of July in MNRF Kemptville District. For cold-water systems, no work is allowed from October to mid-May. There are a few water bodies that have both warm-water and cold-water fish species where no work is allowed from October to the beginning of July. Always check with MNRF for information about restriction periods where you will be doing your project.
- **Season:** cold-water creek enhancement can be completed in summer after July 1 but before September 30; always refer to local restriction periods.
- **Materials and equipment:** order material and reserve equipment well in advance of implementing the project to ensure availability. For native tree species, ordering at least a year in advance may be required.
- **Permits:** permit approval can take over 5 months; find out what permits you need and apply as soon as possible.
- **Funding:** grants run on variable cycles; ensure you know application deadlines for major grants.

Materials and Equipment

Materials required for shoreline naturalization:

- Native tree species
- Shovels
- Rolls of wire fencing and cutters
- Wire clips & pliers
- Metal stakes
- Baling wire
- Pails for watering
- Coconut fiber mats, paper and ground staples
- Chest waders for crossing the creek, if needed
- Truck and trailer
- ATV and trailer for remote locations
- Silt curtain (enough to cross the creek – downstream of spawning bed)*
- Floats and chains to attach to the silt curtain



- About 100 feet of rope (for securing silt curtain)
- Stakes (optional – for securing silt curtain)
- Map and aerial photography
- Required permits

Note: *Silt curtains can be purchased from a supplier such as Geosynthetics or borrowed from Watersheds Canada if located in Eastern Ontario.

Volunteers

Cold-water creek enhancements require 5-8 volunteers capable of physical labour over multiple days.

Budget and Costs

The majority of your costs will come from the materials and equipment required to complete your project. A detailed budget is important when applying for grants and other funding sources.

The costs will vary depending on the size of your project and the length of creek needing restoration. Cold-water creek enhancement projects range from about \$3,000 up to \$10,000.

Donations from local stores and landowners will reduce overall material and equipment costs. Obtain quotes to ensure that your budget is accurate.

As a guide, Table 1 shows approximate costs for rental equipment and material.

Table 1: Approximate Cost for Material and Equipment

Item	Approximate Cost
Silt curtain	\$1,200 per 100 feet
Floats	Usually included with silt curtain
Chains (5/16 inch)	\$55 for 16 feet
Rope (about 100 feet)	\$10
Stakes – silt curtain & trees	\$1 each (wooden stakes); \$5 each (metal T-bar stakes)
Potted Native trees	Range from \$15-30 depending on size (larger are more successful)
Wire Fencing 1inch x 1 inch x 5 feet x 100 feet	\$200 per 100ft
Coconut mats	\$1.50 each
Paper or cardboard	Donated by volunteers
Wire “J” Clips & pliers	\$20



Item	Approximate Cost
Baling wire	\$5 per 50 feet
Wire cutters	\$15
Chest waders and safety equipment	Provided by volunteers
Truck and trailer	Provided by project organizers or volunteers
GPS device	\$500
ATV & trailer	\$230 for eight hours (weekend rate); \$2,000 security deposit or borrow from volunteer and provide gas
Thermometer	\$20
Underwater camera or anglers	\$300 to \$500 for Aqua-Vu or GoPro camera
Permits	Variable

Permits

Refer to your consultation with MNRF, Conservation Authorities, DFO, and Parks Canada for the permits required for your project.



06. Fund your Project

Funding for your project can come from partners and grants. Volunteering and in-kind support (e.g., donations of materials and equipment) can also help reduce your costs.

Create a Project Outline

Creating a concise project outline will help you communicate your project idea with your partners and potential funders. Your outline should answer the following questions:

- What do you want to do?
- How are you going to do it?
- Who are you working with?
- When are you doing this work?

If possible, keep your project outline to a single page.

Create a Budget

Creating a budget will allow you to document:

- What resources do you already have?
- What are you missing?
- In-kind and cash contributions from your organization and project partners

While budget formats vary, keep in mind:

- Typical funding requests ask for four expenses categories: materials and supplies, human resources, other, and administration. Structure your budget based on these categories.
- Include the value of all donations and contributions in your budget. Most funders require a 50% match to any cash they provide.
- Itemize everything you need to complete your project, along with a cost estimate and where you will get these items.

In the Sample Project Budget below, the total project value is \$12,362.50, including both cash needs and in-kind donations. The project's three partners are contributing a total in-kind value of \$9,364. This project requires an additional \$2,998.50 in funding.



Table 2: Sample Project Budget

Item	Description	Total Cost	Cash	In-Kind	Source
Materials and Supplies					
Potted Native Trees	75 trees @ \$15/tree	\$1,125	\$1,125	\$0	ABC Company
Coconut fiber mats	75 mats @ \$1.50/tree	\$112.50	\$112.50	\$0	ABC Company
Ground staples	4 staples/tree x 75 @ \$0.50/staple	\$150	\$260	\$0	ABC Company
Baling wire & cutters	\$5/50ft & \$15/cutter	\$20	\$5	\$15	ABC Lake Association
Fencing for cages	300ft @ \$200/100ft	\$600	\$600	\$0	ABC Company
Paper or cardboard	5 bags @ \$1/bag	\$75	\$0	\$75	ABC Stewardship Council
Wire "J" clips & pliers	\$6/bag & \$14/pliers	\$20	\$6	\$14	ABC Stewardship Council
Chest waders & safety equipment	\$500	\$500	\$0	\$500	ABC Lake Association
Silt curtain, chains, rope, floats	\$1,550	\$1,550	\$0	\$1,550	Watersheds Canada
ATV Rental for 2 days	\$230/8hr (weekend rate); \$2,000 security deposit	\$2,460	\$0	\$2,460	ABC Lake Association
GPS Device	\$500	\$500	\$0	\$500	Watersheds Canada
Underwater camera	\$500	\$500	\$0	\$500	Watersheds Canada
Human Resources					
Installation labour	125 hours @ \$20/hour	\$2,500	\$0	\$2,500	ABC Lake Association
Project manager	40 hours @ \$25/hour	\$1,000	\$1,000	\$0	ABC Stewardship Council
Other					
Travel Administration	1,000 km @ \$0.45/km	\$450	\$0	\$450	ABC Stewardship Council
Overhead (computers, bookkeeping, etc.)	10% of total project cost	\$800	\$0	\$800	ABC Stewardship Council
TOTAL		\$12,362.50	\$2,998.50	\$9,364	



Local Partners

Local partners such as fish and game clubs, conservation organizations, Indigenous groups or businesses will often contribute funding towards your project if you communicate your project goal clearly. Complete your budget and your project outline before approaching partners for contributions.

Grants

Contact the local Conservation Authority, stewardship council and Watersheds Canada for a current list of possible grants to fund the project. Some grants require that the applicant be incorporated or a charitable organization. Comprehensive lists of funding opportunities can be found online at:

- Environment Canada's Green Source Funding Database

Recognition and Reporting

Recognize your partners and supporters for their contributions in all the communications materials you create. Read your funding agreements carefully, as some funders may have specific recognition and reporting requirements.



07. Communicate your Project Plan

Consulting your community is an ongoing process; you may need to meet with your stakeholders several times as your project plan develops.

General Communications Tips

Before reaching out to any stakeholders, answer the following questions:

Who is your audience?

Identifying your audience helps you tailor your communications accordingly. For example, you will describe your project differently to landowners with no environmental experience compared to experts at MNRF.

What are you trying to accomplish by communicating with this audience?

You will have particular reasons for reaching out to each stakeholder: you may be looking for funding or volunteer support, seeking landowner permission, applying for a grant, or informing neighbours about the value of your project.

What are your key messages?

Keep your communications simple by prioritizing your most important messages and using them consistently.

When and how often should you be communicating with this audience?

Consider how far in advance you need to communicate with stakeholders and how often you need to update them as the project progresses. Are there any groups you need to thank or recognize after the project is complete? Are there any groups interested in the long-term results of your project?

What is the best way of communicating with this audience?

Different audiences and purposes may require different communications tactics, such as phone calls, emails, newsletter articles, one-on-one meetings, presentations, media releases or social media posts. Consider which tactics will be most effective with each audience.

How will you address feedback?

Depending on the goal of your communications, your audience may have questions or concerns. How do you plan to address their feedback? How can they contact you if they want to follow up further?

How will you keep track of supporters of your project?

You will find supporters as you communicate your project plan. Be sure that you have a system for collecting their contact information and ask permission to contact them regarding future initiatives.



Engage the Local Community

After completing your project plan, communicate the details of your project to your key stakeholders, including local fish and game clubs, lake associations, Indigenous groups, and residents. Ensure that these groups understand what your project will accomplish and that it will not interfere with their aquatic activities. Before reaching out to these groups with project details, evaluate any concerns they may have. Your goal is to answer questions, dispel myths, and gain volunteers and partners.

Ways to communicate with community partners include:

- Newsletters
- Social media posts
- Attending their meetings
- Phone calls and one-on-one meetings
- Presenting information at the annual lake association meeting
- Annual Lake Links workshop (held in eastern Ontario; visit Watersheds.ca for more information)

Build Partnerships

Possible partners for your project include:

- Government agencies
- Conservation Authorities
- Fish and game clubs
- Lake associations
- Stewardship Councils
- Indigenous Groups
- Non-governmental organizations (NGOs)
- Youth groups such as Scouts Canada or Girl Guides
- Universities, colleges, and other educational institutions

Engaging with these groups will strengthen your project and may make you eligible for certain grants. These partners are also key in providing volunteers, funding, and other support, including spreading the word about your project.

Communicate Your Project Success

After your project is complete:

- Thank and recognize all project partners and contributors
- Inform your stakeholders of the project's success
- Keep in touch with groups interested in the project's long-term results

Also consider sending a media release to local news agencies and sharing on social media platforms to gain greater coverage of your project's success.





Implementation

Order Material and Equipment

Order materials and reserve equipment well in advance of implementing the project to ensure availability. Potted native plants may need to be ordered a year in advance to get adequate species and size. Species such as Silver Maple and Black Willow are examples of native species in Lanark County that grow well along shorelines and provide large overhanging canopies that provide adequate shade and food sources for brook trout. Coconut fiber mats and staples can be ordered through Native Tree Nurseries, such as the Ferguson Tree Nursery in Kemptonville, Ontario. Fencing, stakes and wire can be accessed from your local hardware store.

Install a Silt Curtain

If your project involves frequent water crossings to access your project site, a silt curtain should be installed before any material is placed in the water to prevent silt moving from the work area into the waterbody.

What you'll need:

- 3-5 volunteers capable of physical labour
- Silt curtain (enough to cross the creek)
- Floats and chains to attach to the silt curtain
- Chest waders (if water at site is wadeable)
- About 100 feet of rope for tying off the curtain
- Rocks about 1-2 feet long (only if additional weight is needed to hold the silt curtain in place)
- Stakes (optional)



If the water is shallow enough to walk through, tie the silt curtain securely to a tree, stake, or other solid structure on shore. Then have volunteers in chest waders cross the creek with the silt curtain securing it likewise on the far shore. If the current is too strong to allow the silt curtain to stay in place on its own, weigh the curtain down with rocks. Ensure that the disruption to the riverbed is minimized during this installation.

STEP 1

Measure the width of your creek to determine the length of silt curtain required.

STEP 2

Attach floaters to the top of the silt curtain and chains to the bottom. This will keep the silt curtain from collapsing.

STEP 3

Place the curtain across the creek and secure in place.

STEP 4

Leave the silt curtain in place for 24 hours after the creek enhancement is complete to ensure that all the silt has settled to the bottom of the waterbody.





Adding the floats and chains to a silt curtain.



Secured silt curtain holding the current.

Once the silt curtain is in place, you are ready to enhance the shoreline with new trees.



Naturalizing Shorelines

What you'll need:

- 5-8 volunteers
- Potted native trees – such as Silver Maple and Black Willow (choose native species according to your ecozone)
- Coconut fiber mats and ground staples
- Paper bags or cardboard
- Sharp knife or scissors (to cut paper to size and create a slit for tree trunk)
- Shovel

How to Plant

Larger potted stock (4-5 feet in height) is generally used for this type of project in order for the trees to successfully compete and get established.

- Dig a hole about an inch or two wider and deeper than the pot. There should be enough space for the roots to fit without damaging them.
- Gently remove the plant from the pot by lifting the root ball and stem base. Squeeze the pot to loosen up the soil, or simply cut the pot open.
- Once the plant is out of the pot, use your fingers to massage the root ball and loosen up the soil. This will allow the roots to spread once in the ground. Do not remove all the soil off the roots because too much air exposure can stress the plant.
- Place the root ball into the center of the hole, making sure the roots are pointing down and the stem is straight up. Fill the hole with soil, making sure the soil is level with the root crown. The root crown is the colour change where the trunk meets the root.
- Firmly press the soil down around the base of the plant to remove air pockets in the hole and top up with soil, if needed.
- Water the tree thoroughly.
- Place coconut fiber mat and paper around the tree trunk.
- Use ground staples to secure the mat and paper in place.



Build Tree Cages

Once the silt curtain is in place, you are ready to enhance the shoreline. The first step is to have at least 2-3 volunteers build cages for each tree to help ward off predation. This step can be performed ahead of time off site if needed. It may be easier to build cages on site with 2-3 dedicated volunteers if space permits.

What you'll need:

- 2-3 volunteers
- Metal fencing – 1" x 1" x 5ft x 100ft long
- Wire cage clips (J clips) and J clip pliers
- Wire cutters and pliers
- Roll of baling wire
- Stakes (optional)

STEP 1

To create cages for each tree, find an open area near your creek (or can be made off site) and unroll the wire fencing. You will need something to hold down the fencing (or have a volunteer stand on it) while one person measures out and cuts the needed amount. A length of 1.5 meters or 60" works well for most small trees but use an amount suitable for your potted stock.

STEP 2

Have 1 volunteer roll the cut piece into a tube and using the 4 clips and pliers, have another volunteer secure the overlapped ends that can be placed over and around the tree.

STEP 3

Place the cage over the top of the sapling and secure it to the metal stake using a 6" piece of baling wire, tightening it with the pliers. Note you may need to secure it in at least 2 places to the stake. The height of the cage depends on the predation in the area. Place the cage at ground level if beavers inhabit the area, or higher up for deer browsing.

Note: If you experience various types of predation, a larger cage may be needed. Use larger fencing.





Securing the fencing to create a tree cage.



Evaluate Success



It will take several years to determine the success of a shoreline naturalization project. However, returning annually will allow you to determine the success and growth of the trees planted. Return annually in subsequent years to evaluate the success of your project over time.

What you'll need:

- 2-4 volunteers
- Thermometer
- Water Quality Testing Kit (such as Water Rangers Kits)
- Electrofishing data can be acquired by the local Conservation Authority
- Data sheet to record number and size of fish observed

STEP 1

Return to the site and monitor the newly planted trees. Look for signs of growth, or predation. If drought conditions occur, try to water the trees. After 3-5 years, remove the cages from the young trees, once established. Note if beavers are present, a longer time period may be required prior to removal.

STEP 2

Take the water temperature in the enhanced area during the spring, peak summer and fall seasons annually to determine if temperatures are reducing over time. On the data sheet, record the date and time, waterbody name, water temperature, number of brook trout observed and their approximate size in inches or centimetres.

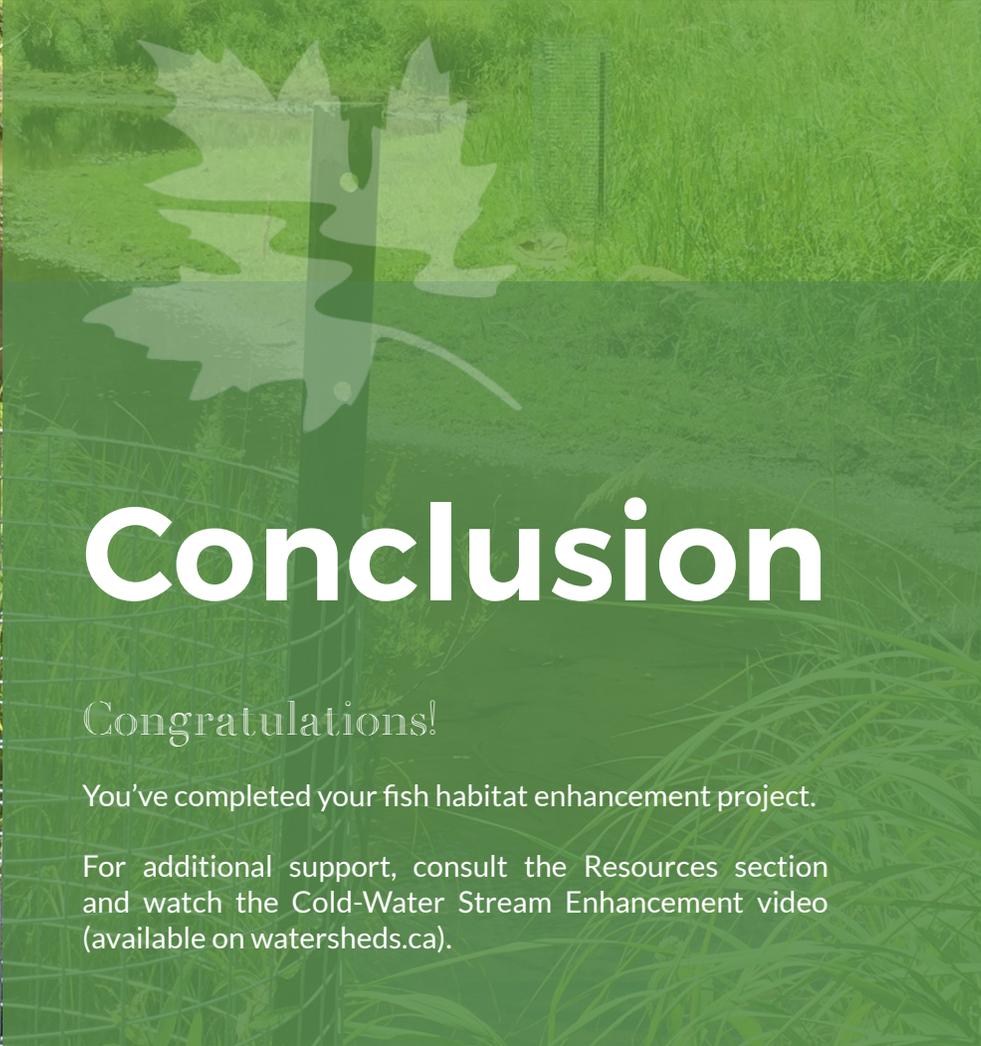
STEP 3

Visit the site annually with the local Conservation Authority. They may be able to monitor the area for water quality parameters and possibly electrofish the site. Record the water quality data, species, size and number of fish observed.

NOTE

Conservation Authorities may be able to electrofish the area to determine brook trout presence and age class in the area.





Conclusion

Congratulations!

You've completed your fish habitat enhancement project.

For additional support, consult the Resources section and watch the Cold-Water Stream Enhancement video (available on watersheds.ca).

Resources

GOVERNMENT

Conservation Ontario

Protects and manages water and other natural resources in partnership with government, landowners, and other organizations.
905-895-0716
info@conservationontario.ca
conservationontario.ca/

Fisheries and Oceans Canada

Provides information and permits regulating fish habitat.
DFO-MPO.gc.ca

Ontario Ministry of the Environment, Conservation and Parks (MOECP)

Responsible for protecting air, land and water. Contact for water quality, algal blooms, and air and water pollution.
Ontario.ca/ministry-environment-conservation-parks

Ontario Ministry of Natural Resources and Forestry

Responsible for fish and wildlife populations, invasive species, nuisance wildlife, forestry, Crown land, shore lands, aggregates, and resources.
1-800-667-1940
Ontario.ca/MNRF

Parks Canada

Water levels, permits for docks, fill, and construction along federal canals.
PC.gc.ca

Transport Canada

Responsible for enforcing the Navigation Protection Act. Contact for permits and information on docks, floating rafts or other structures that could infringe on navigable waters.
613-990-2309; 1-866-995-9737 (toll free)
questions@tc.gc.ca; TC.gc.ca

Ontario's Invading Species Awareness Program

Provides information and resources about invasive species in Ontario.
1-800-563-7711
InvadingSpecies.com

FUNDING

The Green Source Funding Database

canada.ca/en/environment-climate-change/services/environmental-funding.html

OTHER USEFUL CONTACTS

Ducks Unlimited Canada (DUC)

Provides programs and services for the conservation of wetlands.
1-800-665-DUCK (3825)
Ducks.ca

Federation of Ontario Cottagers' Association

Serves as an information center, providing assistance and leadership to Ontario's cottage associations and their members.
705-749-FOCA (3622)
info@foca.on.ca
FOCA.on.ca

Lanark County Stewardship Council

Volunteer-led non-profit organization with experience in fish habitat restoration projects and other environmental protection and restoration initiatives.
info@lanarkstewardshipcouncil.ca
LanarkStewardshipCouncil.ca

Ontario Federation of Anglers & Hunters (OFAH)

Provides anglers and hunters with information and resources.
705-748-6324
ofah@ofah.org
OFAH.org

Watersheds Canada

Works with landowners, communities, and organizations to protect lakes and rivers by developing effective, transferable, long-term solutions.
613-264-1244
info@watersheds.ca
Watersheds.ca

Water Rangers

Provides reliable citizen science - water quality testing kits and data management platform
Waterrangers.ca

Citations

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Ontario Trillium Foundation



LUSH Canada Charity Pot





115-40 Sunset Boulevard,
Perth, Ontario K7H 2Y4
PHONE: 613-264-1244
EMAIL: info@watersheds.ca
WEBSITE: www.watersheds.ca



Lanark County
Stewardship Council

99 Christie Lake Rd., P.O. Box 37
Perth, Ontario, K7H 3E2
FAX.: (613) 267-2793
PHONE: (613) 267-4200 ext. 3192
WEBSITE: www.lanarkstewardshipcouncil.ca

