



Lanark County  
Stewardship Council



Watersheds  
CANADA

# Fish Habitat Enhancement Toolkit

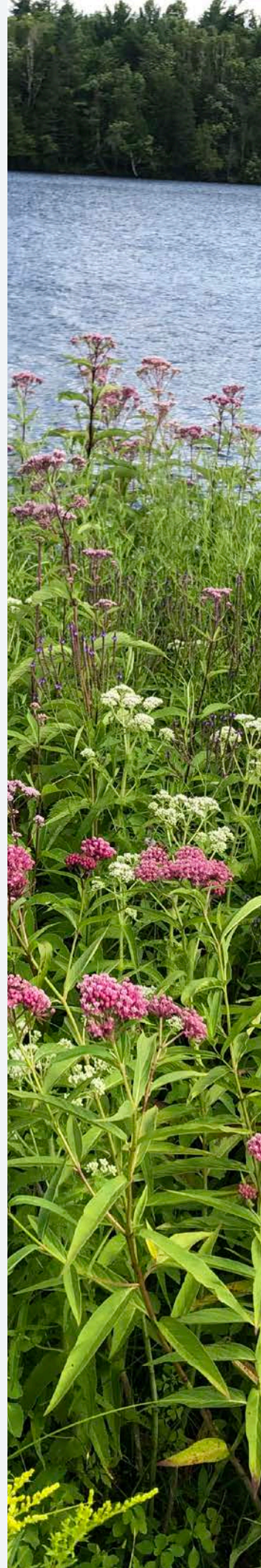
## Walleye Spawning Bed Enhancement in Ontario

Prepared by Lanark County Stewardship Council &  
Watersheds Canada



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# Walleye Spawning Bed Enhancement

## Introduction

Walleye, also known as pickerel, are a highly prized sport fish and an important part of the biodiversity in many waters of Ontario. If you have walleye in your lake or river, you may be able to help strengthen their populations by enhancing walleye spawning beds.

This document outlines planning and implementation guidelines for walleye spawning bed enhancement projects. Lanark County Stewardship Council has also produced a video demonstrating examples of this type of project (available to watch at [watersheds.ca](http://watersheds.ca)).



# About

## Walleye

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Walleye spawn in the spring for one to two weeks, depending on water temperatures, and tend to return to the same spawning site each year<sup>1,2,3,5</sup>. Walleye spawn in both river rapids and on lake shoals, and their choice of spawning habitat may be genetically determined<sup>6</sup>. Rapid changes in the weather can influence the level and duration of spawning activity<sup>6</sup>.

Walleye are not very strong swimmers: they don't negotiate fish ladders, and don't pass through culverts or narrows where stream velocities exceed three feet per second. In fast water, they swim in bursts, and hide and rest behind larger stones or boulders.

## River Spawning Habitat

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Most walleye populations spawn in rivers, creeks, and intermittent streams that are upstream tributaries of a lake. They will spend most of the year in the lake and then move upstream into the river to spawn in the fast-flowing waters that keep the eggs well oxygenated. Some fish populations will move downstream into fast-flowing waters.

Spawning sites include gravel-cobble substrates in turbid or clear streams and rivers<sup>1,3,6</sup>. River and creek spawning habitats are usually more productive than lake shoals because they are less weather-dependent.



## Lake Spawning Habitat

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Some walleye populations spawn on shoals of lakes larger than 100 ha<sup>5</sup>. Typical spawning sites include gravel-rubble shoals or rocky, wave-washed lake shallows<sup>1,3,6</sup>. To keep the spawning material clean and the eggs well oxygenated, there needs to be flowing water or adequate wave action<sup>5</sup>. Shoals used for spawning usually face the predominant wind direction and are not found in protected bays.

Lake shoals are not as productive as river spawning habitat because they are more dependent on weather and water quality. If the shoals are not cleaned by the predominant wave action, or if too much algae and silt accumulate on the rocks, the walleye will not spawn there. There are a few walleye populations that will spawn in both lake shoals and tributaries.

## Spawning Bed Enhancement

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If the rocks used for spawning have become covered in silt or algae, walleye may no longer spawn on them. High flows and ice scouring can displace appropriately sized rock downstream, dismantling the spawning bed.

Depositing fresh rocks in an existing spawning bed may help increase walleye populations. Historical walleye sites are the best ones to enhance, as walleye may not go to new sites for a number of years, if at all.



The Innisville spawning beds, located in the Mississippi River, suggest that constructing several smaller spawning beds may be preferable to one or two larger beds because the smaller beds provide greater habitat diversity.

## Protecting Beds from Silt

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The source of the silt needs to be determined and rectified before more rocks are added to a spawning bed; if silt accumulation is present, it is likely to reoccur and will eventually degrade your enhanced walleye spawning bed.

**See page 13 for more information about silt accumulation causes and mitigation strategies.**







# Planning

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

## Planning a walleye spawning bed 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

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**Determine the objective of your walleye spawning bed enhancement project by considering:**

- Are you enhancing an existing walleye spawning bed?
- Are walleye still spawning on it?
- Does the bed need enhancement?
- Are there other larger or more suitable spawning beds that fish may be targeting instead?
- What issues need to be rectified, such as substrate material or water flows?
- Has there been a decline in the number of walleye spawning on the bed or a decline in the number of small walleye caught in the lake or river?
- Will your enhancement affect water flows and silt accumulation? (Consult a hydrologist or geomorphologist if possible.)
- Will the project be conducted on all or part of the lake?

Access the current walleye population by consulting experts and stakeholders, and by visiting prospective sites.

## 02. Consult Experts and Key Stakeholders

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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.



Dams operated on or close to the waterbody where you are enhancing a walleye spawning bed may affect your project by influencing water velocity and water levels. Be sure to consult with the Ontario Ministry of Natural Resources and Forestry (MNRF), Conservation Authorities, and Parks Canada regarding dams to ensure that there will be adequate water levels and flows during the walleye spawning period.

## 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](http://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 walleye spawning sites
- The status of the walleye population for the waterbody in which you plan to conduct your project
- 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. Find your local Conservation Authority at [conservationontario.ca](http://conservationontario.ca).

## Fisheries and Oceans Canada

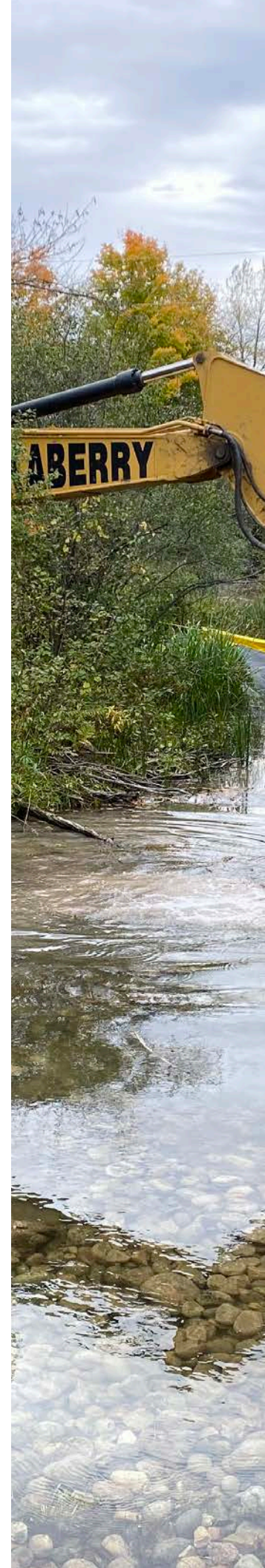
Fisheries and Oceans Canada (DFO) may require permit approval of your project as well. For more information visit [DFO-MPO.gc.ca](http://DFO-MPO.gc.ca)

## 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](http://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 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

If heavy equipment is going to be used on a roadway to place rock in a waterbody, consult with the local county or municipality. They may require trained flag people to direct traffic or plywood to protect pavement from the tracks of the heavy equipment.

## Other Experts

Consult the following experts if possible:

- Hydrologist or geomorphologist experienced in evaluating water flow and river/lake channel design (to determine whether your project will affect water flows or cause silt accumulation)
- MNRF fisheries biologist (to determine if enhancement is required at your site)

## 03. Obtain the Necessary Permits

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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, and so be sure to consult them early in the planning process.

***The most common permits needed for walleye spawning bed enhancement projects are:***

- Ministry of Natural Resources and Forestry (MNRF) work permits (if project area exceeds 15 m<sup>2</sup>)
- Department of Fisheries and Oceans (DFO) approvals
- Parks Canada approvals (if the project is in a federal waterway)

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.



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.





## Ministry of Natural Resources and Forestry (MNRF) Work Permit

### *Why do you need a work permit from MNRF?*

The beds of most navigable waterbodies 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 m<sup>2</sup>
  - 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, and roads, including measurements of the property lines and their distance to the water
- 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 MNRF Work Permit Application Guide 2014 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. MNRF may review comments received from DFO and Conservation Authorities before issuing permits.

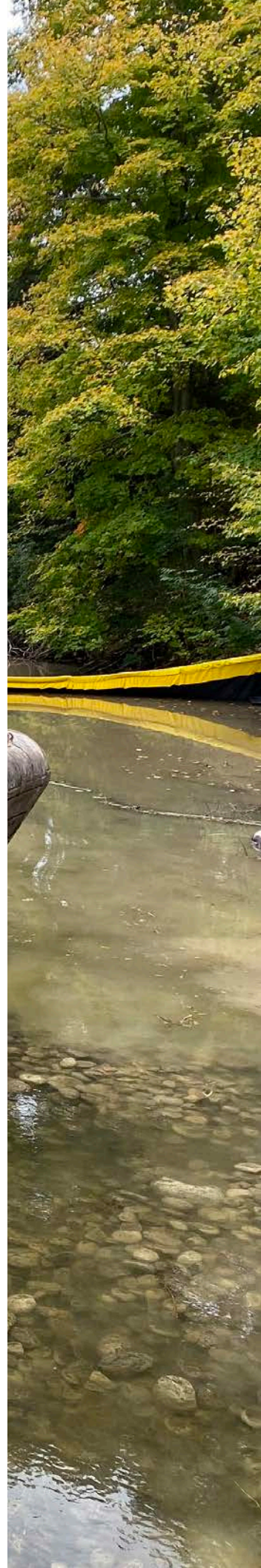
### *What happens if your application is approved?*

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 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-MPO.gc.ca](http://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](http://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**

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### **Consider the following when selecting a suitable site for walleye spawning bed enhancement:**

- Is the lake managed primarily as a walleye lake?
- Where are existing spawning beds?
- Does the site have walleye production potential?
- Can heavy equipment access the site?
- Is there a convenient location to stockpile rock?

You will need to visit prospective sites during spawning (April) and when water levels are low (August).

### **Identify Existing Walleye Spawning Beds**

Consult MNRF, the local Conservation Authority, fish and game clubs, and lake associations for information about existing walleye spawning sites. Obtain maps and fish population data, if available.





## Visit Prospective Sites

*If MNRF, the Conservation Authority, fish and game clubs, and lake associations are not able to confirm recent spawning activity, identify prospective sites by:*

- Checking aerial photographs and contours on topographic maps for possible spawning sites. Look for creeks flowing from and into a lake in a narrow corridor that may be fast flowing. Also look for existing potential walleye spawning beds.
- Recording possible sites on a map and note the GPS coordinates.

Once potential sites are identified, visit each site to document whether spawning walleye are present. You will need to inspect potential spawning bed sites twice: during spawning season (for 1-2 weeks during spring, usually at night) and when water levels are low (usually in August) to evaluate the condition of the substrate.

### *What you'll need:*

- Permission from landowners to access sites
- Topographic maps with depth contours (available from MNRF)
- Aerial photography of the area, if available
- GPS device
- Camera
- Thermometer
- Tape measure
- Q-beam rechargeable spotlight
- Kit for testing water chemistry

## Spring Site Visit: Spawning

Check possible sites in the spring when water temperatures are appropriate for spawning. Spawning generally begins when water temperatures are between 5° and 10°C and peak at 7-8°C. Look for fast-moving water in rivers and creeks, and lake shoals exposed to the predominant wind.



### **FACT**

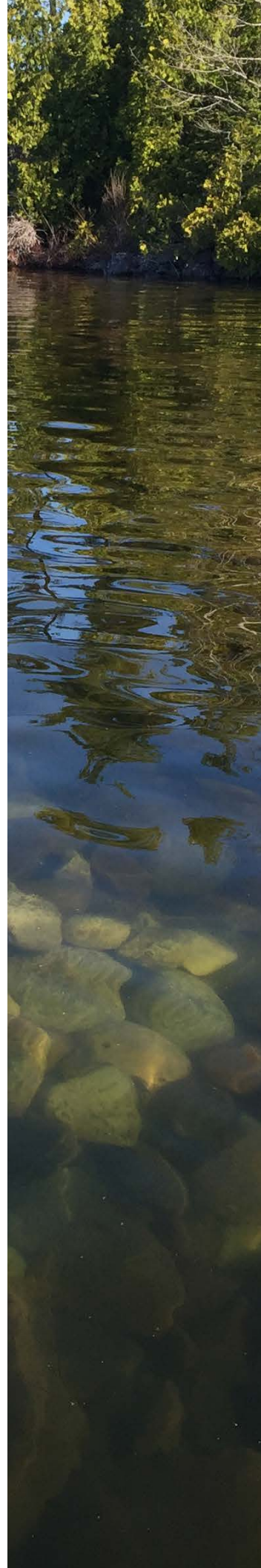
Peak spawning temperatures usually occur in April in eastern Ontario.

### *Ideal walleye spawning parameters include<sup>3</sup>:*

- Water temperature: spawning begins between 5-10°C and peaks at 7-8°C
- Water depth: 30 cm - 3 m
- pH: above 5.1
- Dissolved oxygen: 5-6 mg/L
- Water velocity: 0.2-0.3 m/s







**Walleye spawn at night. When you are ready to assess spawning in your prospective site:**

- Use high-intensity lights, such as the Q-beam rechargeable spotlight, to see them. (The light will reflect off their eyes)
- Count and record the number of walleye seen in the spawning bed
- Record and compare as many of the ideal walleye spawning parameters (above) as possible
- Repeat two-hour intervals on several different days during the spawning period

**Summer Site Visit: Low Water Levels**

You will also need to inspect the spawning bed when water levels are low (usually in August) to evaluate the condition of the substrate. If possible, take photos so that experts can assess whether the bed needs enhancement.

**In river habitats, look for the following conditions:**

- Rock rubble (about 4-12 inches in diameter)
- Large boulders for fish to rest behind
- Migration barriers from the river to the spawning area, such as beaver dams, blocked culverts, or constrictions causing excessive water velocities; determine whether the barrier can be removed
- In-stream cover for walleye fry, such as logs or branches that do not impede fish movements

**For lake habitats, ensure that the shoal:**

- Is exposed to the predominant wind and wave direction
- Is not covered in silt or algae

Although silt and algae can be washed off, determine the source; silt and algae will accumulate again on the rocks in a few years and the walleye will not spawn on the shoal. Examine the tributary upstream of the spawning bed for evidence of the silt source.

There are several possible causes for silt accumulation. Table 1 outlines some of these causes and mitigation strategies.

**Table 1: Causes and Mitigation Strategies for Silt Accumulation**

Cause of Silt Accumulation	Mitigation Strategies
Erosion (particularly from farmlands & lakeshore cottage lawns)	Plant native trees and shrubs along the shoreline
Cattle accessing water	Fence cattle away from waterbody
Road runoff from highways and bridges	Dig settling ponds
Heavy applications of commercial fertilizer	Build buffer strips of vegetation or streamside non-till setbacks
Discharges from wastewater treatment plants	Advise the Ministry of the Environment and Climate Change

Cause of Silt Accumulation	Mitigation Strategies
Over-aged or faulty septic systems	Encourage lake associations to initiate a voluntary septic re-inspection program and cottagers to pump their septic systems every three years

Consult your local Conservation Authority or MNRF office for more information about these mitigation strategies. If you don't have the ability or resources to solve the source of silt accumulation, consider choosing a different site

### Accessibility

When visiting sites, also consider accessibility for equipment. You will need somewhere to stockpile rocks and wash them without allowing the silt to run off into the water (this may be two separate locations). You may also need road access for heavy equipment, such as loaders and cranes, if rocks can't be moved manually.

### 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:**

- Water depths
- Islands
- Shoals
- Creeks (including the direction of water flow)
- Predominant wind direction during spawning (if applicable)

### Is Enhancement Needed?

After the site visits, consult with the MNRF fisheries biologist to determine if the walleye spawning bed requires enhancement.



Figure: Map indicating locations of walleye spawning bed enhancements on Dalhousie Lake.





## 05. Plan your Project

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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.

### 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 warm-water lakes from mid-March to the beginning of July in MNRF Kemptville District. For cold-water lakes, no work is allowed from October to mid-May. There are a few lakes that have both warm-water and cold-water fish species where no work is allowed from October to the beginning of July. Check with MNRF for information about restriction periods where you will be doing your project.
- **Season:** walleye spawning bed enhancement can be completed in summer after July 1 or in winter. However, operating in winter requires different equipment and safety steps. Projects in warm-water lakes may also be possible in autumn. Refer to the Implementation section for more information.
- **Materials and equipment:** order material and reserve equipment well in advance of implementing the project to ensure availability.
- **Permits:** permit approval can take 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 walleye spawning bed enhancement:*

- Silt curtain (enough to surround the spawning bed)
- Floats and chains to attach to the silt curtain
- Chest waders (if water at site is shallow)
- Small boat and motor (if water at site is deep)
- About 100 feet of rope
- Stakes (optional)
- Round rock, 4-12 inches in diameter (40 tons needed for 1,500-sq.-ft. spawning bed)
- 10 boulders, about 3-4 feet long and 12-14 inches high
- Plywood (if using heavy equipment on roadways)
- Reflective flagging tape (winter only)
- 5- to 6-foot evergreen trees (winter only)



Determine whether a local quarry has the correct size of rock available, preferably round (river run) and washed (no silt). Silt curtains can be purchased from a supplier such as Geosynthetics.

**Equipment required:**

- GPS device
- Water pump or high-pressure hose
- Thermometer
- Truck and trailer
- Skid steer, high-hoe, loader, or crane
- Barge or pontoon boat, at least 21 feet long (summer only)
- Life preservers and boat safety equipment (summer only)
- Ice safety equipment, including floater suits, ice picks, an ice spud, floating heaving safety rope, and a cell phone or radio (winter only)
- Ice auger (winter only)
- Snowmobile or ATV (winter only)
- Q-beam rechargeable spotlight
- Underwater camera

The use of trucks, trailers, skid steers, high-hoes, loaders, and cranes to move rocks depends on the requirements of your site. Rocks can also be moved manually.

**Other items:**

- Map and aerial photography
- Required permits


**Volunteers**

Walleye spawning bed enhancements require 5-8 volunteers capable of physical labour.

**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 whether you need heavy equipment. Walleye spawning bed enhancement projects range from about \$5,000 up to \$15,000.

 **QUICK TIPS**

A 1,500-sq.-ft. spawning bed enhancement using a high-hoe and a boat costs about \$5,500. A 3,000-sq.-ft. spawning bed enhancement using a loader and a crane costs \$10,000-\$15,000.





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 2 shows approximate costs for rental equipment and material.

**Table 2: 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	\$1 each (wooden stakes); \$5 each (metal T-bar stakes)
Round rock	\$30 per ton
Boulders	\$45 per ton (each stone weighs about 1 ton); delivery charges vary
Plywood	\$50 for a 8 foot x 4 foot sheet
Reflective flagging tape	\$7 per 150 feet
Small evergreen trees	Usually free from Christmas tree suppliers
GPS device	\$500
Water pump	\$50 per day or free from local fire department
Thermometer	\$20
Truck and trailer	Provided by project organizers or volunteers
Skid steer, high-hoe or loader	\$140 per hour; \$500 delivery (depending on distance)
Crane	\$150-\$200 per hour; \$500 delivery (depending on distance)
Barge or pontoon boat	\$150 per day; \$100 delivery (depending on distance)
Small boat and motor	\$110 per day
Life preservers, chest waders and boat safety equipment	Provided by volunteers
Ice auger	\$75 for manual ice auger; \$500 for gas ice auger
Ice safety equipment	Provided by volunteers
Snowmobile or ATV	\$100



Item	Approximate Cost
Q-beam rechargeable spotlight	\$230 for eight hours (weekend rate); \$2,000 security deposit
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:*

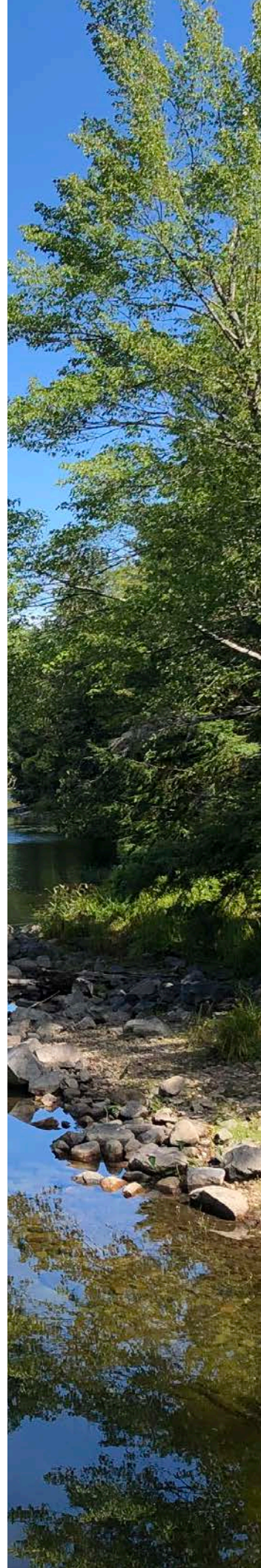
- What do you want to do?
- How are you going to do it?
- Who are you working with?
- When are you doing this work?

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

### Create a Budget

*Creating a budget will allow you to document:*

- What resources you already have
- What you're 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 \$10,400, including both cash needs and in-kind donations. The project's five partners are contributing a total in-kind value of \$6,200. This project requires an additional \$4,200 in funding.

**Table 3: Sample Project Budget**

Item	Description	Total Cost	Cash	In-Kind	Source
<b>Materials and Supplies</b>					
Rock	40 tons @ \$30/ton	\$1,200	\$700	\$500	ABC Company
Water pump	3 days @ \$50/day	\$150	\$0	\$150	ABC Tree Nursery
High-hoe	21 hours @ \$140/hour plus \$500 delivery	\$3,440	\$2,500	\$940	ABC Rental and Trucking
<b>Human Resources</b>					
Installation labour	125 hours @ \$20/hour	\$3,360	\$0	\$3,360	ABC Lake Association
Project manager	40 hours @ \$25/hour	\$1,000	\$1,000	\$0	ABC Stewardship Council
<b>Other</b>					
Travel	1,000 km @ \$0.45/km	\$450	\$0	\$450	ABC Stewardship Council
<b>Administration</b>					
Overhead (computers, bookkeeping, etc.)	10% of total project cost	\$800	\$0	\$800	ABC Stewardship Council
<b>TOTAL</b>		<b>\$10,400</b>	<b>\$4,200</b>	<b>\$6,200</b>	



## Local Partners

Local partners such as fish and game clubs, conservation organizations, 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

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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?***

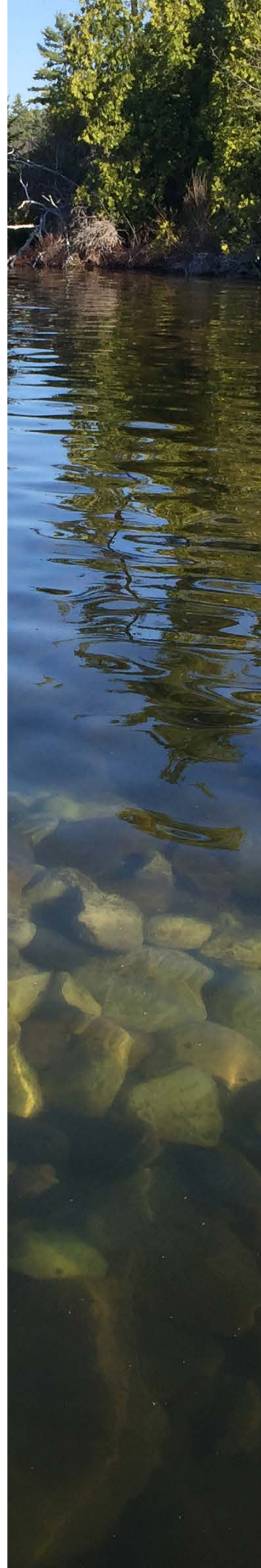
Different audiences and purposes may require different communications tactics, such as phone calls, emails, newsletter articles, one-on-one meetings, presentations, or media releases. Consider which tactics will be most effective with each audience.

#### ***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 lake 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
- Attending their meetings
- Phone calls and one-on-one meetings
- Presenting information at the annual lake association meeting
- Annual Lake Links workshop (eastern Ontario only; visit [Watersheds.ca](http://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 to gain greater coverage of your project's success.







# Implementation

## Order Material and Equipment

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Order material and reserve equipment well in advance of implementing the project to ensure availability. Trained flag people may be required to direct traffic if part of a road is closed for heavy equipment; this can be arranged with the municipality or county road staff.

## Stockpile Rock

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Locate a suitable and accessible property to have rock stockpiled, if needed. Obtain permission from the landowner, and consider if the rock can be easily loaded and transported to where the equipment will be used to place the rock on the spawning bed.

The rock may be washed where it is stockpiled. Wash the rock with a water pump or high-pressure hose at a location where the silt from the rocks will not run off into the water.



Crane being set up to lower rock to walleye spawning bed from a bridge. (Plywood protects the road.)



Clean, washed rock is stockpiled before being loaded onto a crane bucket to lower into the spawning bed.

## Install a Silt Curtain

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If your project takes place in summer, 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:*

- 5-8 volunteers capable of physical labour
- Silt curtain (enough to surround the spawning bed)
- Floats and chains to attach to the silt curtain
- Chest waders (if water at site is shallow)
- Small boat and motor (if water at site is deep)
- About 100 feet of rope
- Rocks about 1-2 feet long (only if additional weight is needed to hold the silt curtain in place)
- Stakes (optional)

#### STEP 1

Measure the circumference of your spawning bed 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

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#### Place the curtain around the spawning bed.

If the water is shallow enough to walk through: have volunteers in chest waders encircle the spawning bed with the silt curtain. Tie the silt curtain securely to a structure, tree, or stake on shore. If water flows are strong and the silt curtain will not stay in place on its own, weigh the curtain down with rocks.

If the water is too deep to walk through: tie or stake the silt curtain to shore, then back a boat around the spawning bed, releasing the curtain out of the boat's bow. You may need to weigh the curtain down with rocks to keep it in place.

### STEP 4

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Leave the silt curtain in place for 24 hours after the spawning bed enhancement is complete to ensure that all the silt has settled to the bottom of the waterbody. This is particularly important if you use heavy equipment in the water.



Adding the floats and chains to a new silt curtain.



Installing the silt curtain around the work site.



# Transport and Deposit Rocks

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Once the silt curtain is in place, you are ready to enhance the spawning bed. Approaches to transporting and depositing rocks will vary depending on the equipment you're using.

## **What you'll need:**

- Required permits
- 5-8 volunteers
- GPS device
- Round rock, 4-12 inches in diameter (40 tons needed for a 1,500-sq.-ft. spawning bed)
- 10 boulders
- Water pump or high-pressure hose
- Skid steer, high-hoe, loader, or crane
- Truck and trailer
- Plywood (if using heavy equipment on roadways)
- Barge or pontoon boat, at least 21 feet long (if needed to move the rock to the site)
- Life preservers and boat safety equipment
- Skid steer or loader (optional if brush piles can be lifted manually)
- Barge or pontoon boat

### **STEP 1**

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If the rock could not be washed where it was stockpiled, use the water pump or high-pressure hose to remove any silt from the rocks. Be sure to do this somewhere far enough away from the waterbody so that the silt does not flow into the water.

### **STEP 2**

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Transport the rocks to the spawning bed location. You may need to use a truck, trailer, or boat, depending on the location of your stockpile.

### **STEP 3**

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**Deposit the rock material on the spawning bed. This can be done manually or by using heavy equipment.**

If you're using a crane: transport the rocks from the trucks to a loader to a crane bucket, which enables a wide distribution of rock over the site.

If you're using a high-hoe: Pile the washed rock near the edge of the water. Use the high-hoe to move the rock into the water. The high-hoe can create a rock road to enable it to reach all areas of the spawning bed and then remove the road as it finishes the project. This ensures that the high-hoe is not travelling along the existing substrate.





#### STEP 4

Using a high-hoe or crane, scatter the boulders throughout the spawning bed to provide resting areas for the spawning walleye.

#### STEP 5

After 24 hours, remove the silt curtain.

## Winter Conditions

If you are implementing this project in winter, ensure that ice conditions are safe and that all volunteers wear proper ice safety equipment.

Visit [HydroOne.com](http://HydroOne.com), [RedCross.ca](http://RedCross.ca), and [LifeSavingSociety.com](http://LifeSavingSociety.com) for information about snowmobiling and general information on ice safety. Ice safety training courses are available from [WildernessSafetySystems.com](http://WildernessSafetySystems.com).

### ***What you'll need:***

- Required permits
- 10-15 volunteers
- Ice auger
- Washed rocks
- Trailers to attach to snowmobiles and ATVs
- Snowmobiles or ATVs
- Stakes
- Reflective flagging tape
- 5- to 6-foot evergreen trees (4-6 per spawning bed)
- Ice safety equipment: floater suits, ice picks, an ice spud, floating heaving safety rope, & a cell phone or radio



Instead of using a trailer, you can pile rocks on an old car hood and attach it to your snowmobile or ATV. Car hoods are easily obtainable at junkyards.



#### STEP 1

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Using the ice auger, ensure that there is adequate ice to support the weight of your equipment and materials. There should be at least 7-10 inches of ice for a snowmobile or ATV. You also need to consider the weight of the rocks.

#### STEP 2

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Using an ATV or snowmobile and attached trailer, pull rock material to the site. Deposit the rocks above the spawning bed; they will sink as the ice melts.

#### STEP 3

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Mark the site with reflective tape or stakes. You can also place small evergreen trees around the walleye spawning bed to make it visible to snowmobilers.





# Evaluate Success



During the first spring following your project, return to the site to record the results of the spawning bed enhancement. Return each spring in subsequent years to evaluate the success of your project over time.

## What you'll need:

- 2-4 volunteers
- Boat (if required to get to the site)
- Thermometer
- Q-beam rechargeable spotlight
- Underwater camera (if flows are not too great and water is deep enough)
- Data sheet to record number and size of fish observed

### STEP 1

Return to the site and take the water temperature to determine when walleye spawning will occur. Peak water temperature for walleye spawning is 7-8°C.

### STEP 2

Monitor the site at night at two-hour intervals on several different days during the spawning period.

On the data sheet, record the date and time, waterbody name, water temperature, number of walleye, and their approximate size in inches or centimetres.

### STEP 3

If the water is deep enough and the flow is not too strong, use an underwater camera to document the numbers of walleye using the spawning bed.

Low numbers in individual years may be due to poor weather conditions that prevent the fish from spawning for their normal length of time. It is therefore important to continue monitoring your walleye spawning bed every spring to determine whether populations are growing.



Male walleye are usually smaller than females.







# Conclusion

Congratulations!

You've completed your fish habitat enhancement project.

For additional support, consult the Resources section and watch the Walleye Spawning Bed Enhancement video (available on [watersheds.ca](http://watersheds.ca)).



# Resources

## GOVERNMENT

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### Conservation Ontario

Protects and manages water and other natural resources in partnership with government, landowners, and other organizations.

905-895-0716

[info@conservationontario.ca](mailto:info@conservationontario.ca)

[conservationontario.ca/](http://conservationontario.ca/)

### Fisheries and Oceans Canada

Provides information and permits regulating fish habitat.

[DFO-MPO.gc.ca](http://DFO-MPO.gc.ca)

### Ontario Ministry of the Environment, Conservation and Parks

Responsible for protecting air, land and water. Contact for water quality, algal blooms, and air and water pollution.

[ontario.ca/page/ministry-environment-conservation-parks](http://ontario.ca/page/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](http://Ontario.ca/MNRF)

### Parks Canada

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

[PC.gc.ca](http://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](mailto:questions@tc.gc.ca); [TC.gc.ca](http://TC.gc.ca)

### Ontario's Invading Species Awareness Program

Provides information and resources about invasive species in Ontario.

1-800-563-7711

[InvadingSpecies.com](http://InvadingSpecies.com)

## FUNDING

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### The Green Source Funding Database

[canada.ca/en/environment-climate-change/services/environmental-funding.html](http://canada.ca/en/environment-climate-change/services/environmental-funding.html)

## SNOWMOBILING AND ICE SAFETY

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### Snowmobiling and Ice Safety

[HydroOne.com](http://HydroOne.com); [RedCross.ca](http://RedCross.ca)

[LifeSavingSociety.com](http://LifeSavingSociety.com); [WildernessSafetySystems.com](http://WildernessSafetySystems.com)

## OTHER USEFUL CONTACTS

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### Ducks Unlimited Canada (DUC)

Provides programs and services for the conservation of wetlands.

1-800-665-DUCK (3825)

[Ducks.ca](http://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](mailto:info@foca.on.ca)

[FOCA.on.ca](http://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](mailto:info@lanarkstewardshipcouncil.ca)

[LanarkStewardshipCouncil.ca](http://LanarkStewardshipCouncil.ca)

### Ontario Federation of Anglers & Hunters (OFAH)

Provides anglers and hunters with information and resources.

705-748-6324

[ofah@ofah.org](mailto:ofah@ofah.org)

[OFAH.org](http://OFAH.org)

### Watersheds Canada

Works with landowners, communities, and organizations to protect lakes and rivers by developing effective, transferable, long-term solutions.

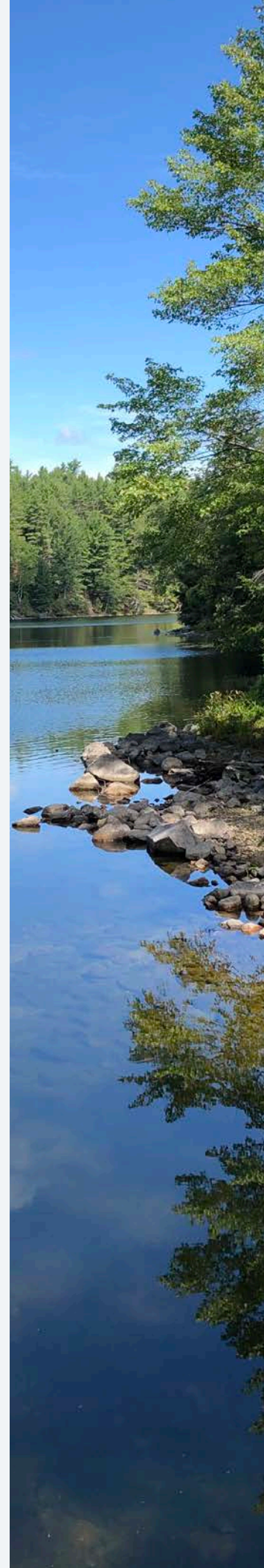
613-264-1244

[info@watersheds.ca](mailto:info@watersheds.ca)

[Watersheds.ca](http://Watersheds.ca)

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- Pinegrove Productions
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Canada

Environnement  
Canada

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Ontario Trillium Foundation



LUSH Canada Charity Pot





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