



Ducks Unlimited
Canada

A Landowner's Guide

to Wetland Restoration
in Ontario

*Planning and Caring for Restored Wetland
Habitats from Ducks Unlimited Canada*

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Canada's Leader in Wetland Conservation

Ducks Unlimited Canada is the national leader in wetland conservation. In Ontario, we've conserved more than one million acres (more than 400,000 hectares) of wetlands and adjacent habitats such as grasslands, forests and waterways.

Since 1974, we've delivered more than 5,000 conservation projects across the province. Our science-based approach to wetland conservation delivers healthy, resilient ecosystems. Our work has real-world impacts that you can walk in and wade in.

And we're just getting started. Demand for wetland restoration is rising as landowners connect healthy watersheds with clean water, flood mitigation and climate resilience.

But for all the acres conserved, even more are being lost. It's estimated that up to 70 per cent of wetlands have been lost in southern areas of Canada—and up to 95 per cent in the most populated areas.

Large-scale wetland restoration can reverse the downward trend of habitat loss and even turn it around to a net gain on the landscape—while contributing to the economy with green jobs.

Placing a high value on nature and its solutions

Wetlands are power players on the landscape, filtering sediment and helping to recharge groundwater, sequester carbon and reduce flood damage from storm and melt events. Our research shows that restored wetlands are phosphorus sinks, capturing nutrients before they move downstream to raise the risk of dangerous algal blooms.

We've also learned that the natural flood-management services of wetlands are a cost-effective complement to traditional infrastructure built to protect communities from floods. All while providing sustainable green spaces and beautiful wildlife for everyone to enjoy.

Learn more about us

A registered charity, DUC partners with government, industry, non-profit organizations, Indigenous peoples and landowners to conserve wetlands and adjacent habitats that are critical to waterfowl, wildlife and the environment. To learn more about DUC's innovative environmental solutions and services, email ontario@ducks.ca or visit ducks.ca/ontario.

ducks.ca/wetlands-at-work

Best Management Practices for Wetland Restoration

Putting Wetlands Back on the Landscape

Thank you for taking the time to learn about wildlife habitat in Ontario. The need for wetland restoration has never been greater to support a healthy, prosperous future.

This guide will help you understand how to plan and implement a wetland habitat project in Southern Ontario. You will find guidance and resources to help you, whether you are enhancing existing habitat or constructing new habitat on your land.

Welcome to the exciting world of wetland restoration. Wetlands are a natural solution to some of the big environmental problems that affect all of us—such as low water quality, extreme weather events and disappearing wildlife populations.

Wetlands are power players on the working landscape. Small wetlands punch far above their weight, capturing phosphorus and other nutrients and slowing water movement across the land. In rural and near-urban Ontario, their ecological functions complement built infrastructure for water, such as dams, culverts, agricultural drains and traditional stormwater ponds.

Wetlands are also beautiful outdoor features to enjoy in all seasons. All this, while providing essential habitat for waterfowl, other birds and wildlife of all kinds.

As we like to say, what's good for the ducks is good for us all!

Climate Resiliency • Clean Water • Flood Mitigation

Join Mary Anne Doré and DUC director Phil Holst at Heritage Hill Farms.

Watch their journey: <https://youtu.be/cKde2GPuEn0>



A Habitat Guide from Ducks Unlimited Canada

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For print readers:
You can download this guide at ducks.ca/wetlands-at-work

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Planning & Implementation

How to Get Started

This guide provides you with an understanding of basic considerations, costs, techniques and follow-up for a small wetland restoration, whether you are restoring a former wetland or creating new habitat on your land.

Up front, it's important to prepare a realistic timeline for habitat projects. When you're working around natural habitats, many factors come together to determine how and when projects can go forward. That's because weather, project size, permit processes and contractor availability can set the pace.

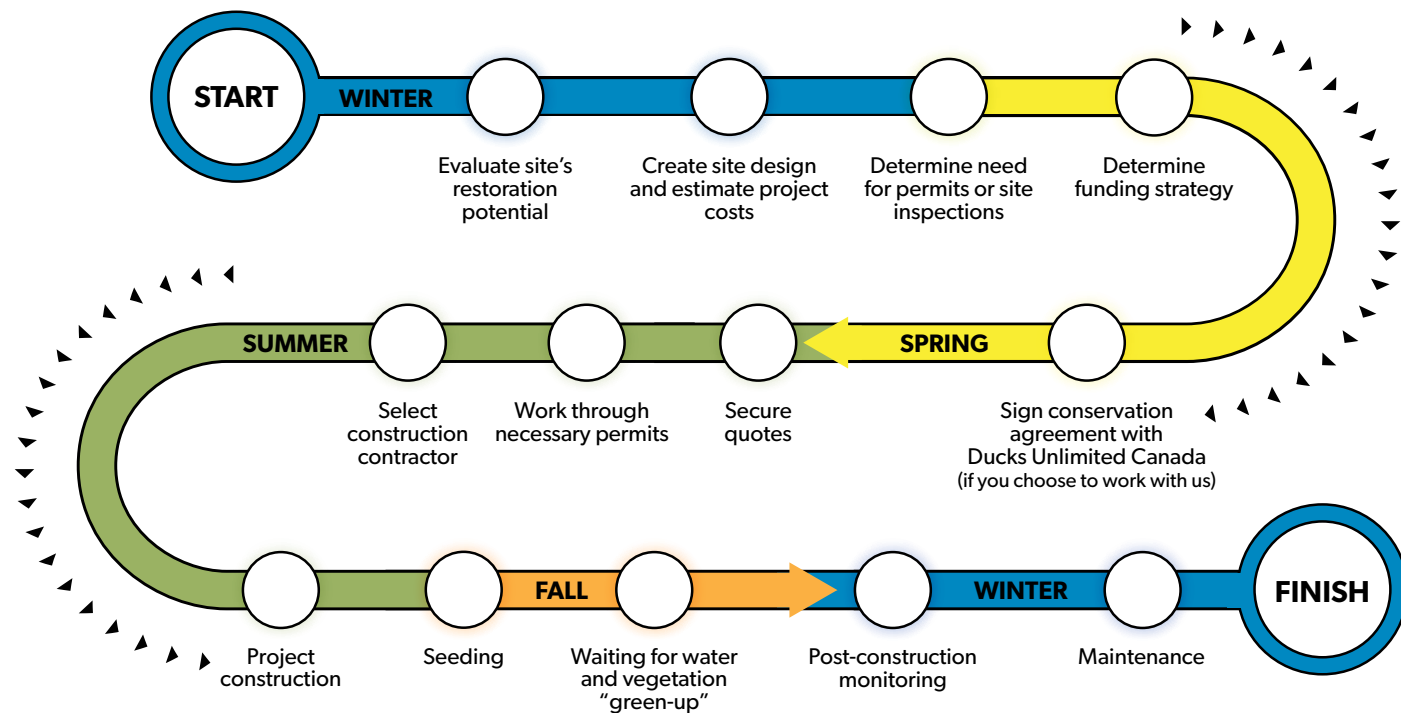
Plan for Timing and Costs

From start to finish, restoring a wetland can take more than a year to complete. To keep costs down, try to create or restore your wetland during the driest period of the year (late summer months are best) when machinery can work more quickly and efficiently.

Potential for delays include:

Seasonal	Permits	Funding	Construction	Weather
Evaluating your property's potential for restoration	Time for site visit (if needed) and administration	Sourcing financial support (if desired)	Availability of knowledgeable contractor	Inclement or very wet weather

Create a timeline



Estimate project costs

The site's location, size and complexity will determine the costs of the restoration. Typical overall expenditures for small wetland restorations range widely (i.e., from \$15,000 to \$25,000) and may be covered by the landowner or shared among funding partners if grants are available.

It's important to secure a contractor with experience in the field so you can have confidence in both the estimate for the job and their ability to create functional habitat—not just a hole in the ground.

Factors that affect costs:

- Size of the overall project
- Timing of construction phase
- Distance to remove or relocate fill material
- Contractor availability and proximity
- Soil moisture conditions
- Construction techniques
- Fast-tracking native vegetation

You can wait for native vegetation to develop naturally over a few years, or you can invest in seeds and plugs, which are small shoots ready for planting, that "fast-track" the greening process.

Where to seek funding assistance

Community funding:

There are programs in many communities that pay a portion of the costs to encourage habitat restoration (e.g., wetland, forest, grassland).

Find community contact information:

Find Your Conservation Authority
(Maintained by Conservation Ontario)
<https://conservationontario.ca/conservation-authorities/find-a-conservation-authority>

Find Your Municipal Offices
(Maintained by Province of Ontario)
<https://www.ontario.ca/page/list-ontario-municipalities>

Grants and funding programs:

Ducks Unlimited Canada
Partial funding for habitat projects that meet conservation goals
ducks.ca/wetlands-at-work

East Central Farm Stewardship Collaborative (ECFSC)
ecfarmstewardship.org

Ontario Soil and Crop Improvement Association
ontariosoilcrop.org

Managed Forest Tax Incentive Program
ducks.ca/resources/landowners/managed-forest-tax-incentive-program-wetland

Alternative Land Use Services (ALUS)
alus.ca/communities

Rural Water Quality Programs / Clean Water Programs
Contact your local conservation authority.





Working with Ducks Unlimited Canada

We work with landowners to create or enhance wetland and grassland habitats where restoration of the landscape is most needed. Our mission is to conserve, restore and manage wetlands and adjacent habitats, which together create healthy ecosystems. While our focus is on habitat for ducks and other waterfowl, these same habitats have many other benefits for water, wildlife and communities.

Our programs and partnerships support conservation projects that are committed to providing wildlife habitat. For this reason, we require landowners to sign a Conservation Agreement with us for a selected number of years. The agreement protects the habitat but does not interfere with the owner's current use and enjoyment of the property.

DUC collaborates with conservation authorities, stewardship councils, local governments and landowners to implement new wetland conservation projects. Our contributions include project identification, site suitability assessments, biological assessments, project design support, assistance with permit processes and requirements, and sourcing "match" funding for habitat projects that meet mutual conservation goals.

Habitat conservation projects include restoration and enhancement work (i.e., small wetland excavations and small impoundments) and support for existing wetland habitats through programs such as nest boxes, agricultural Best Management Practices (BMPs) and other wetland securement tools.

You can find out more about us on our website or contact us directly to arrange to speak with a conservation specialist about your land.

Resources

Finding the right information

Conservation Ontario

Represents Ontario's conservation authorities, which are local watershed management agencies.

Call: 905-895-0716

conservationontario.ca

Find your Conservation Authority

conservationontario.ca/conservation-authorities/find-a-conservation-authority

Ducks Unlimited Canada

Coordinates with landowners to fund, design and implement wetland restoration.

Call: 705-721-4444

ducks.ca/wetlands-at-work

Municipalities

List of municipal offices maintained by the Province of Ontario with a direct link to the website.

www.ontario.ca/page/list-ontario-municipalities

Northern Development, Mines, Natural Resources and Forestry

Responsible for management and protection of natural resources and wildlife.

ontario.ca/wildlife-and-nature

Find Your Regional District Office

www.ontario.ca/page/ministry-northern-development-mines-natural-resources-and-forestry-regional-and-district-offices

Site Selection for Wetland Habitat

A wetland is an area that is covered with water for all or part of the year, and where the water table is at or near the surface. All wetlands have three main characteristics: hydric or "water-holding" soils, a source of water (permanent or seasonal) and wetland-dependent vegetation.

Restoring wetland habitats

A typical site for small-wetland excavation is a poorly drained or wet area, in a field or near the edge of a wood lot. The site must be attractive to wildlife and, ideally, set apart from buildings to limit disturbance from human noise and activities, and domestic animals.

Restoring a drained wetland

Are you restoring a wetland that was drained by an open ditch or installation of a tile drain? Restoration may be as simple as filling in the ditch or cutting a tile. You must contact your municipal public works team to ensure you are not interfering with a municipal drainage ditch. These systems are built under by-law to facilitate drainage of farmlands and can't be blocked. However, drainage ditches constructed by private landowners without financial assistance from the municipality can be blocked, as long as you do not flood any land beyond your property boundary.

Keystone features for suitability

A site with impermeable soil (i.e., clay or silty loam) and very little slope is a candidate to consider for wetland restoration. The best time of year for site inspections is during spring runoff so you can see clearly where water flows across and where it lies on your land.

Soil type: A soil probe test or test hole will tell you what kind of soil is at the site.

A site suitable for wetland restoration is characterized by:

- Hydric soils (soils that will hold water for part or all of the year)
- Flat or very gently sloped (flat sites are best)
- Poorly or imperfectly drained areas (contouring that can contain water)
- Water source (seasonal or permanent surface water or groundwater)
- Previously drained wetlands are excellent opportunities

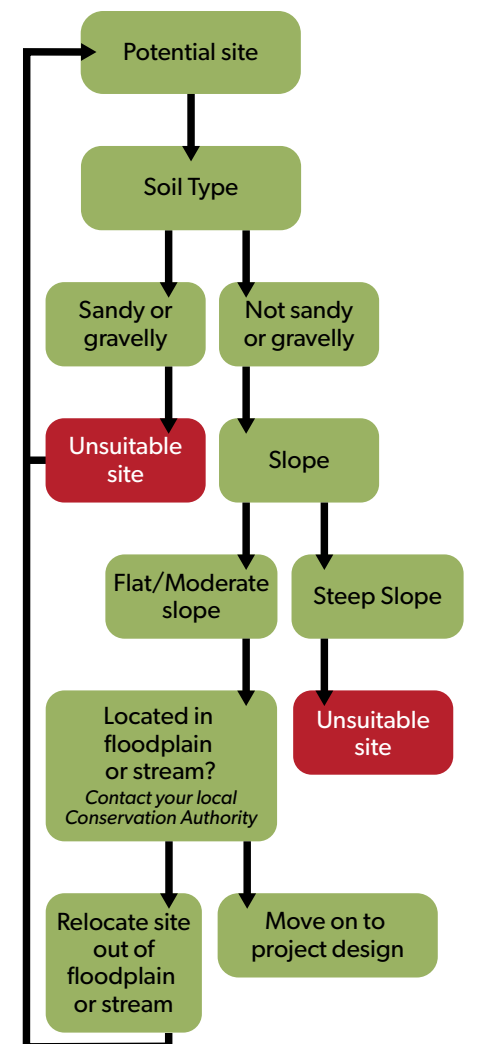
Site features to avoid

Wetlands cannot be built inline or directly within a flowing creek or other watercourse, by regulation.

- Coarse-textured soils (i.e., sand, gravel) do not hold water well
- Sites within existing defined watercourses (permanent or intermittent)
- Areas adjacent to roads or other human disturbance
- Sites with a steep grade
- Areas where flooding could affect a neighbouring property

Small wetlands are not fishponds

Wetland restoration projects are typically shallow which is not always suitable for fish.

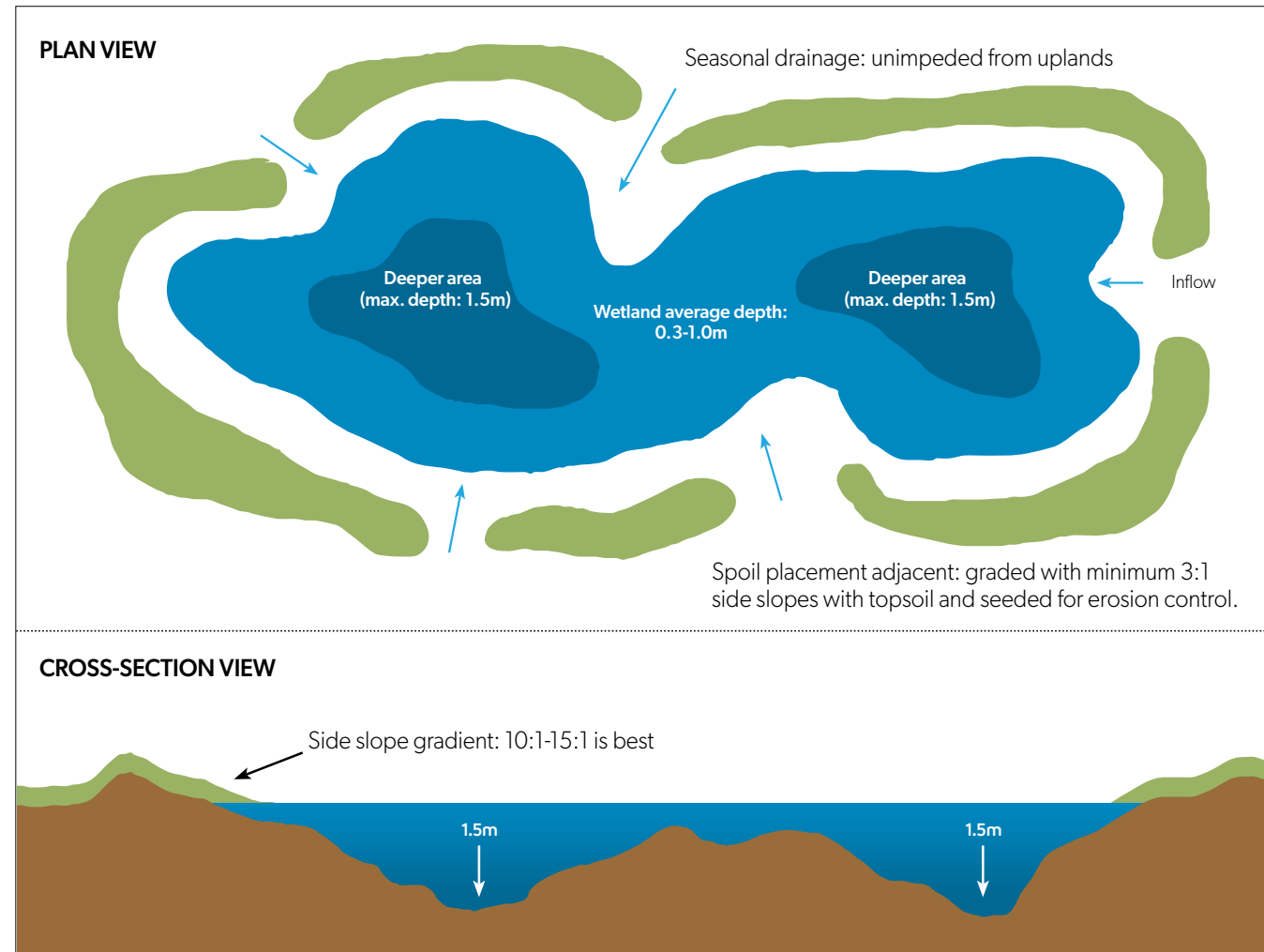


Habitat Project Design

General principles for small wetland design

The technical information in small wetland design is the difference between a shallow pond and functional wildlife habitat.

We encourage everyone to consider consulting a conservation professional before moving forward with design and construction.



Factors in wetland project design

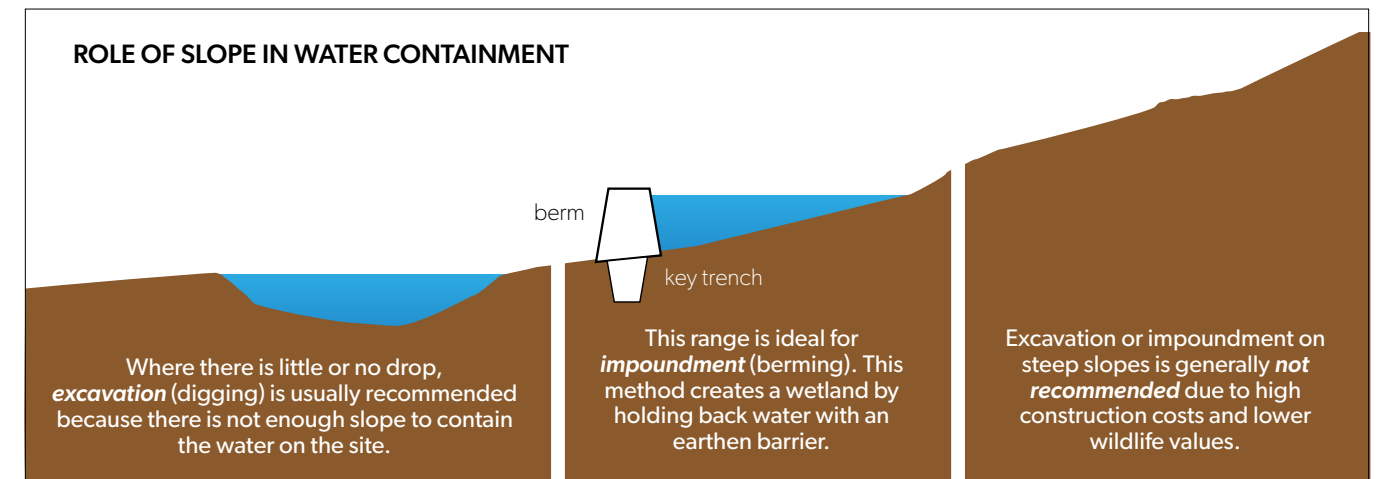
Water volume in the catchment area

The area that provides the water flowing into the wetland is the “catchment”. This is an important consideration because the volume of water entering the wetland will determine how long it will take to fill, how long it stays full, and what sort of spillway or outlet, if any, is required to prevent overflowing during extreme weather events.

The catchment area is difficult to estimate without experience. You can get an idea of potential water volume by inspecting the area during spring runoff or by the size of road culverts directly upstream and downstream of the site.

Slope at the project site

The slope at the site is a key determinant for water containment. Where there is little to no drop, excavation will help create a containment area. Where there is a drop of 0.6 to 1.2 metres (2-4 feet), impoundment (or berming) will hold back water with an earthen barrier. Excavation tends to be a more expensive option particularly when fill removal is factored into the costs.



Scope of the wetland project

Larger wetlands (i.e., two hectares or five acres and larger) are often more permanent and diverse, providing brood rearing habitat for waterfowl and meeting the life cycle needs of many wildlife species.

Irregular shoreline

Irregular shorelines strongly enhance the habitat's attractiveness to wildlife. Good habitat includes small bays and points of land that optimize the “edge community,” encouraging mixed vegetation which also enhances the beauty of the habitat.

Excavated side slopes

Gentle shoreline slopes (10:1 to 15:1) are required to provide shallow edge habitats for plants and wildlife. Gentle side slopes are also safer for people near the wetland.

Water depth

Variable water depths within the wetland form the basis for biodiversity. A mix of habitats will attract a mix of wildlife, including insects, frogs, turtles, birds and mammals. Adding deeper zones provides sunlight and open-water habitat for wildlife, as well as over-wintering habitat for turtles and frogs.

Emergent vegetation can overgrow in a too-shallow design, forming a monotypic stand with reduced diversity for wildlife. If the wetland is too deep, vegetation communities can be flooded and fail to thrive.

- **Sunny location with limited water supply:** Consider depth of at least one metre (three feet) in some areas.
- **Shaded location with good water supply:** Shallower habitat may be sufficient.

Plant communities

The ideal ratio of open water to emergent-vegetation communities is 50:50. Ratios are adequate at 60:40 or 70:30 but less beneficial. Submerged and floating native plants in interspersed aquatic communities shelter wildlife, stabilize aquatic soils, and filter sediments and nutrients from the water column. All these functions improve water quality.

Spoil material

Spoil material must be graded with a minimum 3:1 side slope for both safety and erosion control. Construction disturbance should be minimized, and erosion-control seed mix distributed on all disturbed areas as soon as possible—reducing both erosion and habitat disruption.

Wetland buffer

A minimum 3-5 metre (10-16 foot) buffer of natural or planted permanent native vegetation will prevent land-use intrusions into the habitat. Both the buffer and wetland edges can be enhanced with suitable native trees and shrubs and the addition of loafing logs or large rocks will improve the site's value for wildlife.

Capture basin for excess sediment in inflow water

Small wetlands located where there is a tile-drain outlet, open private ditch, or area of intermittent surface-water flow coming into the wetland are strong candidates for integration of a sediment trap to help water quality and protect the wetland.

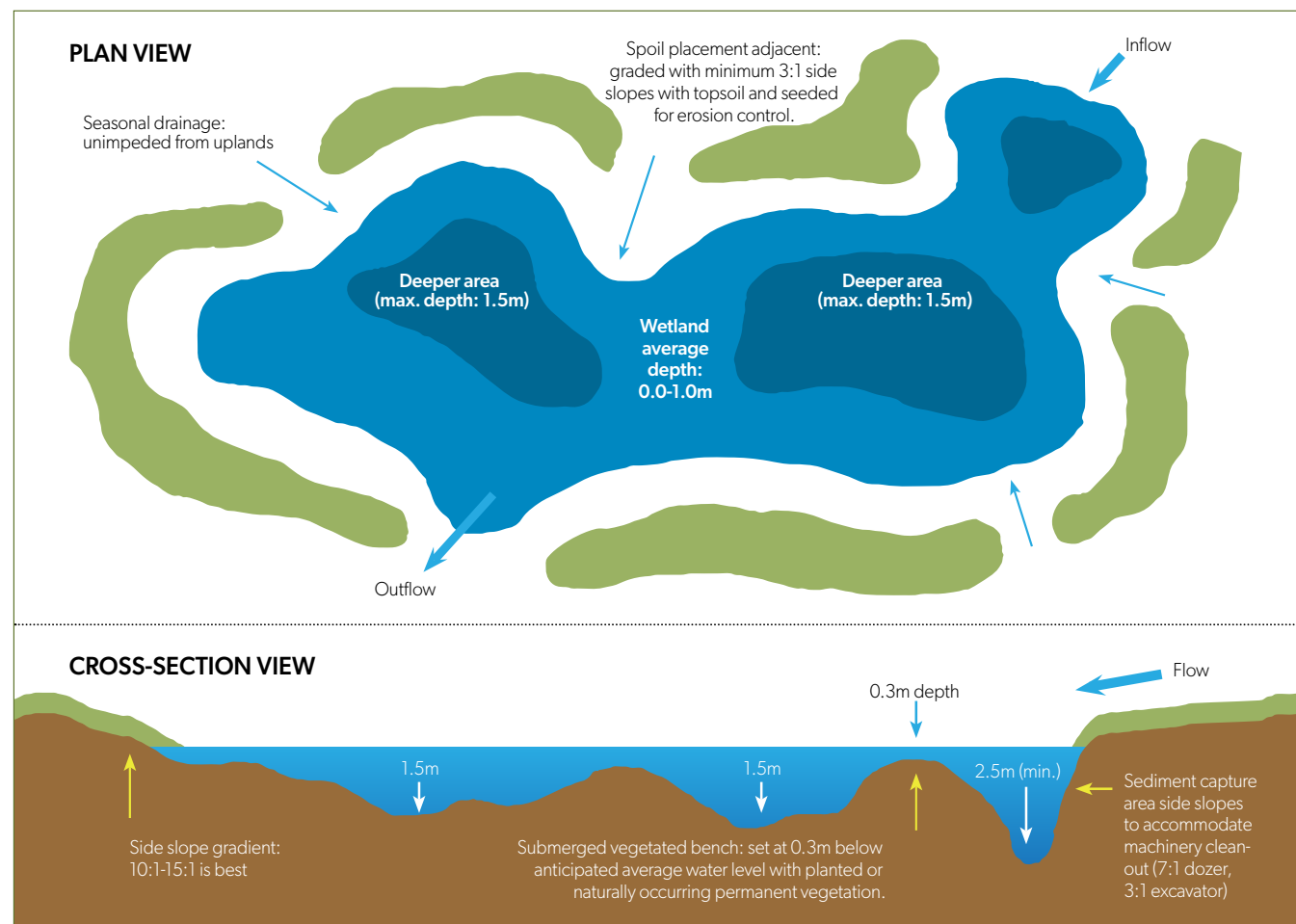
Sediment capture areas extend the life expectancy of a wetland that could otherwise quickly fill with sediment. Too much sediment flowing into a wetland reduces the sunlight that penetrates the water column and can bury aquatic soils and vegetation.

Sediment can also contain excess nutrients such as phosphorus, which can be released by water movement and cause overgrowth of vegetation or harmful outbreaks of blue-green algae in the wetland or in downstream waterways.

The design can be included in a new wetland restoration or retrofitted to an existing small wetland. The sediment capture basin size must be a minimum 10 per cent of the adjacent wetland area and deeper than the wetland itself. A submerged bench of native ground retained between the basin and the wetland captures the sediment while allowing water to flow over into the wetland.

The basin design must anticipate periodic removal of the residual sediment when accumulation reduces the average water depth above the sediment to 1.5 metres or less, within two to four years. Side slopes are recommended at 3:1 (excavator) or 7:1 (dozer).

Sediment moves downslope and into wetlands at a rate dictated by variables such as soil type, topography and land use. An effective design must account for the anticipated in-flow volume and sediment loading in the water.



Seeds of success for biodiversity

Water depth will determine what type and how much vegetation grows in the wetland. Native plants form the basis of the wetland food chain, providing a mix of habitat and food for wildlife and helping to keep your wetland highly functional. Broadly speaking, three months of flooded conditions are needed for insects and amphibians to survive in the habitat.

In most of Southern Ontario, naturally occurring seeds in the air, soil and water will take hold in the new wetland habitat over just a couple of growing seasons. The aquatic plants that germinate on their own are likely to be well adapted to the wetland.

You can hurry up the greening of the habitat with seeds, plugs or plants from nurseries that sell native wetland species. If there is wetland habitat nearby, you can move seeds or cuttings from the plants and shrubs. Be wary of transferring soils with invasive plants or seeds, such as purple loosestrife or *phragmites australis*, which can spread rapidly and prevent native plants from thriving.

Native plant sources

Following are some of the Ontario nurseries that carry authentic native plants.

Ferguson Tree Nursery
fergusontreenursery.ca

Grow Wild!
nativeplantnursery.ca

Somerville Seedlings
treeseedlings.com

Natural Themes Native Plant Nursery
naturalthemes.com

Pineneedle Farms Inc.
pineneedlefarms.ca

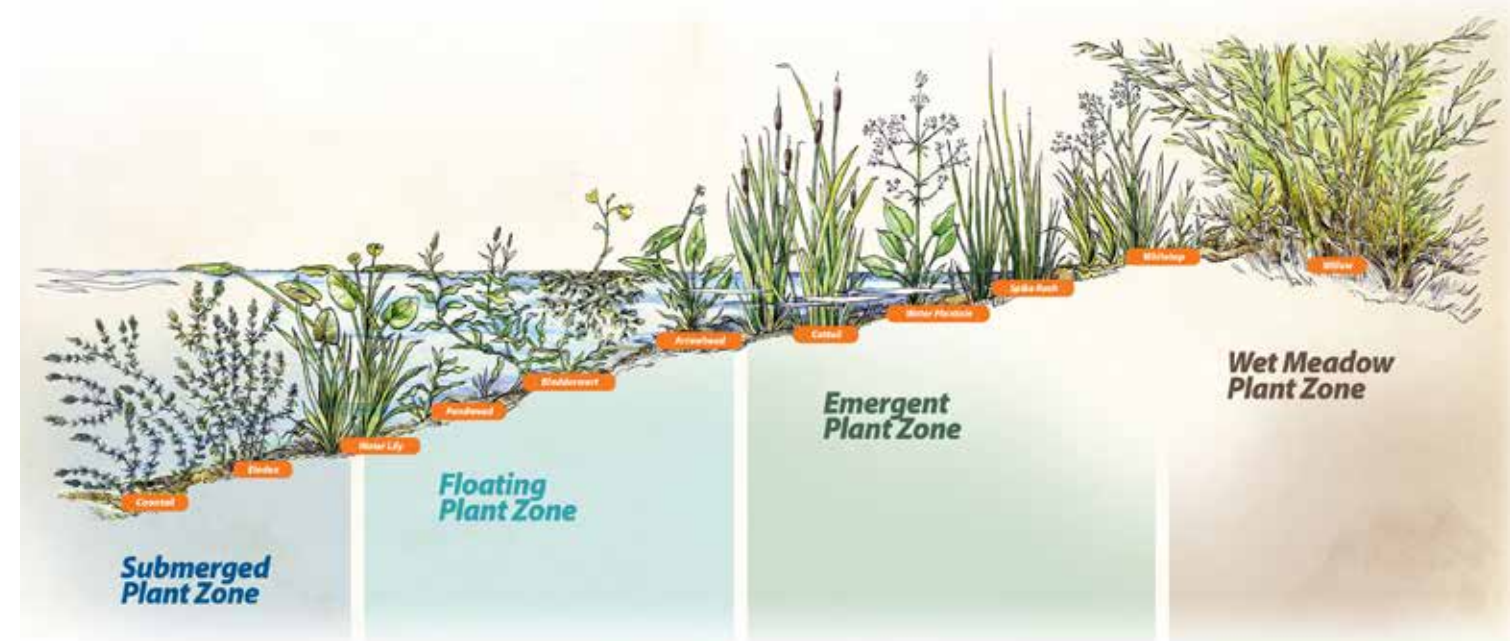
Golden Bough Tree Farm
goldenboughtreefarm.ca

Verbinnen's Nursery Ltd.
verbinnens.com



Variable water depths within the wetland form the basis for biodiversity. A mix of habitats will attract and support a mix of wildlife.

Native wetland plant communities at various depths



Regulations and Permits

Bear in mind that small wetland projects may require authorization from municipal and/or provincial agencies such as the local conservation authority. Be sure to confirm your situation before you move forward with your plans.

Regulations are in place in Ontario to preserve fish and wildlife habitat, protect species at risk of endangerment, manage the capture or blocking of surface water, and oversee the landscape's vulnerabilities to seasonal or other types of flooding within a watershed.

Some municipalities require Site Alteration Permits or other measures for wetland projects. Special protections may also apply if your property is in the jurisdiction of region-specific management such as the Oak Ridges Moraine Act or the Niagara Escarpment Commission.

Legislation that may be relevant to your project:


Legislation	Purpose	Oversight
<i>Conservation Authorities Act</i>	Watershed management	Ontario Ministry of Environment, Conservation and Parks
<i>Drainage Act</i>	Agricultural benefit	Ontario Ministry of Agriculture, Food and Rural Affairs
<i>Endangered Species Act</i>	Wildlife protection	Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry
<i>Fisheries Act</i>	Aquatic ecosystem protection	Fisheries and Oceans Canada
<i>Lakes and Rivers Improvement Act</i>	Waterways protection	Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry
<i>Species at Risk Act</i>	Wildlife protection	Environment and Climate Change Canada and Fisheries and Oceans Canada

Construction Techniques

The main goal of construction is to contain water and the site slope, or rise, determines whether excavation or impoundment is the best course to create functional wildlife habitat.

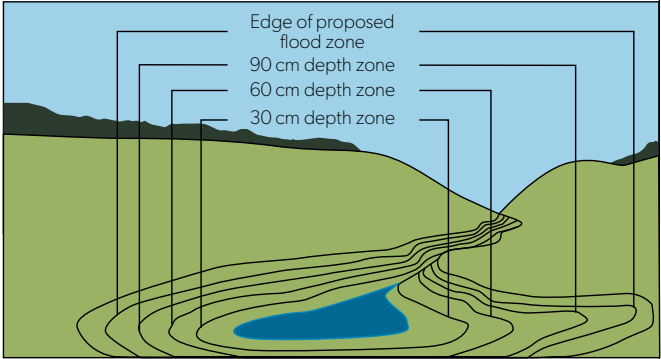
Considerations for optimal vegetation

In general, emergent vegetation (plants you see above the water) will grow in water depths of one metre (3 feet) or less. The vegetated area should cover 25 to 50 per cent of the wetland surface area and 25 to 50 per cent of the surface area should be one metre or more in water depth to ensure some deeper-water habitat is available. Creating these depths will form an ideal mixture of vegetation types and open water areas.



Contour Survey Determines Wetland Size and Depth

Contours of Wetlands: Each depth of water supports different plant species. A surveyor's level is used to determine exactly the water depths, and where the shoreline will be.



Edge of proposed flood zone
90 cm depth zone
60 cm depth zone
30 cm depth zone

Using a Contour Survey to Determine the Wetland Size and Depth: Raising the water level on a smaller wetland will increase the area of the surface water and create zones of varying depths which will diversify plant species.

Excavated small wetlands

For flat sites, excavation will help create a containment area for water.

Considerations for bringing in heavy equipment

We encourage everyone to consult a conservation professional at Ducks Unlimited Canada or a conservation authority before moving ahead with wetland restorations.

- You (or a conservation professional) may need to oversee the construction activity.
- The operator or contractor should be experienced with verified understanding of restoration goals and techniques.
- Provide a clear project plan in writing (i.e., depths, uneven shoreline, excavated material placement, etc.).
- Consider how the equipment will access your property for the initial construction and any potential long-term maintenance.
- Ensure that the contractor understands and complies with any permission and permits granted for the project.
- Ensure that you or the contractor confirm the location of any buried utilities on the property.



© Dairy Farmers of Canada

Kathryn and Mike Boothby welcome wildlife to their small farm north of Lake Erie with forest habitat, pollinator-friendly borders and a small wetland.

Watch their journey: <https://youtu.be/g21bIPcKICO>





Greening of the habitat in a first year, newly excavated wetland.



Native vegetation begins to fill in the habitat in a second-year wetland.



The habitat is thriving a few years after excavation for an "edge-of-field" small wetland.

© Dairy Farmers of Canada



Mature, larger habitat created with impoundment and water controls

Impounded wetlands

We strongly encourage everyone to consult a conservation professional at Ducks Unlimited Canada or a conservation authority before moving forward with design and construction of any conservation project that includes impounded water.

Considerations for creating a large wetland

For sites with a drop of 0.6-1.2 metres (2-4 feet) over 100 metres, impoundment (or "berming") will hold back water with a specially designed earthen barrier.

Small berms are constructed to hold back surface water that is already moving across the land. This technique is inexpensive to implement but requires more expertise and experience for an effective design, efficient permit process, and smooth implementation.

Permit requirements must be understood

Understanding the catchment area and immediate habitat area are critical, and you may require a topographic survey, soil test and engineered design to submit for permit approvals. That's because incorrectly impounding water can cause flooding that affects one or more properties with unintended impacts.



Bermed wetlands can be created with or without water management capabilities. A fixed-height berm with no control structure allows water to flow over an engineered spillway outlet. If a control structure is part of the berm, there is provision for changing water levels to manage out-flow allowing you to manipulate the habitat conditions in the wetland.

As the infrastructure used to restore wetland projects ages, some components—such as metal water-control structures, wooden control-structure boards and, in some cases, sections of earthen dykes—will require maintenance. A regular walk-through of the wetland area is recommended to catch any developing problems before they become large ones.

Considerations for drained wetlands

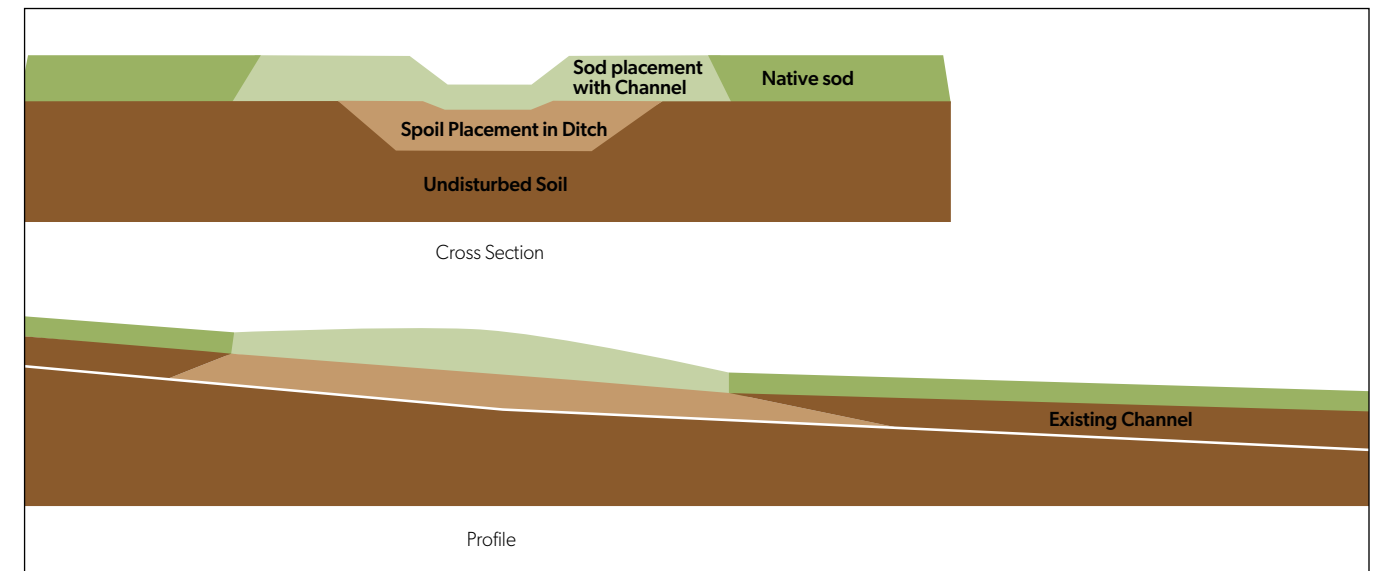
If you own a field that has been tile drained, it is possible that there were wetlands in the field before the tiles were installed. In agricultural fields that have been retired from production, it can be a simple matter to restore wetlands that used to occupy the field by breaking or "cutting" the buried field tiles.

Cutting them allows any water to remain in the wetland area. This work almost always requires an excavator. A site inspection in the early spring can help you find the low areas in the field that will be most likely to hold water. The most difficult part will be to determine where the buried tiles are located.

Checking for old tile installation maps or speaking with a drainage contractor or experienced excavator operator in the local area can help you determine the history of the land. For this technique to work properly, at least two metres (6 feet) of tile should be removed and the resulting trench filled with compacted soil.

Blocking or filling in a private ditch

Restoring a previously drained wetland is often the easiest and most cost-effective method for creating wildlife habitat on your property. If there is a ditch leading out of and draining a wetland it can be a straightforward process to block or fill in the ditch to restore the previous water levels in the wetland basin.



You must contact your municipal public works authority to ensure you are not interfering with a municipal drainage ditch which are built under by-law to facilitate drainage of farmlands and cannot be blocked.

- Inexpensive technique for restoring a wetland
- Wetland plants may already be established
- Existing seed bank of wetland-dependent plants
- Reduces downstream impacts of sediment movement with drainage
- Improves water quality with nutrient uptake by wetland vegetation

Follow-up Care and Maintenance

A professionally designed wetland that is well situated will be self-managing, for the most part. Newly sprouting wetland vegetation will take time to fill in and there may be a post-construction period when the habitat seems barren. Look closely and you will notice tracks and other signs that the habitat is already attracting wildlife.

If you continue to invest in the habitat, you will see increasing returns in the form of native wildlife and the personal rewards of time spent outdoors watching and participating in nature's changes through the seasons.

Enriching the Habitat for Wildlife



Create a shoreline buffer of native grasses and fruit-bearing shrubs to support wildlife, deter geese and enhance water quality.



Install nest boxes to support breeding success for cavity-nesting birds (e.g., wood ducks, hooded mergansers, owls, swallows).



Install bat boxes to house insect-eating bats that help with natural pest control.



Install bee nest boxes to support pollinator populations in summer and winter.



Place thick branches or logs emerging from the water to allow resting and basking for frogs, turtles and ducklings.



Make room for turtles by creating sandy areas for nests around the wetland shorelines.



Make room for snakes with rocky piles, called hibernacula, for hiding and hibernating.

Adapting When Problems Arise

Take time to inspect your wetland a few times a year to head off any problems with, for example, erosion or invasive species. Many landowners who work with us enjoy setting up trail cameras to watch the weather and wildlife action in the wetland habitat.

Check that the shorelines and any infrastructure (e.g., berms) are in good condition. Record and/or stake the water levels and take notes or pictures of the amount of vegetation, signs of wildlife, and general condition of the earthworks around the habitat so that you can track any negative changes.

Managing plant problems

Invasive species that harm aquatic habitat

Invasive aquatic species are plants or animals that were transported from their native environment and found a way to survive here. Many conservation projects are complicated by the need to remove invasive species, which can devastate aquatic habitats. The good news is that wetlands are resilient and rebound swiftly once the invasive species is removed.

How do invasive species spread to wetlands?

- Wind and waterways
- Agricultural drainage ditches
- Transportation corridors
- Equipment moving from site to site

Invasive phragmites is on the watchlist!

If you find this towering invasive reed infiltrating your wetland, please contact us by email with some details about your location and the amount of phragmites stems or stands that you've seen (include pictures if possible). We will provide you with DUC's protocol for managing phragmites at wetland habitat projects so you can be sure to use Best Management Practices for identification and removal in Ontario. Thank you for your vigilance. Email: ontario@ducks.ca

Watch for these invasive plants around your small wetland:



European water chestnut: Non-native aquatic plant that forms dense floating mats and has barbed seeds, identified in Eastern Ontario.



Phragmites australis: Non-native, tall common reed, now widespread in Southern Ontario, that crowds out biodiversity.



Purple loosestrife: Non-native, distinctive plant that is well managed in Southern Ontario but should not be allowed to establish.



Water soldier: Non-native aquatic plant that forms dense floating mats and has serrated leaves, identified in multiple watersheds in Southern Ontario.

The Invasive Species Centre in Ontario estimates the combined impacts of invasive species on agriculture, fisheries, forestry, healthcare, tourism and recreation at \$3.6 billion per year.

Learn more about invasive species ducks.ca/our-work/invasive-species

Vegetation overgrowth

Wetland vegetation is important to ecosystem functions but there may be a problem of excess nutrients in the water if you notice a sharp increase in algae or vegetation (more than 75 per cent of the wetland area).

Always remember to treat the cause and not the symptom. People are sometimes tempted to turn to chemical interventions, but these are often short-term solutions that are potentially dangerous and may even be prohibited near water or restricted to professional use.

- **Prevention:** Verify there is an intact buffer of vegetation around the wetland which reduces nutrient inflows. Check your septic system for leaks if it is nearby.
- **Physical intervention:** Water-level manipulation, dredging, physical removal of plants.
- **Biological intervention:** Aeration, barley straw for prevention of algae growth.

Algae overabundance

There will always be some algae in a healthy wetland. It ebbs and flows with the seasons and may be evident in early spring but disappear as the weeks pass and aquatic plants grow through the summer. An over-abundance of algae is a signal that there are excessive nutrients in the water. Protect the wetland with an intact buffer of vegetation (described in Habitat Project Design section) and minimize any potential runoff of nutrients from lawns and farm fields.

Living with Wetland Wildlife

For many people, proximity to wild plants and animals is the principal joy of living near wetland habitat. However, an imbalance of wildlife activity can create problems for the wetland.

Canada geese

Canada geese are beautiful birds that may pass through your habitat. If you want to deter them from sticking around, ensure there is a shallow area at the shoreline with dense marsh vegetation and avoid cutting grass adjacent to the habitat. Islands in the wetland may also be attractive to nesting geese.

Beavers

Beavers are a natural part of a wetland ecosystem, and many people enjoy these interesting creatures. However, they sometimes cause problems when they bring down valuable trees or raise the water level in the wetland. You can wrap trees with chicken wire or fence out the beavers. There are repellents that can be applied to trees; but these must be used regularly. If the problem persists, you may have to contact your region's district office of the Ministry of Northern Development, Mines, Natural Resource and Forestry for a list of reputable and certified trappers. Live trapping and relocating are not recommended.

Muskrats

Muskrats sometimes burrow into the earth of an impoundment. If the burrows are too numerous, they will eventually cause the berm to fail. A clay core in the berm is the best prevention for this type of damage.

Mosquitoes and ticks

Mosquitoes and ticks are part of rural life in Ontario. Do take precautions against insect bites during warmer months. However, healthy wetlands may contain insects, but they also attract natural predators such as dragonflies, bats and songbirds that keep the insect population down. Sometimes, small fish become established in small wetlands and eat mosquito larvae too. Mosquito larvae thrive in still water and don't do as well in larger wetlands where wind makes wavelets on the water.

A Natural Solution for Climate-ready Landscapes

DUC values nature's solutions to today's environmental concerns.

Wetlands are vital to the long-term health and prosperity of communities. The more we learn about the versatility of these powerful ecosystems, the more we value them for their roles in climate resilience—alongside the built infrastructure we see all around us for transportation, communications and stormwater management.

DUC is uniquely positioned to provide large-scale wetland restoration in Ontario. Our science-based approach to wetland conservation results in healthy, resilient landscapes that support waterfowl and other wildlife, including endangered species such as turtles and wetland-dependent birds.

That's why we seek to continually expand wetland conservation and ultimately reverse the downward trend of loss and turn it around to a net gain on the landscape in Ontario's rural and near-urban communities.

Thank you for joining our community of nature caretakers.



Scott Gillingwater and Teresa Piraino are naturalizing their rural property with their DUC wetland as the centrepiece.

Watch their journey: <https://youtu.be/uhz16Oa9bxQ>





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