WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

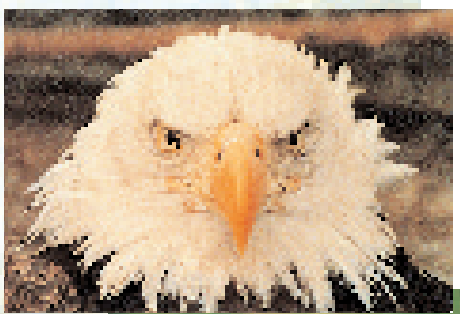
A good water management plan must consider wetlands, watercourses, woodlots, and ponds.

Whether they're natural or artificial, wetlands, watercourses, woodlots, and ponds play pivotal roles in the wellbeing of your farm and the local environment.

What were once seen as nuisances or of little value are now recognized for their benefits to agricultural production. Depending on the type of on-farm water body, it can benefit your operation by:

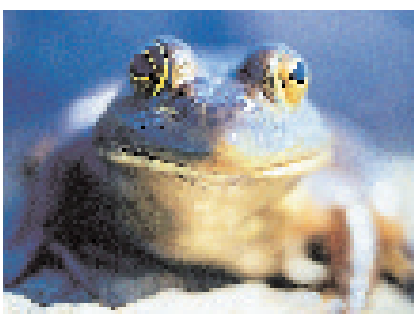
- ► limiting flooding by storing runoff and acting like reservoirs
- ► helping water flow continuously
- ► purifying water
  - ▷ vegetation in wetlands is very efficient in removing nutrients and sediment
- ► reducing soil erosion by acting as a buffer against flowing water, either into or through the system
- ► returning water to atmosphere, stream base, and ground water sources
- ► offering habitat for species that help control insect and rodent infestations
- ► providing fish habitat, including spawning, rearing, and feeding areas
- ► providing opportunities for farm forestry (fencing materials and fuel wood)
- ► providing a source of water in case of fire
- ► providing recreational opportunities.

Bald Eagle



Spotted Turtle

Wetlands provide critical habitat for plants and animals, many of which are rare species.



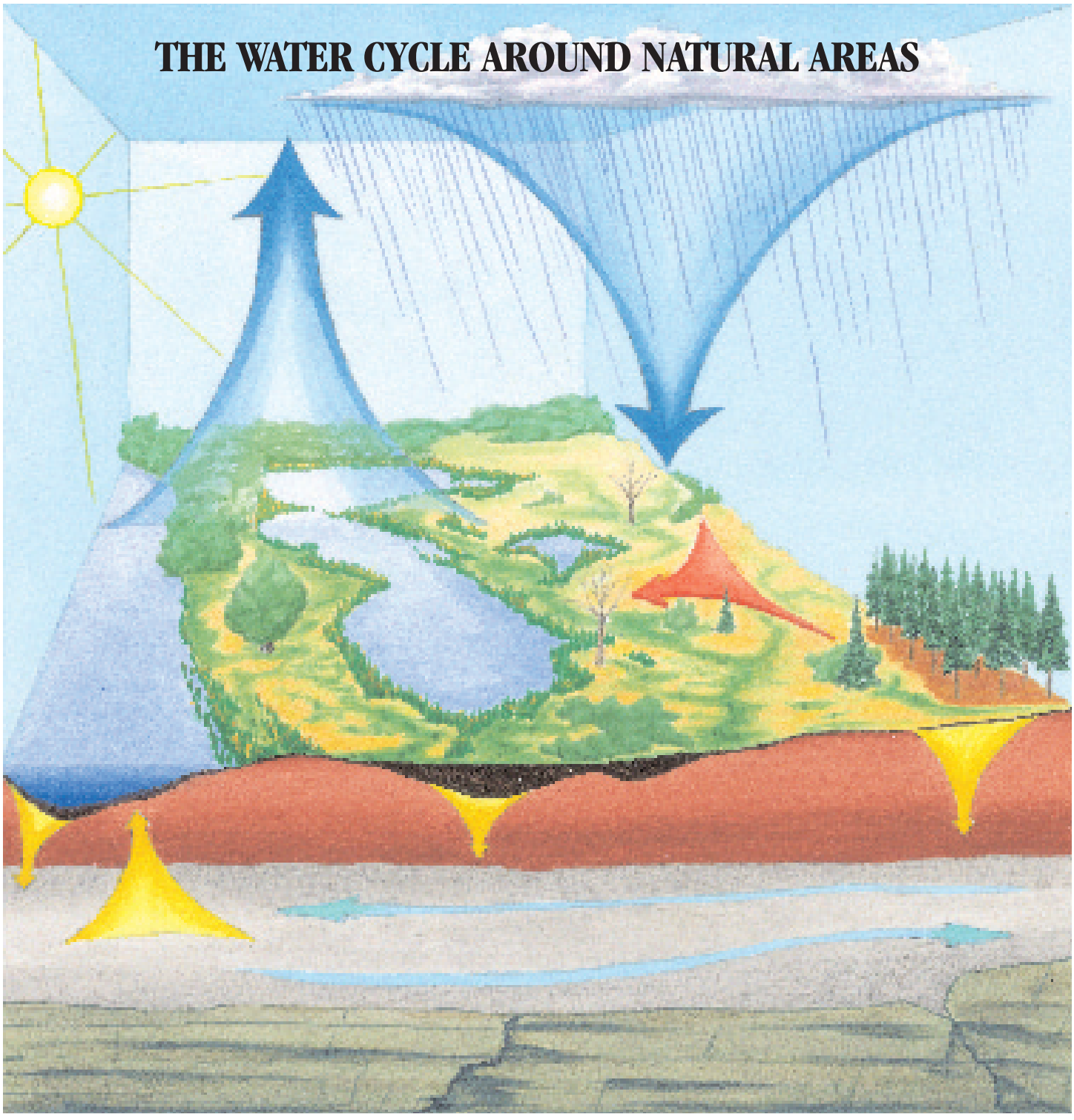
Bullfrog

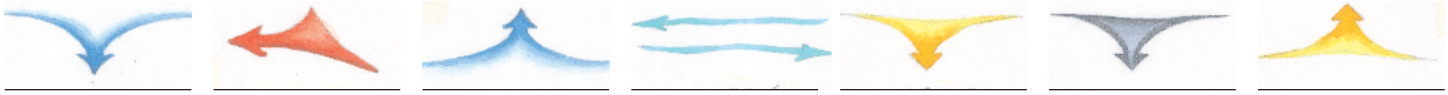
Blue-flag Iris

PATHWAYS OF WATER

Land that is not used for agricultural production is also important to the water cycle. Wetlands, watercourses, woodlots, and ponds have a *natural* ability to conserve water by slowing its movement and removing pollutants.

THE WATER CYCLE AROUND NATURAL AREAS





Precipitation | **Runoff** | **Evaporation and Transpiration** | **Ground water flow** | **Infiltration (uncontaminated)** | **Infiltration (potentially contaminated)** | **Ground water recharge**

Most of the precipitation that falls on wetlands, watercourses, woodlots, and ponds is stored as surface water or infiltrates the soil. Runoff is rarely a problem. The water that infiltrates soil may play key roles in recharging ground water aquifers and discharging clean water to wetlands and ponds, or transpire from plants.

The ground water that doesn't resurface in wetlands or ponds may flow laterally to streams and creeks. Trees can tap into the lateral flow.

These natural areas provide habitat for a broad range of plants and wildlife.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

BEST MANAGEMENT PRACTICES

WETLANDS

In Ontario, the term "wetlands" can be used to describe marshes, swamps, bogs, and fens. Any wetland can be one or a combination of these four types.

For part or all of the year, all wetlands are covered by shallow water, and the water table is at or near the surface. A wetland is home to water-tolerant plants (see Wetland Types table for types of vegetation).

Wetlands are found where land meets water, as inland marshes, along lakes and streams, or as peatland.

WETLAND TYPES

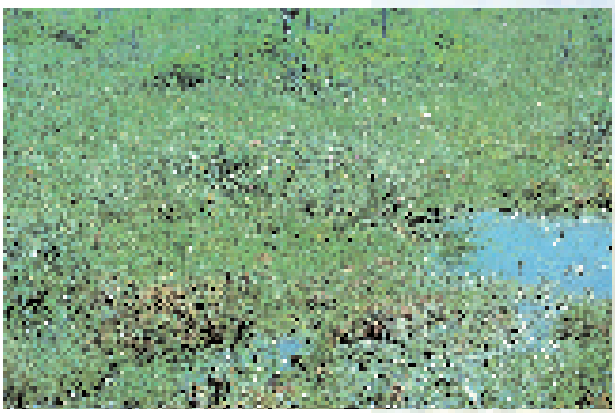
TYPE	VEGETATION	WATER	SOIL	LOCATION
MARSH	• cattails, sedges, rushes	• very efficient at supplying water and nutrients to vegetation • occasional flooding • maintain some open water, less than 2 metres depth • will dry out during extended droughts	• mineral • high organic matter content near surface	• Southern Ontario
BOG	• sphagnum moss	• water from runoff and precipitation only	• thick layer of peat (decomposed sphagnum moss), which is highly acidic, extends beneath bog	• common to Northern Ontario, but some in south
SWAMP	• shrubs and trees, e.g. soft maple and cedar	• occasional flooding	• organically rich mineral soils	• most common wetland in Southern Ontario
FEN	• grasses, sedges	• some flow-through	• neutral and alkaline	• rare in Ontario

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Hillman Marsh, Essex County

Golspie Swamp, Oxford County

Alfred Bog



Alfred Bog – Fen area

Before you decide to drain a wetland, remember that it's providing critical habitat for plants and animals, many of which are rare species, not seen in other places. Wetlands are necessary habitats for many types of wildlife, including amphibians, which are currently showing a decline in numbers in Ontario.

Wetlands are protected by Ontario's Wetland Policy and should not be drained. If you have difficulty distinguishing between wetlands and wet agricultural land, contact your local office of the Ontario Ministry of Natural Resources, Ontario Ministry of Agriculture and Food (see the blue pages of your telephone directory), or Conservation Authority. (Other legislation is outlined on pages 91 to 93.)

Soils are a combination of mineral and organic solids, water and open-air space. Organic soils usually contain more than 30% organic matter. They are often acidic. Mineral soils will have considerably less organic matter, and their acidity will depend on the bedrock materials they were derived from.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Since European settlement, agricultural activity has accounted for up to 85% of wetland losses – 31,769 hectares (78,500 acres) – in Southern Ontario. Nowadays, many activities and land uses, including agriculture, can damage or destroy remaining wetlands. These activities include:

- removing peat and muck soil for commercial sale
- using wetlands as dumpsites for landfill, sewage, and other wastes
- dredging wetlands for ponds, beaches, harbours, marinas and boat access areas
- allowing livestock to graze wetlands
  - animals may eat and trample vegetation, cause erosion, and add excessive nutrients and bacteria
- allowing clearcutting in a wetland
  - clearcutting removes vegetation, raises the water table, and reduces habitat
- removing buffering areas around wetlands
  - impairs filtering ability, allowing increased nutrient and sediment input
- depositing high levels of contaminants including nutrients, pesticides, and heavy metals
  - hazardous to all wetland users including plants, animals, and humans
  - can pollute local surface and ground water
- taking excessive amounts of water from watercourses and wells, which dries wetland
- filling in wetlands
- constructing new drains through wetlands.

Wetlands hold a great deal of water. A hectare (2.5 acres) of wetlands with .3 metres (1 ft) of water would hold approximately 3-million litres (660,000 gallons). Much of this water will go for ground water recharge.

As mentioned earlier, wetlands are protected by Ontario's Wetland Policy. The policy includes an inventory and classification of remaining wetlands, based on their role in providing fish and wildlife habitat, assisting in flood control, and improving water quality.

Activities that are permitted in Ontario wetlands vary according to their designation. There are seven classifications. Classes 1, 2, and 3 designate wetlands that are either regionally or provincially significant. Classes 4, 5, 6, and 7 are not formally protected, but their conservation is still encouraged.

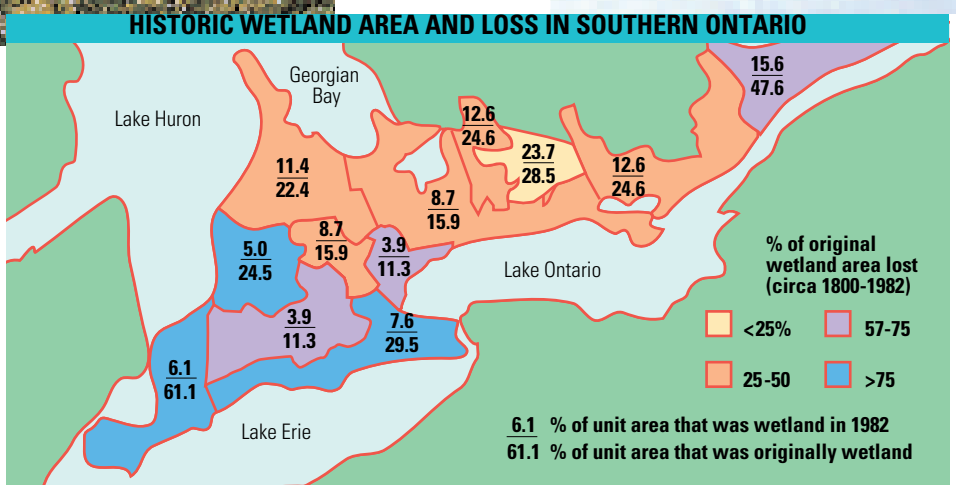
Other legislation, such as the Fisheries Act and the Endangered Species Act, may also have some bearing in your case.

Contact your local office of the Ontario Ministry of Natural Resources to see whether your wetlands have been surveyed, and what can be done to protect them. (See the blue pages of your telephone directory.)

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Many fish species require shallow water and aquatic vegetation for some stage of their life cycle.

Livestock damage wetlands by eating and trampling vegetation and adding excessive nutrients.



MAINTAINING, PROTECTING, ENHANCING, RESTORING, AND CREATING WETLANDS

If you want to maintain and protect your wetland, often the best method is to do nothing. Don't burn, fill, or drain them – or do any of the other activities listed in the previous section.

Buffer strips are excellent filters around wetlands. If you have a buffer strip, maintain it. If there is none, create one. Vegetated buffers will trap sediments and nutrients, and stabilize and reduce erosion, thereby ensuring wetlands receive cleaner ground and surface water. They're usually made of grass, shrubs, and trees, or a combination of each.

The establishment and maintenance of vegetated buffers around wetlands will help to preserve and protect them.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

The desired width of a buffer should take into account:

- ► the slope of your land
- ► the length of slope
- ► soil type
- ► land use
- ► classification rating of the wetland.

Buffer strips will require some maintenance:

- ► inspect regularly for erosion, areas void of vegetation, or other irregularities
- ► avoid fertilizer, pesticide, and other chemical use on the buffer
- ► avoid excessive vehicular traffic
- ► if trees are harvested, leave any tops and other branches as brush piles
- ► if mowing, try to delay until July to protect nesting areas
- ► plant trees or wildlife shrubs
- ► reestablish disturbed trees and other vegetation.

Restoring and creating wetlands involves planning. The steps include:

- ► compiling site background information on soils, land uses (existing/adjacent and compatibility), hydrology of site, drainage systems, and other utility corridors
- ► assessing the reason for restoration
- ► determining whether water cycle can be restored, including water sources above and below ground
- ► comparing to other nearby wetlands and natural areas
- ► determining what type of wetland is suited to site
- ► determining site access for machinery, if necessary
- ► analysing costs and benefits
- ► determining the availability of native plant materials.

Destroying wetlands can leave areas vulnerable to the invasion of non-native nuisance plants, such as purple loosestrife and garlic mustard.

Often wet areas can be restored to wetlands by simply letting them change naturally, so your best bet is to select areas that were once wet. Occasionally, tile drainage systems may be have to be rerouted or plugged.

Field Crop Production describes best management practices for an adjacent field. They reduce the delivery of sediment, nutrients, and pesticides to wetlands. *Wildlife Management*, together with *Farm Forestry and Habitat Management* (which describes buffer strip areas, residue management, and erosion control structures on adjacent areas), will also be helpful to you.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

BEST MANAGEMENT PRACTICES

WATERCOURSES AND LAKES

A healthy, clean watercourse is a measure of your farm's wellbeing. It serves many purposes: removing excess water, and providing water for humans, livestock, crops, fish and wildlife, and recreation. It also provides habitat for fish and other dependent wildlife.

Watercourses and lakes receive water from ground and surface water sources.

GROUND WATER SOURCES	SURFACE WATER SOURCES
• bank seepage	• runoff from precipitation and snowmelt
• tile drains with no surface inlets	• tile drains with surface inlets
• ground water resurfaces to a watercourse	• direct precipitation
• springs	• wetlands, lakes, ponds, or reservoirs

Water can be lost and taken from watercourses and lakes in many ways, including:

- ▶ evaporation
- ▶ infiltration through the ground
- ▶ irrigation, livestock, and other farm uses
- ▶ municipal, commercial, industrial, and residential water-taking
- ▶ flowing downstream to a receiving water body.

Streams and watercourses on farms are sometimes widened, straightened, or deepened. These changes can detract from a stream's ability to move water and sediment. Generally, altering a natural watercourse is not recommended: any work involving stream channels or shorelines requires a work permit from the Ontario Ministry of Natural Resources.

In natural systems, a stream will find a pattern based on its watershed. Unless disturbed, it will maintain a meander pattern, both through the land and within its own banks.

A riffle/pool or step/pool pattern will also be maintained. In other words, water is speeding up and slowing down as it goes from shallower, steeper gradients, to deeper, flatter areas.

If you widen a stream, its velocity will be reduced, and less sediment will be moved through. Slower-moving water may mean you'll have to clean out drains more frequently, and may be damaging wildlife habitat. The unmoved sediment is deposited as bars, especially during low-flow periods.

A ditch will naturally create a low-flow channel after it has been straightened, as indicated here by the sediment bars and meandering pattern.

Straightening a stream will sometimes cause more problems than it appears to solve.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

In some parts of Ontario, almost every watercourse has been constructed into a drainage ditch designed for quick removal of excess surface water.

If you straighten a stream, the slope is increased, thereby increasing the stream's velocity. This will cause erosion along the straightened section, and sedimentation and increased risk of flooding downstream.

Straightening also removes habitat diversity, making the stream less suitable for fish, amphibians, reptiles, and other wildlife.

It is possible to construct or alter a watercourse with minimal negative impacts. Sound planning and design, with consideration to natural channel functions, will produce a good, stable, and efficient drainage system and ensure habitat for fish and other species.

In the farming community, watercourses are either natural, municipal drains, agreement drains, or private ditches. Permission is required from your local municipality and the Ontario Ministry of Natural Resources to work on natural watercourses. Municipalities are responsible for work on municipal drains. See pages 91 to 93 for a summary of relevant legislation.

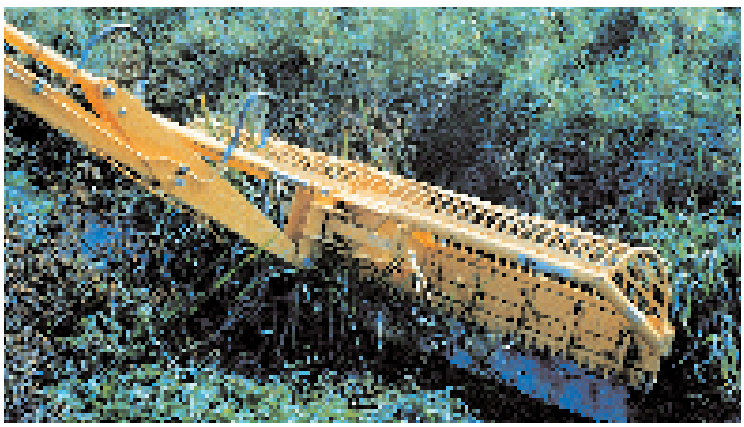
If you're considering improving drainage on your property, and you do not have an adequate or legal outlet, you should consider the Drainage Act. (The Fisheries Act and the Lakes and Rivers Improvement Act may also be relevant.) The Drainage Act provides a procedure whereby landowners can obtain an improved outlet. Each landowner in the watershed is considered, and the local municipality is responsible for following the procedures, and constructing and maintaining the system.

Some key features of the Drainage Act include:

- initiating drainage work through a petition
- having a drain designed by a drainage engineer with Ontario Ministry of Natural Resources and Conservation Authority consultation
- allowing the petitioner's concerns to be heard
- having an engineer determine the costs to be assessed to each landowner involved
- making provincial grants available for work carried out under the Act
- providing an appeal process to address landowner concerns both before and after construction
- providing for ongoing maintenance by the municipality.

For further information, contact your local municipality or office of the Ontario Ministry of Agriculture and Food. (Look up the blue pages of your telephone book.)

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS



Maintenance is necessary to keep these systems functioning. Here, a specially designed bucket removes excess vegetation and sediment from the bottom. The banks are left untouched.

A well-constructed and maintained open ditch. Grass buffers are left to provide stability to the drain bank and filter out soil moving in runoff.

WATERCOURSE MANAGEMENT

Protecting streams and drains begins on adjacent land.

Vegetated buffer strips should be established and maintained between your cropland and watercourses. The benefits are many:

- stabilize drain banks, reducing need for costly maintenance
- filter excess nutrients from surface and ground water runoff
- impede runoff (containing animal wastes, pesticides, and sediment) to watercourses
- reduce soil erosion
- provide habitat for wildlife
- improve water quality and habitat for aquatic life.

There are some downsides to buffer strips, namely:

- maintenance costs
- potential source of weeds
- increased potential for crop damage by wildlife
- loss of productive land.

Research in the United States has shown it takes at least a 15-metre (50-ft) wide buffer of grass, trees, and shrubs to remove most of sediment from entering a stream. This assumes best management practices for soil erosion control and fertilizer and pesticide application are in place, and surface runoff is not concentrated.

Ground water seepage can cause slumping of streambanks. To control slumping, install tile drains along a drain bank.

WETLANDS, WATERCOURSES, WOODLOTS AND PONDS

A buffer strip made up of grass and trees protect this drain. Nutrients deposited in buffer strips are used by the vegetation.

Here are some considerations in the planning stage:

- cropland should be separated from the the top of the ditch or streambank by a minimum of 3 metres (10 ft)
- the Municipal Drainage Superintendent should be contacted if you're planning a buffer strip of trees or shrubs along a municipal drain (access for maintenance vehicles cannot be obstructed)
- to determine buffer widths, consider:
  - type and quantity of potential pollutants
  - sensitivity of the watercourse
  - suitable vegetation
  - soil type
  - slopes
  - ease of access
  - wildlife.

Buffers can be planted to trees, shrubs, grass, or any combination of all three. Refer to *Farm Forestry and Habitat Management* and *Wildlife Management* for more information on suitable species.

Streamside treed buffer strips filter sediment and nutrients from agricultural land.

During runoff events, phosphates attached to sediment are deposited at the surface of treed areas. Trapped phosphates are taken up by tree roots. Leached nitrates from cropland flow with ground water towards the stream.

In the buffer strip, nitrates are taken up by roots, remain in the soil, and are converted to gases for loss to the atmosphere.

Buffer strips require maintenance to ensure their effectiveness. Here are some considerations:

- inspecting annually and after major storms or snowmelt
- limiting farm vehicles, livestock, or excessive pedestrian traffic
- prohibiting fertilizers, pesticides, and other chemicals
- removing trees that may offer future problems such as blockage (otherwise leave undisturbed)
- leaving cuttings from trees on-site as brush piles (tie down if you feel they may pose a problem to watercourse)
- leaving root mass and stumps in place
- trimming grass to promote a dense thick mat and to control weeds, but consider the needs of nesting wildlife. Mowing should be delayed until July.
- reestablishing disturbed grass, trees, and shrubs as necessary
- reducing or eliminating noxious weeds.

Refer to *Farm Forestry and Habitat Management* for additional details.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Surface water should enter your watercourses as safely as possible. Two surface water entry structures to prevent erosion are:

- ▶ rock chute spillways
- ▶ drop pipe inlet.

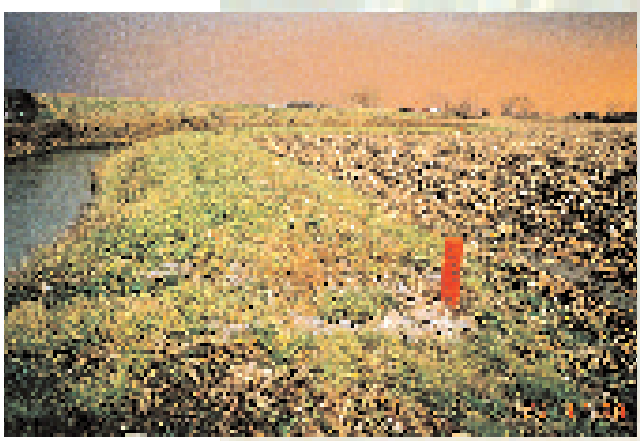
For more suggestions on safely conveying concentrated runoff to your watercourse, read the "Non Tillage Options" section of *Field Crop Production*.

There are a number of methods to control streambank erosion. They include:

- ▶ properly-sized, irregular-shaped rip rap underlaid with filter cloth to protect streambank's lower section
- ▶ vegetation to protect upper bank
- ▶ use of living and dead woody plant materials
  - ▷ some methods use large pieces (tree roots, boulders, logs, live shrubs), which promote fish spawning, feeding and nursery areas, and retreats from predators.

For more information, see *Field Crop Production*.

A proper rock chute conveys cropland runoff to channel.



In this drop inlet system, a diversion constructed along a drain intercepts surface water and directs it to a single drop pipe inlet.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Another way of rehabilitating fish habitat is to install in-stream "lunkers" or fallen trees. They provide protection from predators and habitat diversity. Both will provide shading to cool the stream, and habitat for wildlife and insects that fish feed on.

Installing lunker structures along a municipal drain.

Above the lunker structures, the remainder of an eroded bank is posted with dogwood, alder, and willow cuttings.

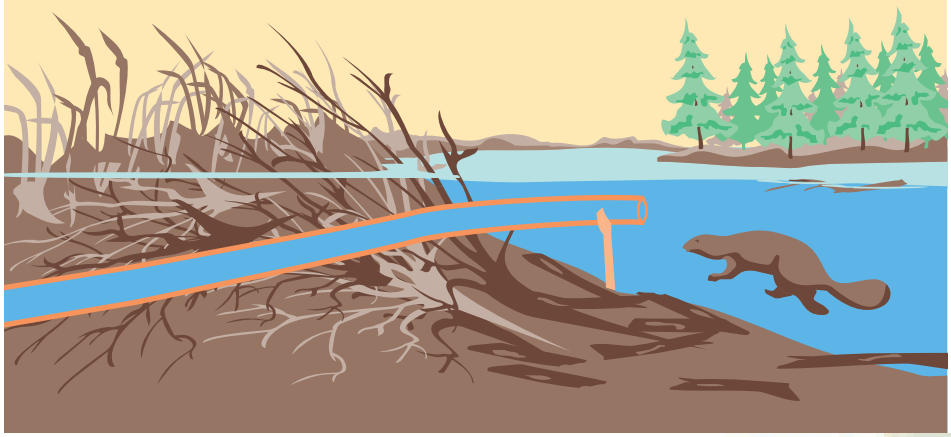
Today's engineering technology makes it possible to restore water channels that will serve both agriculture and nature. A watercourse designed as it would be found in nature will regulate itself to remain more stable over time. Contact Ontario Ministry of Natural Resources staff for appropriate techniques and permits.

Before restoration, this channel flows wide and shallow, offering little opportunity for aquatic life. Following the reshaping of the channel to a natural flow path, the water is deeper and moves faster to provide better flow characteristics and fish habitat.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Beavers can pose problems to your drainage system. In most cases, humane trapping and removal is the best approach. Another is to install a "beaver baffler", which allows the beaver to remain, while providing a drainage outlet for cropland. Additional management techniques for beavers and other wildlife are available through your local Ontario Ministry of Natural Resources (see blue pages of your phone book), and are described in *Wildlife Management*.

BEAVER BAFFLER



The beaver baffler consists of a pipe extended through the dam, with the inlet a few metres upstream. The beaver has difficulty hearing the flow over water, and therefore can't locate and plug this controlled leak. Water can then be maintained at the pipe inlet level.

In your day-to-day operations, remember that watercourse corridors are not dumping grounds, access lanes, or places to mix and load chemicals. Watercourses are protected by legislation. Here are some management considerations:

- equipment crossing
  - if you need to cross a watercourse with machinery on a regular basis, consider building a stable crossing
  - options include culverts, bridges, bed-level and mid-level crossing systems
  - approvals may be required under the Public Lands Act, the Lakes and Rivers Improvement Act, the Drainage Act and the Federal Fisheries Act

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

- ► water-taking
  - ▷ if you're planning to remove water from a watercourse for irrigation, or farm use beyond general household and livestock watering, you'll need a Permit to Take Water from the Ontario Ministry of Environment and Energy
  - ▷ Permit to Take Water program ensures every surface and ground water user gets a fair share while protecting the resource
  - ▷ contact your local Conservation Authority or Ontario Ministry of Environment and Energy
- ► livestock management for intensive pasture management
  - ▷ restrict livestock from watercourses to prevent erosion and water contamination
  - ▷ if fencing around a municipal drain, contact the Drainage Superintendent for setback distances
- ► livestock management for extensive pasture management, i.e. cow-calf operation
  - ▷ restrict livestock where possible from watercourses to prevent erosion and water contamination
  - ▷ locate feed, water, shade, and salt blocks away from watercourse
  - ▷ inspect water channels for erosion and streambanks for slumping, and take appropriate action
- ► livestock watering facilities
  - ▷ when creating watering facilities, decide whether the source offers the quantity and quality of water needed by your livestock
  - ▷ some of the items require high capital costs but need little maintenance
- ► livestock crossings
  - ▷ crossing should restrict stream access at all times
  - ▷ livestock crossing should be at:
    - ▷▷ bank, such as a bridge or culvert, or
    - ▷▷ mid-level
  - ▷ fencing should extend over the crossing
  - ▷ streambank should be stabilized at both ends of the crossing.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

LIVESTOCK WATERING FACILITIES

WATER SOURCE	APPROPRIATE TRANSFER METHOD						
	Electrical Pump	Gasoline Engine	Gravity	Hydraulic Ram	Nose Pump	Solar/ Battery Power	Windmill
Springs & seepage areas (assume gravity collection to spring box)	*	*	*	*	*	*	*
Ponds (surface and ground water fed)	*	*	*	*	*	*	*
Wells	*	*			*	*	*
Watercourses	*	*	*	*	*	*	

Fence types are available that can withstand ice and high-flow damage.

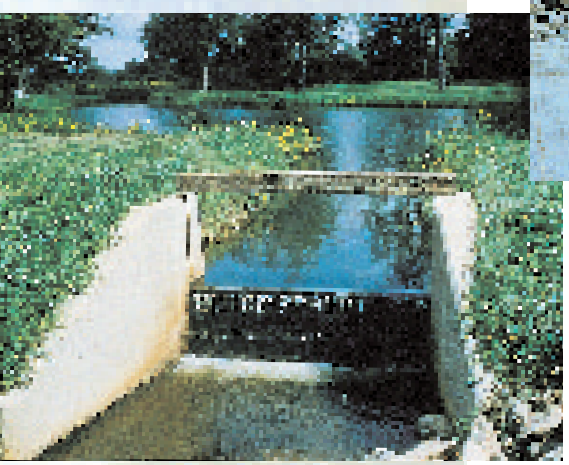
A single nose pump can provide water to 30 animals.

A solar-powered watering system: photovoltaic panels use the sun to charge batteries, which in turn power a pump that distributes water to meet livestock needs.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Do not crop or cultivate up to the water's edge. A buffer strip:
▸filters contaminants
▸prevents erosion
▸preserves water quality.

A low-flow crossing allows livestock access to pasture on both sides of the watercourse. Fencing is installed to restrict them from the channel.



Dams across watercourses create many problems and will not be approved by the Ontario Ministry of Natural Resources.

Culverts in combination with fencing are suitable for livestock and machinery to cross a drain.

Once livestock are restricted and fencing is installed, the buffer area may be planted to vegetation such as grass, trees, and shrubs.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

BEST MANAGEMENT PRACTICES

WOODLOTS

Farm woodlots range from small woodlots of Southwestern Ontario to larger forests of Eastern and Northern Ontario. All of them benefit agriculture.

While there may be some exceptions, the water cycle changes from forested areas to farming areas.

Farm Forestry and Habitat Management discusses woodlots, and best management practices, in detail. Also, your local Conservation Authority can be of assistance.

ITEM	FORESTED AREA	FARMING AREA
• water quality	• streams run clear	• streams are forced to carry higher sediment and chemical loads
• water quantity	• more water infiltrates into forest floor • floods are localized, and do not impact significantly downstream	• water runs off more quickly, offering less recharge to ground water • sometimes create adverse downstream impacts, such as flooding • rate of runoff is reduced
• habitat	• aquatic life and wildlife will be plentiful	• reduced variety of aquatic life and wildlife

BEST MANAGEMENT PRACTICES

PONDS

Ponds, whether artificial or natural, are a common site on Ontario farms.

If your pond is well designed and maintained, it can provide water for:

- ▶ livestock
- ▶ irrigation
- ▶ chemical mixing
- ▶ aquatic life and wildlife
- ▶ fish production
- ▶ fire protection for farm buildings
- ▶ recreation
- ▶ maintaining water table levels
- ▶ aesthetics.

Pond water quality may not be adequate for swimming.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

If you're constructing or altering a pond on or near a stream, you will probably need approval. Contact your Municipality, the local Conservation Authority, the Ontario Ministry of Natural Resources, and the Ontario Ministry of Environment and Energy before proceeding. A Permit to Take Water may be required to fill the pond.

If you want to stock a pond with fish, a permit is required from the Ontario Ministry of Natural Resources.

There are two basic pond types: embankment and excavated.

EMBANKMENT PONDS

Vertical intake pipes are used to adjust water levels in this embankment pond constructed across a natural drainageway.

Embankment ponds include:

- in-stream ponds, created by constructing a dam across a natural watercourse
- dams constructed across a natural draw or valley.

In-stream ponds or dams across watercourses may harm the stream by:

- reducing fish habitat by:
  - restricting access
  - increasing water temperature
  - altering water levels
  - increased erosion and siltation
  - increased evaporation
  - degraded water quality
- increasing flood risk upstream and downstream
- increasing risk to human life and property downstream.

Always seek approval from the Ontario Ministry of Natural Resources before constructing or repairing. In-stream ponds are rarely approved.

Embankments across natural draws or valleys are common in Ontario. Before going to the expense of constructing, you should plan, survey, and investigate thoroughly. Often the underlying soils will dictate the feasibility and practicality of the proposed site.

Your design must account for capacity, fill material, spillways, erosion, and methods of construction.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

EXCAVATED PONDS

Ponds fed by surface water can be built almost anywhere. You must ensure that the pond's bottom is impervious, assuming it's meant to hold water. Upslope land use will often determine the quality of water in the proposed pond. If proper soil isn't available on-site, options include:

- importing clay
- using imported materials such as bentonite or plastic linings.

A sufficient spillway may be important to this system as over topping can be a risk.

Ponds fed by ground water should be built in areas where the permanent water table is within a metre of the surface. It's important in these systems that an adequate water supply is available. The soil water content must be thoroughly investigated before planning any work. Digging test holes is recommended.

The efficient working of a pond includes regular maintenance.

This spring-fed pond was dug for recreational opportunities and supports a permanent trout population.

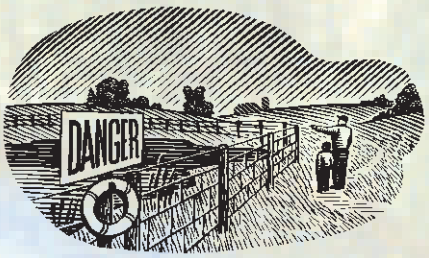
Surface-fed pond located in an expired gravel pit along the valleyside. Water is obtained from intermittent overland flow. A diversion was constructed for this purpose.

POND MAINTENANCE

Pond maintence should include:

- inspecting periodically
  - repair any damage immediately
- maintaining embankments
  - fill any rills, reseed or resod as needed
- using best management practices described earlier to prevent bank erosion and seepage concerns
- keeping outlet structures operating as planned
- discouraging burrowing animals by placing a thick layer of sand, wire mesh, or rip rap 1 metre above and below the water line on the slope of the embankment dam
- planting shoreline vegetation to stabilize the banks and to provide shade, therefore enhancing fish habitat
- diverting contaminated surface and ground water flows away from the pond.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS



POND SAFETY

Keep the pond safe for children, pets and livestock:

- ► restrict access with fencing
- ► post danger or warning signs
- ► have rescue equipment readily available
- ► educate children on safe activities around the pond
- ► discourage swimming, unless you test the water regularly.

A fenced pond to restrict access can provide livestock with a clean water source.

LIVESTOCK

Fence livestock to keep them out of your pond. If the pond is used for livestock watering, supply nose pumps or some other watering system. For more information, see the "Watercourse" section earlier in this chapter.

BANK EROSION

Erosion on your pond banks may be caused by waterfowl or wave action. You can consider using:

- ► berms as part of pond's construction
- ► rock (with filter blanket underlay if required)
- ► grass, shrub (conventionally planted as willow branch bundles laid lengthwise on the bank), and tree plantings
- ► piles or cribs of wood or steel, gabion baskets, and other confinement systems
- ► log booms laid lengthwise on the bank.

Rock can protect pond banks from erosion and damage from burrowing animals.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

SEEPAGE CONCERNS

If your pond is experiencing excessive loss to ground seepage, it probably needs a liner. (Thorough soil testing before construction may have prevented this problem.)

If sealing of the pond bottom is insufficient, liner options include:

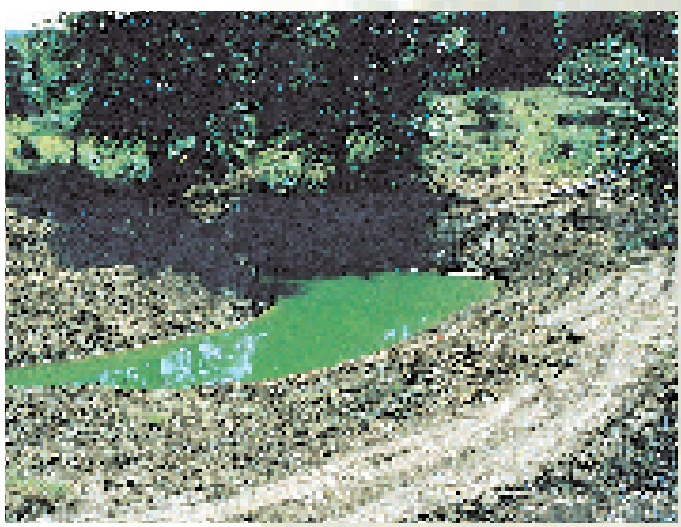
- a compacted layer of clay of at least 30 centimetres (12 in) thick
- granular bentonite as tablets or blanket
- other chemical dispersing agents
- waterproof liners such as those used in swimming pools.

Carry out soil inspections prior to constructing a pond. A polyethylene liner was required for this pond to hold water in sandy soils.

PROTECTION FROM CONTAMINANTS

Keep contaminants out of the pond. Divert runoff containing sediment and chemicals, or consider filtering alternatives such as a constructed wetland. Test the water from your tile drainage to ensure it's suitable for your pond.

In spring-fed ponds, divert surface water away. Do not build ponds near livestock yards, intensive pasture areas, or septic treatment trenches.



If best management practices are not in place, ponds built to collect runoff from agricultural land may show signs of excess nutrient loading – such as these algae blooms.

WETLANDS, WATERCOURSES, WOODLOTS, AND PONDS

Some plant growth is needed for a healthy pond. You must take special care when using chemicals – remember downstream water users.

USING A POND FOR FISH HABITAT AND FISH PRODUCTION

Using a pond for fish will require special planning, design, and construction on your part. Some of your considerations will be:

- adequate quality and quantity of water, relative to numbers of fish
- water temperature
  - shade trees will lower water temperature
  - most fish need cooler water
- spillway structures
  - must keep fish in the pond.

Contact the nearest Ontario Ministry of Natural Resources office for details. (See the blue pages of your phone book.)

WATER QUALITY IMPROVEMENT ALTERNATIVES

Methods to control algae and excessive weed growth include:

- removing dead vegetation and algae by hand and destroying it
- creating aeration by windmills that are either wind or mechanically driven
- adding straw
- applying approved chemical controls
- planting trees for shade.

If problems persist, contact your local Conservation Authority or Ontario Ministry of Natural Resources or Ontario Ministry of Environment and Energy office. (See the blue pages of your phone directory for the latter two.)

A healthy, well-maintained pond offers benefits to all users.