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### Wetlands

Wetlands sustain more life than any other ecosystem - as much as many tropical forests and more than good farmland. Wetlands, which occupy 6% of the earth's land and freshwater surface, play a major role in maintaining the stability of the global environment. They nurture hundreds of different species and provide the critical breeding and rearing habitat for a wide diversity of wildlife. Canada has 14% of the planet's wetlands. Today, Canadian wetlands are under pressure from agriculture, urban and industrial land use development.

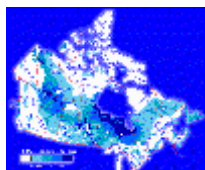
In the following module, you will discover where Canada's wetlands are located, learn about the wildlife species that depend on them, and find out about some of the pressures that they face.

#### List of Topics:

- ▶ [Facts about Wetlands in Canada](#)
- ▶ [The Wetland Ecosystem](#)
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#### Facts about Wetlands in Canada

- ▶ Approximately 14% of Canada is covered by wetlands.
- ▶ Ontario, Manitoba and the Northwest Territories contain the largest area of wetlands.
- ▶ Conflicts between wetland conservation and wetland utilization are concentrated in southern Ontario where population, agriculture and development pressures are the most intense.
- ▶ Agricultural expansion is the major cause of 85% of Canada's wetland losses:
  - ▶ since European settlement, wetland conversion to agriculture is estimated at over 20 million hectares
  - ▶ 65% of the coastal marshes of Atlantic Canada
  - ▶ 70% in southern Ontario
  - ▶ 71% in the Prairie Provinces
  - ▶ 80% of the Fraser River Delta in British Columbia
- ▶ Over 80% of the wetlands near major urban centres have been converted to agricultural use or urban expansion.
- ▶ Less than 0.2% of Canada's wetlands lie within 40 kilometres of major urban centres (the 23 largest urban areas which contain 55% of Canada's population).



[Click for larger version](#), 48 KB

Figure 1. Percentage Coverage of Wetlands

## The Wetland Ecosystem

Wetlands are considered to be one of the most productive ecosystems on Earth. Wetlands have an abundance of food and vegetative cover for shelter and water. They are rich in wildlife species and are a unique habitat for many different types of plants and animals. The coastal estuarine and inland marshes provide breeding, nesting and wintering habitat for thousands of migratory birds and shorebirds such as ducks, geese, swans, cranes, gulls and sandpipers. Many predators such as kingfishers, owls and ospreys feed in wetlands.

Many species of fish have economic and recreational value reproduce and spend part or all of their life cycle in wetlands. These fish species include bass, smelt, capelin, eel, carp, northern pike, perch and pickerel. Wetlands are also an essential habitat to many types of amphibians and reptiles. Amphibians, especially frogs and salamanders, live part of their lives under water and so need wetlands to breed in and to winter in. Reptiles are less dependent on wetlands, but most Canadian turtle species live only in wetland habitats. Many species of mammals depend on the water and hydrophytic vegetation of wetlands while other mammals use wetland habitats either for food, escape cover, or for breeding. These species include rodents (such as muskrat, beaver, mice and rabbits), cervids (which include moose and caribou), carnivores, like wolves and omnivores like bears.

Estuaries support marine mammals such as harbour seal and sea lions. The wetlands in these estuaries and in coastal areas are essential to many species of fish and invertebrates. Shellfish, finfish, crustacean species use these areas as spawning, feeding, cover or nursery areas for their young. Freshwater wetlands also provide spawning, nursery and cover for a large number of non-marine fish.

Wetlands are probably best known for birds. Wetlands are extremely important as a habitat for them. All of inland, estuarine and coastal marshes provide breeding, nesting and wintering habitat for thousands of migratory birds and shorebirds. Birds that are commonly associated with wetlands include ducks, geese, swans, cranes, gulls and sandpipers, and birds of prey such as ospreys. In the interior of Canada, the many sloughs of the Prairies provide habitat for approximately 50% of North American waterfowl.

There are also many species of invertebrates in wetlands. These include animals such as insects and shellfish. There are thousands of species of them, but a few are very distinctive parts of wetlands, for example: dragonflies, crayfish and clams.



[Click for larger version](#), 20 KB

Animal montage

Wetlands are also the critical habitat for many endangered species. In Canada, more than 200 bird species (including 45 species of waterfowl) and over 50 species of mammals depend on wetlands for food and habitat. Many of these are species at risk. Wetlands are particularly important for these animals and plants: one third of the species at risk listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) live in or near wetlands.

Wetlands are called nature's kidneys because they act as a natural filtering system. Some types of wetlands can trap and neutralize sewage waste. This is done mainly by the wetland vegetation: plants absorb nutrients and help cycle them through the food chain. Plants also slow down flowing water and thereby cause silt to settle out. Wetland plants provide food to other wildlife species in addition to their normal role of providing oxygen through photosynthesis. Near urban and agricultural areas, wetlands play an important role in water purification.

By their ability to retain water, wetlands also provide a natural flood barrier that slows down the runoff of spring meltwater and also storm water. This ability to hold back spring runoff makes them very useful in many parts of Canada because the normal low summer flow in rivers often causes serious problems for people and places depending on rivers for their water supply. The more wetlands there are in the drainage area, the higher the likelihood that serious water shortages can be prevented.

Finally, wetlands also help to reverse global warming. Global warming is largely due to the release of carbon dioxide into the atmosphere. Wetlands are carbon sinks: the carbon from decaying plant and animal tissue accumulates in the wetlands rather than being released into the atmosphere as carbon dioxide.



[Click for larger version](#), 14 KB

Figure 2. Wetlands as a Carbon Sink

### Where are the wetlands in Canada?

Canada has more than 1.2 million square kilometres of wetlands (127 million hectares) or 14% of Canada's total land area. The distribution of wetlands varies greatly across Canada. Most of Canada's wetlands are located in Manitoba, Ontario and the Northwest Territories.

**Table 1. Total Wetland Area**

Total Wetland Area			
Province and Territory	Hectares	Percentage of Land Area in Province or Territory	Percentage of Total Canadian Wetlands
British Columbia	3 120 000	3	2
Alberta	13 704 000	21	11
Saskatchewan	9 687 000	17	8
Manitoba	22 470 000	41	18
Ontario	29 241 000	33	23
Quebec	12 151 000	9	10
New Brunswick	544 000	8	<1
Nova Scotia	177 000	3	<1
Prince Edward Island	4 000	<1	<
Newfoundland and Labrador	6 792 000	18	5
Northwest Territories	27 794 000	9	1
Yukon Territory	1 510 000	3	22

Source: *Wetlands A Celebration of Life*. 1993. Final Report of the Canadian Wetlands Conservation Task Force. Issue Paper, No. 1993-1. Ottawa: North American Wetland Conservation Council (Canada).

### What are wetlands?

Wetlands are lands that are covered with water all or most of the time or are flooded. They are not considered to be firm land nor are they considered to be water bodies. Wetlands normally have fresh water, but there are also many salt-water wetlands near ocean shorelines. Canada has many different types of wetlands, such as bogs, fens, swamps, marshes and shallow waters. Each wetland class displays characteristics which set them apart biologically and hydrologically.

Bogs are peatlands covered with mosses, low shrubs, and even trees.



[Click for larger version](#), 23 KB  
Bog

Fens are also peatlands, but the dominant plants are sedges (tall grass-like plants). A fen is fed by either a stream or ground water. A fen is less acidic and generally richer in nutrients than a bog.



[Click for larger version](#), 13 KB  
Fen



[Click for larger version](#), 23 KB  
Peatlands



[Click for larger version](#), 9 KB  
Swamp

Shallow waters are wetland areas with water two metres in depth or less. Except when they are dried out to expose mud flats, they do not have exposed vegetation.



[Click for larger version](#), 11 KB

Shallow waters

Historically, wetlands were perceived as having very little value. They were seen as wasteland that needed to be drained or filled for agriculture, housing, roads or towns. Over one seventh of the original pre-settlement wetland area in Canada has already been converted to other uses. Today, with the increased awareness of the importance of wetlands as wildlife habitat, for water supply, and for recreational use, wetland loss has become a national concern.

#### Agricultural Conversion is a Major Cause of Wetland Loss

Many of the wetlands of southern Canada do provide some direct economic benefits. These include the harvesting of wild rice, cranberries as well as horticultural peat and sphagnum mosses. The use of peat resources as a source of fuel, has been the focus of recent research, especially in Atlantic Canada. Even forest resources can come from wetlands: in the clay belt of northern Ontario, most of the black spruce (*picea mariana*) harvesting is on wetlands.

Recreation activities can either preserve the natural condition of wetlands or be part of their destruction. Many activities such as hunting, fishing and bird-watching are considered non-destructive. However, other recreational activities involving the construction of facilities such as marinas and docks, cottages and beaches are destructive to wetlands.

#### Facts on the Economic Value of Wetlands

- ▶ commercial and native harvesting of mink, muskrat, beaver and other wetland dependent game
- ▶ flood peak modification in watershed and shoreline protection
- ▶ non-consumptive recreation (photography, bird-watching and education)
- ▶ commercial fisheries on wetlands and estuary-dependent species of fish and shellfish
- ▶ forestry (peatlands softwood and wetlands hardwood) and also wild rice and hay harvesting
- ▶ aquaculture of fish
- ▶ market gardens or managed peatlands
- ▶ peat production for horticulture and energy
- ▶ water purification and sinks for pollutants
- ▶ recreational sport fishing and hunting

#### Major Migratory Flyways in Canada

Canada's wetlands are essential to the survival of migratory bird populations in the Western Hemisphere and polar regions. This map shows the routes and sanctuaries used by migratory birds.



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Figure 3. Major Flyways and Migratory Bird Sanctuaries, National Wildlife Areas and Ramsar Sites

#### Migratory Bird Sanctuaries, National Wildlife Areas and Ramsar Sites in Canada

Each wild plant and animal species needs habitat, that is a particular location with a appropriate climate, food and shelter. Animals that migrate need several habitats. They may breed in one habitat during the summer, winter in another and migrate along a traditional route during spring and fall. In order to preserve abundant and diverse wildlife populations in Canada, it is necessary to preserve suitable habitat.

Canada is renowned as a land with an abundance of wildlife and natural beauty. Some of Canada's most scenic sites are also protected spaces for wildlife. A network of 49 National Wildlife Areas and 98 Migratory Bird Sanctuaries managed by the Canadian Wildlife Service has been established across Canada to protect wildlife and their habitats.

Migratory bird sanctuaries in Canada protect about 11.3 million hectares (about twice the area of Nova Scotia). The

Migratory Bird Sanctuary Regulations prohibit all disturbance, hunting and collecting of migratory birds and their eggs within the sanctuary. Visitors are also prohibited from carrying firearms and or allowing their pets to run at large.

The first migratory bird sanctuaries were established in 1917 to protect migratory birds from physical disturbances and hunting. By the middle of the century, however, the loss and degradation of habitat had become the greatest threat to migratory birds and other wildlife. The creation of National Wildlife Areas with the primary focus on habitat protection was a major response to this threat. These sites protect about 300 000 hectares for wildlife and contain a wide diversity of habitat of both national and international importance.

Ramsar sites are another form of migratory bird sanctuary. There are 32 sites in Canada designated under the Ramsar Convention as wetlands of international importance in the promotion of intercontinental flyway habitat conservation for migratory birds. Seventeen of the Migratory Bird Sanctuaries or National Wildlife Areas are recognized as Ramsar sites or have been included within Ramsar sites. (Ramsar is the place in Iran where the conference establishing the Ramsar Convention was held).

In addition, there are two sites in Canada that are designated as Western Hemisphere Shorebird Reserve Network sites. This network links together sites in different countries of North, Central and South America that are essential to large number of shorebirds as they complete their annual migration. Some of these migrations routes are 10 000 kilometres or more in length.

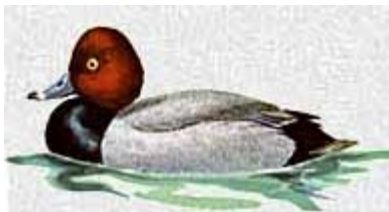
#### Facts on Species in Migratory Bird Sanctuaries, National Wildlife Areas and Ramsar Sites

- ▶ Single flocks of 250 000 semipalmated sandpipers (10% of the world's population) move as one body and occupy the beaches and mudflats of Shepody and Chignecto National Wildlife Areas at migration time.



[Click for more information](#), 4 KB  
Sandpiper

- ▶ The Great Plains of the Koukdjuak on Baffin Island (part of Dewey Soper MBS) shelters the largest goose colony in the world.
- ▶ The leafy woodlands, marshes and beaches of Long Point (part is a NWA) contain over 90 species of boreal and Carolinian plants that are rare in Ontario. It also includes several birds, reptiles and amphibian species.



[Click for more information](#), 4 KB  
Redhead duck

- ▶ More than 10% of North America's population of redheads (diving ducks) stop at Long Point during the Spring and Fall migration.
- ▶ Clouds of monarch butterflies also alight at Long Point during their migration southward.
- ▶ Over 100 000 Snow Geese use the Cap-Tourmente National Wildlife Area for resting and feeding during the Spring and Fall migration across North America.
- ▶ The Alaksen National Wildlife Areas in the Fraser Delta of British Columbia is a central area for waterfowl and shorebird population of the Pacific Coast of North America.



[Click for larger version](#), 21 KB  
Snow geese taking flight

#### Major Global Flyways

Major flyways link wetlands that are used for feeding, staging, breeding and nesting by migratory birds.

Canada's wetlands are essential to the survival of migratory bird populations both in the Western Hemisphere and the polar regions. Western Hemisphere Shorebird Reserves and Canada's 32 sites designated under the Ramsar Convention as wetlands of international importance promote intercontinental flyway habitat conservation for migratory birds.

## Wetlands at Risk in Canada

Wetlands near urban areas are under the greatest stress, even though they are the ones most valued for recreational purposes. Wetlands are destroyed because they get in the way of many human activities. The major cause of wetland loss is conversion to agricultural use - this has accounted for 85% of the wetland loss since the early 1800s. Other activities which displace wetlands are residential development, and the building of roads, utility rights of way, and the creation of sites for large facilities such as shopping centres, manufacturing plants, airports, harbours and hydro-electric reservoirs.

When wetlands are lost, so are the benefits derived from them by wildlife and people. Once wetlands are removed in agricultural areas, there is an increase in soil salinization which reduces crop production. In agricultural and urban areas, wetland removal can result in problems with increased runoff after storms because the wetlands are not there to soak up storm water.



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Figure 4. Wetlands at Risk

## The Future of Wetlands

Major programs are now being implemented to promote the conservation of Canada's wetlands. The North American Waterfowl Management Plan, involving Canada, the United States and Mexico, is targeted on over 2.5 million hectares of wetlands in Canada. During the 1988 to 1993 period over 700 000 hectares of wetlands were secured. Over the next 10 years, this plan will result in major waterfowl habitat, soil, water and socio-economic benefits. The Government of Canada is the first national government in the world to bring forward a federal wetland policy. Parallel provincial wetland initiatives are being implemented. These policies cover over 70% of Canada's wetland resources.

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## Why Wetlands?

Not land or water, but a fluid combination of both, [wetlands](#) are among the most productive habitats on Earth. Wetlands are all built on a simple foundation: water becomes trapped, either through poor drainage, periodic flooding or by coastal barriers such as sandbars, and a wetland -- that unique mix of land and water -- is born.

From this beginning, wetlands develop in a number of ways depending on local climate conditions, the availability of nutrients, and the geography and soils of a site. They also change over time: an open marsh may dry out enough to become a wooded swamp, only to revert back to open marsh again after heavy flooding.

In the past, wetlands were thought of as mosquito-infested wastelands that could only be dealt with by draining, filling or paving. Now, wetlands are increasingly recognized as much more dynamic, productive and diverse ecosystems. They are wildlife nurseries and nesting sites, feeding grounds and resting places, water filters and reservoirs. They help protect shoreline areas from storm damage, control and reduce flooding, clean sediment-laden waters, and attract fish, birds, amphibians, reptiles and mammals. They are also great places for people to explore and reconnect with nature.



Yet, despite these values, wetlands continue to be lost at an alarming rate. They are drained for agriculture, filled for development, polluted by toxic runoff, invaded by exotic species, and damaged by artificial changes in water levels. Today, almost two-thirds of southern Ontario wetlands have been lost or severely degraded, while the health of those that remain continues to be threatened. If we continue to lose wetlands, a large and important piece of the natural system that keeps our world healthy will disappear.

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## Wetland Functions and Values

Wetlands represent one of the most important life support systems in the natural environment. Wetlands provide:

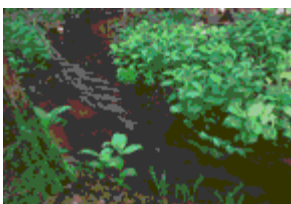
- A water filtration system...removing contaminants, suspended particles and excessive nutrients, improving water quality and renewing water supplies.
- An irreplaceable habitat...nesting, feeding and staging ground for several species of waterfowl and other wildlife such as reptiles and amphibians, and also for many species at risk.
- A high quality spawning and nursery area for many species of fish.
- Natural shoreline protection...protecting coastal areas from erosion.
- A reservoir...helping to control and reduce flooding through water storage and retention.
- A source of oxygen and water vapour...playing a vital role in the natural atmospheric and climatic cycles.
- Recreational activities...hiking, birdwatching and fishing.



Recreation



Provision of habitat for species like the Beaver



Filtration of sediments from watersheds



Flood prevention

The functions and values of wetlands are becoming increasingly clear to scientists and those who manage wetlands. However, the difficulty faced by these individuals is how to communicate these functions and values in a way that will be understood by land owners, government regulators and the public.

In other sectors of the economy, the most common way of demonstrating the value of something is to quote a price. But what is the price of a wetland? There is an entire branch of economics emerging that is devoted to the assessment of ecological value. For more information on how to value wetlands, see [Putting an Economic Value on Wetlands - Concepts, Methods and Considerations.](#)

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## Wetland Stresses

The importance of wetlands to both humans and ecosystems is increasingly being recognized; however, there are many direct and indirect stresses that continue to threaten habitats. Stresses can also be classified as natural or human-induced. Many wetlands are able to adapt to natural stresses, such as storms, ice damage and low water levels. Unfortunately, human-induced stresses often occur so quickly and drastically that wetlands are not able to fully recover. [Working Around Wetlands](#) is an informative brochure that provides basic information on how landowners can minimize stress to wetlands when working in close proximity to wetlands on their property.

### Direct Stresses

Direct stresses are those that occur within a wetland, such as dredging, filling, draining, and invasive species. They are usually human-induced, highly visible and can result in rapid changes to wetlands.



Dredging in wetlands or nearby waterways



Peat extraction

Great Lakes coastal wetlands are often located at river mouths and in protected areas which are also favourable places for harbours. As a result, dredging has historically occurred in wetland areas to allow the safe entry of boats. Deepening the water and removal of sediments can result in the destruction of wetland habitat. In the same way, draining and filling of small wetlands for urban development and to increase agricultural area results in significant losses of wetland area and function each year.

Invasive species are those that reproduce so aggressively that they displace native plants in the area that they have become established. Common invasive wetland plants include Purple Loosestrife and Eurasian Water Milfoil. Aggressive fish and wildlife can also be a problem. Carp, a fish introduced from Europe, damages wetland ecosystems while feeding and spawning by uprooting submerged vegetation and increasing the cloudiness of the water which decreases light penetration required for plant growth.

## Indirect Stresses

Indirect stresses are often less pronounced, causing changes to occur to wetland function and vegetation communities over a longer period of time. It is often difficult to pinpoint the exact source of these stresses.

Indirect stresses include runoff from upstream agricultural practices, sewage treatment plants and industrial sources which can cause loading of nutrients, sediments and toxic chemicals in downstream wetlands. Due to the collective contribution of sources, it is often difficult to remediate these problems. Fortunately, wetlands are able to assimilate some nutrients and toxic chemicals through plant uptake and the interaction of flowing water with microbial communities active in the wetland soils. These tiny organisms are able to transform and break down nutrients and some toxic chemicals.

Another indirect stress is lakewide water level regulation, which occurs on Lake Superior and, to a more significant extent, on Lake Ontario. Regulation is carried out to maintain water levels in the Great Lakes at a level appropriate to accommodate navigation, shipping, hydroelectric power and shoreline landowners. However, this means less natural variability in water levels, to which coastal wetlands have adapted over many years. Alternating high and low water levels often lead to more diverse plant communities: thus, consistent high or low water levels can cause less diverse systems by excluding those species that rely on periodic changes in water level.

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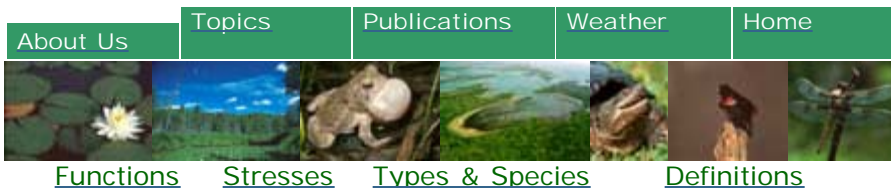


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## Habitat Types and Species Protected


There are a wide variety of wetland habitats and species that are protected throughout the Great Lakes by partnered [conservation initiatives](#), including the [Great Lakes Wetlands Conservation Action Plan \(GLWCAP\)](#) and the [Eastern Habitat Joint Venture](#). The five major freshwater wetlands types are represented in protection activities: marsh, swamp, bog, fen, and shallow open water. For each of the habitat types, examples of secured sites and some of the protected species found within them are provided in the table below.



For more information about some of the wetland species listed in the table (and many other species found in Canada), explore the following Canadian Wildlife Service wildlife information sources:


[Hinterland Who's Who](#)

[WILDSPACE™](#)

[Species at Risk in Ontario](#)

WETLAND HABITAT TYPES	SECURED SITES	SPECIES PROTECTED
MARSHES		
<p>These wetlands are periodically or permanently covered by standing or slowly moving water. Marshes are rich in nutrients and are characterized by an emergent vegetation of reeds, rushes, cattails and sedges. Water remains within the rooting zone of these plants for most of the growing season. Marshes are the most productive wetlands habitat.</p>	 <p style="text-align: right;">Long</p> <p>Point Marsh * Matchedash Bay * St. Clair River Detroit River<sup>T</sup> Dunnville Marshes *<sup>T</sup> Wainfleet Bog * Niagara River<sup>T</sup> Metro Toronto's Waterfront<sup>T</sup> Oshawa's Second Marsh<sup>T</sup> Hamilton Harbour<sup>T</sup> Bay of Quinte<sup>T</sup> Rondeau Bay *<sup>T</sup> Big Sandy Bay * Hoasic Creek * Pigeon Marsh * Port Franks Wetlands</p>	<p>Bald Eagle, Forester's Tern, Loggerhead Shrike, Prothonotary Warbler, Red-shouldered Hawk, Sandhill Crane, White Pelican, Least Shrew, Eastern Hognose Snake, Fox Snake, Queen Snake, Eastern Spiny Softshell Turtle, Spotted Turtle, Fowler's Toad, Orangespotted Sunfish, Spotted Gar</p>

	and Dunes * Riley Marsh*	
SWAMPS		
Swamps are dominated by shrubs or trees. They may be flooded seasonally or for long periods of time. Swamps are both nutrient rich and productive. Vegetation may be composed of coniferous or deciduous forest or tall thickets. Swamps are most common in temperate areas of Canada.	 <p>North Cayuga Slough Forest * Brockville Long Swamp Fen * Minesing Swamp * Oxley Poison Sumach Swamp * Westplain Mud Lake * Hoasic Creek (DuPont Provincial NR) *</p>	American Ginseng, Dwarf Hackberry, Prairie-Fringed Orchid, Least Bittern, Loggerhead Shrike, Red-shouldered Hawk, Blanding's Turtle, Spotted Turtle
BOGS		
Bogs are peat-covered wetlands in which the vegetation shows the effects of a high water table and a general lack of nutrients. Due to poor drainage and the decay of plant material, the surface water of bogs is strongly acidic. Although they are dominated by sphagnum mosses (peat) and heath shrubs, bogs may support trees. More common in northern Ontario and rare in the south, bogs are the least productive of all wetland types.	 <p>Wainfleet Bog* Fairlan Lake Bog</p>	Virginia Bartonnia, Many-fruited False Loosestrife, Marsh St. John's wort, Pin Oak, Southern Tickseed, Swan's Sedge, Tapered Rush, Toadflax, Torrey's Mannagrass, Virginia Yellow Flax, Yellow-breasted Chat, Opossum, Black Rat Snake, Massasauga Rattlesnake, Spotted Turtle, Fowler's Toad
FENS		
These wetlands are characterized by a high water table with slow internal drainage by seepage down low gradients. Their surface waters may be acidic or alkaline. Fens are not as low in nutrients as bogs and as a result are more productive. Although	<p>Brockville Long Swamp Fen * Westplain Mud Lake * Alliston Basin Wetlands *</p>	Handsome Sedge, Prairie-fringed Orchid, Twin-scaped Bladderwort, Cooper's Hawk, Blanding's Turtle, Spotted Turtle, Olive Hairstreaked

<p>fens are dominated by sedges they may also contain shrubs and trees. Like bogs, they are more common in the north.</p>		<p>Butterfly</p>
<p>SHALLOW OPEN WATER</p>		
<p>These wetlands include potholes and sloughs (ponds), as well as waters along rivers and lakeshore areas. They are usually relatively small bodies of standing or flowing water commonly representing a transitional stage between lakes and marshes, or between spring high water levels and levels during the remainder of the year.</p>	 <p>Alliston Basin Wetlands*</p>	<p>American Ginseng, Riverbank Wild Rye</p>

\* securement site  
 † rehabilitation site

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## WETLANDS

Lands that are seasonally or permanently covered by shallow water, including lands where the water table is at or close to the surface. The presence of abundant water causes the formation of hydric soils and favours the dominance of either hydrophytic or water-tolerant plants. The five major types of wetlands are: marshes, swamps, bogs, fens, and shallow open waters.

## NATURAL WETLANDS

A wetland dominated by native biota and occurring within a biophysical system which has developed through processes with minimal human intervention.

## DISTURBED WETLANDS

A wetland that has had its functions altered, directly or indirectly, by external human or natural forces.

## ENHANCED WETLAND

An existing wetland where some planned activity by humans addresses the stresses or limitations to change one or more functions or values.

## WETLAND REHABILITATION

Improvement of the functions or values of a degraded wetland.

## WETLAND RESTORATION

Modification of the existing function and structure of a wetland's habitat so that it is similar to historical conditions.

## WETLAND CREATION

The conversion of a persistent upland vegetation community or ephemeral shallow water area into a permanent wetland where no previous wetland existed.

*\*Definitions from Temperate Wetland Restoration Guide.*

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