



marsh havens

improving marsh habitats for birds in the Great Lakes basin

Great Lakes Marshes

Wetlands are among the most biologically productive ecosystems in the Great Lakes basin. Marshes provide important habitats for a wide variety of invertebrates, fish, amphibians, birds, and mammals. Breeding birds rely on Great Lakes marshes for nesting cover and to raise their young. Marshes also provide essential feeding and staging habitat for many bird species during migration.

The value of marshes can be easily overlooked. Obvious impacts to marshes such as draining, dredging and filling, and some less obvious effects such as water level stabilization, sedimentation, nutrient enrichment, reduced adjacent natural lands, and exotic species invasions have combined to drastically reduce the area and condition of many Great Lakes marshes. Despite these widespread losses and impacts to many important Great Lakes marshes, some remain in relatively

good condition and provide high quality habitat for a wide variety of species.

In recent years, conservation efforts by various programs and organizations have protected and enhanced many remaining Great Lakes marshes. These efforts have begun to identify and restore marsh functions that have been damaged or lost. Actions to enrich these ecosystems are valuable for the health of birds, other wildlife, and the many people who also rely on the vast basin for the necessities of life. The status of marsh bird populations is recognized as an important indicator of Great Lakes ecosystem health.

This fact sheet provides practical information to help guide habitat management, conservation and stewardship practices to benefit marsh birds in the Great Lakes region.



Virginia Rail - Jim Flynn



Bullfrog - Bird Studies Canada

Ontario Ecosystems Under Pressure

Southern Ontario has the most concentrated human population in Canada, resulting in extensive impacts on the landscape. Detrimental effects on biological diversity often arise from the cumulative impacts of several stressors, such as habitat destruction and fragmentation, environmental pollution, and climate change. All natural ecosystems in the area are under intense pressure. These include forests, grasslands, wetlands, rivers, and the Great Lakes.

Trade generated in the Great Lakes basin is crucial to Canada's economy. Annual Canada-United States trade in this region is in excess of \$180 billion. This amount represents 45 percent of Canada's industrial capacity and 25 percent of its agricultural capacity. Economic activities have had considerable impacts on the natural landscape, some of which require remediation.

- 12 million people live in Ontario
- 10 million people live in the Canadian Great Lakes basin
- 40% of Canada's species at risk are in Ontario
- 90% of Ontario's Carolinian forests have been lost
- 70% of southern Ontario's wetlands have been lost



Great Blue Heron - Peter LaTourrette

Great Lakes Marsh Birds

Healthy Marsh Habitats For Healthy Marsh Bird Communities

Great Lakes marshes have been destroyed or highly degraded by human activities, resulting in losses of more than 50 percent of marsh area in several Great Lakes states and more than 70 percent in southern Ontario. A variety of marsh bird species have been negatively affected because they are dependent on these disappearing habitats (e.g., Least Bittern, Black Tern, and Pied-billed Grebe). Several marsh bird populations appear to be at risk due to continued marsh habitat losses and degradation.

Many marsh birds depend on healthy marsh habitats to complete their life cycles. However, habitat needs for many species of marsh birds are not well known, due in part to the secretive nature of some species. One of the goals of the Marsh Monitoring Program is to determine habitat associations of marsh bird species in the Great Lakes basin. A good understanding of these relationships is critical to designing and implementing effective marsh management, restoration, and conservation practices.



Wetland Habitat Fund

The Marsh Monitoring Program

www.bsc-eoc.org/mmpmain.html

The Marsh Monitoring Program (MMP) has been monitoring trends in marsh birds and calling amphibians in the Great Lakes basin since 1995, using data provided by more than 600 volunteer participants. Efforts by these citizen scientists to monitor and evaluate the status of marsh birds and amphibians are essential to understanding how well these marshes are functioning. Volunteer participants conduct regular surveys of marsh birds (two 10-minute evening surveys per year) and amphibians (three 3-minute evening surveys per year) and provide descriptions of marsh habitat (percent cover of plant and habitat types) at each survey station. To enquire about participating in the MMP, call 1-888-448-2473.



Spring peeper - Mary Gartshore

Frogs and toads are surveyed at night when their calling activity is usually greatest.



Ron Ridout

MMP participants record habitat characteristics that occur within their bird and amphibian sample areas. These valuable data have been used to examine habitat associations and identify bird habitat needs.



Steve Timmermans

MMP participants broadcast recorded calls of secretive species (Virginia Rail, Sora, Least Bittern, Common Moorhen, American Coot and Pied-billed Grebe) to help elicit call responses and improve detection of these species.

Wetland Types

Wetlands are areas that are seasonally or permanently covered by shallow water, including areas where the water table is close to or at the ground surface. These areas are dominated by water-tolerant plant species. Large wetland complexes often encompass more than one of the four main wetland types.

Swamps

Wetlands dominated by trees and shrubs, with periodic standing water, limited drainage, and often neutral or slightly acidic organic soils.

Bogs

Peat-accumulating glacially formed wetlands that trap precipitation as the major water source, with typically acidic organic soils, often containing Sphagnum mosses.

Marshes

Wetlands that are almost always flooded and characterized by a mixture of emergent, floating, and submergent aquatic vegetation.

Fens

Peat-accumulating wetlands with groundwater as the dominant water source.

Marsh Bird Population Trends

Since the MMP was initiated in 1995, population trends for certain Great Lakes marsh birds appear to be emerging. MMP data in the figure below show only two marsh bird species (Common Yellowthroat and Mallard) as experiencing significant increases in abundance.

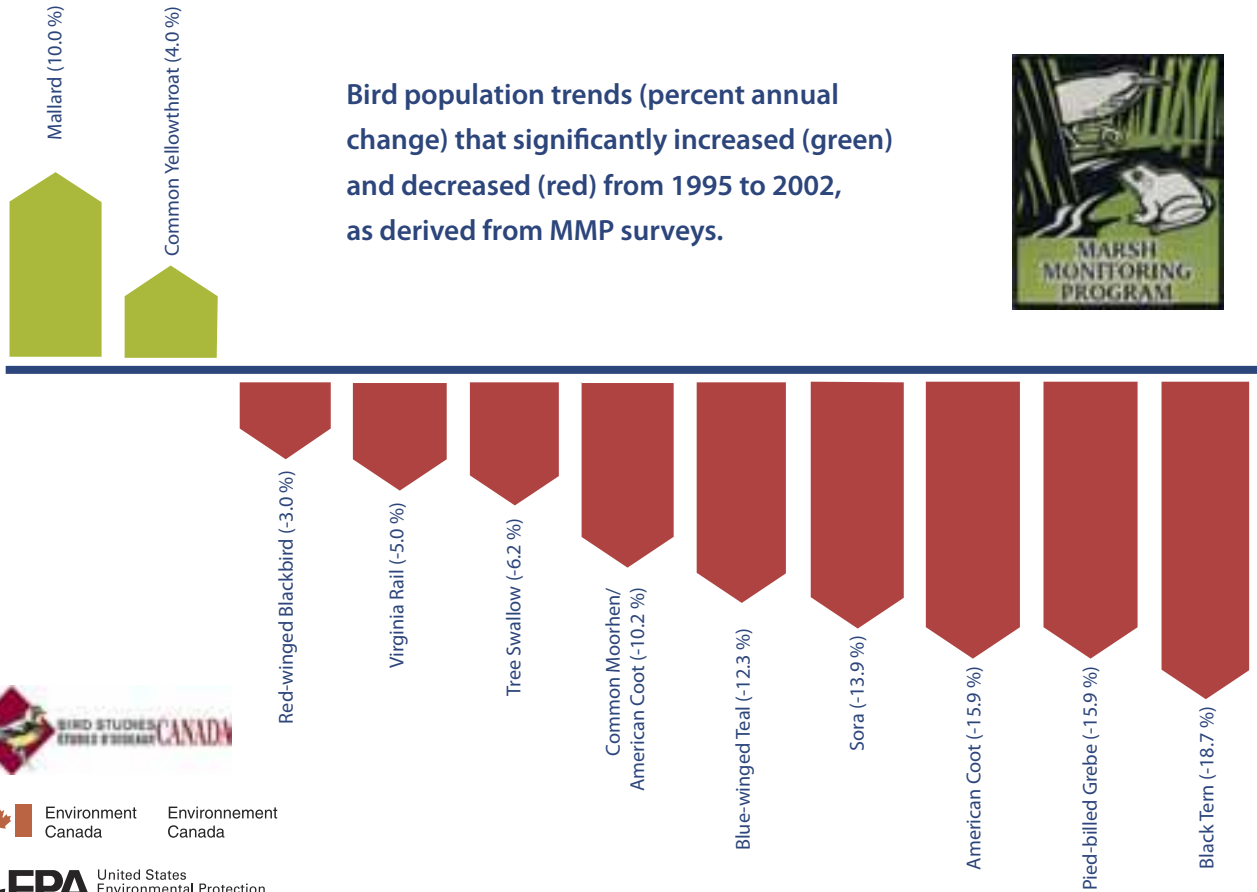
Conversely, populations of American Coot, Black Tern, Blue-winged Teal, Common Moorhen/American Coot, Pied-billed Grebe, Red-winged Blackbird, Sora, Tree Swallow, and Virginia Rail all appear to be declining. Recent studies have found that population changes for certain marsh birds in coastal marshes correlate with fluctuations in lake levels.



Sora - Peter LaTourrette



Common Yellowthroat - Peter LaTourrette

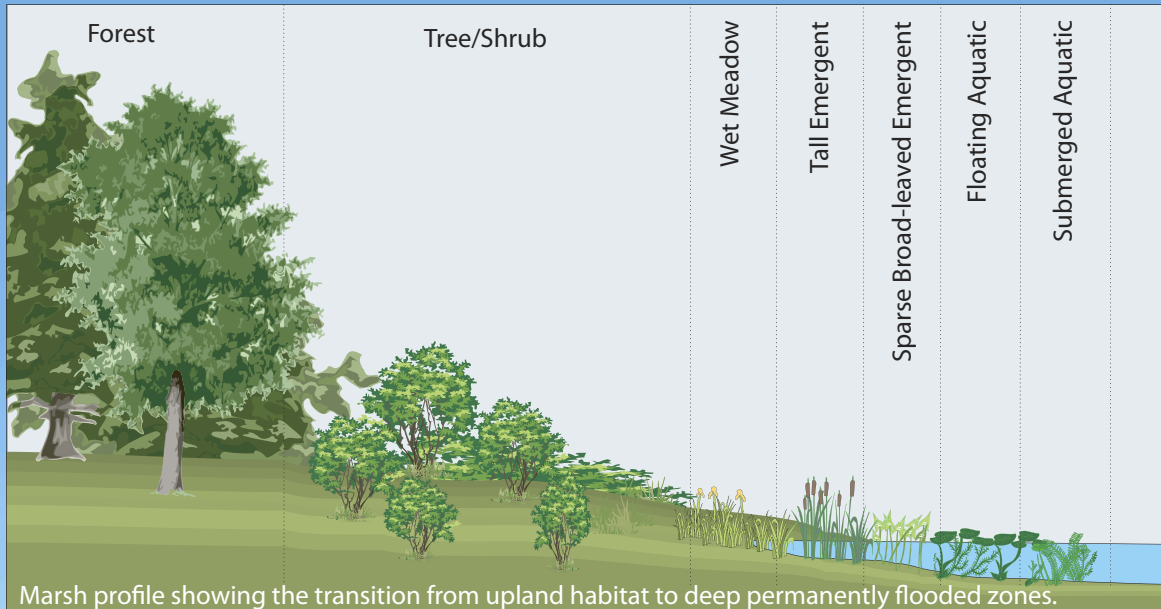


Environment Canada / Environnement Canada



Great Lakes Marsh Habitats

Plant communities are essential components of healthy marshes. Their presence prevents flooding of adjacent uplands, promotes settling of particulates from the water, and protects extensive areas from wind and wave damage. A marsh's habitat structure is largely based on the composition and distribution of plant species. Water depth is the key factor that determines the types and extent of vegetation communities in wetlands. These vegetation communities occur in transitional zones along depth gradients within wetlands.



Species Group	Marsh Habitat Use	Species Examples
Birds	Breeding, feeding, migratory stopover, cover	Sora, Black Tern, Least Bittern
Fish	Spawning and nursery, feeding, cover	Northern pike, largemouth bass, bluegill
Amphibians	Breeding, nursery, feeding, cover	Bullfrog, spring peeper, mudpuppy
Invertebrates	Breeding, feeding, cover	Dragonfly, damselfly, midge
Mammals	Breeding, feeding, cover	Beaver, muskrat, mink



Canadian Wildlife Service

Habitat Zone

Definition

Species Examples

Tree/Shrub

Dominated by water-tolerant woody plants.

Willow, dogwood, alder, buttonbush, soft maple, ash, cottonwood



Canadian Wildlife Service

Wet Meadow

Transitional between woody and tall emergent. Subject to shallow flooding, often moist to dry.

Grasses, sedges, forbs



Steve Timmermans

Tall Emergent

Usually flooded during entire growing season.

Cattail, reed grass, burreed, bulrush



Steve Timmermans

Sparse Broad-leaved Emergent

Usually shallow, continuously flooded vegetated areas. Roots of plants submerged, but leaves and flowers above water's surface.

Arrowhead, arrow-arum, smartweed, pickerelweed



Steve Timmermans

Floating Aquatic

Zones where plants are either deep-rooted with leaves floating on surface or with free floating non-rooted plants. Interspersed through sparse emergents to open water zones.

Water lily, pondweed



Steve Timmermans

Submerged Aquatic

Zones where plants grow entirely underwater. Typically occur in open water patches.

Wild celery, milfoil, coontail, pondweed



Marsh Bird Habitat Needs

Marsh Size

Marsh size can influence the distribution, composition and complexity of marsh habitats. Larger, more complex marshes with greater numbers of habitat types are likely to attract greater numbers of bird species. In addition, some species of birds are known to be “area-sensitive”, meaning that they require marshes of a certain size threshold.

MMP results show that the size of a marsh can be used to predict the relative frequency of occurrence of certain bird species. Figure 1a, for example, demonstrates considerable differences in expected frequency of occurrence among bird species found in marshes that are considered to be “small” (estimated area of 1 to 25 hectares). While certain species, such as Eastern Kingbird, Song Sparrow and Alder Flycatcher prefer small marshes, several other species do not. Black Tern, American Coot, Marsh Wren, Least Bittern, Common Moorhen and American Bittern are more likely to occur in larger marshes. While there is a shortage of marshes of all sizes in the Great Lakes basin, those that are greater than 25 hectares are in shortest supply and in most need of conservation action.

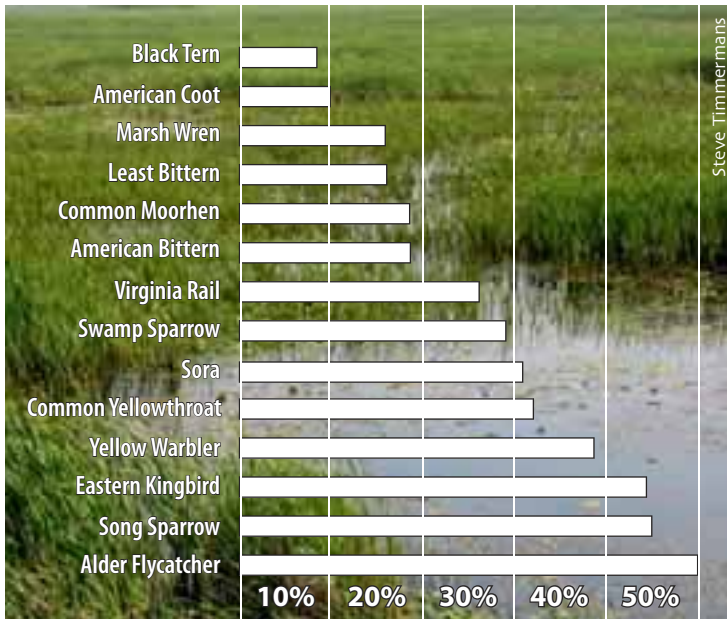


Figure 1a: Probable occurrence of selected bird species in small (1 - 25 hectare) marshes as derived from MMP bird and habitat surveys in Great Lakes marshes.

Woody Vegetation

Certain types of trees and shrubs that prefer “wet feet” are frequently found in woody vegetated zones of marshes, and provide important habitat for an array of wetland bird species. Some of these birds are considered “edge” species, because they are associated with the transitional zone between aquatic and terrestrial habitats or strictly with adjacent terrestrial zones. MMP results demonstrate that a higher to moderate proportion of woody vegetation in marshes is preferred among species such as Eastern Kingbird, Alder Flycatcher, Common Yellowthroat, Song Sparrow and Yellow Warbler. Obligate marsh-nesting species, such as Marsh Wren, American Bittern, Black Tern, and Least Bittern, all have preferences for marshes with little to no woody vegetation (Fig. 1b).



Figure 1b: Optimal proportional coverage of woody vegetation in marsh habitats for a selection of bird species, as derived from MMP bird and habitat surveys in Great Lakes marshes.





Eastern Kingbirds - Jim Flynn



Eastern Kingbird nest - Steve Timmermans



Swamp Sparrow - Peter LaTourrette

Wet Meadow

Wet meadow zones often separate deeper emergent zones from tree/shrub and terrestrial zones. Wet meadow grasses and sedges can also intermix with other permanent marsh zones, depending on stability and depth of water levels. MMP data demonstrate that certain species tend to be found in this kind of habitat, such as Song Sparrow, Common Yellowthroat, Yellow Warbler, and Swamp Sparrow. Eastern Kingbird and Willow Flycatcher both tend to prefer areas containing intermediate proportions of grass and sedge cover. Conversely, this zone is largely unsuitable for Pied-billed Grebe, Least Bittern, Marsh Wren, and Common Moorhen (Fig. 1c).



Figure 1c: Optimal proportional coverage of grasses and sedges in marsh habitats for a selection of bird species, as derived from MMP bird and habitat surveys in Great Lakes marshes.

Tall Emergent and Open Water

For many obligate marsh-dependent bird species, the proportion of tall emergent cover (e.g., cattail) and presence of standing water (both open water patches and water interspersed within emergent zones) are critical habitat features. Analysis of MMP data demonstrates that marshes containing high densities and proportions of tall emergent vegetation, with relatively low proportion of open water, are preferred by species such as Swamp Sparrow, American Bittern, and Marsh Wren (Fig. 1d).

Conversely, tall emergent marshes that have relatively high proportions of open water are preferred by such species as American Coot, Pied-billed Grebe and Black Tern (Fig. 1e). Common Moorhen, Least Bittern, and Marsh Wren are examples of species that have preferences for an intermediate coverage of open water patches.

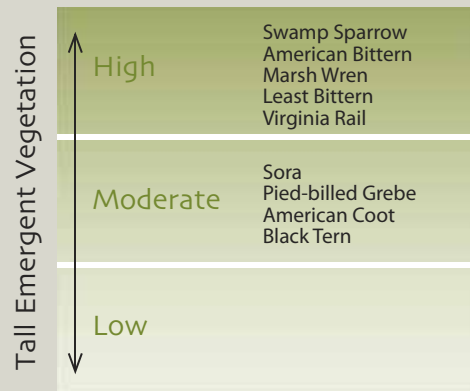


Figure 1d: Optimal proportional coverage of tall emergent vegetation in marsh habitats for a selection of bird species, as derived from MMP bird and habitat surveys in Great Lakes marshes.



Figure 1e: Optimal proportional coverage of open water patches in marsh habitats for a selection of bird species, as derived from MMP bird and habitat surveys in Great Lakes marshes.



Wet meadow - Steve Timmermans



Marsh Wren - Jim Flynn



Tall emergents - Steve Timmermans

Improving Marsh Bird Habitats



Well-interspersed habitat zones - Steve Timmermans

Marsh birds rely on healthy and diverse marsh habitats; therefore, any reduction of marsh habitat diversity, loss of certain habitat components, or loss of natural hydrologic regimes could have marked effects on specific bird populations. For instance, marshes that become “choked” with dense cattail stands can be unattractive habitat for many marsh bird species. Providing ideal marsh habitat for marsh birds and other wetland inhabitants typically involves establishing a structurally diverse wetland.

Marsh managers should consider options for providing a diversity of available vegetation habitats for a broad suite of bird species. Some marsh birds need patches of tall, dense emergents, some need wet meadow habitats, while yet others need a certain amount of woody habitat. The number and size of open water patches, and how they are interspersed among the stands of vegetation are also very important. The ability to achieve biodiversity through restoration will vary because marshes vary in their ability to support given vegetation types.

Several options are available to encourage marsh habitat diversity. Planning is critical for success. Some techniques are complex and expensive, and professional advice should be sought. In addition, application of some techniques may require approvals or permits from government agencies.



Red-winged Blackbird - Ron Ridout

Water Level Fluctuation

Hydrology (dynamics of water abundance and flow) is the single most important factor affecting composition and structure of vegetation in marshes. Therefore, water level management can be an effective method for controlling and restoring the density and diversity of vegetation in marshes. Vegetation, in turn, creates nesting habitat and protective cover. In addition to water depth, the duration, frequency, timing and extent of water level fluctuations determine the composition of marsh plant communities. Seasonally- or annually-variable water levels tend to result in greater overall wetland plant diversity than do static water levels.

Wetland managers are able to regulate water levels by means of dyking or berming, often in combination with the installation of water control structures. Management activities can be expensive, but water level management can be an extremely effective means to flood out dense vegetation. Alternatively, water levels can be lowered to temporarily dry out or draw down a marsh for plant rejuvenation. Though generally beneficial for marsh birds, overly extensive dyking or berming may have negative effects on coastal marsh fish communities.



Open Water Areas

When densities of some wetland plants become too high, marshes can become “choked”, and several marsh bird species can be deterred from using the habitat. For example, Pied-billed Grebe and Black Tern require marshes with open water patches.

In some cases, marsh managers can physically create channels through wetland vegetation (e.g., with excavation equipment), opening up a “choked” marsh and increasing habitat complexity. Similar benefits can be derived from managing muskrat and/or beaver populations. These animals can be valuable tools for wetland management. Beavers cause periodic flooding and draining of water bodies, which is beneficial to marsh habitats. Muskrats create small open pools of water and loafing areas. Sometimes, muskrats can over-exploit their resources, and lead to a decline in emergent vegetation. Nevertheless, with management (e.g., licensed trapping), their presence can benefit a wide array of marsh bird species.



Photos, clockwise from top left: Water level control - Wetland Habitat Fund; Emergent and floating aquatic zone - Steve Timmermans; Virginia Rail - Peter LaTourrette; Channel - Steve Timmermans; Great Blue Heron - Ron Ridout; Muskrat-created loafing platform - Steve Timmermans; Muskrat - Eric Dresser.





If water level regulation is not viable or beaver and muskrat activity insufficient, there are other options to manage vegetation, including disking, cutting, application of herbicides, and burning. Permits are required for herbicide application. Caution and planning will help prevent accidental environmental contamination during chemical vegetation control.

Burning is perhaps the most natural option of those listed, and has been practised for many generations by North American First Nations people. Careful planning is essential for a successful and safe prescribed burn. While in the planning stages, advice should be sought from local natural resource agencies. Permits are required and are contingent on the municipality and local bylaws on burning. The local fire department must give permission to conduct the burn and successful application is more likely with a written burn plan developed with professional input.

Burning dense emergent patches during the fall, winter or spring once plants die off removes residual plant cover and releases nutrients that promote wetland plant growth. It is important to time burns during a period of anticipated water level increase. If water levels can be controlled, burns should be followed by a period of sustained high water levels to increase interspersed open water patches.



Sediment Control

Marshes are productive ecosystems because of nutrients that they receive and trap as water cycles through their systems. However, too much sediment flowing into a marsh can lead to high levels of water turbidity or smothering, and limit aquatic vegetation growth, causing a decline in overall marsh condition. This stress often occurs where agriculture, logging or development causes soil to erode from uplands or stream banks in the watershed.

Best management practices, such as promoting alternative livestock watering techniques, will reduce soil erosion runoff, sediment movement, and deposition in wetlands. Efforts should also be made to retire marginal lands surrounding wetlands, keep livestock out of rivers and streams, and stabilize river banks. The trend toward low tillage in agricultural fields has reduced soil erosion and sediment build-up in marshes.





Wetland plantings - Paul Morris



Least Bittern - Jim Flynn



Native wetland plant nursery - Steve Timmermans

Marsh Vegetation Improvement

Wetland managers can speed up the process of creating suitable marsh bird habitats by establishing desired plant species, especially in newly created wetlands. A thorough understanding of plant species ecology, hydrology and nature of the substrate will improve success. Only locally sourced native species should be considered for use, because these are adapted to local growing conditions. If the marsh is large enough (e.g., 5 hectares or more), consider options for providing a diversity of vegetation habitats to suit a broad array of bird species.

Physical Modification

Marsh restoration may involve physically altering a wetland's open water to vegetation ratio to the desired interspersed habitat types. Excavating channels and pools with a dragline can achieve the available range of water depths. A bulldozer or backhoe can contour the marsh bottom. These management techniques can be costly but can result in very positive long-term benefits to marsh birds and other marsh species.

The "pit and mound" technique involves piling up the soil that is removed when digging scattered deep pools to create elevated areas. Some mounds (but not necessarily all) may become islands. In addition to creating a range of water levels, this technique can save haulage and disposal fees. In large-scale marsh restoration projects, it is best to create a variety of pit depths, which in turn create a variety of mound elevations. Ensure that the banks of the pool pits are not too steep.



Pit and mound - Steve Timmermans



Mature pit and mound - Wetland Habitat Fund

Undesirable Exotic Species

Certain wetland plant and animal species are not native to North America. Their activities and/or presence can be very detrimental to native marsh species. Common Carp and Mute Swans are exotic fish and bird species, respectively, that can highly disturb or curtail submergent and even emergent plant growth. Carp can be controlled by the use of draw downs, fish barriers, and by trapping and netting. Managers can sometimes obtain federal permits to remove Mute Swans when high numbers of resident breeding individuals create significant turbidity and cause damage to aquatic plant communities. Common reed is an invasive tall emergent plant that can displace native cattail stands, and can be controlled by disking, herbicide application, or controlled burns. In general, try to keep the marsh free of all exotic plant and animal species.



Tips for Success



Careful planning is central to the success of any habitat restoration or enhancement project. There are many steps to take before actually making changes to any marsh. The long-term success of the project will be determined mainly by careful timing of each project stage, including maintenance that may be required in subsequent seasons. Take the time to research and source the best advice and expertise, materials and equipment, and all supplies needed for any project.

The first step should be to seek assistance and potential financial support from experts in the field. In Canada, both Ducks Unlimited Canada and the Wetland Habitat Fund offer particular expertise in marsh restoration and creation (see Contacts).

Bigger is Better

When it comes to marsh habitats, bigger is definitely better. Species that are of particular conservation concern in the Great Lakes basin tend to be area-sensitive, such as Black Tern, Pied-billed Grebe, Least Bittern, and American Bittern. A 10-hectare marsh, or a complex of 10 small marshes that are closely associated is much more valuable to birds (and other wildlife) than are 10 one-hectare marshes that are widely separated and non-associated. The ideal combination is a complex containing a large marsh in conjunction with many smaller ones.



Variety is the Spice of Marsh Life

Structural diversity is the second most important ingredient for attracting marsh birds. Structural diversity of marsh habitats can be greatly enhanced through having a variety of water levels present in the marsh, ranging from shallow to deep (up to two metres). This will ensure that there are always areas of open water and that wetlands do not become choked by dense mats of cattail within a few years.

Physically contouring the wetland bottom to achieve this diversity is part science and part art. In almost all cases, avoid steep-sided drop-offs, particularly around the marsh perimeter. Gentle slopes are almost always best and are most effective in emulating natural marsh conditions.

Protect Your Investment

Natural vegetation between marshes and adjacent land uses provides valuable cover for birds and other wildlife, and reduces erosion and pollution from run-off. The amount of adjacent natural vegetation for wildlife purposes should be site- and species-specific, considering the critical area of adjacent upland that marsh wildlife species require for part of their life cycle. For example, for Wood Ducks or Mallards that nest in woodlands or meadows surrounding marshes, the availability of nesting habitats adjacent to marshes is critical. At least 100 metres of adjacent natural vegetation should be considered.

Adjacent uplands will establish naturally with species that occur in the seed bank, but planting native trees, shrubs, prairie plants, or simple grasses and clovers can aid natural processes.



Steve Timmermans

Looking Ahead

It is hoped that the information in this fact sheet will be used in conjunction with other available information sources to help guide efforts to restore and create marsh habitats in the Great Lakes basin. While the focus here is on helping to maintain healthy and diverse bird populations in marshes, these approaches also benefit a wide variety of wildlife and plants that depend on these habitats. Even small additions of marsh habitat area and function will help regain the major historical losses that these important environments have incurred. Collectively, our efforts to restore marsh environments will help ensure a sustainable and healthy future for the environment.



Pied-billed Grebe
- Peter LaTourrette



Green Heron - Peter LaTourrette



Northern Rough-winged Swallow
- Peter LaTourrette

Recommended Reading

Environment Canada and Ontario Ministry of Natural Resources. 1997. Working around wetlands? What you should know. Canadian Wildlife Service – Ontario Region, Toronto, Ontario.

Environment Canada. 1996. Planting the Seed: A Guide to Establishing Aquatic Plants. Canadian Wildlife Service – Ontario Region, Toronto, Ontario.

Environment Canada. 2002. Where Land Meets Water: Understanding Wetlands of the Great Lakes. Environment Canada, Toronto, Ontario.

Mansell, W.D., L. Christl, R. Maher, A. Norman, N. Patterson, and T. Whillans. 1998. Temperate Wetlands Restoration Guidelines. Ontario Ministry of Natural Resources, Environment Canada, and Ducks Unlimited Canada.

Society for Ecological Restoration – Ontario Chapter. 2004. 2004 –2005 Native Plant Resource Guide for Ontario. Information and sources of planting materials for ecological restorationists in Ontario.

Resources

Ontario Society for Ecological Restoration
Website: www.serontario.org

WetKit
Website: www.wetkit.net/modules/1/

Citizen Science - Wildlife Habitat Canada
www.whc.org/citizen_science.htm

Marsh Monitoring Program
www.bsc-eoc.org/mmpmain.html

Contacts

Canadian Wildlife Service - Ontario Region

Environment Canada
4905 Dufferin Street
Downsview, ON M3H 5T4
(416) 739-5830
www.on.ec.gc.ca/wetlands

Ducks Unlimited Canada

Provincial Office
566 Welham Road
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(705) 721-4444
www.ducks.ca/province/on

Ontario Ministry of Natural Resources

1-800-667-1940
www.mnr.gov.on.ca

Ontario Ministry of Natural Resources, Ontario Stewardship

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Peterborough, ON K9J 8M5
(705) 755-3206
www.ontariostewardship.org

Wetland Habitat Fund

A program of the Eastern Habitat Joint Venture
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Photo on front cover: Steve Timmermans

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