PRIVATE LAND PARTNERSHIPS
WORKING TOGETHER FOR WILDLIFE

WETLAND RESTORATION TECHNIQUES

Wetlands come in a wide variety of types and sizes, and support a great diversity of wildlife. We have come to realize that collectively wetlands are of great benefit to society by providing wildlife habitat, improving water quality, reducing flood damage, and offering recreational opportunities and aesthetic value. In the past, we had less understanding of the functions of wetlands and often placed little value on them. As a result, many were drained, filled, or otherwise degraded for other land uses.

Historically, Michigan had an estimated 11 million acres of wetlands, or about one-third of the state's land mass. Since European settlement, over 35 percent of these wetlands have been lost. In southern Michigan the loss is even greater -- more than 75 percent in some counties. In some cases, the loss is permanent. In others, we are able to reverse these impacts, such as drainage, and restore the wetland.

Wetland restoration techniques provide private landowners with an opportunity to benefit wildlife, themselves, and their community. If at one time a wetland existed on your land, you might be able to restore it. This chapter explains how.

Wetland Ingredients

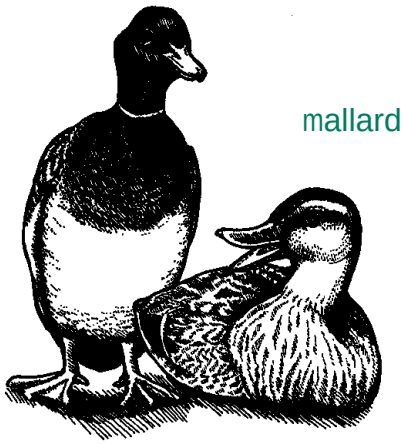
There are three characteristics that every wetland posesses.

1) Hydrology: A supply of water that is at or near the ground surface at least a portion of the growing season.

2) Hydric soils: Soils that develop under saturated conditions. Hydric soils have the capacity to hold water on or near the ground surface for at least a portion of the year.

3) Wetland vegetation: Plants that are adapted to grow in wet soils.

Wetland restoration involves returning one or more of these three characteristics to a site. Hydric soils form over a long period of time and the soil characteristics are very difficult to create. For this reason, restorations take place where the hydric soils remain but the hydrology or vegetation has been altered.



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Wetland Creation Versus Restoration

Wetland creation involves impounding water with berms and dikes or by excavating depressions in areas that did not previously contain wetland soils or vegetation. Essentially, all three key characteristics are missing. Adding these characteristics where they do not exist is difficult, costly, and often unsuccessful. Financial assistance to land owners is not generally available. For these reasons, landowners are often discouraged from undertaking creation projects. However, it is possible to create a small shallow pond for wildlife on upland areas. Refer to the chapter on **Building and Managing Ponds** in this section for more information.

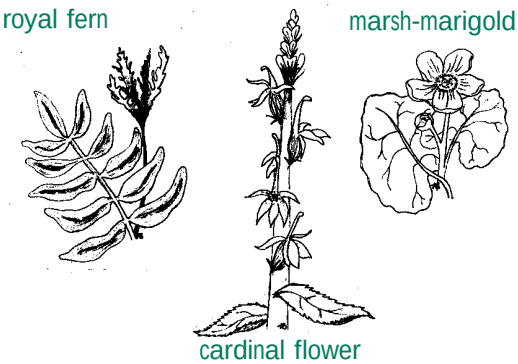
Wetland restoration involves returning one of the wetland ingredients, generally water retension, to a degraded or drained wetland site. Sites that have been ditched, tiled or leveed, or degraded from excessive logging, uncontrolled cattle grazing, or unrestricted off-road vehicle use are all candidates for restoration. Projects can span the spectrum from curtailing these or other damaging practices to restoring the water source and/or other wetland properties. Because the degree of current damage will vary, the effort needed to restore sites will also vary. For instance, a partially drained wetland may be fairly simple to restore to its natural

water level. The remainder of this chapter will focus on restoring wetlands that have been fully or partially drained.

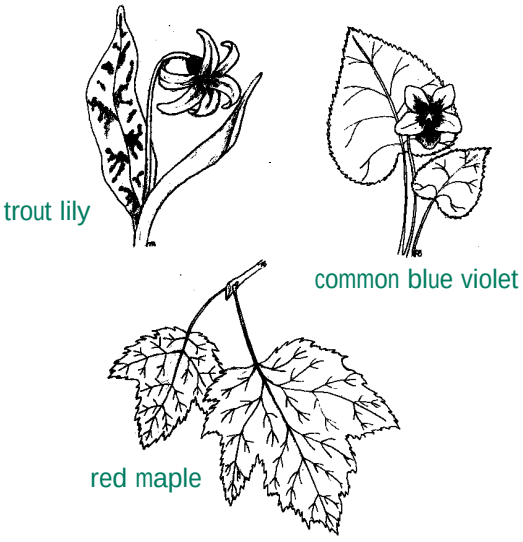
Locating Restoration Sites

Identifying a drained wetland is the first step in restoring it. Some degraded or partially drained wetlands are readily apparent, while others may be apparent only through review of soil maps, photographs, or other records. Drained wetland sites will have hydric soils. You can obtain a copy of the County Soil Survey from your local Conservation District (CD) office and ask a staff person to help indicate any hydric soils on your property. You can also ask the CD staff if aerial photographs are available for review. On photos, degraded wetlands or wet spots appear as dark areas and field tiles appear as dark, linear marks. Reviewing photos taken from several different years, and those taken 20 years ago or more may help identify areas that were wet at one time. In addition, records from, or conversations with, previous landowners or neighbors may help to identify past drainage.

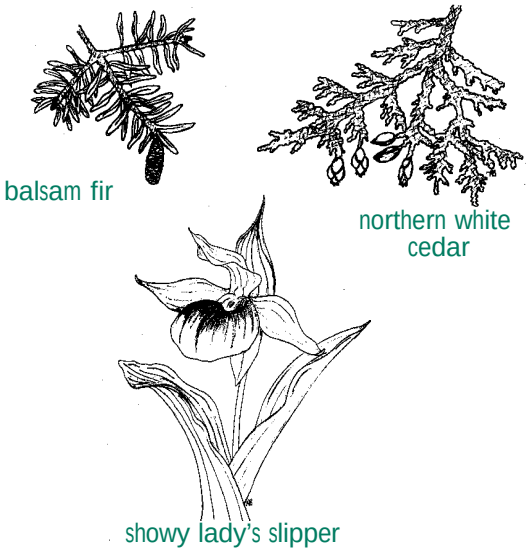
A field inspection can also help to identify restorable wetlands. Hydric soils often display similar field characteristics (see **Introduction to Wetland Management**). Also, drainage ditches or evidence of drain tiles may be apparent. Spots in fields that hold water briefly after a heavy rainfall may be tiled and drained wetland basins. Also, look for clumps of wetland vegetation in existing fields, low areas where crops are stressed or do not grow, or wet areas where farm machinery has been stuck. On fields no longer farmed, look for changes in vegetation including the presence of wetland vegetation, and depressional areas that are wet or hold water at least a portion of the year.



Wetland plants that occur in wetlands 99 percent of the time.



Wetland plants that occur in wetlands 67-99 percent of the time.



Wetland plants that occur in wetlands 34-66 percent of the time

Before Beginning

Wetland restoration is typically NOT a do-it-yourself project. A wildlife biologist or wetland specialist can help assess the project area, look for potential impacts to others, and determine if hydric soils and a water source are present. Voluntary programs offering technical and financial help may be available to help restore your wetland - check with your local CD staff for initial assistance before proceeding any further. You can probably save yourself time and money by working with the CD staff.

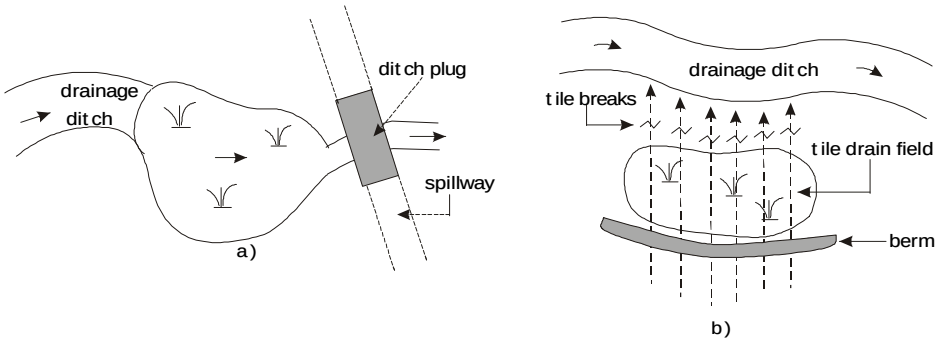
Projects begin with planning to determine feasibility and design. Without proper planning, projects may lead to problems for you or your neighbors. Develop a reasonable management goal and stick to it. Safety is a primary concern both during and after construction. Also, the good neighbor policy applies -you don't want to flood a neighbor's crop field or basement, or interrupt their drainage. By talking with your neighbors you can address their concerns, and may find they want to join in on the project. In addition, watershed size is important - too much water or too little water may mean the project is not workable. If a project looks like a "go," survey equipment will be used to determine water levels for the completed project and to help design structures, such as ditch plugs,

dikes, or spillways. Finally, local, state, or federal permits may be needed. In Michigan, permits are required from the Michigan Department of Environmental Quality (DEQ) for any work in a stream, flood plain, and most existing wetland areas.

Restoration Techniques

Typical projects restore water to a fully or partially drained wetland basin by removing underground drain tiles, plugging open ditches, or building small dikes. Projects are often one to three acres in size, and have an average water depth of about 18 inches. Many small-basin wetlands of this type that were drained for agriculture, provide opportunities for restoration today. Generally marshes or swamps, with seasonal or permanent water, are most often restored.

The simplest restoration, a "tile break," involves removing a section of underground agricultural tile that is draining a wetland basin. Drain tile, or field tile as it is often called, is usually made of clay or perforated plastic and buried at a depth of two to six feet. Generally, a contractor with a backhoe is used to remove or crush a 25 to 50 ft section of tile downstream of the basin. The downstream end or outlet pipe is then plugged with a bag of redi-mix concrete or clean clay fill, and the trench is filled. Sometimes, a portion of unperforated tile, called a “riser”, is connected to the downstream end of the tile line and brought to the surface in order to control the water level. Water will fill the wetland basin until it reaches the mouth of this riser where it will then flow back through the tile line into the ditch. This may work well when you wish to maintain downstream drainage.

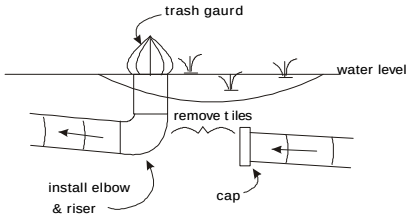


Examples of restoring drained wetlands a) drainage ditch stopped with ditch plug, and spillway
b) tile drain field broken, and berm constructed to prevent flooding in areas that are to remain dry.

A “ditch plug” restoration builds an earthen wall to impound water. This type of restoration uses equipment to fill a portion of a drainage ditch to natural ground level. Again, a riser may be used to let water flow through a tube once it reaches a certain level. A small dike or berm may also be used, which will impound the water that will begin to collect once the drain has been plugged. A dike prevents the drainage of water downstream and requires a spill way or other water-control structure to regulate the water level and prevent the dike from being washed away during periods of heavy runoff.

Typically, a berm or dike is constructed with a top width of eight to 10 feet and a maximum side slope of 3:1 (three feet of horizontal width to each foot of rise). A three foot high dike would have a bottom width of 24 to 30 feet. When constructing a low-level dike, soil is often pushed up or excavated from within the former wetland site. This helps to form a deeper pool within the basin. Sod and topsoil are stripped from the construction site and stockpiled. The dike or berm is then constructed with subsoil, often with a good clay component. Topsoil from the basin, which is a good seed source for wetland plants, is then spread back into the basin and on the dike or berm. Disturbed upland areas, including areas of the ditch plug, dike, or berm, are seeded with grasses to minimize erosion and provide cover. Generally, nothing is planted in the wetland basin as wetland vegetation usually re-establishes itself quickly from seeds that have remained dormant in the soil.

Managing water, especially excess water, is important on restoration projects. A water-control structure can be used to manage water levels within a project. Examples include plastic or metal risers, and corrugated metal or plastic stop-log structures. These help to manage the normal flow of water. An emergency spillway, which is a wide trough-like opening in the side of the dike, should be designed into wetland restoration projects if excess water is expected



Removing tiles from a drain field to restore a wetland

during flood events. Emergency spillways are sized according to the watershed but typically are at least eight feet wide and one to two feet below the top of the ditch plug, dike, or berm. These spillways allow water to pass through without damaging the retension structures in high-water events. Since water management is critical, consult a professional for design specifications suitable for your wetland.

Most restoration projects involve open-area wetlands, but forest and shrub wetlands are also important and can be restored too. Restoration of wooded sites should be done cautiously, however, to avoid killing the trees and shrubs that normally grow in wetlands. Woody wetland plants can often withstand brief flooding during the growing season, but be aware that prolonged inundation may stress trees and kill them.

Maintenance of the Restored Site

Simple basin restorations should be relatively maintenance-free. However, some restored wetlands, particularly those with water-control or earthen structures, require some maintenance. Water-control structures should be checked periodically. Fallen leaves, twigs, or other debris may build up around the mouth of the structure. An accumulation of debris may partially obstruct the flow causing the water level to rise. Inspection of the site, particularly during and after a big storm, will allow you to remove materials before problems develop.

Ditch plugs, dikes, and berms also require some care. Established seedings of grasses should be periodically mowed or burned to prevent woody vegetation from invading. Root growth from woody vegetation will allow water to penetrate the earthen structure, which will cause it to leak and may contribute to a future washout. Annual maintenance also means keeping muskrats, beaver, and woodchucks in check by filling their excavations, and removing some through trapping if necessary.

As you enjoy your restored wetland, you can also keep an eye open for potential problems and address them quickly. It is much easier to solve a problem while it is small than to wait until it is out of hand. Also, remember that a restored wetland is most often only four feet deep at its deepest spot and averages only two feet deep throughout the basin. This is not a fish pond. If you want to create a fish pond, see the chapter on **Building and Managing Ponds** in this section.

State and federal agencies and conservation groups often have programs that may be able to assist you in identifying potential restoration sites and in wetland restorations. These programs may provide technical assistance and cost-share expenses. Start with your local CD office staff as they will be able to direct you to available assistance programs.

In summary, restoring wetlands may require more time, effort, and money to complete than many other wildlife projects. Fortunately, technical and financial help is available, and the rewards are well worth the effort. Most landowners are quite pleased to see how quickly the wetland is re-established when water is restored. They also often report rapid use by wildlife. You will also have the satisfaction of returning to health a part of Michigan's natural history.

FOR ADDITIONAL CHAPTERS CONTACT:
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Private Land Partnerships: This partnership was formed between both private and public organizations in order to address private lands wildlife issues. Individuals share resources, information, and expertise. This landowner's guide has been a combined effort between these groups working towards one goal: Natural Resources Education. We hope this manual provides you with the knowledge and the motivation to make positive changes for our environment.