Wetland Habitat Management for Wildlife

Wetlands in the United States were considered wastelands for more than 200 years. Many people viewed them as unproductive lands that needed to be filled or drained to be made usable and profitable. Economic incentives in federal laws enacted during the 1800s encouraged landowners to convert wetlands to agricultural production. Until 1986, federal tax laws allowed farmers to deduct the cost of wetland drainage as a farm improvement expense. Terms used to describe wetlands included sinister, dismal, and forbidding.

Today wetlands are beginning to receive the respect and attention they deserve. Wetlands are now viewed as valuable real estate that needs to be protected and perpetuated. State and federal funds are available to restore them. Words such as rich, productive, and fertile are now being used to characterize wetlands.

Is it too late to save wetlands? The historical record is not encouraging. Wetlands have been destroyed at an alarming rate. Between 1780 and 1980, 60 acres of wetlands were lost every hour. Over 50% of the wetlands in the contiguous U.S. have been totally destroyed or severely degraded. In Ohio, 90% of this valuable habitat has been converted to other land uses, primarily agriculture and commerce. Ohio ranks a close second only to California in the percentage of original wetlands destroyed.

However, efforts are under way to protect Ohio's remaining wetland resources, and the Division of Wildlife is working to restore some of what has been lost. This publication will introduce you to the value, ecology, and management of wetlands. Hopefully, it will motivate you to action, so that by working together we can prevent further destruction of this precious natural resource, and perhaps even increase Ohio's wetland acreage.

THE VALUES OF WETLANDS

Wetlands have been called the kidneys of the landscape, because they can filter out sediments from surface water runoff and absorb surplus chemicals. Wetlands also replenish groundwater supplies and serve as water retention basins, thus contributing to flood water control. Wetlands are particularly important to wildlife. Nearly 32% of Ohio's endangered and threatened wild species live in wetland habitat. Over one-third of Ohio's wildlife depends upon wetlands for their survival.

This dependence illustrates the importance of protecting and restoring wetland habitat in Ohio. Ohio wetlands provide vital links as resting and feeding areas which connect animals with their breeding and overwintering grounds. The reproductive potential of migrant birds is influenced by the availability and quality of these stopover wetlands. Birds arrive at their breeding grounds in healthier condition if they find sufficient food and resting areas along the way. These seasonal wetland habitats are in short supply in Ohio.

DESCRIPTION OF WETLAND HABITAT

Defining wetlands has been the subject of great debate. However, most wetlands can be identified easily by three basic characteristics. First is the presence of water. Water levels may range from just moist or saturated soil to water depths greater than three feet. Wetlands receive their water from three primary sources: surface runoff, ground water discharge, and direct precipitation. Water conditions shape the character of any wetland.

Second, wetlands are defined according to the soil type. Wetland soils, in their undrained state, are usually saturated, flooded, or ponded long enough during the growing season to develop conditions that favor the development of wetland vegetation.

Third, wetlands are defined by the types of vegetation growing in them. Plants such as cattails, sedges, and bulrushes that prefer water conditions ranging from moist to ponded are commonly associated with wetland habitat.

Wetlands vary widely in size, from potholes of a few acres to expanses of several square miles. Many of Ohio's remaining wetlands are relatively small, ranging from 1 to 25 acres, and most are wooded wetlands that most people do not recognize as wetland areas.

Wetland types are classified according to plant composition and water depth. The following are the most common types of wetlands in Ohio.

Wet Woods

Wet woods are dominated by trees taller than 15 feet. Tree species such as green ash, swamp white oak, pin oak, hackberry, red maple, and silver maple are prevalent. Soils are usually saturated or ponded with less than three inches of water.

Scrub/Shrub Wetlands

These wetlands are dominated by shrubs such as silky, gray, and red-osier dogwood, buttonbush, common alder, willow, and elderberry and hardwood trees less than 15 feet tall.

Wet Meadows

Wet meadows have water depths of less than six inches for an extended period during the growing season. Vegetation consists primarily of grasses and sedges. Forbs such as blue vervain, swamp milkweed, Joe-Pye-weed, jewelweed, and boneset can also be found. Annuals such as beggar's-tick, barnyard grass, and smartweed commonly pioneer disturbed areas and mud flats.

Shallow Water Marsh

This type of wetland has a water depth between six inches and two feet for an extended period during the growing season. Some open water is usually mixed with vegetation such as cattail, bulrush, arrowhead, bur reed, and water plantain.

Deep Water Marsh

A deep water marsh wetland has an estimated water depth greater than two feet for an extended period during the growing season (but is not a pond or lake). The area is primarily open water, sparsely vegetated with floating and submergent plants such as water lily, lotus, and pond weed.

A single wetland area may be composed of two or more of these types. Such a composite is called a wetland complex, which is a preferred wetland situation for wildlife.

Wetlands are subject to change in plant composition and structure as water depths fluctuate due to natural causes, such as drought. Man-made alterations such as excavation, drainage, and filling can also induce severe changes in the makeup. Although natural and artificial changes in wetlands can be beneficial, most changes disrupt the complex water cycles and impair the wetland's ability to attract and sustain wildlife populations. Existing wetlands should be protected; modified or damaged wetlands should be restored. The next section discusses the principles and methods for restoring and managing wetlands for wildlife.

WETLAND WILDLIFE HABITAT REQUIREMENTS

What Attracts Wildlife To a Wetland

The use of wetlands by wildlife is influenced largely by three factors: water levels, mix of cover and open water, and the height, arrangement, and density of wetland plants. The last two factors are directly connected to the first. Plant occurrence and distribution are determined by water depth, and in turn dictate the types of animals that will use the wetland. Wildlife will select the vegetative zone created by the water depth that best provides for their needs, such as food, and nesting. Diving ducks feed on submergent vegetation in the deeper, more open water areas; dabbling ducks feed off the surface in the more shallow zones; shorebirds use the exposed mud flats; songbirds seek out the cattails and shrubs. Table l shows the wetland habitat requirements for some of Ohio's breeding and migratory wildlife. The ideal type of wetland for wildlife is a hemi-marsh, one that is 50% open water and 50% vegetation. Hemi-marshes are mixtures of open water with submerged vegetation and emergent zones that contain plants of variable heights and densities.

SELECTING A SITE FOR WETLAND DEVELOPMENT

Certain physical characteristics identify land that is suitable for wetland creation or restoration. Because water depth and flooding duration are critical to plant zone development, it is important to look for land that will produce the water regime that will create the wetland habitat most accommodating to the greatest diversity of wildlife. The best potential site for developing wetland impoundments is where former wetlands have been converted to agriculture. Use the following criteria for determining whether a site is suitable for wetland development.

Topography

The slope of a wetland can be relatively flat or gently rolling. The site should have irregular, uneven contours that create subtle breaks in elevation. Sites with sharp relief, steep slopes, and deep draws are not suitable for creating shallow water wetlands. Cropfields that have low depressional basins that are positioned to intercept surface water but have poor or narrow outlets lend themselves well to wetland creation. Keep in mind that topography influences water depth,and in turn vegetation patterns. It is important to select a site that will promote natural changes in water levels. Choosing a site with good topography will reduce the cost of restoration.

Soils

Soils formed under wet conditions are known as hydric soils. These soils should have low permeability and have the capacity to store and sustain desired water levels. Hydric soils provide the best opportunities for wetland restoration, although some nonhydric soils are suitable for wetland development. Hydric soils allow more rapid establishment of wetland vege-tation. Soil types can be identified on your property by referring to the county soil map or by contacting the Natural Resources Conservation Service (NRCS).

Watershed Size

The amount of land that drains into the potential wetland often determines the size of the embankment and outlet structure required to impound water safely. Therefore, watershed size has a bearing on the cost of constructing the wetland. Watersheds under 15 acres are preferred because their wetlands are less expensive to build. The size of a watershed can be calculated by using a U.S. Department of the Interior Geological Survey map, or you can request assistance from the NRCS.

Hydrology

The water conditions of a proposed wetland site are another important feature to consider. Ask the following questions: (1) What are the sources of water and where do they originate? (2) What direction does the water flow? (3) How much surface water flows into the area? (4) Are there any natural outlets? (5) Has the drainage of the area been altered by subsurface drainage tile? (6) Can it be changed? (7) If the drainage is changed, what effect will it have on the surrounding land? (8) Is there a high water table? (9) How long does the water naturally stand on the site? Division of Wildlife biologists or NRCS personnel can assist you in this process. Generally, areas where water is present for extended periods during the growing season are good sites for wetland development.

Remember: For the greatest diversity of wildlife, select a site that will maximize the interspersion of vegetation types with open water after flooding. Try to picture what the site will look like when it is finished. You can contact a Division of Wildlife biologist or a representative from the NRCS to help you in selecting a potential wetland restoration site.

WETLAND DESIGN AND CONSTRUCTION

An attractive wetland for wildlife is the result of proper planning and construction. The primary objective of wetland creation is to restore the natural features of the wetland, especially shallow water. Water depths are determined by natural topography, excavation, and height of the dike. To achieve this objective and restore a quality wetland for wildlife, follow these steps:

Survey

The site must be surveyed to establish the water line (pool size), the dike location, and size for embankment-type wetlands. The field survey data will also be used to draw up an engineering plan, which will serve as a blueprint for the contractor during construction. The Division of Wildlife or the NRCS can provide you with assistance in surveying the site and designing the plan.

Type of Impoundment

There are four basic methods for impounding water: embankment, dugout, tile cut, or ditch plug. The site determines which method should be used.

Embankment, Dike, or Levee (mounded and compacted soil). The embankment method is used when the topography is either a relatively wide, shallow draw or a low, depressed area with a narrow water outlet between two high spots in the land. The dike is placed between the two knolls and intercepts the water and impounds it on the upstream side. A dike should have 3:1 slopes and, to maintain shallow water conditions, be under four feet high. It is always necessary to install a structure (pipe) and/or spillway that will efficiently handle excess water during flood stages. Emergency spillways can be built as a principal or supplemental outlet during high water. Generally, the bottom of the spillway is constructed at the desired water level or at least 6 to 12 inches above the outlet pipe. Watershed size determines the size of the pipe. Sites with watersheds of less than 15 acres usually require a six-inch trickle tube (PVC pipe).

Dugouts are used in flat areas. They are the most expensive shallow water wetlands because they are created entirely by excavation. This method can achieve the best water levels for the development of vegetative zones that are ideal for the desired wildlife.

Tile cuts involve pinching off, plugging, cutting, or removing subsurface tile that drains the area to be impounded. An upright or riser pipe is then installed and attached to a functioning tile that will drain the water off when it reaches the desired level. This impoundment method will generally create wetlands that are on average 6 to 12 inches deep. Tile cuts are very inexpensive.

Ditch Plugs involve placing fill material into an existing drainage ditch. The fill blocks the water flow and creates a ponded area on its upstream side. An outlet pipe and/or spillway serves as an overflow to handle excess water during the spring.

Wetland Design Specifications

The following special features can be incorporated into almost any wetland design plan. Refer to Figure 1.

Different Water Depths. A wetland should have a mix of water depths. The ideal goal is; 40% of the area at a water depth of $1^1/_2$ feet; 30% of the area at $^1/_2$ to 1 foot; 10% at 3 to 4 feet; and 20% of the area should be exposed mud flats. Avoid designs that confine the deep water to the middle and the shallow water to the perimeter of the wetland. Work with the topography.

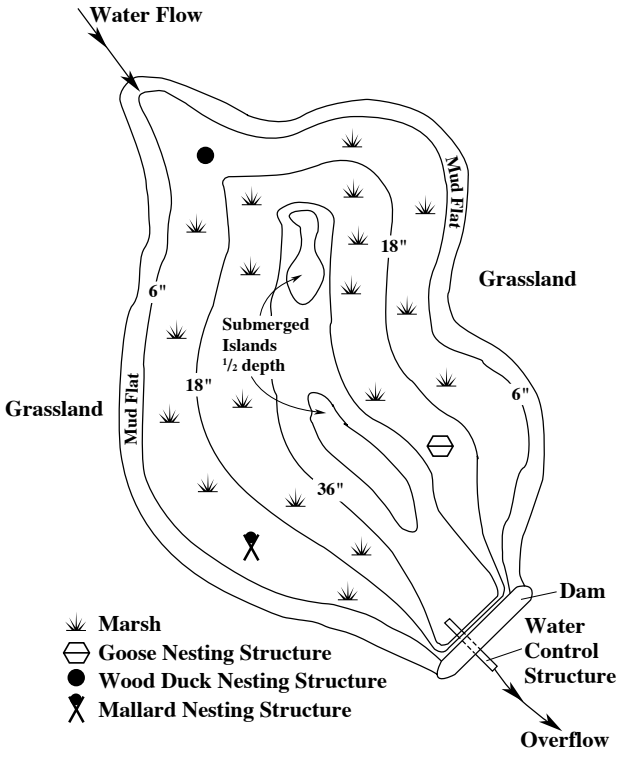
Irregular Shoreline. Wetland edges should be irregular in shape, with bays, inlets, and peninsulas.

Variable Side Slopes. Slopes should be soft and gentle, ranging from 10:1–16:1.

Use of Excess Spoil. Excess spoil from the pool area can be used to create elevated nesting areas around the wetland or to build submerged islands in it. Islands raised above the water level in the pool area should be constructed only if the wetland is larger than 10 acres. Submerged and raised islands should be a minimum of 20 feet in diameter with gentle side slopes that are 4:1–6:1. Raised islands must have a settled height of no less than two feet above water level and should be planted to a waterfowl nesting grass. Refer to the *Grassland Habitat Management for Wildlife* publication for details.

Water Control Structures are optional and require time and effort to monitor and maintain. The ability to control unwanted plants and manipulate plant composition is an advantage of water control structures. Refer to the next section for more details. Contact the NRCS for more information on the types of water control structures available.

Figure 1. Shallow-water wetland restoration design. Adapted from diagram found in **Marsh Development for Wildlife,** ***Indiana DNR.***



POST-CONSTRUCTION MANAGEMENT OF WETLANDS

Manipulation of Water Levels

Water level management can improve the attractiveness of a wetland to wildlife throughout the year. As previously mentioned, there are advantages to installing a water control structure that enables you to manipulate water levels within your wetland basin. Wetland plant height, density, and arrangement are enhanced by timely dewatering and flooding. Stagnant water conditions usually produce a monoculture which results in reduced wildlife use and diversity. Artificial water level fluctuations should duplicate natural wetland drawdown and flooding cycles. The following principles and procedures can be used as a guide in establishing a water level management strategy.

Partial or Temporary Drawdown to Create Moist Soil Areas. The two primary objectives of a drawdown are to provide exposed mud flats that will serve as feeding habitat for shorebirds and to stimulate the growth of annual wetland plants such as smartweed and barnyard grass for the production of seed for waterfowl. A gradual, partial drawdown should begin in spring to coincide with peak shorebird migration (April-May). Water can be returned to the basin in the fall, coinciding with the arrival of migratory waterfowl. Flooding should be done gradually, starting in late August and reaching maximum water depths by October. Maintain water depths of 6-12 inches during fall. Water levels should generally equal only one-third of the total height of newly established moist soil plants. Disking the exposed mud flats may encourage the growth of annual plants. Planting mud flats to small grains is a workable but less desirable alternative to natural plant establishment. After spring migration, as the mud flats dry, sow the area to buckwheat, Japanese millet, or sorghum. Gradually flood the area to a depth of 1-15 inches before fall migration. Hold the water levels at maximum water depths over winter and then repeat the water manipulation cycle in spring.

Permanent Deep Water Wetland Management. Gradually remove water from the wetland in late April through May. Begin flooding in August; gradually increase the water level until depths of 6 to 18 inches are reached by October. Repeat the drawdown cycle for a second year to establish a good stand of emergents such as cattails. Maintain low water levels for several more seasons to encourage the growth of perennial emergents. The ratio of emergent to submergent vegetation should be about 50:50 for as long as possible; (two to five years is average (See Figure 2). Maintain stable, moderate water depths (two to three feet) for several years to promote submergent

aquatic plants. Initiate the first step again when the emergent vegetation dies out and is replaced by open water and/or when a monocultural plant community develops.

The preceding guidelines can be adjusted to the individual wetland being managed. If more than one wetland is involved, then, for diversity it is best to manage them at different phases. Avoid having the wetlands at the same stages of plant development.

Green-Tree Reservoir Management

The green-tree reservoir, though not common, is an extremely effective method of attracting waterfowl and wetland animals. It involves placing a dike system with a water level control structure around a woodland area dominated by swamp white oak or pin oak. The area is flooded to a depth of 1-12 inches in October and is removed in February or early March before tree growth begins. Scattered openings throughout the woodland add to the benefit by diversifying cover. Selecting an area with oaks is very important for maximizing food production. Competing species may be cut to improve oak growth. Trees killed by the impounded water provide nesting cavities and food for several species of wildlife. Refer to the publication *Woodland Habitat Management for Wildlife*, "Timber Stand Improvement" Section.

Management of Adjacent Non-wetland Areas
(Refer to Figure 1)

The area surrounding a restored wetland can be managed to increase the attractiveness of the wetland to wildlife as well as provide for the needs of non-wetland wildlife species.

A grass buffer at least 50 feet in width should be established around the entire edge of the wetland. This will protect it against silt and chemical runoff and provide nesting cover for both upland and wetland wildlife.

Food plots can be planted to furnish a fall and winter food source for wildlife. Wetlands that have been drawn down should not be used for food plots.

Low growing shrubs can be planted on the windward side of the wetland to break the wind and reduce wave action on the wetland. Brisk spring winds occasionally make the water too rough for waterfowl, especially if the wetland is in open, flat country.

Nest structures can be erected for martins, swallows, wood ducks, mallards, and Canada geese.

Dike Maintenance

Because the dike or dam of a restored or created wetland involves a large investment of time and money, proper maintenance is essential.

After construction, the area should be well seeded to a grass and legume cover. Brome grass, timothy, or orchardgrass mixed with a legume should be used to hold soil in place and to provide some nesting cover for upland nesting wildlife. Mow only to control weeds and brush, and only during August to prevent nest destruction. Don't allow trees or brush to become established on dikes; woody plants make maintenance more difficult and may eventually cause the failure of the dike.

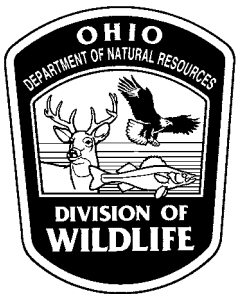
Muskrats can also cause damage if they become established in a dike or dam. Muskrats should be trapped if a problem occurs.

Figure 2.

Table 1. Wetland habitat requirements for selected Ohio wildlife.

Habitat Requirement	Waterfowl	Shorebirds	Waders & Water Birds	Piscivores (Fish-eating birds)	Raptors	Insectivores	Others
Open water	Mergansers Mallard Migrant dabbling & diving ducks Geese	Phalarope	Herons Coot Loon Grebe	Kingfisher	Osprey Bald eagle		Muskrat Beaver Turtles Otter
Emergents (e.g., cattails)	Migrant dabbling ducks Blue-winged teal Redhead Ruddy duck		Sora rail Virginia rail Bitterns Common gallinule Grebe		Harrier	Marsh wren Red-winged blackbird Swamp sparrow Beaver	Muskrat Pheasant (winter cover)
Wetland shrubs	Wood duck Black duck		Green-backed heron			Eastern kingbird Willow flycatcher C. yellowthroat Yellow warbler Song sparrow	Beaver Deer
Flooded live & dead timber	Wood duck Hooded merganser		Green-backed heron Great blue heron Cormorant	Kingfisher	Osprey Bald eagle Kestrel Barred owl Screech-owl	Tree swallow Great crested flycatcher Woodpeckers	Bat
Mud flats		Spotted sandpiper Killdeer Snipe Several migrants	Herons			Grackles	Raccoon Mink
Wet meadow	Mallard Canada goose	Upland sandpiper	Rails		Harrier Short-eared owl Barn owl (feeding area)	Red-winged blackbird Bobolink Sedge wren	Pheasant Turtles Snakes

Adapted from *Wildlife Occurrence in Water Impoundments* by Don Rakstone and John Probst.



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