

**PART FOUR:**  
Habitat  
Management for  
Wetland, Pond,  
and Riparian Areas



## 12. WETLAND HABITAT MANAGEMENT

Wetlands are ecosystems characterized by hydric soils that support vegetation adapted to life in a wet environment. Wetland communities include the vegetated, shallow-water margins of lakes and ponds, the seasonally flooded borders of rivers and streams, and an amazing diversity of topographic settings across the landscape, including basins, seepage slopes, and wet flats. There are three characteristics shared by all wetlands. First, they are inundated by or saturated with water for varying periods during the growing season. Second, they contain wetland or hydric soils, which develop in saturated conditions. Finally, they are dominated by plant species that are adapted to life in saturated soils.

Wetlands can be grouped into the following general wetland types. *Swamps* are wetlands dominated by woody plants, either trees or shrubs. *Marshes* are wetlands dominated by herbaceous plants. *Fens* are peat-accumulating open wetlands that receive mineral rich groundwater. *Bogs* are also peat-accumulating wetlands but are isolated from mineral-rich water sources by deep peat accumulation and therefore receive most of their water and nutrients from precipitation.

### WETLAND FUNCTIONS AND VALUES

Wetlands are some of the most biologically rich and diverse ecosystems that exist in Vermont, the United States and throughout the world. In Vermont, they represent a small percentage of the overall landscape (approximately five percent) and as such, must be protected for the many values they support. Generally speaking, wetlands provide a wide array of benefits including flood storage, water quality improvement, recreation, education and science, and habitat for many species of fish, wildlife, plants, and insects.

The following functions, although mentioned briefly, are important to consider when understanding the importance of wetlands on your property and help provide context for the values they may provide.

#### **Hydrology**

Frequency and duration of soil saturation are the primary factors determining the type of wetland that will develop or occur in a particular setting. For example, permanent standing water in deep-water marshes excludes most woody plants and is suitable habitat for only those herbaceous plants adapted to such a stressful environment that is created by this type of hydrology. Other wetlands are only seasonally wet or flooded, such as vernal pools or floodplain forests. These wetland habitats support a different set of plants and trees, and as a result, support different species of wildlife.

#### **Nutrient Availability**

The availability of nutrients in wetlands has a significant effect on the plants that will grow there. Fens occur in areas with calcium-rich bedrock. Many marshes receive surface water runoff, which provides a source of dissolved nutrients and minerals. In contrast, mineral poor wetlands

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have low nutrient availability. Bogs are especially low in nutrients. The effect on what plants occur in a wetland effects what food is available for some wildlife, or what brood-rearing habitat may be available for nesting waterfowl.

#### ***Attenuation of Flood Flows***

Many wetlands, especially those that occur in basins with restricted stream outlets or in the floodplains of rivers, have the capacity to store large volumes of water generated by heavy rainfall, rapid snowmelt, or floods. These wetlands release stored water slowly back into rivers or streams or in some cases allow the water to percolate into the ground.

#### ***Surface Water Quality Protection and Groundwater Recharge***

Wetlands are effective in trapping sediments and removing nutrients and pollutants from surface water runoff before that water reaches streams or lakes. The location of a wetland relative to sources of runoff and the receiving stream or lake is important in determining how effectively a wetland will protect the quality of surface waters. Groundwater discharge may be evident as seeps or springs where water comes to the surface. These wetlands have characteristic features such as stable water levels and soil saturation, defined outlet channels, and water chemistry and vegetation that reflect mineral-enriched conditions.

#### ***Fish Habitat***

Certain freshwater fish species require wetlands as spawning grounds and as nursery areas for their young. Spring spawning by northern pike in the emergent wetlands adjacent to Lake Champlain is a particularly good example. Others, like black bullhead, yellow perch, pumpkinseed, and bluegill, leave open water to spawn in shallow water wetlands. Wetlands are also important for maintaining the quality of fish habitat by providing shade or discharging water from cold springs, both of which moderate surface water temperatures.

#### ***Wildlife Habitat***

As previously mentioned, wetlands provide essential habitat for numerous species of wildlife. The dense vegetation found in most wetlands provides a variety of foods and also nesting sites that are relatively safe from predators. Many species, such as Canada goose, wood duck, great blue heron, muskrat, beaver, snapping turtle, and bullfrog are wetland dependent, meaning that they rely on wetlands for some or all of their life cycles. For others, such as black bear, moose, deer, wood frogs, and marsh hawks, wetlands are not primary habitat but are important for a part of their life cycle or during certain times of the year. Wetlands also provide critical habitat for many animal groups that we know much less about, including dragonflies, butterflies, moths, beetles, and other insects.

#### ***Habitat for Rare, Threatened, and Endangered Species***

Wetlands occupy only five percent of the land area in Vermont, but they provide necessary habitats for the survival of a high percentage of the threatened and endangered species in the state. Examples of such wetland dependent species are Calypso orchid, Virginia chain fern, marsh valerian, common loon, spruce grouse, sedge wren, spotted turtle, and western chorus frog.

### **Shoreline Stabilization**

Vegetated wetlands along the shores of lakes or the banks of rivers can protect against erosion caused by waves and strong currents. These wetlands dissipate wave and current energy, trap sediments, and bind and stabilize the wetland substrate. Wide wetlands with dense woody vegetation are most effective, but as can be observed in many locations along the shores of Lake Champlain, emergent wetlands such as deep bulrush marshes also contribute significantly to stabilizing the shoreline.

### **Beavers and Wetland Communities**

Beaver alteration of wetlands is a form of natural disturbance and generally occurs in cycles that may span decades. Wetlands created and influenced by beavers are widespread and represent some dynamic and diverse wildlife habitats. These wetlands provide important habitat for a wide array of wildlife from wood ducks and Canada geese to mink, otter, and of course, beaver. Dam construction and creation of an impoundment typically kills all woody plants in the affected area and can drastically alter species composition. Over a period of years, however, beavers typically deplete their local food supply — woody species that grow near their pond — and move to other suitable habitat. Although the impoundment may persist for years, eventually the dam may fail and the pond drains. The resulting wet mud flats are colonized by annuals, then perennials, and finally woody plants after several years. All the successional wetland types created as part of this cycle are important habitats for numerous species of plants and animals.

## **FORESTED WETLANDS TYPES**

*Floodplain Forests* are usually dominated by silver maple, red maple or sugar maple, with abundant ostrich fern or sensitive fern. They are closely associated with river and lake floodplains and have exposed mineral soils of alluvial origin.

*Hardwood Swamps* are dominated by broad-leaved deciduous trees, but may have lesser amounts of conifers. Dominant trees may be red maple, silver maple, black ash, green ash, or black gum. Soils are mineral or organic.

*Softwood Swamps* are dominated by conifers, including northern white cedar, red spruce, black spruce, balsam fir, tamarack, and hemlock. Broad-leaved deciduous trees may be present but are less abundant than conifers. Soils are mineral or organic.

*Seeps and Vernal Pools* typically are very small and occur in depressions or at the base of slopes in upland forests. Trees in the wetland may be scarce, but there is an overhanging canopy from the adjacent forest. Seeps have abundant groundwater discharging at their margins and usually a lush growth of herbs. Vernal pools are depressions that fill with water in the spring and fall and typically have little herbaceous cover.

## **OPEN WATER WETLANDS TYPES**

*Open Peatlands* have stable water tables at or near the soil surface, generally lack seasonal flooding, and mosses and liverworts are consistently abundant. Trees are generally absent or sparse, except in black spruce woodland bogs and pitch pine woodland bogs.

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*Marsbes and Sedge Meadows* have standing or slowly moving water with depths that may fluctuate seasonally. The soils are primarily mineral, with well-decomposed organic mucks in some cases. Herbaceous plants are dominant.

*Wet Shores* are sparsely vegetated wetland communities occur along the shores of rivers and lakes and are subject to seasonal flooding and scouring. The soils are mineral and include mud, sand, gravel, and cobble.

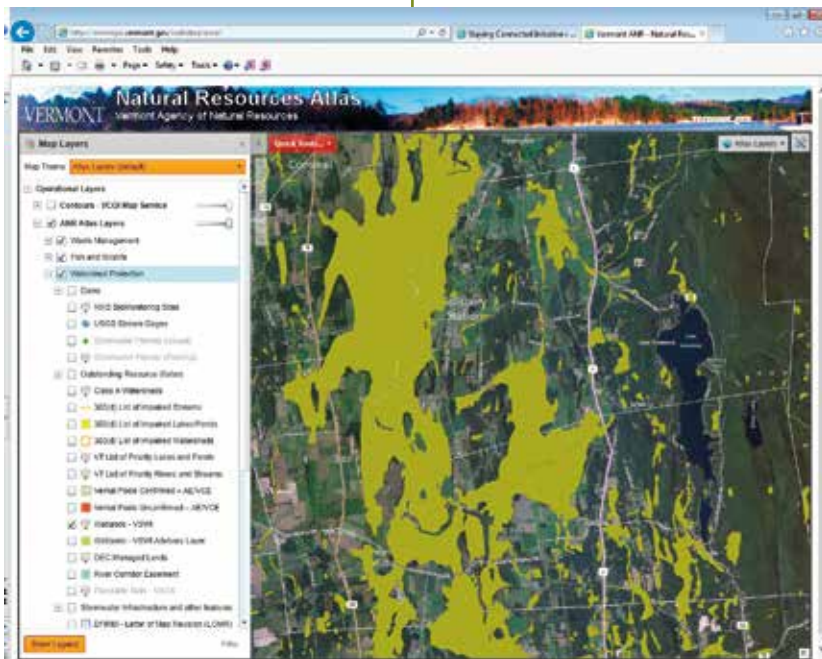
*Shrub Swamps* typically have significant seasonal flooding and variable soil types. Shrubs that typically dominate include speckled alder, willow, sweet gale, and buttonbush.

## HOW TO PROTECT, ENHANCE, OR CREATE A WETLAND

Wetlands are one of the most sensitive and biologically rich habitats that occur in Vermont and the best way to manage wetlands is by protecting them from development or other disturbance. Establishing wide buffers around the perimeter of a wetland may be the best approach for managing to conserve the wildlife functions of the habitat. Natural wetlands, which developed across thousands of years, are hard to duplicate because of their complexity. Preserving those that are not currently altered by humans is often the best way to maintain existing functions, including wildlife habitat.

The Vermont Fish and Wildlife Department can provide detailed information on occurrences of significant wetland natural communities as well as technical assistance on wildlife habitats and use in wetlands. In addition, vernal pools are being mapped throughout the state and more information is available online or through the Vermont Fish and Wildlife Department (see Figure 12.1 and **Resources** for link).

Wetlands that have been dredged, drained, filled, or otherwise altered may offer an opportunity for restoration. Often, blocking a ditch or removing a portion of a field tile line may be all that is needed to restore water levels the support wetlands. Contact the Vermont Department of Environmental Conservation Wetlands Program or the U.S.D.A. Natural



**Figure 12.1**  
Map of wetlands as shown by the ANR Atlas

Resources Conservation Service for more information. Websites for both programs can be found in **Resources**.

“Enhancement” of an existing wetland can be difficult, and improving surrounding upland habitats is generally more effective. Enhancement efforts, however, may include removing nuisance plants and adding nest structures and other habitat improvements. To maintain and increase the size of naturally vegetated wetland buffers provides for wildlife travel corridors and screening for wildlife that are feeding and resting in wetlands. Refer to the chapters on waterfowl and beaver management for more information.

Other management options for enhancing the wildlife value of wetland habitats include:

- Install nesting structures to encourage ducks, geese or other waterfowl dependent birds to use the wetland for reproduction;
- Retain mature standing dead trees for nesting habitat for wood ducks and other cavity nesting birds and to serve as perches for raptors and other birds;
- If possible, control water levels. This is not typically the case and is not recommended without a qualified wildlife biologist. Draw advice from a biologist during the growing season to encourage prolific growth of smart weed and other native wetland plants that are of high food value to waterfowl and other wetland wildlife;
- Plant nut-producing trees, such as white oak, along the edge of the wetland to produce a valuable food resource;
- Where beavers occur, allow them to create wetlands, where appropriate — beaver influenced wetlands can become highly productive wildlife habitat;
- Retain shrub and herbaceous cover adjacent to within 1/2 mile of a wetland where it occurs — this serves as important nesting cover for mallards and other ground-nesting waterfowl that will use the wetland once their eggs hatch (delayed mowing or brush hogging is a useful approach);
- Carefully remove invasive plants such as phragmites and purple loosestrife. Follow proper protocols to prevent the seeds and roots from being dispersed to other locations.



Creating wetlands can also help wildlife, but this process may be both difficult and expensive depending on site characteristics. Wetland creation is most often done for mitigation of wetlands. Often created wetlands do not function correctly and result with failed projects due to incorrect soils, vegetation, and other factors. Wetland creation and restoration is a complicated science that involves engineering expertise and is not recommended without the guidance of an experienced wetland restoration expert. The U.S.D.A.'s Natural Resource Conservation Services and the U.S. Fish and Wildlife Service (links for which are provided in **Resources**) may provide guidance on opportunities for wetland restoration.

## VERNAL POOLS

### *What Are Vernal Pools?*

Vernal pools are small (generally less than 1 acre), ephemeral pools that occur in natural basins within upland forests. Vernal pools typically have no permanent inlet or outlet streams and have very small watersheds. These temporary pools generally last only a few months and then disappear by the end of summer, although some pools may persist in wet years.

During their dry period, vernal pool depressions may be recognized by the sparse vegetation and by stained leaves marked by seasonal high water. Vernal pools typically lack trees but are shaded by trees growing in the surrounding upland forest, with highly variable vegetation within the depression.



For vernal pools to be effective breeding habitats for amphibian populations, they must retain water for at least three months during the spring and summer breeding season in most years so that amphibians can complete their larval stage.

### *Why Are Vernal Pools Important?*

Vernal pools are perhaps best known as breeding habitat for amphibians. Typical Vermont species that rely heavily on vernal pools for reproduction include the mole salamanders (spotted salamander, blue-spotted salamander, and Jefferson salamander), eastern four-toed salamander, and wood frog. For vernal pools to be effective breeding habitats for amphibian populations, they must retain water for at least three months during the spring and summer breeding season in most years so that amphibians can complete their larval stage.

The periodic drying of a vernal pool excludes populations of predatory fish and diving beetles that prey on amphibian larvae. Other animals use the pools as well, such as fairy shrimp, fingernail clams, snails, eastern newts, green frogs, American toads, spring peepers, and a diversity of aquatic insects. The amphibians and invertebrates found in vernal pools constitute a rich source of food for various species of mammals, reptiles, and birds such as wood ducks, mallards, black ducks, and great blue herons. Despite their small size and temporary nature, vernal pools are highly productive ecosystems. For more information on vernal pools, see the Natural Resource Conservation Service's website at the link in **Resources**.

### **THREATS TO VERNAL POOLS**

Vernal pools and the species that depend on them are threatened by activities that alter the earth and water in and around the pool, as well as by significant alteration of the surrounding forest. Construction of roads and other development in the upland forests around vernal pools can block salamander migration. Poorly managed timber harvesting can have significant effects on vernal pools, including altering the vernal pool depression, changing the amount of sunlight and organic debris that reaches the pool, and disrupting amphibian migration routes by creating deep ruts. Even when the pool is dry, altering the depression may affect its ability to hold water and may disrupt the eggs of invertebrates that form the base of the vernal pool food chain.

### **MANAGEMENT RECOMMENDATIONS**

Management of a vernal pool needs to include the surrounding upland habitat as well as the breeding pool. The area used by an amphibian population can be represented by three management zones: the breeding pool, a zone that extends to 100 feet around the pool, and a third zone that extends to 600 feet from the pool edge.

**Breeding pool.** This area includes the pool depression measured at spring high water. During dry periods, you can determine the high water mark using such evidence as watermarks on trees within the depression, water-stained, compressed or silted leaves, or an obvious change in topography at the pool edge.

Leave breeding pools undisturbed, with no cutting, heavy equipment, skidding, storage of slash or other woody debris, or sedimentation within these depressions during any season.

**The 100-foot zone.** Avoid land clearing, development including roads and driveways, use of pesticides, herbicides or fertilizers, and barriers to amphibian movement. Consider only light cutting or no cutting, such that at least an 80 percent canopy cover remains within this zone. Harvesting within this area should only occur on completely frozen ground in mid-winter.

**The 100- to 600-foot zone.** To provide adequate amphibian habitat and canopy cover, practice uneven-age forest management. Leaving some large, mature hardwoods is especially helpful for protecting and enhancing habitat. To provide adequate shading, a minimum of 60 percent of the canopy cover composed of trees at least 25 feet tall should remain intact. Try to maintain a moist forest floor with deep leaf litter and abundant coarse woody debris of various sizes. Timber harvesting should not happen during the amphibian movement period in early spring and preferably should be done on frozen ground.

Avoid using pesticides within 600 feet of a breeding pool. Avoid any activities that direct water away from a breeding pool, as this reduces the amount of water held in the depression and increases the chance that the pool will dry before amphibian larvae complete their development. Do not direct additional runoff into a breeding pool from outside its natural basin. This can change the hydrology of the pool and introduce pollutants and sediments, both of which can kill eggs and developing larvae.

Check with your town or other local government office to see if there is a wetland protection ordinance that applies to your property.

## REGULATIONS FOR PROTECTING WETLANDS

In Vermont, most wetlands are protected by the Vermont Wetland Rules. Some towns in Vermont have local rules that also protect wetlands. The federal Army Corps of Engineers and the U. S. Environmental Protection Agency also protect wetlands through federal laws. No wetland management should occur without a complete understanding of whether any of these laws or rules apply. Check with your town or other local government office to see if there is a wetland protection ordinance that applies to your property. State and some federal regulations can be addressed by contacting the Vermont Wetland Program in the Vermont Agency of Natural Resources — they have numerous fact sheets on their website — and the U. S. Army Corps of Engineers. Furthermore, the Natural Resource Conservation Service administers a federal wetland compliance program for landowners who participate in U. S. Department of Agriculture programs. Allow enough time for permit application and approval so as not to upset the time frame for your project.



## RESOURCES

Austin, J. A., C. Alexander, E. Marshall, F. Hammond, et al. 2013. *Conserving Vermont's Natural Heritage: A Guide to Community-Based Planning for the Conservation of Vermont's Fish, Wildlife, and Biological Diversity*. 2nd edition. Montpelier, VT: Vermont Fish and Wildlife Department.

U. S. Army Corps of Engineers. *1987 Corps of Engineers Wetland Delineation Manual*. <http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf>

U.S. Department of Agriculture. Natural Resources Conservation Service. <http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/>

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U. S. Fish and Wildlife Services. <http://www.fws.gov/>

Vermont Agency of Natural Resources. Vermont Wetland Program. <http://www.watershedmanagement.vt.gov/wetlands.htm>

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