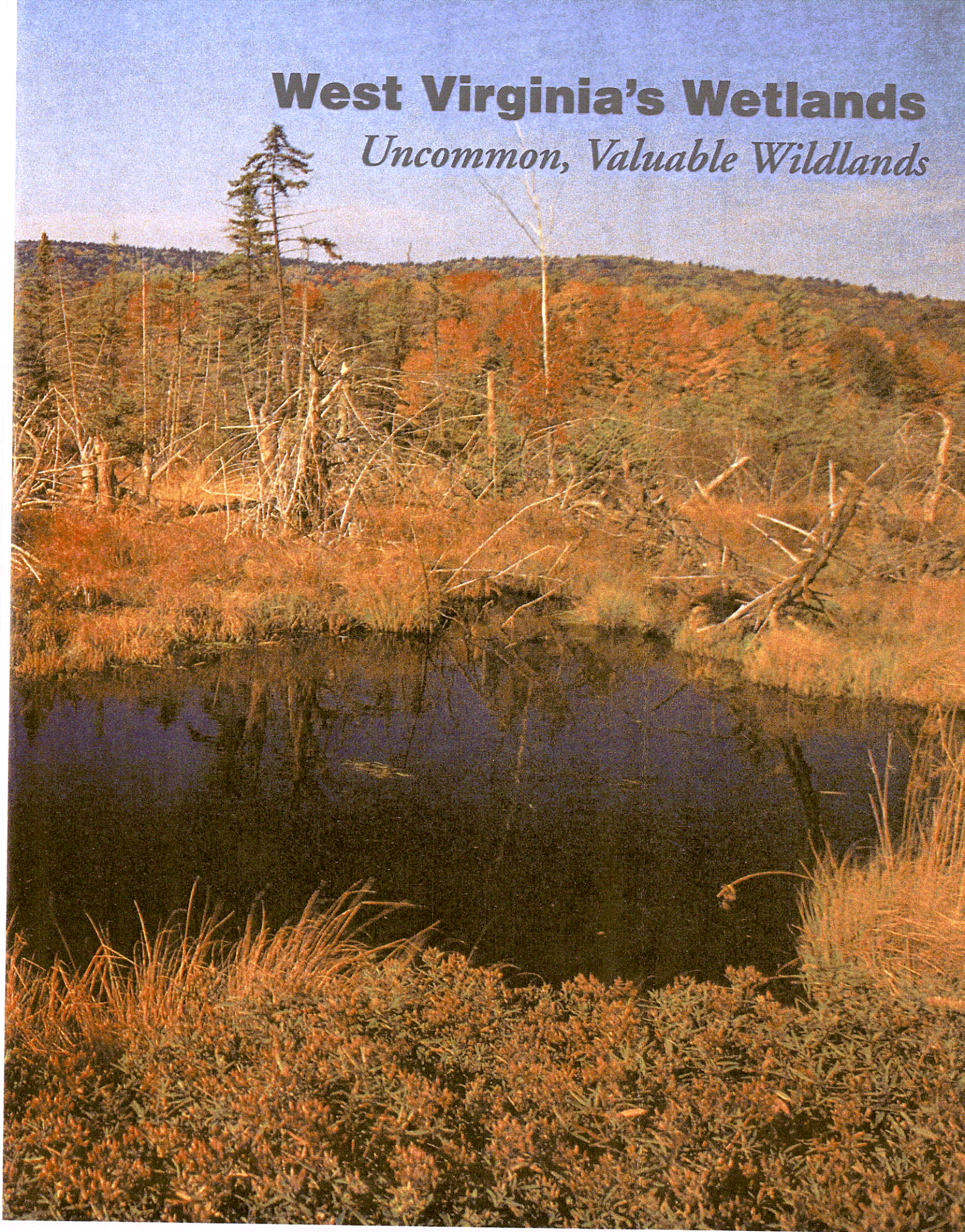
West Virginia's Wetlands

Uncommon, Valuable Wildlands



Preface

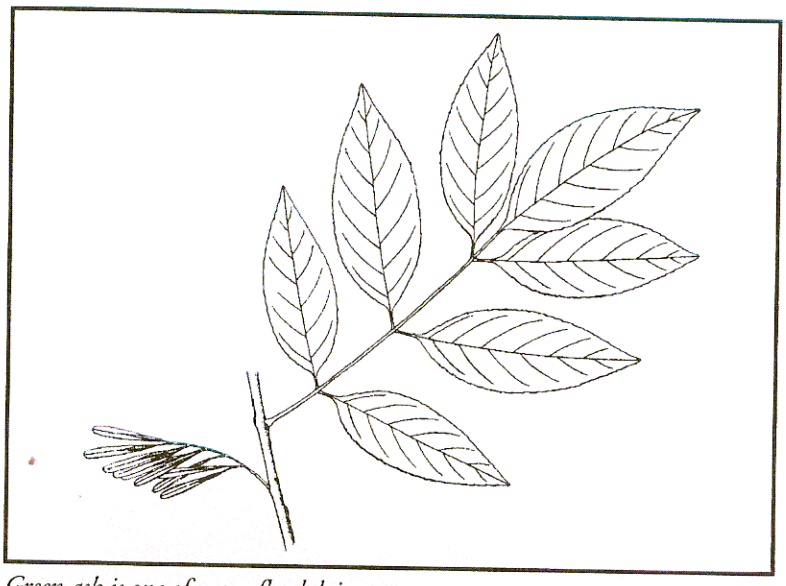
This booklet summarizes the most up-to-date information on West Virginia's wetlands for the general public. It provides brief descriptions of the state's wetlands, their distribution, and their values. In addition, the booklet presents some recommendations to improve management and conservation of wetlands.

This document is based on a wetlands inventory of the state recently completed by the U.S. Fish and Wildlife Service's National Wetlands Inventory with support from the West Virginia Division of Natural Resources. The purpose of the inventory was to produce a series of large-scale (1:24,000) maps that identified the location, type, and shape of wetlands larger than 1-3 acres in size. The inventory utilized 1:58,000 color infrared photography from 1980–1986 to interpret wetlands. Wetlands were classified to various types, including emergent, scrub-shrub, and forested wetlands. Farmed wetlands were not mapped. The results of this inventory are presented on the National Wetlands Inventory maps and in a technical publication that reports the statistical findings (wetland acreages) of the inventory. Copies of maps can be ordered from the Natural Heritage Program, West Virginia Division of Natural Resources, P.O. Box 67, Ward Road, Elkins, West Virginia 26241 (telephone 304-637-0245), and a copy of the technical report can be obtained from the Technical Support Unit, West Virginia Division of Natural Resources, at the above address.

Wetlands are places where water floods or saturates the soil for extended periods. Specially-adapted plants called "hydrophytes" colonize these sites. (Photo by G.S. Ratliff)

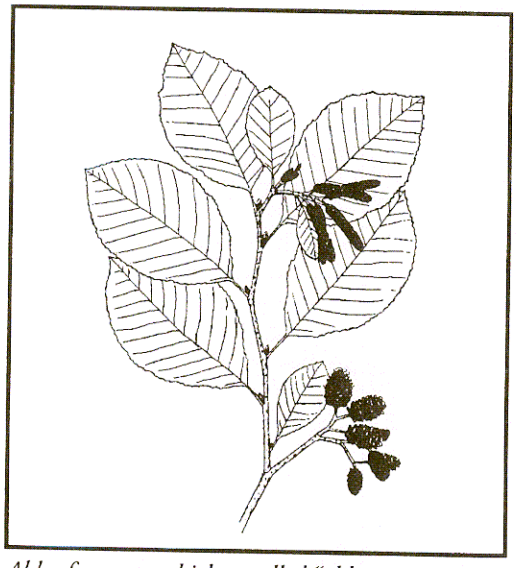
What are Wetlands?

Wetlands are largely lands that are flooded or saturated at or near the ground surface for varying periods of time during the year. The term "wetland" is derived from two words, "wet" and "land." This implies that wetlands are lands that are at least periodically wet enough to limit uses of the land (e.g., usually can't farm without draining and can't build without filling). Wetlands are the collection of wet environments that occur on the landscape. They include marshes, wet meadows, swamps, bogs, mires, seeps, and seasonally flooded bottomlands. Ponds and the shallow water zones of lakes are also considered wetlands.



Green ash is one of many floodplain trees.

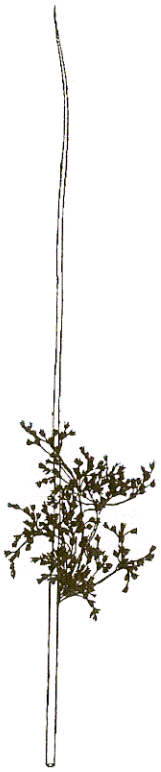
Wetlands form where there is at least a periodic excess of water on a recurring basis. This excess typically occurs at some frequency, such as every other year, and for some duration, usually more than 2 weeks of saturation near the surface—within 1 foot of the ground surface where most of the plant roots exist.[1] Water can come from rainfall, snow melt, river overflow, springs, and other groundwater discharges. Water is likely to collect in depressions, low-lying relatively flat areas along waterbodies (rivers, streams, ponds, lakes), at the toes of slopes, and even on slopes in association with drainageways, seeps, and springs.



Alder forms wet thickets called "alder swamps."

The U.S. Fish and Wildlife Service, with wide scientific peer review, developed a technical definition of wetland for the purpose of conducting a nationwide inventory of wetlands:

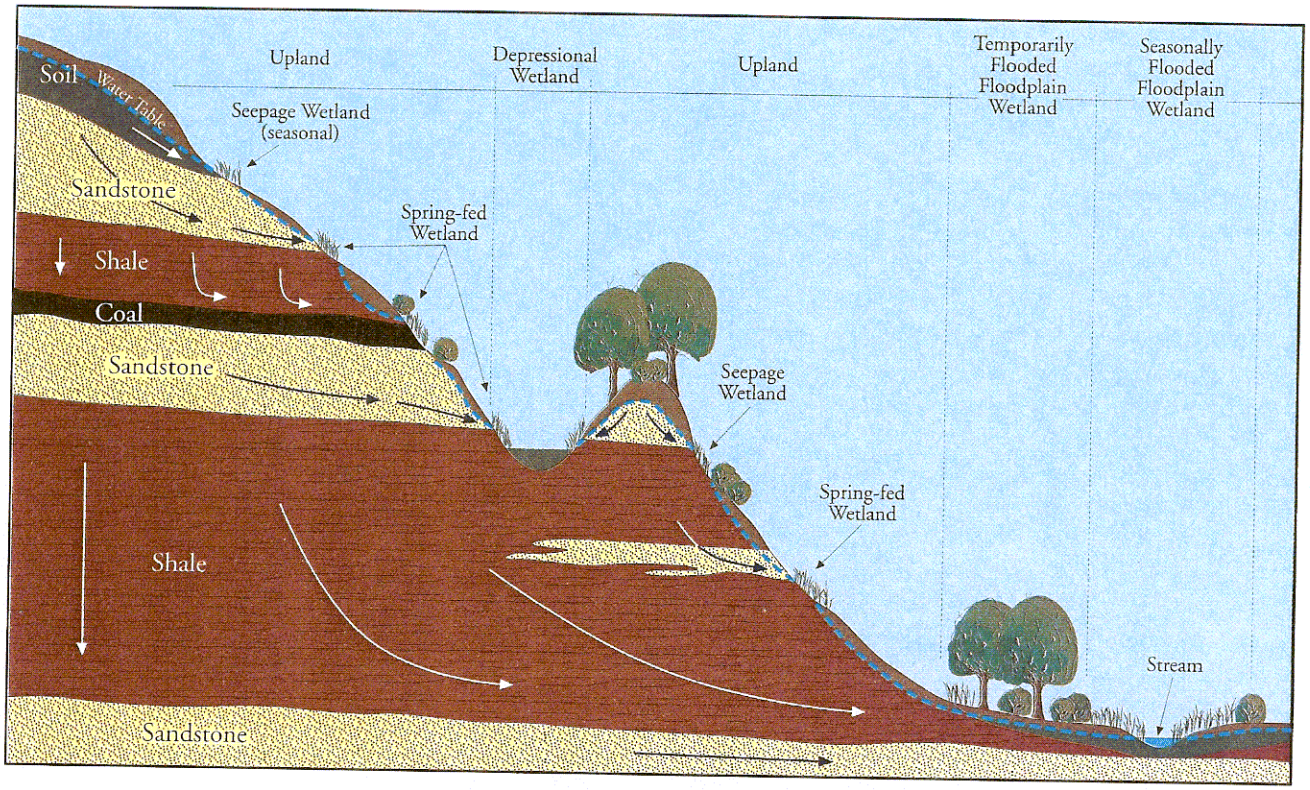
> "*Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.*" (Cowardin *et al.* 1979)[2]



Soft rush is a common wet meadow species.

[1]The National Academy of Sciences recently concluded that wetlands typically are saturated within 1 foot of the soil surface for at least 14 days during the growing season in most years. Further, they recognized that there may be regional differences, but no data to the contrary presently exists. National Research Council. 1995. *Wetlands Characteristics and Boundaries.* National Academy Press, Washington, DC.

[2]Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31.



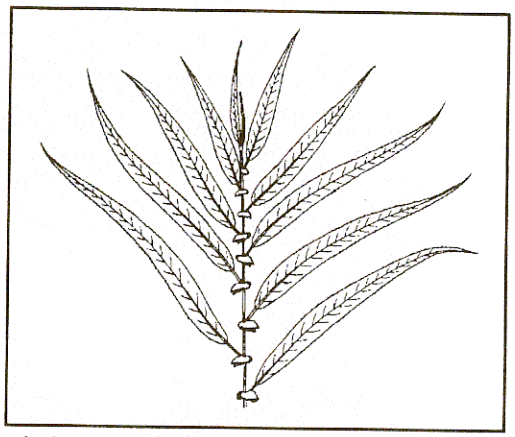
Wetlands develop at positions on the landscape where excess water is available. This cross-sectional diagram shows groundwater flow paths that create wetlands at different locations—valleys, depressions, and hillside slopes (vertical scale greatly exaggerated).

Reed canary grass is another common wet meadow species.

This definition focuses on three attributes: (1) the degree of flooding or soil saturation (wetland hydrology); (2) wetland vegetation (hydrophytes); and (3) wet soils (hydric soils). All areas considered wetland must have enough water at some time during the growing season to stress plants and animals not adapted for life in water or on periodically saturated soils.

When soils are flooded and/or saturated for a few days or longer, the soils become oxygen-deficient. Since all plants require oxygen for survival and growth, only plants with special adaptations can live in these soils. These plants are called "hydrophytes." Out of all the plants that grow in the United States, only a third can tolerate the prolonged oxygen-deficiency associated with most wetlands. Soil development is also affected by these conditions. Such soils typically lose the reddish to orangish color of iron oxides characteristic of well-drained (oxygen rich) soils. Instead, many "hydric soils" are gray-colored below the topsoil. In soils frequently flooded for very long periods, peat or muck accumulate at the surface because leaves and other organic matter do not readily break down under these conditions.

Most wetlands are characterized by the presence of hydrophytes and hydric soils. West Virginia and the federal government presently use these features plus other signs of prolonged water saturation to identify wetlands subject to the Clean Water Act regulations. Not all wetlands are vegetated—mud flats along exposed shores and shallow bottoms of rivers, lakes, and ponds may not be colonized by plants, but are still considered wetlands.



Black willow trees are common in swamps and bottomland wetlands.

Wetlands occur along streams, lakes, and other waterbodies. Water willow dominates this streamside marsh along the Greenbrier River. (Photo by B. Tolin)

This wet meadow is an example of a seepage wetland. It begins upslope where groundwater is discharging at the surface (foreground) and extends to the valley floor. (Photo by G. Keer)

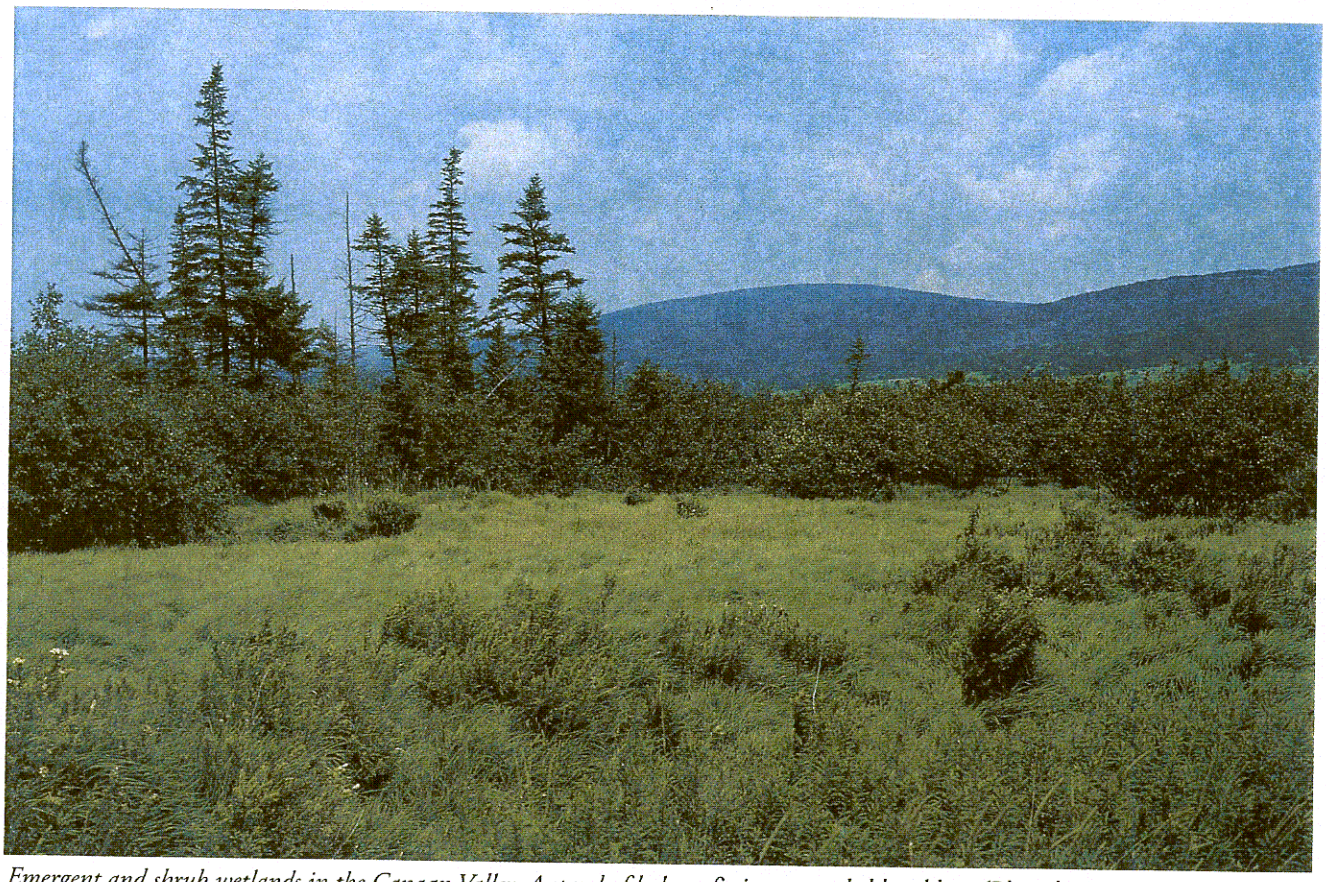
Some wetlands support very diverse plant communities—among the most diverse in the state. (Photo by G.S. Ratliff)

Wetland Types

Wetlands are represented by vegetated wet areas (e.g., marshes, swamps, and bogs), and shallow waterbodies (including ponds and the littoral zone of lakes). Their periodic wetness or shallow water habitat distinguishes them from lakes, rivers, and reservoirs (deepwater habitats). West Virginia's vegetated wetlands may be separated into three major types based on their dominant vegetation: (1) **emergent wetlands** (commonly called marshes and wet meadows) characterized by grasses, sedges, and other nonwoody plants, (2) **shrub wetlands** (including shrub swamps and bogs) represented by low-to-medium height (less than 20 feet tall) woody plants, and (3) **forested wetlands** (mostly wooded swamps and bottomland forests) dominated by trees (woody plants 20 feet or taller).

Emergent Wetlands

Marshes usually are flooded for most of the growing season. As a result, they typically have mucky soils. Characteristic plants include cattail, bur-reeds, arrowheads, rice cutgrass, three-way sedge, other sedges, sweet flag, and spatterdock. Many marshes have developed in beaver ponds and along the shores of man-made farm ponds and other permanent waterbodies. Common marsh species in rivers are water willow and marsh purslane.



Emergent and shrub wetlands in the Canaan Valley. A stand of balsam fir is surrounded by alders. (Photo by R. Tiner)

Bottomland forested wetland. (Photo by G. Keer)

Shrub Wetlands

Shrub swamps include a wide variety of wet shrubby thickets ranging from nearly permanently flooded buttonbush swamps to seasonally flooded meadowsweet swamps. Common shrubs in shrub swamps include arrowwoods, alders, willows, meadowsweets, hardhack, dense St. John's-wort, highbush blueberry, chokeberries, and swamp rose. Some shrub swamps consist of saplings of tree species such as red maple and black willow. These swamps will eventually become forested wetlands.

Shrubs may dominate hair-cap moss bogs in many areas. Species represented include black chokeberry, velvet-leaf blueberry, cranberry, swamp dewberry, dense St. John's-wort, wild raisin, smooth arrowwood, and mountain holly.

Cattail is one of the most familiar wetland plants.

Wet meadows are saturated for extended periods during the growing season, with surface water often present for short periods. They are characterized by wet mineral soils. The plant community of wet meadows varies. Some meadows are dominated by a single species like reed canary grass, bluejoint grass, or soft rush, while others are probably among West Virginia's most diverse habitats. Wet meadow species include marsh fern, sensitive fern, woolgrass, tussock sedge, grasses (including rice cutgrass, redtop, and manna grasses), rushes, sweet flag, asters, goldenrods, Joe-Pye-weeds, smartweeds, arrow-leaved tearthumb, New York ironweed, some species of tickseeds (beggar-ticks), boneset, St. John's-worts, and jewelweed. Shrubs such as hardhack (steeplebush), meadowsweets, alders, arrowwood, willows, and silky dogwood may be scattered in these wet meadows. Many meadows have been used as pastures and more might have been cultivated in the past.

Open bogs of hair-cap moss and peat moss are found in various places in West Virginia. Common herbs in these bogs include cottongrass, sedges, and rushes. Swamp dewberry is usually quite abundant.

Forested Wetlands

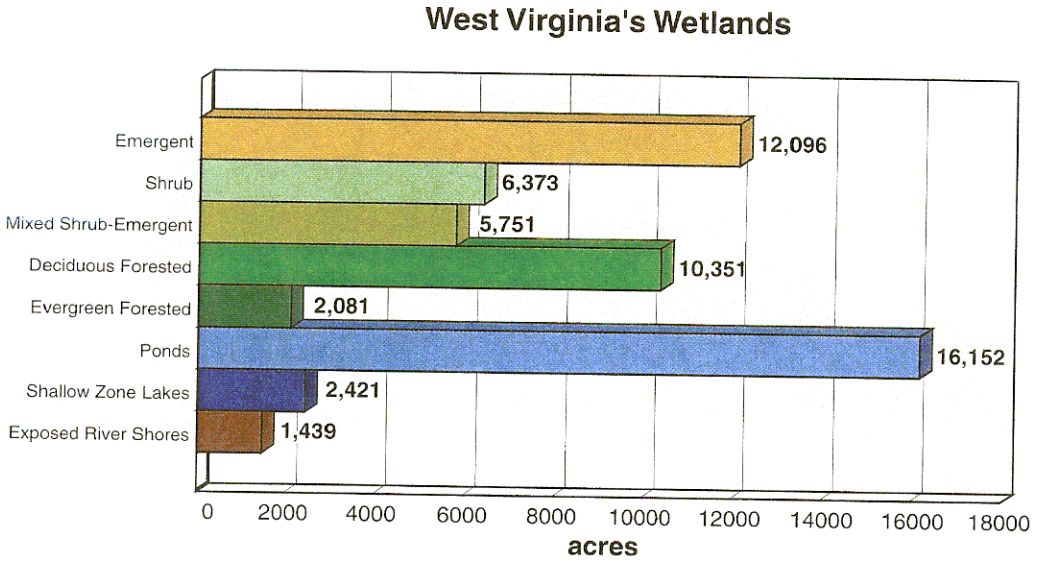
Forested wetlands (also called wooded swamps) are usually dominated by trees that shed their leaves each fall. Red maple is typical of wetter swamps, with other common hardwoods such as black willow and green ash. On floodplains, temporarily flooded bottomland forested wetlands are characterized by silver maple, red maple, sycamore, cottonwood, black willow, and box elder, and to a lesser extent by elm, green ash, and pin oak. Black cherry, black walnut, river birch, beech, and locusts are also frequently observed. Other common plants in these wetlands may include jewelweed, nettles, and poison ivy.

Evergreen trees dominate some wetlands, especially in the Canaan Valley. Hemlock and red spruce are dominant conifers, with rhododendron and yellow birch as common associates. Yellow birch may be a co-dominant with hemlock in many swamps. Balsam fir, white pine, and red maple may also be present in varying amounts. Balsam fir is co-dominant with hemlock and red spruce in some Canaan Valley wetlands.

Wetland Extent and Distribution

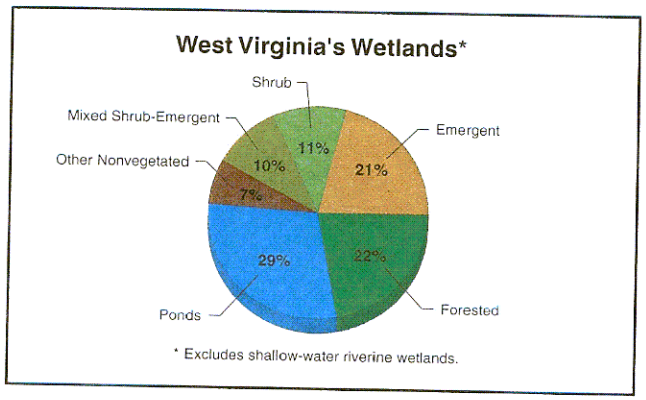
How many acres of wetlands are in West Virginia? Estimates of West Virginia's wetland acreage vary due to different survey techniques. The most commonly used number—102,000 acres—came from a 1987 U.S. Fish and Wildlife Service report.[3] This figure was produced by analyzing wetlands on 144 four-square mile study plots—roughly 2 percent of the state—and then making a statewide projection. This number may overestimate the extent of wetlands in the state. Estimates based on soil mapping (i.e., totalling the acreage of hydric soil map units) are even higher (over 170,000 acres) because these units include an undetermined amount of drained former wetlands and nonwetlands due to mapping procedures. In 1982, the state of West Virginia inventoried nearly 46,000 acres including vegetated wetlands and nonchannel waterbodies (e.g., ponds, lakes, and reservoirs).[4] The U.S. Fish and Wildlife Service recently mapped roughly 57,000 acres of wetlands in West Virginia as part of the National Wetlands Inventory. This inventory used aerial photo-interpretation techniques to identify wetlands for preparing 1:24,000-scale wetland maps for the entire state. Due to inherent limitations of these techniques, the maps are conservative. They underestimate the extent of wetlands for several reasons—they typically show large wetlands (more than 1-3 acres in size), farmed wetlands are not designated, and many West Virginia wetlands are small and are not mapped. The number also does not include shallow rivers which technically qualify as wetlands.

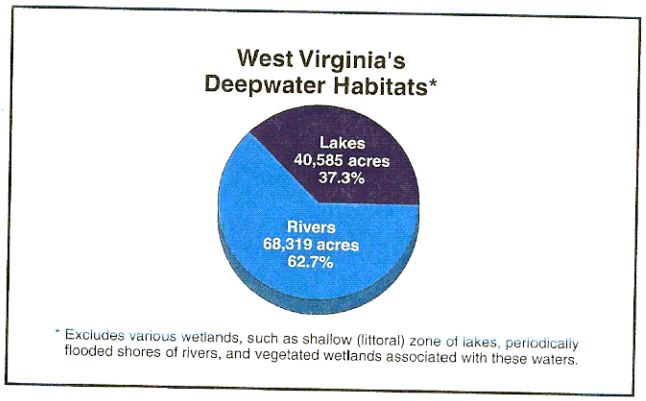
The total statewide wetland acreage is likely to be somewhere between 57,000 and 102,000 acres—representing less than 1 percent of the state's land area. Only through conducting a comprehensive inventory with extensive field checking can a more exact acreage be determined. Regardless of the true number, wetlands are, without question, an uncommon resource in the state. For this information booklet, the 57,000-acre figure is used because it is derived from the most detailed wetlands inventory performed to date for the state.



[3]Tiner, R.W. 1987. *Mid-Atlantic Wetlands. A Disappearing Natural Treasure.* U.S. Fish and Wildlife Service, Newton Corner, MA and U.S. Environmental Protection Agency, Philadelphia, PA. Cooperative publication.

[4]Evans, J.E., S.A. Wilson, and R.L. Hall. 1982. *West Virginia Wetlands Inventory.* West Virginia Department of Natural Resources, Wildlife Resources Division. Bulletin No. 10.





Wetlands occupy less than 0.4 percent of West Virginia's land surface area. Ponds are the most common type, being closely followed by forested and emergent wetlands. Deepwater habitats (reservoirs, lakes, and rivers) are almost twice as abundant as wetlands, yet they only cover 0.7 percent of the state. Aquatic habitats (lakes, rivers, reservoirs, and wetlands) combined represent about 1 percent of the state. This means that 99 percent of West Virginia is upland and that wetlands are indeed a scarce resource.

Wetland distribution is not uniform in West Virginia. Most of the state's wetlands can be found in Tucker County's Canaan Valley. Greenbrier County, with the Meadow River wetlands, is the second-ranked county. About 30 percent of the state's wetlands occur in these two counties. Other counties with over 1,000 acres of wetland include Randolph, Preston, Pocahontas, Nicholas, Grant, Barbour, Mason, Fayette, Berkeley, Jefferson, and Hampshire.

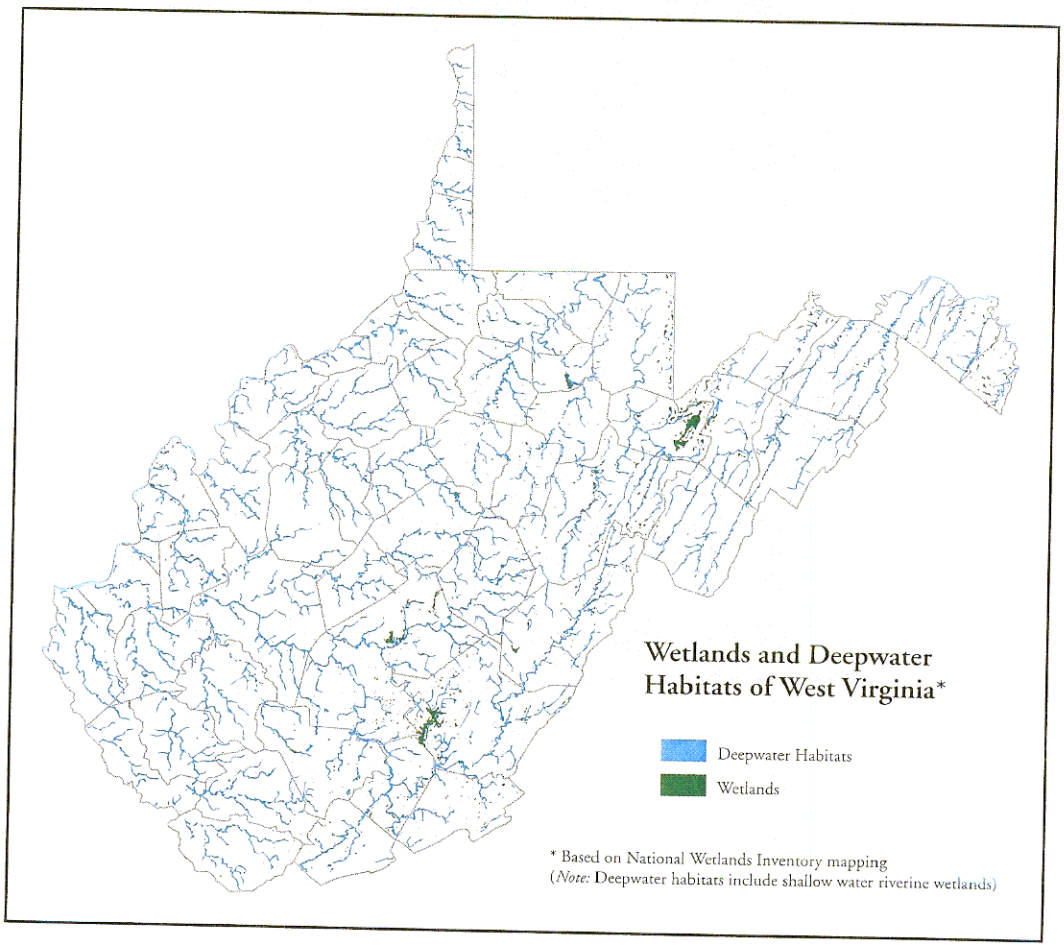


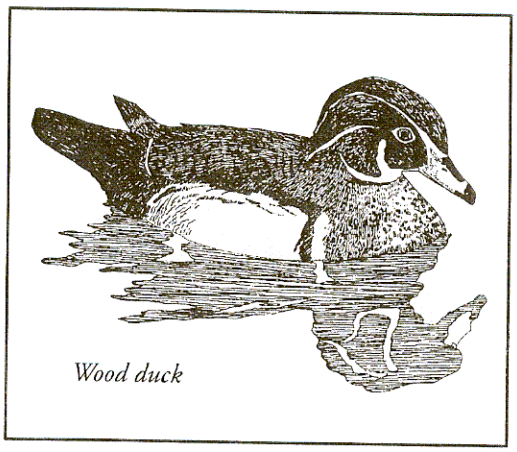
Table 1. Wetland acreage of the 55 West Virginia counties based on National Wetlands Inventory mapping. Percentages of each county represented by wetland and ranking based on wetland acreage are also given. State total may vary slightly from those in figures due to computer roundoff.

County	Land Area (Sq. Miles)	Land Area (Acres)	Wetland Acreage	% of County Represented by Wetland	Rank by Wetland Acreage
Barbour	343	219,520	928	0.42	15
Berkeley	321	205,440	1,372	0.67	10
Boone	503	321,920	305	0.09	37
Braxton	513	328,320	548	0.17	30
Brooke	90	57,600	232	0.40	41
Cabell	282	180,480	550	0.30	29
Calhoun	280	179,200	76	0.04	55
Clay	346	221,440	118	0.05	50
Doddridge	321	205,440	100	0.05	54
Fayette	667	426,880	1,441	0.34	9
Gilmer	340	217,600	150	0.07	48
Grant	480	307,200	1,760	0.57	7
Greenbrier	1,025	656,000	6,990	1.07	2
Hampshire	644	412,160	1,106	0.27	12
Hancock	84	53,760	118	0.22	51
Hardy	585	374,400	894	0.24	17
Harrison	417	266,880	909	0.34	16
Jackson	464	296,960	567	0.19	28
Jefferson	209	133,760	1,308	0.98	11
Kanawha	901	576,640	568	0.10	27
Lewis	389	248,960	383	0.15	34
Lincoln	439	280,960	156	0.06	45
Logan	456	291,840	188	0.06	43
Marion	535	342,400	522	0.15	32
Marshall	312	199,680	370	0.19	35
Mason	305	195,200	1,460	0.75	8
McDowell	433	277,120	312	0.11	36
Mercer	420	268,800	648	0.24	24
Mineral	329	210,560	932	0.44	14
Mingo	424	271,360	109	0.04	52
Monongalia	363	232,320	619	0.27	25
Monroe	473	302,720	781	0.26	19
Morgan	230	147,200	605	0.41	26
Nicholas	650	416,000	3,593	0.86	3
Ohio	106	67,840	108	0.16	53
Pendleton	698	446,720	754	0.17	21
Pleasants	131	83,840	151	0.18	47
Pocahontas	942	602,880	2,472	0.41	6
Preston	651	416,640	2,950	0.71	5
Putnam	346	221,440	741	0.33	22
Raleigh	608	389,120	994	0.26	13
Randolph	1,040	665,600	3,474	0.52	4
Ritchie	454	290,560	270	0.09	39
Roane	484	309,760	166	0.05	44
Summers	353	225,920	768	0.34	20
Taylor	174	111,360	531	0.48	31
Tucker	421	269,440	9,494	3.52	1
Tyler	258	165,120	191	0.12	42
Upshur	355	227,200	740	0.33	23
Wayne	508	325,120	262	0.08	40
Webster	556	355,840	498	0.14	33
Wetzel	359	229,760	126	0.05	49
Wirt	235	150,400	155	0.10	46
Wood	367	234,880	817	0.35	18
Wyoming	502	321,280	298	0.09	38
State Total	**24,121**	**15,437,440**	**56,678**	**0.37**	

The location of wetlands between land and water makes them valuable wildlands. (Photo by R. Snow)

Why are Wetlands Important?

The water-holding capacity of wetlands provides many opportunities to benefit people and wildlife. Among other things, wetlands serve as important fish and wildlife habitats, improve water quality, and temporarily store flood waters. Each wetland works in combination with other wetlands as part of a complex, integrated system (e.g., a watershed, ecoregion, or flyway) that delivers these and other benefits to society. An assessment of the value of a particular wetland must take this critical interrelationship into account.



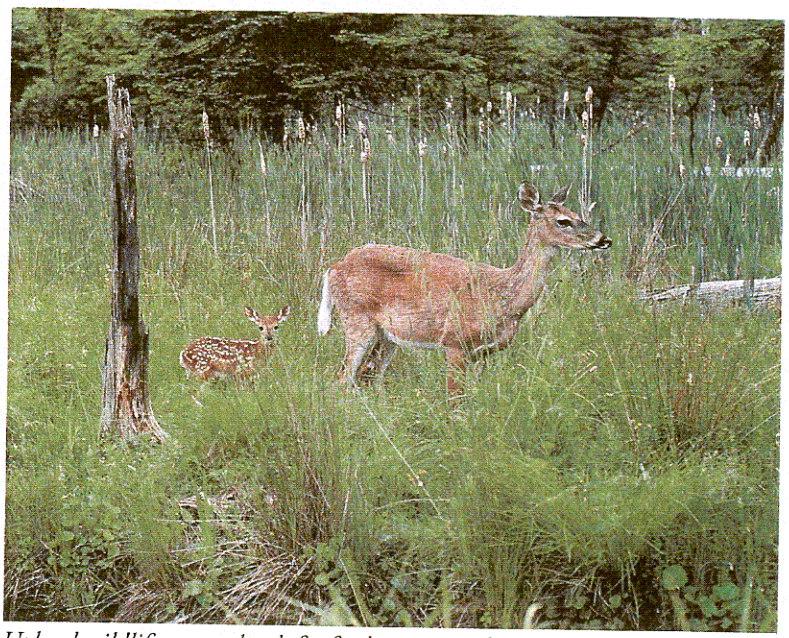
Wood duck

Fish and Wildlife Habitat

Wetlands are required by many types of animals and plants for survival. For many, like the wood duck, snapping turtle, muskrat, green heron, cattail, lurid sedge, and buttonbush, wetlands are their primary homes or habitat—the only places they can live. For some animals, such as fish and amphibians, wetlands are critical breeding grounds, while the adults move into deepwater or upland areas, respectively. Even terrestrial or upland animals frequently utilize wetlands to obtain food, water, or cover that are important for their well-being. The majority of West Virginia's rare and endangered plants depend on wetlands for survival—as many as 150 species.

All of West Virginia's fishes depend on wetlands, either directly or indirectly, since wetlands are vital to maintaining water quality and regulating streamflows. Many fishes feed in wetlands or upon wetland-produced food or their young use wetlands, especially riverine and lacustrine wetlands, as nursery grounds. Almost all recreationally important species spawn in the aquatic portions of wetlands. Many of the state's fishes require or prefer shallow water and associated aquatic beds for feeding and/or reproduction: muskellunge, pickerels, longnose gar, suckers (e.g., quillback and bigmouth buffalo), various minnows, bullheads, mudminnow, largemouth bass, and some sunfishes. The decline of certain species (pugnose and silvery minnows, grass pickerel, and buffalo sucker) may be related to wetland drainage and destruction along major rivers.

West Virginia's wetlands are valuable bird habitats providing year-round habitats for resident species and breeding sites, wintering grounds, and feeding areas for migratory birds including waterfowl. Some typical birds found in the state's marshes are great blue heron, green-backed heron, king rail, Virginia rail, sora, sedge wren, swamp



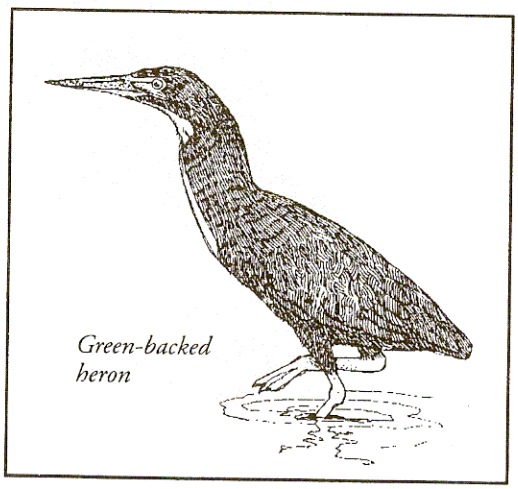
Upland wildlife use wetlands for food, water, and cover. (Photo by J. Hudgins)

Many songbirds nest in wetlands, including the yellow warbler. (Photo by F. Knapp)

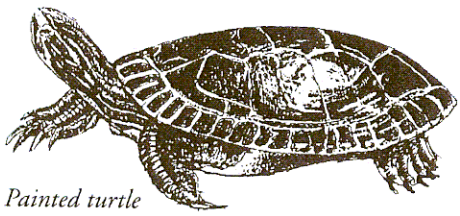
sparrow, song sparrow, osprey, bald eagle, spotted sandpiper, common snipe, woodcock, belted kingfisher, red-winged blackbird, purple martin, tree swallow, northern rough-winged swallow, warbling vireo, yellow warbler, common yellowthroat, Canada goose, wood duck, mallard, and American black duck. Shrub swamps provide nesting sites for swamp sparrow, song sparrow, common yellowthroat, alder flycatcher, willow flycatcher, white-eyed vireo, gray catbird, yellow warbler, and chestnut-sided warbler. Woodcock favor alder swamps because of their wealth of earthworms. In forested wetlands, a variety of songbirds can be found, including several that nest there: wood duck, red-shouldered hawk, barred owl, ovenbird, Louisiana and northern water thrushes, red-eyed vireo, scarlet tanager, olive-sided flycatcher, Acadian flycatcher, and prothonotary warbler. Many of the wetland birds are relatively rare in the state due to the scarcity of wetlands.

Most of the mammals associated with West Virginia's wetlands are small and usually not seen—deer mice, white-footed mice, and meadow voles. Some are rare and listed as "species of concern" because of their dependence on limited and shrinking wetland habitats—northern water shrew, star-nosed mole, and meadow jumping mouse. The more frequently observed wetland mammals are muskrats, beaver, and eastern cottontail. Beavers have been increasing in numbers since the 1930s when state conservation and management programs were initiated. Today, beaver are most abundant in the eastern two-thirds of the state. Beaver-influenced wetlands are most common in Tucker, Randolph, Pocahontas, Fayette, and Greenbrier Counties. River otter, once extirpated from the state, have been reintroduced into several drainages: Little Kanawha, West Fork, Elk, Meadow, and Greenbrier. White-tail deer and black bear, important game species, also use wetlands for food and cover. Bats are other mammals associated with West Virginia's wetlands—they can be seen at dusk feeding on flying insects above marshes, ponds, and other waterbodies.

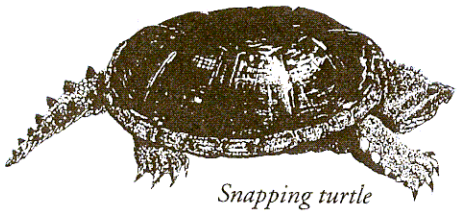
Many amphibians (frogs, toads, and salamanders) and some reptiles (turtles and snakes) depend on wetlands. Frogs and toads breed in wetlands and in puddles and roadside ditches across the state. The spring peeper with its familiar springtime "peeps" breeds in shallow ponds and temporarily flooded pools. Bull frogs and green frogs live in marshes and shallow waterbodies, while leopard frogs and pickerel frogs are frequently observed in wet meadows. The eastern American toad is the most common toad in the state. Eight species of salamanders use shallow permanent ponds and temporary woodland pools for breeding, including Jefferson, spotted, marbled, and smallmouth salamanders. The red-spotted newt is generally confined to permanent water. Seeps, springs, and small streams are vital habitats for many salamanders. Six species of turtles live in West Virginia's marshes and ponds and midland painted, eastern painted, stinkpot, and snapping turtles are most common. The northern water snake and eastern ribbon snake are



Green-backed heron



Painted turtle



Snapping turtle

the typical wetland snakes, and only the water snake occurs throughout West Virginia.

About half of the Nation's endangered species require wetlands at some point in their lives. All freshwater mussels, including six federally listed species, depend on wetlands since they are vital in maintaining water quality and assist in regulating stream flow. In West Virginia, endangered species such as the northern riffleshell, clubshell and the James spinymussel are small to medium-sized stream/river species intimately associated with riverine emergent and aquatic bed wetlands. The bald eagle depends on the productive aquatic ecosystem to provide their primary food source—fish. Three federally listed plants—harperella, Virginia spiraea, and the northeastern bulrush—depend directly on West Virginia's wetlands for their survival.

Water Quality Improvement

One of the most important values of wetlands is their ability to help maintain good water quality in our Nation's rivers and other waterbodies and to improve degraded waters. Wetlands do this in several ways: (1) removing and retaining nutrients, (2) processing chemical and organic wastes, and (3) reducing sediment loads to receiving waters. Wetlands are particularly good water filters. Due to their position between upland and deep water, wetlands can both intercept surface water runoff from land before it reaches open water and help filter nutrients, wastes, and sediment from flooding waters. This function is important in both urban and agricultural areas. Mussels in West Virginia's rivers and streams are excellent indicators of good water quality. Clean waters are important to people as well as to aquatic and other wildlife.

Flood Damage Protection

Wetlands have often been referred to as natural sponges that absorb flooding waters, yet they actually function more like natural tubs, storing flood waters that overflow riverbanks or surface water that collects in isolated depressions. By temporarily detaining flood waters, wetlands help protect adjacent and downstream property owners from serious flood damage. Trees and other wetland plants also help slow the speed of flood waters. This action combined with water storage allows wetlands to lower flood heights and reduce the water's erosive potential. Wetlands in and upstream of urban areas are especially valuable for flood protection, since urban development increases the rate and volume of surface water runoff, thereby increasing the risk of flood damage. Runoff is also high from farmland, especially in rolling terrain. Upstream wetlands help reduce the likelihood of flood damage to crops by temporarily storing runoff.

Nature's wetland builder—the beaver. (Photo by S. von Oettingen)

Although wetlands temporarily store water and help minimize flood damages, building on floodplains still leads to problems. (Photo by J. Schmidt)

Jefferson County wetland. (Photo by G. Keer)

Erosion Control

Wetlands are often located between rivers and high ground and are, therefore, in a good position to buffer the land against erosion. Wetland plants stabilize shorelines by binding soil in their roots, dampening wave action by friction, and reducing current velocity through friction. Some states are now recommending planting of wetland vegetation to control shoreline erosion. This technique is a type of bioengineering that is being increasingly used to protect banks and to stabilize and restore eroding shorelines.

Natural Products

A wealth of natural products are produced by wetlands. Wet meadows serve as pasture for livestock. In some places, wetland grasses are cut for hay. Timber is harvested from some wetlands. Trapping provides recreation and income to trappers. Waterfowl, deer, and black bear are important game species for residents and out-of-state hunters alike.

Recreation and Aesthetics

Besides hunting and fishing, other recreation, including nature study, photography, swimming and boating, takes place in and around wetlands. Given the diversity of wildlife associated with wetlands, many people simply choose to spend their leisure time exploring or boating near wetlands observing plant and animal life. Wetlands serve as important places for outdoor education and research, since they are among the most diverse and interesting natural environments. Through the centuries, wetlands have also captured the attention of some artists who have painted wetland scenes or have written about wetlands. Thus, wetlands are an important part of the country's natural heritage and West Virginia's wetlands, although uncommon, are among America's most valuable natural resources.

The Future of West Virginia's Wetlands

Nationwide, wetlands have been dredged, filled, drained, polluted, and degraded in many ways. Today, less than half of the Nation's wetlands remain. There are no comparable statistics for West Virginia, but we do know that many marshes and wet meadows have been drained for cropland and many seasonally flooded bottomland forests cleared and drained for farms or pastures. To a lesser degree, urban development along major rivers has filled wetlands. Regardless of the magnitude of these losses, West Virginia's wetlands are an extremely limited resource and an important one worthy of protection and restoration.

In general, there are two widely used approaches to protect wetlands: (1) regulation of wetland uses and (2) acquisition of wetlands. More recently, wetland restoration has emerged as a third approach to increase wetland acreage and/or the functions of degraded wetlands. A fourth option —private stewardship—is one that should be pursued. The U.S. Fish and Wildlife Service's "Partners for Wildlife" and the U.S. Department of Agriculture's "Wetland Reserve" Programs are examples of what can be done to protect wetlands.

Currently, West Virginia's wetlands are regulated through the federal Clean Water Act. The state has no specific state wetland protection laws, unlike most northeastern states. To help protect wetlands, West Virginia has developed state laws and regulations to implement Section 401 of the Clean Water Act. Specific state water quality standards must be maintained as a basis for state water quality certification.

Nationally, the U.S. Army Corps of Engineers, with program oversight by the U.S. Environmental Protection Agency, regulates uses of wetlands to varying degrees. Depositing fill in wetlands and excavating wetlands have typically required a federal permit. More recently, draining wetlands also needs to be permitted before commencing work. Certain activities are exempt from permit requirements. Currently, there is much public debate over the extent to which the federal government should be involved in wetland regulation.

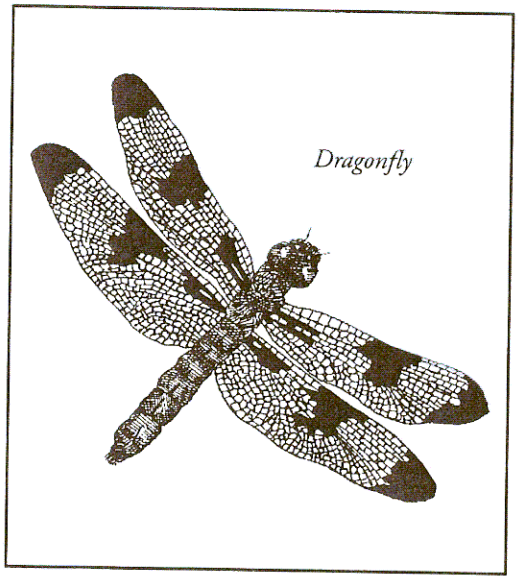
West Virginia's present role in wetland regulation comes from two sources. Chapter 20-2-1 of the West Virginia Code states that "All species of wildlife shall be maintained for values which may be either intrinsic or ecological or of benefit to man." Chapter 22-11 declares that it is public policy "to maintain reasonable standards of purity and quality of the water of the state consistent with (1) public health and public enjoyment thereof; (2) the propagation and protection of animal, bird, fish, aquatic, and plant life, ..." This code authorizes the Director of the Division of Environmental Protection (DEP) to issue state water quality certification required under the Clean Water Act. The DEP and the Division of Natural Resources jointly review projects for certification and the DEP may issue, waive, or deny certification with conditions to enforce state water quality standards. In addition, the Division

The Nation's 500th National Wildlife Refuge was established in West Virginia. (Photo by G. Baker)

of Natural Resources has responsibility for reviewing federal Clean Water Act permits under authority of the federal Fish and Wildlife Coordination Act.

Acquisition involves purchasing wetlands or acquiring easements on privately owned wetlands. This approach results in the establishment of wildlife refuges, fish and wildlife management areas, sanctuaries, or other conservation areas. This technique has been used by government agencies and private conservation organizations. The Division of Natural Resources has an active wetland acquisition program supported by license fees, state waterfowl stamps, federal funds, and partnerships with Ducks Unlimited and other groups. The U.S. Fish and Wildlife Service recently established its 500th National Wildlife Refuge—the Canaan Valley Refuge. This is West Virginia's second National Wildlife Refuge—the Ohio River Islands Refuge was the first, established in 1990.

Wetland restoration represents a new and growing approach for improving the status of wetlands. It involves largely restoring hydrology to drained wetlands. Farmers are recognizing that many of these drained lands are only marginally productive and would be better restored to a marsh-pond complex for their enjoyment. These restored wetlands provide landowners with hunting and in some cases, fishing opportunities, while providing wetland functions that benefit society (water quality filtration, flood storage, and fish and wildlife habitat). The U.S. Fish and Wildlife Service's Partners for Wildlife Program is actively assisting West Virginia landowners in restoring wetlands through technical assistance and funding partnerships.



Private stewardship is encouraging landowners to protect, restore, and enhance wetlands on their property. Although wetlands provide many public benefits, landowners can reap certain values (e.g., timber, hay, grazing, hunting, fishing, and nature observation). Marshes and ponds may also serve as water supplies for livestock and fire suppression.

Much can be done to slow the rate of wetland loss and improve the quality of our remaining wetlands. Many opportunities exist for private citizens, corporations, government agencies, and others to help accomplish these objectives. Cooperation between public agencies and private citizens and the private sector is essential to securing a promising future for our wetlands. Individual landowners and corporations are in a key position to determine the fate of wetlands on their properties. Every citizen, landowner or not, can help wetlands by supporting any number of wetland conservation initiatives. Major public and private options for improving the status of wetlands are listed below.

West Virginia's wetlands are uncommon habitats and their many functions make them worth protecting and restoring. (Photo by J. Schmidt)

Public Sector Opportunities

1. Develop a consistent public policy at all levels of government to provide adequate protection to wetlands of national, state, and local significance.
2. Improve both the efficiency and effectiveness of existing wetland protection programs at all levels of government—develop interagency partnerships.
3. Ensure proper implementation of existing laws and policies through adequate staffing, surveillance, enforcement, and training.
4. Increase wetland acquisition in selected areas for preservation purposes.
5. Continue work with landowners to encourage private stewardship of wetlands.
6. Continue to remove government subsidies that encourage wetland drainage and destruction.
7. Encourage tax and other incentives to landowners and industry to promote wetland preservation through private stewardship and remove existing tax benefits that encourage wetland destruction.
8. Review cost-benefit analyses and justifications for flood control projects that involve channelization of wetlands and watercourses.
9. Improve wetland management on publicly-owned lands.
10. Increase the number of marsh creation and restoration projects (including enhancement of existing wetlands by improving local water quality and establishing buffer zones). Opportunities exist related to compensatory mitigation for unavoidable wetland losses by government-sponsored water resource projects or permits issued by existing wetland regulatory programs.
11. Continue research to increase our knowledge of wetlands (including analyses of wetland changes, wetland hydrology, and functions/values) and to identify ways of using wetlands that are least disruptive to their ecology and public values.
12. Increase public awareness of wetland status and values through various information and media sources.

Private Sector/Landowner Opportunities

1. Rather than drain or fill wetlands, adopt a wetland stewardship program for your land—restore wetlands for their natural benefits or seek compatible uses involving minimal or temporary wetland alteration, such as selective timber harvest, waterfowl production, fur harvest, hay and forage, wild rice production, and hunting and trapping leases.
2. Seek non-wetland sites for development projects and avoid wetland alteration or degradation during project construction to the extent possible.
3. Donate wetlands or funds for purchasing wetlands to non-governmental organizations or public conservation agencies.
4. Maintain wetlands as open space—put a development restriction in your deed to preserve wetlands in perpetuity.
5. Educate other citizens about wetland values—let people know that you feel wetlands are important natural resources worthy of conservation.
6. Construct pond-marsh complexes in uplands and manage for wetland and aquatic species.
7. Purchase federal and state duck stamps to support wetland acquisition.
8. Support various wetland conservation initiatives by public agencies and non-governmental organizations.

Concluding Remarks

Wetlands are an important part of our national heritage and a vital component of our natural environment. In many ways, they are diamonds-in-the-rough that are valuable even without human intervention. Our quality of life is largely dependent on our Nation's wealth of natural resources and how we choose to use them. Wetlands provide a vital linkage between our land and water resources. Serious attention should be given to minimizing adverse wetland impacts as we strive to improve our economic and personal well-being.

As wetlands continue to be lost, the remaining wetlands become even more valuable. Already we have lost over half of our Nation's wetlands since America was first settled. West Virginia's wetlands are a scarce, valuable natural resource that produces more benefits than most other habitats. Less than 1 percent of the state is wetland.

Now is the time to take positive steps to protect the remaining wetlands to ensure that the values they presently provide will be preserved for future generations. We should also encourage wetland restoration to increase the amount of these valuable resources and the benefits they yield. So, let's do what we can to help maintain and enhance our vanishing wetlands.

Beaver swamp. (Photo by J. Schmidt)

Information Sources

To get information on wetland regulations, wetland restoration opportunities, wetland maps and available wetland publications, contact the following agencies.

Wetland Regulations

U.S. Army Corps of Engineers
Huntington District
502 Eighth Street
Huntington, WV 25701-2070
(304) 529-5487

U.S. Environmental Protection Agency
Wetlands and Marine Policy Section
841 Chestnut Building
Philadelphia, PA 19107-4431
(215) 597-1182

West Virginia Division of Environmental Protection
Office of Water Resources
Environmental and Regulatory Affairs
1201 Greenbrier Street
Charleston, WV 25311-1088
(304) 558-1052

West Virginia Division of Natural Resources
P.O. Box 67
Elkins, WV 26241-0067
(304) 637-0245

Wetland Restoration

U.S. Fish and Wildlife Service
Partners for Wildlife Program
P.O. Box 1278
Elkins, WV 26241-1278
(304) 636-6586

Wetland Maps

West Virginia Division of Natural Resources
Wildlife Resources, Natural Heritage Program
P.O. Box 67
Elkins, WV 26241-0067
(304) 637-0245

Wetland Publications List

U.S. Fish and Wildlife Service
Ecological Services – National Wetlands Inventory
300 Westgate Center Drive
Hadley, MA 01035-9589
(413) 253-8606

Meadowsweet shrub swamp. (Photo by R. Tiner)

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