

Plants and Habitat: the Foundation of Wild Delaware

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When I consider the diversity of the natural world that makes Delaware “wild,” I think first of the plants and their habitats that are native to the state and serve as the foundation on which Delaware’s natural heritage is built. This foundation is critical to the survival of our native wildlife species, as it provides them with food, cover and areas in which to breed.

Delaware is a small state, with about 1.3 million acres in its three counties. But within this small geographic area, an impressive diversity of plant life exists; more than 1,500 species and varieties of native plants have been documented. This diversity stems from several factors: a varied array of habitat types, a temperate climate and a geographic position within the eastern United States that places it within a transition zone between the north and south.

Habitat is basically an area in which plants and animals reside; the dominant plants that grow within the area define the habitat. When discussing the state’s diverse assortment of habitats, keep in mind that Delaware lies within two distinct physiographic provinces, the Piedmont and the Coastal Plain. The Piedmont is the hill country of northern New Castle County and comprises only 5 percent of the state, and the flat Coastal Plain covers the rest. The two provinces have very different geological origins and ages, and thus have very different habitats and plant life. Since Delaware is primarily Coastal Plain, where the nearly level landscape is conducive to the development of poorly drained soils, the state’s most widespread habitat types are wetlands, both tidal and non-tidal. Tidal wetlands, which can be fresh, brackish or salt, develop along the streams, creeks and rivers that flow toward the coast and the Chesapeake Bay and appear as open marshes and swamps. Non-tidal wetlands also develop along streams and creeks, but can also appear as isolated forested swamps or depressions. In the hill country of the Piedmont, wetlands are not as well developed as on the Coastal Plain, but non-tidal wetlands can still be found on the floodplains of streams and creeks, and also at the base of steep wooded slopes. On higher ground of both the Piedmont and Coastal Plain, where the soils are moist to well drained, upland forests and woodland habitats develop. The canopy of these forests and woodlands are usually a mix of deciduous species, such as oaks (*Quercus* spp.), hickories (*Carya* spp.), beech (*Fagus grandifolia*), and tulip poplar (*Liriodendron tulipifera*). Evergreen species, such as loblolly pine (*Pinus taeda*) and Virginia pine (*P. virginiana*), often occur as well.

Delaware's temperate climate, moderated by the Delaware Bay, the Atlantic Ocean and the Chesapeake Bay, is one reason the state has a diverse collection of plant life. Our summers may at times be hot and humid but our winters are mild; precipitation is distributed fairly evenly throughout the year. Collectively, these conditions are all favorable to plant growth.

Delaware's plant diversity is influenced by its geographic position in the eastern United States, within a transition zone between the north and south. In other words, many species of plants that have their center of distribution north of Delaware are at or near their southern limits of distribution in the state; conversely, many plants that have their center of distribution south of the state are at or near their northern limits of distribution; 22 percent of the native plant life of Delaware has a more northern distribution, and 28 percent has a more southern distribution. Though our native plant life has a slightly more southern affinity, the meeting within the state of plants from both the north and south creates a diverse and interesting area of study.

From this basic understanding of Delaware's diverse plant life and habitats, we can discuss more specific themes. Let's begin in the Piedmont province, then work our way south onto the Coastal Plain. We can't discuss all of Delaware's plants and habitats but we will focus on some of the more interesting habitat types and the unique plants they support.

In forests and on the steep woodland slopes of the Piedmont, where the soils are rich in organic matter and thus quite fertile, a habitat known as a "rich wood" develops that supports some of our most beautiful spring wildflowers, such as bloodroot (*Sanguinaria canadensis*), wild geranium (*Geranium maculatum*), round-lobed hepatica [*Anemone american* synonym = *Hepatica americana*], yellow trout-lily (*Erythronium americanum*), showy orchis (*Galearis spectabilis*) and violet wood sorrel (*Oxalis violacea*). Ferns are well represented in this habitat and include species such as the maidenhair fern (*Adiantum pedatum*) and the broad-beech fern (*Phegopteris hexagonoptera*). Several state-rare and uncommon plants are found in this habitat: wild ginseng (*Panax quinquefolius*), white baneberry (*Actaea pachypoda*) and the shrub eastern leatherwood (*Dirca palustris*).

As most of us have learned, species become rare primarily due to the loss and degradation of habitat, and over time Delaware has lost and degraded its share of habitat. Delaware was once mostly forested. Since the arrival of European settlers, the state has lost about 80 percent of its forest cover to agriculture and development. The forests that remain have been severely chopped up and fragmented; many exist as isolated islands in a sea of cropland or subdivisions. In addition, thousands of acres of both tidal and non-tidal wetlands have been either filled or ditched to drain the land for the tilling of crops and the construction of houses and buildings. Such abuse of Delaware's natural heritage has taken a severe toll on our native plant life. Today, 36 percent (562 species) of the state's native plant life is considered rare, and 62 species are known from only a single location. In addition, 12 percent (180 species) of the state's native plant life is thought to be either historical (not seen for 20 or more years), or extirpated (gone from the state,

never to be seen again). Species rarity is not entirely due to the loss and degradation of habitat by humans; many species in Delaware are simply rare by their very nature and have always been rare in the state. Many state-rare species are very habitat-specific and require specialized environmental conditions, and many are near the edge of their natural distribution and thus are infrequent to rare in their occurrence. However, these rare species that require specialized habitats, or are rare because they are edge-of-range species, are usually the first to become threatened by human-caused changes to their environments. Unfortunately, Delaware has no state laws or regulations that protect plants and their habitats, so if the destruction and degradation of habitat continues, many of the plants that are common today, may become rare in the future.

Another Piedmont habitat that supports a unique suite of species are the floodplain wetlands found along some of the larger creeks in the province, such as the White Clay, Red Clay and the Brandywine. Some of the more showy of these species that grow in the silty, nutrient rich soils of the floodplains include: Virginia bluebells (*Mertensia virginica*), Greek valerian (*Polemonium reptans*), eastern waterleaf (*Hydrophyllum virginianum*), and the green-headed coneflower (*Rudbeckia laciniata*). Some non-native invasive species severely threaten these characteristic plants of the floodplain wetlands. Most troublesome is the plant lesser celandine [*Ficaria verna* (synonym = *Ranunculus ficaria*)], which is so aggressive that it can completely dominate an area of the floodplain to the exclusion of all native plants.

Non-native invasive plants can have a significant impact on our native plant life. Non-native plants are those that did not exist in North America prior to European settlement and are now well established in the natural landscape. Many of these plants arrived with the early settlers, either intentionally or unintentionally, or are modern-day garden escapes. To date, 674 species and varieties of non-native plants have been documented for the state. Non-native invasive plants are extremely aggressive in growth and have the ability to outcompete and displace our native vegetation. Non-native invasive species threaten the preservation of our native plant life, particularly plant species that are rare or uncommon. Considerable time and resources are expended trying to control the invaders; of the 674 non-native plant species in the state, 87 are considered invasive.

The Piedmont's seepage slope wetland, a wetland that develops at the base of steep wooded slopes, where ground water seeps to the surface, is dominated by skunk cabbage (*Symplocarpus foetidus*) and the golden saxifrage (*Chrysosplenium americanum*). Other interesting plants occurring in this habitat include: false hellebore (*Veratrum viride*), drooping sedge (*Carex prasina*), hooked buttercup (*Ranunculus recurvatus*), Pennsylvania bittercress (*Cardamine pennsylvanica*), the state-rare rough sedge (*Carex scabrata*) and the log wood-fern (*Dryopteris celsa*).

Let us now head south on the Coastal Plain and discuss some of the habitats and plant life of this province. The flat Coastal Plain is conducive to the development of both tidal and non-tidal wetlands; the diversity of wetland types on the Coastal Plain is notable. One of the most abundant tidal wetland types is the salt marsh, which occurs

along the Delaware Bay, the Atlantic Ocean and the Inland Bays of Sussex County. The principal plant that grows in salt marshes is the salt marsh cordgrass (*Spartina alterniflora*), and these marshes are often referred to as “spartina marshes.” In the salt marsh, the dominant plants are grasses, sedges and rushes, including the big cordgrass (*S. cynosuroides*), salt hay (*S. patens*), salt marsh bulrush (*Schoenoplectus robustius*), three-square bulrush (*S. pungens*), needle rush (*Juncus roemarianus*), and black-grass rush (*J. gerardii*). Other plants that occur in the salt marsh include: sea lavender (*Limonium carolinianum*), salt marsh fleabane (*Pluchea odorata*), seaside goldenrod (*Solidago sempervirens*), and the state-rare dwarf glasswort (*Salicornia bigelovii*). Unfortunately, thousands of acres of salt marshes throughout the state have been infested with the non-native grass, the common reed (*Phragmites australis* subsp. *australis*). This grass will form monocultures, or pure stands, which have very little value to wildlife and disrupt the complex ecological processes of the marsh. For many years much effort has been put towards controlling this species. Many gains have been made, but the species is so aggressive that we will likely be doing battle with it until the end of time.

While Delaware has many salt water tidal marshes, sea-level rise, which may be the result of global warming, is making the occurrence of fresh water tidal marshes increasingly rare. With sea-level rise, salt water from the bays and ocean intrudes further up the tidal rivers and streams, making fresh water more salty; this will gradually change fresh water marshes to salt water marshes. The species diversity within fresh water marshes is much higher than in salt marshes, and many of these plants are found only in fresh water tidal marsh habitat, so the loss of these marshes would be devastating to the wildlife that depend on them for survival. Fresh water tidal marshes occur infrequently within the estuary of the Delaware Bay; the state’s most extensive acreage of fresh water tidal marsh habitat is found on the Nanticoke River. These marshes support a wide range of plant species, such as wild rice (*Zizania aquatica*), arrow-arum (*Peltandra virginica*), spatterdock (*Nuphar advena*), pickerelweed (*Pontederia cordata*), blue-flag iris (*Iris versicolor*), broad-leaf arrowhead (*Sagittaria latifolia*), and the state-rare riverbank sedge (*Carex lacustris*).

Atlantic white cedar swamps are an uncommon and fascinating wetland type that occurs in both tidal and non-tidal situations, but they are most diverse in non-tidal habitats. Atlantic white cedar (*Chamaecyparis thyoides*), an extremely rot-resistant evergreen species, is the dominant tree of these swamps. The poorly drained soils in which it grows are extremely acidic. Because acidic soil conditions prevent most plants from taking up certain essential nutrients, Atlantic white cedar swamps are often home to carnivorous plants, which obtain the nutrients they are unable to get from the soil by digesting insects. Some of the state rare carnivorous plants that primarily occur in Atlantic white cedar swamps include: the purple pitcher plant (*Sarracenia purpurea*), round-leaf sundews (*Drosera rotundifolia*), and the humped-bladderwort (*Utricularia gibba*). One of the most spectacular plants of Delaware’s Atlantic white cedar swamps is the swamp pink (*Helonias bullata*). The swamp pink typically blooms in early spring and has a wand-like cluster of bright pink flowers on a tall, leafless stem and is quite striking when encountered. The swamp pink is state-rare; the U.S. Fish and Wildlife Service also list it as threatened.

No discussion of swamps in Delaware would be complete without mention of the bald cypress swamp. Bald cypress (*Taxodium distichum*) is somewhat of a signature tree for Delaware, because it occurs at the extreme limit of its northern natural distribution. Most Delawareans are familiar with it, having seen it growing in Trap Pond State Park and nearby Trussum Pond. Most of our bald cypress swamps occur in south-central Sussex County, but three small ones are found farther north in Kent County; two are associated with the Murderkill River and the third, associated with the St. Jones River, is just south of Dover. Because bald cypress is at its northern limit in Delaware and only a few swamps remain, bald cypress is considered to be rare in the state.

Perhaps Delaware's most unique and important non-tidal wetland resource is the Coastal Plain seasonal pond. Coastal Plain seasonal ponds, also known as Delmarva Bays or whale wallows, are isolated, open, sunny depressions occurring within forested areas. Usually smaller than one acre and often elliptical in shape, they are home to many state-rare plants and serve as critical breeding areas for salamanders, toads and frogs. Coastal Plain seasonal ponds are not permanent bodies of water, the water levels in these ponds fluctuate with the seasons. In late winter and early spring the ponds are flooded when rain is plentiful and the ground water table is high; by late summer and early fall the ponds are dry when rain is scarce and the ground water table is low. Coastal Plain seasonal ponds are most frequently found in the Blackbird region of southwestern New Castle County but they can be found in all three counties. State-rare plants found in Coastal Plain seasonal ponds include the awned meadow beauty (*Rhexia aristosa*), the pink tickseed sunflower (*Coreopsis rosea*), and the dwarf fimbry sedge (*Fimbristylis perpusilla*). One of the rarest grasses in the world, the Hirst's Brothers panic grass (*Dichanthelium hirstii*), is known from only six populations worldwide and includes a population in the Inland Bays region of Sussex County. Fluctuating water levels drive the ecology of Coastal Plain seasonal ponds, and the plant and animal species found in these ponds depend on these fluctuating water levels to complete their life cycles. The featherfoil (*Hottonia inflata*) best describes this ecology. The featherfoil is an annual species and its seeds germinate in the ponds when they are dry in late summer and early fall. After germination, a small rosette of leaves develops and will overwinter in standing water. In early spring, when the ponds are flooded, a long stem forms from the rosette and grows toward the water surface. From this stem, new hollow stems develop, allowing the plant to float on the water's surface while flowering and setting seed. Once the seed matures, it drops and floats to the bottom of the pond where it waits for the pond to dry, starting the process all over again.

Delaware's non-tidal fresh water wetlands support the highest diversity of rare plants in the state, but these habitats have very limited and, in most cases, no federal, state or county protection. Should we lose these wetlands, or allow them to continue to degrade, future generations will question why we did not do more to protect and preserve this important part of our natural heritage.

With so many habitats and even more intriguing plants, our state offers countless opportunities for outdoor exploration. I do hope this summary encourages you to learn more and inspires you to actually explore the wilds of Delaware.

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