

IV. Existing and Emerging Benefits and Services

In Section III of this assessment (Forest Conditions and Trends), it is quite clear that Delaware's forests provide a wide range of natural benefits and services, both those that we have traditionally recognized (wood products, wildlife habitat, recreational opportunities) as well as those that have recently begun to garner attention (carbon sequestration, water quality and quantity, etc.). The Forest Conditions and Trends section of the assessment provided an overview of these natural benefits and services. Future strategies and resources must consider and address the spectrum of all benefits provided by forests. Below is a brief summary of the existing and emerging benefits and services provided by our rural and urban forests, beginning with a summary of Delaware's forests.

Forest cover

Forests cover approximately 29% of Delaware (359,000 acres). This acreage has remained relatively constant during the last century but is beginning to decrease. Over one-quarter of Delaware's forests are protected, through public ownership, conservation easements, or nongovernmental organization (NGO) ownership.


While a significant portion of Delaware forests are protected, the remainder is becoming increasingly fragmented. A comparison between 2009 and 2017 aerial photographs found that the number of large forested blocks (250 acres or more) decreased by nearly 4% with a total loss of 6,600 acres. The majority of our state's forests are privately owned, and the average forest ownership continues to decrease, from over 30 acres/owner in 1975 to less than 10 acres today. This fragmentation and outright loss of forestland is expected to continue.

Delaware's forests are also aging, with an increasing percentage of trees in older, larger size classes. Furthermore, the species composition is also changing with more hardwoods and a recent slight increase in conifers (loblolly pine).

Delaware's urban tree canopy varies greatly among our municipalities, ranging from a low of 10% to a high of 85%. The statewide urban tree cover is 25% within municipal areas and approximately 31% when other urbanized areas (outside municipal boundaries) are included. Like rural forests, urban forests provide numerous environmental benefits including carbon sequestration, water quality enhancement, energy savings, and controlling stormwater runoff.

Biological diversity and wildlife habitat

Delaware enjoys a significant variety of tree species and forest types in a relatively small geographic area. Delaware is the northern extreme for certain southern tree species, such as loblolly pine and baldcypress, while some northern species are not found south of Delaware, except at higher elevations (e.g., sugar maple, basswood, and eastern hemlock). Delaware's forest interior habitats (both wetland and upland) support the greatest diversity of native vascular plants, more than any other specific habitat type, with upland forests representing the most species-rich forest type. There are currently 584 animal species (vertebrate and invertebrate) listed in Delaware as species of greatest conservation need (SGCN). Thirty of these are forest-dependent bird species. Furthermore, 13 vertebrate species are considered endangered in the state (SGCN Tier 1 species)—four birds, three reptiles, three amphibians, and three mammals. The animals on the state endangered list are also forest-dependent.



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Small whorled pogonia

One mammal, the northern long-eared bat (*Myotis septentrionalis*), is federally listed as threatened by the U.S. Fish & Wildlife Service. And since the first Delaware forest resource assessment was completed in 2010, the Delmarva fox squirrel (*Sciurus niger cinereus*) has been delisted from its previous status as federally endangered in 1967.

Additionally, two forest interior plant species are federally listed as threatened by the U.S. Fish & Wildlife Service—swamp pink (*Helonias bullata*) and small whorled pogonia (*Isotria medeoloides*).

Some of Delaware's forest communities have, historically, experienced significant declines in acreage. Wetland forest types (baldcypress, etc.) have experienced significant acreage decreases due to harvesting and drainage. Delaware's forests are becoming older with larger trees, and thus, fewer younger stands containing saplings and seedlings. If this trend continues, it could lead to reduction in critical habitat for certain animal and plant species.

Forest products/economic contribution

A new study is planned for publication in 2020 based on statistically-valid data on the impact of the forest products industry to Delaware's economy: *Forest Products Industries' Economic Contributions: Delaware*. The contribution made by the forest industry to Delaware's economy is significant. In 2002, more than 2,600 people were employed in the forest products manufacturing industry in Delaware, representing about five people/1,000 between the ages of 18 and 65. The average rate of pay for those individuals was about \$15/hour, and they had a total payroll of \$92 million. Most of these jobs were located in secondary wood processing industries—63 establishments producing a variety of products including furniture, custom millwork, cabinets, and other wood products employed these citizens. More recent data (2018) has shown a drop in the number employed to around 1,150.

While there are very few primary wood processors in Delaware (such as sawmills), processors in adjoining states purchase a substantial amount of timber in Delaware, providing significant revenue to Delaware's forest landowners. Approximately 2,663 acres are harvested annually—991 acres by clearcut, 873 acres by selection harvests, and 799 acres of pine thinning (pulpwood). The DFS estimates that these harvests generate at least \$2.5 million of income for forest landowners.

Urban forests also contribute jobs to Delaware's economy. The number of tree care companies is growing as Delaware continues to urbanize. There are now 43 ISA-certified arborists in Delaware. Delaware farms growing nursery stock currently generate an estimated \$13.5 million in sales.

There is also an opportunity for new wood markets in Delaware, including urban wood. The growing amount of low quality (primarily hardwood) timber is a potential supply for bioenergy. Wood could help to achieve renewable energy goals and provide additional returns to landowners and timber harvesters. Additional research is needed to more accurately estimate the amount of wood that is available for this market.



Soil and water quality protection and enhancement

Delaware has significant water quality challenges. Approximately 85% of Delaware's rivers and streams do not fully support swimming use and 94% do not support fish and wildlife use. Additionally, 41% of Delaware's fresh water ponds and lakes do not fully support swimming use and 74% do not fully support fish and wildlife use. These percentages, although very high, represent an improvement over the data from ten years ago, but there is much more room for further improvement. The cause of impairment in most cases is an excess of nitrogen and phosphorus.

Forests are widely recognized as the land use that is most beneficial for water quality—they provide multiple benefits and services that improve water quality (part of the suite of non-consumptive benefits often called ecosystem services). Maintaining and expanding forest cover is a goal for many water pollution control strategies. Creating forestland (e.g., afforestation) from other land uses reduces the amounts of nitrogen and phosphorus that reach streams and groundwater. Riparian buffers help filter and clean surface waters. Forest cover also helps improve surface waters that supply municipal drinking water reservoirs. There are two drinking water reservoirs in Delaware—both in northern New Castle County.

Forests also play a critical role in Delaware's groundwater recharge by cleaning this water before it enters the aquifers. Forests comprise approximately 31% of Delaware's 119,000 acres of excellent groundwater recharge areas. These areas provide much of the groundwater to recharge Delaware's underground aquifers—the state's primary water supply for all purposes.

Wetlands provide a wide range of valuable functions, including slowing water runoff and trapping sedimentation and filtering pollutants before they reach streams and other waterways. Forested wetlands are highly valued for all of these natural benefits in addition to the valuable habitat they provide for many species of wildlife and plants. There are an estimated 145,308 acres of forested wetlands in Delaware. A particularly important forested wetland type is the Coastal Plain seasonal pond. These seasonally flooded wetlands are found throughout Delaware but particularly in southwestern New Castle County and northwestern Kent County. In addition to water quality benefits and groundwater recharge, they provide habitat to a variety of state and globally rare plants and animals.

Urban forests also provide significant water quality benefits. They filter and clean water leaving urban sites. They also help control stormwater runoff by slowing these waters and reducing their impacts on waterways. Many studies have found that well-positioned tree plantings, such as around catch basins and stormwater ponds, can reduce the water flow thereby decreasing the potential for flooding during storm events and reducing the amount of land needed for these retention ponds.






Carbon sequestration/climate moderation

The increase in carbon-containing gases in the atmosphere is widely believed to lead to increased global temperatures. Trees combat this effect because they sequester carbon and store it within their trunks, branches, roots, etc. Currently, Delaware's forests store approximately 22.5 million tons of carbon (including 3.1 million tons in urban forests). This amount is increasing because Delaware's forests are, on average, aging and thus increasing in size. While the carbon market is still emerging in the United States, prices are expected to bring at least \$4/ton. Therefore, one could argue that Delaware's forests currently store nearly \$100 million of carbon from the atmosphere.

Furthermore, forests help moderate climatic effects at the local scale. Riparian forested buffers moderate water temperatures within streams, thus protecting fish and other species that use these waters. Urban forests reduce energy consumption by cooling urban areas in the summer (shade) and providing windbreaks during the winter. A 2009 urban forest resource assessment in northern Delaware concluded that urban trees in New Castle County saved an estimated \$403,000 annually in residential building energy costs, including \$183,000 within the City of Wilmington. Forests also remove other pollutants that degrade our atmosphere. Another 2009 study estimated that Delaware's 7.1 million urban trees (at the time) removed over 1,700 metric tons/year of pollutants, including 242 tons of nitrous oxide, 221 tons of sulfur dioxide, and 744 tons of ozone. This pollution reduction was valued at \$13.5 million annually. Although these studies are slightly dated, they clearly show the importance of urban trees and the enormous energy savings they provide along with removing tons of pollutants.

Recreation

Forests offer a wide variety of opportunities for outdoor recreation. Of Delaware's top ten recreational activities, at least six occur in forested settings. Over 3.2 million people in Delaware annually participate in these six activities (walking/jogging, picnicking, hiking, camping, hunting, and horseback riding). There are 567 miles of trails open to the public in Delaware, an increase of 53% compared to 2002. In addition, approximately 155 of these trail miles are open to horseback riding and 483 miles to mountain biking. Nearly all of these trails traverse forested areas. Forests are vital to Delaware's recreation and tourism industries and to our quality of life.



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