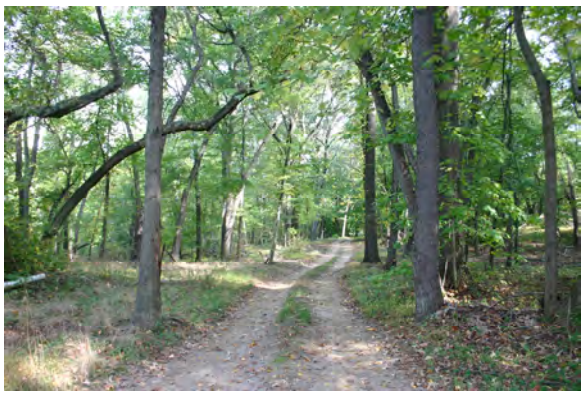
CHAPTER 5

Biological Resources

When a community protects wildlife and habitat, it is also protecting biodiversity, which is important for the health and productivity of the ecosystem and its inhabitants, including humans. Biodiversity refers to the variety of genetic material within a species population, the variety of species (plants, animals, and microorganisms) within a community, and the variety of natural communities within a given region. Biodiversity facilitates adaptation and evolution, improving a species' chance of survival as the environment changes. A diversity of plant and animal species is also necessary to maintain healthy human environments, working landscapes, and productive ecosystems. Lower organisms, many not well known, contribute to nutrient cycling, decomposition of organic matter, soil rehabilitation, pest and disease regulation, pollination, and water filtering. Once biodiversity declines, it is extremely difficult for an ecosystem to recover or replace species.



Susan Stevens Halbe Preserve
Source: DVRPC

Moorestown contains numerous types of habitats, all of which are important for maintaining biodiversity. Wooded wetlands and upland forests are the two most abundant natural ecosystems found in Moorestown. Herbaceous wetlands and scrub wetlands are also present in large areas adjacent to Moorestown's stream corridors and creeks. The following sections will identify and describe in more detail the plant and animal communities that inhabit these unique ecosystems within Moorestown.

Natural Vegetation

A region's vegetation is dependent upon many factors, the most important of which are climate and soils. Moorestown's climate is characterized by moderate temperatures, precipitation, and wind, with an average annual temperature of 54.9 degrees Fahrenheit. The average annual precipitation is 48.22 inches and is fairly well distributed throughout the year. The majority of Moorestown's soils are poorly drained soils that exhibit ponding and sustain wetland plants. However, Moorestown also has a great deal of moderately well-drained soils that support a diversity of trees and crops. See the **Soils** section for a detailed description of Moorestown. A list of plant species identified at South Valley Woods may be found in **Appendix B**.

Moorestown's natural vegetation types, along with human-influenced types of land cover, have been tabulated and mapped by NJDEP's 2007 land cover analysis based on infrared aerial photography. The designation of a particular land cover as a vegetation type is based on definitions provided by the Anderson Land Use Classification System, created by the U.S. Geologic Survey. See **Map 16: Natural Vegetation (2007)**.

Table 17: Moorestown Natural Vegetation

Vegetation Type	Area (Acres)	Percentage of Township
Brush/Shrubland	52.81	0.55%
Brush/Shrubland - Oldfield	139.17	1.45%
Tidal Marshes - Freshwater	94.53	0.99%
Tidal Waters	105.25	1.10%
Upland Forest - Coniferous	18.18	0.19%
Upland Forest - Deciduous	525.66	5.49%
Upland Forest - Mixed (Coniferous Dominated)	20.87	0.22%
Upland Forest - Mixed (Deciduous Dominated)	8.68	0.09%
Water	110.88	1.16%
Wetlands - Coastal (Phragmites Dominated)	2.64	0.03%
Wetlands - Herbaceous	22.34	0.23%
Wetlands - Modified	150.83	1.57%
Wetlands - Phragmites Dominated	17.61	0.18%
Wetlands - Scrub/Shrub	55.25	0.58%
Wetlands - Wooded - Coniferous	0.98	0.01%
Wetlands - Wooded - Deciduous	702.74	7.34%
Total Natural Vegetation Acres	**2,028.42**	**21.18%**
Total Moorestown Township Acres	**9,578.66**	**100.00%**

Source: NJDEP, 2012

Wetlands

Wetlands are a critical ecological resource, supporting both terrestrial and aquatic animals and boasting biological productivity far greater than that found on dry land. Wetlands play a vital role in maintaining water quality by naturally filtering surface and ground waters. The ecological importance of wetlands, however, has not always been appreciated. For over three centuries, people drained, dredged, filled, and leveled wetlands to make room for development and agriculture.

Within Moorestown, wetlands are located in floodplain areas, as well as in other areas of depressions. All of Moorestown's wetlands are freshwater. Natural wetlands cover 1,047

acres within Moorestown (11 percent of the township), of which 704 acres are wooded wetlands, and 343 acres are low-growing emergent, scrub/shrub or herbaceous wetlands, or tidal marshes. See **Map 10: Surface Water, Wetlands, and Vernal Pools**.

Most wetlands in Moorestown are found in association with the township's many streams and tributaries. Moorestown's most abundant wetlands are deciduous wooded wetlands, scrub/shrub wetlands, and modified wetlands. These wetlands are found surrounding the township's stream corridors, such as Pompeston Creek and Swede Run, as well as Kendles Run. Wooded wetlands are also found adjacent to the majority of the township's deciduous upland forests. Trees like sweet gum, red maple, magnolia, black gun, and ash are surrounded by an understory consisting of shrubs like buttonbush, alder, and pepperbush, and herbaceous species, such as cardinal flower, skunk cabbage, and hellebore. Many of the wooded wetlands, once covered in willow, oak, white cedar, wild rice, and river cane, are now invaded by bulrush, cattails, *Phragmites*, and maple.

Great egret
Source: Chet Dawson

Wetlands are protected through enforcement of the buffer requirements of the New Jersey Freshwater Wetlands Protection Act.

Upland Forests

Upland areas are those locations without water at or near the soil surface. Upland forests are located on drainage divides, terraces, and slopes, where water is not the controlling factor and where drainage is sufficient so that soils do not become saturated for extended periods of time. Nearly all old growth upland forests in New Jersey were harvested for lumber during colonial times.

Today, upland forests are the second most abundant natural vegetative land cover in Moorestown after wetlands. Upland forests occupy 573 acres (six percent) of the township. The tree composition in the these upland forests is mostly one of broad leaf hardwoods, including oak, hickory, beech, poplar, cherry, sassafras, and maple. Patches of coniferous pine may also occur sporadically.

Grasslands

NJDEP defines grassland habitat as brushland, shrubland, or old fields that were cleared or disturbed at one time and then abandoned. Following abandonment, old fields are overgrown by perennial herbs and grasses. These pioneer plants remain the dominant species for three to 20 years. Later, woody plants take over. This habitat is visible along wood edges, roadsides, and in landscapes where mowing is infrequent and where woody plants are not yet the dominant vegetation.

Brushland, shrubland, or old fields cover 192 acres (two percent) of Moorestown. In the township, brushland and old fields are generally found adjacent to residential, industrial or wetland areas. Trees, such as sassafras, black cherry, red cedar, and white oak, are often the first species to recolonize old field lands. Meadow onion, broom-sedge, rushes, grasses, common dogbane, and vines of Japanese honeysuckle can also be found in grassland habitat.

Trees

The Moorestown Tree Planting and Preservation Committee was formed to encourage and assist the community of Moorestown to successfully implement a tree management program by providing information and assistance to the Township Council and management to sustain and enhance the community forest. In 2009, this committee began an initiative to inventory the trees located in road rights-of-way and in municipal parks, which are the responsibility of Moorestown Township to maintain. This in-depth survey was completed by local volunteers in 2012. The diameter, species, health, and GPS coordinates of nearly 7,700 trees in the township were inventoried. In addition, the survey identified sites for potential new plantings. **Map 22: Tree Survey** illustrates the results from this inventory.

Beech tree on Main Street
Source: Joan Ponessa

Overall, the most common tree surveyed was the red oak, of which there were 1,051 trees. The second most common tree was the pin oak (560 trees), followed by London planetree (358 trees), sugar maple (353 trees), common maple (302 trees), littleleaf linden (298), Norway maple (292 trees), Japanese zelkova (292 trees), and northern red oak (212). The complete list of tree species identified as part of the survey can be found in **Appendix B: Plant Species in Moorestown Township**.

Based on the township-wide tree survey, the economic and ecological benefits of trees were calculated. The total annual economic value of trees to the township is an estimated $850,000, an average of $137 per tree. The Moorestown Township Shade Tree Department budget for 2011 was $250,000, so the net annual benefit of trees to the township is a total of $600,000, or an average net benefit of $96.50 per tree. The township's trees lead to an annual energy reduction for cooling and heating costs of $105,000 in electricity and $16,000 in natural gas. These trees intercept a total of 23 million gallons of stormwater annually, saving $230,000 total. The annual stormwater interception per tree averages 3,725 gallons, or $37 per tree. The township's trees reduce atmospheric carbon dioxide by 1,500 tons annually, equivalent to a benefit of $22,000, and cause the removal or avoidance of 17,000 pounds of air pollutants, equivalent to a benefit of $17,000. The increase in property values caused by trees is estimated at $500,000, or an average of $80 per tree.

Moorestown Township has been a designated Tree City USA municipality since 1990. The Tree City USA program, sponsored by the Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters, provides direction,

technical assistance, public attention, and national recognition for urban and community forestry programs in thousands of municipalities across the country.

Landscape Project Priority Habitats

The Landscape Project, developed by the Endangered and Nongame Species Program of the NJDEP Division of Fish & Wildlife, documents the value of various types of habitats within New Jersey. It categorizes these habitats into one of five groups according to their importance (five being the highest). The NJDEP Division of Fish and Wildlife divides New Jersey into six habitat regions based on ecological characteristics. Moorestown Township is located entirely within the Piedmont Plains region. Moorestown Township contains all five rankings of habitat importance.

Approximately 33.24 percent, or 3,184.21 acres, of Moorestown Township has been identified as landscape project priority land. See **Map 17: Landscape Project Priority Habitat (2012)**.

Table 18: Landscape Project Habitats

Rank	Area (Acres)	Percent of Township Land
1	1,507.99	15.7%
2	463.95	4.84%
3	967.14	10.1%
4	169.69	1.8%
5	75.44	0.8%
Total Landscape Project	**3,184.21**	**33.24%**
Total Moorestown Township	**9,578.66**	**100%**

Source: NJDEP, 2012

These areas have been identified as priority habitat due to the presence of the following rare species: savannah sparrow, great blue heron, bog turtle, bald eagle, black-crowned night heron, and wood thrush.

Animal Communities

Although there is no comprehensive inventory of the different animal species that may be found within Moorestown, there are records of sightings, biological studies of range, and assessments of endangered and threatened species status. Using federal, state, local and other sources, it is possible to identify and describe known and possible animal communities of Moorestown. These are included in **Appendix C: Vertebrate Animals Known or Probable in Moorestown Township**. A list of animal species identified in South Valley Woods in 2011 is also included in **Appendix C**.

Invertebrates

Invertebrates are the basis of a healthy environment and are part of every food chain – either as food for amphibians and fish, or as a part of nutrient cycling systems that create and maintain fertile soils. Invertebrates consist of insects (beetles, butterflies, moths, dragonflies, ants, termites, bees, wasps, flies, and others), arachnids (spiders, ticks, and mites), crustaceans (crayfish and microscopic copepods), mollusks (mussels, clams, snails, and slugs), and worms.

Macroinvertebrates are invertebrates that are visible to the naked eye but smaller than 50 millimeters. Benthic (bottom dwelling) macroinvertebrate communities provide a basis for ecological monitoring and are relatively simple to collect from shallow stream bottoms. These communities consist largely of the juvenile stages of many insects, such as dragonflies and mayflies, as well as mollusks, crustaceans, and worms. Monitoring for diverse assemblages of macroinvertebrates reveals the effect of pollutants over a longer period of time, as compared to chemical monitoring, which measures water quality at one moment in time. The Ambient Biomonitoring Network (AMNET) surveys streams for macroinvertebrate communities, which indicate certain levels of water quality, discussed in the section on **Surface Water Quality**.

During warm weather, Moorestown is home to a variety of dragonflies, damselflies, butterflies, moths, beetles, wasps, and cicadas. A list of invertebrates identified at South Valley Woods can be found in **Appendix C**.

Vertebrates

Vertebrates are less numerous than invertebrates, but their larger size makes them much more visible, and thus, better studied and recorded. Fish species are fairly well documented, as are mammals.

White-tailed deer
Source: Chet Dawson

Mammals

Mammals appear to be abundant because they tend to be larger and live in habitats also ideal for human development. There are 90 mammal species in New Jersey, of which nine are listed as endangered and none are listed as threatened by the state. Some common mammals found in Moorestown Township include the opossum, Eastern mole, big brown bat, little brown bat, Eastern cottontail, Eastern chipmunk, gray squirrel, white-footed mouse, meadow vole, muskrat, pine vole, red fox, gray fox, raccoon, striped skunk, river otter, beaver, and white-tailed deer.

Birds

New Jersey has between 350 and 500 species of birds, which is an exceptional number given the state's small size. New Jersey is an important location for migratory birds heading south for the winter. Not only is the state an important "rest stop" for birds migrating to warmer climates in Central and South America, but also the New Jersey Atlantic Coast and the Delaware Bay are major parts of the Eastern Flyway (established migratory air route) in North America.

Red-tailed hawk
Source: Chet Dawson

Moorestown is home to an abundance of birds, listed in **Appendix C: Animals Known or Probable in Moorestown Township**.

One of the most common birds is the Canada goose. The State of New Jersey has a "resident" Canada goose population of approximately 100,000 birds that no longer migrate to more southern locales, and that number may double in the next five to 10 years. Goose droppings that wash into surface waters during storm events can elevate coliform bacteria to unhealthy levels, closing lakes to swimming.

Removing geese or preventing them from residing in park areas is a difficult task. Because geese move freely, the most effective management solutions are best conducted at the community level. Canada geese are protected by the Migratory Bird Treaty Act. Therefore, a management program may require the U.S. Department of Agriculture's approval and permits. A federal rule signed into law in December 2005 eases hunting restrictions and allows county and municipal officials to coordinate with state fish and wildlife departments to destroy birds and/or eggs that pose a threat to public health and safety. Management techniques include planting shrubby vegetation around streams, lakes, and ponds to block waterfowl access, discouraging humans from feeding geese, and removing goose eggs and replacing with decoys.

Canada geese
Source: Chet Dawson

By the early 1980s, the number of geese in Moorestown was becoming a rapidly increasing problem. Sidewalks and play areas around Strawbridge Lake were becoming unusable and parents were complaining about the slippery slime on the recreation fields. With the assistance of the USDA Fish and Wildlife Service, the Moorestown Environmental Advisory Committee (MEAC) in 2003 conducted goose counts in January and June and found that several thousand migratory geese were stopping over in Moorestown to join the close to 1,000 resident geese. Many of those migratory geese (mostly Canadian geese with a few snow geese) would spend the winter in Moorestown and still do. Later that year, MEAC presented to the Town Council a number of options for goose control and a program for egg addling and

goose harassment was adopted, with implementation beginning in 2004.

While geese remain a problem, the addling program has held the number of resident geese in check and the harassment program has reduced significantly the number of geese around Strawbridge Lake and the recreation fields. From 2004 to 2012, over 3,500 eggs were addled. About 100 nests are addled each year with the highest concentration along the tributaries to Strawbridge Lake and along Swede Run on the eastern part of the township. Border collies are used heavily for harassment with some use of radio controlled boats on Strawbridge Lake. Some residents have also contracted harassment services and there is an increasing use of dog cut outs in farm fields.

Important Bird and Birding Area

The Important Bird Area (IBA) is a global effort by the Audubon Society to identify and conserve areas that are vital to birds and other species. The New Jersey Audubon Society has an expanded initiative called the Important Bird and Birding Area (IBBA) Program, which identifies areas that provide essential habitat for sustaining bird populations (Bird Areas), as well as areas that provide exceptional opportunities for bird watching (Birding Areas). The New Jersey IBBA Program has identified 122 sites within the state and one site in Moorestown, Rancocas Creek.

The Rancocas Creek IBA is 8,969 acres of open waters and forested riparian habitat in the Pineland Plains region of New Jersey. The Rancocas Creek IBA is located between the Pinelands and the developed areas of Burlington County. Notable species in the Rancocas Creek IBA include bald eagles and pied-billed grebes, and the site hosts many wintering mallards and American black ducks. The Rancocas Creek is an important staging area for northern pintails during the major spring migrations. Staging areas are locations where migratory animals temporarily congregate for feeding and rest. Habitat protection for established staging areas can reduce mortality during migrations from exhaustion and collisions with buildings or traffic.

Reptiles and Amphibians

Reptiles and amphibians can be quite elusive when surveys attempt to document them. Some reptiles and amphibians, called herpetological species, are rare because they depend on vernal ponds, as discussed in the **Surface Waters Resources** section. Amphibians in particular tend to be very sensitive to environmental changes, offering a visible warning to humans that significant changes are occurring.

New Jersey is home to approximately 80 reptile and amphibian species. Some common herpetological species that may be found in Moorestown include the common snapping turtle, red-bellied turtle, eastern painted turtle, musk turtle, box turtle, Northern water snake, Eastern garter snake, Northern brown snake, black racer, bullfrog, green frog, Northern two-lined salamander, spring peeper, and New Jersey chorus frog. See **Appendix D: Animals Known or Probable in Moorestown Township** for a complete list of reptiles and amphibians that may be found in the township.

Fish

When European settlers arrived in present-day Burlington County, they encountered Lenape Indians, who regularly fished along the inland streams and gathered shellfish in the Delaware River. Shad fishing was an important industry along the Delaware River until the early 20th century. Due to the unintended consequences of overfishing, urban development, industrial advancement, and mechanized agriculture, the amount and diversity of aquatic life has decreased dramatically throughout most of New Jersey.

The New Jersey Division of Fish and Wildlife, under the Bureau of Freshwater Fisheries, monitors and actively aids the propagation, protection, and management of the state's freshwater fisheries. The bureau raises several million fish for stocking in suitable waterbodies and conducts research and management surveys.

There are over 30 species of fish that are likely to be found in Moorestown's many streams and lakes. See **Appendix C: Animals Known or Probable in Moorestown Township**.

Rare Wildlife

The New Jersey Natural Heritage Program identifies the state's most significant natural areas through a comprehensive and continuously updated inventory of rare plant and animal species and representative ecological communities. The Natural Heritage Database compiles information on the distribution, biology, status, and preservation needs of these species and communities. Natural Heritage Grid Maps show the general locations of rare plant species and ecological communities, without providing the sensitive detailed information that could place these resources at risk for vandalism or illegal collection. These maps are available to Environmental Commissions and for research projects, but are otherwise not public.

According to the Natural Heritage Database and the Landscape Project, rare wildlife species have been documented in Moorestown Township over the course of the past 100 years.

The Natural Heritage Database of the NJDEP lists six species of rare wildlife found in Moorestown, which includes five birds and one reptile. Moorestown provides foraging and wintering habitat for the bald eagle (endangered), as well as foraging habitat for the black-crowned night heron (threatened) and great blue heron (species of special concern). There have also been breeding sightings of the savannah sparrow (threatened) and the wood thrush (species of special concern). The bog turtle also occupies habitat in Moorestown Township. The bog turtle is classified as endangered in the state and threatened in the United Sates. The bog turtle is the only rare species found in Moorestown Township that is federally listed.

Additionally, there are other rare species sighted by township residents but not yet verified by the Endangered and Nongame Species Program. They are, therefore, not included in this list. These animals are listed in **Appendix C: Animals Known or Probable in Moorestown Township** under **Rare Wildlife**.