

# Northern Bobwhite Quail: A Success Story



A pair of northern bobwhite quail (*Colinus virginianus*) rests in a patch of purple flowers. Feather coloration on the head distinguishes the birds: the female has light brown feathers (left), while the male has bold black and white feathers (right).

## Did you know?

The bobwhite quail is often nicknamed the *fire bird* due to how well its populations respond to fire as a habitat management tool. Prescribed fire helps maintain the plant species that the quail feed on and take cover under.

Once a sound quite common on the Delmarva Peninsula, the quail's unique, whistle-like "bob-white" call is now seldom heard. Bobwhite quail populations have steadily declined since the mid-1900s due to habitat loss driven by development pressure, landscape changes, and lack of fire. However, recent efforts by wildlife experts and land managers to restore habitat have proven successful in supporting localized populations of bobwhite quail.

During the spring and summer, bobwhite quail forage and nest in areas of dense low cover — grasslands or meadows with some shrubby growth. Hedgerows around fields and open woodlands with a low understory provide shelter and forage during the fall and winter, when meadow grasses die back. It is important that these habitat types be within a quarter to half-mile of each other, as bobwhite quail spend most of their time on the ground, rarely taking flight except to evade predators.

The Maryland Wildlife & Heritage Service maintains about 200 acres of bobwhite quail habitat here. Shrubby meadows cover former agricultural fields; prescribed burning of small portions each year maintains the desired meadow conditions while ensuring that the quail still have access to adequate resources. Dense hedgerows line the meadows. Timber harvests created an open forest with mature trees; periodic prescribed burning helps keep understory growth low and diverse. Together, these meadows, hedgerows, and open forest make ideal habitat for northern bobwhite quail.

Wildlife researchers monitor the bobwhite quail population each year by taking two counts:

- . In the summer, listen for and count each instance of the bird's unique call. Special recording devices are sometimes used.
- . In the fall, seek out and count *coveys*, or groups of about 10-16 quail. A covey stays together throughout the winter to share warmth.



Habitat management units here at Nanticoke River Wildlife Management Area.



Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Department of Natural Resources are equal opportunity providers and employers.

# Creating Habitat ~ Creando Hábitat



Before becoming Cypress Branch State Park, this land was used as a landscape plant nursery and then for farming corn and soybeans.

- Restoring the old farm fields to habitat will attract many different kinds of wildlife.
- Planting a variety of oak trees and fruiting shrubs will attract deer, turkey, and small mammals (pictured left).
  - Planting native meadow grasses and flowering plants will attract pollinators, migratory songbirds, and bobwhite quail (pictured right).

Restoring habitat will also provide ecosystem services for visitors. Ecosystem services are benefits that people get from nature, like shade, water quality improvement, or recreational opportunities.



Antes de convertirse en el Parque Estatal Cypress Branch, esta tierra se utilizó como Vivero de plantas ornamentales y luego para cultivar maíz y soja.

La restauración del hábitat en este antiguo campo agrícola atraerá a muchas especies diferentes de vida silvestre.

- La siembra de una variedad de robles y arbustos frutales atraerá ciervos, pavos y mamíferos pequeños (en la imagen a la izquierda).
- Plantar pastos de pradera nativos y plantas con flores atraerá polinizadores, pájaros cantores migratorios y codornices blancas (en la imagen a la derecha).



La restauración del hábitat también proporcionará servicios ecosistémicos para los visitantes. Los servicios ecosistémicos son beneficios que las personas obtienen de la naturaleza, como sombra, mejora de la calidad del agua u oportunidades recreativas.



## Did you know?

Tree tubes (pictured above) deter animals from eating young leaves and stems. This gives each tree a better chance of growing tall and strong.

## ¿Sabías?

Los tubos de los árboles (en la imagen de arriba) disuaden a los animales de comer hojas y tallos tiernos. Esto le da a cada árbol una mejor oportunidad de crecer alto y fuerte.



Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Department of Natural Resources are equal opportunity providers and employers.

# Wildlife Food Abundance

Once used as a loblolly pine plantation, management here transformed the forest with the goal of producing more food for wildlife. In stocking this natural grocery store, the Maryland Wildlife & Heritage Service aims to ensure that wildlife populations have year-round access to an abundance of food.



Each species of oak tree (genus *Quercus*) produces a unique acorn. From left to right, the species pictured are: chestnut oak (*montana*), northern red oak (*rubra*), black oak (*velutina*), white oak (*alba*), pin oak (*palustris*), willow oak (*phellos*), and southern red oak (*falcata*).

## Did you know?

Many wildlife species eat a variety of food throughout their life, depending on what is available in each season. Plant diversity in the forest is essential to meeting the nutritional needs of the wildlife that call it home.

## Mast

A series of timber harvests thinned the forest to remove loblolly pines. Opening up the canopy brought sunlight to the ground and created space for other trees to grow. By diversifying the types of trees present to include more shortleaf pine and hardwoods such as oak, hickory, and beech, the forest produces more *mast*.

Mast refers to the fruit of forest trees, like acorns and persimmons. Mast is a great food source for wildlife during the fall and winter months.



Two fruit ripen on the branch of a persimmon tree (*Diospyros virginiana*).

## Legumes & Forbs

After thinning, the forest was managed using prescribed fire. This encouraged sprouting of native disturbance-dependent seeds dormant in the soil. Post-burn monitoring showed increased counts of *legumes* and *forbs* in response to the disturbance caused by fire.

Legumes include beans, peas, and lentils. Forbs are broad-leaved herbaceous flowering plants, like goldenrod or milkweed, that produce seeds. Forbs and legumes offer food for wildlife during the spring and summer months.



This legume is listed as threatened in Maryland but responds well to prescribed fire treatments here at Idylwild Wildlife Management Area.

A hairy snoutbean plant (*Rhynchosia tomentosa*) in bloom.



Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Department of Natural Resources are equal opportunity providers and employers.

# Co-benefits of Timber Harvesting

Timber harvesting benefits landowners in many ways, including recreational opportunity expansion, aesthetic improvement, and income generation. Private woodland owners often see forests as an investment for themselves and future generations. Public land managers re-invest the income generated by harvest operations to fund future restoration activities.

Prior to a harvest, trees are selected for cutting based on the type of operation. Trees with great genetics for lumber — straight trunk, minimal branching — are marked for retention and left standing as a seed source to kickstart the growth of another profitable forest.

Proper use of timber harvest operations promotes forest health and encourages tree growth. Healthy forests provide benefits to the local ecosystem; native plant and wildlife species thrive in the restored habitat conditions and biodiversity soars.

## Did you know?

Forest-generated income depends on *wood product markets*. Sustainable manufacturing and consumption of products such as paper, lumber, and pellets, are key to supporting forest health.

## Common timber harvest operations:



A *regeneration harvest* removes all of the merchantable trees in an area. This promotes establishment of early successional habitat.



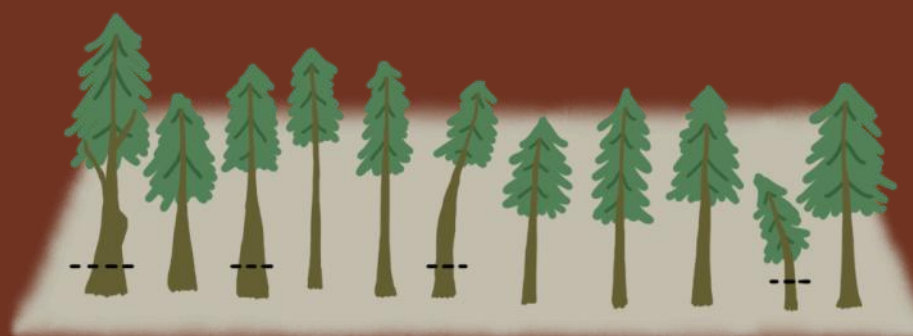
A *seed tree harvest* retains one to eight strong trees per acre as a seed source for growing the next forest.



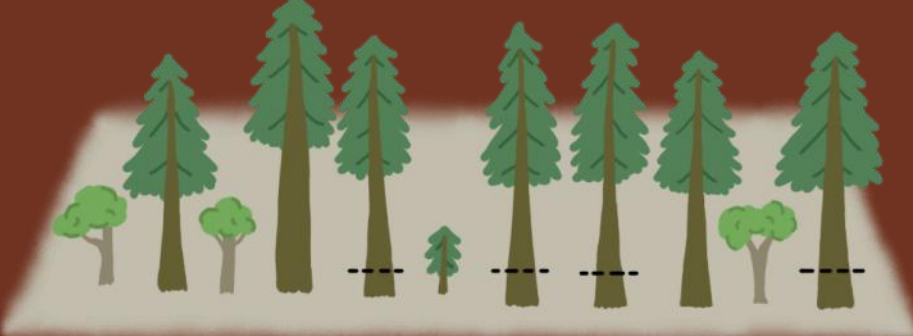
A *shelterwood harvest* retains at least twelve trees per acre, maintaining some canopy to protect future growth.



A *selection harvest* removes individual trees at random. Periodic select cutting leads to a forest with many ages of trees.



A *pre-commercial thinning* removes trees that are deformed or crowded at a young age. This creates space for the remaining trees to grow.



A *commercial thinning* harvests up to 50% of the trees that are ready to go to a sawmill. This allows the remaining trees to mature faster.

## Delmarva Fox Squirrel

A sight to see, the Delmarva fox squirrel is about twice the size of a common gray squirrel. Its tail can grow up to 15 inches long! Habitat loss in the early 1900's drove the fox squirrel into less than 10% of its historic range; the subspecies was listed as endangered in 1967.

The fox squirrel spends much of its time on the ground and prefers to inhabit mature forests with an open, navigable understory. Periodic pre-commercial and commercial thinning operations can help build this habitat type. Both harvests retain large diameter mixed hardwood and pine trees, which provide food for the squirrels. Efforts to restore Delmarva fox squirrel habitat have been successful, leading to the removal of the subspecies as endangered in 2015.



A Delmarva fox squirrel (*Sciurus niger cinereus*) stands at the base of a pine tree.



Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Department of Natural Resources are equal opportunity providers and employers.

15 inches!

# Partners for Northern Bobwhite Quail

Partnerships are essential to creating lasting habitat improvement across a landscape. When multiple groups come together to work toward a shared objective, they are able to achieve more by combining resources and ideas. When the groups are adjacent landowners, it also allows for habitat improvement on a larger scale. Bobwhite quail habitat management at this site occurs on over 580 acres across three ownerships.



A male northern bobwhite quail (*Colinus virginianus*) stands on dusty ground.

## Did you know?

Various federal and state government agencies offer *cost-share programs* that can help cover the cost of management activities on private land.

Building the partnership began in 2011, when a private landowner requested a Forest Stewardship Plan from the Maryland Forest Service. The plan recommended a series of timber harvests to thin the forest and periodic prescribed burning to control understory growth. These activities created the basic habitat conditions necessary to support bobwhite quail.

After seeing success, the landowner encouraged a neighbor to join in the effort. Together, they raise thousands of bobwhite quail each year to release into the landscape. Adjacent State lands are managed to complement the private landowners' efforts.

Though the landowners' goal of recreation differs from the State's goal of habitat restoration, both seek to see bobwhite quail thrive on the landscape. As is often stated, teamwork makes the dream work!



Land ownership within the partnership area. Notice the variation in land cover. Dark green sections indicate a forest with full canopy closure. Tan areas with dotted green indicate open pine woodlands with a grassy understory. Some of the land is still in agricultural production, seen as tan or light green.

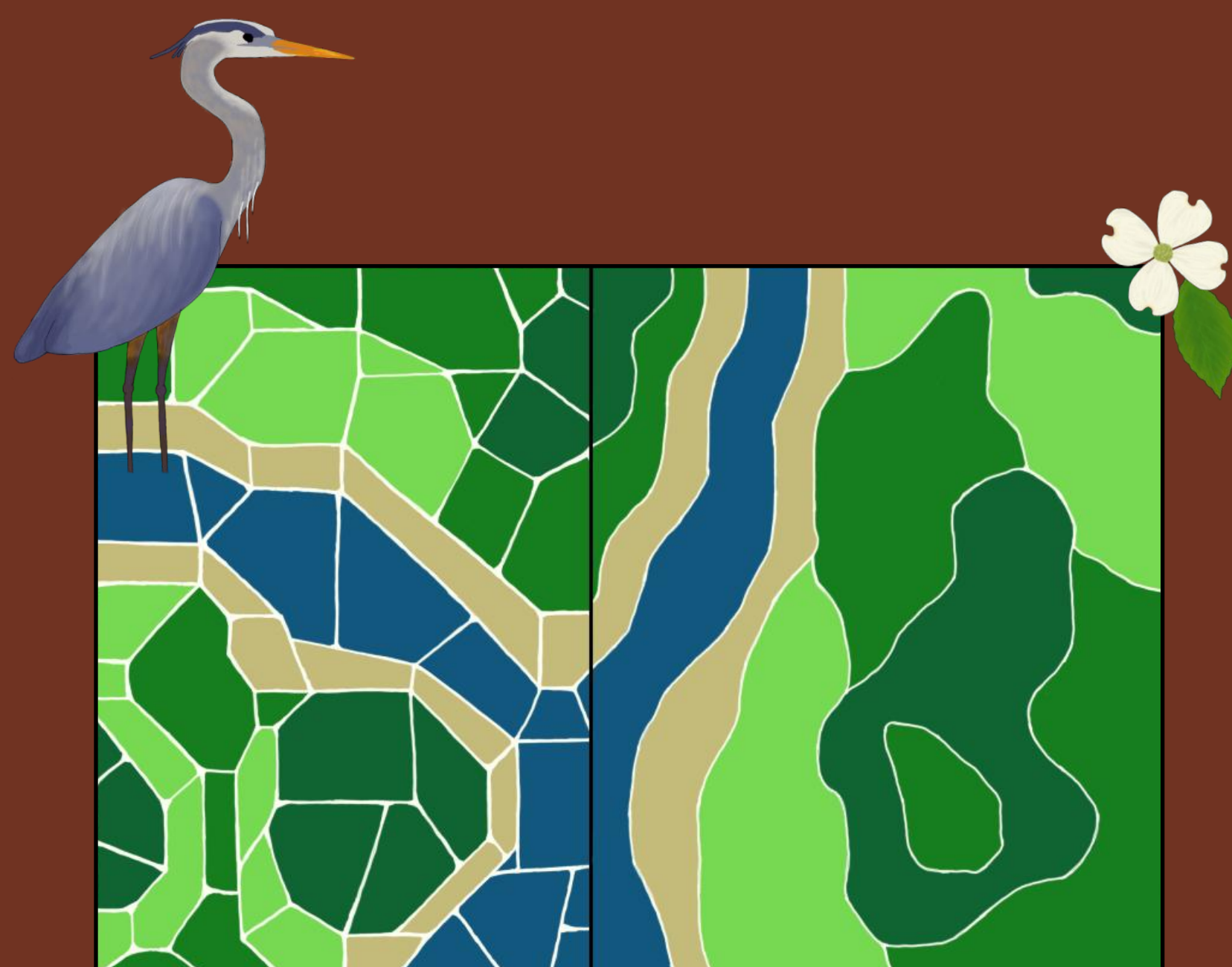


Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Department of Natural Resources are equal opportunity providers and employers.

# The Landscape as a Living Mosaic

A healthy landscape often resembles a mosaic. In art, a mosaic is an image created by arranging small colored tiles. In natural resources management, a mosaic is a landscape that includes sections of different habitat types.

Each habitat type provides food and shelter in unique ways to the wildlife that depend on it. This promotes *biodiversity*. Biodiversity is the variety of living things in an ecosystem.



A tile mosaic in art (left) and a landscape mosaic in natural resources management (right).



Habitat restoration plan for Tuckahoe State Park: Land managers carefully chose each habitat type for the mosaic. Naturally low-lying areas became wetlands; short ridges called *berms* were constructed to aid in water collection. High and dry areas became grasslands. Tree plantings filled in forest gaps and increased edge habitat.

Let's play I-SPY! How many native organisms can you find hiding on this sign? See if you can spot all 15.

*Hint: A leaf or cone represents the tree that it comes from.*

Did you know?

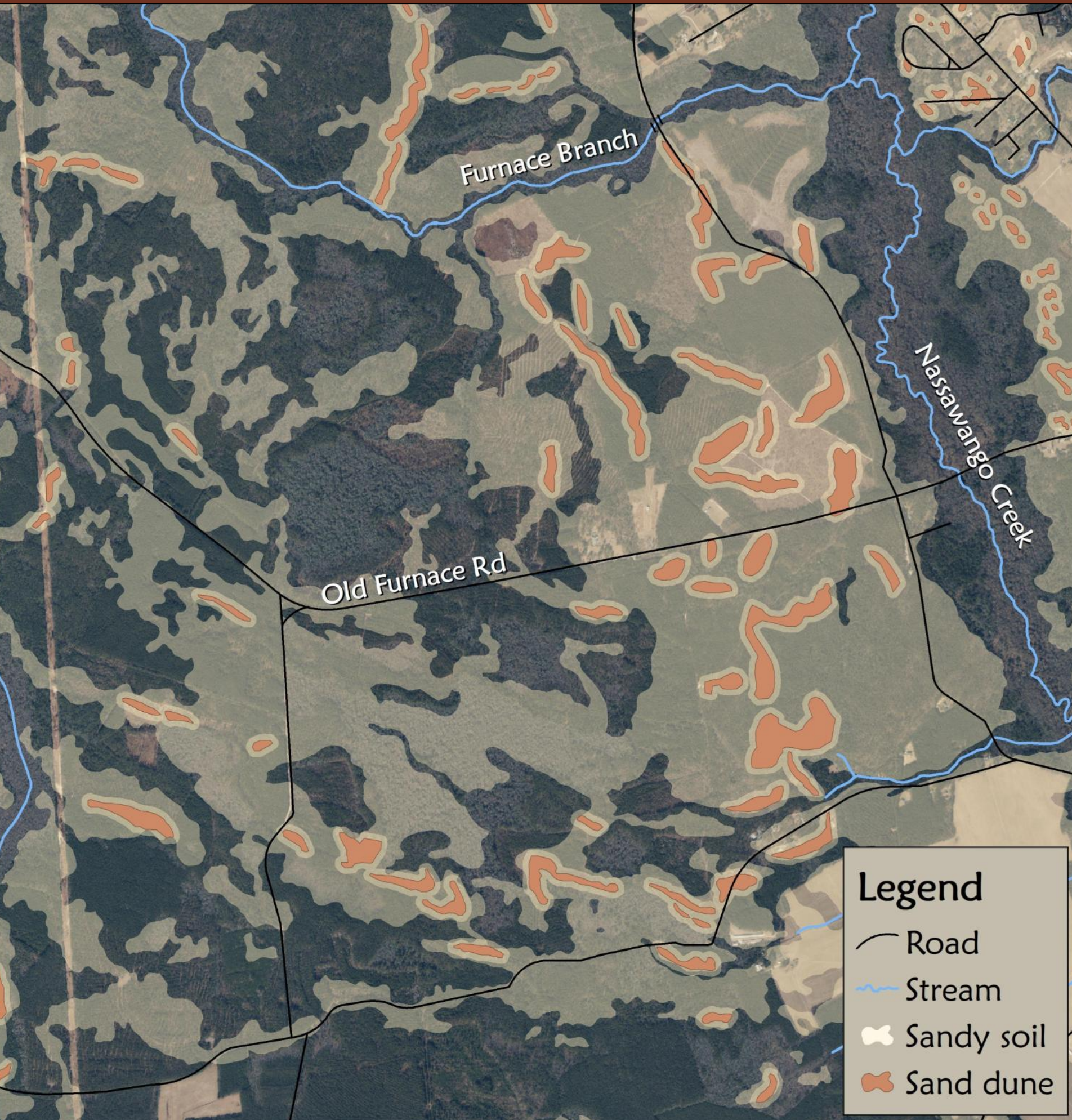
Oak trees (genus *Quercus*) are some of the most important plants that support pollinators. Over 700 species of native moths and butterflies depend on oak trees throughout their lifecycle.



Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Forest Service are equal opportunity providers and employers.

# Oak-Pine Savanna Restoration

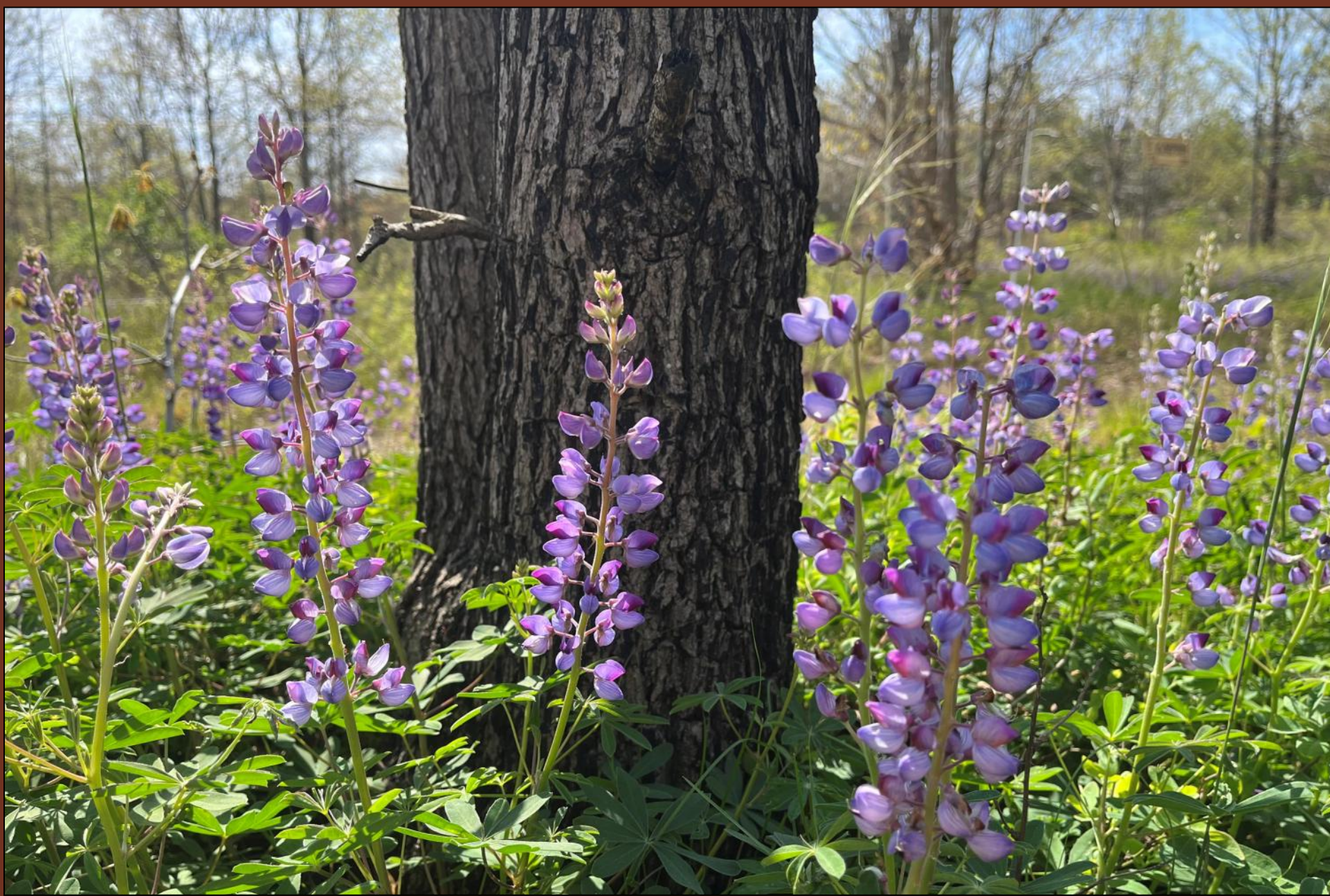
The Delmarva Peninsula hides a unique geographic feature: inland sand dunes formed over 10,000 years ago. As glacier melt pushed sediments down from the Great Lakes area, wind carried sand across the peninsula, forming large deposits called *dunes*.



Sandy soils and sand dunes in the Pocomoke State Forest area. Mapping is a useful tool in identifying target areas for restoration.

Flat areas of dry, sandy, nutrient poor soils surround the dunes. Together, these sand dunes and flats support an ecosystem that is *disturbance dependent*. To mimic the types of disturbance that would naturally occur, such as wildfire, land managers use two techniques:

- Timber harvests remove all of the loblolly pines and retain trees like oak and shortleaf pine. Harvesting opens up the canopy, increasing the amount of sunlight available to plants on the ground.
- Prescribed burns control the growth of fire-intolerant species and wake up dormant seeds in the soil. Small sections of habitat are burned every year on a rotation so that each section sees fire return every three to five years.



Sundial lupine (*Lupinus perennis*) grows beneath a tree with burn scars. Prescribed burning did not harm this tree; only the outer layer of bark was affected by the controlled fire.

These techniques support establishment of *oak-pine savanna* habitat. Oak-pine savannas are dominated by plants that thrive in open, sunny areas with sandy soils. For example, populations of sundial lupine and wild indigo swelled in response to the timber harvests and periodic fire. Both are host plants for the state endangered, globally rare frosted elfin butterfly.



Frosted elfin butterfly (*Callophrys irus*) perched on a sundial lupine leaf.

**Did you know?**  
The Pocomoke State Forest hosts one of the strongest frosted elfin butterfly - sundial lupine communities in the Mid-Atlantic U.S.

# Greentree Reservoir Management



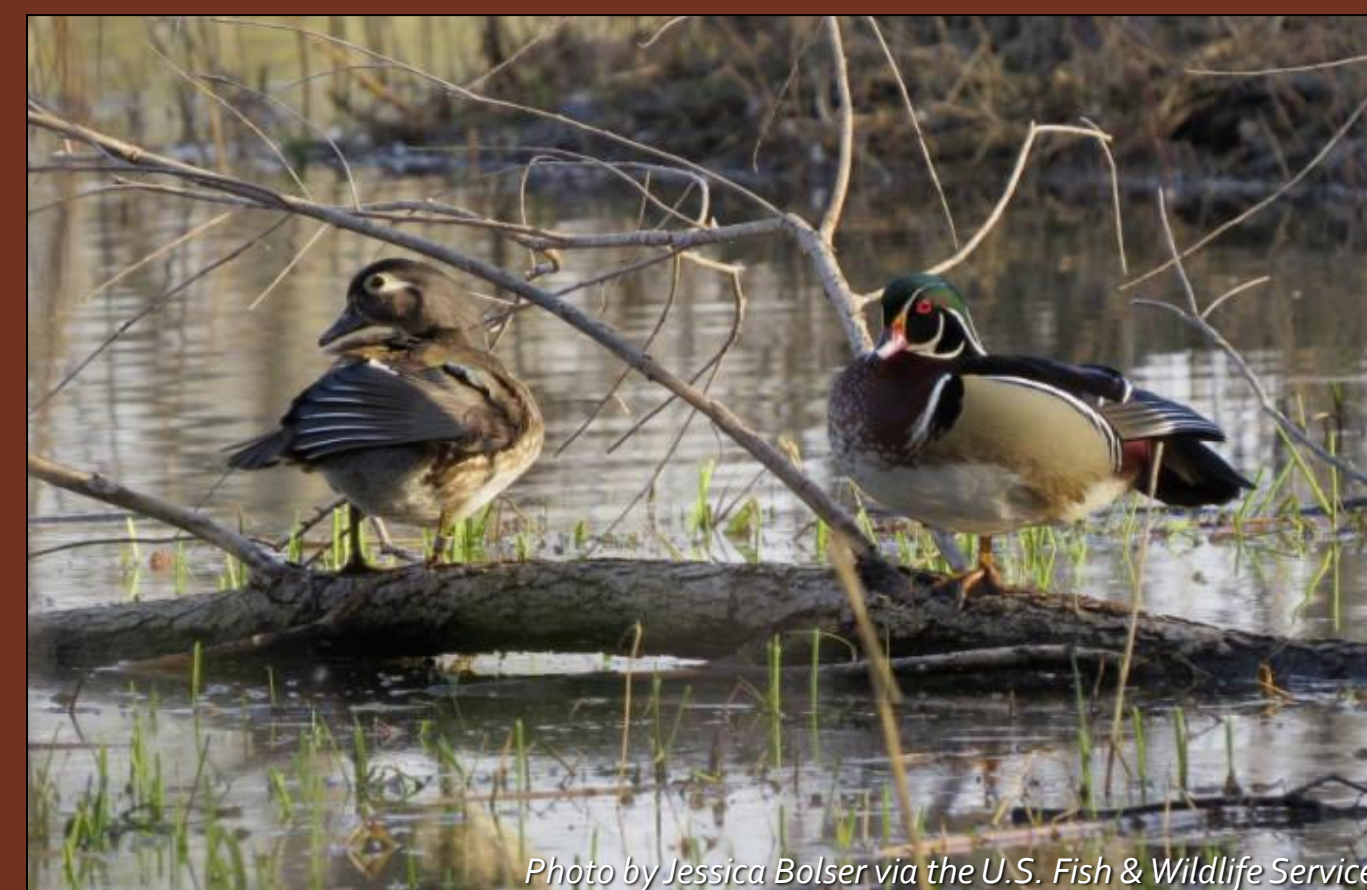
A mature oak tree rises out of the flooded forest. Oak trees supply the most desirable type of food for visiting waterfowl — acorns.

## Did you know?

*Vernal pools* are depressions in the forest floor that fill up with water naturally during the winter and spring months and dry out during the growing season. Many amphibian species depend on both the vernal pools and dry forested uplands throughout their lifecycle.

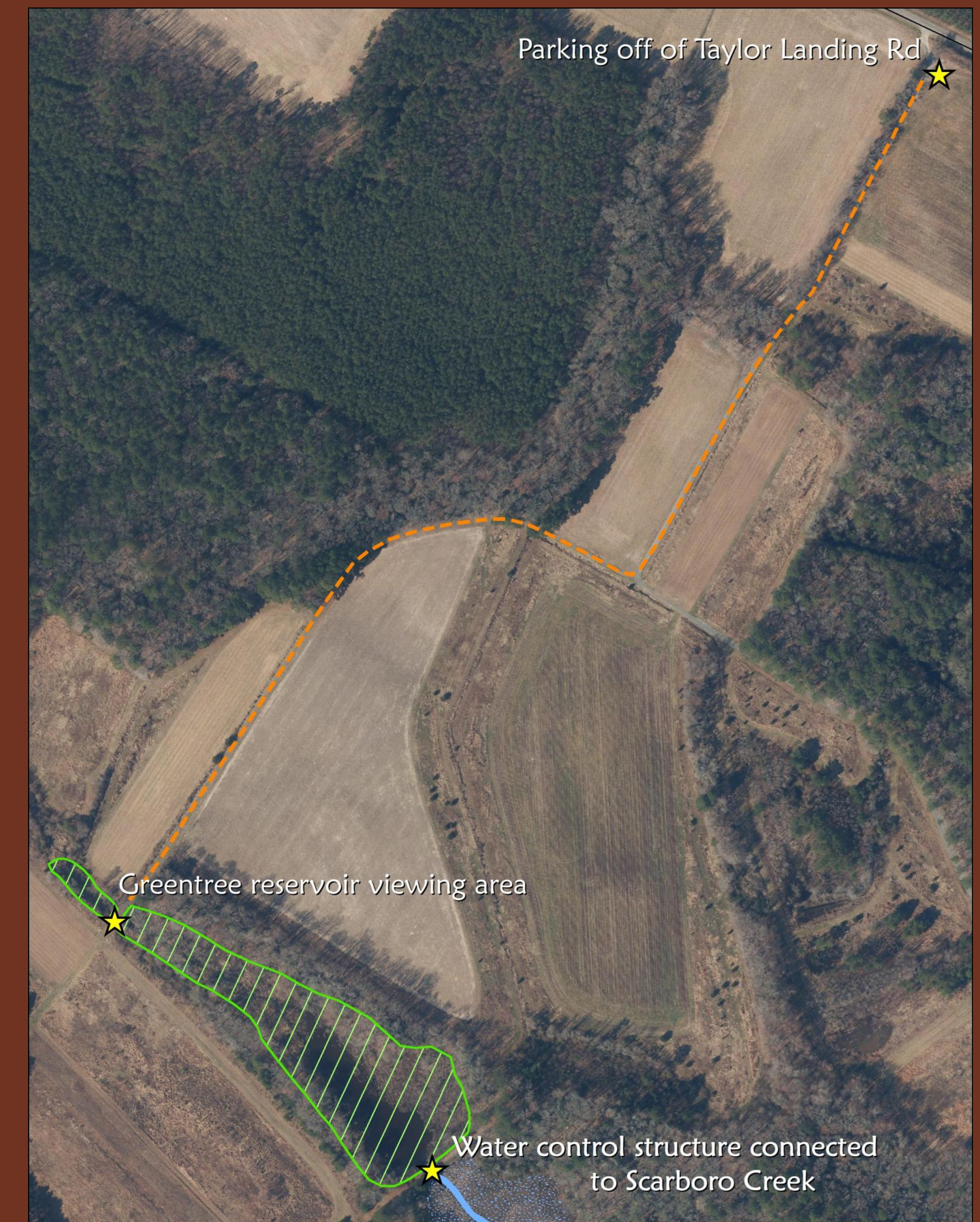
The Delmarva Peninsula lies along a major migratory path for many species of waterfowl, shorebirds, and songbirds. Some of these birds, including wood ducks and mallards, depend on water in the woods as a source of food and shelter.

A *greentree reservoir* is a low-lying forested area that is flooded by land managers in the winter when the trees are dormant. The forest is mostly composed of oaks and other *mast*-producing trees. Mast, the nuts and fruit produced by trees and other woody plants, serves as the main food source for visiting birds.



A female (left) and male (right) wood duck (*Aix sponsa*) stand on a fallen tree.

Water control structures between the reservoir and an adjacent waterbody allow the Maryland Wildlife & Heritage Service to adjust the water level throughout the season. Maintaining a suitable water depth, on average about 18 inches, is important for both attracting waterfowl and protecting tree health.



Map showing route to the greentree reservoir viewing location. Outlined in green, this reservoir covers a little over 4 acres.



Funding for this project provided by the U.S. Department of Agriculture, Forest Service, Landscape Scale Restoration Program. The U.S. Department of Agriculture and Maryland Department of Natural Resources are equal opportunity providers and employers.