

Floodplain



An Ashland Nature Center Trail



About the Trail

*This trail has been designed to explore the natural features and purpose of a floodplain. The trail follows the Red Clay Creek upstream through woodlands and fields before looping back to conclude at the Visitor Center. Along the trail, you will encounter **24 blue numbered markers** denoting interesting aspects of the floodplain, such as the land animals, stream-dwelling organisms, and various trees, shrubs, and other plants that thrive in a wet or moist environment. You will also learn why it is important for humans to protect the creek and keep the floodplain in its natural state.*

Please follow the blue arrows along the path and down the steps to the start of the trail.

FLOODPLAIN TRAIL

Trail Length - .75 miles

Trail Surface - flat terrain; often muddy following wet weather

Difficulty: Moderate

Approx. Walking Time - 50 minutes (w/booklet)

1

The **Red Clay Creek** flows in front of you, moving hundreds of thousands of gallons of water through this valley every hour.

Where does all that water come from and where is it going?

The creek begins as mere trickles of water from groundwater springs north of Kennett Square, Pennsylvania. Tributary streams and additional groundwater inflows along the way add to the creek as it flows through Pennsylvania and into Delaware. The Red Clay passes us here and flows generally southeastward until it joins the White Clay Creek, just south of Stanton, Delaware. The combined streams flow into the Christina River, then into the Delaware River, and eventually out to the Atlantic Ocean at Cape Henlopen! (It is also interesting to note that, just after the Red Clay Creek joins with the White Clay Creek, some of the water is withdrawn by United Water Delaware and is purified into drinking water at the Stanton Water Treatment Plant. The purified water is then piped to homes, schools, businesses, and industries in New Castle County.)

On most days of the year, water in the Red Clay Creek is shallow enough for you to wade through without much danger. But during floods, the water rises over the banks and spreads out in a broad area called the **floodplain**. The floodplain extends from the bottom of the hill behind you all the way to the line of trees on the far side of the meadow across the creek. During severe floods, the water level where you are standing has risen to more than 8 feet above ground level!

Why is the floodplain important? The floodplain is a “safety valve” for the creek. When the creek overflows its banks, the excess water runs

off onto the floodplain. Here, the grasses, shrubs, and trees help slow the water down so that some of it can soak into the ground.

2

As you walk this trail, watch out for **stinging nettle**, an herbaceous (non-woody) plant which thrives in the moist floodplain. The leaves and stems of this plant are covered with needle-like

hairs that produce an unpleasant stinging sensation when touched.



Stinging Nettle



Jewelweed

Jewelweed is another common, herbaceous plant which often grows in close proximity to stinging nettle on the floodplain. Its hollow, tube-like stems contain a mucilaginous juice which can be used to relieve the sting of nettle. Look for yellow and orange flowers of the jewelweed in late summer.

3

The kinds of **trees** which grow on the floodplain are different from those on the hills and uplands, because of the wetter soil conditions here. Black willow, for example, often grows right at the stream edge, and is not bothered by flooding or siltation. Its roots help prevent the erosion of stream banks by holding the soil in place. One of the largest black willows at Ashland Nature Center is located about 40 feet beyond the trail marker (the largest tree, looking towards the creek) - you can recognize black willow by its very dark, furrowed bark and long, slender leaves. Other trees abundant on the floodplain include the green ash, ashleaf maple (or boxelder), and sycamore. Black cherry, sassafras, hawthorn, red maple, and silver maple occur here to a lesser extent.

4

Pigs and other **farm animals** were once kept in a fenced area here on the floodplain. When the farm was abandoned, the old animal pens became overgrown gradually by wild plants in a process called natural succession. First annual plants, like grasses, became established. Then wildflowers and other perennial plants took over for a few years. Eventually, woody plants such as berry briars, shrubs, and young trees took root and began to grow. With numerous large trees now present here, this area is well on its way to developing into a mature floodplain forest. Look for remnants of the old wire farm fence, largely hidden by vegetation, as you continue on your walk.



5

From the wooden bridge across **Wildflower Brook** you can see where this small stream flows into the Red Clay Creek. Wildflower Brook is one of dozens of tributary streams that empty into the Red Clay as it flows through Pennsylvania and Delaware. Look for **animal footprints** in the mud and sand along the stream edge – White-tailed Deer, Raccoon, Virginia Opossum, and many kinds of birds visit the stream each day to drink or search for food.



White-tailed Deer



Raccoon



Opossum

6

All of the hills you can see from here are part of the **Red Clay Creek watershed**, a 54-square mile area which extends north into Pennsylvania and includes all of the land that drains into the Red Clay Creek. The ecology of the watershed and the creek are interrelated so that anything that affects the watershed will ultimately affect the creek. Trees and grass on the slopes of the watershed help to stabilize the soil. Without these plants, rainwater would carry valuable topsoil and nutrients into the creek.

Young trees, including red maple, green ash, sycamore, and tuliptree, have been planted here in an effort to reforest the floodplain. Wire cages protect the tender young trees from hungry White-tailed Deer.

7

Stop for a moment and look at the unkempt tangle of young trees, shrubs, brambles, and vines in this area. You may prefer a mowed or manicured look to this tangle of brush and “weeds”, but most animals would prefer the unmowed thicket because it provides excellent protection. The Eastern Cottontail (rabbit) uses both mowed and unmowed areas, nibbling cautiously at the green grass, clover, and other herbaceous plants for its food, and bounding away to the safety of the dense thicket at the first sign of danger. Woodchucks (groundhogs) also make use of both areas, and in addition have the safety of underground burrows in which to escape. In addition, many birds build nests in the thicket and eat the berries and seeds provided here. Northern Mockingbird, Gray Catbird, Northern Cardinal, and Carolina Wren are some of the birds that you may see or hear.



Belted Kingfisher

8

The **large rocks** (rip-rap) along the banks of the Red Clay Creek were put there to help minimize erosion and prevent the creek from meandering. These particular rocks were brought from the site of the former John Wanamaker store on Augustine Cutoff, where they were blasted out of the hillside during construction (c.1950). Look for cylindrical holes in the rocks that were once drilled to hold dynamite. As you walk on, listen for the dry, rattle-like call of the **Belted Kingfisher**. This bird nests in cavities in the stream bank and perches on branches above the creek, looking for fish to catch. It is frequently seen and heard here.

9

Why is there a **big bend** in the tributary stream in front of you? Like all natural streams, the course of Birch Run is slowly but continuously changing. Once the stream was almost straight here, but every day the running water gnaws away at the outside bank and deposits sediment on the inside bank, slowly increasing the arc of the bend. During a future storm, the stream may break through across the peninsula you are standing on to find a shorter path to the Red Clay Creek.

10

If you had been standing here on September 15, 2003 you would have been swept away in a raging torrent of water! On that day, remnants of **tropical storm Henri** dropped 7 to 10 inches of rain in Kennett Square, Pennsylvania, and nearby Delaware, causing the Red Clay Creek to swiftly overflow its banks. When the raging water reached Yorklyn, Delaware (~1 mile upstream from here) it tore through the Yorklyn business community, severely damaging buildings, equipment, and vehicles and sweeping away tons of debris. From there it ravaged through the valley, destroying the tracks and bridges of the historic Wilmington & Western Railroad. Bypassing the bend in the creek near the Sharpless Road bridge, the floodwaters crossed Sharpless Road and cut across the floodplain in front of you, carrying along slabs of asphalt, massive wooden beams from the railroad trestles, propane tanks, uprooted trees, and countless other items (the trail map in the front of this guide shows the path of the floodwaters). Upon reaching this area, the largest debris items were trapped by the stand of ash, willow, and maple trees growing here. This debris would still be here was it not for a massive debris-removal project completed by New Castle County in 2005.

Based on data from the U.S. Geological Survey, it is estimated that more than 8 billion gallons of water flowed through this valley on September 15, 2003 – approximately 500 times the average flow for the Red Clay Creek!

11

What are all those **plastic tubes** doing sticking up on the floodplain here? In the fall of 2006, hundreds of tree seedlings were planted in this part of the floodplain to help establish a forested buffer, or “riparian buffer”, along the Red Clay Creek. The plastic tubes allow sunlight to penetrate, while protecting the young trees from being browsed by White-tailed Deer, Eastern Cottontails, and other animals. The term “riparian buffer” refers to a corridor of vegetation along the bank of a stream, river, or other natural waterway.

These vegetated corridors are important for numerous reasons, including the following: reducing the severity of floods; holding the soil in place and preventing erosion; reducing the impact of pollutants entering the stream; maintaining cooler water temperatures; improving water quality for aquatic organisms; and providing forested floodplain habitat for a wide diversity of animals.

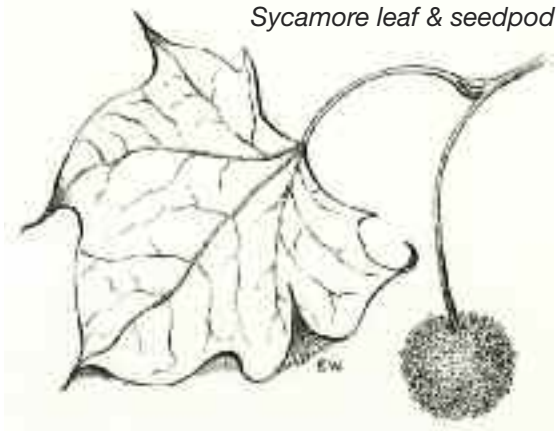
12

From this vantage point you can view the **path of floodwaters** during a major flood of the Red Clay Creek, such as the flood in September 2003. The floodwaters flow through the broad floodplain from Sharpless Road (marked by overhead electrical lines, in the distance), continue on past this point (flowing nearly perpendicular to the creek bed), and across the floodplain on the other side of the creek, towards Barley Mill Road and the Ashland Covered Bridge (visible in the distance).

The destructive aspects of flooding are largely the result of humankind's careless habit of building on the floodplains, as well as overdevelopment of the watershed as a whole. Concrete, asphalt, and other man-made materials do not absorb water like the soil does, so most of the rainwater falling on these so-called "impervious surfaces" runs off quickly into the streams and contributes to destructive flooding and erosion. Severe flooding along the Red Clay Creek in recent years is no doubt a result of further development and increased areas of impervious surfaces upstream from here.

13

The **sycamore** vies with the tuliptree for being the most massive tree on the East Coast. The sycamore grows almost exclusively along stream banks and in lowlands. Its distinctive mottled bark is a result of the old brown bark peeling off to reveal the inner whitish underbark. Other identifying characteristics include its broad, simple leaves and its ball-shaped seed clusters, which fall from the tree in spring and break into downy fluff to be carried away on the wind or water.



In the spring and early summer, listen for the thin, wheezy notes of the Blue-gray Gnatcatcher and the long, melodious warbling phrases of the Warbling Vireo, two songbirds which prefer to nest in floodplain trees, such as the sycamore.

14

Sharpless Bridge Spur Trail: To the right is a 1/8-mile spur trail following the creek upstream to view the Sharpless Road bridge over the Red Clay Creek. At the end of the spur trail are views of a dam on the Red Clay Creek, part of an old millrace, and a small portion of the Wilmington and Western Railroad. (After viewing these features, return to the main trail by the same route.)

The dam on the Red Clay Creek by Sharpless Road was built in the early 1700's of stone but was later modernized with concrete. The associated millrace ran 4/10 mile southeast to provide water to operate a grist (flour) mill built by John Gregg at Ashland (formerly along Barley Mill Road north of the Covered Bridge). John Gregg was one of the original settlers in the Hockessin area, purchasing his land from the William Penn estate. The mill was owned and operated by the Gregg family for several generations and then sold to others in the early 1800's. After construction of the Wilmington & Western Railroad was completed through Ashland in 1872, the flour mill became even more profitable, and the size of the waterwheel and millrace were increased.

The mill operated until 1943 and the building itself survived until the 1950's. Most of the millrace has since filled with sediment, but the tailrace (that portion of the millrace located "downstream" of the mill) still exists today as a long, skinny pond. This pond is used by the Delaware Nature Society to teach children and adults about the pond ecosystem. The miller's house, constructed of brick by William Gregg in 1737, still stands at the corner of Route 82 and Ashland-Clinton Schoolhouse Road.

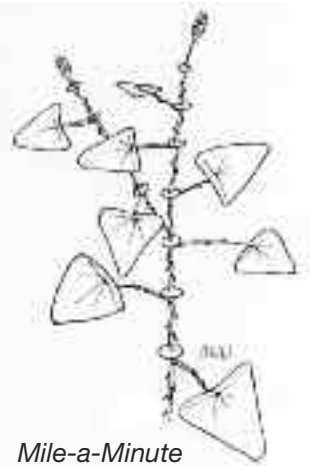
15

Alien invasion: This broad open area once supported a beautiful, ecologically diverse, wildflower meadow. What happened to the meadow? The September 2003 flood deposited several feet of sand and gravel here, burying the meadow plants and the underlying fertile soil those plants depended on. Subsequent floods brought more debris – and also seeds from plants that were growing upstream, including several species of alien plants. These alien plants, such as **Japanese hop** and **Mile-a-minute**, thrive in disturbed areas like this and have quickly overgrown



Japanese Hop

the area. Japanese hop and mile-a-minute are both climbing or trailing vines with prickly stems and small, inconspicuous flowers. Japanese hop has large, rough leaves divided into five distinct lobes; mile-a-minute has smaller, triangular leaves. Alien plants such as these crowd out native plant species, and generally do not provide the best food or shelter for native animal species. Only time will tell whether or not a meadow dominated by native species will become reestablished in this area.



Mile-a-Minute

How can you tell that a stream once flowed through this **low, swampy area**? The presence of several black willows is the best clue, since these trees only become established along stream banks. Buttonbush is another plant, growing near the willows, which may have taken root when the stream flowed here. This semi-aquatic shrub gets its name from its spherical, button-shaped flowers. During periods of plentiful rainfall, this low area once again supports a small stream.

16

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Buttonbush

17

Look closely at the rocks in **Birch Run**. Believe it or not, the rock fragments that you see are eroded pieces of metamorphic rocks that formed more than 400 million years ago in the core of an ancient mountain range! Those mountains were as high then as the Rockies are today! Where did the tall mountains go? Over many millions of years, the mountains gradually eroded away to the gently rolling hills that we see around Ashland today. Rain, ice, and plant roots attacked the rocks, steadily breaking them down into smaller pieces. The smaller pieces then gradually moved downhill, carried in part by rainwater runoff, eventually being picked up by streams like Birch Run. Once in a stream, rock pieces are tumbled and ground against one another, breaking them into even smaller particles of gravel, sand, silt, and clay. The particles are carried downstream and eventually deposited where the current slows. Some sand grains are carried all the way to the ocean to build our beaches!

This **old field** contains many of the herbaceous plants that were once abundant near marker #15, including goldenrod, aster, common milkweed, and poison hemlock but it also contains an abundance of woody brambles such as wild blackberries. Many animals find food and shelter in this old field, including Woodchucks, Eastern Cottontails, and Red Fox, as well as smaller mammals like the Meadow Vole, Northern Short-tailed Shrew, and Least Shrew, which scurry about on the surface, and Eastern Moles and Star-nosed Moles, which dig underground tunnels. But if you're hoping to see animals here on any given day, your best bet is to think small and look for insects.

Butterflies, moths, leafhoppers, grasshoppers, crickets, cicadas, true bugs, and beetles are among the many kinds of insects you can find here in abundance in the spring, summer, and fall. After laying their eggs in summer or fall, most kinds of adult insects die, although some adults do stay over the winter buried in the ground or in bark where it is warmer. A few, like the monarch butterfly and green darner dragonfly, even migrate south to warmer lands for the winter to escape freezing temperatures! There are at least 1,000 insect species in this field. How many can you find?

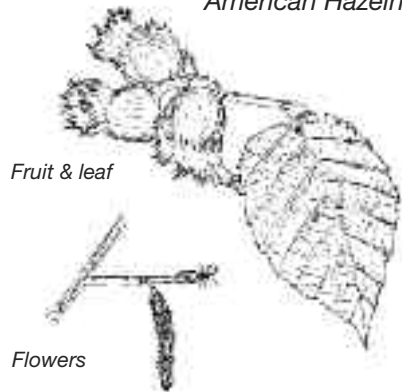


19

Why aren't there any willow, ash, or sycamore trees growing here? Because the soil on this slope is too well-drained to support floodplain tree species. Instead, trees typical of **upland woods** thrive here, such as hickory, oak, tuliptree, ironwood, sassafras, and American beech.

20

On the uphill side of the trail is a dense stand of **American hazelnut** (also called American filbert). This native shrub is most noticeable in the spring before the leaves open out, when slender, drooping, yellow-brown catkins of the male flowers and bright-red pistils of the small, petal-less female flowers appear. In the fall the shrub produces edible nuts encased in leafy, ragged-edged husks.

American Hazelnut**21**

About 10 yards upstream from the foot bridge over Wildflower Brook, you can access the stream edge to explore for small stream animals. Look for **water striders**, a type of insect, walking on the surface of the water, supported by the water's surface tension. Pick up a submerged rock and examine the surface closely — clinging onto the rock you may find mayfly and stonefly nymphs, two kinds of immature aquatic insects that need clean water to survive. You may also find the camouflaged protective cases of caddisfly larvae, which look like parts of the rock and are made up of tiny pebbles held together by means of a silk produced by the larvae. Numerous other types of invertebrates, such as dragonfly and damselfly nymphs, beetles, snails, and crayfish, also live in the stream, along with vertebrates such as small fish and stream salamanders.

*Water Strider*

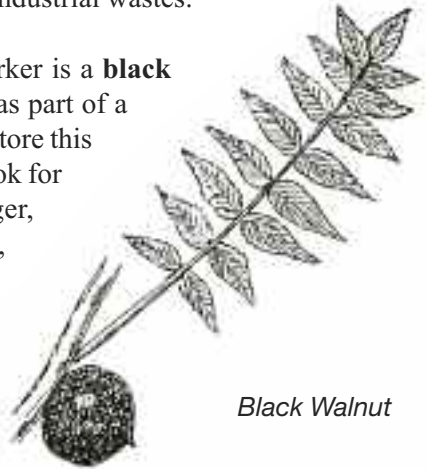
Note that stream life does not cease in the winter. Although ice and snow may cover the surface of the water, fish, salamanders, insects, and stream organisms continue to live beneath at lowered levels of activity.

The high diversity of aquatic organisms found in Wildflower Brook, along with the presence of stonefly and mayfly nymphs, is indicative of excellent water quality. The small watershed of Wildflower Brook consists mostly of woods and fields managed by the Delaware Nature Society, along with a handful of wooded, residential properties. Therefore the brook receives no significant input of pollutants and it remains a stream in excellent health.

In contrast, close inspection of the Red Clay Creek reveals that it is not as healthy as it may appear from a distance. A low diversity of aquatic organisms, along with the presence of numerous pollution-tolerant aquatic insects, indicates poor water quality. Unlike Wildflower Brook, the Red Clay Creek has a large watershed with a wide variety of land uses. Pollution affecting the Red Clay Creek includes runoff of fertilizers, pesticides, herbicides, and soil from lawns and agricultural enterprises; runoff of oils and road salts from roads, parking lots, and driveways; and discharge of industrial wastes.

22

The large tree by the marker is a **black walnut**, planted in 1976 as part of a bicentennial project to restore this once-abundant native species. Look for other walnuts, including younger, “second generation” walnut trees, as you walk up the hill. Black walnut tree roots, leaves, and nut husks produce a chemical that is toxic to some other plants; plants that are sensitive to the toxin will not grow near black walnut trees. (Note: walnuts are edible, but caution should be taken when handling the nut husks because they produce a yellow-brown stain).



Black Walnut

23

Upland fields: Can you see any differences between the vegetation growing on these hillsides and that on the floodplain you left behind? Although many of the same herbaceous plants grow in both locations, others, like jewelweed and stinging nettle, are not present here because the soil is too dry.

Did you know that the Ashland Nature Center is built on the site of an **old barn**? The old stone wall behind the Visitor Center and the silo are all that remain of the old barn structure, built in the mid 1800's. The silo (reconstructed in 1942) now holds a spiral staircase that connects the Visitor Services area on the upper level with the offices on the lower level. Be sure to walk inside and check out the silo from the inside sometime!

And have you noticed how high above the floodplain you are? The farmer who chose this site recognized that buildings should not be placed in the floodplain; a principle which is equally valid today but which is not always followed!

This is the **end of the Floodplain Trail**. On your walk, you have observed a variety of floodplain habitats. You have walked through fields, thickets, wooded areas, and swampy sections, each of which supports plant and animal communities uniquely adapted to the moist conditions of the floodplain. You have also observed evidence of the power of raging floodwaters, and hopefully have gained an understanding of the important function that floodplains serve. It is essential, for ourselves and for the benefit of future generations, that we do our part to leave floodplains in their natural state, and carefully manage new development in the surrounding watersheds.

We hope you have enjoyed your walk and will come back again to visit the Ashland Nature Center. Please deposit \$1.00 in the box, if you would like to keep this guide; otherwise return the guide to its box.



SCIENTIFIC NAMES OF SPECIES MENTIONED IN TEXT

(Common names for plants are not standardized)

Trees

Ashleaf maple (or box elder) (*Acer negundo*)

Red maple (*Acer rubrum*)

Silver maple (*Acer saccharinum*)

Ironwood (or American hornbeam) (*Carpinus caroliniana*)

American beech (*Fagus grandifolia*)

Oak (*Quercus* spp.)

Hickory (*Carya* spp.)

Black walnut (*Juglans nigra*)

Sassafras (*Sassafras albidum*)

Tuliptree (*Liriodendron tulipifera*)

Green ash (*Fraxinus pennsylvanica*)

Sycamore (*Platanus occidentalis*)

Hawthorn (*Crataegus* sp.)

Black cherry (*Prunus serotina*)

Black willow (*Salix nigra*)

Shrubs and Woody Vines

American hazelnut (*Corylus Americana*)

Blackberry (*Rubus* sp.)

Buttonbush (*Cephalanthus occidentalis*)

Herbaceous Plants

Poison hemlock (*Conium maculatum*) -alien

Common milkweed (*Asclepias syriaca*)

Asters (*Aster* sp.)

Goldenrods (*Solidago* sp.)

Jewelweeds, or touch-me-nots (*Impatiens* spp.)

Japanese hop (*Humulus japonicus*) -alien

Mile-a-minute (*Polygonum perfoliatum*) -alien

Stinging nettle (*Urtica dioica*) -alien

Mammals

Virginia Opossum (*Didelphis virginiana*)
Northern Short-tailed Shrew (*Blarina brevicauda*)
Least Shrew (*Cryptotis parva*)
Eastern Mole (*Scalopus aquaticus*)
Star-nosed Mole (*Condylura cristata*)
Eastern Cottontail (*Sylvilagus floridanus*)
Woodchuck (*Marmota monax*)
Meadow Vole (*Microtus pennsylvanicus*)
Red Fox (*Vulpes fulva*)
Raccoon (*Procyon lotor*)
White-tailed Deer (*Odocoileus virginianus*)

Birds

Belted Kingfisher (*Ceryle alcyon*)
Warbling Vireo (*Vireo gilvus*)
Carolina Wren (*Thryothorus ludovicianus*)
Blue-gray Gnatcatcher (*Poliophtila caerulea*)
Gray Catbird (*Dumetalla carolinensis*)
Northern Mockingbird (*Mimus polyglottos*)
Northern Cardinal (*Cardinalis cardinalis*)

Invertebrates

Monarch (butterfly) (*Danaus plexippus*)
Green Darner (dragonfly) (*Anax junius*)

ACKNOWLEDGMENTS

Text and map:

Amy Wendt White 2008

Illustrations:

Amy Wendt White, Ellen Wood, Karen Wenny

ABOUT THE DELAWARE NATURE SOCIETY

People of all ages learn about nature and the environment through the Delaware Nature Society's programs at Ashland & Abbott's Mill Nature Centers, Coverdale Farm, Cooch-Dayett Mills and the new DuPont Environmental Education Center at the Wilmington riverfront. DNS has helped preserve thousands of acres of land and advocates for conservation of our natural resources. The society owns or manages more than 1000 acres of wildlife habitat for education and biodiversity and DNS is the Delaware affiliate of the National Wildlife Federation.



www.delawarenaturesociety.org

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