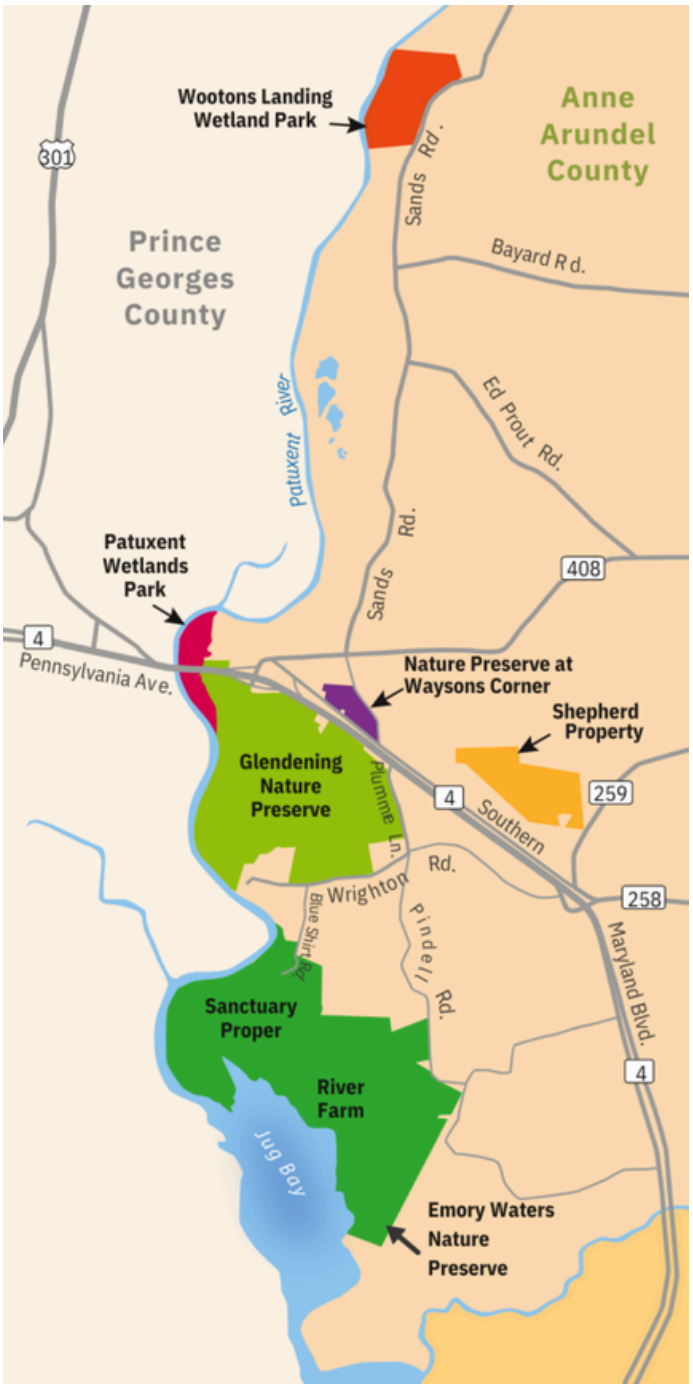
A Pocket Naturalist at Glendening Nature Preserve

Cedar Robison, Environmental Education and Interpretation Intern, JBWS, Summer 2023



Welcome to Jug Bay Wetlands Sanctuary!

The Sanctuary is about 1,700 acres of protected lands over 5 properties in the southern tidal reaches of the Patuxent River. They contain 9 unique terrestrial habitats and 19 aquatic ones, making the land a vital resource for a high diversity of species. Today, you are exploring part of our Glendening Preserve.

We will be following the Green Loop. It is 1.9 miles long and takes you through 3 different habitats. The full loop will take roughly 2 hours.

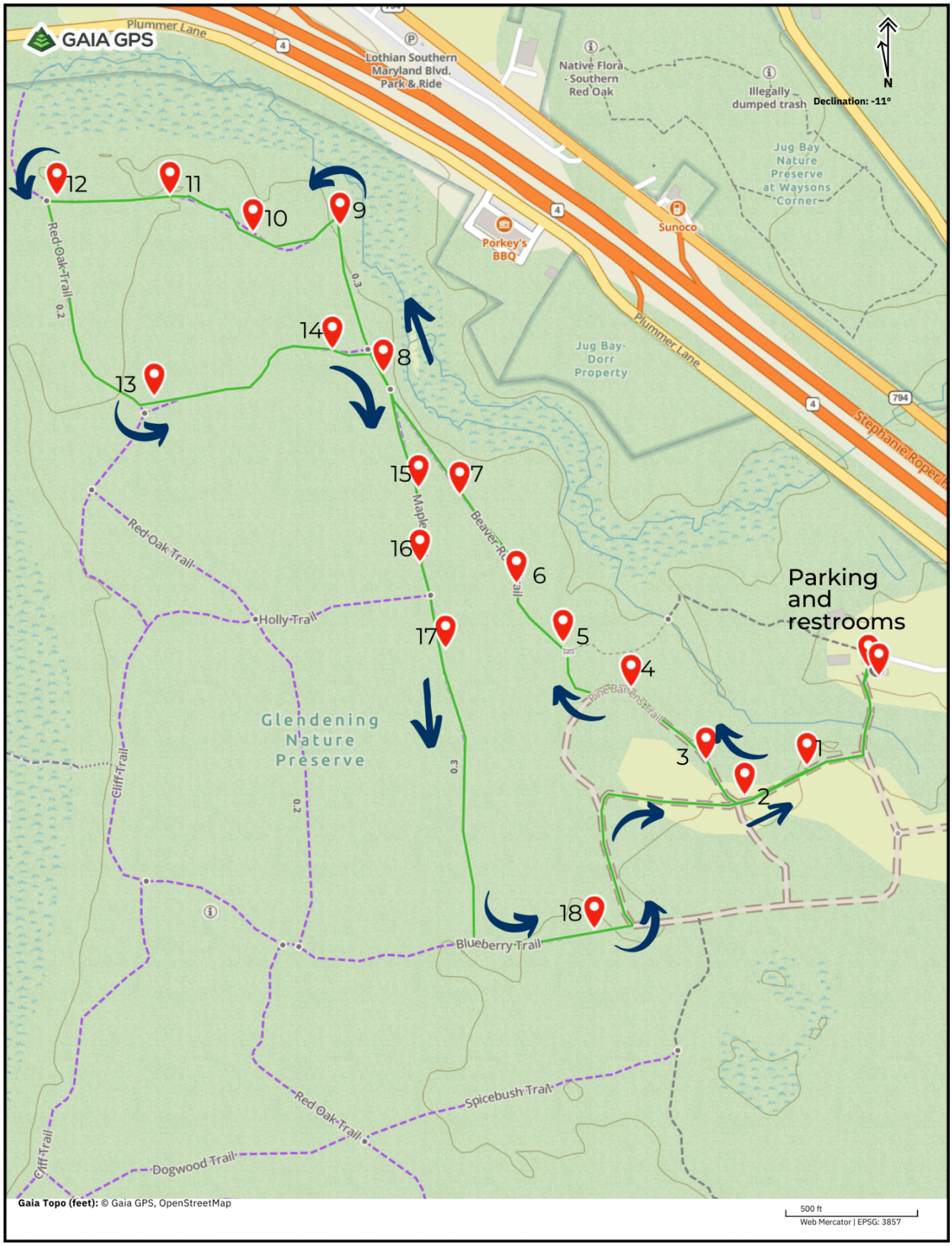
The hike begins at the Plummer entrance of the Glendening Preserve (5702 Plummer Lane, Lothian, MD 20711). The trail entrance is behind Plummer House. If you would like, you can explore the butterfly garden and pollinator homes near the barn before or after your hike.

There are 18 waypoints throughout the hike. Each takes between 5 and 8 minutes to discuss before moving on. If you would like a shorter route, feel free to skip or condense some of the waypoints.

GPS coordinates are listed after the name of the waypoint. For ease of access, a digital map was created. It is easiest to use on the app Gaia GPS.

In case of an emergency:

1. Call 911
    a. 5702 Plummer Lane, Lothian, MD 20711 OR
    b. Use the provided GPS coordinates if on a hike
2. Call JBWS to notify 410) 222-8006
3. Poison Control: (800) 222-1222


GAIA GPS
Plummer Lane
Lothian Southern Maryland Blvd. Park & Ride
Native Flora - Southern Red Oak
Illegally dumped trash
Declination: -11°
N
Jug Bay Nature Preserve at Waysons Corner
Sunoco
Porkey's BBQ
Jug Bay-Dorr Property
Plummer Lane
794
Stephanie Roper Pl
12
11
10
9
14
8
13
15
7
16
6
17
5
4
3
2
1
18
Red Oak Trail
0.2
0.3
Maple
Beaver Run Trail
Holly Trail
Pine Barrens Trail
Parking and restrooms
Glendening Nature Preserve
Cliff Trail
Blueberry Trail
Spicebush Trail
Dogwood Trail
Gaia Topo (feet): © Gaia GPS, OpenStreetMap
500 ft
Web Mercator | EPSG: 3857

Directions and Interpretations

GPS coordinates are located after the waypoint name, walking directions are highlighted in green, and extension questions are indicated with a question mark.

Begin behind Plummer house, on the trail, and walk down through the gully and up to the meadow. When the hike splits, take the Beaver-Rock trail on your right. Continue walking until you reach a birdhouse on your right.

1. Meadows- Part 1 (38.80115, -76.69220)

A meadow surrounds you. A meadow is an ecosystem dominated by herbaceous (non-woody) plant species that thrive on surface water or shallow groundwater (less than 1 meter).[1] They receive full sun for at least six hours a day. Meadows are critical habitats that attract wildlife from small mammals and grassland birds to their predators (ex., hawks and owls).[2] Some of the common plants in Jug Bay's meadows are little bluestem (*Schizachyrium scoparium*), common milkweed (*Asclepias syiaca*), and goldenrod (*Solidago spp.*).[3]

As you walk through, note how the landscape changes from this tall herbaceous plant cover to a prairie-like landscape with a majority of grasses. (more about meadows at stop 3)

Below: little bluestem (Schizachyrium scoparium)



Below: common milkweed (Asclepias syiaca)



Below: goldenrod (Solidago spp.



Stop just before the next intersection. There is a dead, standing tree on your right.

2. Snags (38.80084, -76.69303)



This standing dead tree is called a snag. At first glance, snags may not look like much. However, they are important habitats for a multitude of species. You may find woodpeckers, owls, and many other species of birds using it as a place to nest, as well as raccoons, squirrels, and bats. Insects are attracted to the nooks and crannies of a snag, and they are food sources for many animals. Fungi growing on the snag are a snack, too. Some animals also use the loose bark and cavities to store nuts and food, while others– birds of prey like osprey and hawks– use it as a perch.[4]

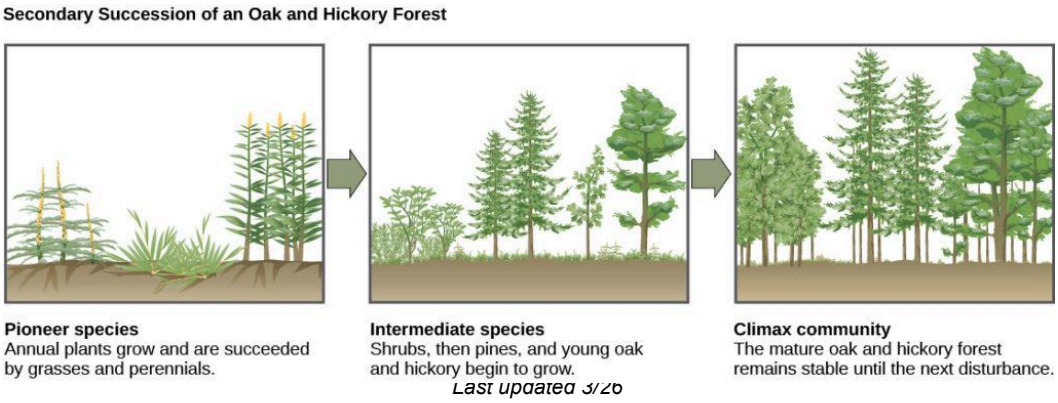
Walk to the next birdhouse on your right.

3. Meadows-Part 2 (38.80121, -76.69355)

Here at Jug Bay Wetlands Center, we manage our meadows to ensure they remain meadows. By mowing or burning our meadows, we prevent forest succession from occurring.

Succession is the “replacement of one plant community by another as a result of natural and progressive development”,[5] and is driven by competition for light. Fast-growing species that can establish root systems and require full sunlight such as annual grasses are the first step in succession. Soon, herbaceous perennials including the common milkweed and woody shrubs overtake the grasses and herbs. Joining the shrubs are shade-intolerant trees. As these trees mature and create canopies, the amount of light available to shrubs decreases, and the amount of undergrowth in the forest decreases. Shade-tolerant trees, content to grow in these conditions, begin to take root like oaks, maples, and beech trees. They bide their time, waiting for a patch of canopy to open, where they flourish due to the additional sunlight. Forest succession is never a linear process. It is influenced by natural disasters and the animals living within it.

You’re likely seeing another example right now, the saplings that cover such a large expanse of what used to be a meadow are white oak saplings. They are prolific here now because squirrels bury their acorns and forget where they are. The abundant light creates the perfect conditions for the white oaks to establish themselves and turn the meadow into a forest.



Continue walking until you reach the pine grove on your left. This is the pine barrens.

4. Pine Barrens (38.80197, -76.69455)

You will see two types of barrens on this hike. Barrens are early successional habitats characterized by few trees, an abundant ground cover, shrubs, and small herbaceous patches that support a diversity of species. Their soil is sandy and well-drained.[6]

A healthy barren ecosystem is maintained through fire. In nature, low-severity wildfires clear out the understory while high-severity fires remove the understory and mature trees from the canopy. Both allow more sunlight to reach the floor, creating conditions that promote biodiversity. Some seeds even lay dormant until exposed to heat! The ashes from the fire also act as fertilizer. In the past, fires were lit by lightning strikes or by indigenous peoples. Burning promoted berries and improved hunting grounds. Beginning in the early 1900s these fires were actively suppressed to limit property damage. But without fire, forest succession rapidly occurred from early successional to closed canopy because the slower-growing trees intolerant to fire expanded and changed the habitat structure.[7]

?

- *Why is biodiversity important?*

Take the first right, then stop next to the fence and Pine Barrens trail marker.

5. Social Trails (38.80244, -76.69546)

A social trail is an unauthorized trail that forms when visitors take shortcuts or venture into a closed area. With repeated use, it becomes more prominent and trail-like. They are recognizable because they are less developed and smaller than official trails. It is important to refrain from using social trails because they increase erosion, disturb the surrounding ecosystem, and are a hazard for hikers.[8]

Continue straight. As you walk down this path, observe the leaves and ground cover.

Right: woolly caterpillar on a stick



6. Ground Cover (38.80306, -76.69608)

The forest floor is covered by a layer of organic matter made of leaves, twigs, and other debris. In some places, it can be inches thick. As these items decompose, they return essential nutrients to the soil to be reused by plants. This layer also retains moisture and maintains cooler temperatures while reducing erosion (the removal of surface materials like soil by natural processes such as wind and water). This organic layer is also

a vital overwintering habitat for many species including lightning bugs (*Lampyridae* family has over 2,000 species) and woolly caterpillars (the larvae of *Pyrrharctia isabella*, the isabella tiger moth). Mulch is vital for a healthy, happy forest.

There will be a large fallen tree on your left. Stop at the tree with a smaller tree growing out of its roots.

7. Suckers (38.80399, -76.69684)

Sprouting from this tree's roots, there looks to be a smaller tree growing. This is called a sucker. Suckers occur when a tree is stressed or injured from factors like soil compaction (caused by excessive walking like a trail, driving over, or other means that press down on the soil), disease, or drought. They can form multiple trunks or grow into the lower part of the tree. The reason we only see them in the wild is that on human landscapes, we prune them. Suckers can break easily and leave the tree susceptible to injury. However, if the main tree suffers enough damage, it can stay alive through its sucker and continue growing.[9]



To the left: suckers growing from the base of a tree

Walk straight past the Maple trail. Approximately 50 steps after the trail marker, there are two holes in the ground on the right.

8. Predated Turtle Nest (possible and seasonal) (38.80527, -76.69786)



As you walk the trail, look for holes in sandy soils near here. If you are lucky, you may see remnants of white eggshells around the area that are leathery to the touch. These leathery bits were once turtle eggs in a buried nest. If you see them, the eggs were most likely predated, eaten by a fox or raccoon.

There are many species of turtles at Jug Bay, including box and snapping turtles (*Chelydra*

serpentina). Eastern box turtles (*Terrapene carolina*) reach sexual maturity at 5 years old, and they live between 25 and 35 years. However, there are records of some living for more than a century! They deposit their eggs in holes like these during the warmer months of the year (May-June), then return to their home. Box turtles generally have a home range with a diameter of 750 feet (230 meters). If the nest is not predated, the turtle hatchlings will emerge after a three-month incubation. The hatchlings' sex is determined by the nests' temperature. Warmer temperatures produce females, while cooler temperatures produce males.

Nest predation is one of many ways nature balances animal populations. Unfortunately, human interference is negatively impacting many animal species, including the eastern box turtles. As suburban development increases, their habitat is further destroyed and fragmented by roads where many are struck and killed. Box turtles are also popular as pets. Regulations now exist to regulate the commercial sale of turtles, but many are still caught to keep as pets, as well as for turtle racing.[10]



Above: an Eastern box turtle

What problems can you see in the future for eastern box turtle populations because of the length of time required to reach sexual maturity and factors like habitat loss and poaching?

Continue straight on the Beaver Rock trail, past the Cedar trail. Stay on the low path when the path splits.

9. Erosion (38.80681, -76.69844)

This part of the trail is a perfect example of what erosion is and what helps prevent it. As mentioned earlier, erosion is the transfer of surface materials through mechanisms like wind or water. Ground cover, like leaves, prevents some erosion, but plants' roots do a massive amount of erosion prevention. The roots weave through the soil like a massive net that keeps the soil in place. Leaves take the brunt of energy from rainfall, where it then trickles gently to the ground. Wind cannot effectively move the dirt because vegetation acts as a natural windbreak.

If you look to your right, the entire hill is made of exposed roots because that is the only place where the soil is structured enough to keep particles from being displaced. However, many roots are being completely exposed and removed from the ground. Water is tricky and once it manages to slip into the tiniest crack, erosion begins.

- Can you identify other areas of erosion while on our hike?
- Can you explain why erosion is bad?
- Can you explain why erosion (specifically) is bad for the Chesapeake Bay?

Take a sharp, uphill left at the Beaver Rock trail marker. As you walk, read the Noise Pollution section.

10. Noise Pollution (38.80674, -76.69960)

Take a moment to listen. Can you hear the cars driving by? The Glendening Preserve is located next to the highway, which is a perfect example of noise pollution. I am challenging you to find a location where noise pollution is low and sit for a while.

Noise pollution involves any sound that disturbs the environment. It can include loud and quiet sounds: airplanes, lawnmowers, and even an air conditioning unit. The louder the sound, the more disruption it causes. These unwanted sounds interfere with animals' ability to navigate, communicate, avoid predators, and more.[11]

Stop at the bottom of the hill where it begins to turn grassy.

11. Sand Barrens (38.80713, -76.70071)

As you descend, you enter the second barren habitat at the preserve- the sand barrens. Like the pine barrens, the sand barrens are marked by sandy soil with few trees and an abundance of ground cover. This area is an abandoned sand mine, a place that was used to harvest and sell sand. There are still multiple operating mines along the shore of the Patuxent River as you drive up Sands Rd.



The United States is home to over 4,000 native species of bees, with over 400 found in Maryland. *Perdita bradleyi* is one of them. It is an uncommon bee with a range from Alabama to New York. Thousands of nest sites were found in the sand barrens, surprising researchers because they had only been found in one other location in all of Maryland. In fact, five bees never recorded in Maryland have been found at Jug Bay. *Perdita bradleyi* is one of many rare species found here, which is why Jug Bay is such an important conservation location.[12]

Above: Perdita bradleyi, a native, rare ground bee species that calls Jug Bay home.

Did you know that not all bees sting? Only the females do! Many people confuse bees with wasps and other stinging insects. While all are pollinators, not all stinging insects are bees.

Stop near the picnic table.

12. Prickly Pear (38.80712, -76.70222)



One of the most immediate changes in vegetation is the appearance of the prickly pear cactus (*Opuntia humifusa).* While often associated with the deserts of the western United States, these prickly pear cacti are native to Maryland. In fact, they are the only widespread cacti that are native to the eastern U.S. They have flat, elliptical pads and grow close to the ground in sunny areas, thriving in the well-drained soil of the sand barrens. The cacti bloom yellow during late spring and early summer. Keep an eye out to see if you can spot any outside of the sand barrens!

Take a left at the picnic table onto the Red Oak trail, then take a left onto the Cedar trail. As you walk, look for Virginia Creeper and read the next section.

13. Virginia Creeper/Poison Ivy (38.80502, -76.70092)

The sides of the trail are covered in a plant with five leaflets named Virginia creeper (*Parthenocissus quinquefolia)*. Native to Maryland, it grows best in full sun but does well in moist, shady areas. The vine loves to climb trees, and it does so without harming the plant. It is often grown as an ornamental over fences or walls because of its beautiful autumn foliage. Virginia creeper is also a host plant for several moths and is valuable to wildlife due to its berries.[13]

A common companion to Virginia creeper is poison ivy (genus *Toxicodendron)*, so be aware! Poison ivy is distinguishable by its three leaflets that alternate on the vine. While humans react adversely to its oils, other animals are not impacted at all. In fact, deer and insects consume its leaves, and its fruits, called drupes, are an important food source for birds.[14]

Below: Virginia creeper in the autumn (left) and poison ivy (right)





About 25 paces after a green trail blaze, there is a dead tree on your left with lots of small, circular holes in it. After the next green blaze (a few minutes walk), stop at the tree stump on your right.

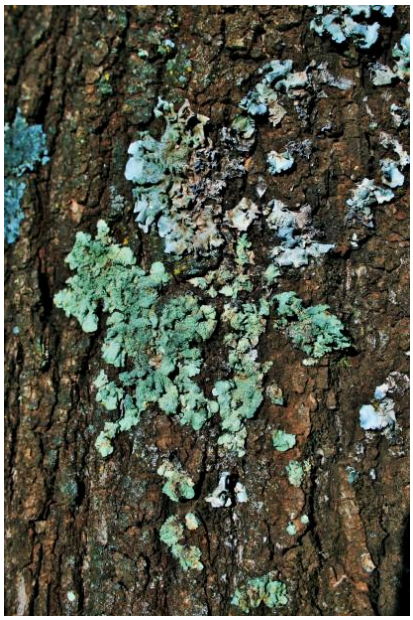
14. Tree Stump (38.80551, -76.69854)

Tree stumps are important for wildlife as habitat or feeding grounds. Mushroom populations increase around areas of accumulated organic material and are food for insects, turtles, and birds, to name a few. Small creatures use the stump as a home. This brings more predators to the area, looking for a meal. One tree stump can create its own interconnected web of life in the forest.

Take a right at the trail conjunction. Listen to the different sounds, and count the different bird calls you hear. Take a right onto the Maple trail, then stop at the tree marked with a green blaze covered in a pale green lichen.

15. Lichen (38.80406, -76.69739)

Lichen is an organism composed of algae, a fungus, and a yeast in a mutualistic symbiotic relationship. There are multiple types of symbiotic relationships: mutualistic, parasitic, and commensalistic. Mutualistic relationships benefit both species involved, while a parasitic relationship benefits one (the parasite) while negatively impacting another (the host). Commensalism benefits one while neither harming nor helping the other.[15] So, the algae and fungus benefit one another. The algae create nutrients through photosynthesis that they share with the fungus in return for the fungus preventing the algae from drying out.



Lichen grows in colonies pretty much everywhere– including Antarctica. Over 3,600 species exist in North America alone! They are incredibly slow-growing, so they are usually found on inanimate objects or declining trees and shrubs. This is because the bark they grow on will expand too fast or be shed if the tree is rapidly growing. They do not harm the plants that they grow on. Lichen provides numerous benefits to the ecosystems. Deer, birds, and rodents feed on it, and birds use it to line their nests, as well. They also protect rocks from erosion and trees from exposure to extreme elements.

One last benefit of lichen is its quality as a biomonitor. A biomonitor is an organism that indicates the health of the environment it is in. Lichens are sensitive to the air quality because that is where they obtain their food. Different species have different preferences for particulates in the air. If the air is too polluted with materials like sulfur, heavy metals, or nitrogen, the lichen may die, indicating to scientists that the air is heavily polluted.[16]

- *What other symbiotic relationships can you think of? (coral- mutualistic, tick and host-parasitic)*

After the next trail blaze, stop at the tree with a cavity in it on your right.

16. Tree Cavities (38.80328, -76.69737)

Tree cavities are formed in a few ways: naturally through decay or by an animal's efforts- most notably woodpeckers. The size of the cavity determines what species will inhabit it. Smaller cavities attract small birds and mammals such as songbirds and mice. Ducks and smaller owls can be found in medium-sized tree cavities. Large cavities may be inhabited by raccoons or turkey vultures occupying them. Some clues that a tree cavity is active are fur or feathers, twigs or other nesting material at its entrance, or a lack of spider webs around the opening.[17]

Continue straight past the Holly trail. There will be a holly bush on your right.

17. Holly Defense Against Deer (38.80238, -76.69703)



As plants evolve, they develop strategies to increase their odds of survival. One of holly's (genus *Ilex*) strategies is changing the shape of its leaves to become more prickly. Every leaf on a tree is genetically identical. A chemical process called methylation that modifies DNA but doesn't alter an organism's genetic sequence is what changes the leaves. When a plant is being browsed, it sends chemical signals to change the shape of its leaves to prevent animals like deer from eating them. [18]

- *Why would the tree have both types of leaves? What do prickly leaves help the plant prevent?*

Take a left onto the Blueberry Trail. Stop at the spicebush path right before a trail blaze.

18. Spicebush (38.79944, -76.69504)

The spicebush (*Lindera benzoin*) is a common native plant in eastern North America that gets its name from the aromatic scent its leaves release when crushed. It is tolerant of a variety of soil types and amounts of sunlight. In the fall, its leaves turn a brilliant yellow while over twenty species of birds feast on its bright red berries. Plenty of mammals, including deer, rabbits, and opossums, feed on the shrub. The spicebush also hosts multiple species of butterflies and moths. The Spicebush Swallowtail

(*Papilio troilus*) and Promethea Moth (*Callosamia promethea*) are two species that prefer to lay their eggs on spicebush plants.

The spicebush has medicinal properties, as well. Its leaves, buds, and new growth twigs can be made into tea, and its berries can be a substitute for allspice when dried and ground. There are records of indigenous peoples using it as a treatment for multiple ailments including as a cold remedy.[19]





Above: Spicebush (left) and a Spicebush Swallowtail (right
Below: Promethea Moth



Take a left at the next intersection, then a right at the parking sign. Continue straight, and make a final left back to the house.

You will have about 20 minutes to get back to Plummer House. During this time you have some options. You can:

- Use this time to reflect
- Hike in silence
- Give students questions to think about and answer at the parking area/picnic tables
- Provide a task for students to observe certain things on their own
    - Mushrooms
    - Insects
    - Scat

Thanks for supporting Jug Bay Wetlands Sanctuary.

Resources

Maryland Biodiversity Project

Jug Bay Habitat Descriptions

Native American Archaeology in Anne Arundel County

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