**Natural Processes of Harpers Ferry**

[lifted from ROCR]

[Natural processes](http://npsdev.natureserve.org/glossary/term/152) are interactions among plants, animals, and the environment that help create and shape [*natural communities*](http://www.explorenaturalcommunities.org/glossary/term/23). Some important natural processes in Harpers Ferry include natural disturbances such as flooding and fire, [herbivory](http://npsdev.natureserve.org/glossary/term/109) by white-tailed deer, erosion and [*sediment transport*](http://www.explorenaturalcommunities.org/glossary/term/188) by streams and stormwater runoff, and [*groundwater processes*](http://www.explorenaturalcommunities.org/glossary/term/101).

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**What are Natural Processes?**

Natural processes are interactions among plants, animals, and the environment that occur naturally without the involvement of humans. They are just as critical to the health of natural communities as are the plants and animals that make up the communities.

[Ecobit: More about Natural Processes](http://www.explorenaturalcommunities.org/content/more-about-natural-processes)

Let’s look more closely at a few natural processes that are particularly important for understanding the natural communities we see at Harpers Ferry today.

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**Fire**

Fire is a natural disturbance that can help maintain the park’s drier hilltop communities, such as the **Chestnut Oak / Mountain Laurel Forest** and the **Mixed Oak / Heath Forest**.

[Ecobit: Fire—Rising from the Ashes](http://www.explorenaturalcommunities.org/content/fire-rising-ashes)

The predominance of [*fire-adapted*](http://www.explorenaturalcommunities.org/glossary/term/83) species in these hilltop communities indicates that fires were likely an important natural disturbance here historically, weeding out fire-sensitive plants.

Unfortunately for these natural communities, as urbanization spread around the park, fires were suppressed. The increasing presence of fire-sensitive trees such as red maple and American beech in the park’s hilltop communities is a result of [*fire suppression*](http://www.explorenaturalcommunities.org/glossary/term/82).

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**Floods**

Another natural disturbance, flooding, is important for maintaining the **Tuliptree Small-Stream Floodplain Forest**. This community’s plant species, such as sycamore and American hornbeam, thrive through frequent flooding that might kill a dry-adapted chestnut oak or mountain laurel.

Ecobit: Floods: Rich but Hard to Live With

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**Canopy Gap Regeneration**

[](http://farm9.staticflickr.com/8324/8390678376_d100173a8a_b.jpg)A gap in the forest canopy admits sunlight beneficial to young oak [*saplings*](http://www.explorenaturalcommunities.org/glossary/term/183).  
Photographer: NPS. Inset – Matt Jones.A natural disturbance that is important at Harpers Ferry is the creation of gaps in the canopy that allow sunlight to reach [*seedlings*](http://www.explorenaturalcommunities.org/glossary/term/192) and saplings on the forest floor. These gaps can be created when disease or wind kills one to several large trees. The newly available sunlight allows young trees to grow and join the canopy.

[Ecobit: Canopy Gaps—Room to Grow](http://www.explorenaturalcommunities.org/content/canopy-gaps-room-grow)

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**Herbivory**

Herbivory is the consumption of plants by animals, including mammals and insects.

**Unfortunately, herbivory in Harpers Ferry is unbalanced due to an overpopulation of native white-tailed deer.**

The deer eat so many seedlings and saplings that they are threatening the ability of Harpers Ferry’s forests to regenerate. In addition, deer may be changing the composition of the forests through their preferences for certain plants.[1](http://www.explorenaturalcommunities.org/parks-places/rock-creek-park/natural-history/natural-processes#footnote1_qi6taxh)

[Ecobit: Herbivory—A Balanced Diet](http://www.explorenaturalcommunities.org/content/herbivory-balanced-diet)

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**Erosion and Sediment Transport**

Erosion and sedimentation are most evident in the **Tuliptree Small-Stream Floodplain Forest** in Harpers Ferry.

However, sediments creep or slide downslope in in other areas as well. For examples, ancient river [*gravels*](http://www.explorenaturalcommunities.org/glossary/term/97) on ridgetops gradually move downhill, affecting the soils in natural communities downslope. Soil itself also washes downslope, leading to thinner soils on steeper slopes and thicker soils on flatter or [*concave*](http://www.explorenaturalcommunities.org/glossary/term/56) landforms.

[Ecobit: Erosion and Sediment Transport—Earth in Motion](http://www.explorenaturalcommunities.org/content/erosion-and-sediment-transport-earth-motion)

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**Processes Affecting Soils**

Many natural processes in Harpers Ferry interact to determine soil characteristics, such as depth, moisture content, composition, and texture. These characteristics, in turn, determine where different natural communities can be found.

[Ecobit: Soil Processes—A Place to Take Root](http://www.explorenaturalcommunities.org/content/soil-processes-place-take-root)

Soil moisture is an obvious factor in determining what plants can grow where. On ridgetops and upper slopes in Harpers Ferry, exposure to sun and wind create dry soils that support the **Chestnut Oak / Mountain Laurel Forest** and **Mixed Oak / Heath Forest**.

The **Mixed Mesic Hardwood Forest**, on the other hand, grows in soil that is mesic—not too wet, not too dry. Mesic soils tend to be found in areas protected from extremes in climate, such as lower slopes and rolling uplands. **The Coastal Plain Oak Forest** and the **Basic Mesic Hardwood Forest** also occur on mesic soils.

In the lower elevations of the park, along Rock Creek and its tributaries or at the base of hills, you’ll find natural communities growing in soils that can be quite wet, with the moisture being supplied by [*groundwater*](http://www.explorenaturalcommunities.org/glossary/term/99) or floods. These wetland communities are the **Tuliptree Small-Stream Floodplain Forest** and the **Red Maple Seepage Swamp.**

The depth of soil varies across the park as well. The **Oak – Beech / Heath Forest** survives on steep slopes where [*weathering*](http://www.explorenaturalcommunities.org/glossary/term/234) and gravity prevent much soil from accumulating.

In contrast, the **Basic Mesic Hardwood Forest** is found in areas with deep accumulations of soils, such as concave slopes.

Furthermore, the composition of the soils that support the **Basic Mesic Hardwood Forest** are relatively rich compared to other soils in the park. The [*nutrients*](http://www.explorenaturalcommunities.org/glossary/term/158) of these rich soils may be supplied by the [*mineral*](http://www.explorenaturalcommunities.org/glossary/term/144) composition of underlying [*bedrock*](http://www.explorenaturalcommunities.org/glossary/term/38) or sediments, or nearby nutrient-rich groundwater.

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**The Water Cycle**

[](http://farm8.staticflickr.com/7305/12326760935_927b1d58f5_b.jpg)Rock Creek's frequent floods impact the Tuliptree Small-Stream Floodplain Forest.  
Photographer: Ryan Valdez Harpers Ferry’s streams, tributaries, springs, and groundwater seeps are all part of the water cycle, which plays a central role in Harpers Ferry’s natural communities.

The **Red Maple Seepage Swamp** and **Tuliptree Small-Stream Floodplain Forest** depend on a steady source of water, whether from groundwater or flooding. Less water cycles through the high and dry **Chestnut Oak / Mountain Laurel Forest** and **Mixed Oak / Heath Forest**, and that water comes mostly in the form of precipitation rather than flooding or groundwater.

[Ecobit: The Water Cycle—What Goes Around, Comes Around](http://www.explorenaturalcommunities.org/content/water-cycle-what-goes-around-comes-around)

In addition, the water cycle at Harpers Ferry has been greatly impacted by its urban location. (See [**Current Water and Land Use in Harpers Ferry**](http://www.explorenaturalcommunities.org/parks-places/rock-creek-park/stewardship-and-ecological-threats/water-and-land-use/current-water-and-land-use) in Stewardship & Ecological Threats.)

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**Forest Succession**

Prior to the formation of the park in 1890, much of the land that became Harpers Ferry had been recently disturbed by logging, farming/orchard planting, and Civil War [*clear-cutting*](http://www.explorenaturalcommunities.org/glossary/term/47). (*Tip: To see the location of Civil War forts closest to Rock Creek, search for "fort" on the Harpers Ferry* [*Map Viewer*](http://www.explorenaturalcommunities.org/parks-places/rock-creek-park/map)*.*)

Most of these areas have had many years to recover, but the composition of these forests tells us that they are the result of successional processes—processes that influence the reestablishment of vegetation on a site that was formerly cleared.

Successional forests contain clues that can indicate whether the area was logged or whether it experienced more extreme disruption, such as plowing or earth-moving. **Ecobit: Forest Succession: Clues to a New Beginning**

However, it’s not always possible to accurately guess a piece of land’s history strictly by reading the current forest growth. For example, at Fort DeRussy, today we see mature chestnut oak and northern red oak trees, and very little else.

A typical natural community would have a better developed [*understory*](http://www.explorenaturalcommunities.org/glossary/term/227). A typical [*successional community*](http://www.explorenaturalcommunities.org/glossary/term/217) would be made up of mostly non-oaks. We don’t know the precise history of the vegetation at Fort DeRussy that led to this anomalous combination. Any number of unknown variables (in this case probably human-induced ones) may have impacted the site during and since its clearing.