

Succession at the Ivy Creek Natural Area: A Tour on the Brown Trail

The Ivy Creek Natural Area encompasses 219 acres bordering the South Fork Rivanna Reservoir. With seven miles of trails traversing a mix of upland woods, pine stands, fields, streams, and shoreline, ICNA is an ideal site to learn about the rich natural history characteristic of Central Virginia.

However, overgrown roadbeds and old fence lines, barely discernible as they run through the woods, are reminders that this was once a farm. The fields and woodlands here show what typically happens in the Piedmont when farmlands are abandoned and nature is allowed to take its course -- a process called secondary succession.

What is Secondary Succession?

When pastures and cornfields are abandoned or forests are leveled by clear-cutting or fire, natural plant communities will repopulate the disturbed area. These communities are characterized by rapid and continual change, particularly in the early stages of re-establishment. Pioneering species, tolerant of poor conditions and in need of direct sunlight, appear first. As they grow, they shade the soil and otherwise alter the immediate environment to their own detriment and in favor of species in the next seral (intermediate) stage of succession. This continues until the plant community becomes more or less stable and no longer significantly alters the environment itself. At this stage, less predictable environmental impacts will be the agents of change.

Take a Walk

Next to the barn, the red blazed trail enters a forest of oaks, hickories, tuliptrees and other hardwood species. Dogwoods, sassafras, red maple, and spicebush grow beneath the taller trees. A number of ferns provide ground cover, and wildflowers bloom, particularly in spring. Along the Red Trail, redcedars, and Virginia and shortleaf pines grow mixed in with the hardwoods. These mixed stands show the transition from earlier stages of succession, when pines dominate, to later stages of mature hardwoods. Prior to this, young pines shaded out the grasses and shrubs growing in a field. As they developed, their own seedlings, which require direct sunlight, are unable to grow, and shade-tolerant hardwood saplings spring up in their shade. The traditional stages here find old pine trees joined primarily by younger hardwoods. In the next stage, the pines die out and the hardwoods dominate.

Walking the Red Trail, cross the creek on a small bridge, and follow the Red trail up the bank to the right and along the shoreline. Turn left into the woods, past the Bartholomew Oak to the conjunction of the Red, Brown, Peninsula and Orange Trails. Follow the Brown Trail to the left.

Old Field Succession

The fields here are in the early stages of succession. Various grasses, sedges, and other herbaceous plants, like little bluestem, broom sedge, and asters, rapidly overrun an abandoned field. Soon goldenrod, brambles, sumacs and other shrubs move in. Scattered redcedars, pines, and saplings of such trees as sassafras and locust also appear. Summer wildflowers highlight it with color. An older field, more thoroughly invaded by shrubs and trees, lies in the distance. In order to maintain the various stages of succession for educational purposes, the fields are bushhogged every year.

Conifers Move In

At the end of the field, bear left into the woods. Here cedars and pines dominate. This represents the next seral stage of succession when trees set in. These pioneering trees, tolerant of poor conditions and in need of direct sunlight, appear first. Pine seeds are wind borne and abundant. Cedars are transported by birds that relish their fruit and prepare them for germination by passing through their gut. As the trees sprout and grow, they shade the soil and otherwise alter the immediate environment in such a way as to favor other tree species. Note how dark this stretch of woods is.

Mixed Forest

At the T-intersection, turn left to return to the barn. Along this trail, look for stands of evergreens and deciduous hardwoods growing side by side. These mixed stands show the transition from earlier stages of succession when pines dominate to later stages of mature hardwoods. Hardwood seedlings appear after the emergence of conifers, nurtured by the soil changes caused by pine litter (increased organic matter and subsequent moisture retention). Their large seeds are brought in by seed-eating animals such as blue jays and squirrels, whose hoarding behavior inadvertently plants many a tree. These deciduous trees will sprout and grow amidst the evergreens competing for the canopy light. As the hardwoods reach the canopy, they will begin to shade out the sun-loving pines and cedars that will then die back, opening up the forest to more light. These hardwoods will eventually become the most dominant component of the plant community. Because of their slow growth rate, this dominance can take many years to develop.

Hardwood Forest

When the plant association changes very little and perpetuates itself, a more stable community has been reached. Generally, as individuals die, they are replaced by species of the same plant association. The term "climax community" has traditionally referred to a specific association of plants that supposedly becomes established in a given climatic region. For instance, the oak-hickory forest has been considered the climax community in the Piedmont. However, environmental factors, such as topography, exposure, soil nutrients and moisture, temperature, and wildlife activities are not consistent throughout each region. Therefore the course of succession may vary by locality.

Other local factors that influence the specific sequence of plant succession are: the types of plants already present or nearby and the degree of disturbance. Disturbances may set back the progression. Clear-cutting can reduce mature forest to a field, or a severe fire - by burning off almost everything - may create conditions of primary succession. Changes occur even within an established community, resulting in a mosaic pattern of vegetation. A tree falls, opening up the forest canopy; this allows shade-intolerant species to regain a foothold.

Nature is a dynamic system.