II. Forest Ecology

Geologic activity dating back hundreds of millions of years, and glacial activity dating back hundreds of thousands of years, have created the layers of rock and glacial till that underlie the lowland meadow and the upland mini-forest that make up the Braemore Preserve. Human activity dating back only a few hundred years has significantly shaped the forest ecology of the Preserve.

Indigenous peoples, who may have arrived in this region as early as ten thousand years ago, had created a "humanized landscape" throughout New England by the time the first European immigrants set foot here in the 17th century. These colonizers used the existing infrastructure to harvest tall white pines for shipbuilding; later settlers cleared the forests to create fields and pastures. As farming declined in the early 1800's, forests took over abandoned fields and pastures. These second-growth forests were then cut down for the production of charcoal during and following the Civil War. Another period of agriculture and decline and reforestation followed, with the result that most of the forest in Guilford is third and even fourth growth.

The upland section of Braemore is part of a larger forested area that includes the Rockland Preserve in Madison.

The tallest trees, which make up the forest canopy, are mostly deciduous species: beech, oak, birch, tulip, and maple. There are also a few hemlocks and red cedars, along with a solitary tall white pine for which the Lone Pine Trail is named. Saplings and shrubs make up the understory. Mosses, grasses, and ferns provide most of the ground cover.

This forest has its own microclimate, which tends to be cool and moist. The soils are poorly drained, creating conditions for wetlands of various types. Some of these wetlands are spring-fed or stream-fed, and they drain into small streams (one of which crosses the Inner Loop Trail).

Another type of wetlands is the ***vernal pool,*** which is defined by the creatures that use this seasonal pond for their annual mating and reproductive cycle. Braemore is home to two vernal pools that offer wood frog and spring peeper concerts in late March/early April.

Like most areas in Connecticut, Braemore also has its share of invasive species. Multiflora rose is choking out native plants along the boardwalk. Of particular concern is Japanese barberry, which is part of a micro-ecosystem of white-footed mice and black-legged ticks, also known as deer ticks. These tiny arachnids (eight-legged creatures, similar to spiders) spread several diseases that are harmful to humans and pets: Lyme disease, anaplasmosis, babesiosis, and Powassan virus.

Conservation management of Braemore is largely limited to an annual mowing of the meadow, to prevent reforestation of this lowland area. Passive recreation management primarily involves trail maintenance and invasive species control. The Preserve's trails are designed to provide access to the geological and ecological diversity of the Preserve, while minimizing the impact of human activity on the meadow and in the forested area. Motorized vehicles are not permitted anywhere in Braemore.

Geology and Forest Ecology of Guilford's Braemore Preserve

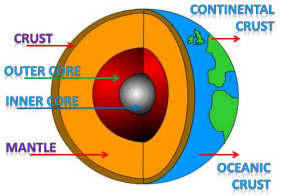
The meadow and rocks and ledges and ridges and wetlands and plants that we encounter in the Braemore Preserve are evidence of geologic activity from hundreds of millions of years ago. They are also evidence of much more recent glacial activity. The preserve's forest ecology has been shaped in part by human activity.

Ledge

Mosses in Winter

I. Geology

If you look at a cross-section of Earth, you will see that it is made up of four concentric layers: the inner core, the outer core, the mantle, and the crust.



The ***mantle*** consists of molten rock or magma; the ***crust*** consists of hardened rock, in the form of large oceanic and continental plates.

In the course of hundreds of millions of years, these continental and oceanic plates, which are actually floating on magma, move in different directions: sometimes pushing together (compression) and sometimes pulling apart (rifting). These movements have created the continents as we know them today.

Continental ***compression*** dates back more than 300 million years. The forces of compression heated up parts of the crust and forced it upward, creating wrinkles on the surface that eventually became today's mountains and ridges (which are composed of metamorphic rock). These mountains and ridges were much higher when they were created by compression, but weathering and other forces have worn them down to their present elevations.

Continental ***rifting*** began about 250 million years ago and continues even today. Rifting caused mountains and ridges to break apart at weak spots, creating low valleys. At some of these weak spots, cracks or faults developed, allowing magma to break through and flow across the surface, before hardening into new ridges of igneous rock.

One of these ancient faults runs deep underneath Route 77 across from the Bluff Head parking area. Since the valley to the west of this fault was much lower than the ridges to the east, the magma flowed only westward, hardening into a type of ***igneous*** rock called traprock and forming what is now Totoket Mountain (seen above in March 2018 from the open ledge called Reid's View).

This ancient fault is the boundary between the Eastern Upland and the Central Valley. Braemore is located on the western edge of the Eastern Upland, which was formed by continental compression. Bluff Head, which is west of Braemore and visible from Reid's View, was formed by continental rifting. (From Bluff Head, if you look carefully, you can see Reid's View. Two very different kinds of rock from two very different geologic eras are thus within easy view of each other.)

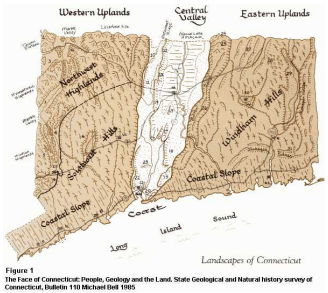
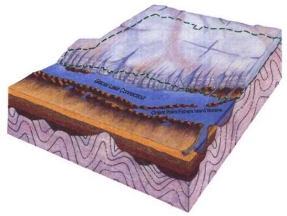


Figure 1
The Face of Connecticut: People, Geology and the Land. State Geological and Natural history survey of Connecticut, Bulletin 110 Michael Bell 1985

The rock making up the ledges in Braemore is ***metamorphic***, which means that it has been transformed by intense heat and pressure during the millions of years of continental compression. (An example is this banded gneiss ledge in the photo to the left.) The loose rocks and subsoil in the Preserve are composed mostly of ***glacial till***; landowners in the 19th century built stone walls from these loose rocks, to mark off their property boundaries.

During the last Ice Age, which began more than 100,000 years ago, North American glaciers reached as far south as what is now Long Island Sound. As glaciers moved across Connecticut, they picked up loose rocks and boulders and carried them south. The last glacier began to melt and retreat about twenty thousand years ago, leaving behind all the material it had picked up during its earlier life. This material is called glacial till, and is made up of clay, sand, gravel, small rocks, and huge boulders (often called glacial erratics). Water from the melting glacier formed new rivers and lakes.



Underlying Braemore's meadow (which was once a lake) is a deep layer of glacial till and clay through which water does not easily drain; this explains why the meadow remains wet throughout much of the year. Glacial till has helped to form vernal pools in the Preserve, which provide habitat for certain frogs and salamanders (see the Forest Ecology section for more about vernal pools).

As the Lone Pine Trail begins to climb, the soil under the thin layer of topsoil is more of a mixture of gravel and small rocks. Large chunks of ledge have been broken off by water flowing into small cracks and then freezing, making larger cracks and repeating the cycle until these chunks eventually fell from the ledge, or were sheared off by glacial activity.

(For additional information about CT geology, visit http://peabody.yale.edu/teachers/curricula-connecticut-geology-guide.)