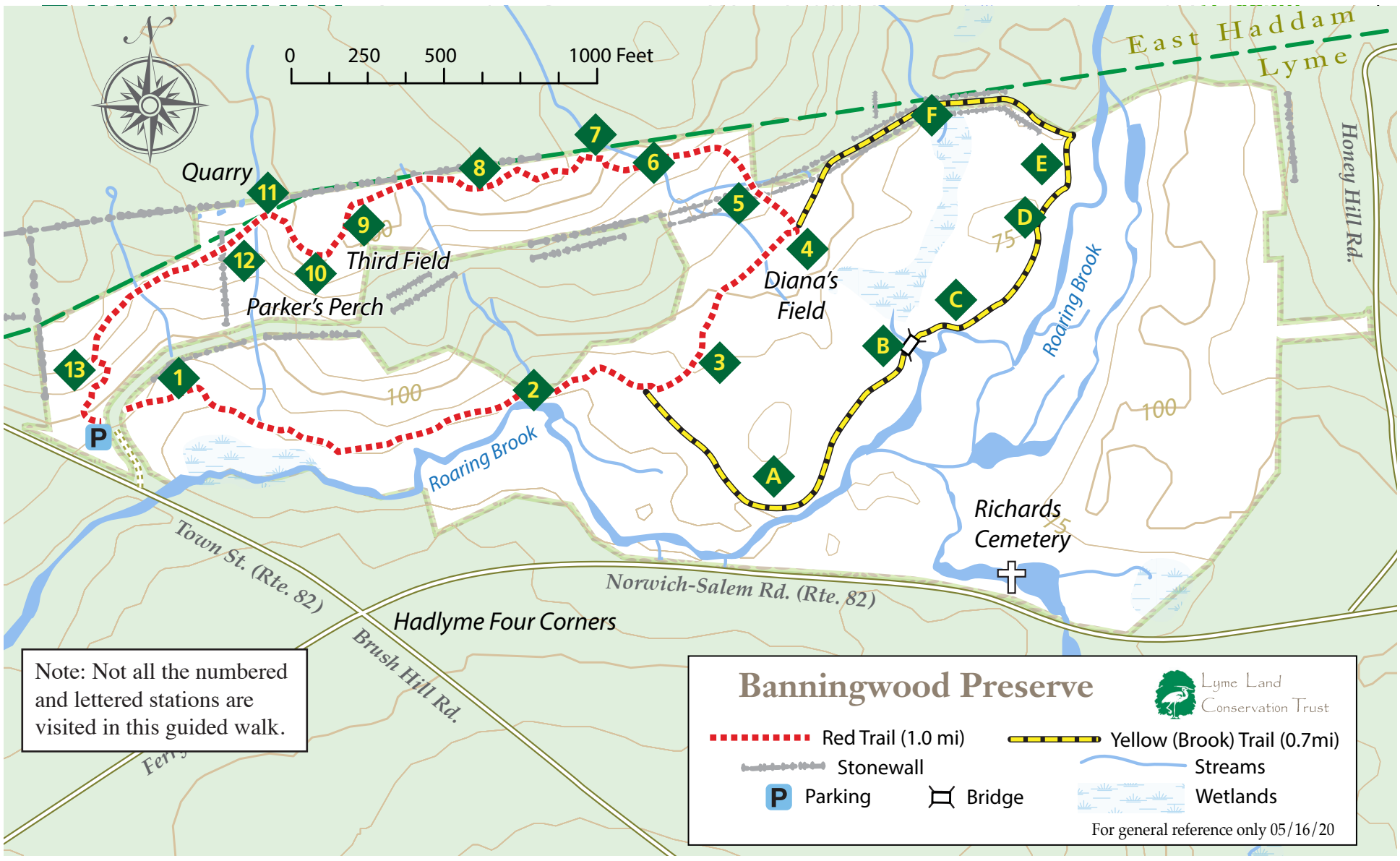


Diana's Field–Glacial Delta

Diana's Field is a high-standing portion of the Glacial Lake Hadlyme delta deposit that has not been eroded away by Roaring Brook.

Third Field

A plateau in the forested rocky uplands, wildlife love the open habitat vegetation and the insects that live in Third Field. If you are quiet, you may see foraging wild turkeys.

Parker's Perch–Viewing Platform

Enjoy spectacular views of the forested hills of Lyme from Parker's Perch, a unique viewing platform 230 feet above sea level on one of the highest outcrops in Banningwood Preserve.

The Honey Hill Fault Zone

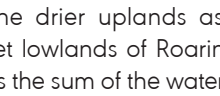
The Honey Hill Fault zone which runs through Banningwood marks the boundary between two geological terranes, areas that have bedrock that is different from each other. .

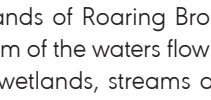
Richards Cemetery

Access: Park along the road on Rte 82. The cemetery has three stones: Caroline Crosley, died 1855, Olive Richards, died 1858, and Henry Richards, died 1851. Caroline was the wife of Prentiss Crosley, a former African/Native American slave who gained his freedom by serving 3 years in the Revolutionary War. Their daughter, Olive, married Henry Primas Richards, another former slave who gained his freedom in 1801 and became a farmer here. It is not known where Prentiss Crosley is buried.

Self-Guided Trail Walk: Geology and Ecology

Access: The Red Trail Loop starts at the Banningwood Preserve parking lot, Town Street, Lyme, CT. This guide focuses on the geology and ecology of the preserve. Not all of the numbered and lettered stations are used for this guide.

Red Trail Loop is numbered. 

Yellow (Brook) Trail Loop is lettered. 

The red trail is a one-mile loop. The yellow trail is 0.7 miles. Loop from parking lot, lower red plus yellow is 1.5 miles.

Introduction: Banningwood represents a diverse mix of geological types and ecological habitats, ranging from wetlands in floodplain forest to upland forest rising to dry, ridgetop woodlands.

Geology: The formation of the bedrock ridges occurred about 300 million years ago, when the small continent "Avalonia" was caught in the middle of the collision between the North American tectonic plate and the ancient continent of Gondwana. This tectonic "fender bender" completed the assembly of the super continent Pangea and created the Appalachian Mountains. When Pangea broke up into the current five continents, Avalonia was pulled apart. Now, the Atlantic Ocean separates portions of Avalonia that were once joined–one part resides in Southeastern Connecticut and another part resides around the British Isles. The Honey Hill Fault Zone, which runs through Banningwood Preserve, marks the boundary where Avalonia and the terranes to the north joined.

Ecology: From the high uplands to the floodplain lowlands, water is the limiting factor that most strongly determines what plants grow where in Banningwood. As waters flow and drain from ridgetop to riverside, you can see a greater diversity and abundance of vegetation types as you move from the drier uplands associated with Parker's Perch to the wet lowlands of Roaring Brook. Roaring Brook, like all rivers, is the sum of the waters flowing to it. Whether from surface runoff, wetlands, streams and groundwater, the water quality of a river depends upon the quality of these imports. Think of it this way: **You can't protect a river by just protecting the river.**

Unfold to continue....

- The preserve is open sunrise to sunset.
- Be considerate of other hikers and wildlife in the preserve. Leave it as you found it.
- Dogs are welcome! Keep them leashed or under close supervision. And please pick up after your dog.
- There is no hunting in Banningwood Preserve, but it is good practice to wear bright colors during hunting seasons.
- No motorized vehicles or fires allowed without permission.

Many Thanks

The Lyme Land Conservation Trust thanks its members for their support, **The Rockfall Foundation** for financial backing, and forest ecologist **Anthony Irving** and former CT State Geologist **Ralph Lewis** for compiling a comprehensive inventory of the preserve, which has been made public and is available on our website.

Want to learn more on the trail? Please see more interpretive trails on our website: ***lymelandtrust.org***

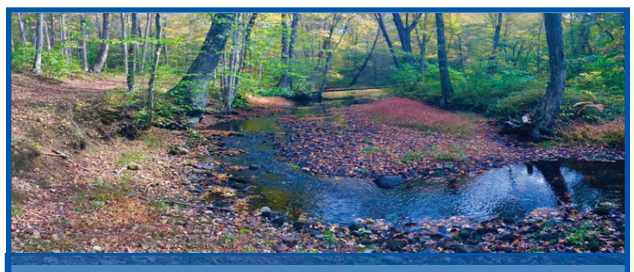
Tag us in your photos when you share .
Facebook: @lymelandtrust
Instagram: @lymelandtrust

To learn more about becoming a member of the Lyme Land Trust or to make a donation, please visit us at *lymelandtrust.org* or call 860-434-5051.

Report any problems or comments on the Trail Condition Form:
lymelandtrust.org/trail-condition-form
or email *stewardship@ lymelandtrust.org*

Text by Anthony Irving and Ralph Lewis; lidar maps by Janet Stone; editing, diagrams and trail map by Wendolyn Hill; photos by Sue Cope, Wendolyn Hill, Anthony Irving, and Ralph Lewis; layout by Lisa Reneson.

For additional brochures, visit lymelandtrust.org.

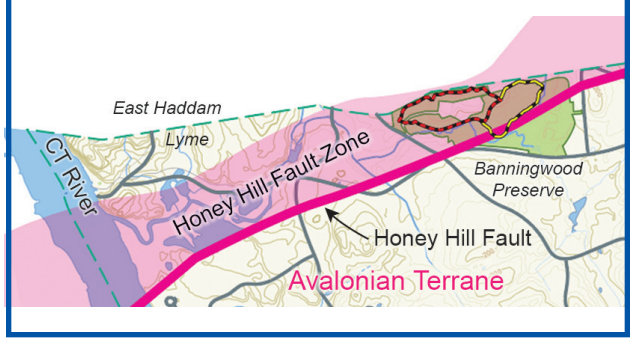


Banningwood Preserve

Map and Self-Guided Trail Walk
Geology and Ecology

This brochure highlights the ancient geological forces that formed the land that we see today and the effect that they have had on the present day ecosystem. The bedrock and sediments that were transformed, transported, and deposited so long ago have a profound effect on the types of habitats we find in the preserve today.

The Lyme Land Trust bought the 102-acre Banningwood Preserve from Diana and Parker Lord in 2013, with financial assistance from the CT DEEP Open Space and Watershed Land Acquisition Grant Program



Red Trail Loop

1 Blueberry Field: This is the same field seen in the 1934 aerial photograph below, although not as large. In 1934, this field continued down to the edge of Roaring Brook. The stone walls attest to its agricultural past. With its abandonment this grassland was quickly replaced by invasive barberry with a developing overstory of deciduous trees. With the understory thick with barberry, native shrubs and herbaceous plants are "locked out" reducing habitat quality and complexity. Meadow restoration is ongoing.

Aerial Photograph 1934

2 Roaring Brook: As streams flow around bends, the water flows faster on the outside of the curve and the stream's energy erodes the edge, forming **cut banks**. On the inside of the curve, the water moves more slowly. With less energy, the water deposits sediment as **point bars**. Where Roaring Brook is **braided**–consisting of many small channels that divide and recombine like a braid (see the trail map)–it has formed a wide flood plain. Roaring Brook will continue to shift, forming new channels and backwaters.

3 Kettle Holes: Do you see the large rounded holes in the forest here? As the last glacier melted out of the Roaring Brook Valley, large chunks of ice that had broken off the melting glacier were surrounded and sometimes buried by layers of sand, silt and gravel that were deposited by streams flowing from the melting upstream glacier. As the ice chunks eventually melted away, they left depressions in the "meltwater deposits". (see Lidar Map 1 below)

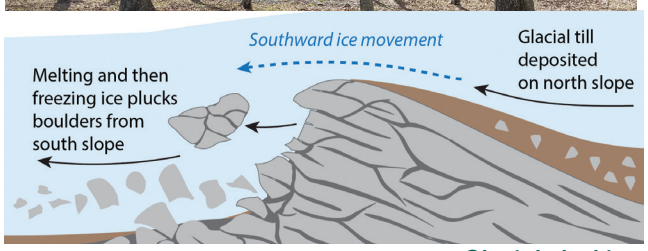
4 Diana's Field: The topographic and compositional differences between upland ridges, lowland meadow and lower wetlands are evident here. (See Lidar Map 1) The uplands are covered by a thin blanket of till that doesn't mask the shape of the bedrock, so steep slopes and bedrock outcrops are visible. The flat, grass-covered field is composed of thick sediment that completely buries the underlying bedrock. The edge of the field dramatically drops off to the wetlands below. These differences are due to the influences that the bedrock surface had on glacial deposits. As the last (Wisconsinan) glacier melted back (~20,000 years ago), two basic types of glacial deposits were left behind in the Roaring Brook Valley. 1. Ice-laid deposits, called till, are unsorted mixtures of whatever the glacier contained as it melted. Till was dumped as a thin, boulder and ice-laid blanket over the hilly bedrock uplands; 2. Water-laid (meltwater) deposits are better sorted silts, sands and gravels that are typically devoid of boulders. At that time, glacial ice occupied the portion of the Roaring Brook Valley that lies just west of Rte. 82. This ice acted like a dam, blocking the westward flow of Roaring Brook, and impounding a small lake (Glacial Lake Hadlyme) in the valley. As meltwater carried sediments from upstream into the lake, a thick delta deposit built up and filled the Banningwood portion of the Roaring Brook Valley. As the ice blockage to the west melted, Lake Hadlyme drained away and the now free-flowing Roaring Brook carried away center portions of the thick lake deposit. Roaring Brook and its floodplain eroded down to the present level. Diana's Field is a high-standing portion of the Lake Hadlyme delta that has not been eroded away by Roaring Brook. Lidar Map 1 shows that Diana's Field sits on a remnant of the delta at +32m (meters above sea level) that once extended all the way across the valley.

5 Older Forest: The glacial tills found here support vegetation growth since they tend to be moist due to their location at the toe of the slope. Tree species here include red oak, black oak and shagbark hickory, all providers of mast-nuts and acorns-food for wildlife. The trees in this small area are over 100 years old whereas the balance of Preserve trees are 60-80 year-old. It gives an idea of how an older, more mature woodland would look and feel.

6 Stream in the woodland upland forest: This stream is flowing in a narrow fracture that cuts through the upland ridges. In Banningwood, there are five of these fractures running from north to south with streams feeding into Roaring Brook. These wet microhabitats add another layer of habitat complexity to the Preserve. (See Lidar Map 3)

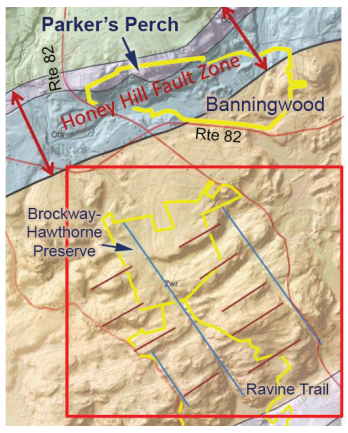
8 .Mylonites are fine-grained, usually banded rocks which were melted and recrystallized by excessive shear strain in fault zones, like the Honey Hill Fault Zone. The flat slabs that were formed slid and rotated against each other, causing them to fracture and break into smaller pieces. The fracturing of these outcrops creates covert spaces for wildlife shelter.

9 Rôche Moutonnée: The northward dip of the bedrock layers is nicely exposed in this outcrop. The asymmetric shape of the ridge is exaggerated because southward moving glacial ice smeared till against the north side of the ridge and plucked boulders from the south side. This type of ridge is called rôche moutonnée (or sheepback).



Glacial plucking

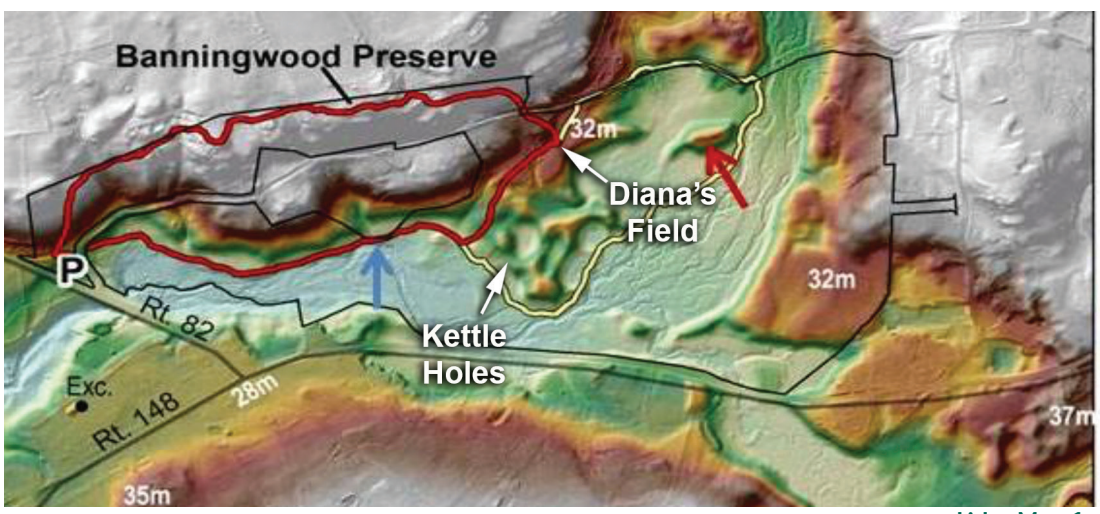
10 Parker's Perch is on an outcrop that is part of a series of east/west trending ridge lines that were pushed up when Avalonia was compressed between two tectonic plates. Hills folded up in rows, like corrugated cardboard. The direction of the ridges parallels the Honey Hill Fault zone. They are an anomaly in CT where ridges normally trend north/south. Just below and in the fault zone, fractures cut north/south across the ridges creating a "blocky" topography, unique to Lyme.



Lidar Map 2

Ridges
Fractures

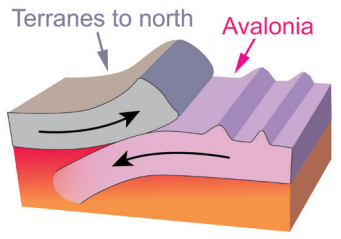
Lidar Map 3



Lidar Map 1

11 Old Stone Quarry: This is one of many small bedrock quarries in Banningwood. Notice that there are no drill holes here. Owing to the stresses associated with shear along the Honey Hill Fault zone, the bedrock here separates into small flat slabs that are easy to pry out and are great for building walls. Rock that did not meet the needs of the people doing the quarrying was cast aside in waste piles that lie near the quarries. The holes left by these small quarries fill with water during spring rains, creating vernal pools. This one retains water long enough to support egg laying and development of amphibians, such as wood frog and spotted salamander.

12 Honey Hill Fault Zone : Bedrock units that make up a geologic terrane have properties distinct from other terranes. The northward tilt or "dip" of the bedrock in Banningwood resulted when bedrock of the Avalonian Terrane wedged and shifted under the bedrock units of the terranes to the north resulting in the Honey Hill Fault Zone. Terrane boundaries are a big deal in geology!



13 Folded Rock: The bedrock units that we see in Banningwood today were buried deep in the earth at the time of the collision of Avalonia and the North American plate, so they were hot and pliable (ductile). They folded as Avalonia rotated northward and began to impinge upon the existing bedrock that now underlies East Haddam.

Yellow (Brook) Trail Loop

A Forested Floodplain Area. This lowland area is a good example of the floodplain forest that has developed since farmland abandonment about 100 years ago. Soils here are excessively drained due to the coarseness of the underlying sands and gravels; however the water table is close to the surface, making for good growth for this young forest. Aside from their vegetative complexity, these floodplains reduce the effect of flooding, are optimal for water recharge, filter nutrients and sediments and have high value for wildlife.

C Backwater Pools: The numerous backwater pools give testimony to the centuries of Roaring Brook meandering over this flat floodplain of river borne sand, silts and gravels. As new channels formed, the old streambeds were reshaped by the numerous flooding events following glacial retreat.

These isolated streambeds are fed by groundwater. Some function as cryptic wetlands (they provide habitat similar to vernal pools) for mole salamanders (*Ambystoma spp.*) and wood frogs (*Rena sylvatica*). Because they are cut off, they are fish-free, enabling these amphibians to develop free of predation.

D Dome-like Hill: The top of this isolated hill (see Lidar Map 1, red arrow) may be a remnant of the +32m (meters above sea level) delta that once filled this entire portion of the valley. Note the smaller diameter trees, likely a consequence of the excessively drained meltwater sands and gravels that make these soils droughty and quite acidic.

F This is a remnant of **Old Field Succession.** Much of Banningwood looked like this as it grew in after farmland abandonment. The high light environment allows for the establishment of multiflora rose and barberry, both non-native invasives. With time this opening will be overtopped by trees, reducing light to the understory. The multiflora rose will die back as it is not shade tolerant, whereas the barberry will persist under the low light conditions.

Multiflora Rose