Caumsett Park

Cliff and Beach Walk

Caumsett State Park
Lloyd Harbor New York

Caumsett State Park is located on this scenic peninsula extending into Long Island Sound. Its recent history begins in 1921 when 1750 acres was purchased by Marshall Field III and developed into a self-sufficient farm, hunting preserve and home. He called it Caumsett, its original Matinecock name, which means, "place by a sharp rock"

Caumsett became a New York State Park in 1961 and offers a wide range of activities for visitors. We will focus on the geologic history whose events formed the features found along the cliffs and beach area bordering Long Island Sound.

The advance and retreat of two continental glaciers formed Long Island some 20,000 years ago.

Stop 1: Fisherman's Parking lot

Glaciers form when lots of snow falls and does not melt completely during the summer. As the snow accumulates, it is compressed much like when you make a snowball. In glacial terms this would be called firn. If you squeeze that snowball hard enough, it will become and iceball.

Same principal only bigger! When the pile of ice becomes thick enough, gravity forces it to begin moving downhill.

As the Glacier moves south encountering warmer weather, the ice at its front begins to melt. A glacier is always moving forward. When its front is melting faster than its downhill movement the glacier is receding, but not moving backward. This glacier has accumulated sediments within it from having scraped along the land beneath it, and from wind blown sediments that deposit on its surface and drop below. As the ice melts these sediments, called glacial drift are deposited in a new position at the front of the glacier

Stop 2: Bottom of stairs

Looking north the water you see is Long Island Sound, a large body of salt water. Imagine that it is 20,000 years ago. A previous glacier has pushed south and deposited its till (unsorted glacial deposits) forming the Ronkonkoma Moraine, the central spine of Long Island. This glacier then retreats and forms a huge fresh water lake between it and the Ronkonkoma moraine. You are standing at the bottom of this lake, which was about 200ft deep. The glacier rises about 100ft above the surface of the lake.

Sea level then was much lower (350ft). The south shore of Long Island was 70miles south of where it sits today. Mastadonts and sabre-toothed tigers roamed the area.

At the base of the stairs is a large boulder. This granite boulder was brought here form western Connecticut. Boulders transported and deposited by a glacier are called erratics. Just east, another more pink erratic is a remnant of the 300million year old collision of the North American Plate with the African Plate.

Walk east along the cliffs about 400ft, glancing at them as you go. The rows of marine plant debris (rack) on the beach are placed there by the tides. Diurnal tides are caused by the gravitational attraction between the Earth and Moon.

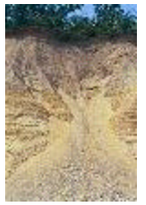
Stop 3:

The cliffs were formed when streams of water carrying sand and gravel gushed from the glacier and entered the lake. The faster the water is the larger the sediments it can carry. Upon reaching the still water, the streams slowed and dropped their sediments forming a delta. Do you know of any other deltas? They form for the same reasons.

You can see the many layers in the cliffs. The layers tell of periods of higher and lower water velocity (Summer, Winter).

Take a look at the beach. You are walking on gravel and sand. Where do you think it came from? (Hint: look at the cliffs). Walk east another 300ft.

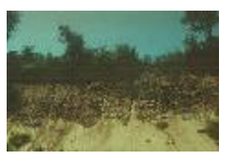
Stop 4: Concave area at top of cliff



The upper layers of sand and gravel are sloping down to the west, but you cannot see the bottom face of the cliffs. Wind and weather at a rate of 3ft per year are eroding the cliffs. As sediments fall from upper layers to the beach, they cover lower areas of the cliffs. This is called overburden.

Twenty feet above beach level you can catch a glimpse of reddish sand and gravel. These sediments were deposited on the floor of the Sound 65million years ago during the Cretaceous Period, the time of the extinction of the dinosaurs! As the glacier moved south during the Pleistocene Period 20,000years ago, its bottom scraped these sediments and pushed them forward into this area. Later, Pleistocene sediments were deposited on top of the Cretaceous sediments.

Stop 5: Inspiration Point (sign at top of cliff asks visitors to keep off cliffs)



Here the cliffs are at their highest elevation, about 126ft. (The top of the triangular shaped delta). Beneath the soil layer at

the top is a layer of fine-grained yellowish sediments called loess. Loess is good at trapping water within its small particles.

At the base of the cliffs, you can see more Cretaceous deposits. Behind the overburden in between, you would see that all the layers are continuous. If you could cut into this area, you would see the fine layers folded and faulted. Pushing a piece of paper against a wall you notice it bend and crumple. When a glacier pushes horizontal layers of sediment forward, the same thing happens.

Walk east past one erratic to the next, a large pink granite.

Stop 6: Large pink granite erratic

Granite is an igneous rock formed from the slow cooling of molten magma far below the earth's surface. The magma forming this rock had lots of pink orthoclase feldspar and quartz in it that cooled slowly enough to form large crystals called pegmatite.

Turning to the cliffs you notice holes in the loess layer near the top. The loess here is soft enough for the cliff swallows to burrow into, making it a perfect place for them to nest.

Walk east to next dark grey erratic.

Stop 7: Dark grey boulder

This Basalt is another igneous rock. Basalt rock forms along and lines the ocean floors. It is fine grained because it cools quickly when meeting the cold water.

Just below the loess in the cliff, is a layer of sediments of all sizes from clay to boulders. Notice a huge boulder stuck in the till. How do you think it got there? After the formation of the delta, the glacier proceeded to advance and run right over it. Soon after, it melted, dropping anything contained within it. This is till.

How do you think the other erratics got to the beach? (Hint, look at the cliff). They were all part of the till layer originally and dropped as the cliff eroded.

Walk east to a large slab erratic.

Stop 8: Grey rock slab

The other erratics in this area have many wavy lines on them. They are highly deformed. What could have caused this? The intense pressure and heat generated when tectonic plates collide causes rock to become metamorphic. The minerals in the rock get soft and recrystalize forming horizontal layers. If enough pressure is applied, the layers bend and fold.

Are you wondering why some erratics have sharp edges, while others are more rounded? Wave action here is not sufficient to round the edges of the rock. As rocks are carried by a glacier, they bump and grind against eachother and along the rock the glacier travels over, smoothing their edges. Some rocks travel greater distances than others, these are generally more rounded.

Walk East to next dark grey erratic.

Stop 9: Basalt rock with mud around it.

The white lines you in this rock are formed when cracks in the basalt were filled in by quartz crystals.

If the mud is dry you should notice the geometric design of the cracks in it. If this mud hardens to rock (lithifies), the cracks may then be filled in with other minerals.

Where do you think the mud came from? (hint: look at the cliffs) As rocks are ground to dust in the glacier, fine clay sediments are produced. The clay is deposited with the sand and gravel in layers in the cliffs.

Walk east to the area four large outcrops of Cretaceous sand and clay.

Stop 10: Mt. Rushmore (You have to imagine the faces. Extinct dinosaurs maybe?)

This beautiful outcrop of bright colored Cretaceous sand and clay displays red and white layers that change direction. This crossbedding indicates changes in the direction of the water depositing these sediments.

Pick up a handful of beach sediments. Notice the variety of the particle sizes. This is typical of glacial deposits in whose till you find particles from fine clay to giant boulders.

Walk east to a large flat topped erratic.

Stop 11: Table rock

This erratic is a metamorphic granite gneiss made up of pink and yellow feldspar, quartz and muscovite (white) mica. It's a good place to sit and take a break!

East of Inspiration Point you may have noticed that the layers began sloping downward to the east. In this area the eastern edge of the delta reaches close to the beach level. Just east of here you can see Smugglers Cove. How do you think it got its name?

As you rest, try to imagine global temperatures rising at the end of the Pleistocene Ice Age. Melting of the world's glaciers adds water to the seas. Rising sea levels reach and breach the eastern boundary of this glacial lake, changing it from fresh water to the salt water we see today.

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