Introduction:

Located northwest of the Village of Stony Brook, West Meadow Beach is a north-south oriented peninsular spit approximately 1.5 miles long. West Meadow Beach is bordered to the east by West Meadow Creek, a 1.7 mile long tidal creek flanked by wetlands. The creek is then bordered to its east by bluffs of the Harbor Hill Moraine.

The beach is a depositional feature supplied with sediment by the longshore transport of sand, pebbles and cobbles from morainal headlands of Crane Neck Point and Crane Neck north of the beach. The material within the morainal headlands is predominantly sand and gravel with glacial till at the top which consists of an unsorted mixture of sand, clay, gravel, and boulders. This clasts (sedimentary particles) were rounded by the glacial ice, and once introduced into Long Island Sound, they have been further rounded and sorted by wave action.

Human Impact:

West Meadow Beach was once the location of approximately 98 cottages that served as a summer community on Long Island’s North Shore. Although the National Park Service listed the cottages on the State and National Register of Historic Places, New York State courts found the cottages were built on public land, and the majority of the cottages were torn down in December 2004. Today, several cottages still remain.

Dredging in Stony Brook Harbor in the early 1950s, especially in Porpoise Channel and Yacht Club Spur, began to reshape the northern-most reaches of the harbor. In 1980 the southern 2000 ft of West Meadow Beach was covered with dredged material from Yacht Club Spur. Then in 1997, the public beach and areas surrounding the cottages were covered with more dredged material. Dredging continues to change the geology of West Meadow Beach. This dredged material consists of relatively unsorted sands and gravels.

As you complete this leisurely science walk, remember you are observing nature at work. Beaches are always changing!
1. West Meadow Beach Sediments

From the parking lot at West Meadow Beach walk to the large flag pole. Looking north with Stony Brook Harbor to your left, you can see the morainal headlands of Crane Neck which is one source of the sand, pebbles and cobbles found on the beach. These sediments were and are continuing to be derived from the headlands as the headlands are eroded by waves. These same waves move the sediments southward along the beach in a process known as longshore transport. As the waves roll the pebbles and cobbles southward, they are smoothed and sorted.

The shoreline has a distinct profile as shown in the figure below. The upper beach, or berm, is covered with an unsorted mixture of dredged sand and gravel. The high tide area consists of smaller, flatter rocks that are more easily transported away from the shoreline by waves. Bands of seaweed and finer sand are deposited at high tide and blown about during low tide. The blown sand may form dunes. During low tide, large cobbles in the swash zone are exposed.

Why are the beach rocks so smooth? How were they rounded?

The beach contains pebbles and cobbles of different types of rocks that were moved here from their original location first by glacial ice and then by wave action. Identify as many as you can:

- Basalt is a dark, fine-grained igneous rock (meaning it was once melted) that was created at the time of continental rifting of the supercontinent Pangaea about 200 million years ago.
- Quartz is white or pinkish on this beach. Its mainly derived from quartz veins in basement rocks.
- Granite is a coarse-grained igneous rock that intruded into the basement rocks during one of the many events associated with the Appalachian Mountains.
- Gneiss is a layered metamorphic rock formed by high temperatures and pressures exerted on igneous or sedimentary rocks. Some gneiss found here contains small garnets.

How many different rock types did you find? How did these rocks get here?

2. Dredged Material

Walk south along the beach until you are in front of Cottages 105 and 106. The flat berm area here is covered with dredged material from Yacht Club Spur. Dredge material consists mostly of unsorted coarse sands and gravels as well as small, angular rocks. How does dredge material differ from the naturally occurring beach sediments?

3. Dunes, Storm Overwash and Low Tide Bars

Go further south along the beach and stop in front of the next group of cottages. These beach dunes developed through wind driven, transport of fine-grained sand. Dune grass catches and holds the wind-blown sand allowing the dunes to develop. If you look closely at the dune sand, you will notice that it is made mostly of white, quartz sand grains. There are also small cobbles and pebbles within the dune. These may have been moved here by high tide wave action, high energy storm surges, or even gulls that mistake the stones for shells.

Why is it important to keep plants on dunes?

Here, a high energy storm surge created an overwash lobe of small, rounded rocks that reaches the dunes. Sometimes even larger, flat cobbles can make it far from the water. Flat cobbles are more easily transported by waves than round, spherical cobbles. During low tide, sand bars and tidal flats may be seen. These areas can extend as far as 1500 feet from the coast. Before entering the water to explore, notice the large sand ripples present at times on the flat areas of the beach face. These ripples form as water quickly drains away from the beach. The beach changes every day. Sand bars and ripples can change location especially after large storms.

Do you think you would find these ripples during high tide?

4. Jetty

Continue to walk until you reach the first line of rocks extending into the water. This is a man-made jetty built to counter beach erosion. Sand, pebbles and cobbles are trapped by the jetty as water moves by. Please note the, the northern sides of the jetties hold more sediment than the southern sides. Why does this occur? Think about where most of the beach’s sand, pebbles and cobbles comes from.

5. West Meadow Creek

Leave the beach and walk to Trustees Road for the last stop. Be careful when walking through the vegetation and stay away from the poison ivy which is prevalent here. Poison ivy has three shiny leaflets. Walk along Trustees Road to the north towards the parking area. On the right side of the road, look for two large boulders which mark the last stop at West Meadow Creek. This creek is a tidal embayment bordered by bluffs of the Harbor Hill Moraine to the east. The tidal wetlands are zoned by salt marsh vegetation which includes the taller smooth cordgrass in the low marsh and saltmeadow cordgrass in the high marsh. The low marsh is covered with water during high tide when water moves north into the creek. Which way is the water moving in the creek now? Is it high tide or low tide?

Information from:
- Poison Ivy photo from: http://landscaping.about.com

Copies of this guide and others may be found at www.geo.sunysb.edu/esp/