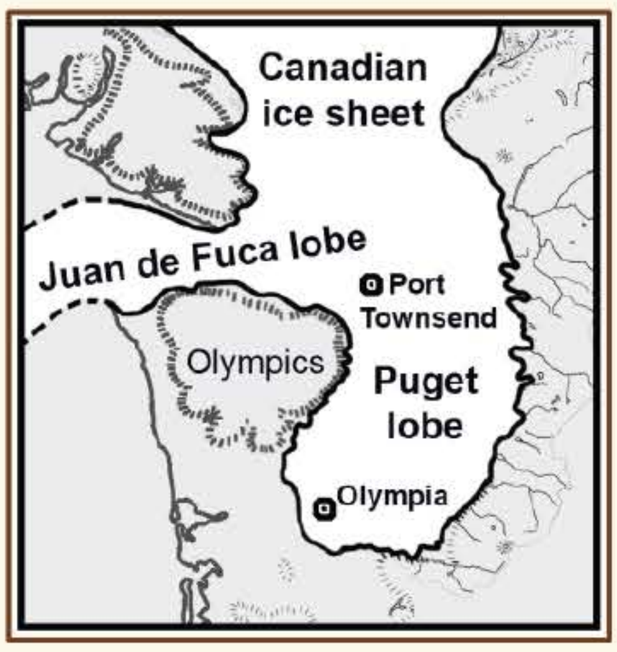
Geology at Fort Flagler State Park

GLACIERS ~ *The land you see all around you is a legacy of glacial activity*

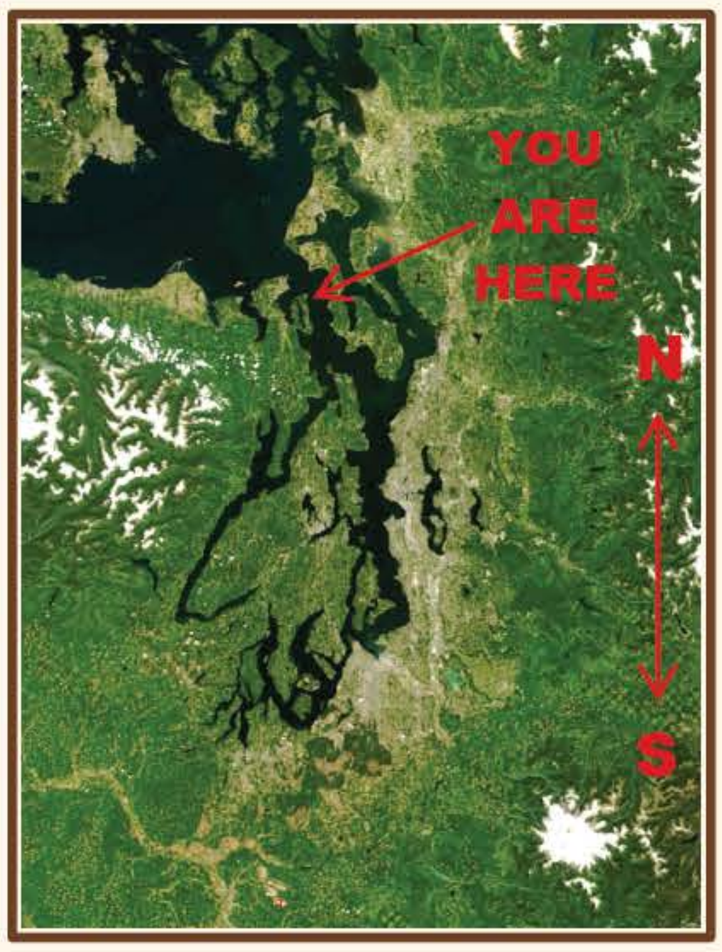


About **two million years ago** a great, global Ice Age began. At least six glacial cycles occurred in the Puget Sound region. Each glacial advance ground its way south from a Canadian ice sheet, gouging and shoving the ground it crossed. The ice carried immense loads of rock from the north that were deposited here when the ice melted.

18,000 years ago, the most recent ice advance entered Washington. Global sea level dropped as water was bound up in Earth's ice masses. **17,000 years ago**, at its greatest extent regionally, the ice was as much as 4,000 feet thick at Port Townsend and its great weight pressed the regional land surface down about 200 feet below its present level. By about **16,000 years ago**, as the global climate warmed, most of the ice here had melted away, leaving this region under a shallow sea. The flat top of Whidbey Island to the northeast of the park is a remnant of this ancient seafloor. Relieved of the great weight of the ice, this whole region rose again within a few thousand years and stabilized at its present level.

Glacial and interglacial processes left layer upon layer of sand, gravel, and boulders—deposited, shoved about, compacted, and eroded—building and shaping the land of the Puget Sound region.

- The north-south trend of most Puget Sound landforms reflects the path of the southbound glaciers. →
- Below ground, deep, thick layers of glacial sand-and-gravel deposits create aquifers that provide water for our wells.



← ♦ Look south to the gap between Indian and Marrowstone Islands. An ancient *fault* (a moving fracture) in the Earth's crust caused a weak spot here that the glaciers both eroded and refilled.

♦ Glacial deposits formed both Indian and Marrowstone Islands, and the high bluff to the north that overlooks Port Townsend Bay. →

BLUFFS and BEACHES

Wind, waves, rain, emerging groundwater, and gravity all contribute to the instability of our coastal bluffs. The resulting surface erosion and localized landslides continually bring glacial and interglacial material—from silt and sand to boulders—tumbling down to beach level. The sand-and-gravel texture of the beach can change dramatically from tide to tide and from season to season, depending on the strength and orientation of the wind and waves.

Due primarily to wind-driven wave action, sand and fine gravel are continually moving along the beach in drift cells that feed the beach. At Fort Flagler, large northward-driven cells move along the east and west edges of Marrowstone Island; a small eastward-driven cell moves along the northeast corner of the park; and a large southwest-driven cell runs along the remainder of the park's north-facing beach. The convergence of these drift cells form both Marrowstone Point at the park's northeast corner and the low-tide sand spit at the park's northwest corner.

As time passes, geologic processes will continue to shape and reshape this ground.

Enjoy our local geology!

Jefferson Land Trust Geology Group