

# Glacial Landforms of the Puget Lowland

During the advance and retreat of the Puget lobe, drainages around the ice sheet were blocked, forming multiple proglacial lakes. The darker colors on this map indicate lower elevations, and show many of these valleys. The Stillaguamish, Snohomish, Snoqualmie, and Puyallup River valleys all once contained proglacial lakes. There are many remnants of these lakes left today, such as Lake Washington and Lake Sammamish, east of Seattle. As the Puget lobe retreated, lake outflows, glacial meltwater, and glacial outburst flooding all contributed to dozens of channels that flowed southwest to the Chehalis River at the southwest corner of this map. Remnants of these channels can be seen along the eastern and southern edge of the colored area in the map. Present-day Lake Kapowsin and Ohop Lake both occupy one of these channels. Today, the Chehalis River flows through a wide valley that was largely sculpted by ice-age meltwater.

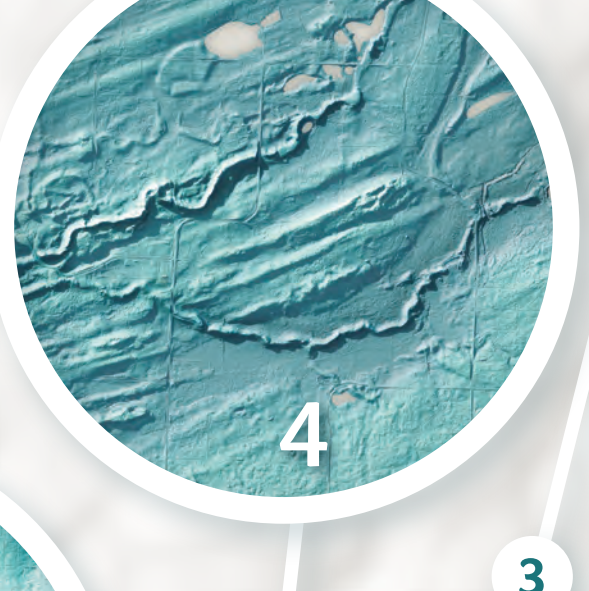
During the last ice advance and retreat (in the latest Pleistocene), an extension of the Cordilleran ice sheet, called the Puget lobe, covered the Puget Sound region (see location map below).

The colored area of the map (at right) represents the approximate maximum extent of the Puget Lobe during this time period. During glacial maximum, the location of modern-day Seattle (near the center of this map) was beneath 3,000 feet of ice.

All of the land and waterways in this region were shaped, at least in part, by the glacial ice of the Puget lobe. Many large-scale glacial landforms are preserved in the landscape today. In this lidar\*-derived map, landforms such as drumlins, kettles, eskers, and glacial stream channels can be seen. Examples of these and other landscape features are enlarged at bottom right.

Most of Washington's population lives in this region—the glacial geology influences many aspects of daily life, including transportation, water supply systems, agriculture, and building regulations.

**\* What is Lidar?**  
The fine detail depicted on this map is the result of lidar. Lidar is a remote-sensing technique that uses light pulses to rapidly collect a very large quantity of elevation points across large areas. To learn more about lidar in Washington visit: [www.dnr.wa.gov/lidar](http://www.dnr.wa.gov/lidar)



**1 Drumlins** - Drumlins (or fluted ridges) are geologic features where movement of the ice sheet smooths glacial sediment into elongated teardrop shapes. Drumlins align in the direction of the ice flow and are evident across most of the Puget Lowland.

**2 Mima Mounds** - Intriguing features called Mima Mounds are found on Mima Prairie and in several outwash channels in the southern part of this map. Composed of organic-rich, sandy soil, Mima Mounds on this map are only found on the most recent glacial outwash deposits. The origin of the mounds has been debated for decades and a consensus on their formation has not yet been agreed upon.

**3 Kettles** - Glacial kettles are depressions that form when a retreating glacier leaves a bit of ice behind which then becomes buried by sediment shed from glacial streams. When the block of ice melts, the sediment collapses, forming a kettle. Kettles can be dry or filled with water, depending on their depth and the level of groundwater in the area.

**4 Eskers** - Eskers are snake-shaped landforms that are often found near the glacier's terminus. Eskers are formed when rivers that are underneath, on top of, or within a glacier, transport pebble- to cobble-sized gravel that is exposed once the glacier retreats. The resulting landform is a sinuous ridge of gravel that runs roughly parallel to the direction of ice flow.

**5 Outwash Channels** - Dozens of stream channels were created by glacial lake outflows, glacial meltwater streams, and glacial outburst floods. Today, many of the channels no longer transport water or have smaller streams occupying them than the streams that formed them.

**6 Fault scarps** - Sharp breaks in the fluted topography make it easy to identify geologically recent faults, such as this one called the Toe Jam Hill fault on Bainbridge Island west of Seattle, which is part of the Seattle fault zone.

