

Washington



Geologic Map Delineates Volcanic Hazards

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Defining the Problem

Active volcanoes, such as Glacier Peak (Fig. 1), pose a variety of potential **hazards**. Like Mount Rainier (Fig. 2) and Mount St. Helens (Fig. 3), the history of Glacier Peak includes explosive eruptions and **lahars**. Eruptions, earthquakes, or precipitation can trigger landslides that with the incorporation of water become lahars or mudflows. Lahars and lahar runouts (the dense deposits they form) have been known to travel more than 160 km, and they place infrastructure and people living in valleys draining the volcano at risk (Fig. 4).

The Geologic Map

Geologic mapping provides information on the frequency, magnitude, distribution, and style of these volcanic events that is useful for **land management planning** and emergency preparedness. The geologic map (Fig. 5) delineates two distinct volcanic eruptions, one about 5000 years ago and the other about 1800 years ago. The 5000-year-old event deposited more than 15 km³ of material — five times the amount of the 1980 Mount St. Helens eruption.

Applying the Geologic Map

The cities of Lyman, Sedro-Woolley, and Burlington are built on terraces composed of lahar-runout deposits from Glacier Peak volcano. Near the town of La Conner and Puget Sound, 135 km down the valley from Glacier Peak, the lahar-runout deposits are 3 to 18 m thick. Although the frequency of large destructive volcanic events from Glacier Peak is once every few thousand years, the impact of such an event could be catastrophic. Lahars could bury entire towns and valuable agricultural land in the lower Skagit Valley, as well as I-5, a critical transportation corridor between Seattle and Vancouver, B.C. Lahar deposits could also block tributary stream valleys, causing upstream flooding. The lahar dam itself could then be breached by water from the inundated valley causing sudden downstream flooding.

Conclusion

Because lahar deposits are typically composed of saturated deposits of uncompacted sand and gravel, areas underlain by such materials have an increased susceptibility to become lahars during strong earthquakes. Surface and subsurface mapping of lahar and lahar-runout deposits from Glacier Peak volcano contributed important geologic information relevant to land-management planning and **emergency preparedness** in the lower Skagit Valley.

Fig. 1. Although Glacier Peak normally can not be seen from any urban areas, this active volcano periodically erupts in an explosive catastrophic manner that could affect the lower part of the populated Skagit River Valley.

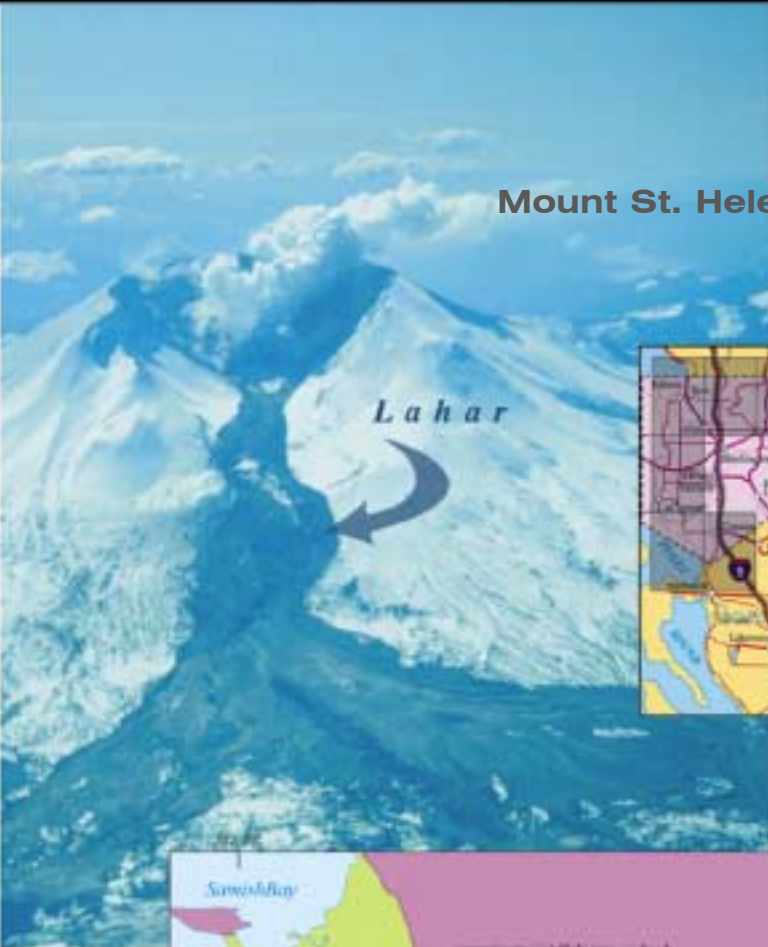
Glacier Peak



Fig. 2. Mount Rainier threatens Tacoma, WA.

Mount Rainier





Mount St. Helens

Fig. 3. Lahar racing down the slopes of Mount St. Helens. A lahar is a mud flow consisting of a thick mixture of water and volcanic debris.

area map

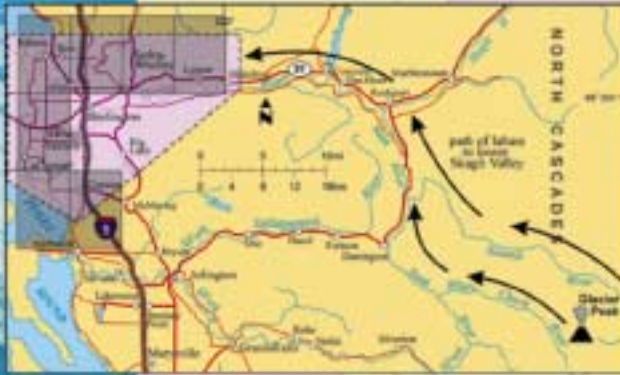


Fig. 4. Note the location of Glacier Peak volcano and the path lahars have taken down stream valleys to reach the plain of the lower Skagit Valley. Gray rectangles indicate geologic mapping study area.

geologic map

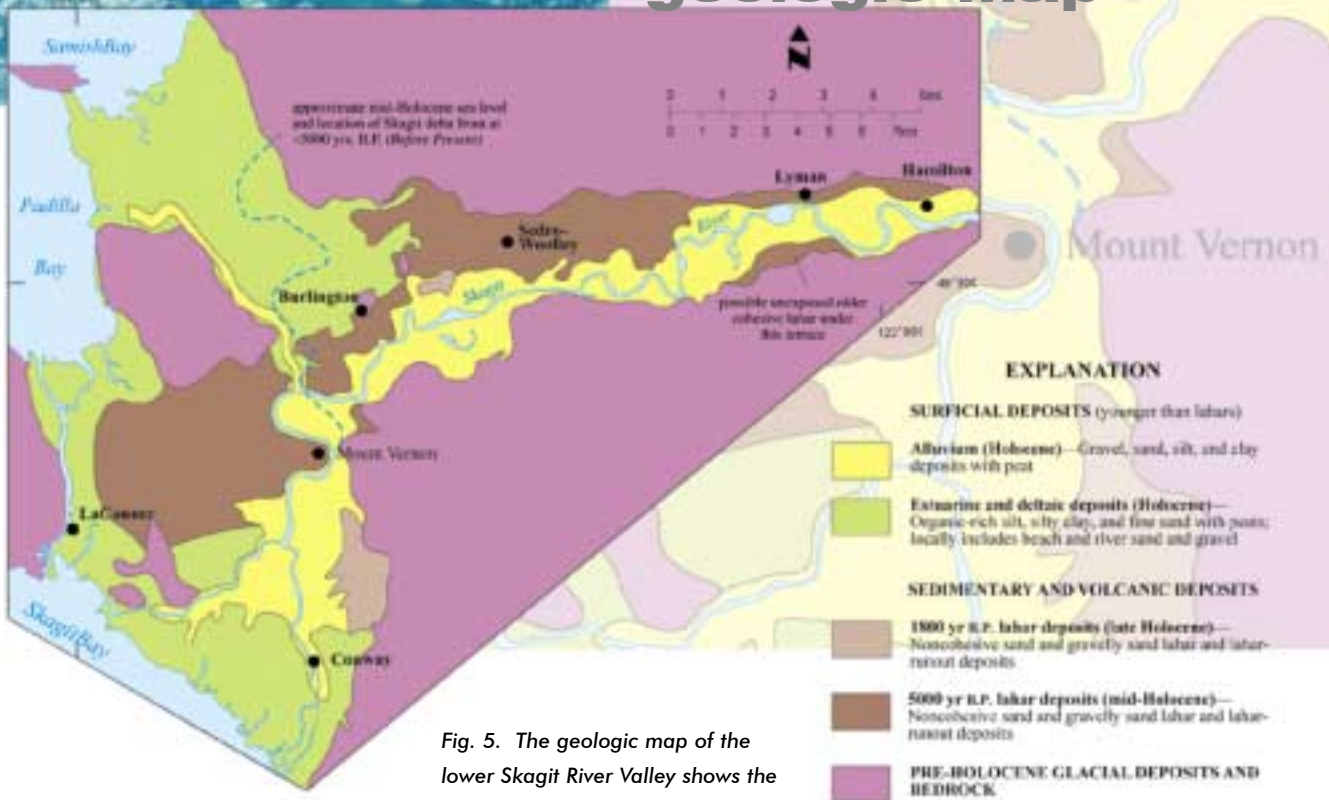


Fig. 5. The geologic map of the lower Skagit River Valley shows the extent of exposed lahar deposits from Glacier Peak volcano. This information is vital to regional and local land planning and emergency preparedness in the area.