

MOUNT ADAMS--SUMMARY OF CURRENT VOLCANIC, HYDROLOGIC, AND HAZARD ISSUES

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ABSTRACT:

Mount Adams is a major Cascade volcano surrounded by volcanic fields that contain several hundred smaller volcanoes. Hundreds of thousands of years of recurrent eruptive activity, the youngest about 1,000 years ago, has made Adams one of the most voluminous volcanoes in the Cascades, more than twice as large as neighboring Mount Hood. In contrast, volcanic fields, such as Indian Heaven and Simcoe, are broad uplands created by overlapping, short-lived volcanoes, each of which formed in, at most, a few centuries. The Mount Adams region lies in the broadest section of the Cascade volcanic arc, with geologically young volcanoes spanning a 100-mile swath from Portland to Goldendale. Future eruptions and other hazardous events hosted by both Mount Adams and short-lived volcanoes present potential hazards to life, property, and economic health in the region [see <http://vulcan.wr.usgs.gov/Volcanoes/Adams/Hazards/OFR95-492/framework.html>]. Chief among these hazards are eruptions of lava flows and ash, the latter with the potential to affect areas tens to hundreds of miles from an erupting volcano. But for Mount Adams the hazard of volcanic mudflows, called lahars, is potentially the most devastating. Lahars form in several ways—when eruptions swiftly melt snow and ice or when parts of a volcano weakened by acidic fluids fail as landslides. Lahars can destroy or bury most structures in their paths and large lahars in the Klickitat and White Salmon valleys can inundate valley floors and flow to the Columbia River. Disruption of watersheds by lahars can affect downstream reaches for years or decades by promoting increased sediment loads, increased flooding, shifting channels, and aggradation. Such events would have substantial impacts on the regional economy by disrupting major river and possibly ground transportation routes through the Columbia River gorge. At present, Mount Adams is not geophysically monitored commensurate with the risk it poses. In the future, USGS hopes to improve earthquake and ground-deformation monitoring at Mount Adams as part of a broader national effort.

Even without eruption, surficial processes active at Mount Adams can affect regionally significant resources such as fish, irrigation, and recreation. The volcano, with its high relief, steep slopes, locally weakened areas, extensive glaciers and snowpack, and essentially endless supply of sediment, affects streams in multiple ways. Rock and ice avalanches and debris flows generated by heavy rain storms, rain on snow events, or outbursts of water stored in glaciers move substantial volumes of sediment and cause locally severe erosion and deposition in upper parts of watersheds and sediment-laden water flows farther downstream. Such events have had well-known effects on fishery resources and on trails, roads, bridges, and irrigation diversions. Decadal and longer-period changes in sediment and water fluxes owing to a variety of factors probably affect channels in lower reaches of watersheds, but such linkages are poorly known at Mount Adams. Recent work at Mount Rainier may provide some clues. Current concerns over future climate change and its potential effects on glaciers, sediment budgets, and water resources range widely, but further research is required to better assess causes, effects, and potential outcomes.

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