UNITED STATES GEOLOGICAL SURVEY

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Glacier Peak is a dormant volcano that is situated immediately west of the crest of the Cascade Range about 100 km (62 miles) northeast of Seattle, Washington. Although the summit of Glacier Peak stands 3209 m (10,451 ft) above sea level, well above the general height of the surrounding mountains, it is perched on a high bedrock ridge and the volcanic rocks of the peak are only a few thousand feet thick. The volcano is made up of lava flows with a predominantly pyroxene-dacite composition, all of which probably were extruded within the last 700,000 years (Tabor and Crowder, 1969, p. 24-28).

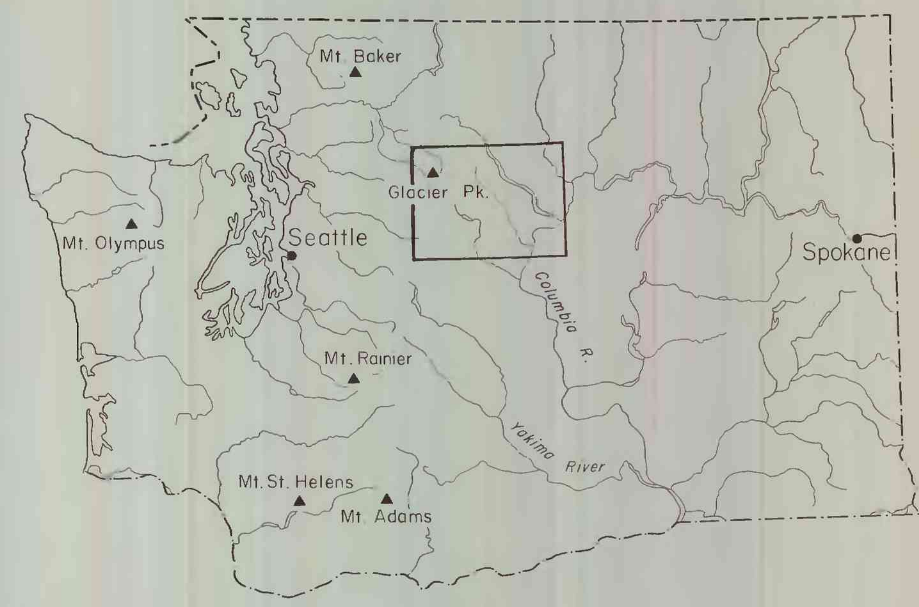
The most recent series of eruptions approximately 12,000 years ago (Fryxell, 1965, p. 1288) produced immense quantities of pumice that were blown far downwind from the volcano. Although the pumice, here referred to as tephra, is found west of the Cascade crest only in the immediate vicinity of Glacier Peak, it has been found east of the volcano at distances up to 1000 km (625 miles).

Carithers (1946) studied the tephra in the vicinity of Glacier Peak and found two layers in many places. Present studies indicate that the tephra deposits consist of at least seven distinct layers that can be distinguished in the field on the basis of particle size, thickness, and stratigraphic position. The tephra generally rests directly on late-glacial drift that lacks any discernible weathering profile. The seven informally designated layers are listed in Table 1.

One tephra unit, identified as layer G by major-element analysis, reaches southern Alberta (Westgate and others, 1970). Another layer (layer B) probably is the same as that found overlying late-glacial sediments of the Yellowstone basin (Richmond, 1965, p. 49).

Preliminary studies indicate that eruptions that produced layers B and G were of approximately equal volume, whereas the layer M eruption was of lesser volume. Isopleth maps depicting maximum particle size are presented for these layers and isopach maps showing maximum thickness are presented for layers B and G. An isopach map has not been prepared for layer M because in most outcrops the layer showed evidence of substantial reworking.

The reader is referred to the list of additional readings for discussions of hazards which are associated with volcanic eruptions and which might result from future large-scale eruptions of Glacier Peak. The effects might include damage to or destruction of vegetation by deposition of tephra downwind from the volcano, passage of hot ash flows or lahars (volcanic mudflows), or both, down valleys heading at Glacier Peak, and contamination of streams and lakes by widespread erosion of pumice for many years after an eruption.



MAP OF WASHINGTON SHOWING APPROXIMATE LOCATION OF STUDY AREA

REFERENCES AND ADDITIONAL READING

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Crandell, D.R., and Waldron, H.H., 1969, Volcanic hazards in the Cascade Range, in Geologic hazards and public problems: Office of Emergency Preparedness, Region 7 Conference Proceedings, Santa Rosa, California, May 27-28, 1969, p. 5-18. A nontechnical description of the kinds of hazards presented by volcanic eruptions and a brief review of the recent eruptive history of Mount Rainier and several other volcanoes in the Cascade Range.

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Powers, H.A., and Wilcox, R.E., 1964, Volcanic ash from Mount Mazama (Crater Lake) and from Glacier Peak: Science, v. 144, p. 1334-1336.

Richmond, G.M., 1965, West Yellowstone to Madison Landslide, in Schultz, C.B., and Smith, H.T.U. (eds.), Guidebook for Field Conference E, Northern and Middle Rocky Mountains: VII INQUA Congress, Boulder, Colorado, p. 49.

Tabor, R.W., and Crowder, D.F., 1969, On batholiths and volcanoes - Intrusion and eruption of Late Cenozoic magmas in the Glacier Peak area, North Cascades, Washington: U.S. Geol. Survey Prof. Paper 604, 67 p.

Westgate, J.A., Smith, D.G.W., and Tomlinson, M., 1970, Late Quaternary tephra layers in southwestern Canada: Proc. 2nd Ann. Paleoenvironmental Workshop, Univ. Calgary Arcaeological Assn., p. 13-34.

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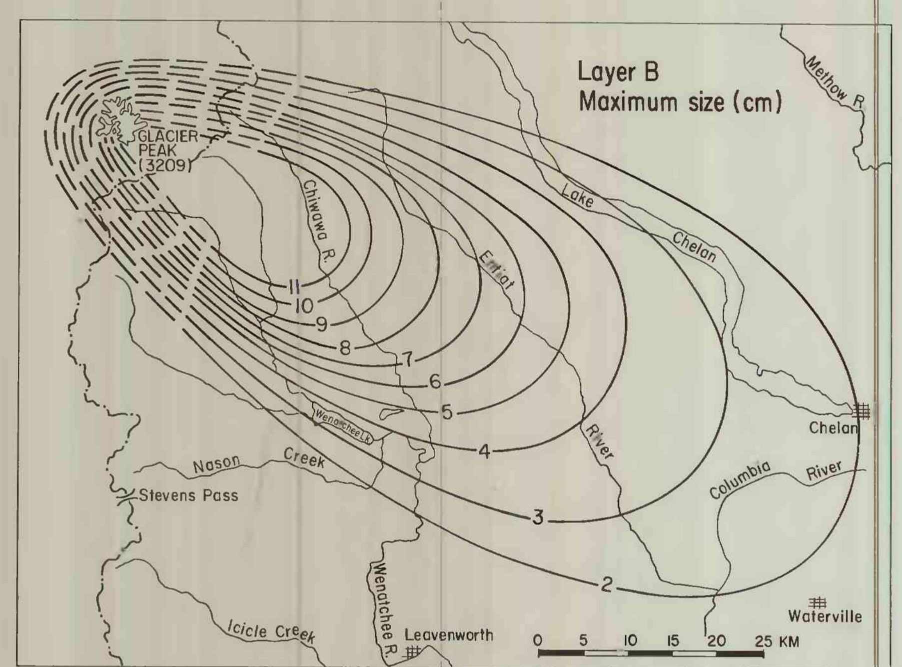
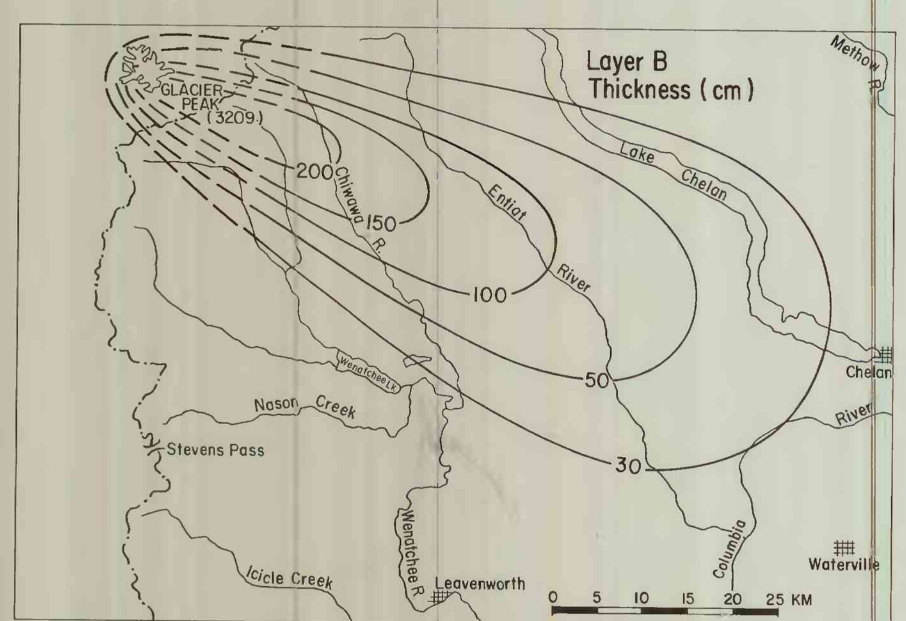
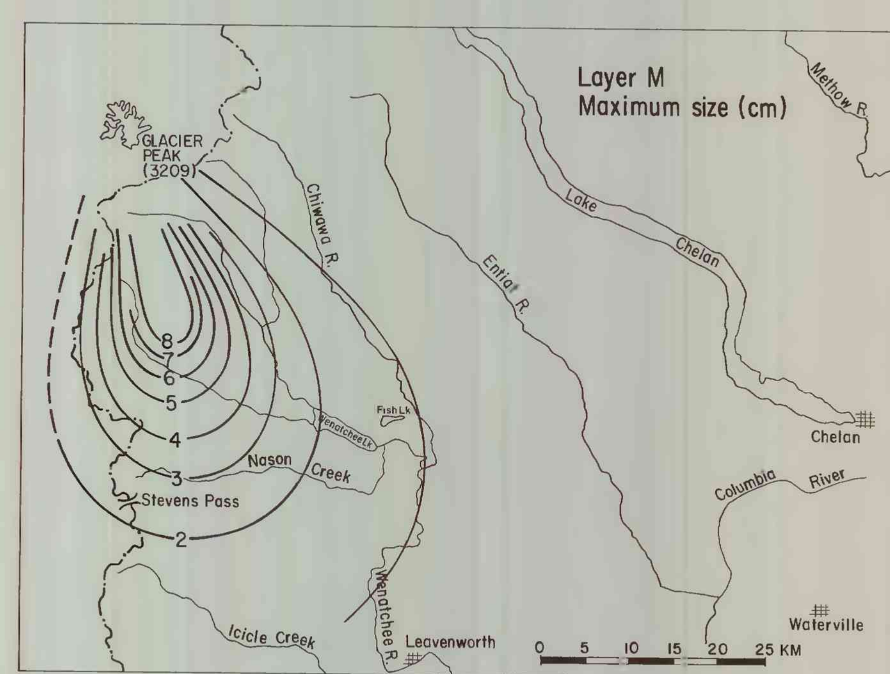
TABLE 1

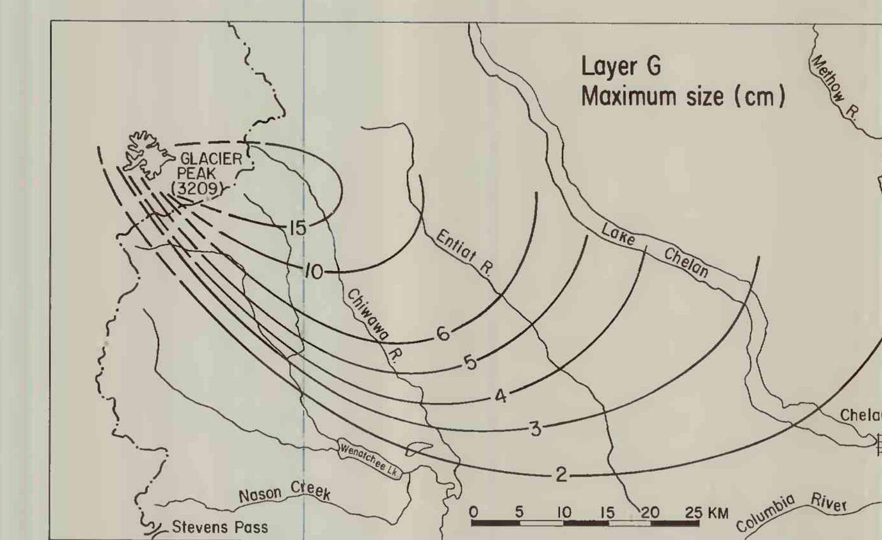
Subdivision of tephra deposits from Glacier Peak volcano

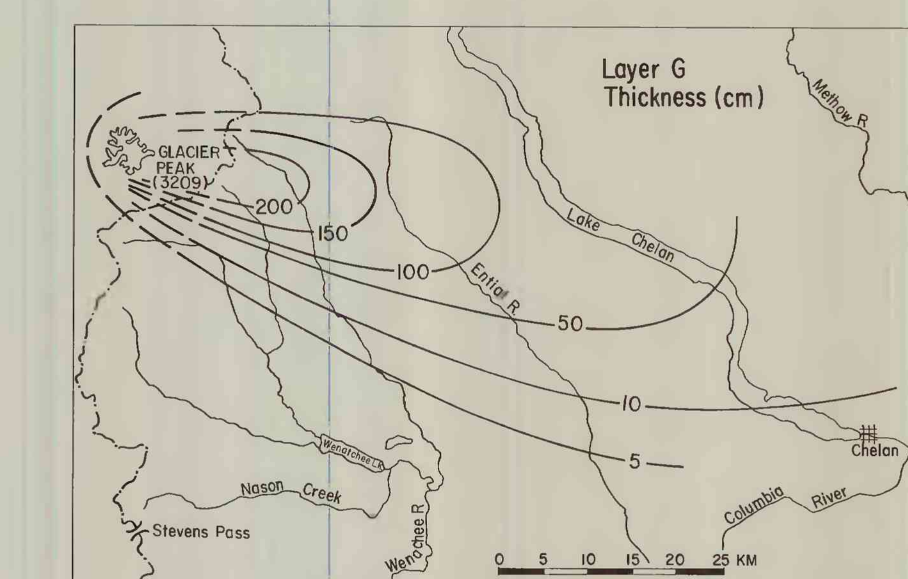
Tephra Layer	Character	Typical thickness (cm) 20 km east of the volcano
B (youngest)	Yellowish-brown pumice blocks, lapilli, and ash, and lithic fragments. Layer forms a major southeast-trending lobe.	150
S	Tripartite pumiceous ash forming a southeast-trending lobe.	10
M	Pumice lapilli and ash forming a south-trending lobe. Mostly reworked, probably due to deposition on ice and snow along the Cascade crest.	10
F	Fine pumiceous ash. } Thin layers mostly of ash-size pumice distributed east and southeast of the volcano.	10
C	Coarse pumiceous ash. } Thin layers mostly of ash-size pumice distributed east and southeast of the volcano.	5
N	Pumiceous ash. } Thin layers mostly of ash-size pumice distributed east and southeast of the volcano.	4
G (oldest)	Light-gray pumice blocks, lapilli, and ash, and lithic fragments. Layer forms a major east-trending lobe.	200











STRATIGRAPHY AND DISTRIBUTION OF TEPHRA FROM GLACIER PEAK (OF 12,000 YEARS AGO) IN THE NORTHERN CASCADE RANGE, WASHINGTON

BY

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1976