

# Scientific Notes

## RECENT GROWTH OF GLACIERS IN THE PACIFIC NORTHWEST

Approximately 90 per cent of the total area covered by glaciers in the United States is found in the Olympic and Cascade Mountains of Washington State. Altogether, Washington's glaciers cover a cumulative area of some 225 square miles, which by way of comparison, represents approximately one-third of the cumulative area of all glaciers in the European Alps.

In the mid-19th century these glaciers began to shrink and retreat, as did glaciers in several other mid-latitude regions in the world. During the late 1930's and very early 1940's shrinkage of these glaciers became so great that it could be described as catastrophic.

In 1944, however, Arthur Johnson<sup>1</sup> of the U.S. Geological Survey discovered that the highest parts of the Nisqually Glacier on Mt. Rainier had ceased to shrink and were growing in ice thickness. In 1950, Kermit B. Bengston, currently a graduate student at the University of Washington, found that the Coleman Glacier on Mt. Baker has begun to advance.<sup>2</sup>

In 1953, the writer began an investigation to determine whether increased activity on Nisqually and Coleman Glaciers was an isolated, anomalous phenomenon, or was indicative of a general reversal in glacier activity from the widespread shrinkage of glaciers which had been the pattern for the past several decades.

From 1953 to 1954, 25 glaciers were checked by several observers by taking comparative photographs of the glaciers one year or more apart. In the fall of 1955, a flight was made over the Northern Cascade ranges by the writer and Edward La Chapelle of the Forest Service, Alta, Utah, and photographs were made of 48 glaciers which had previously been aerially photographed by the Geological Survey in 1950.

Altogether by 1955, a total of 73 glaciers was observed. Observations show that at present 50 of these glaciers are advancing. At least one of the glaciers, the Boston Glacier in the Northern Cascades, has advanced at an average rate of one foot per day for the past five years and in this time has increased its over-all length by approximately 10 per cent. Several

<sup>1</sup>Johnson, Arthur, "1946 Progress Report on Nisqually Glacier, Washington," on file, Office of Water and Power Branch, Conservation Division, U.S. Geological Survey, Tacoma, Washington.

<sup>2</sup>Bengston, Kermit B., "Coleman Glacier Studies, Mt. Baker," *Mountaineer*, v. 43, No. 13, pp. 36-37, Dec. 1951.

other glaciers have been advancing at average rates from 100 to 250 feet per year for the past five years, and in this time have increased their total lengths from three to five per cent. Observations further indicate that the remaining 23 glaciers are all growing, although their termini are not yet advancing.

An analysis of local climatic data demonstrates a present trend toward a cooler, wetter climate in Western Washington. The 10-year running mean annual temperature at Tatoosh Island off the coast of Washington has decreased approximately 1.5°F from the period 1934-1943 to the period 1945-1954. In the same time interval the 10-year running mean annual precipitation at Tatoosh has increased 15 inches and during the last decade has reached its highest value since the period 1898-1907.

In the history of modern glaciers it is known that similar growth of glaciers in many parts of the world, followed by glacier shrinkage, occurred in the 17th, 18th, and 19th centuries. It is possible that this pattern is now being repeated and before long, glaciers in other mid-latitude regions of the world may begin to advance.

A coordinated study of glaciers all over the world is planned during the International Geophysical Year, 1957-58. It is expected that these coordinated world-wide observations will reveal most significant evidence on the present trends of world-wide climates, and to what extent the growth of glaciers in the Pacific Northwest of our country may be significant as one indicator of a new trend in climatic change.

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#### GLACIAL ADVANCE ON MOUNT BAKER

The Coleman Glacier on Mt. Baker, a 10,750-foot volcanic peak in Washington State, occupies on the north the natural depression formed at the junction of the present summit cone and an older volcanic cone somewhat to the side. It extends from the summit of the mountain down to about the 4,000-foot level and was first observed to be advancing in 1949. This year a visit in late September to the glacier showed the advance to be continuing and accelerating. Considerable thickening of the Coleman has occurred since last year at 6,000 feet, thickening has occurred at 4,900 feet despite the dry, sunshiny summer, and the terminus has pushed another 250 feet down valley for a total advance along the surface of the ground of about 1,000 feet since 1949. Late in September the glacier surface was still covered with last year's snow down to about 5,800 feet. This means more snow was received than melted on about 80 per cent of