



Figure 1. Collier Glacier, July 23, 1965, looking south to Middle Sister. Heavy snows of 1964 and of the spring and early summer of 1965 have not melted. Abundant meltwater from the glacier has backed up on Collier Flat, forming a small, temporary pond, largest in late afternoon. Water from this pond as well as from Little White Branch was flowing rapidly into Melt-hole, just out of the photograph to the left. Compared with the August 21, 1963 photograph (Hopson 1963), the snow on the Middle Sister and on the upper glacier appears to be about the same, but on the lower glacier and Collier Flat the snow is much more extensive.

Collier Glacier, 1965

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ALTHOUGH TWO TRIPS to Collier Glacier during July and September of 1965 did not replace the lost visit for 1964, they did afford opportunities to observe marked changes in the glacier and its surroundings. This report is a follow-up to those that appeared in MAZAMA 1960, 1961, 1962, and 1963.

Throughout the summer of 1964, much snow remained in the high mountains of the Oregon Cascades. The snowfall of the winter of 1964-65 added to this. At the time of the first trip to Collier Glacier on July 22-24 (photograph, July 23, 1965), snow covered a great deal of the lower glacier and of Collier Flat. This and the

heavy accumulation of snow on the upper glacier (see the long black ridge east of the Middle Sister), gave promise that Collier was ready to build up and advance. However, warm, relatively dry weather followed and by the September 9-10 trip (photograph, September 10, 1965), Collier Glacier had lost its 1965 snow plus that which had remained from 1964, and was again a dwindling glacier.

The salient changes in Collier Glacier between 1934 and 1960 are summarized in my report for 1960. As background for the present account, a brief form of this summary follows:



Figure 2. Collier Glacier, September 10, 1965. Same view as Figure 1. The hot, dry weather of late July, August, and early September has removed the snow from the lower glacier, except at the former outlet to White Branch. No ponding remains. The ice cliff at the left of the ice-falls in the upper left of the photograph is greatly enlarged, apparently from melting of ice below the falls. Black margins around all rock outcrops reveal extensive melting.

1. Collier Lake waxed and waned.
2. The height and extent of the ice shrank.
3. Ice in the upper glacier increased since 1936.
4. Ablation moraine increased on the surface of the lower portion of the glacier.
5. The eastern lateral moraine slumped progressively.
6. Exposed crevasse fillings enlarged and new ones appeared.
7. Rock exposure on Cirque Rock varied.
8. Shape of the lower western lateral moraine changed.
9. Surface drainage of the glacier shifted.

These changes are discussed in more detail and are shown in the photographs that were taken in each of the following summers: 1934, 1936, 1938, 1940-51, 1954, and 1960.

The most significant change since 1960 occurred in the summer of 1961 when White Branch, the stream that formerly drained Collier Glacier was captured (diverted eastward) at its source. Previous to this time, White Branch

flowed down its own valley to join Lost Creek and with it to merge with the McKenzie River.

In 1961, White Branch vanished. Drainage from the glacier no longer even reached the location of the former snout of the glacier (the source of White Branch), but instead, turned eastward on Collier Flat (the sediments that filled the former Collier Lake), and flowed in that direction to disappear into a hole, named Melt-hole. Collier Lake was almost filled in 1961. All of it became Collier Flat in 1963. The beginning and end of the lake is discussed in the 1963 report. Names for the various features of Collier Glacier were proposed at the end of the 1962 report.

Two previous photographs of Collier Glacier were taken at the same time of year as the one of July 23, 1965, namely, July 23, 1942, and July 22, 1960. Experience in those years indicated that one could usually expect the major snowfall of the previous year to be melted by that time, and hence little subsequent change in



Figure 3. Little White Branch on Collier Flat, September 10, 1965. Little White Branch drains Collier Glacier and flows into Melt-hole between the broken blocks of ice at the middle left of the photograph. Where the water is going from there, remains as big a mystery as when it was first discovered in 1961! Melt-hole is a crevasse that has opened up in the lower glacier, proof that Collier Flat lies on ice of the glacier, as does the rest of the ablation moraine of the lower glacier. However, the crevasse must lead to porous lavas beneath the ice, lavas formerly sealed by ice. Little White Branch continues to form changing patterns of erosion. The conical pile of gravels in the foreground came from the terminal moraine in 1961. Comparison with that photograph, shows that this debris pile has enlarged, and that several of the larger rocks have moved down hill.

the appearance of the glacier. In 1964, the snow never did melt away at the altitude of Collier.

Although the summer of 1965 started with heavy snows in the mountains, and promised to repeat conditions of 1964, a hot, relatively dry late July and August denuded the mountains of snow by early September. Another look seemed desirable, and the trip to Collier on September 9-10 produced noteworthy contrast.

Striking features of Collier Glacier, September 10, 1965 follow:

1. No lake remains.
2. White Branch is completely dry. This was true all the way to its confluence with Sunshine Creek, just before the "White Branch Crossing" on Obsidian Trail. No water was coming from the glacier into White Branch on July 23, either. Some snow-melt from the surrounding high elevations drained into the old White Branch stream-course and flowed near Sawyer's Bar. Evidence of larger amounts of water earlier, was a deposit of gravel across the lavas above Sawyer's Bar. Apparently a stream flowed over the snow and ice that then covered the lava, but could not maintain its way over the rough, porous lava after the snow melted. This stream may have come from Collier, but more likely from the melting snow of surrounding slopes.
3. Larger margins of black rock exposed on the ridge east of the Middle Sister (Black Hump), on Cirque Rock, on the ridge below Cirque Rock, and in crevasse fillings parallel to this ridge, all indicate that the surface of the glacier has lowered. The slump material from

the lateral moraine on the east side covers a much larger area. Just above this rock debris are five parallel ridges which I believe to be crevasse fillings. Only two showed in 1963, although as many as four have been exposed in lesser amounts in other years.

4. The small streams on the west side, near the lower lateral moraine, prominent in the 1963 photograph, are no longer there in 1965. The drainage that they formerly carried has been captured by the major consequent stream, Little White Branch.

The loss of snow and ice in the upper glacier is especially significant, since this means that evidence in previous years indicating that the glacier was building up at its source, is now nullified. Studies of glaciers in northern latitudes in the last several years indicate that some glaciers are building up and advancing. Definitely Collier Glacier is not!

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