



- DESCRIPTION OF MAP UNITS**
- Qa1 Alluvium
 - Qa2 Landslides
 - Qa3 Talus
 - Qa4 Undivided glacial deposits
 - Qbp Basalt of Grays Peak—Medium-gray basalt flows with sparse small olivine phenocrysts.
 - Qm Rhodacite of Manzanita—Thick, porphyritic rhodacite flow with phenocrysts of plagioclase, biotite, and hornblende and sparse hypersthene in a light-brown glassy groundmass. Mafic xenoliths are locally abundant.
 - Qr10 Rhodacite of Loomis Peak—Thick flows of porphyritic rhodacite containing large phenocrysts of plagioclase and smaller phenocrysts of biotite, hornblende, and hypersthene in a light-gray glassy groundmass. Mafic xenoliths are locally abundant.
 - Qav Andesite of Viola—Medium-gray, sparsely phytic andesite flows containing large resorbed plagioclase and hornblende phenocrysts and small augite and olivine phenocrysts.
 - Qar1 Andesite of Red Lake Mountain—Dark-gray, porphyritic flows of mafic andesite containing distinctive large phenocrysts of bright-green augite and smaller phenocrysts of plagioclase and hypersthene with abundant xenocrysts and glomeroporphyritic clots of olivine.
 - Qb1 Basalt—Thin flow and cinder cone of porphyritic basalt containing large phenocrysts of olivine and plagioclase.
 - Qhb Andesite of Huckleberry Lake—Thin flows of porphyritic mafic andesite containing variable amounts of small to large olivine and plagioclase and sparse hypersthene and augite phenocrysts.
 - Qdf Debris Flows—Sheet-like debris flows with light-orange, ashy matrix and abundant clasts of two-pyroxene andesite from Brokeoff Volcano.
 - Qrrt Rockland Tephra—Rhyolitic ashflow consisting of white loosely-aggregated ash, pumice lapilli, and sparse bombs with abundant lithic and crystal fragments. Pumice has a silky texture and contains sparse phenocrysts of plagioclase, green hornblende, and hypersthene.
 - Qapf Pyroclastic Flow Deposits—Partially welded thin pyroclastic flows consisting of collapsed pumice in a brick-red crystal-rich matrix.

- Qamd Andesite of Mt. Diller—Thin flows and interflow breccias of light-gray to black, glassy andesite containing 30X large phenocrysts of plagioclase, and 5X each of hypersthene and augite, with sparse olivine. Glomeroporphyritic clots of plagioclase, augite, and hypersthene are abundant.
 - Qadc Andesite of Digger Creek—Thick flows of light- to dark-gray, occasionally black, porphyritic andesite containing 30X large phenocrysts of plagioclase and 5X each of hypersthene and augite with sparse olivine and hornblende crystals. Glomeroporphyritic clots of plagioclase, augite, and hypersthene are abundant.
 - Qagm Andesite of Glassburner Meadows—Thick flows of light-gray porphyritic andesite containing 30X large phenocrysts of plagioclase and 5X each of hypersthene and augite with sparse olivine and resorbed hornblende crystals. Glomeroporphyritic clots of plagioclase, augite, and hypersthene are abundant.
 - Qabf Andesite of Bluff Falls—Thin flows of light- to medium-gray, porphyritic andesite containing 20X phenocrysts of plagioclase and 10X of augite and hypersthene with sparse olivine crystals. Glomeroporphyritic clots of plagioclase, augite, and hypersthene are abundant.
 - Qdtm Dacite of Twin Meadows—Medium-gray to black, hornblende-pyroxene and pyroxene dacite flows containing variable amounts of phenocrysts. Hornblende-pyroxene dacites contain 20X phenocrysts, dominantly plagioclase and hornblende with minor amounts of augite and hypersthene. Pyroxene dacites are less porphyritic and hornblende is absent or completely resorbed. Mafic xenoliths are locally abundant.
 - Qabl Andesite of Blue Lake Canyon—A small parasitic cone complex of dikes, flows, cinder agglutinate, and a small plug of nearly aphyric andesite containing small olivine phenocrysts and variable amounts of plagioclase, augite, and hypersthene xenocrysts derived from disaggregated plutonic nodules.
 - Qaht Andesite of Heart Lake—Thick flows of medium-gray, porphyritic andesite containing 30X phenocrysts of plagioclase, hypersthene, and augite. Serpentinized olivine xenocrysts are a characteristic minor component.
 - Qabc Andesite of Bailey Creek—A thick, medium-gray porphyritic andesite flow containing small plagioclase, hypersthene, and augite phenocrysts.
 - Qars Andesite of Rock Spring—A thin, medium-gray sparsely porphyritic flow of andesite containing small phenocrysts of plagioclase, olivine, and augite. Glomeroporphyritic clots of all three phenocrysts minerals are common.
 - Qaoc Andesite of Onion Creek—A thick flow of black glassy andesite containing 30X small phenocrysts of plagioclase, augite, and olivine with minor hypersthene.
 - Qam Andesite of Mill Canyon—Medium-gray andesite flows of variable phenocryst content. Most contain 15-20X small phenocrysts of plagioclase, augite, and olivine with minor hypersthene.
 - Qash Andesite of Ski Hill—Thin dark-gray to black flows of porphyritic andesite with abundant interbedded pyroclastic debris. Most contain 15-30X small phenocrysts of plagioclase, augite, olivine, and hypersthene.
 - Qdrr Dacite of Red Rock Mountain—Dome of light-gray dacite containing 3X phenocrysts of plagioclase and resorbed hornblende with minor hypersthene and quartz. The rock is typically oxidized to shades of red.
 - Qacs Andesite of Cahin Spring—Medium-gray flows of porphyritic andesite containing large, conspicuously color-zoned phenocrysts of augite with lesser amounts of hypersthene and small plagioclase. Milky quartz inclusions with fine-grained rims of augite are common.
 - Qdrp Dacite of Rocky Peak—Light-gray dacite dome and thick flow containing 20X phenocrysts of plagioclase and resorbed hornblende with minor hypersthene and augite.
 - Qamr Andesite of Martin Creek—Thick flows of medium-gray porphyritic andesite containing large phenocrysts of augite and hypersthene and small phenocrysts of plagioclase. Milky quartz inclusions with fine-grained rims of augite are common.
 - Qdgs Dacite of Crowler Spring—A thick flow or dome of light-gray porphyritic dacite containing 30X phenocrysts of plagioclase, hornblende, augite, hypersthene, olivine and quartz.
 - Qdmv Dacites of Maidu Volcanic Center—Dacite domes containing 15-25X phenocrysts, dominantly plagioclase and hypersthene or hornblende, with minor augite and occasional quartz or olivine.
 - Qrbr Rhyolite of Blue Ridge—A thick flow of sparsely porphyritic, glassy rhyolite containing phenocrysts of plagioclase and hornblende with minor hypersthene and biotite.
 - Qatm Andesite of Turner Mountain—Thick flows of light-gray porphyritic andesite containing large phenocrysts of augite and hypersthene, resorbed olivine, and abundant small phenocrysts of plagioclase. Glomeroporphyritic clots of pyroxene are abundant and characterize this unit.
 - Qamv Andesites of Maidu Volcanic Center—Thin to thick flows and breccias of porphyritic andesite containing variable amounts of phenocrysts of plagioclase, augite, hypersthene, and olivine.
 - Tcbf Basalt of Camp Forward—Thin flows of light- to dark-gray sparsely porphyritic basalt containing 10X small phenocrysts of olivine, plagioclase, and augite or 20X larger phenocrysts of augite, olivine, and plagioclase.
 - Ta Tertiary Andesite—Flows of andesite of variable phenocryst content, generally porphyritic with large phenocrysts of plagioclase, hypersthene, and augite.
- Contact—Dashed where approximate or gradational.
- - - Boundary of mapped area.



Base from United States Geological Survey
Lassen Peak, Manzanita Lake, Manton,
and Whitmore, 1956.

Geology by M. A. Clynne, 1979-1982, and
D. A. Trimble 1980-1982.

GEOLOGIC MAP OF THE WESTERN FLANK OF BROKEOFF VOLCANO AND VICINITY
BY
MICHAEL ALAN CLYNNE
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This map is preliminary and has not been reviewed
for conformity with U.S. Geological Survey editorial
standards and stratigraphic nomenclature.