All rocks may be assigned to one of three major classes: igneous, sedimentary, or metamorphic. Igneous rocks include any rocks formed either at the surface or at depth, by cooling and solidifying of magma. Sedimentary rocks form at the surface and consist of fragments of other rocks and minerals that have been compacted and cemented to form solid rock. Metamorphic rocks are any rocks that have been altered by heat and/or pressure. Within a very small area, the Summerland basin has various examples of all three rock types and is located in an Eocene volcanic *caldera* (a circular depression associated with volcanic vents). The basin is obscured to the east by the Okanagan Fault. Major local units include: massive volcanic beds (Marron Formation), trachyandesite lavas (at Rattlesnake Ridge), dome-forming dacitic lava (at Giant's Head), and fluvial and lacustrine sedimentary rocks (White Lake Formation).

STOPS OF GEOLOGICAL INTEREST
Directions: Head North from Summerland on Highway 97. Turn right at Sumac Ridge Drive. Stay to the left and park at the mailboxes. Walk across the street and look across at the cut made by the highway.

1.White Lake Formation At Sumac Ridge Drive: These sandstones and conglomerates contain many sub-tropical plant fossils. Calcite cement holds part of the rock together and mildly acidic rain can dissolve calcite allowing boulders and pebbles to fall out, forming cavities. The beds have experienced regional folding so they do not lie horizontally but dip at a steep angle.

Continue northward on Highway 97 to the scenic lookout on the right hand side.

2. Highway 97 Scenic Lookout (north of Summerland): Okanagan Lake was formed by a depression caused by the Okanagan Fault, which runs up the middle of the lake. Across the lake, Okanagan Mountain Park has been smoothed, sculpted, and elongated by the glaciers in the direction of their movement. Rattlesnake Ridge (across the highway) contains large, rounded "cannonballs" or lava bombs.

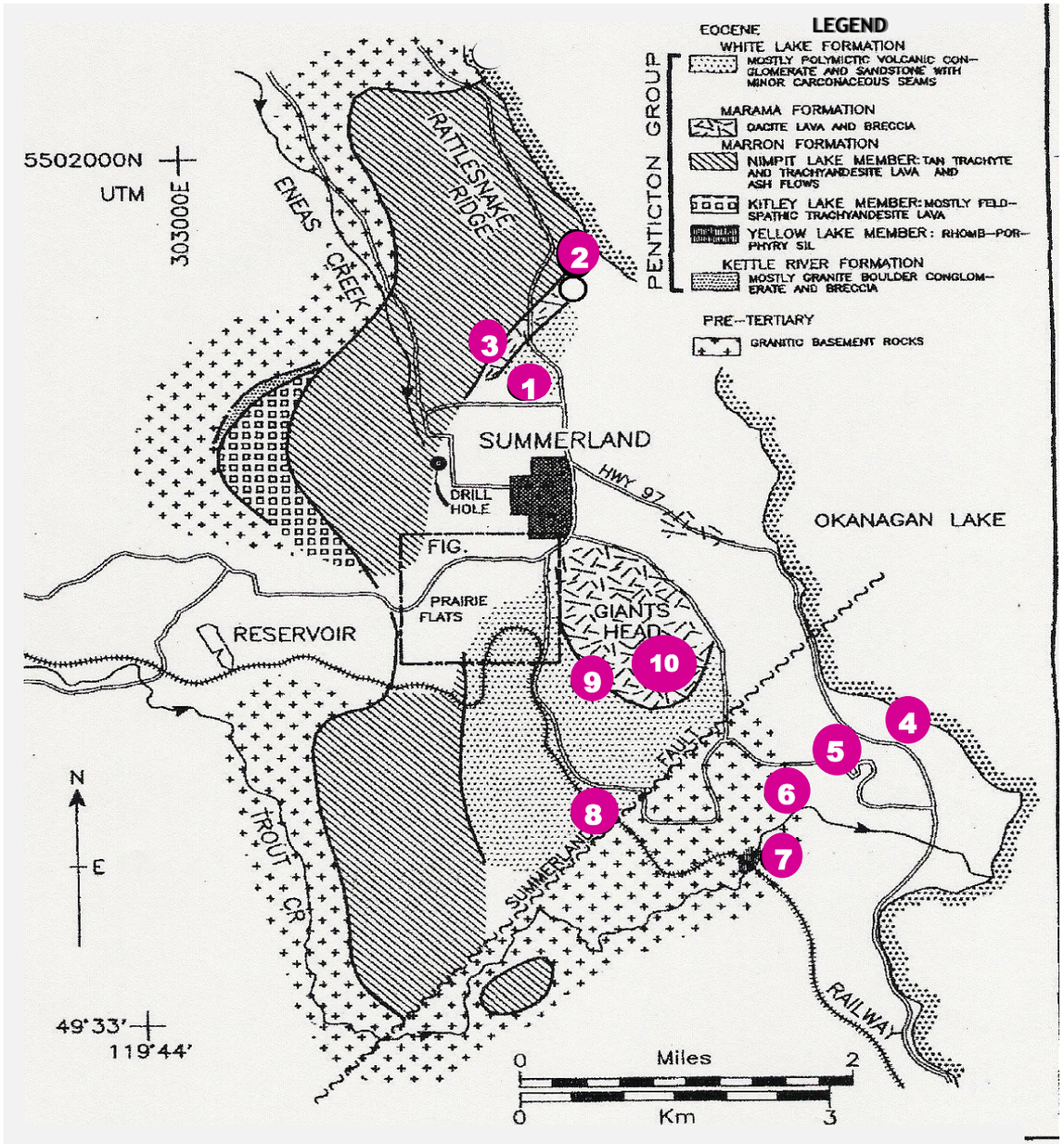
Proceed southward and take the first right at Bentley Road. Just across the cattle guard on the right is a large road cut.

3. Dacite Dike: Dikes help determine relative ages of rock formations as they cut across other rocks; the rocks which cut across must be younger than the rocks they cut. For example, the *dacite* (a fine-grained extrusive rock) is younger than the Rattlesnake Ridge *trachyandesite* (an extrusive rock with sodic plagioclase, alkali feldspar, and one or more mafic minerals).

Go back to Hwy 97 and continue south, past entrances to town, down the hill to lake level. Turn left on Thornber St. and stop at the Visitor Pullout. Look across the highway at Giant's Head Mountain.

4. Trout Creek Visitor Pullout: The last Cordilleran Ice Sheet covered the Okanagan up to 3000m deep in ice, 25,000 to 10,000 years ago. The ice took 5000 years to melt. Giant's Head Mtn is a giant *roche moutonnee* (an abraded knob carved and plucked at the base of a moving glacier). It is typically striated and has a gentle slope facing the up stream direction of the ice movement. Glacial plucking produced the "profile" on the south side fo Giant's Head Mountain. Glacial Lake Penticton was formed by an ice dam at Okanagan Falls and reached a maximum elevation of 457

Geological Features of Summerland



Church et al. 1990

British Columbia Geological Survey

Carefully drive straight across Highway 97 from Thornber Street to Arkell Road. Pull into the right side just past the intersection.

5. Silt Cliffs looking north along highway: (sedimentary) These silt bluffs are composed of silt, clay and sand related to glacial lake sedimentation. We can see mainly horizontal layering in these cliffs, so we know that these silt cliffs have not undergone extreme tectonic forces; this is basically how they looked after deposition. Varved clay (annually deposited) or rhythmic deposits are common in glacial lakes and are visible in the small hillock that comes down to the path 3/4 of the way up. The thick light coloured layers were deposited in the summer when glacial streams carried an abundant supply of silt into the lake. Thin dark layers formed during winter when streams were frozen and no new silt was being supplied. A year's deposition is represented by one light layer and one dark layer.

Continue up Arkell Rd. Turn right on Gartrell Rd. Continue past Kercher & Spruce Aves to Happy Valley Rd. Turn left. There is no pullout so be careful when stopping!

6. On top of the Silt Cliffs: on southern end of Happy Valley Rd (sedimentary, glaciation). Look east across the lake; notice the silt cliffs of Naramata. Bench levels can be correlated from one side of the valley to the other, and this gives an idea of how much larger the bottom of Glacial Lake Penticton was compared to the modern day Okanagan Lake.

Continue along Happy Valley Rd and right at its end onto Hilborn Street; then a quick left onto Canyon View Rd. Pull to the side at the Trout Creek Bridge.

7. Bridge at Trout Creek: (modern sediments, volcanic). Trout Creek partly encircles the Summerland caldera on the south. The upper section of the river west of Summerland is the source of water for municipal use. The river meanders through pre-Tertiary basement rocks and the uranium rich Yellow Lake Member as it enters the lake. As the river slows, the suspended sediments drop out of the water and build up at the mouth of the creek. A delta spreads out beyond the steep-sided valley which makes up the Trout Creek Point.

Proceed along Canyon View Road. Turn right onto Monro Ave. Stop just past the train tracks.

8. Summerland Fault:Where the railway tracks cross the road a small depression with a marsh extends to either side. This is the Summerland Fault which is a surface along which a rock body has been broken and displaced. The rock types on either side of the fault are very diferent from one another. The hill behind the railway tracks is granite, whereas the rocks on the flat side of the tracks are White Lake Formation.

Turn left at Victoria Rd South, following the railway tracks & turn right on Lenzi Street, then right on Shale Ave. Pull over half way along Shale Ave.

9. Giant's Head Mountain Columnar Dacite: (volcanic) Pull over part way along Shale Ave. and look a third of the way up the mountain. Columnar jointing of the dacite is just visible above where the trail cuts the talus slope. OR park near Shale Ave. & Alder St. and proceed to the left and upslope. Take the higher trail along the talus slope at the base of the mountain. There are three distinct lava flows. In the bottom flow, columnar jointing (a system of fractures that split a rock body into long prisms) formed as a result of contraction during cooling. Large talus rocks show the polygonal shapes of the columns.

Return to Victoria Rd S. turning right towards downtown. The take the first exit from the round-about which is Prairie Valley Rd, and at the 2nd round-about take the first exit to stay on Prairie Valley Rd. Next street on the right is Giant's Head Rd. Turn right and then right on Milne Rd. Travel uphill and turn left to the (gates) of Giant's Head Mtn Park. Drive up the winding road to the parking area. Park. Take the winding path or the straight path up to the summit.

10. Top of Giant's Head Mountain Park: (glaciation). Driving up notice the road-cuts of unsorted glacial till. Up to 56m of gravel and glacial till can cover local bedrock. As you walk up the trail to the top of the mountain notice striations, or ice scratch troughs, in the underlying rocks. The scratches show the direction of the glacier's movement (from north to south). From this vantage point is a good look at part of the caldera. Looking west is a depression surrounded by volcanic hills which is a glacial valley within the caldera. This area is called the Prairie Flats and the Prairie Creek winds through these flats. Notice the glacial moraine at the edge of the western edge of the flats.

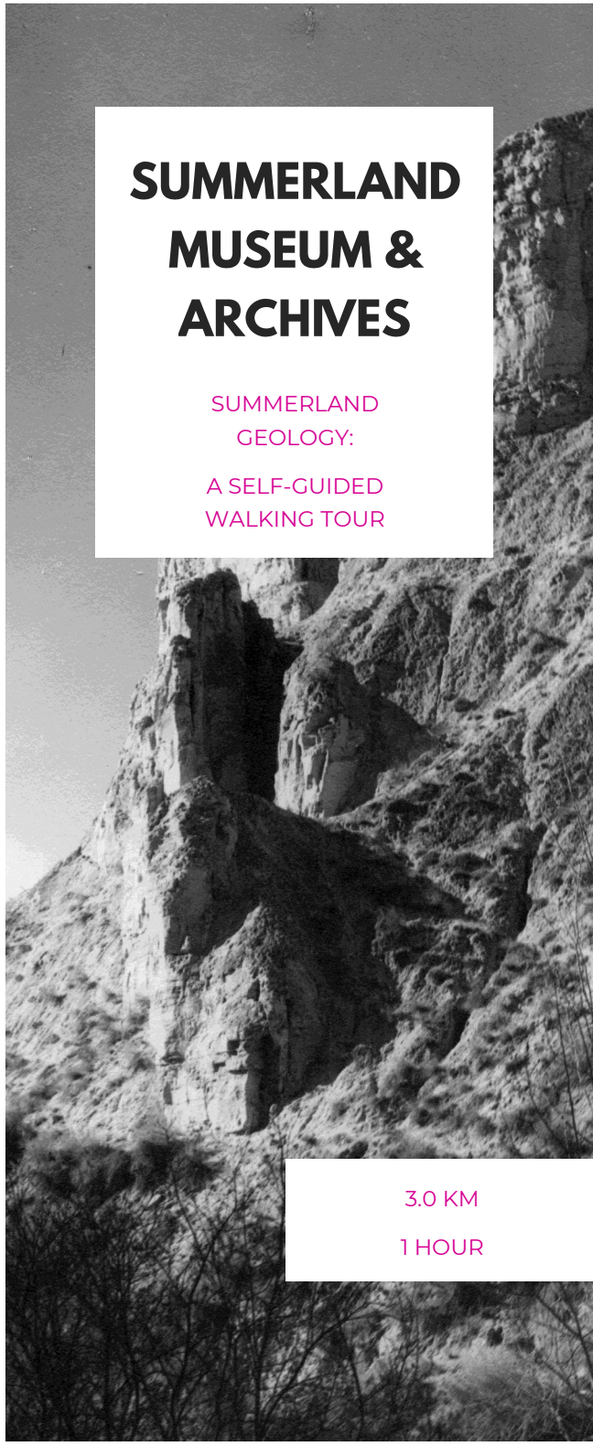
Suggested reading: Okanagan Geology South; Geologic Highlights of the South Okanagan, BC, Murray A. Roed and Robert J. Fulton, Editors. Okanagan Geology Committee, 2011.

Cannings, S. & R. The Geology of British Columbia: A Journey through Time. Greystone Books, 1999.

It's a good idea to wear hiking boots or sturdy shoes. Please respect private property.

Rev. September 2017

Summerland Museum & Archives
9521 Wharton Street, Summerland, BC
Tel: 250-494-9395
Email: info@summerlandmuseum.org
www.summerlandmuseum.org



SUMMERLAND MUSEUM & ARCHIVES

SUMMERLAND GEOLOGY:

A SELF-GUIDED WALKING TOUR

3.0 KM

1 HOUR