The South Yuba River cuts through four major **tectonic belts**; the Smartville Complex (in the Bridgeport area), the Calaveras Complex, the Feather River Belt, and the Eastern Belt. The 20-mile long scenic river canyon within the park exposes the oceanic-continental tectonic plate boundary during Jurassic and older times features **granitic plutons**, **metamorphosed rocks**, **ophiolite**, and younger sedimentary and volcanic rocks. The oldest Smartville Complex rocks are volcanic and are about 160 million years old; currently believed to have formed along the ancient west of North America. Over time, erosion by the 20-mile long South Yuba River exposed layers of different rocks that compose the canyon that you can walk along today. As you explore the Park, see if you can identify the rock types you encounter.

Glossary of Terms:

Batholith – very large pluton
Country rock – native rock
Diabase – fine-grained igneous basalt
Dike – new rock that fills cracks in existing rock
Igneous – crystalized magma
Metamorphosed – consolidated rock altered by heat and pressure
Ophiolite – sedimentary and igneous oceanic crust
Placer deposit – gold bearing gravel deposited by water and gravity
Plate Tectonics – a theory explaining the motion of the earth's crustal plates
Pluton – large rock body formed under the surface from cooling magma
Tectonic Plates – layers of rocks that have been folded and mixed together
Xenolith – rock piece introduced into magma

This was an important gold-bearing area during the California Gold Rush in the 1850's and again in the 1930's during the Great Depression. Gold ore deposits are far younger than the Smartville Complex. They formed during the 120-100 million years ago when gold-bearing fluids filled rock fractures and cooled to form gold-rich veins. Weathering and erosion freed gold from the veins and then transported the gold to creeks, streams and the Yuba River. The river emerged from the steep gorge upstream, and, as it slowed, it dropped much of the heavy gold particles; forming auriferous gravels. Gold deposits formed by these processes are known as **placer deposits**. Gold can be separated from placer deposits and concentrated using various methods, including gold panning.

The Park wishes to thank Bruce Pauly, California State College East Bay for use of his original document, which provided the foundation for this guide.
References can be found at the Visitor's Center.

Self-Guided Geology Hike of the South Yuba River State Park

Like trees, the Earth develops rings of material that form the layered stratigraphy of the crust of the Earth. These layers rest on tectonic plates that collide together to form mountains, and subduct to form seas. This topographic anatomy of the Sierra Nevada has been exposed by the erosion of the South Yuba River; just like the famous Grand Canyon, we can see millions of years of the Earth's geologic history exposed.

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(1) Along the river bed you can investigate the many types of rocks that have been eroded from the local tectonic belts and deposited where you find them today.

(2) The rock grotto consists of weathered, **metamorphosed** granitic rocks belonging to the Smartville Complex. Texturally similar to fresh granite, but metamorphism and weathering have given them a brownish, greenish appearance. Coarse visible grains indicate that these plutonic rocks cooled slowly at great depth within the Earth's crust.

Fresh exposure of the rocks a few steps further (3) illustrate the extent of the weathering on exposed granitic rocks.

(4) Past the Grotto, notice the rocks at river elevation; these large bluish rocks have whitish veins (**dikes**) cutting through them. Texturally similar to the coarse-grained plutonic rocks of the grotto, the erosional power of the river has scoured and polished the rocks, giving them a smooth, bluish appearance and feel. A nearby dike is 60 million years old, and likely intruded on the earlier Sierra Nevada **batholith**.

(2) Rock Grotto

(5) On your left is an outcrop of relatively light-colored rock with a prominent dark, vertical band. The lighter-colored rock appears to be more granitic, plutonic rock. The darker vertical rock (**diabase**) is finer grained, appears to have cut through the existing lighter host rock, thus the younger dark rock is known as a **dike**.

(6) On the left is another outcrop of diabase, the darker-colored, finer grained rock seen at the previous outcrop.

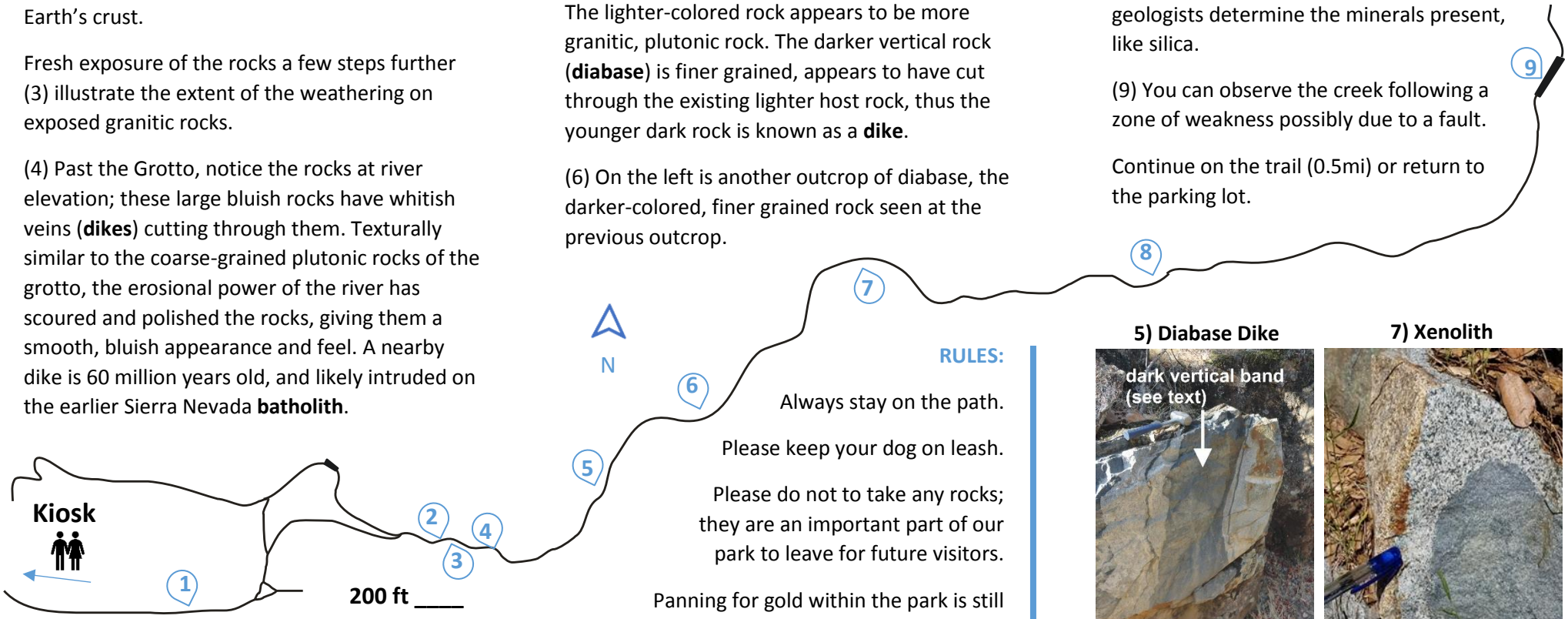
Steep rock steps down to the river provide a close view of polished bluish granitic rocks.

(7) Toward the end of the rock retaining wall is an example of a dark **xenolith**. These are probably pieces of **country rock** (older rock surrounding the magma) that fell into the newly forming granitic magma.

(8) Here you can find a good example of red lichen. Despite appearing inhospitable, plants exploit cracks in the rocks such as the Canyon Dudleya succulent, which has vibrant orange flowers late spring and early summer. Bryophytes, lichens, and mosses also make their home on rocks. Different types of lichen prefer minerals found in high concentrations in specific rocks; this can help geologists determine the minerals present, like silica.

(9) You can observe the creek following a zone of weakness possibly due to a fault.

Continue on the trail (0.5mi) or return to the parking lot.



RULES:

Always stay on the path.

Please keep your dog on leash.

Please do not to take any rocks; they are an important part of our park to leave for future visitors.

Panning for gold within the park is still allowed today, hands & pans only.

5) Diabase Dike

7) Xenolith