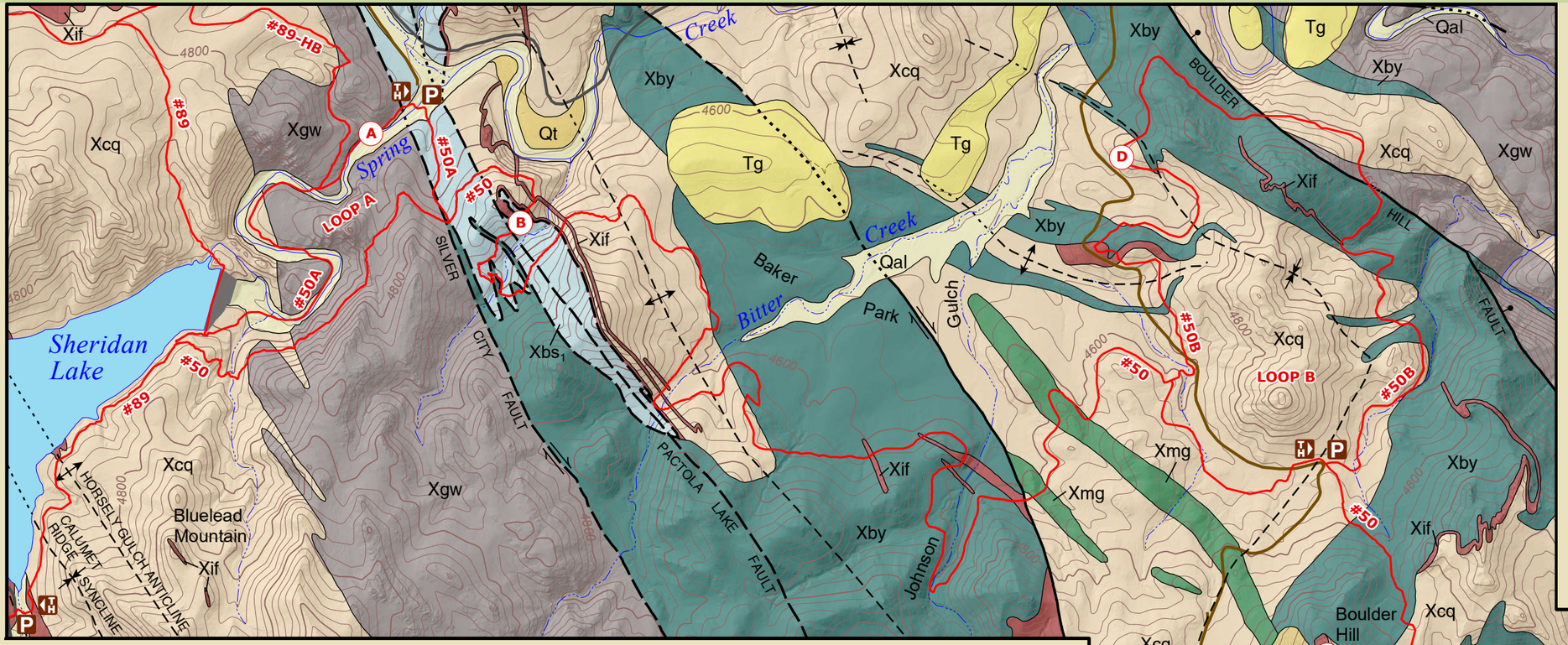
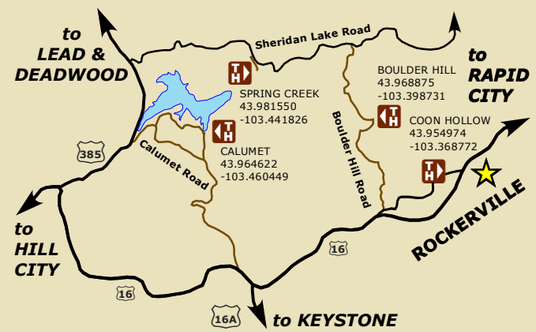
GEOLOGY ALONG THE FLUME TRAIL WITH LOOPS A, B, AND OVERLOOK
BLACK HILLS NATIONAL FOREST TRAILS #50, #50A, #50B AND #50C

Compiled by Tyler J. Myrman

SOUTH DAKOTA GEOLOGICAL SURVEY
EDUCATIONAL SERIES MAP 09
www.sdgs.usd.edu



LOCATION MAP



LEGEND

- A WAYPOINT
- TRAILHEAD
- P PARKING
- #50 TRAIL NUMBER
- Anticline / Syncline — FOLD
- Normal / Strike Slip — FAULT
- CONTACT
- TRAIL
- ROAD
- STREAM

0 1/4 1/2 Mile

CONTOUR INTERVAL: 40 FEET
TOTAL TRAILS LENGTH: 18.4 MILES

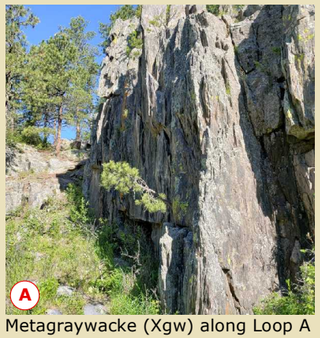
GEOLOGIC FORMATIONS ALONG THE TRAILS

Qal — **ALLUVIUM** - Clay, silt, sand, and gravel deposited in drainages during the Quaternary period (2.5 million years to present-day)

Qc — **COLLUVIUM** - Unconsolidated rock debris developed along steep slopes that is typically mixed with soil and vegetation. Deposited during the Quaternary period (2.5 million years to present-day)

Qt — **TERRACE DEPOSITS** - Unconsolidated gravels, ranging from clasts to boulders deposited in a fluvial environment up to 20 ft above present day drainages during the Quaternary period (2.5 million years to present-day)

Tg — **GRAVEL DEPOSITS** - Unconsolidated gravels, ranging from clasts to boulders, deposited in a fluvial environment up to 200 ft above present day drainages during the Tertiary period (2.5-66 million years ago). Some contain variable amounts of pinkish bentonitic beds. These deposits are possibly equivalent to the White River Group

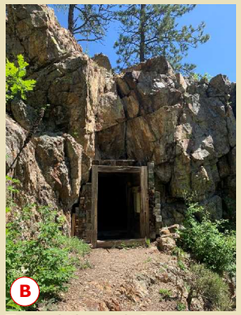


Metagraywacke (Xgw) along Loop A

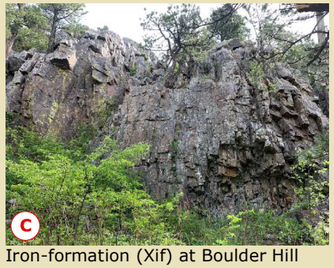
Xmg — **METAGABBRO** - Thin dark-green sills and dikes composed of amphibolite and schist. The age of the formation is inferred to be between 1.98-1.8 billion years old

Xgw — **METAGRAYWACKE** - Tan to gray schist and phyllite composed of metamorphosed graywacke units. Original graywacke was deposited in a deep marine environment before being metamorphosed. This formation is between 2.2-1.9 billion years old and can be observed at waypoint A

Xif — **IRON-FORMATION** - Black carbonate iron-formation, iron-stained metachert and phyllite. Formed from debris flow deposits and associated thermal springs before being metamorphosed. Original rock was deposited in a deep marine environment. This formation is roughly 2.2-1.9 billion years old and can be observed at waypoints B and C



Tunnel through Iron-formation (Xif)



Iron-formation (Xif) at Boulder Hill

Xby — **METABASALT** - Green to gray amphibolite composed primarily from a metamorphosed basalt flow. Pillow structures have been observed in some of the flows. This formation is between 2.2-1.9 billion years old

Xcq — **METACONGLOMERATE, QUARTZITE, SCHIST** - Gray and tan schist, quartzite and metaconglomerate. The metaconglomerate has clasts up to 3 ft across usually composed of quartzite and rarely composed of metabasalt. This formation is between 2.2-1.9 billion years old. Outcrops of quartzite from the Xcq formation can be observed at waypoint D

Xbs_1 — **BIOTITE-GARNET SCHIST AND BIOTITE SCHIST** - Gray to black schist and phyllite with garnet- and biotite-rich layers. Also contains massive quartzose beds. Generally considered a slate derived from a metamorphosed black shale. Original black shale was deposited in a deep marine environment. This formation is between 2.2-1.9 billion years old

Quartzite (Xcq) along the trail

Contact the appropriate US Forest Service (USFS) office or refer to USFS Trail Map 50 for most up-to-date trail conditions and uses

Many trails are in remote locations with limited, poor, or nonexistent cell phone reception. It is the responsibility of the induvidual(s) using this map to ensure that they are physically able to perform the hike safely and are equipped with appropriate supplies before arriving at the trailhead (including but not limited to food, water, medical/emergency supplies, and backup navigation). Be aware that trail conditions may change abruptly. Resonable efforts have been made by the South Dakota Geological Survey to ensure that this map accurately reflects the source data used in its preparation. Geology on this map is modified from *Geologic Map of the Mount Rushmore Quadrangle, South Dakota* (SDGS map publication GQ24K-26). Some base data for this map are modified from the USFS's Flume Trail Map 50: https://www.fs.usda.gov