

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science Directorate
Geologic Resources Division



Shenandoah National Park

GRI Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) geologic map for
Shenandoah National Park

shen_geology.pdf

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Geologic Resources Inventory Map Document for Shenandoah National Park

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Geologic Resources Inventory Map Information Document

This document accompanies the National Park Service (NPS) Geologic Resources Inventory (GRI) geologic map prepared for Shenandoah National Park, Virginia (SHEN). Key content from source data is presented in this document, including correlation and descriptions of geologic units, cross sections, and other relevant graphics and information.

About the NPS Geologic Resources Inventory

Background

In the late 1990s, the GRI was established as one of the 12 original baseline inventories in the NPS Inventory and Monitoring (I&M) program. This baseline inventory compiled existing information, acquired new information, and helped establish a minimum level of data across the more than 270 parks that are part of the I&M networks. The primary deliverable was a geologic map for use with GIS software. Between the 1990s and early 2020s, in addition to a geologic-GIS map, scoping meeting summaries, geologic map posters, and reports were produced for most of the 270 parks. These products are designed to enhance stewardship of park resources by providing valuable information about soils, geologic formations, hazards, and links between geology, history, and other natural resources. The geologic map for Shenandoah National Park is a baseline GRI product.

As of 2025, GRI began the process of completing baseline inventories for I&M parks and transitioning to a model of accepting park-proposed projects from all NPS units, under the Inventories & Assessment (I&A) Program. The I&A Program operates under a park-proposed inventory strategy in which parks submit natural resource inventory and assessment project proposals to the Project Management Information System (PMIS) during the Service-wide Comprehensive Call (SCC). Park staff should contact the I&A Program for instructions to submit a project proposal including basic eligibility requirements, evaluation criteria, and the approval and implementation process.

Products

All GRI products are available on the [NPS Datastore](#) accessed through the Integrated Resource Management Portal (IRMA). See the [GRI Projects collection](#) for a complete list of projects and associated products.

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that outlines a plan to produce a geologic of the park and identifies geologic resource management issues.

Geologic Maps: Digital geologic maps reproduce key elements of traditional paper maps, including notes, legends, and cross sections. The GRI uses bedrock, surficial, and special purpose maps, such as coastal or geologic hazard maps, to create GIS data that meet park needs. These data make geologic information easier to view and analyze alongside other resource management data.

For details on GIS parameters, including attribute field definitions, field codes, value definitions, and relationship rules, see the [NPS Geology-GIS Data Model](#).

Geologic Reports and Posters: GRI reports synthesizes information from the scoping meeting, follow up conference calls, and later research. They describe the parks's geologic setting, key features and processes, resource management issues, and geologic history. Most reports also include a poster showing the GRI geologic map draped over shaded relief or imagery of the park.

For more information about the Geologic Resources Inventory Program visit the [GRI webpage](#). At the bottom of that webpage is a "Contact Us" link if you need additional information. You may also directly contact the program coordinator:

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The Geologic Resources Inventory is funded by the National Park Service Inventory and Monitoring (I&M) Division; learn more about I&M and its natural resource inventories at [NPS Inventory and Monitoring](#).

GRI Products and Source Map Citation

GRI Geologic Map of Shenandoah National Park and Vicinity, Virginia (GRI MapCode SHEN)

Chappell, J. R. and R. D. Karpilo, compilers. 2026. Geologic Map of Shenandoah National Park and Vicinity, Virginia. National Park Service Geologic Resources Inventory. Lakewood, Colorado. Scale 1:100,000. <https://irma.nps.gov/DataStore/Reference/Profile/2319375>

Legacy contributors for this dataset are Phil Reiker, Jim Chappell, and Stephanie O'Meara

The source used to compile this map:

Southworth, S., J. N. Aleinikoff, C. M. Bailey, W. C. Burton, E. A. Crider, P. C. Hackley, J. P. Smoot, and R. P. Tollo. 2009. Geologic Map of the Shenandoah National Park Region, Virginia. U. S. Geological Survey, Open-File Report OF-2009-1153. Scale 1:100,000. ([Shenandoah National Park Region](#)). (GRI Source Map ID 75180).

The full extent of this source map was used, and all geologic features within this extent were captured.

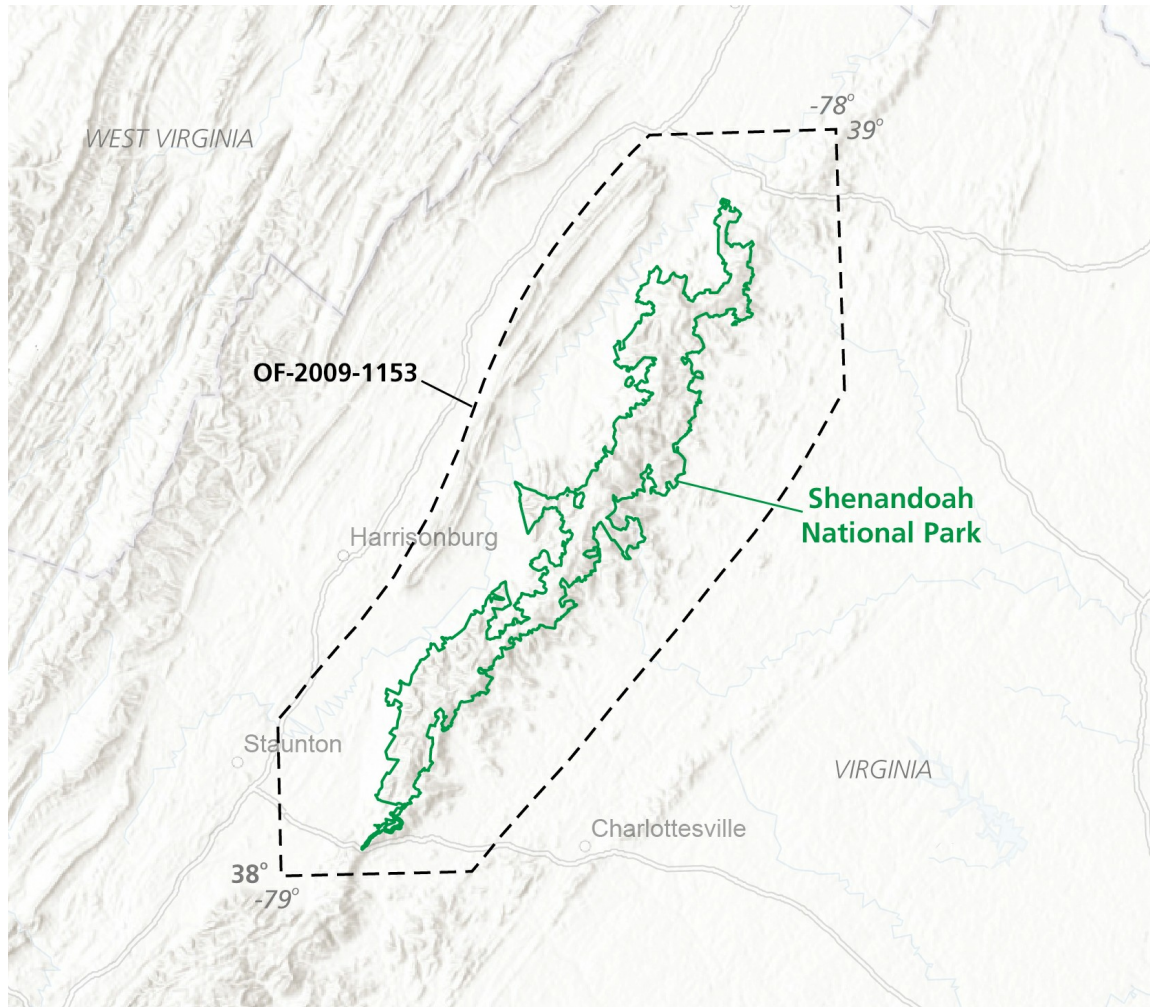
Additional information pertaining to each source map is also presented in the GRI Source Map Information Table (SHENMAP) included with the GRI Geologic data.

The GRI Geologic Report for Shenandoah National Park, Virginia (SHEN):

Thornberry-Ehrlich, T. L. 2014. Shenandoah National Park: geologic resources inventory report. Natural Resource Report NPS/NRSS/GRD/NRR—2014/767. National Park Service, Fort Collins, Colorado. <https://irma.nps.gov/DataStore/Reference/Profile/2207690>

Index Map

The following index map displays the extent of the GRI geologic map produced for Shenandoah National Park (SHEN). The boundary for Shenandoah National Park (as of July 22, 2026) is outlined in solid green. The extent of the GRI map and source map (OF-2009-1153) is outlined in dashed black line.



Index map by Jim Chappell (Colorado State University)

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. Units are listed with their assigned unit symbol and unit name (e.g., Qa - Alluvium). Information about each geologic unit is also presented in the GRI Geologic Unit Information Table (SHENUNIT) included with the GRI geologic data.

All unit descriptions from source map: [Shenandoah National Park Region](#)

Qa - Alluvium (Holocene)

Unconsolidated silt, sand, cobbles, and boulders. Located along streams, flood plains, and alluvial plains. Thickness is as much as 12 m. Alluvium in the highlands is mostly boulders and is transitional with debris fans on lower slopes.

Qdf - Debris-flow deposits (Holocene)

Debris flow scars and tracks in the Blue Ridge highlands resulted from high rainfall associated with a tropical storm in June 1995. Consists of boulder deposits on chutes in bedrock and residuum.

Qb - Quartzite block-field deposits (Holocene and Pleistocene)

Clast-supported, open framework of subangular, lichen-covered quartzite blocks and boulders. Commonly located on nonvegetated slopes of ridges underlain by quartzite of the Chilhowee Group. Thickness is variable.

Qc - Colluvium (Holocene and Pleistocene)

Clast-supported diamicton of subangular to subrounded cobbles and boulders. Grades downslope and is transitional into debris-fan deposits. Thickness ranges from a thin veneer to 30 m.

Nt - Terrace deposits (Neogene)

Unconsolidated sand, gravel, cobbles, and boulders along major rivers. Deposits range from 0 to 9 m thick on terraces to as much as 9 m above present flood plains. Includes elevated terraces as much as 60 m above present flood plains.

Np - Alluvial-plain deposits (Neogene)

Broad areas of coalescing terraces along major rivers in the lowlands east of the Blue Ridge highlands. Little to no transported material preserved. Older alluvial plains shown by pattern.

Nd - Debris-fan deposits (Neogene)

Diamicton consisting of subrounded pebbles, cobbles, and boulders, of local rocks supported in a matrix of unstratified clay, silt, sand, and pebbles. Forms fans and sheets on lower slopes and valleys. Includes terraces of debris fans as much as 36 m above the adjacent debris fans and alluvium. Thickness is as much as 30 m.

Nf - Alluvial-fan deposits (Neogene)

Unconsolidated sand, pebbles, cobbles, and boulders of quartzite and sandstone, mostly derived from the Harpers and Antietam Formations. Forms coalescing fans and sheets that extend from the lower west slope of Blue Ridge to the South Fork of the Shenandoah River. Thicknesses are highly variable as a function of the weathered state of the underlying bedrock and subsequent alluvial modification. Bedrock residuum is locally exposed beneath a thin veneer of gravel but drill-hole data and mining operations show fan thicknesses may locally exceed 150 m.

Jpd - Peridotite dike (Late Jurassic)

Elliptical peridotite dike 182 m long and 46 m wide intruding the Martinsburg Formation west of Front Royal. Consists of olivine and pyroxene altered to chlorite, phlogopite, biotite, ankerite, and talc (Young and Bailey, 1955).

Jad - Alkalic dike (Late Jurassic)

Northwest-trending vertical alkalic dikes consisting of nepheline syenite, teschenite, and teschenite-picrite intruding the Martinsburg Formation west of Grottoes (Johnson and others, 1971).

Jd - Diabase dike (Early Jurassic)

Medium- to dark-gray, moderately crystalline and equigranular, massive diabase dikes that weather to subrounded boulders with characteristic orange-brown-surface. Dikes consist of olivine-normative (olivine-plagioclase-pyroxene) tholeiitic diabase and low-titanium, quartz-normative tholeiitic diabase containing centimeter-sized clusters of calcic plagioclase phenocrysts in a fine-grained groundmass of pyroxene and plagioclase.

DSu - Devonian and Silurian rocks, undivided (Devonian and Silurian)

Includes the formations listed below:

Mahantango Formation (Middle Devonian)—Gray mudstone, sandstone, and fossiliferous shale.

Needmore Shale (Middle and Lower Devonian)—Greenish-gray, fossiliferous shale and calcareous mudstone; black shale at the base.

Tioga Ash Bed (Middle and Lower Devonian)—Gray shale and siltstone; brown-biotite-bearing, calcareous ash; and black, fissile shale.

Marcellus Shale, undivided (Middle and Lower Devonian)—Dark-gray to black, fissile shale with interbeds of gray, silty limestone and calcareous shale.

Ridgeley Sandstone (Lower Devonian)—Light-gray fine- to coarse-grained, cross-laminated, calcareous, fossiliferous, locally conglomeratic sandstone.

Helderberg Group (Lower Devonian)—Light-gray, laminated to thick bedded limestone; black, nodular chert; and white, blocky chert. Upper part is sandy.

Keyser Limestone (Lower Devonian and Upper Silurian)—Gray, fossiliferous limestone and gray, laminated limestone with black, nodular chert and white, blocky chert.

Tonoloway Limestone (Upper Silurian)—Gray, laminated limestone with mudcracks.

Wills Creek Formation (Upper Silurian)—Gray limestone and greenish-gray, calcareous siltstone and mudstone.

Bloomsburg Formation (Upper Silurian)—Red mudstone interbedded with red, ferruginous sandstone and shale.

McKenzie Formation (Upper and Middle Silurian)—Gray, calcareous shale.

Sm - Massanutten Sandstone (Silurian)

Light-gray, fine- to coarse-grained, cross laminated, locally conglomeratic sandstone.

Om - Martinsburg Formation (Upper and Middle Ordovician)

Light-brown shale, calcareous shale, and siltstone. Contains thin to medium beds of sandstone and metagraywacke in the upper part; gray, argillaceous limestone at the base.

Oeln - Edinburg Formation, Lincolnshire Limestone, and New Market Limestone, undivided (Middle Ordovician)

Gray to black, fossiliferous limestone and black shale; gray, fossiliferous and cherty limestone; and bluish-gray, micritic limestone.

Ob - Beekmantown Group, undivided (Middle and Lower Ordovician)

Light-gray, medium- to thick-bedded dolostone and laminated dolostone containing white and light-gray chert nodules. Weathered surface characterized by “butcher-block” of cross-hatched joints. Irregular bedding at top is due to collapse breccia and paleokarst.

Os - Stonehenge Limestone (Lower Ordovician)

Dark-gray, fine- to medium-grained, thick-bedded, fossiliferous limestone with minor black chert. Contains algal bioherms, intraformational conglomerates, and bioclastic and dolostone beds. Also contains minor light-gray, laminated, silty limestone with thin interbeds of platy limestone and coarse-grained bioclastic limestone; and light- to dark-gray, fine- to medium-grained, thin- to medium-bedded, fossiliferous limestone and crystalline dolostone containing gray chert nodules.

OCc - Conococheague Limestone (Lower Ordovician and upper Cambrian)

Light-gray, calcareous to dolomitic sandstone; medium-gray, fine-grained limestone with intraformational conglomerate; and light-gray, fine-grained dolostone interbedded with dark- to light-gray, laminated, algal limestone; dolomitic limestone; and light-brown dolostone and calcareous sandstone.

Ce - Elbrook Limestone (upper and middle Cambrian)

Medium-gray, thinly bedded limestone interbedded with white marble; light-brown, laminated dolostone; and thin, calcareous shale and shaly dolostone.

Cwa - Waynesboro Formation (lower Cambrian)

Consists of three units too thin to map separately, in ascending order: (1) interbedded light-olive-gray shale; light-gray, fine-grained sandstone; and medium- to dark-gray, sandy, dolomitic limestone; (2) interbedded gray, bioturbated dolostone, dolomitic limestone, and laminated limestone, with a few thin, sandy limestone beds near the middle; and (3) interbedded dusky-red shale, mudstone, and argillaceous sandstone; light-gray sandstone; and light-brown, sandy, dolomitic limestone and dolostone.

Ct - Tomstown Formation (lower Cambrian)

Light- to dark-gray limestone, dolostone, and marble. Includes four subdivisions too thin to map separately, in ascending order: (1) dark-gray, fine-grained, thin-bedded limestone with wispy dolomitic burrows that increase in abundance upsection; may include a basal 15-m-thick interval of gray to white, mylonitic marble; (2) dark-gray, thick-bedded, burrow-mottled dolostone; (3) light-gray, very thick bedded to massive, sugary dolostone with faint cross-bedding with a base that is gradational with the underlying bioturbated dolostone; and (4) a unit consisting of a lower dark-gray, bioturbated dolostone interbedded with intervals of dark-gray, laminated dolostone and dark-gray limestone, and an upper dark-gray, bioturbated, oolitic dolostone interbedded with laminated limestone and silty dolostone.

Cca - Antietam Formation (lower Cambrian)

Light-olive- to olive-gray, medium- to coarse-grained, medium-bedded, locally ferruginous, micaceous, silty metasandstone interbedded with very fine grained, silty metasandstone to sandy metasiltstone. Local ferruginous horizons with abundant botryoidal hematite and limonite are located near contact with overlying Tomstown Formation.

Cch - Harpers Formation (lower Cambrian)

Greenish- to bluish-gray quartz-chlorite-sericite phyllite and metasiltstone interbedded with thin gray metasandstone, quartzite, and meta-arkose; also includes interbedded layers of quartzite, metasandstone, and metasiltstone. Lower part locally consists of green and brown metasiltstone interbedded with fine metasandstone, but dark quartzite occurs at Blackrock. In northern part of the map, characterized by upward-coarsening sequences of bioturbated phyllite with intervals of wavy, thick laminations that grade into blocky beds of metasiltstone and fine sandstone that contain abundant burrows. Top of the lower part consists of quartzite with interbeds of metasandstone and thin dolomite. Local beds of pebbly metasandstone and metaconglomerate are in the lower part and vitreous quartzite and ferruginous arkosic metasandstone are in the upper part. The trace fossil *Skolithos linearis* appears to be limited to clean quartzite beds in the upper part.

Cchs - Harpers Formation, ferruginous metasandstone (lower Cambrian)

Maroon and dark-blue to black, ferruginous metasandstone.

Ccw - Weverton Formation (lower Cambrian)

Maroon and gray, laminated phyllite that includes beds of pebbly quartzite interbedded with siltstone, and metaconglomerate at the base. Coarse-grained, sandy and pebbly metasandstone interbedded with silvery-green, quartzose phyllite and reddish-purple, coarse-grained, thick-bedded, ferruginous metasandstone. Locally capped by light-tan to brown, pebbly metasandstone and maroon ferruginous metasandstone in the southern part of the Shenandoah National Park. In the northern part of the park, consists of upward-coarsening sequences of heavily bioturbated metasiltstone and phyllite with intervals of wavy, thick laminations; blocky, fine-grained quartzite that is commonly bioturbated with flat and wavy laminations; and a cap of crossbedded, pebbly metasandstone and metaconglomerate.

Zcp - Catoctin Formation, metavolcanic phyllite (Neoproterozoic)

Dark, variegated (gray, blue, dusky-red), mottled to lustrous phyllite containing white to green, elongated vesicles and smeared sericite and chlorite blebs.

Zcm - Catoctin Formation, metabasalt (Neoproterozoic)

Light-green to dark-greenish-gray to medium-bluish-gray, fine-grained to aphanitic, massive to schistose, amygdaloidal metabasalt composed of actinolite, chlorite, epidote, albite, and rare quartz. Contains lenses and layers of light-green, fine-grained, massive epidosite, which consists of epidote and quartz. Locally contains thin layers of phyllite and metasandstone.

Zcr - Catoctin Formation, metarhyolite (Neoproterozoic)

Light-gray to pinkish-white, very fine grained metarhyolite and tuff containing feldspar phenocrysts and centimeter-wide clots of white quartz and pale-green epidote. Occurs as a layer about 10 m thick and 5 km long in metabasalt near the base of the formation in the extreme northeast part of the map area (Lukert and Nuckols, 1976).

Zcs - Catoctin Formation, metasandstone and laminated phyllite (Neoproterozoic)

Light-greenish-gray, medium- to coarse-grained metasandstone and variegated, finely laminated quartz-muscovite phyllite. Occurs within metabasalt in the upper part of the formation from the extreme southwest part of the map area northeast for about 17 km.

Zmd - Metadiabase dike (Neoproterozoic)

Dark-greenish-gray, fine- to medium-grained, massive to schistose metadiabase composed predominantly of chlorite, albite, epidote, and actinolite. Coarse-grained variety has 2- to 8-mm-long actinolite pseudomorphs after clinopyroxene, and aphanitic variety has relict euhedral laths of plagioclase. Similar in composition to metabasalt of the Catoctin Formation; interpreted to be feeder dikes to those metabasalt flows. Includes augite-bearing porphyritic and actinolite-rich amphibolite dikes in the northeastern part of the map area (Lukert and Nuckols, 1976; Lukert and Halladay, 1980).

Zhg - Hornblende metagabbro dike and (or) sill (Neoproterozoic)

Greenish-black, medium- to fine-grained, massive to foliated dike or sill consisting of hornblende, plagioclase, epidote, and quartz. An altered ultramafic rock consisting of actinolite, epidote, chlorite, and magnetite is found locally beneath hornblende metagabbro east of Graves Mill (Bailey and others, 2003).

Zsr - Swift Run Formation (Neoproterozoic)

Pink to gray, very coarse to medium-grained, crossbedded metasandstone and quartzite containing pebbles and cobbles of quartz phyllite and sandstone; brownish-green chlorite-sericite-feldspar-quartz metagraywacke; and lustrous, silvery quartz-sericite schist. Also includes grayish-reddish-purple phyllite; grayish-green, finely laminated phyllite; dark-greenish-gray to brownish-gray, sandy, sericitic phyllite; and medium-dark-gray slate in fining-upward sequence.

Zmr - Mechum River Formation (Neoproterozoic)

Consists of four units (Bailey, Peters, and others, 2007) not differentiated on the map: (1) laminated metasiltstone and metamudstone with minor arkosic metawacke; (2) fine- to coarse-grained, graded arkosic metasandstone and metawacke interbedded with minor metasiltstone and metaconglomerate; (3) crossbedded arkosic metasandstone and metaconglomerate; and (4) laminated metasiltstone, metagraywacke, and crossbedded, arkosic metawacke.

Zra - Amissville Alkali Feldspar Granite (Neoproterozoic)

Gray, medium-grained alkali feldspar granite composed of mesoperthite, quartz, and diagnostic quartz phenocrysts. Small, irregular (miarolitic) cavities contain protruding quartz crystals.

Zrbr - Rhyolite and metaconglomerate (Neoproterozoic)

Light-gray, aphanitic, extrusive metarhyolite containing fluorite and feldspar phenocrysts; interlayered with metaconglomerate consisting of pebbles of metarhyolite and conglomerate comprised granite boulders.

Zrbd - Felsic dike (Neoproterozoic)

Light-gray, aphanitic, felsic dikes; intruded Mesoproterozoic gneisses as well as granites of the Robertson River Igneous Suite.

Zrbf - Felsite (Neoproterozoic)

Light-gray, aphanitic, extrusive felsic volcanic rock composed of phenocrysts of alkali-feldspar- dominant mesoperthite and quartz; locally displays flow banding, lithophysae (hollow, bubble-like structures composed of concentric shells of finely crystalline minerals), and small, irregular (miarolitic) cavities containing protruding quartz crystals.

Zrb - Battle Mountain Alkali Feldspar Granite (Neoproterozoic)

Gray, medium-grained alkali-feldspar granite composed of alkali-feldspar-dominant mesoperthite, and quartz; local small, irregular (miarolitic) cavities contain protruding quartz crystals.

Zrh - Hitt Mountain Alkali Feldspar Syenite (Neoproterozoic)

Gray, coarse-grained, inequigranular, locally pegmatitic alkali-feldspar syenite composed of mesoperthite (chiefly microcline), quartz, saussuritized plagioclase, hastingsite, and rare garnet.

Zrqt - Quartz trachyte (Neoproterozoic)

Dusky-red to gray, aphanitic to fine-grained quartz trachyte composed of mesoperthite and quartz with light-gray mesoperthite phenocrysts; occurs in one locality in the park, southeast of Jenkins Gap, between Mesoproterozoic rocks and Catoctin Formation. Locally layered and fragmented; interpreted to be the extrusive volcanic equivalent of Cobbler Mountain Alkali Feldspar Quartz Syenite.

Zrc - Cobbler Mountain Alkali Feldspar Quartz Syenite (Neoproterozoic)

Gray, medium-grained, and massive alkali-feldspar quartz syenite composed of conspicuous stubby, euhedral mesoperthite grains that are 2 to 4 mm in diameter and are intergrown with anhedral quartz.

Zrw - White Oak Alkali Feldspar Granite (Neoproterozoic)

Gray, coarse-grained, inequigranular alkali-feldspar granite composed of mesoperthite (chiefly microcline), quartz, and hastingsite.

Zrl - Laurel Mills Granite (Neoproterozoic)

Gray, coarse-grained, inequigranular granite composed of alkali-feldspar-dominant mesoperthite, diagnostic pale-blue quartz, hastingsite, biotite, magnetite, and titanite.

Zram - Arrington Mountain Alkali Feldspar Granite (Neoproterozoic)

Gray, medium-grained, equigranular alkali-feldspar granite composed of mesoperthite (chiefly microcline), quartz, and hastingsite, biotite, fluorite, and rare garnet and muscovite.

Zrr - Rivanna Granite (Neoproterozoic)

White, medium-grained, and equigranular granite composed of quartz, plagioclase, and alkali-feldspar-dominant mesoperthite (chiefly microcline), biotite, fluorite, and rare muscovite. Local small, irregular (miarolitic) cavities contain protruding quartz and pyrite crystals.

Zp - Garnet-graphite paragneiss (Neoproterozoic)

Rusty-brown, medium- to fine-grained, compositionally layered graphite-garnet-biotite- plagioclase-quartz gneiss. Includes garnetiferous, quartzofeldspathic, and quartzitic layers that are several millimeters thick. Almandine garnets 0.1 to 1 cm in diameter occur as aggregates; graphite occurs as small disseminated flakes. Exhibits foliation parallel to layering. Locally cut by pegmatite. Commonly retrograded to chlorite schist with Paleozoic schistosity.

Ybg - Biotite monzogranite-quartz monzodiorite (Mesoproterozoic)

Very dark gray, medium- to coarse grained, inequigranular, nonfoliated to weakly foliated biotite monzogranite and quartz monzodiorite. Biotite content is as much as 25 percent.

Yom - Orthopyroxene monzogranite-quartz monzodiorite (Mesoproterozoic)

Dark-green to black, medium- to coarse-grained, inequigranular, massive and nonfoliated, orthopyroxene-, amphibole-, and clinopyroxene-bearing orthopyroxene monzogranite and quartz monzodiorite.

Ypb - Megacrystic quartz monzonite (Mesoproterozoic)

Light- to medium-gray, medium-grained to megacrystic, weakly foliated quartz monzonite containing porphyroblasts of pink microcline.

Ybm - Megacrystic biotite monzogranite (Mesoproterozoic)

Light- to medium-gray, very coarse grained, inequigranular, weakly to moderately foliated, megacrystic biotite monzogranite. Includes variable amounts of biotite; quartz is typically blue. Intruded by comagmatic dikes of pegmatite and biotite monzogranite.

Ycg - Crozet Granite (Mesoproterozoic)

Light-gray, very coarse grained, massive, nonfoliated to moderately foliated, biotite- and clinopyroxene-bearing monzogranite. Includes megacrysts of euhedral feldspar and anhedral quartz as much as 10 cm long. Intruded by undeformed pegmatite dikes.

Yor - Old Rag Granite (Mesoproterozoic)

White- to light-gray, medium- to coarse-grained, inequigranular, massive, nonfoliated to weakly foliated, biotite-, and orthopyroxene-bearing, garnetiferous leucogranite and garnetiferous syenogranite containing gray and blue quartz grains.

Yml - Porphyroclastic metagranitoid (Mesoproterozoic)

Light-gray, very coarse grained, strongly foliated, biotite-bearing alkali-feldspar granite.

Yog - Orthopyroxene granite-monzogranite (Mesoproterozoic)

Dark-gray, medium- to coarse-grained, equigranular, weakly to strongly foliated, orthopyroxene-, amphibole-, biotite-, and garnet-bearing orthopyroxene granite-monzogranite.

Yfh - Flint Hill Gneiss (Mesoproterozoic)

Dark- to medium-gray, medium-grained, inequigranular, strongly foliated, locally migmatitic quartzofeldspathic syenogranite to monzogranite in compositional layers separated by biotite. Includes gray and blue quartz grains and blue quartz veins.

Yll - Lineated leucogranite gneiss (Mesoproterozoic)

Light-gray to tan, medium-to coarse-grained, strongly foliated, lineated leucogranite gneiss. Exhibits diagnostic stripped texture due to lineations of biotite.

Yomg - Orthopyroxene monzogranite-quartz monzodiorite gneiss (Mesoproterozoic)

Greenish-gray to black, strongly foliated, orthopyroxene-, clinopyroxene, and biotite-bearing orthopyroxene monzogranite and quartz monzodiorite gneiss. Exhibits rusty-weathered, ribbed surface and transposed leucocratic layers.

Yos - Megacrystic orthopyroxene syenogranite-monzogranite gneiss (Mesoproterozoic)

Dark-gray to dark-greenish-gray, very coarse grained, strongly foliated, orthopyroxene-, amphibole-, and clinopyroxene-bearing megacrystic orthopyroxene syenogranite-monzogranite gneiss; alkali-feldspar megacrysts are as much as 12 cm long.

Ygd - Granodiorite gneiss (Mesoproterozoic)

Light-gray, equigranular, compositionally layered, strongly foliated granodiorite gneiss that includes clots and lineations of biotite.

Yoq - Orthopyroxene quartz diorite gneiss (Mesoproterozoic)

Greenish-gray to black, medium-grained, compositionally layered, strongly foliated, orthopyroxene-, biotite-, and garnet-bearing orthopyroxene quartz-diorite gneiss.

Yon - Orthopyroxene syenogranite and monzogranite gneiss (Mesoproterozoic)

Gray, medium- to coarse-grained, compositionally layered, strongly foliated orthopyroxene-, biotite-, garnet-, and clinopyroxene-bearing orthopyroxene syenogranite and monzogranite gneiss. Exhibits transposed garnetiferous leucocratic layers.

Yod - Orthopyroxene granodiorite gneiss (Mesoproterozoic)

Dark-gray, medium- to coarse-grained, compositionally layered, strongly foliated, amphibole-bearing orthopyroxene granodiorite gneiss. Exhibits transposed leucocratic layers.

Ypg - Foliated, garnetiferous, porphyroblastic monzogranite (Mesoproterozoic)

Medium-gray, variegated, medium- to coarse-grained, biotite-bearing, moderately foliated, garnetiferous, porphyroblastic monzogranite. Contains microcline megacrysts or aggregates as much as 3 cm in diameter and distinctive clots of blue quartz.

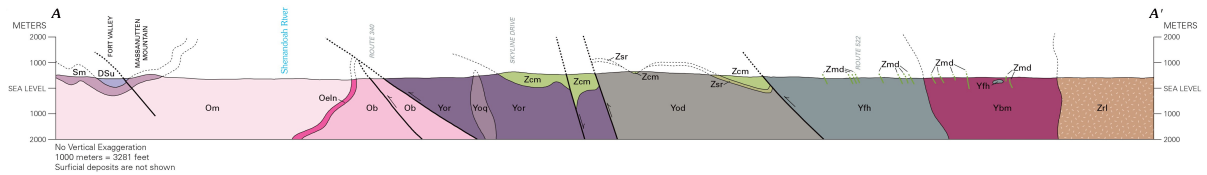
Ylg - Leucogranite gneiss (Mesoproterozoic)

Light-gray, coarse-grained to megacrystic, weakly to strongly foliated leucogranite gneiss. Composition varies and includes alkali-feldspar granite, syenogranite, and monzogranite. Intruded by medium-gray, medium-grained, equigranular, biotite-bearing, isoclinally folded leucogranite dikes. Both gneiss and dikes are in turn intruded by leucocratic pegmatites.

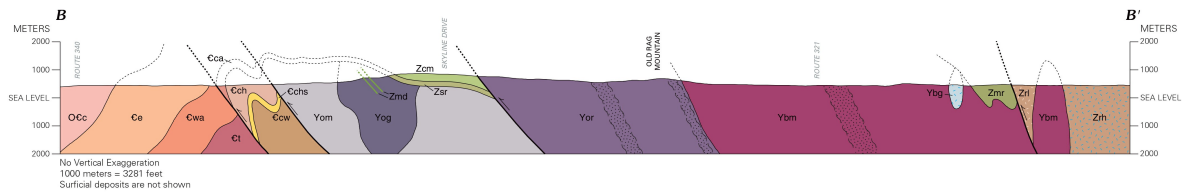
Geologic Cross Sections

The geologic cross sections present in the GRI geologic data produced for Shenandoah National Park, Virginia (SHEN) are presented below.

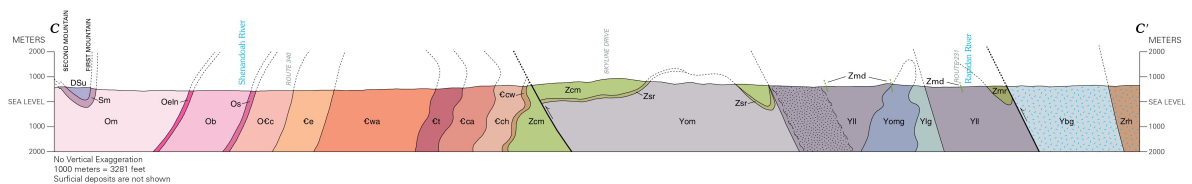
Cross Section A-A'



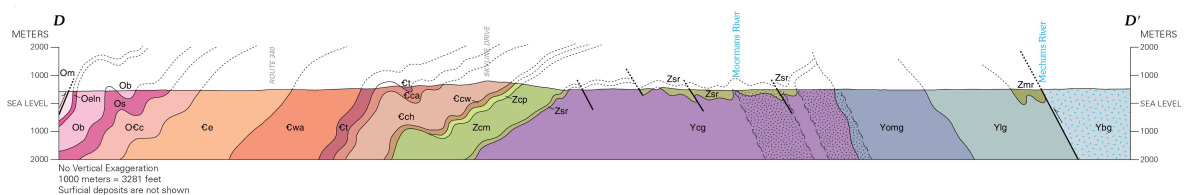
Cross Section B-B'



Cross Section C-C'



Cross Section D-D'



Cross section graphics from source map: [Shenandoah National Park Region](#).

Source Map Information

The following section presents additional information associated with source data used for this project.

Shenandoah National Park Region

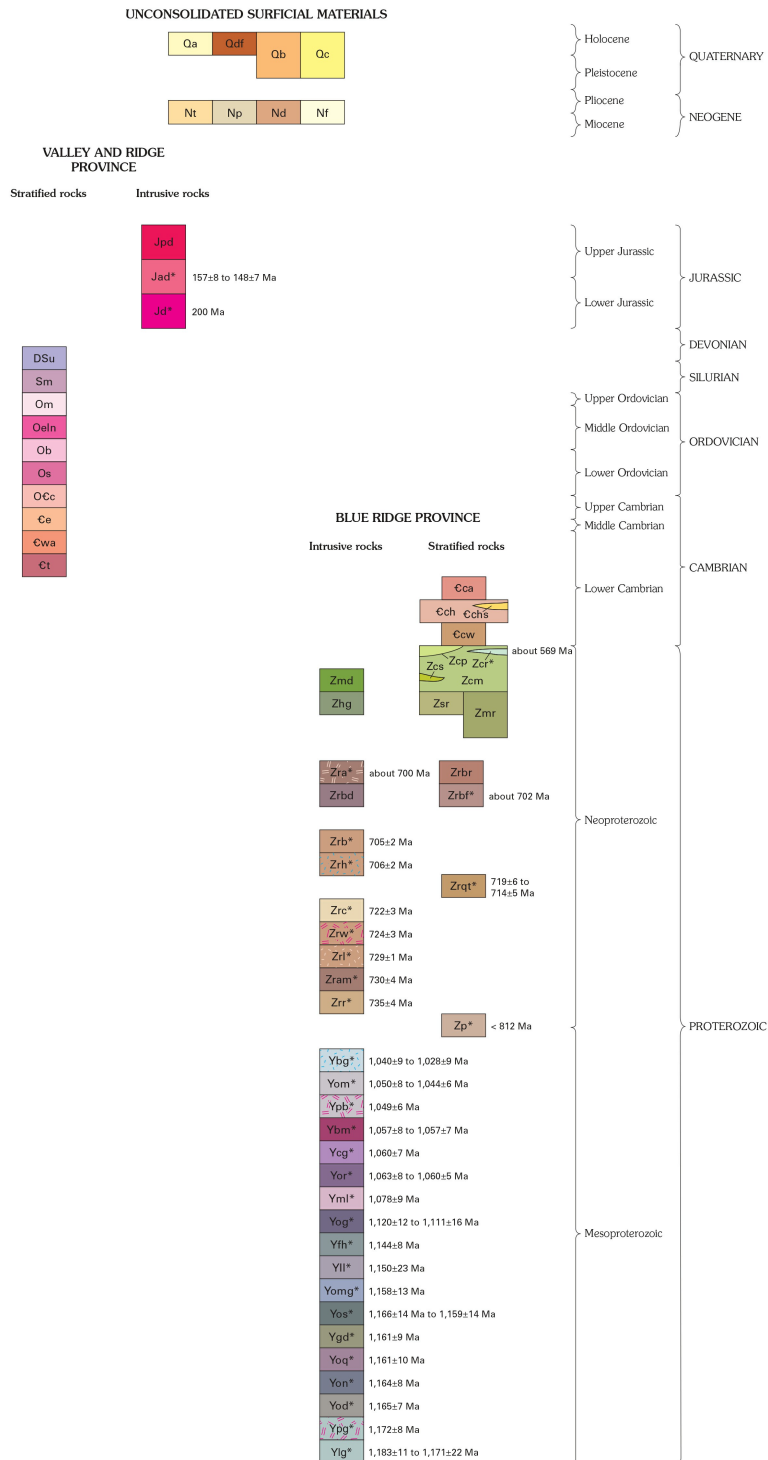
The formal citation for this source.

Southworth, S., J. N. Aleinikoff, C. M. Bailey, W. C. Burton, E. A. Crider, P. C. Hackley, J. P. Smoot, and R. P. Tollo. 2009. Geologic Map of the Shenandoah National Park Region, Virginia. U. S. Geological Survey, Open-File Report OF-2009-1153. Scale 1:100,000. (*GRI Source Map ID 75180*).

This publication, related documentation, and source GIS data can be found on the USGS publications website here: [OF-2009-1153](#)

Prominent graphics and text associated with this source:

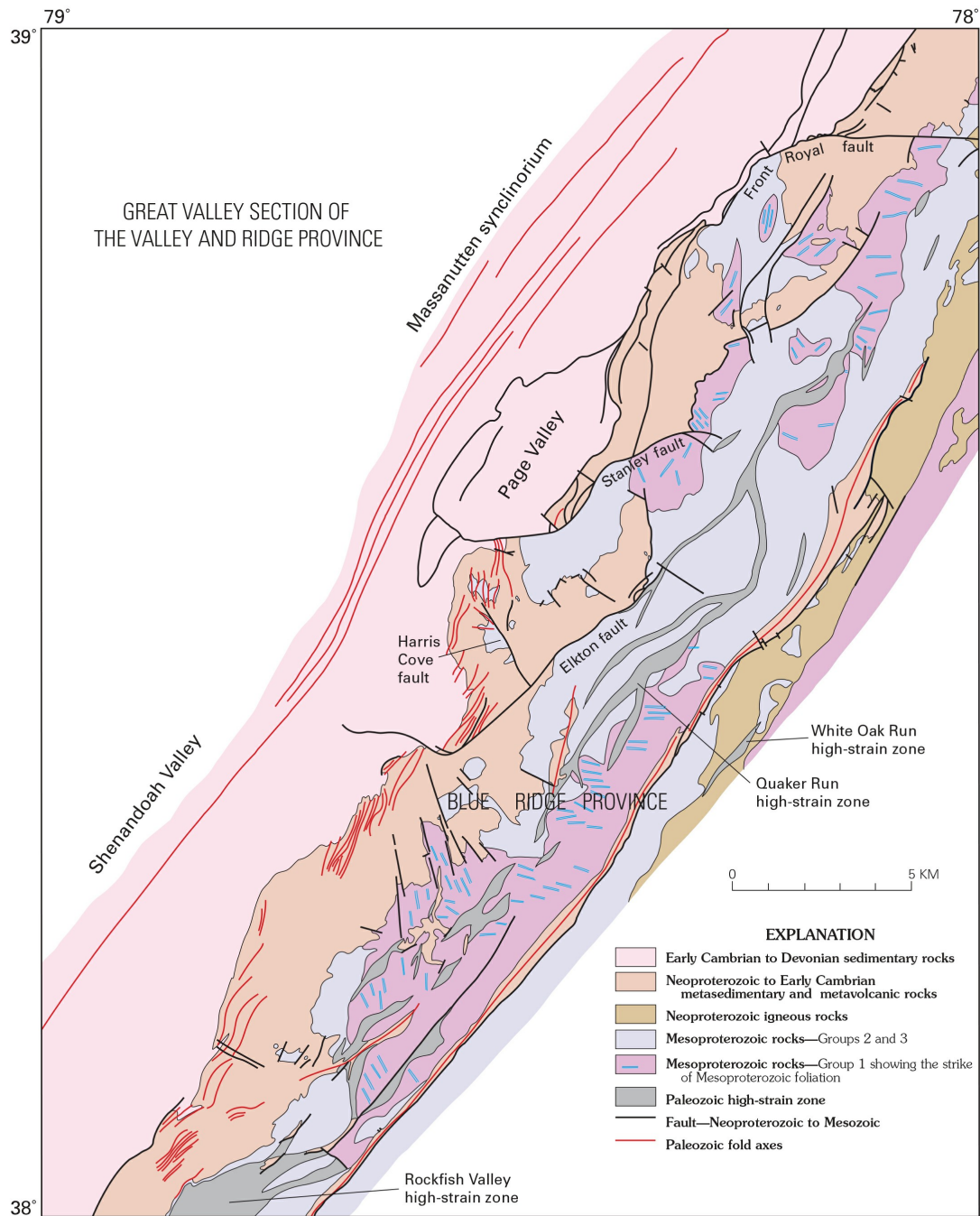
Correlation of Map Units



Units with an asterisk have been dated.

Graphic from source map: [Shenandoah National Park Region](#)

Physiographic Provinces



Map showing the major physiographic provinces and structural features of the Shenandoah National Park region.

Graphic from source map: [Shenandoah National Park Region](#)

Geologic Report

A pamphlet included with this source publication that provides a comprehensive description of the geology of Shenandoah National Park and the surrounding region of Virginia, including bedrock and surficial geologic units, their distribution and characteristics, geologic history, and the processes that shaped the present landscape is available here: [OF-2009-1153-pamphlet](#).

Report from source map: [Shenandoah National Park Region](#)

Table 1. Isotopically Dated Rocks

Sample number	Map symbol	Technique	Age, in Ma
1	Zra	TIMS	700
2	Zrbf	TIMS	702
3	Zrbg	TIMS	705±2
4	Zrqt	SHRIMP	714±5
5	Zrqt	SHRIMP	719±6
6	Zrw	TIMS	724±3
7	Zrl	TIMS	729±1
8	Zram	TIMS	730±4
9	Zp	SHRIMP	<812
10	Zp	SHRIMP	<959
11	Zp	SHRIMP	<997
12	Ybg	SHRIMP	1,028±9
13	Ybm	SHRIMP	1,030±11
14	Ybg (xenolith)	SHRIMP	1,032±10
14	Ybg	SHRIMP	1,040±9
15	Yom	SHRIMP	1,044±6
16	Yom	SHRIMP	1,049±9
17	Yom	SHRIMP	1,050±8
18	Ybm	SHRIMP	1,057±7
19	Ybm	SHRIMP	1,057±8
20	Yor	SHRIMP	1,060±5
21	Ycg	SHRIMP	1,060±7
22	Yor	SHRIMP	1,063±8
23	Yml	SHRIMP	1,078±9
24	Yog	SHRIMP	1,111±16
25	Yog	SHRIMP	1,120±12
26	Yfh	SHRIMP	1,144±8
27	Yll	SHRIMP	1,150±23
28	Yomg	SHRIMP	1,158±13
29	Yos	SHRIMP	1,159±14
30	Ygd	SHRIMP	1,161±9
31	Yoq	SHRIMP	1,161±10
32	Y8n	SHRIMP	1,164±8
33	Yod	SHRIMP	1,165±7
34	Yos	SHRIMP	1,166±14
35	Ylg	SHRIMP	1,171±22
36	Ylg (dikes)	SHRIMP	1,175±11
36	Ylg	SHRIMP	1,183±11

Table 1. Location of Isotopically dated rock in the Shenandoah National Park Region.

Uranium-lead (U-Pb) dating techniques are abbreviated as follows: TIMS, thermal ionization mass spectrometry; SHRIMP, sensitive high-resolution ion microprobe. Ages given in millions of years (mega-annum, Ma).

Graphic from source map: [Shenandoah National Park Region](#)