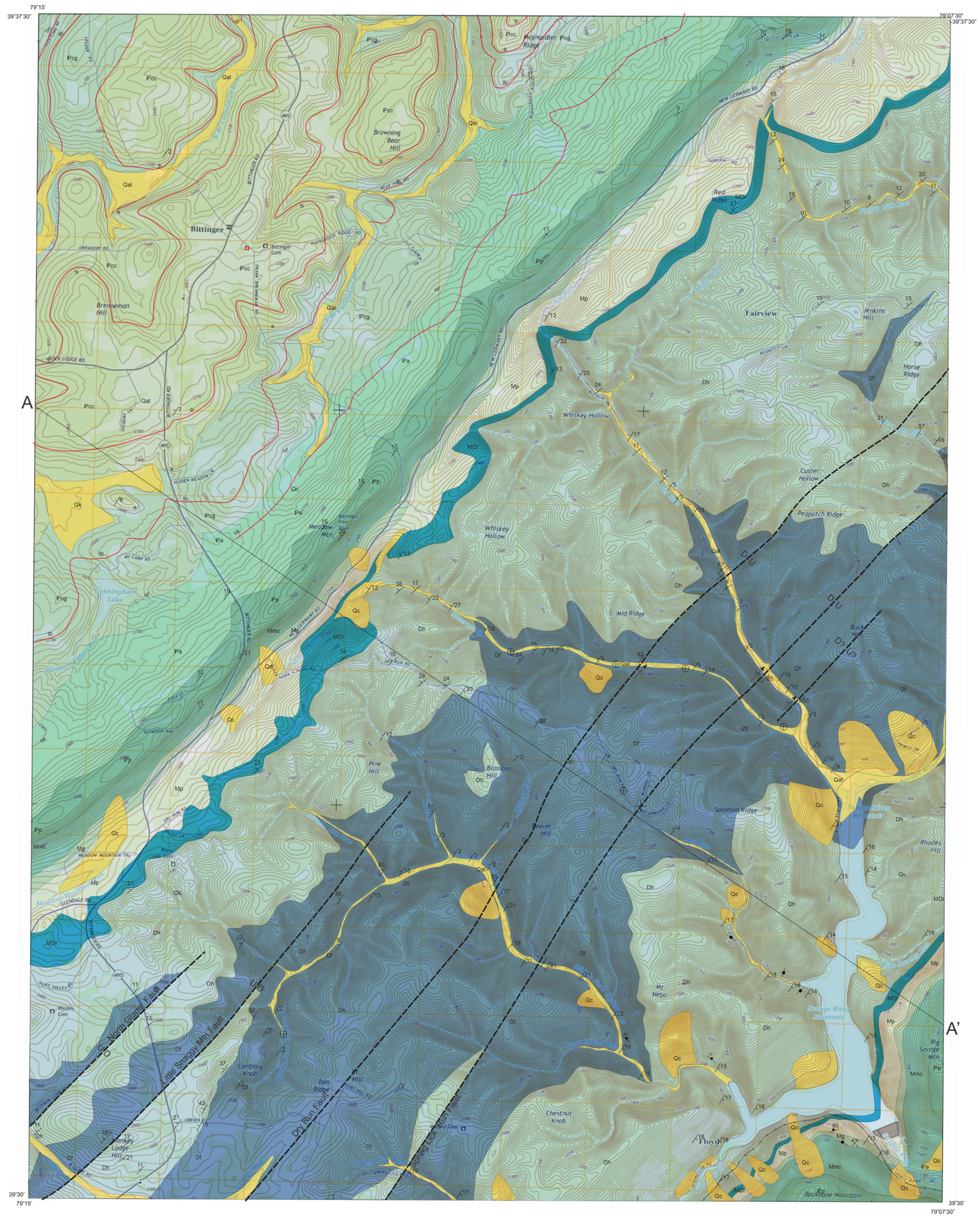


U.S. Geological Survey (USGS) US Topo 7.5-minute Series
Bittinger, MD quadrangle, 2019
Maryland State Plane Coordinate System 1983
(Projection: Universal Tranverse Mercator, Zone 17S

Geographic coordinates (latitude-longitude). Shown near corners

Reported magnetic north declination (center of Bittinger quadrangle): 9.4°W
To determine current magnetic declination see: (http://www.ngdc.noaa.gov/geomag/declination.shtml)

Geologic Map of the Bittinger Quadrangle, Garrett County, Maryland

By
David K. Brezinski
2017

Adjoining 7.5-minute quadrangles
(Bittinger quadrangle shaded)

1	2	3	1 Accident 2 Grantsville 3 Avilton 4 McHenry 5 Barton 6 Deer Park 7 Kitzmiller 8 Westernport
4		5	
6	7	8	

Scale 1:24 000

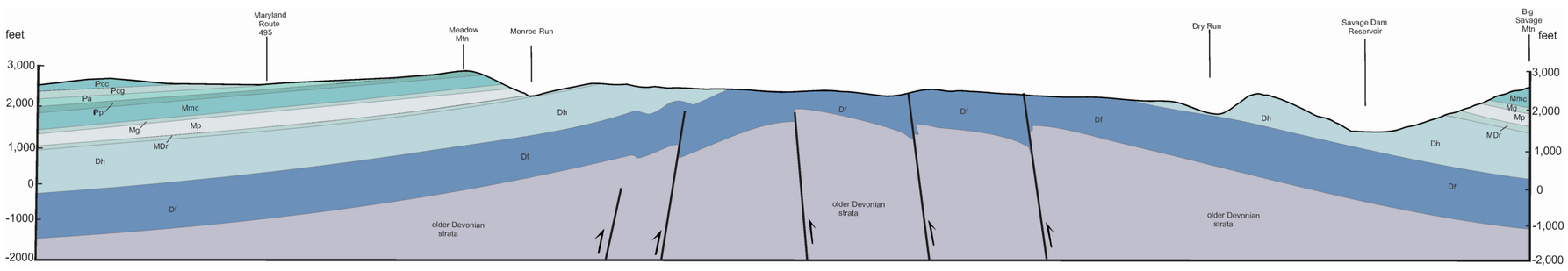
1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETERS

Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929
(To convert elevations to North American Vertical Datum of 1988, subtract 1 foot)
(To convert from feet to meters, multiply by 0.3048)

GN
(State Plane Grid North)



DESCRIPTION OF MAP UNITS

Quaternary

Alluvium (Qal)
Pebbles, cobbles and boulders that weather yellow, orange, and orange-brown. Although much of Savage River flows on exposed bedrock, adjacent mapped alluvium deposits include those formed along both modern and ancient streams. The thickness of alluvium varies from a thin veneer to more than 30 feet (10 m). These thicker accumulations tend to be concentrated where colluvium at the edge of valleys overlaps the alluvium.

Swamp (Qs)
Unconsolidated dark gray to black, organic-rich matter to peat. These materials accumulated in low-lying, poorly drained areas that are remnants of late Pleistocene glades and lakes. These sediments are water-logged during parts of the year and are provide poor agricultural lands. Thickness ranges from less than three feet to nearly 10 feet (1 – 3 m).

Colluvium/Landslide (Qcl)
Unconsolidated and unsorted diamicton of boulders, cobbles, pebbles, sand and mud that accumulate on steep slopes or at the base of slopes as the result of mass movement. These accumulations typically have an undulating or wavy upper surface and thin upslope. Thickness ranges from several feet on steep slopes to more than 50 feet (3 to 15 m).

Pennsylvanian

Conemaugh Group
Interbedded, sandstone, shale, siltstone, and light gray nonmarine limestone. The aggregate thickness of the Conemaugh Group is 800 to 900 feet thick (245 to 275 m), approximately 700 feet (215 m) of the group are exposed in the Bittinger Quadrangle.

Casselman Formation (Pcc)
Interbedded, tan, medium- to coarse-grained, locally conglomeratic, cross-bedded sandstone, reddish gray mudstone, medium gray, silty shale, siltstone, and light gray, nonmarine limestone. The Barton (b) coal bed is the only coal bed mined in this interval in the Casselman basin.
Approximately 200 feet (61 m) of the Casselman Formation are preserved in the Bittinger Quadrangle.

Glenshaw Formation (Pcg)
Interbedded, gray, tan-weathering, micaceous, medium- to coarse- grained, cross-bedded sandstone containing abundant coaly plant fragments, reddish and reddish gray, silty shale, siltstone, light gray bioturbated nonmarine limestone, and thin, dark gray, fossiliferous marine shale. The base of the Glenshaw Formation is the top of the Upper Freeport coal bed, and the top of the formation is the top of the Ames marine shale.
Several marine intervals are underlain by mined coal beds. These are the Brush Creek (bc), Lower Bakerstown (lb), and Ames (a) coals. The Glenshaw Formation is approximately 350 feet (105 m) thick.

Allegheny Formation (Pa)
Interbedded, medium to dark gray shale and siltstone, and tan to light gray, cross-bedded sandstone, with thin claystone near the base, and several mineable coal beds. The top of the formation is at the top of the Upper Freeport (uf) coal bed and the base of the formation is the top of the Homewood Sandstone member of the underlying Pottsville Formation. The Upper Kittanning (uk) and Lower Kittanning (lk) coal beds are locally mined. The Allegheny Formation is between 200 to 250 feet thick (61 to 76 m).

Pottsville Formation (Pp)
Dominantly tan to light gray, medium- to coarse-grained, cross-bedded sandstone and conglomeratic sandstone with abundant coaly plant fragments and subordinate intervals of dark gray, coaly shale, siltstone, and thin coal beds. The massive, light gray, highly cross-bedded Homewood Sandstone Member constitutes a resistant, mappable sandstone layer at the top of the formation, while the conglomeratic Sharon Member forms a massive unit at the base. Total thickness for the unit is 180 to 200 feet (55 to 61 m).

Mississippian

Mauch Chunk Formation (Mmc)
Interbedded, reddish brown shale, variegated, mudstone and siltstone, and reddish brown to greenish gray, medium-grained, micaceaous sandstone. Sandstone intervals are cross-bedded, exhibit sharp bases, and fine upsection. Several thin greenish gray, marine calcareous shale to argillaceous limestone units are present near the base of the formation. The Mauch Chunk Formation is approximately 600 feet thick in Allegany County and thins westward to 300 feet in thickness in western Garrett County (90-180 m).

Greenbrier Formation (Mg)
Light gray, cross-bedded, sandy limestone to calcareous sandstone at the base (Loyalhanna Member). The Loyalhanna Member is overlain by interbedded, reddish, fossiliferous mudstone, and tan to reddish brown, fine-grained sandstone, and reddish brown siltstone and variegated shale (Savage Dam Member). The Savage Dam Member is succeeded upwards by thin- to medium-bedded, light to medium gray, argillaceous, fossiliferous limestone at the top of the formation (Wymps Gap Member). The Greenbrier Formation is 150 to 200 feet thick (45 - 60 m).

Purslane Formation (Mp)
Light gray, tan, and locally reddish brown, coarse-grained to conglomeratic, thick-bedded to cross-bedded sandstone, thin beds of gray shale, and coaly shale. In the Bittinger Quadrangle the base of the Purslane Formation is mapped at the base of a resistant, massive, buff weathering, pebbly, conglomeratic sandstone above the bioturbated marine sandstone and variegated shales of the Riddlesburg Member of the Rockwell Formation. The Purslane Formation is 250 to 300 feet thick in western Garrett County (75 - 90 m).

Rockwell Formation (MDr)
Interbedded, greenish gray, argillaceous, bioturbated sandstone, and reddish gray to gray, coaly siltstone and shale and tan lenticular sandstone. The greenish gray bioturbated sandstones at the base of the formation (Oswayo Member) sharply overlie the reddish strata of the Hampshire Formation. These basal marine strata are overlain by a light gray to tan, thin- to medium-bedded, cross-bedded, fining upward nonmarine channel sandstone equivalent to the Cussewago Sandstone of Pennsylvania and then rooted gray mudstone. The top of the formation consists of burrowed, tan sandstone and greenish gray marine shale of the Riddlesburg Member. The Rockwell Formation is between 150 and 200 feet thick in Garrett County (45-65 m).

Devonian

Hampshire Formation (Dh)
Interbedded, reddish gray, reddish brown, and brownish red, locally greenish gray, cross-bedded, fining upward, lenticular sandstone; reddish brown micaceous siltstone, shale, and red-brown rooted claystone. The Hampshire ranges from approximately 1,600 to 2,000 feet (500 600 m) in Garrett County but only the upper 700 to 900 feet (215 – 275 m) of the formation are present in the Bittinger Quadrangle.

Foreknobs Formation (Df)
Interbedded, olive gray, medium- to coarse-grained, cross-bedded, bioturbated sandstone; greenish gray to dusky red, fossiliferous shale and siltstone. Top of the formation is marked by a thick-bedded, pebbly, cross-bedded, light gray to white (>30 feet, 10 m) sandstone herein considered equivalent to the Pound Sandstone Member of the Valley and Ridge Province. The base of the formation is not exposed in the Bittinger Quadrangle, but elsewhere the base is marked by down section gradation from interbedded sandstone and shale to primarily shale of the underlying Sherr and Brallier formations. The Foreknobs Formation is approximately 1,500 feet (450 m) thick in Garrett County, but thickens to more 2,000 feet (600 m) in Allegany County, Maryland.

Explanation of Map Symbols

A — A' Cross section line

Contacts
Geologic contacts; definite, approximate, and concealed location

Planar Features
Inclined bedding, strike and degree of dip shown
Horizontal bedding
Vertical bedding
Inclined joint, strike and degree of dip shown
Vertical joint, strike shown

Faults
Fault; approximately located. D refers to down thrown side, U to the up thrown side.

Folds
Minor anticline

Coal Beds
Projected outcrop trace of coal bed

Quarry

Base Map Symbols

Transportation
Primary route, class 1 (divided lanes)
Primary route, class 1 (undivided)
Secondary route, class 2
Light duty road or street, class 3

Topography
Topographic index contour (100- ft interval)
Topographic intermediate contour (20-ft interval)

Hydrography
Stream
Water body (eg. lakes, ponds, rivers)

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Geologic field mapping conducted in 2016-2017.

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