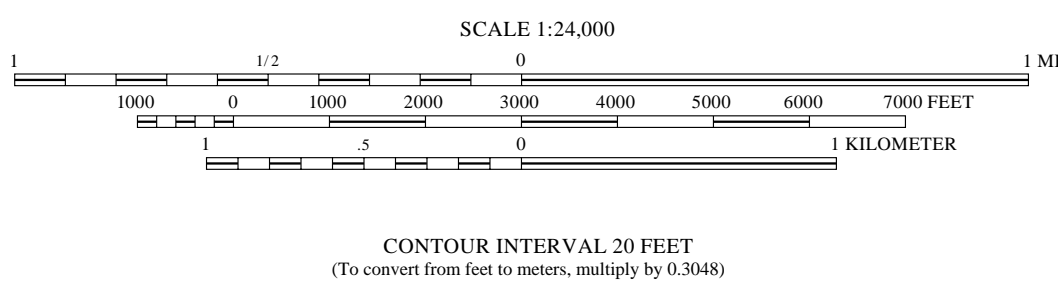
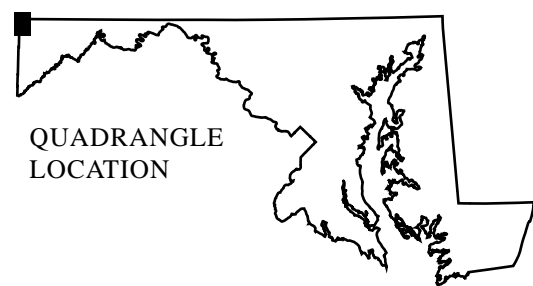


U.S. Geological Survey (USGS) US Topo 7.5-minute series  
Coordinate System: NAD 1983 (2011) StatePlane Maryland FIPS 1900 (US Feet)  
Projection: Lambert Conformal Conic  
Horizontal Datum: North American Datum 1983 (2011) [NAD 1983 (2011)]  
Vertical Datum: North American Vertical Datum 1988 (NAVD88)  
Geographic coordinates (latitude-longitude) shown near corners

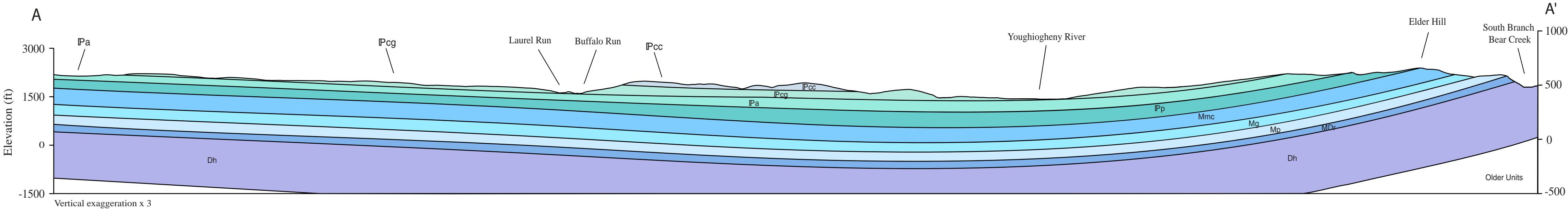
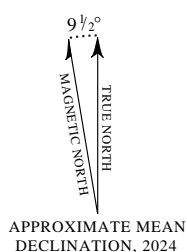
## Geologic Map of the Maryland Portion of the Friendsville Quadrangle, Garrett County, Maryland

by  
**Rebecca Kavage Adams and David K. Brezinski**  
2025



1	2	3
4	5	
6	7	8

1. Fort Necessity  
2. Ohioyle  
3. Confluence  
4. Brandonville  
5. Accident  
6. Cuzzart  
7. Sang Run  
8. McHenry  
Adjoining 7.5' quadrangle names  
(Friendsville quadrangle shaded)



### Description of Map Units

Quaternary	Qal	<b>Alluvium</b> Unconsolidated clay, sand, silt, pebbles, cobbles and boulders. Olive gray to medium dark gray, weathering moderate brown. Finer alluvium such as sand, silt and gravel underlies many of the lower gradient streams, while steeper streams are frequently floored by bedrock or locally derived sandstone cobbles and boulders. Valley floors are narrow in the steep terrain of resistant sandstones (Pottsville Formation) and coarse colluvium is transitional with alluvium. Floodplains develop smoothly on the less resistant strata of the Allegheny Formation and Conemaugh Group. Total thickness ranges from a thin veneer to 15 feet (5 m).
	Qc	<b>Colluvium</b> Unconsolidated cobbles, boulders and large blocks of sandstone and conglomerate. Light olive gray to yellowish gray. Typically derived from massive Pottsville and Allegheny Formation sandstones that were transported by gravity, debris flow, and freeze-thaw processes. Abundant on steeper slopes adjacent to the Youghiogheny River and South Branch Bear Creek. Includes boulder streams and boulder fields. Thickness is estimated at 3 to 50 feet (1-15 m).
	Qps	<b>Peatland and swamp deposits</b> Peat, clay and sandy clay. Beneath modern peat is clay and sandy clay ranging in color from light brown to brown with plant debris and wood fragments. Deposits are located west of the Youghiogheny River south of the town of Friendsville. Total thickness estimated at 10 feet (3 m).
	Qt	<b>Terrace deposits</b> Very poorly sorted clay, sand, pebbles, gravel and boulders from 55 to 80 feet (17-25 m) above the Youghiogheny River. Clasts are moderately well rounded to well rounded. Thickness is estimated at 10 feet (3 m).
Pennsylvanian	Pcc	<b>Conemaugh Group</b> <b>Casselman Formation</b> Shale, sandstone, siltstone, limestone and coal. Shale is predominantly medium to dark gray and found in association with coal and clay layers. Shale is predominantly medium to dark gray and found in association with coal and clay layers. Sandstone is light olive gray and thin- to thick-bedded with occasional cross bedding. Important coals include: Barton (b) and Wellersburg (w) (Lower Friendsville coal of Jacobsen and Lyons, 1985). Marker sandstone units include the Grafton Sandstone above the Ames marine horizon and the Morgantown Sandstone above the Barton coal bed. The base of the formation is mapped at the top of the Ames marine horizon. The top is not present in the Friendsville Quadrangle; thickness is 100-150 feet (30-45 m).
	Pcg	<b>Glenshaw Formation</b> Shale, sandstone, siltstone, limestone, coal and redbeds. Shale is medium gray to black, thinly bedded, fissile, typically found in association with coal and clay layers. Coarse-grained olive gray sandstones weather yellowish brown with black, orange-stained, pitted surfaces. Some tabular cross bedding and massive conglomeratic layers present. Important coals include: Brush Creek (bc), Lower Bakerstown (lb) and Ames (a) (Harlem coal of Jacobsen and Lyons, 1985). Marker sandstone units include the Upper Mahoning Sandstone above the Upper Freeport coal bed, the Buffalo Sandstone above the Brush Creek coal bed, and the Salsburg Sandstone above the Lower Bakerstown coal bed. Marine horizons are present above the Brush Creek and Ames coal beds and limestone (Myersdale Limestone of Jacobsen and Lyons, 1985) was quarried on the western edge of the Friendsville Quadrangle. The base of the formation is placed at the top of the Upper Freeport Coal. Total thickness is 350-425 feet (100-125 m).
	Uf	<b>Allegheny Formation</b> Sandstone, conglomerate, shale, coal and underclay. Interbedded sandstone and conglomerate intervals are very light to medium light gray, thick-bedded to massive with white quartz pebbles. Tabular cross bedding and iron staining are common and iron banding is occasionally present. Erosional channel bases have abundant plant fossils, black to brown iron staining, and stylolites. Shale is medium gray to black, thinly bedded, fissile, typically found in contact with coal and clay layers, and capped by resistant sandstone layers. Two mineable coals are mapped (from top): Upper Freeport (uf) and Upper Kittanning (uk). The Upper Freeport is the most persistent and commonly mined coal bed in the Youghiogheny basin. The base is mapped on the top of the Homewood Sandstone. Total thickness is 200-250 feet (60-75 m).
	Pp	<b>Pottsville Formation</b> Sandstone and conglomerate, with minor shale, coal underclay. Sandstone and conglomerate are light olive gray and thin-bedded to massive. Tabular cross bedding, erosional bases, and fossil plant fragments are common. The Homewood Sandstone, present at the top of the formation, forms ledges and colluvial slopes in the southern portion of the Friendsville Quadrangle in South Branch Bear Creek and the Youghiogheny River and largely covers underlying lithologies. No mineable coals are mapped in the Friendsville Quadrangle. The Pottsville Formation rests unconformably on the Mauch Chunk Formation. The base is mapped on the disappearance of olive green sandstone and appearance of red and green shale or paleosol. Total thickness is 150-200 feet (45-60 m).
Mississippian	Mmc	<b>Mauch Chunk Formation</b> Shale, siltstone, sandstone and limestone. Shale is reddish gray, olive green, thin-bedded and fissile with root casts, and weathers easily to reddish gray soil. Siltstone and sandstone are thin- to medium-bedded, light olive gray, argillaceous, micaceous, and frequently cross bedded in multi-stacked sandstone layers that outcrop as small ridges on hillsides and bedrock steps in streams. Thin fossiliferous shales and limestones of the Reynolds Member occur near the base of the formation. The base of the formation is mapped in red and green shale above the Wymps Gap Member of the Greenbrier Formation. The only exposure is in the South Branch Bear Creek valley. Total thickness is 450 feet (150 m).
	Mg	<b>Greenbrier Formation</b> Limestone, shale, siltstone and sandstone. Four members are recognized but not mapped (Brezinski, 1989). The basal Loyalhanna Member is a reddish gray to light gray, arenaceous limestone with large-scale cross bedding accentuated by weathering. It is 50 feet (15 m) thick. The overlying Deer Valley Member is a light olive gray, massive, crystalline limestone with white to pink calcite veins and slickensides. It weathers to moderate yellowish brown and thin siltstone beds occur every 4-6 inches (10-15 cm). It is 15 feet (5 m) thick. The Savage Dam Member overlies the Deer Valley Member and is mostly reddish gray, grayish green, thin-bedded siltstone and variegated shale with mudcracks and light gray to white fine-grained sandstone. Sandstone layers are pale yellowish brown to yellowish gray, thick to massive, cross bedded, and calcareous. The member is 75 feet (25 m) thick. The uppermost unit of the Greenbrier Formation is the Wymps Gap Member, which is light olive gray to medium dark gray, shaly to argillaceous limestone with abundant brachiopod, bryozoan, and crinoid fossils. Bedding is thin to massive, ripple laminated, and sometimes nodular. A distinct fetid odor emerges upon breakage of some units and white calcite slickensides are present. The Wymps Gap Member is 45 feet (14 m) thick. The base of the formation is mapped at the base of the Loyalhanna Member. This unit is found in small historic quarries above South Branch Bear Creek. The Wymps Gap Member was quarried historically for lime on the east side of South Branch Bear Creek. Total thickness is 185 feet (56 m).
	Mp	<b>Purslane Formation</b> Sandstone and conglomerate. Sandstone is predominant in the upper portion of the formation and is light olive gray, thin- to medium-bedded, flaggy, and weathers moderate brown. Some layers are cross bedded with erosional bases and shale rip-up clasts. The base of the formation is a massive yellowish gray to very pale orange conglomerate with rounded clear to white quartz pebbles ranging from 0.3-2 inches (0.5-5 cm). Occasional white, friable beds are present. The base of the formation is mapped below this massive conglomerate, which forms ledges and conglomerate block fields. The Purslane Formation appears in the southeast section of the quadrangle. Total thickness is 250-300 feet (75-90 m).
	MDr	<b>Rockwell Formation</b> Shale, siltstone and sandstone. Siltstone and sandstone are olive green to yellowish gray, thin- to thick-bedded, cross bedded and burrowed. Shale is olive gray to black and thin-bedded with brachiopods, indeterminate bivalves and coaly plant fragments. The base of the Rockwell Formation is mapped where the tan bioturbated sandstones of the Rockwell Formation become prevalent over red shales of the Hampshire Formation. Equivalent to lower portion of the Price Formation in West Virginia. Total thickness is 150-200 feet (45-65 m).
Devonian	Dh	<b>Hampshire Formation</b> Shale, siltstone and sandstone. Shale is reddish gray, greenish gray, thin-bedded, and hackly with root casts. Siltstone and sandstone are olive green and reddish gray, cross bedded, and blocky. Where covered, the Hampshire Formation is mapped on the presence of reddish gray soil. The base is not present in the Friendsville Quadrangle. Equivalent to the Hampshire Group in West Virginia. Thickness exposed in the Friendsville Quadrangle is 50-100 feet (15-30 m).

### References

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### Explanation of Map Symbols

A — A' Cross section line		Planar Features	
Contacts		Multiple measurements at a single locality	
-----	Geologic contacts; approximately located, dotted where concealed	30°	Inclined bedding; showing strike and dip
⊕	Faults	⊕	Horizontal bedding
30°	Small, minor inclined fault; showing strike and dip	↘	Inclined joint
40°	Small, minor reverse fault; showing strike and dip	⚡	Vertical joint
⚡	Folds	⚡	Other Features
+	Small, horizontal anticline; showing strike	⚡	Quarry, inactive
+	Small, horizontal syncline; showing strike	x	Mine prospect or adit, inactive
20°	Small, plunging anticline; showing strike and plunge	—	Coal Beds
57°	Small, plunging syncline; showing strike and plunge	uk	Projected outcrop trace of coal bed, dotted where concealed

### Base Map Symbols

Transportation		Topography	
—	Primary route, class 1 (divided, lanes separated)	—	Topographic index contour (100-ft interval)
—	Primary route, class 1 (undivided)	—	Topographic intermediate contour (20-ft interval)
—	Secondary route, class 2	—	Hydrography
—		—	Stream
—		—	Water body (e.g. lakes, ponds, rivers)

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