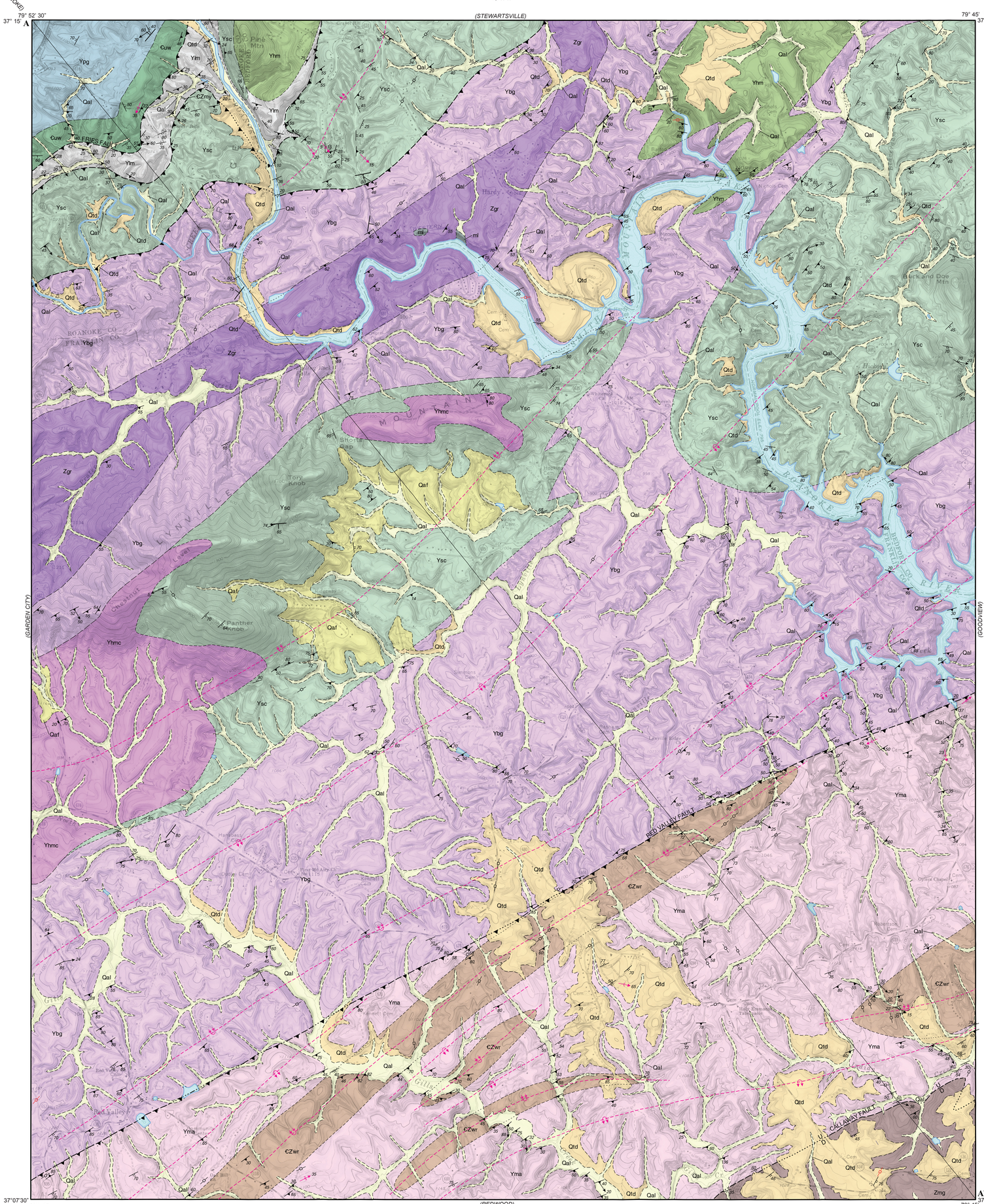
GEOLOGIC MAP OF THE HARDY QUADRANGLE, VIRGINIA

William S. Henika
2011



Basemap, modified U.S. Geological Survey DRG
1965 Hardy Quadrangle, Virginia

Polyconic projection: UTM zone 17, NAD 1927

Digital cartography by Peter J. Hof, Amy Gilmer,
Jason Elliott, Elizabeth V.M. Campbell, and Aaron Cross

MN GN
8.3° 151 MILS
0°43' 13 MILS
2011 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:24,000
1 0.5 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology mapped from 1980-1983 and 2004-2005

DESCRIPTION OF MAP UNITS

QUATERNARY

ml — **Modified land -** Areas of extensive cut and fill related to construction site preparation and landscaping.

Qal — **Alluvium -** Unconsolidated flood-plain deposits of light-brown to light-gray, well-stratified clay, silt, sand, and gravel.

Qaf — **Fan deposits -** Poorly stratified overlapping debris-flow deposits that consist of well-rounded cobbles and boulders with dark-reddish-brown clay, silt, sand and gravel matrix.

Qtd — **Terrace deposits -** Dissected remnants of older alluvium and slope deposits that occur on gentle slopes and benches above flood plains. Deposits consist of poorly sorted, well-rounded quartz pebbles and cobbles with deeply weathered, dark-reddish-brown clay, silt, and sand matrix.

CAMBRIAN-LATE PROTEROZOIC

Ꞓr — **Rome Formation** (in cross-section only) **-** Dusky-red to varicolored yellowish-green, phyllitic mudstone and quartzose, slaty-cleaved argillite interbedded with dark-gray dolomite and medium- to light-gray, wavy laminated algal limestone beds. Thickness: 1137 to 1170 feet (346 to 355 meters) (Haynes, 1991).

Ꞓuw — **Unicoi Formation -** Pinkish-gray to dark-greenish-gray, fine- to coarse-grained, locally conglomeratic phyllite, metasiltstone, and meta-arkose that exhibit spheroidal weathering. Lower contact with granite wash on Precambrian basement is gradational. Near the top of the formation, a greenish-gray, purple, and white, very thick bedded quartz pebble conglomerate forms prominent ledges. Thickness: 1000 to 1400 feet (300 to 425 meters).

FRIES THRUST SHEET SOUTHEAST OF RED VALLEY FAULT

ꞒZwr — **Wills Ridge Formation (Rankin and others, 1993) -** Medium- to light-gray, laminated, garnetiferous gneiss and dark-gray, graphitic mica schist. Mafic and felsic metavolcanic gneiss, including greenish-gray amphibole-bearing metatuffs and tuffaceous metagraywacke layers are locally present at the base.

FRIES THRUST SHEET SOUTHEAST OF CALLAWAY FAULT

Zmg — **Lynchburg Group, Moneta Gneiss (Pegau, 1932) -** Black and white banded, medium- to fine-grained biotite-hornblende gneiss that weathers moderate-olive-brown to dusky-yellowish-green. Contains large concordant bodies of dark-greenish-gray to black and white, medium- to coarse-grained amphibolite, as well as light-gray, fine-grained quartz-feldspar gneiss, feldspathic metaconglomerate, and mica schist.

MIDDLE-LATE PROTEROZOIC BASEMENT COMPLEX

Zgr — **Granite and granitic gneiss -** Medium-gray, poorly-foliated to massive biotite or hornblende granitoid composed mainly of perthitic feldspar and quartz with relict hypidiomorphic granular texture and xenoliths of porphyritic volcanic or subvolcanic rocks. Fluorite and allanite are diagnostic accessory minerals. Gradational to medium-gray, fine- to medium-grained mylonite gneiss near sheared contacts with plutons. Granite from the pluton along White Oak Creek was recently dated at 745–736 my by Fokin (2003).

BOTTOM CREEK SUITE (BARTHOLOMEW AND LEWIS, 1984)

Ybc — **Charnockitic gneiss** (in cross-section only) **-** Greenish-gray to dark-green, very coarse grained, porphyritic granitoid composed of orthopyroxene-garnet-bearing groundmass with 2- to 3-inch (5- to 7-centimeter) long, potassic feldspar phenocrysts. Grades from coarse-grained protomylonite to mylonite gneiss. Includes Bottom Creek Charnockite Suite of Bartholomew and Lewis (1984).

Ypg — **Pyroxene granulite gneiss -** Medium- to dark-greenish-gray, fine- to medium-grained, garnet-pyroxene-quartz-feldspar granulite. Surrounds plutons and is also present as xenoliths in Grenville and Iapetan intrusive suites. Gradational to greenish-gray mylonite and mylonite gneiss along ductile deformation zones that separate major plutonic units. Correlated with the Lady Slipper Granulite Gneiss, dated at 1130 Ma (Sinha and Bartholomew, 1984).

HORSEPEN MOUNTAIN SUITE (BARTHOLOMEW, 1981)

Yhm — **Mylonitic charnockite -** Medium- to dark-gray, medium- to coarse-grained, hypidiomorphic, granular to porphyritic, biotite granitoid orthogneiss that grades into dark-gray, well-foliated biotite augen gneiss, protomylonite, and mylonite gneiss.

Yhmc — **Massive charnockitic gneiss -** Dusky-green, medium- to coarse-grained, hypidiomorphic, granular to porphyritic, massive to foliated, orthopyroxene-bearing charnockitic orthogneiss.

Yma — **Mylonitic augen and flaser gneiss -** Light- to medium-gray, medium- to coarse-grained muscovite-biotite gneiss and schist that contain polycrystalline quartz-feldspar augen.

Ybg — **Biotite augen gneiss -** Dark-gray, medium- to coarse-grained, protomylonitic biotite augen gneiss. Contains large monocrystalline alkali feldspar porphyroclasts.

Ysc — **Sandy Creek Granulite Gneiss (Bartholomew and Lewis , 1984) -** Light-gray to dark-grayish-green, medium- to coarse-grained, segregation-banded, biotite granofels with local enclaves of layered pyroxene granulite gneiss. Garnet and hornblende commonly replace earlier pyroxene. Dark-green, uralitic, amphibole-bearing mylonite gneiss is also common.

Ylm — **Mylonitic granulite gneiss -** Dark-green, uralitic, amphibole-bearing mylonite gneiss along the Fries Fault and related late Paleozoic fault zones.

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ACKNOWLEDGEMENTS

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SUGGESTED REFERENCE

Henika, W.S., 2011, Geologic map of the Hardy quadrangle, Virginia: Virginia Division of Geology and Mineral Resources Open File Report 2011-3, Map Scale 1:24,000.

MAP SYMBOLS

For all contact and fold symbols: lines are solid where the location is exact, long-dashed where the location is approximate, short-dashed where the location is inferred, dotted where the location is concealed. Queries added where identity or existence may be questionable. For geologic observation symbols, observation sites are centered on the strike bar or at the intersection point of multiple symbols.

Contacts

Faults

Reverse - sawteeth on upthrown block

Left-lateral Extensional

Folds

Anticline (overturned)

Syncline (overturned)

Strike and dip of inclined beds

Strike and dip of overturned beds

Strike and dip of inclined schistosity

Strike of vertical schistosity

Strike and dip of inclined joint

Strike of vertical quartz vein

Strike of vertical pegmatite dike

Strike and dip of inclined compositional layering

Strike of vertical compositional layering

Bearing and plunge of lineation

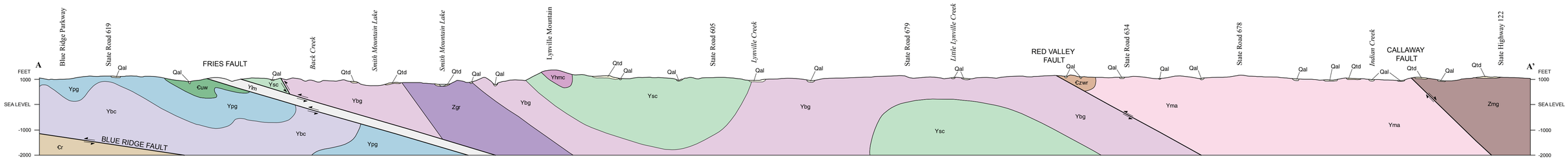
Inclined fold hinge of small, minor syncline

Inclined fold hinge of small, minor anticline

Inclined symmetric minor fold hinge

Inclined asymmetric minor fold hinge

Strike and dip of minor fault



Interpretive cross-section:
1. No vertical exaggeration except surficial deposits
2. Subsurface structures interpreted from surface measurements