DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES
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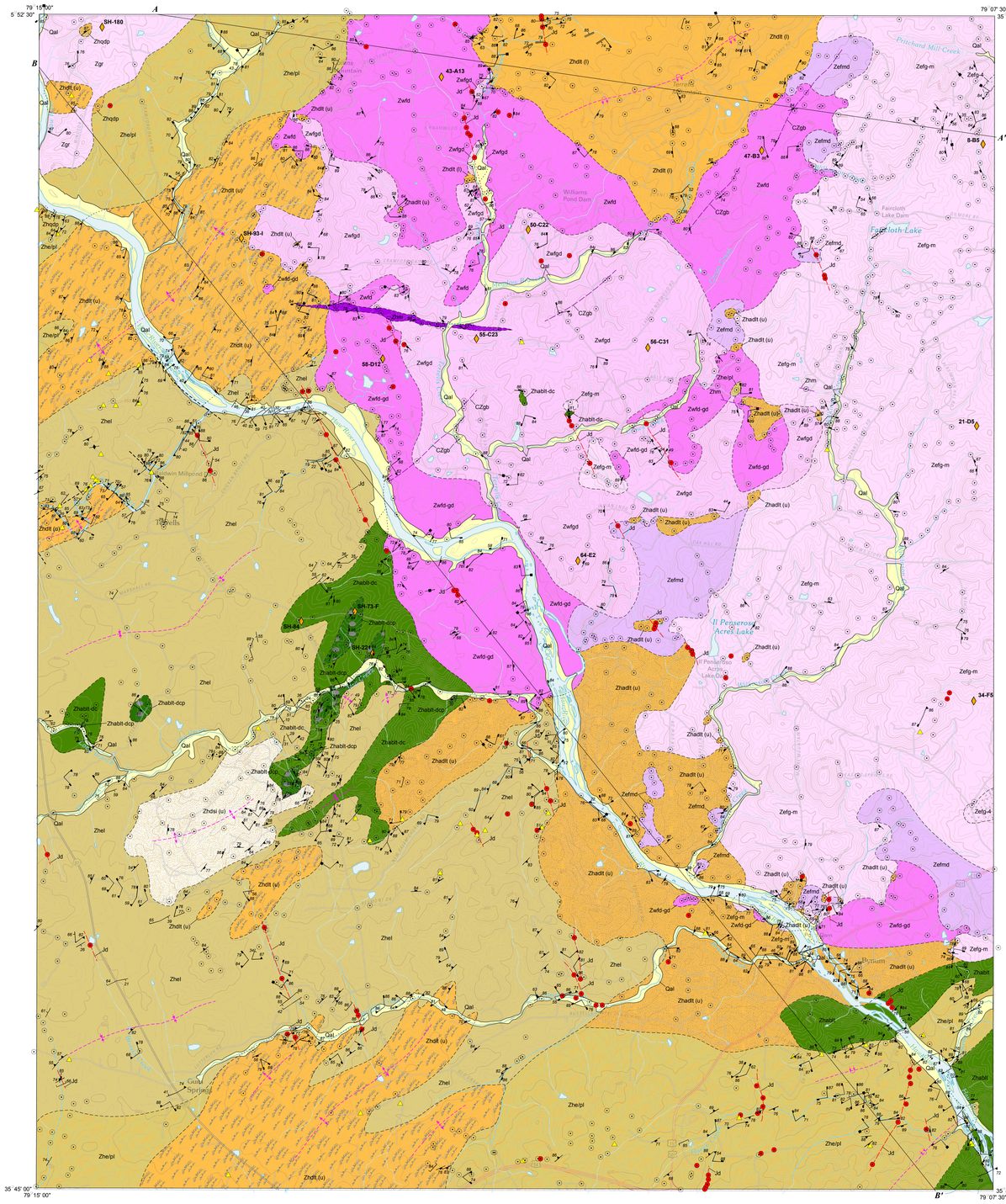
NORTH CAROLINA GEOLOGICAL SURVEY
OPEN FILE REPORT 2013-03



Geology mapped in 2007, summer 2010 and August 2012 through July 2013.

SCALE 1:24 000

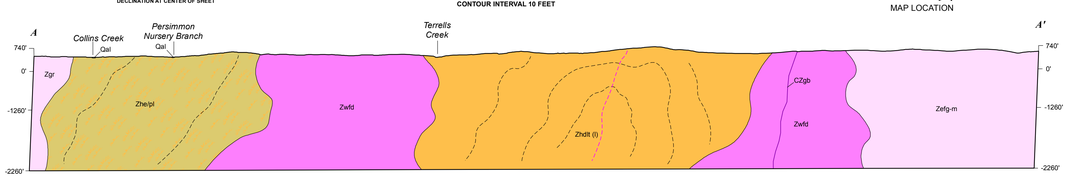
1 0.5 0 1 Miles

1,000 500 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

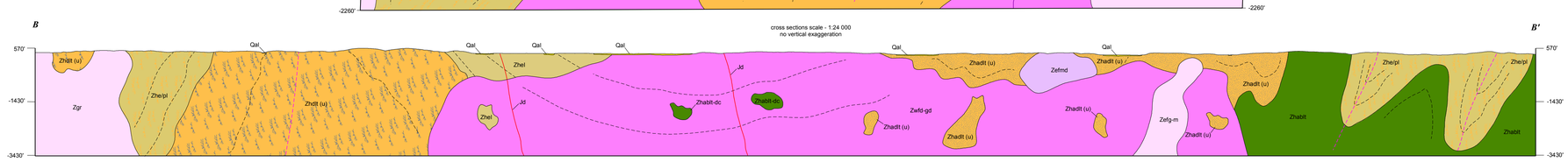
1 0.5 0 1 Kilometers

CONTOUR INTERVAL 10 FEET

UTM GRID AND 2010 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



cross sections scale - 1:24 000
no vertical exaggeration



Mesozoic Quaternary

Qal — alluvium

Jd — diabase

Metamorphic Rocks

Zhm, Zhm — CZgb — Hunter Mountain dike (Zhm) gabbro to gabbro porphyry dike (CZgb)

Neoproterozoic

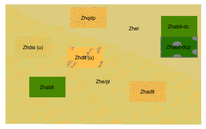
East and West Farrington Plutons
ca. 579 Ma (Tadlock and Loewy, 2006)

Zefg-m, Zefg-4, Zefmd, Zwfd, Zwfd-gd, Zwfgd

Hyco Formation - upper member

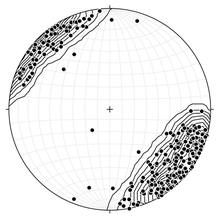
Zgr — metamorphosed plutonic rocks ca. 613 and 614 Ma (Wortman et al., 2000)

metamorphosed volcaniclastic sedimentary and pyroclastic rocks (stratigraphic relations uncertain) ca. 612 - 616 Ma (Wortman et al., 2000; Bowman, 2010; and Bradley and Miller, 2011)

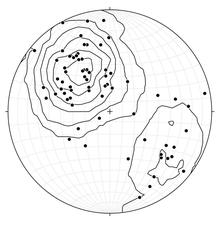


Hyco Formation - lower member

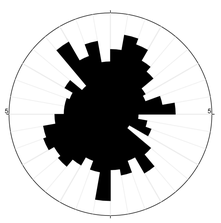
Zhdlt (l) — metamorphosed volcaniclastic sedimentary and pyroclastic rocks ca. 633 - 629 Ma (Wortman et al., 2000; Bradley and Miller, 2011)



Equal Area Schmidt Net Projection of Contoured Poles to Foliation and Cleavage
Contour Interval = 2 sigma N = 277



Equal Area Schmidt Net Projection of Contoured Poles Primary Bedding and Layering
Contour Interval = 2 sigma N = 70



Unidirectional Rose Diagram of Joints
Joints N = 656
Outer Circle = 5%
Mean vector = 283 degrees

INTRODUCTION

Pre-Mesozoic crystalline rocks in the Bynum Quadrangle are part of the redefined Hyco Arc (Hibbard et al., 2013) within the Neoproterozoic to Cambrian Carolina terrane of the Carolina Zone (Hibbard et al., 2002; and Hibbard et al., 2006). In the region of the map area, the Carolina terrane can be separated into two lithotectonic units: 1) the Hyco Arc and 2) the Aaron Formation of the redefined Virgilina sequence (Hibbard et al., 2013). The Hyco Arc consists of the Hyco Formation which include ca. 612 to 633 Ma (Wortman et al., 2000; Bowman, 2010; Bradley and Miller, 2011) metamorphosed layered volcaniclastic rocks and plutonic rocks. Available age dates (Wortman et al., 2000; Bradley and Miller, 2011) indicate the Hyco Formation may be divided into lower (ca. 630 Ma) and upper (ca. 615 Ma) members (informal) with an apparent intervening hiatus of magmatism. In northeastern Chatham County, Hyco Formation units are intruded by the ca. 579 Ma (Tadlock and Loewy, 2006) East Farrington pluton and associated West Farrington pluton. The Aaron Formation (not present in the map area) consists of metamorphosed layered volcaniclastic rocks with youngest detrital zircons of ca. 578 and 588 Ma (Samson and Secor, 2001 and Pollock, 2007, respectively).

The Hyco Arc and Virgilina sequence lithologies were folded and subjected to low grade metamorphism during the ca. 578 to 554 Ma (Pollock, 2007) Virgilina deformation (Glover and Sinha, 1973; Harris and Glover, 1985; Harris and Glover, 1988; and Hibbard and Samson, 1995). In the map area, original layering of Hyco Formation lithologies are interpreted to range from shallowly to steeply dipping due to open to isoclinal folds that are locally overturned to the southeast. Jurassic-aged diabase dikes intrude the crystalline rocks of the map area. Quaternary-aged alluvium is present in most major drainages.

Map units of meta-volcaniclastic rocks include various lithologies that when grouped together are interpreted to indicate general environments of deposition. The dacitic lavas and tuffs unit is interpreted to represent dacitic domes and proximal pyroclastics. The andesitic to basaltic lavas and tuffs unit is interpreted to represent eruption of intermediate to mafic lava flows and associated pyroclastic deposits. The epiclastic/pyroclastic units are interpreted to represent deposition from the erosion of dormant and active volcanic highlands. Some of the meta-volcaniclastic units within the map area display lithologic relationships similar to dated units present in northern Orange and Durham Counties. Due to these similarities, the meta-volcaniclastic units have been tentatively separated into upper and lower portions of the Hyco Formation; geochronologic data is needed to confirm this interpretation.

All pre-Mesozoic rocks in the map area have been metamorphosed to at least the chlorite zone of the greenschist metamorphic facies. Many of the rocks display a weak or strong metamorphic foliation. Although subjected to metamorphism, the rocks retain relict igneous, pyroclastic, and sedimentary textures and structures that allow for the identification of protolith rocks. As such, the prefix "meta" is not included in the nomenclature of the pre-Mesozoic rocks described in the quadrangle. Jurassic diabase dikes are unmetamorphosed.

Unit descriptions common to Bradley et al. (2007), Bradley and Stoddard (2008), and Bradley and Hanna (2012) from the Farrington, White Cross, and Pittsboro geologic maps, respectively, were used for conformity with on strike units in adjacent quadrangles. The nomenclature of the International Union of Geological Sciences subcommission on igneous and volcanic rocks (IUGS) after Le Maitre (2002) is used in classification and naming of the units. The classification and naming of the rocks is based on relict igneous textures, modal mineral assemblages, or normalized mineral assemblages when whole-rock geochemical data is available. Past workers in the Bynum quadrangle and adjacent areas (Ragland and Butler, 1972; Black, 1977; Hauck, 1977; Allen and Wilson, 1968; and Wagener, 1964 and 1965) have used various nomenclature systems for the igneous rocks. The select raw data, when available, of these earlier workers was recalculated and plotted on ternary diagrams and classified based on IUGS nomenclature. Pyroclastic rock terminology follows that of Fisher and Schminke (1984). Sterogram plots and calculations created using Stereonet v. 8.6.0 based on Allmendinger et al. (2013) and Cardozo and Allmendinger (2013).

DESCRIPTION OF MAP UNITS

SEDIMENTARY UNITS

Qal — **Qal – Alluvium:** Unconsolidated poorly sorted and stratified deposits of angular to subrounded clay, silt, sand and gravel- to cobble-sized clasts, in stream drainages. May include point bars, terraces and natural levees along larger stream floodplains. Structural measurements deposited on the map within Qal represent outcrops of crystalline rock inliers surrounded by alluvium.

INTRUSIVE AND META-INTRUSIVE UNITS

Jd, CZgb, Zhm — **Jd – Diabase:** Black to greenish-black, fine- to medium-grained, dense, consists primarily of plagioclase, augite, and may contain olivine. Occurs as dikes up to 100 ft wide. Diabase typically occurs as spheriodally weathered boulders with a grayish-brown weathering rind. Red station location indicates outcrop or boulders of diabase.

CZgb – Gabbro to gabbro porphyry dike: Dark green to black, melanocratic, medium-grained gabbro to fine-grained, plagioclase porhyritic gabbro porphyry. Present as a dike.

Zhm – Hunter Mountain dike: Distinctive, mesocratic, greenish-gray, plagioclase porphyritic (with plagioclase phenocrysts up to 1 cm long) granodiorite to diorite. Matrix is fine-grained consisting of interlocking plagioclase and amphibole (possibly pyroxene) crystals up to 1 mm. Correlated with the Hunter Mountain dike complex of Hauck (1977).

FARRINGTON IGNEOUS COMPLEX

The Farrington igneous complex consists of several map scale plutons that are grouped into the East and West Farrington plutons. The East Farrington pluton is composed dominantly of granite to granodiorite with several map scale facies with distinct mineral and textural characteristics. U-Pb zircon geochronologic data (Tadlock and Loewy, 2006) indicate that the East Farrington pluton is ca. 579 Ma. The West Farrington pluton is a gradationally zoned composite pluton (Ragland and Butler, 1972) that is characterized by diorite in the northern portions of the map, diorite to granodiorite along its southwestern margins, and leucogranodiorite in the central portions of the pluton.

The intrusive relationships between the different phases of the East and West Farrington pluton are not well understood. Based on intrusive relationships observed in outcrop, boulders, and map patterns, it is interpreted that the Zwfd and Zwfd-gd are locally cut by Zwgd. Zefmd locally cuts West Farrington related units and Zefg-m cuts Zefmd.

East Farrington pluton

Zefg-m — **Zefg-m – East Farrington pluton main facies:** Leucocratic, orange pink to pinkish-gray to gray, unfoliated, medium- to coarse-grained, equigranular to slightly porphyritic, amphibole (va. hornblende?) granite to granodiorite. Amphibole content varies from approximately 5 to 10% by volume and occurs locally as dark green, elongate crystals up to 1.5 cm long and amorphous intergrowths with feldspar and quartz up to 0.5 cm diameter. Dark gray xenoliths/enclaves up to 8 cm in diameter are common. Grain size becomes finer and xenoliths/enclaves larger near the pluton edge. Cavities, less than 1mm in diameter, with euhedral terminating crystals are common in some specimens. In thin section the main facies can be separated into two groups: 1) rocks with a porphyritic texture with orthoclase and plagioclase phenocrysts in a groundmass of intergrown orthoclase, plagioclase and quartz with a granophyric texture (micrographic texture) and 2) porphyritic and equigranular rocks consisting of orthoclase, plagioclase and quartz without a granophyric texture in matrix. The two varieties appear to be intermingled throughout the study area and within the adjacent Farrington Quadrangle (Bradley et al., 2007).

Zefg-4 — **Zefg-4 – East Farrington pluton gray granitoid:** Leucocratic to slightly mesocratic, light gray to light greenish-gray, unfoliated to foliated medium-grained granite to granodiorite. White-colored feldspar content is greater than pink feldspars. Foliated specimens have visible white mica growth and less pink feldspars than unfoliated specimens. Foliated rock is present along portions of Pritchards Mill Creek in the Bynum and Farrington quadrangle and Pokeberry Creek and Cumbo Branch in the Farrington Quadrangle.

Zefmd — **Zefmd – East Farrington monzodiorite porphyry:** Leucocratic to mesocratic, light gray to dark grayish-green where fresh, olive drab weathering, plagioclase-phyric monzodiorite and diorite. Fine- to medium-grained groundmass, with phenocrysts to 8 mm. Quartz phenocrysts very rare. Commonly has a cloudy, splotchy, or mottled appearance. Locally contains salmon-colored feldspar phenocrysts and/or orange ovoids interpreted as cavity filling or weathered phenocrysts. May have a thin light beige outer weathering rind. Weathered surface may be pitted. Locally sulfide-bearing, saussuritized, or streaked with tiny epidote veins. Fine-grained near margins.

West Farrington pluton:

Zwfd — **Zwfd – West Farrington pluton diorite:** Mesocratic, unfoliated, medium- to coarse-grained, with dark green amphibole (actinolite after hornblende) diorite. Locally with chlorite/biotite; dominantly equigranular but locally weakly plagioclase porphyritic; includes quartz diorite, granodiorite, quartz monzodiorite, and tonalite; commonly contains ovoid enclaves of green to black microdiorite to 0.5 m; grades to local patches of more mafic diorite and gabbro; fine dense to slabby hornfelsed country rocks occur locally as enclaves and near contacts; locally strongly saussuritized and pale greenish; white weathering with plagioclase occurring in positive relief giving "bumpy" texture.

Zwfd-gd — **Zwfd-gd – West Farrington pluton diorite to granodiorite:** Mesocratic to leucocratic, unfoliated, medium- to coarse-grained with dark green amphibole and/or biotite diorite. Quartz content varies locally causing field identification to vary from diorite, quartz diorite, and leucogranodiorite (looks tonalitic locally). Locally with pinkish feldspars. Generally identical to Zwfd but with more intermingled granodiorite with abundant visible quartz.

Zwfgd — **Zwfgd – West Farrington pluton leucogranodiorite:** Leucocratic to mesocratic, unfoliated, medium- to coarse-grained, biotite-bearing with dark green amphiboles leucogranodiorite. Quartz content varies locally causing field identification to vary from quartz diorite, leucogranodiorite, to tonalite. Locally with pinkish feldspars. Granophyric texture occurs locally in map area south of Collins Mountain.

HYCO FORMATION

Metaintrusive rocks associated with Hyco Formation: upper portion
ca. 613 and 614 Ma (Wortman et al., 2000)

Zgr — **Zgr – Granite:** Leucocratic, light brownish to beige or creamy, and locally pale pink or green; medium- to coarse-grained, equigranular metamorphosed leucocratic granodiorite and granite; locally weakly porphyritic with beta-quartz forms; grades to quartz porphyry in zones of cleavage development; quartz may be bluish; locally reddish weathering; locally contains epidote and/or chlorite clots possibly pseudomorphic after a hornblende; feldspar and quartz grains resist weathering and produce a bumpy surface; plagioclase and quartz phenocrysts sit in a granophyric matrix of alkali feldspar and quartz. Correlative to the Chatham granite of Hauck (1977). May be genetically related to Zhqdp unit.

Metamorphosed volcaniclastic sedimentary and pyroclastic rocks associated with Hyco Formation: upper portion (stratigraphic relations uncertain). ca. 612 - 616 Ma (Wortman et al., 2000; Bowman, 2010; and Bradley and Miller, 2011).

Zhel — **Zhel - Epiclastic rocks and lavas:** Conglomerate, conglomeratic sandstone, sandstone, siltstone and mudstone. Siltstones and mudstones typically display bedding ranging from mm-scale up to 10 cm, bedding layers traceable for several feet locally, may exhibit soft sediment deformation. Locally tuffaceous with a relict vitric texture. Locally contain interbedded dacitic to basaltic lavas. Conglomerates and conglomeratic sandstones typically contain subrounded to angular clasts of dacite in a clastic matrix. Deposition interpreted as distal from volcanic center, in deep water(?), and via turbidite flows. Correlative in part to Hav River sequence of Hauck (1977). Clasts of Zhablt-dcp occur locally in conglomerates of the unit adjacent to outcrop area of Zhablt-dcp.

Zhe/pl — **Zhe/pl ~ Mixed epiclastic-pyroclastic rocks with interlayered dacitic lavas:** Grayish-green to greenish-gray, locally with distinctive reddish-gray or maroon to lavender coloration; metamorphosed: conglomerate, conglomeratic sandstone, sandstone, siltstone and mudstone. Lithologies are locally bedded; locally tuffaceous with a relict vitric texture. Siltstones are locally phyllitic. Locally contain interbedded dacitic lavas identical to Zhdlt unit. Contains lesser amounts of fine- to coarse tuff and lapilli tuff with a vitric groundmass. Minor andesitic to basaltic lavas and tuffs present. Silicified and/or sericitized altered rock are locally present. Conglomerates and conglomeratic sandstones typically contain subrounded to angular clasts of dacite in a clastic matrix. Portions of the Zhe/pl unit are interpreted to have been deposited proximal to active volcanic centers represented by the Zhdlt unit but are also interpreted to record the erosion of proximal volcanic centers after cessation of active volcanism.

Zhdlt (u) — **Zhdlt (u) – Dacitic lavas and tuffs of the upper portion of the Hyco Formation:** Greenish-gray to dark gray, siliceous, aphanitic dacite, porphyritic dacite with plagioclase phenocrysts, and flow banded dacite. Dacite with hyalaclastic textures are common. Welded and non-welded tuffs associated with the lavas include: greenish-gray to grayish-green, fine tuff, coarse plagioclase crystal tuff and lapilli tuff. Locally, interlayers of immature conglomerate and conglomeratic sandstone with abundant dacite clasts are present. The dacites are interpreted to have been coherent extrusives or very shallow intrusions associated with dome formation. The tuffs are interpreted as episodic pyroclastic flow deposits, air fall tuffs or reworked tuffs generated during formation of dacite domes. The unit occurs as map scale pods surrounded by clastic rocks of Zhe/pl and/or Zhel units. Wortman et al. (2000) reports an age of 615.7+3.7/-1.9 Ma U-Pb zircon date for a dacitic tuff from the unit in the Rougemont quadrangle.

Zhdsi (u) — **Zhdsi (u) – Dacitic shallow intrusive of the upper portion of the Hyco Formation:** Gray-green, light green to green, greenish-gray to light gray; dacite, plagioclase porphyritic dacite with a granular-textured groundmass to micro-granodiorite (intrusive texture visible with 7x hand lens). Locally fine- to medium grained granodiorite present. Plagioclase phenocrysts , when present, range from less than 1 mm to 4 mm. Black colored amphibole, when visible, occurs as phenocrysts (less than 1 mm to 1 mm) and as intergrowths with plagioclase. Amphibole intergrowths distinguish rock from fine-grained tuffs. Interpreted as shallowly emplaced dacite probably co-magmatic with Zhdlt (u) unit.

Zhqdp — **Zhqdp - Quartz dacite porphyry:** Strongly porphyritic with aphanitic groundmass and sub- to euhedral phenocrysts (2-6 mm) of white to salmon plagioclase and gray to dark gray (beta-) quartz; phenocrysts typically constitute 20 to 25% of the rock; local weak alignment of plagioclase; interpreted as either lava flows or shallow intrusives possibly associated with domes.

Zhadlt (u) — **Zhadlt (u) – Andesitic to dacitic lavas and tuffs of the upper portion of the Hyco Formation:** Black to dark gray, gray-green to green; aphanitic andesite to dacite and porphyritic andesite to dacite with plagioclase phenocrysts. Hyaloclastic textures are common. Interlayed with the lavas are gray to black; welded and non-welded; coarse tuff, lapilli tuff, and tuff breccia. Locally interlayered with meta-sediments identical to adjacent Zhe/pl and/or Zhel units. Rocks interpreted as andesites have distinct interior weathering rind of light brown to gray and fresh surfaces exhibit weakly vitric like textures in contrast to dacites. Hornfels of unit present near contact with West Farrington Pluton.

Zhablt — **Zhablt – Andesitic to basaltic lavas and tuffs:** Green, gray-green, gray, dark gray and black; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Hyaloclastic texture is common and imparts a fragmental texture similar to a lithic tuff on some outcrops. Locally interlayered with meta-sediments identical to adjacent Zhe/pl and/or Zhel units.

Zhablt-dc — **Zhablt-dc – Andesite to basaltic lavas and tuffs of the Dry Creek area:** Green, gray-green, gray, dark gray and black; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Locally interlayered with meta-sediments identical to the Zhel unit. Clasts of Zhablt-dcp locally occur in conglomerates of the unit adjacent to outcrop area of Zhablt-dcp. Includes rocks of the Dry Creek unit of Hauck (1977).

Zhablt-dcp — **Zhablt-dcp – Andesite to basalt porphyry of the Dry Creek area:** Distinctive, green to dark green, andesite porphyry with aphanitic groundmass and euhedral phenocrysts (up to 10 mm) of greenish-white plagioclase; phenocrysts typically constitute 20 to 50% of the rock; local alignment of plagioclase; lesser pyroxene/amphibole phenocrysts. Green to dark green basalt porphyry with abundant pyroxene (altered to amphiboles) phenocrysts with minor plagioclase phenocrysts. Andesite and basalt porphyries locally amygdaloidal (up to 2 cm), amygdules in filling include calcite, quartz, chlorite, and epidote. Clasts of unit locally occur in conglomerates of Zhel. Same as Dry Creek Porphyry complex of Hauck (1977).

Metamorphosed volcaniclastic sedimentary and pyroclastic rocks associated with Hyco Formation: lower portion ca. 629 - 633 Ma (Wortman et al., 2000 and Bradley and Miller, 2011)

Zhdlt (l) — **Zhdlt (l) – Dacitic lavas and tuffs of the lower portion of the Hyco Formation:** Distinctive gray to dark gray, siliceous, cryptocrystalline dacite, porphyritic dacite with plagioclase phenocrysts, and flow banded dacite. Welded and non-welded tuffs associated with the lavas include: greenish-gray to grayish-green, fine tuff, coarse plagioclase crystal tuff; lapilli tuff; and tuff breccia. The dacites are interpreted to have been coherent extrusives or very shallow intrusions associated with dome formation. The tuffs are interpreted as episodic pyroclastic flow deposits, air fall tuffs or reworked tuffs generated during formation of dacite domes. Wortman et al. (2000) report a 632.9 +2.6/-1.9 Ma zircon date from a sample within the unit in the Chapel Hill quadrangle directly on strike with this unit.

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EXPLANATION OF MAP SYMBOLS

CONTACTS

Lithologic contacts - Distribution and concentration of structural symbols indicates degree of reliability.

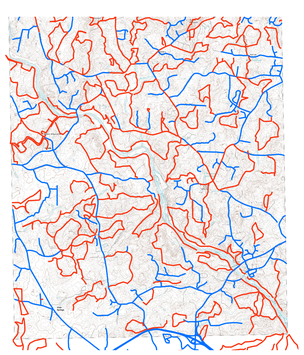
- contact - location inferred
- contact - location concealed
- brittle fault - location inferred
- cross section line
- anticline, plunging
- syncline, plunging
- overturned anticline, plunging
- overturned syncline, plunging
- in cross section, inferred axial trace of large-scale fold
- diabase dike - location inferred
- diabase dike - location concealed
- in cross section, diabase dike
- in cross section, fold form lines of non-cylindrical asymmetric folds

PLANAR FEATURES

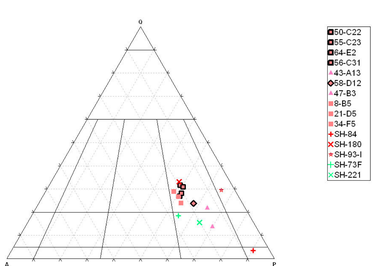
- strike and dip of primary bedding and/or layering
- strike and dip of primary bedding and/or layering (multiple observations at one location)
- strike and dip of inclined overturned primary bedding
- strike and dip of primary volcanic compaction and/or welding foliation
- strike and dip of inclined regional foliation
- strike and dip of inclined regional foliation (multiple observations at one location)
- strike of vertical regional foliation
- strike and dip of cleavage
- strike and dip of cleavage (multiple observations at one location)
- strike and dip of inclined joint surface
- strike and dip of inclined joint surface (multiple observations at one location)
- strike of vertical joint surface
- strike of vertical joint surface (multiple observations at one location)

OTHER FEATURES

- prospect pit - Au
- station location
- 47-B3 geochemical station location
- indicates location of vuggy quartz or siliceous breccia float
- diabase station location



TRAVERSE MAP
by car
by foot



QAP plot of normalized whole rock geochemical analyses of select samples from past workers in quadrangle. Analyses with prefix of "SH" from Hauck and Drez (unpublished data, 1977). Remaining analyses from Ragland and Butler (1972). Data provided in analytical table on map.

Sample	Source	Map Unit	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	H2O	Total
8-B5	Ragland and Butler (1972)	Zefg-m	71.5	0.42	14.40	1.43	1.54	0.10	0.55	1.44	4.84	3.60	NA	99.82
21-D5	Ragland and Butler (1972)	Zefg-m	72.1	0.40	14.00	1.44	1.08	0.08	0.50	1.30	4.60	3.73	NA	99.23
34-F5	Ragland and Butler (1972)	Zefg-m	71.5	0.44	14.70	1.60	1.65	0.09	0.51	1.16	5.34	3.67	NA	100.66
43-A13	Ragland and Butler (1972)	Zwfd	61.9	0.85	14.90	2.52	4.50	0.13	2.82	5.11	3.75	1.88	NA	98.36
47-B3	Ragland and Butler (1972)	Zwfd	55.8	1.95	13.80	4.79	5.48	0.22	4.08	7.30	3.57	1.83	NA	98.82
50-C22	Ragland and Butler (1972)	Zwfgd	66.1	0.62	14.40	1.36	3.84	0.10	1.89	3.82	3.25	3.13	NA	98.51
55-C23	Ragland and Butler (1972)	Zwfgd	69.0	0.52	14.50	2.18	2.40	0.09	1.81	3.65	3.18	2.92	NA	100.25
56-C31	Ragland and Butler (1972)	Zwfgd	65.9	0.70	14.00	2.00	3.98	0.10	2.14	3.92	3.21	2.90	NA	98.85
58-D12	Ragland and Butler (1972)	Zwfd-gd	62.9	0.73	14.60	2.09	4.49	0.15	2.59	4.77	3.32	2.43	NA	98.07
64-E2	Ragland and Butler (1972)	Zwfgd	69.1	0.53	14.30	2.22	2.95	0.08	1.74	3.44	3.48	2.79	NA	100.63
SH-73-F	Hauck and Drez (unpublished data, 1977)	Zhablt-dcp	57.99	0.90	18.59	4.50	1.39	0.14	1.66	5.73	2.18	3.84	3.56	100.48
SH-221	Hauck and Drez (unpublished data, 1977)	Zhablt-dcp	57.75	0.88	18.19	3.99	1.91	0.09	1.73	5.61	3.32	2.89	1.80	98.16
SH-84	Hauck and Drez (unpublished data, 1977)	Zhablt-dc	47.17	0.97	19.58	6.28	3.25	0.18	5.27	8.69	2.85	0.72	3.60	98.56
SH-93-I	Hauck and Drez (unpublished data, 1977)	Zhdlt (u)	71.81	0.62	14.33	1.73	1.30	0.07	0.42	1.87	6.26	0.81	0.93	100.15
SH-180	Hauck and Drez (unpublished data, 1977)	Zgr	72.29	0.33	13.81	0.70	1.61	0.08	0.57	1.98	4.10	3.01	2.05	100.53

NA = Not analyzed for parameter
See Ragland and Butler (1972) for specific analytical methods
Hauck and Drez samples analyzed at University of North Carolina – Chapel Hill by X-ray fluorescence, colorimetry, and atomic absorption spectrophotometry

Base map is from USGS 2010 GeoPDF of the Bynum 7.5-minute quadrangle.
Aerial photo, map collar and select features removed. Bounds of GeoPDF based on 7.5-minute grid projection in UTM 17S; North American Datum of 1983 (NAD83).

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Scan with smartphone for link to GeoPDF of map. Third party App required.

GEOLOGIC MAP OF THE BYNUM 7.5-MINUTE QUADRANGLE, ORANGE, CHATHAM AND ALAMANCE COUNTIES, NORTH CAROLINA

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Digital representation by Michael A. Medina, Philip J. Bradley and Heather D. Hanna

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