DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF LAND RESOURCES

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NORTH CAROLINA GEOLOGICAL SURVEY
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GEOLOGIC MAP OF THE FARRINGTON 7.5-MINUTE QUADRANGLE, CHATHAM, ORANGE AND DURHAM COUNTIES, NORTH CAROLINA

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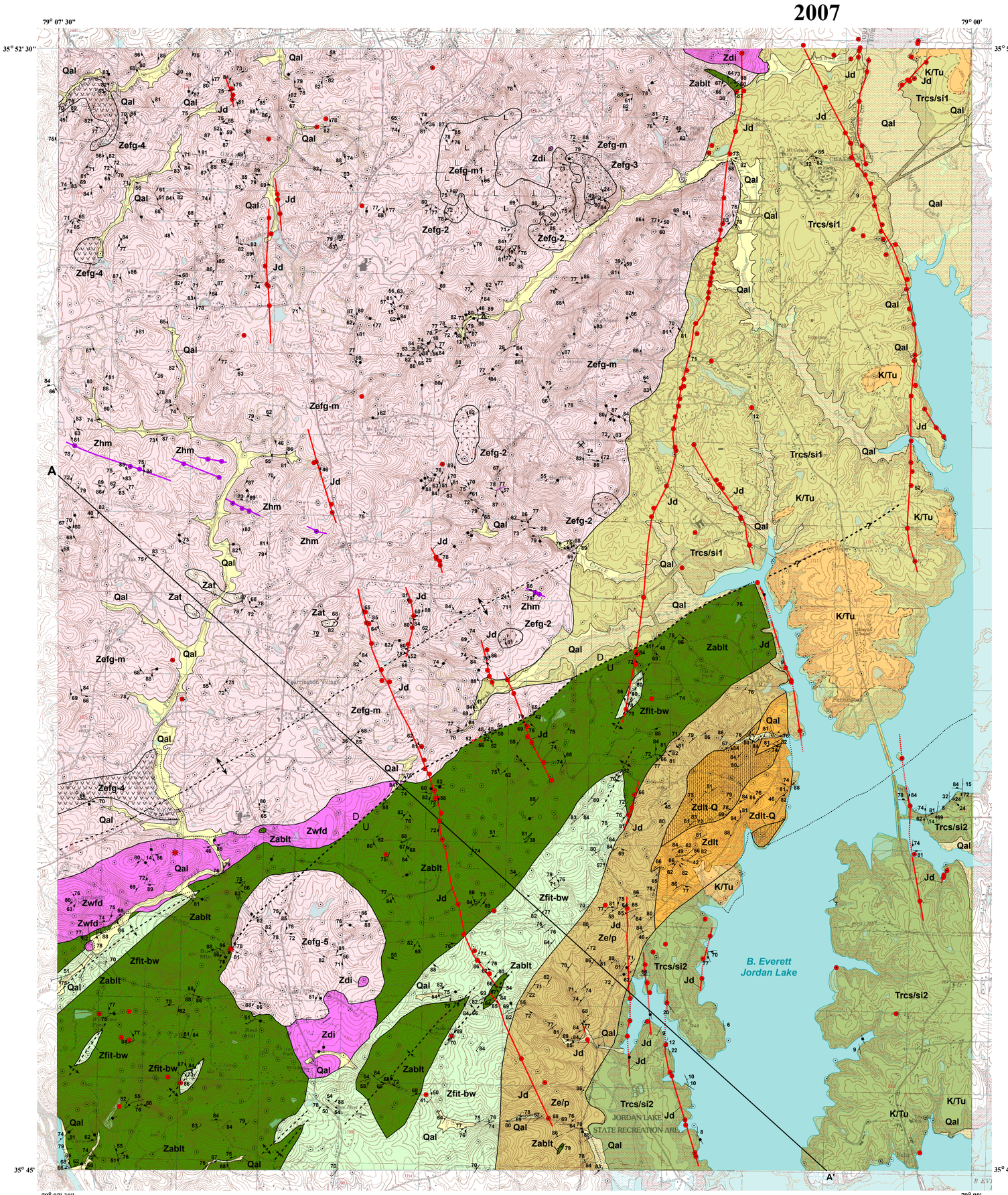
Digital representation by Michael A. Medina, Philip J. Bradley and Norman K. Gay

2007



DESCRIPTION OF MAP UNITS

All pre-Mesozoic rocks of the Farrington quadrangle 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.

The nomenclature of the International Union of Geological Sciences subcommission on igneous and volcanic rocks (IUGS) after Streckeisen (1973 and 1979) 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 Farrington quadrangle (Eligman, 1987 and Wagener, 1964 and 1965) have used various nomenclature systems for the igneous rocks. The raw data 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).

Sedimentary Units

Qal - Qal - Alluvium: Unconsolidated clay, silt, sand and gravel to cobble-sized clasts, subrounded to angular, deposited in drainages.

K/Tu – post-Chatham Group undifferentiated sediments: Yellowish-orange to brownish-yellow to yellowish-gray, unconsolidated to friable unit that consists of distinctive subrounded to well rounded granules, pebbles and small cobbles of white- to rose-colored quartz interlayered with clay, sandy-clay and clayey-sand. Lesser amounts of moderately indurated, yellowish-white, medium- to coarse-grained arkosic sandstone present. Unit is exposed on shores of B. Everett Jordan Lake and the southern portion of the Farrington peninsula south of Lystra Road. Unit is in unconformable contact with Triassic sediments.

Trcs/si1 - Trcs/si1 - Chatham Group Lithofacies Association I: Pinkish-gray, light-gray, and light-tan; fine- to coarse-grained, micaeous, slightly clayey, moderately poor to moderately well sorted, subangular to subrounded arkose and lithic arkose; maroon, very silty, micaeous, moderately well sorted, fine-grained sandstone; and maroon, massive, and thickly laminated, bioturbated, micaeous to very micaeous, siltstone and mudstone. Muscovite flakes up to 3 mm diameter are common especially in the siltstone. Fine-grained flakes of biotite in the arkose and lithic arkose is a distinctive accessory. Randomly oriented and vertical, cylindrical structures often filled with pale-green, fine-grained, quartz sandstone are interpreted as burrows. Bedding, when observed, is parallel to slightly wavy, occurring as thick laminations to thinly bedded (0.5 cm to 5 cm). These rocks are assigned to the Lithofacies Association I of Hoffman and Gallagher, 1991 and Watson, 1998. The clastic rocks of Lithofacies Association I are interpreted to have been deposited in a braided stream fluvial system.

Trcs/si2 - Trcs/si2 - Chatham Group Lithofacies Association II: Grayish-pink to pale-red, micaeous, coarse- to very coarse-grained, pebbly, cross-bedded lithic arkose interbedded with maroon, micaeous mudstone. Good outcrops typically exhibit cyclical fining upward depositional sequences. Best exposures are present near intersection of Martha's Chapel Road and B. Everett Jordan Lake (see Stop 3 in Clark et al., 2001). These rocks are assigned to the Lithofacies Association II of Hoffman and Gallagher, 1991 and Watson, 1998. The clastic rocks of Lithofacies Association II are interpreted to have been deposited in a meandering stream fluvial system.

Intrusive and Meta-Intrusive Units

Jd - Jd - diabase: Black to greenish-black, fine- to medium-grained, dense, consists primarily of plagioclase, augite, and +/- 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.

Zhm – Hunter Mountain dike: Distinctive, 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). Purple station location indicates outcrop or boulders.

East Farrington pluton

The East Farrington pluton is composed of 4 distinct granitoid facies based on textural characteristics. U-Pb zircon geochronologic data (Tadlock and Loewy, 2006) indicate that the East Farrington pluton is ca. 579 Ma.

Zefg-m – Zefg-m – East Farrington pluton main facies: Unfoliated, orange pink to pinkish-gray to gray, medium- to coarse-grained, equigranular to slightly porphyritic, amphibole (va. hornblende?) granite. 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, <1mm in diameter, with euhedral terminating crystals are common in some specimens. Weakly foliated outcrops are present along Pokeberry Creek and several other locations. In thin section, the main facies can be separated into two groups: 1) rocks with a porphyritic texture with orthoclase and plagioclase phenocryts 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.

Zefg-m1 – Zefg-m1 – East Farrington pluton main facies variety 1: Identical to main facies but with dark green, chlorite masses up to 4 mm diameter. In thin section, the chlorite masses are intergrowths of chlorite and dark green, fibrous amphibole.

Zefg-2 – Zefg-2 – East Farrington pluton porphyritic granite: Gray, fine-grained groundmass with pink- and white-colored phenocrysts (1 mm to 4 mm) of orthoclase and plagioclase, granite. Anhedral to acicular-shaped, dark green, amphiboles (<1 mm to 4 mm long) present in groundmass of quartz and orthoclase and as intergrowths with orthoclase and plagioclase phenocrysts. Present as several map scale bodies and as outcrop scale enclaves surrounded by East Farrington pluton main facies rock.

Zefg-3 – Zefg-3 – East Farrington pluton fine-grained granite: Orange pink, fine-grained granite. Similar texture and mineralogy to East Farrington pluton main facies but with an overall finer-grained texture. White feldspar phenocrysts compose <5% of rock.

Zefg-4 – Zefg-4 – East Farrington pluton gray granitoid: Unfoliated to foliated, light gray to light greenish-gray, 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 Pokeberry Creek, Pritchards Mill Creek and Cumbo Branch.

Zefg-5 – Zefg-5 – East Farrington pluton satellite granite: Unfoliated, orange pink to pinkish-gray to gray, fine- to medium-grained, equigranular, amphibole (va. hornblende?) granite. Similar to East Farrington pluton main facies but overall finer-grained.

Zwfd – Zwfd – West Farrington pluton diorite: Unfoliated, medium-grained hornblende diorite.

Zdi – Zdi – Diorite: Greenish-gray to gray, medium-grained, equigranular, hornblende diorite. Major minerals include plagioclase and hornblende. Greenish-white plagioclase crystals compose up to 50% of the rock and are typically sericitized and saussuritized. Hornblende is typically altered to chlorite and actinolite masses.

Metavolcanic Units

Zat – Zat – Altered tuffs: Very light-gray, light-greenish-gray to white, mottled red and yellow, hydrothermally altered rock interpreted to be silicified and/or sericitized tuffs. Unit occurs as map scale xenoliths within the East Farrington pluton.

Zablt – Zablt – Andesitic to basaltic lavas and tuffs: Typically unfoliated, green, gray-green, gray, dark gray and black; 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. Tuffs associated with the lavas are weakly foliated to foliated, green to gray to silvery-gray, coarse tuff and lapilli tuff. Local hornfels of unit present in the vicinity of Big Hole Road.

Zfit-bw – Zfit-bw –Felsic to intermediate tuffs of the Big Woods area: Heterogenous unit of felsic to intermediate composition tuffs and with lesser interlayers of andesitic to basaltic lavas and epiclastic rocks. Abundant dacitic lavas and tuffs, identical to Zdlt unit lithologies, are interlayered within unit.

Ze/p - Ze/p - Mixed epiclastic-pyroclastics: Green to Gray, conglomerates, conglomeratic sandstones, tuffaceous sandstones, and thinly layered siltstones. Unit contains lesser amounts of crystal and lapilli tuffs and minor andesitic to basaltic lavas and tuffs. Polymictic, matrix supported, conglomeratic sandstone to conglomerate containing subrounded to angular volcanic clasts is a distinctive lithology within the unit.

Zdlt - Zdlt - Dacitic lavas and tuffs: Distinctive dark-gray to black, siliceous, cryptocrystalline dacite, porphyritic dacite with plagioclase phenocrysts, and flow banded dacite. Tuffs associated with the lavas include welded and non-welded: greenish-gray to grayish-green, coarse plagioclase crystal tuff; lapilli tuff; lithic tuff. The dacites are interpreted to have been coherent magma that were extrusive 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.

Zdlt-Q – Zdlt-Q – Quartz dacite lavas and tuffs: Interlayered light-gray to white, unfoliated quartz and hornblende porphyritic dacite and foliated quartz crystal tuff. Quartz phenocrysts are distinctive with di-pyramidal form ranging from 1 mm up to 4 mm diameter. Hornblende phenocrysts are brown with a vitreous luster and are present up to 4 mm diameter. In hand sample, the groundmass is light-gray to white on weathered and fresh surfaces. Unfoliated varieties are interpreted to be lava or shallow intrusive bodies; foliated varieties are interpreted to be tuff. Quartz dacite porphyry unit of Eligman (1987).

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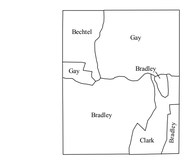

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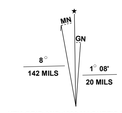
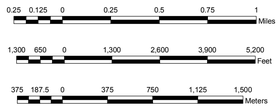


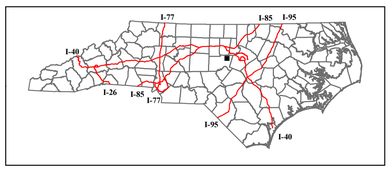
UTM GRID AND 1999 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



1:24,000 SCALE
CONTOUR INTERVAL 10 FEET

Base topographic map is digital raster graphic image of the Farrington 7.5 minute USGS quadrangle (1994), North Carolina State Plane NAD 83 meters coordinate system Lambert Conformal Conic projection

LOCATION OF THE FARRINGTON 7.5-MINUTE QUADRANGLE, NORTH CAROLINA



Geology mapped from August 2006 through May 2007

Disclaimer:
This Open-File report is preliminary and has not been reviewed for conformity with the North Carolina Geological Survey editorial standards or with the North American Stratigraphic Code. Further revisions or corrections to this preliminary map may occur prior to its release as a North Carolina Geological Survey map.

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CONTACTS

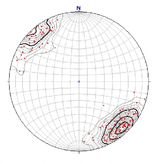
Lithologic contacts - Distribution and concentration of structural symbols indicates degree of reliability.

- geologic contact
- inferred geologic contact
- concealed geologic contact
- Quaternary alluvium contact
- fault - D indicates downthrown side, U indicates upthrown side, ? indicates extent uncertain
- inferred fold axis of major- and minor-scale anticline
- inferred fold axis of minor-scale syncline

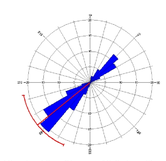
STRUCTURAL SYMBOLS

Observation sites are centered on the strike bar or are at the intersection point of multiple symbols.

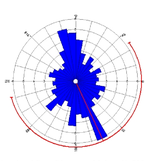
- 63 strike and dip of primary bedding and layering
- 60 strike and dip of primary volcanic flow banding
- 82 strike and dip of foliation
- 73 strike and dip of cleavage
- 80 strike and dip of shear foliation
- 75 strike and dip of joint
- fault gouge
- 24 strike and dip of slickenside
- station location
- 61 strike and dip of primary volcanic compaction and/or welding
- strike and dip of primary vertical volcanic flow banding
- vertical foliation
- vertical cleavage
- 77 strike and dip of diorite dike
- vertical joint
- 71 brittle fault plane
- 12 trend and plunge of slickenline lineation
- inactive quarry location



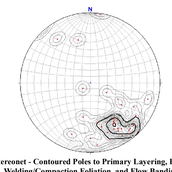
Stereonet - Contoured Poles to Foliation, Cleavage, Spaced Cleavage, and Shear Foliation N=145



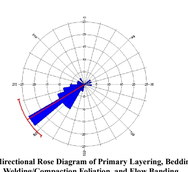
Unidirectional Rose Diagram of Foliations, Cleavage, Spaced Cleavage, and Shear Foliations N=145



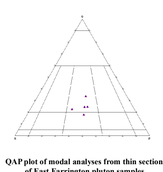
Unidirectional Rose Diagram of Joints N=725



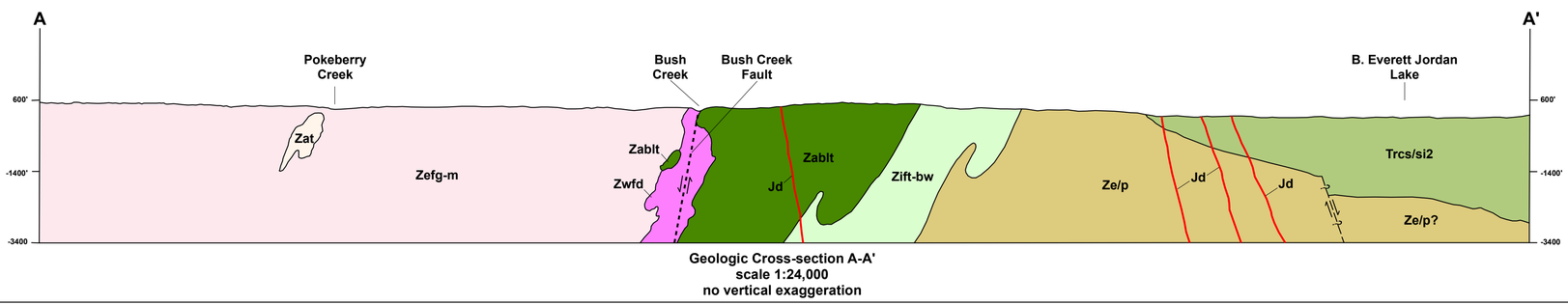
Stereonet - Contoured Poles to Primary Layering, Bedding, Welding/Compaction Foliation, and Flow Banding in Carolina terrane rocks N=35



Unidirectional Rose Diagram of Primary Layering, Bedding, Welding/Compaction Foliation, and Flow Banding in Carolina terrane rocks N=35



QAP plot of modal analyses from thin sections of East Farrington pluton samples.



Geologic Cross-section A-A'
scale 1:24,000
no vertical exaggeration

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