

INTRODUCTION AND PREVIOUS MAPPING

DESCRIPTION OF MAP UNITS

This is a compiled geologic map of Franklin County. Geologic data from portions of seventeen (17) 7.5-minute quadrangles were compiled. Bedrock geologic units and descriptions are modified from NCGS Open-File Reports or unpublished manuscript maps (see index map). Coastal Plain units in the Bunn East and Bunn West quadrangle by John G. Nickerson. Coastal Plain units are unmapped in the remaining quadrangles. Rocks belonging to four Piedmont terranes underlain by two of these terranes. The eastern portion is underlain by two of these terranes underlain by two of these terranes. The eastern portion is underlain by two of these terranes underlain by two of these terranes. In Franklin County, the Macon fault separates the Raleigh and Spring Hope terranes; abundant evidence of dextral shear may be found along this fault and within its associated shear zone. Spring Hope terranes; abundant evidence of dextral shear may be found along this fault and within its associated shear zone. Spring Hope terranes; abundant evidence of dextral shear may be found along this fault and within its associated shear zone. Spring Hope terranes; abundant evidence of dextral shear may be found along this fault and within its associated shear zone.

terranes. Two orthogneisses from the Raleigh terrane yield zircon ages of 542 Ma (Caslin, 2001) and 560 Ma (Owens and Buchwaldt, 2009); both are interpreted as crystallization ages In western Franklin County, the Raleigh terrane is in fault contact with the Crabtree terrane consists of a matrix of two-mica schist in which are numerous blocks and pods of metamorphosed mafic and ultramafic rocks. Formerly interpreted as a mélange that originated within an accretionary prism (Horton and others, 1986), the terrane is currently thought to represent altered and metamorphosed sub-volcanic plutons containing xenoliths of lower crustal and mantle rocks (Blake and others, 2012). The majority of the map area is underlain by late Paleozoic (Alleghanian) granitoid rocks belonging to the composite Rolesville batholith and other smaller plutons. In addition, Jurassic dikes of olivine diabase are common in the area, most striking north-northwest, as are linear zones of siliceous breccia, mostly northeast-trending, which are thought to represent brittle faulting of Mesozoic age (cf. Heller and others, 1998). Outliers of Coastal Plain and/or other unconsolidated sediments are

but radiometric ages on metavolcanic rocks range from 525 to 628 Ma (Goldberg, 1994; Horton and Stern, 1994; Horton and Stern, 1994; Coler and Samson, 2000; Stoddard and Miller, 2011). Raleigh terrane that lie in the southwest from those in the north-central have led Blake and others (2012) to suggest that they might be considered separate

present, though their extent is not well documented in most of the county. Quaternary alluvium is present in most major drainages. Important early work in this area includes that of Parker (1968), who defined the structural framework of the region that includes Franklin County at a scale of 1:100,000. Farrar (1985a, b) mapped the entire eastern Piedmont of North Carolina, defined map units for the region, and proposed a model for the tectonic evolution of the region that has held up remarkably well. Russell and others (1985) showed that eastern Piedmont rocks understood at that time. Horton and others (1994) studied and mapped parts of the Rolesville batholith, and began to elucidate its nature. Sacks (1996a, b, c, d) mapped a strip of four 7.5-minute quadrangles along the Virginia-North Carolina border, to the north and along strike of rocks in Franklin County (see also Sacks, 1999).

UNCONSOLIDATED SEDIMENTS Qal - Alluvium: Unconsolidated tan to light gray stream deposits of sand and gravel, locally with clay and silt; poorly to well sorted, poorly stratified.

- Cpu Coastal Plain sediments, undifferentiated: Unconsolidated, fine to coarse-grained, tan to light gray arkosic sands and clayey sands with occasional gravel. Ttg - Unconsolidated upland terrace gravel: Abundant well-rounded quartz pebbles and cobbles, typically ellipsoidal, occurring at higher elevation than active floodplains and stream valleys. Stratigraphic relationship to Coastal Plain units unknown. Kittrell.
- **Tpgrv Gravel Patches:** Gravel layers with rounded clasts of vein quartz and quartzite. *Middlesex, Grissom*.
- Tphms Heavy mineral bearing sand: Sand, silty and clayey with scattered rounded pebbles, reddish brown, yellow, and pink; poorly sorted. Contains rare to trace heavy minerals and trace mica. Bunn East, Bunn West.
- Tpfms Fine micaceous sand: Sand, fining upward from gravelly poorly sorted sand at base to medium or coarse sand at the surface. Contains trace to common mica. *Middlesex, Zebulon*.
- qrx Quartz rock and quartz breccia: Sizable accumulations of milky and/or smoky quartz, commonly with vuggy crystals. Possibly related to quartz mineralization along brittle fracture zones or faults. On the basis of such quartz occurrences, several fault segments are inferred, having typical trends between N80W and N60E. Yellow diamond indicates isolated outcrop or major float occurrence. Castalia, Justice.
- Jd Olivine diabase: Gray to bluish-black, generally fine-grained and locally porphyritic diabase, consisting primarily of plagioclase, augite, olivine, magnetite and ilmenite. Occurs as steeply dipping to vertical dikes. Dikes are indicated by a red circle.
- Jd2 Two-pyroxene diabase: Gray to bluish-black, fine to medium-grained and commonly plagioclase porphyritic, olivine-free, augite + pigeonite diabase commonly containing quartz and alkali feldspar granophyre (Reising and Stoddard, 2006). Dikes are indicated by solid lines where location is known, dashed where inferred by correlation and aeromagnetic data, and dotted where concealed. Isolated diabase stations indicated by a red circle. Kittrell, Franklinton, Rolesville. Jp (?) – Felsic porphyry: Olive drab porphyritic rock with a very fine-grained (almost glassy) groundmass and phenocrysts of quartz having beta morphology and of plagioclase, with or without alkali feldspar. May belong to an unmapped dike. Observed at a single location northwest of Ingleside. Ingleside.
- The Rolesville batholith is a large, composite granitoid intrusive complex. It is elongate parallel to the north-northeast regional strike, and generally lies along the axial trace of the Wake Warren anticlinorium (Parker, 1968). Field evidence indicates that the plutons crystallized and cooled during the Pennsylvanian and Permian periods (Fullagar and Butler, 1979; Horton and Stern, 1994; Schneider and Samson, 2001). Previous studies dealing with the Rolesville batholith in the area covered by this map include those of Parker (1968), Julian (1970), Becker and Hoff (1997), Speer (1994), Speer and others (1994), Speer and Hoff (1997), Stoddard and Blake (2011), and Thornton and Horsman (2012). As described by Speer (1994), reentrants of country rock enclaves separate various plutons of the Bunn, Mitchell, and Averette granitoids were mapped as constituent plutons of the batholith by Speer (1994). The separate Cedar Creek and Wilton plutons lie in southern Franklin Country. In addition to the Rolesville main, these named plutons of the batholith by Speer (1994). The separate Cedar Creek and Wilton plutons lie in southern Franklin Country. The granitic bodies on the map are divided into a number of granitoid facies, based on texture, mineralogy, and other physical characteristics. See the unit descriptions below for details. Granitic pegmatite bodies are associated with all of the mapped granitoid plutons, but especially with the Gupton northwest pluton. In addition, pegmatite occurs in associated with all of the mapped granitoid plutons, but especially with the Gupton northwest pluton. In addition, pegmatite occurs in associated with all of the mapped granitoid plutons, where former mining activity took place along Maple Branch and several tributaries of Shocco Creek (Steel, 1952). Pegmatite outcrops are indicated on the map by open plus symbols.
- PPwg Granite of the Wilton pluton: Grayish-orange to pinkish-orange, medium- to coarse-grained, weakly foliated or lineated\to nonfoliated, leucocratic (CI less than 15) biotite granite. Locally molybdenite bearing. Wilton, Kittrell.
- PPbg -- Biotite granite: Pink-white, medium to coarse-grained, unfoliated to weakly foliated biotite granite, with local pegmatite. Kittrell. PPccg – Granite of the Cedar Creek pluton: Pink-white, medium to coarse-grained, unfoliated to moderately foliated and lineated biotite granite, with local pegmatite. Kittrell, Franklinton, Grissom.
- Includes Castalia, Gupton, and Gupton Northwest plutons. Also includes the Bunn, Mitchell, and Averette phases (Speer, 1994). Unit identifier denotes the pluton with first lower-case letter (c: Castalia; g: Gupton; n: Gupton Northwest; r: main mass of Rolesville batholith).
- PPrgd granitoid facies d: Fine to coarse-grained, but primarily medium-grained equigranular to moderately porphyritic (very rarely megacrystic), rarely foliated, pink or salmon and white biotite extension and plagioclase grains. CI = 5 12. Contains common biotite schlieren and local biotite crystal clots. Pegmatite dikes and pods are extremely common; locally, isolated xenocrysts of alkali feldspar 1 - 4 cm in length also occur. Unit also contains relatively common xenoliths of fine granodiorite or tonalite and Louisburg quadrangles. Less commonly nubbly, friable and/or cavernous. Rolesville main phase of Speer (1994). Ingleside, Louisburg, Justice, Kittrell, Franklinton, Rolesville, Bunn
- PPrgf foliated Rolesville granite: Gray-white to pink-white, medium to coarse-grained, locally weakly porphyritic, moderate to well-foliated biotite-bearing granite and leucogranitic gneiss. Locally contains muscovite, garnet, or hornblende. Kittrell, Franklinton. PPrdg – Diorite-gabbro of the Rolesville batholith: medium grained biotite granodiorite, hornblende-biotite diorite, quartz diorite, and biotite-hornblende gabbronorite, apparently unmetamorphosed and surrounded by PPrgd. Kittrell.
- PPrge, PPnge, PP
- Moulton, and in the zone of mixed rocks separating the main plutons. Locally contains pegmatite dikes in many localities, and quartz-muscovite greisen in the Bunn East quadrangle. Includes unnamed bodies (PPge). Gold Sand, Ingleside, Louisburg, Justice, Centerville, Bunn East.
- Prgn Bunn granitoid (Speer, 1994): massive, medium- to coarse-grained biotite + muscovite granitoid, identical to the Rolesville main phase (PPrgd) except containing accessory monazite. Zoned pegmatite dikes with smoky quartz relatively common. Bunn East, Bunn West, Louisburg, Justice.
- PPrgt Mitchell granitoid (Speer, 1994): massive, medium-grained (1-4 mm) leucocratic (CI = 5) biotite + muscovite monzogranite to granodiorite. Distinguished by white feldspars and overall white color. Bunn West, Rolesville.
- PPrgv Averette granitoid (Speer, 1994): massive, coarse-grained biotite +/- muscovite granitoid, having abundant subhedral orange alkali feldspar megacrysts to 1 cm. Locally foliated near western margin of batholith. Rolesville, Franklinton.
- PPcga granitoid facies a: Moderately K-feldspar porphyritic, medium to coarse-grained, buff weathering, white or pink and white, unfoliated biotite granite and monzogranite. Constitutes the main body of the Castalia pluton. CI around 10. Castalia, Justice, Bunn East.
- **PPcgb granitoid facies b:** Medium to coarse-grained, equigranular, unfoliated white, gray and pale pink biotite +/- garnet +/- muscovite granite and leucogranite. Locally contains magnetite. CI = 5-10. Occurs along the margins of the Castalia pluton. Castalia, Bunn East, Justice. **PPggc - granitoid facies c:** Fine to medium-grained, equigranular, unfoliated white to buff biotite granite. Constitutes the main body (southeastern portion) of the Gupton pluton. CI = 10-15. Castalia, Justice, Gold Sand, Centerville.
- PPngf granitoid facies f: Fine to coarse-grained, white, unfoliated to strongly foliated, locally K-feldspar porphyritic muscovite +/- garnet +/- biotite leucogranitic gneiss. CI less than 5. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or aplite. Locally contains abundant enclaves of gneiss and schist, as well as numerous dikes and pods of pegmatite or application.
- **PPrgg granitoid facies g:** Fine to medium-grained, white to pale gray biotite monzogranite to granodiorite. Locally carries a weak biotite foliation. Rare anhedral to subhedral garnet less than 1mm. May be cut by thin pegmatite dikes having beige to white-colored alkali feldspar. Displays gray to white weathering surfaces, but is distinctively more resistant to weathering when compared to the other granitoid phases. CI = 8 14. Louisburg.
- PPrgh granitoid facies h: White to tan, fine to medium grained, equigranular to weakly K-feldspar porphyritic, biotite +/- muscovite syenogranite. Locally, dikes of PPrgd cut rocks similar to PPrgh, PPrgg, and PPrgi. CI = 8 18. Louisburg.
- PPrgi granitoid facies i: Fine-grained to medium-grained white, light gray, or tan, equigranular to weakly porphyritic biotite +/- muscovite granitoid phases. Ingleside, Louisburg.
- PPrgj granitoid facies j: Heterogeneous granitoid gneiss. Includes granitoid gneiss. Includes granitoid gneiss. Includes granitoid gneiss granitoid gneiss. Includes granitoid gneiss granitoid gneiss. Includes granitoid gneiss granitoid gneiss granitoid gneiss granitoid gneiss. Includes granitoid gneiss gneiss granitoid gneiss Additionally may contain feldspar or biotite foliation. Planar fabric elements may be contorted and possibly transposed. Pegmatite and aplite dikes are abundant and locally deformed. Consistently associated with granitoid of the Rolesville main phase PPrgd. Ingleside, Kittrell.
- PPrgk granitoid facies k: Medium-grained, generally equigranular white, pink, orange or buff biotite +/- muscovite leucogranite and granite, locally having smoky quartz. Locally intrudes and contains autoliths of fine-to-medium grained biotite granite PPrgi. Ingleside. PPrgl – granitoid facies 1: Medium grained (typically 3 - 5 mm), hypidiomorphic granular to weakly porphyritic biotite granodiorite. Contains titanite, apatite and opaque minerals. CI=15 - 20. Occurs in three small mapped pods. Ingleside.
- ?Pzlp Lamprophyre dike: A fine to medium-grained, panidiomorphic lamprophyre with generally euhedral phenocrysts to 1.5 mm of red-brown kaersutitic (?) hornblende, red-brown biotite, and pale pink to beige augite. Amphibole is the most abundant ferromagnesian mineral, followed by biotite and then clinopyroxene. Amphibole is the most abundant ferromagnesian mineral, followed by biotite and then clinopyroxene. of extensively sericitized alkali feldspar and sausurritized plagioclase, with alkali feldspar apparently about twice as abundant as plagioclase. The rock is unmetamorphosed, but shows significant late-magmatic and/or hydrothermal alteration. Secondary minerals include calcite. Classified as a vogesite. Franklinton
- PzZgg gneissic biotite granitoid (Paleozoic?): Foliated biotite granitoid and granitoid orthogneiss interlayered with Raleigh gneiss. Grissom, Franklinton, Rolesville. METAMORPHIC ROCKS
- Note: Order of listed units does not imply stratigraphic sequence Metamorphic Rocks of the Falls Lake Terrane
- CZfs Falls Lake schist: Variably gray colored, mesocratic, medium- to coarse-grained, biotite-white mica-oligoclase-quartz schist locally having garnet, staurolite, kyanite, and/or chlorite porphyroblasts. Contains pods of metagabbro, amphibolite, and undivided meta-ultramafic rocks. Wilton, Grissom.
- CZfu ultramafic rocks (undivided): Variably altered and metamorphosed ultramafic rocks including metapyroxenite, actinolite-chlorite schist, and talc schist. Wilton, Grissom. Metamorphic Rocks of the Crabtree Terrane
- CZmca Middle Creek gneiss, mafic facies: Dark grayish-black to dark green, fine- to medium-grained, foliated and lineated, layered, epidote-bearing hornblende gneiss to aphibolite. Locally contains opaque mineral-rich metapyroxenite. Wilton, Grissom, Kittrell.
- CZmcg Middle Creek gneiss: Fine- to coarse-grained, gneissic to schistose, locally lineated, mesocratic (CI less than 30), biotite quartz dioritic to granodioritic gneiss. Interlayered with pink-gray to orange-tan, fine- to medium-grained amphibolitic gneiss. Wilton, Grissom, Kittrell.
- CZum Metaultramafic rock: Dark green to black, fine to coarse-grained massive to foliated talc-chlorite-actinolite schist and actinolite rock, locally with octahedral magnetite crystals. Wilton. Metamorphic Rocks of the Raleigh Terrane
- CZfig Falls leucogneiss: Leucocratic (CI less than 5) pink-gray to orange-tan, medium-grained, weakly to moderately foliated and strongly lineated, biotite magnetite granitic gneiss. Kittrell, Wilton, Grissom, Franklinton.

CZrl - fine-grained leucocratic gneiss: Very light gray, fine-grained, leucocratic epidote-plagioclase-quartz gneiss, locally containing darker, hornblende-bearing interlayers. Grissom.

- CZrgn Raleigh gneiss: Mixed unit consisting mainly of fine to coarse-grained, well foliated, compositionally layered, and locally lineated biotite + hornblende gneiss, biotite schist, white mica +/- sillimanite schist, white mica exprained, and locally lineated biotite granitoid gneiss containing garnet and locally magnetite. The unit is locally intruded by dikes of pink to gray granitic pegmatite and white to gray graphic granite. Kittrell, Franklinton, Rolesville, Grissom.
- CZum Metaultramafic rock: Dark green to black, fine to coarse-grained massive to foliated talc-chlorite-actinolite schist and actinolite rock, locally with octahedral magnetite crystals. Franklinton, Kittrell.

CZfg - Felsic gneiss: Light tan to pinkish gray, fine to medium grained, well foliated, fissile, quartz-plagioclase-K-feldspar-muscovite-biotite orthogneiss, locally having feldspar porphyroclasts as augen. Gold Sand, Ingleside.

- CZsms Sillimanite muscovite schist: Bluish green to gray to golden or white, fine to coarse-grained, moderately to well foliated muscovite schist. Locally may be strongly and chaotically crenulated and/or rusty or maroon weathering. Locally carries sillimanite, kyanite, garnet, pyrite and/or very rare staurolite. Includes quartz-muscovite schist. Bluish green to gray to golden or white, fine to coarse-grained, moderately to well foliated muscovite schist. Locally may be strongly and chaotically crenulated and/or rusty or maroon weathering.
- CZbgs Biotite gneiss and schist: Medium to dark gray, fine to medium grained, moderately to well foliated biotite gneiss to variably banded biotite gneiss and biotite gneiss to variably banded biotite gneiss and biotite gneiss to variably banded biotite gneiss and biotite gneiss and biotite gneiss to variably banded biotite gneiss to variably banded biotite gneiss and biotite gneiss and biotite gneiss and biotite gneiss and biotite gneiss to variably banded biotite gneiss and bioti locally contains quartzofeldspathic bands with abundant feldspar augenor fine-grained, poorly foliated, weakly banded quartz-biotite gneiss with fewer augen. Locally associated with dikes and/or sills of pegmatite and/or leucogranite. Also occurs as xenoliths within granitoid bodies. Gold Sand, Ingleside, Louisburg.

CZms - Muscovite schist: Silvery gray to dark greenish gray, medium grained, well foliated schist with well developed button foliation interpreted as an S-C shear fabric indicating subhorizontal right-lateral shear sense. Varies from muscovite schist: Locally contains sillimanite and/or chlorite-muscovite schist to chlorite-muscovite schist to chlorite-muscovite schist to chlorite-muscovite schist with well developed button foliation. Gold Sand, Ingleside, Justice,

- CZmxg Mixed gneiss: Mixed unit consisting of (1) felsic, tannish pink to gray, fine to medium grained, well foliated amphibolite with local chlorite and actinolite. May also contain biotite gneiss or biotite-muscovite schist. Commonly occurs with granite, foliated granite, or leucogranite. Gold Sand,
- CZhg hornblende gneiss: Dark gray to black, medium grained, poorly to moderately foliated hornblende-plagioclase gneiss and amphibolite. May contain biotite or epidote. Where biotite content is high may be somewhat schistose. Occurs in the western half of the quad as xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths are indicated by point symbols within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies. The larger bodies are mapped as pools while the smaller xenoliths within granitoid bodies.

- CZegs Enclaves of gneiss and schist: Along with metavolcanic rocks, these rocks occur as enclaves (primarily xenoliths of country rocks) within granitoid plutons and as trains defining septa along the contacts between plutons. Includes biotite schist, muscovite schist, biotite gneiss, amphibolite, and granitic gneiss. Justice, Gold Sand.
- CZfmv Felsic metavolcanic rocks: Includes distinctive bluish, gray, or white weathering, thinly layered and locally strongly fissile fine-grained rocks consisting predominantly of very strongly recrystallized mosaic matrix of very fine quartz are present. Biotite and white mica may be present but are sparse; banding is locally defined by biotite. Typically contains significant magnetite. Rock is distinctively hornfelsic near granite plutons. Common metamorphic minerals, especially in hornfels zone, include Ca-amphibole, Mn-Fe garnet, and epidote; these minerals may occur in abundance as country rock enclaves also occur in ab
- rocks are rhyodacitic in composition, and locally have relict K-feldspar phenocrysts. Zircons from felsic crystal tuff in the Bunn East Quadrangle have yielded a preliminary U-Pb upper intercept crystallization age of 590 +/- 3 Ma (Goldberg, 1994). Also includes rare intermediate metavolcanic rocks, mineralogically similar to felsic varieties but with a higher percentage of epidote and/or biotite, taking on a darker hue or a salt-and-pepper appearance. Unit also includes tuffaceous metasedimentary rocks, as well as rare intermediate metavolcanic rocks, mineralogically similar to felsic varieties but with a higher percentage of epidote and/or biotite, taking on a darker hue or a salt-and-pepper appearance. Centerville, Castalia, Justice, Bunn East. CZmmv - Mafic metavolcanic rocks: Includes massive fine to medium-grained epidote + chlorite + actinolite + actinolite + actinolite + albite greenstone; chlorite phyllite and schist; weakly to non-foliated, medium to coarse-grained amphibolite consisting of hornblende and intermediate plagioclase, with or without epidote/clinozoisite and Fe-Ti oxide minerals; and metabasalt with relict igneous texture, plagioclase phenocrysts, and local quartz +/- epidote amygdules. Locally includes quartz-epidote rock containing various mixtures of hornblende, plagioclase, epidote/clinozoisite, quartz, chlorite, and opaque minerals. Also includes very rare metagabbro. In the zone of hornblende (and/or actinolite), epidote (or clinozoisite, quartz and/or chlorite. Plagioclase, epidote/clinozoisite, quartz and/or actinolite), epidote (or clinozoisite, quartz, chlorite, and opaque minerals, and locally quartz and/or chlorite. Plagioclase may be twinned or untwinned. In thin section, both amphibole and plagioclase may be optically zoned, Locally mafic hornfels about one mile north of Centerville contains mineral assemblages with multiple amphiboles, including cummingtonite, together with garnet, biotite, Fe-Ti oxide minerals, and Ca-rich plagioclase (Stoddard and others, 1987). Chemical analyses of mafic metavolcanic

believed to be correlative with Bens Creek leucogneiss of Farrar (1985a,b), quartzite of McDaniel (1980), and "dacitic bluestone" of Stoddard and others, 2011; Sacks and others, 2011). Zircons from a sample located in the north-central Centerville Quadrangle gave a discordant upper intercept U-Pb age of 524.9 +/- 8.6 Ma (Stoddard and others, 2011).

Unit also includes light colored, generally fine grained and phyllitic to schistose rocks consisting of white mica, quartz, feldspar(s), chlorite, and rare biotite and epidote. Commonly contain relict phenocrysts of quartz (typically showing beta morphology) as well as sodic plagioclase, and/or white to beige and typically flattened lapilli. Interpreted as crystal-lithic tuff. Chemical and petrographic data from the Bunn East Quadrangle (Stoddard, 1993) indicate that at least some of these

- rocks of the Spring Hope terrane in the Hollister Quadrangle (Sacks and others, 2011) are low-K tholeiites inferred to have ocean-floor or volcanic arc affinities (Boltin, 1985; Boltin and Stoddard, 1987). Mafic metavolcanic rocks also occur as enclaves along the Castalia Gupton pluton contact in the Justice quad. Centerville, Castalia, Bunn East, Justice, Gold Sand. CZmgs - Metasedimentary rocks: Predominantly metagraywacke and metasiltstone. Also includes minor metamudstone and metaconglomerate. Metagraywacke may be massive or poorly bedded. Typically shows good relict clastic texture of medium sand to silt-sized grains of sericitized feldspar and quartz. Metamorphic biotite and epidote are common in the matrix, as is white mica. As overall grain size decreases, white mica increases in abundance. Fine opaque mineral grains are common. In addition to the minerals listed above, Corbitt (1987) describes chlorite, garnet, allanite, zircon, and tourmaline in metagraywackes from the Portis Mine cores. Graded bedding and scour-and-fill structures were observed in outcrop, and have also been reported by Waltman (1985) and Corbitt (1987) in the eastern Centerville quad. Where stratigraphic facing direction can be inferred, beds appear to be upright in every case. Quartzose rocks which may be called fine metagraywackes from the Portis Mine cores. impure quartzite are also present, and may be interlayered with white mica phyllite. They locally contain biotite and/or garnet, and locally may show graded bedding. These quartzite, and may be, at least in part, derived from altered and silicified felsic or intermediate metavolcanic rocks. Intrusive sills and dikes, now metadiorite and metabasalt, as well
- as minor volcanic layers also occur, but are too small to show on the map. In a study utilizing rock cores from the Portis Gold Mine, Waltman (1985) and Corbitt (1987) also describes intrusions of quartz diorite and quartz veins and metagraywacke. Waltman (1985) and Corbitt (1987) also describes intrusions of quartz diorite and quartz veins and metagraywacke. fine to medium-grained pure quartz rocks. These have been interpreted by Stanley (1978) as metamorphosed quartz arenites, but may instead have resulted from recrystallization of zones of hydrothermal quartz alteration. Zircons from an unmapped felsic crystal tuff layer within metasedimentary rocks in the southeastern Centerville Quadrangle gave a nearly concordant U-Pb age of 628 +/- 1.7 Ma (Stoddard and Miller, 2011). Castalia, Centerville. CZps - Pelitic schist: Medium to coarse-grained, light gray, silver, or maroon muscovite schist, commonly associated with intrusions of granite or pegmatite. May be stratigraphic equivalent to part of CZmgs, at higher metamorphic grade. Gold Sand, Centerville. CZmbs - Muscovite-biotite schist and semischist: Fine-grained, quartzose (and possibly feldspathic?) muscovite-biotite schist or micaceous quartzite. Biotite porphyroblasts give rock a salt-and-pepper appearance. Relict bedding is suggested by layers with varying mica to quartz ratio. White mica defines the schistosity, and white mica-rich layers may be crenulated. Locally contains tiny garnets. Some exposures are fissile or slabby weathering. May be stratigraphic
- equivalent to part of CZmgs, at higher metamorphic grade. Centerville. CZqfg - Quartzofeldspathic gneiss and schist: Fine- to coarse-grained, white to light gray, well foliated, quartzofeldspathic gneiss, white to gray, fine-grained muscovite schist, quartz-muscovite schist, biotite schist, and greenish-black to black amphibolite. Zebulon, Bunn West. CZsa - Argillite: Very fine grained, light-gray to light-olive-gray laminated metamudstone or argillite. Chlorite +/-muscovite, and tyrosite schist (Gaughan, 1999; Gaughan and Stoddard, 2003). Locally, residual soil contains loose
- staurolite and garnet porphyroblasts. The schist commonly carries obvious crenulations and strong associated lineations. Away from the pluton this unit consists of lower-grade rocks. Bunn East, Bunn West, Zebulon, Middlesex. CZspe – Muscovite phyllite and tuff: Dominantly white mica phyllite and tuff: Dominantly white mica phyllite or fine schist, locally having strong crenulation cleavage. Locally contains flattened, disk-shaped relict quartz phenocrysts (2-5 mm). Locally includes quartz-epidote rock, metasiltstone, metagraywacke, or impure quartzite. Also includes medium- to coarse-grained, laminated epiclastic rocks or lithic-crystal tuff containing local flattened pumice lapilli and/or quartz crystals. Interpreted to have a mixed volcanic and sedimentary protolith. Bunn Fast Middleson Runn West volcanic and sedimentary protolith. Bunn East, Middlesex, Bunn West.

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