DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF LAND RESOURCES
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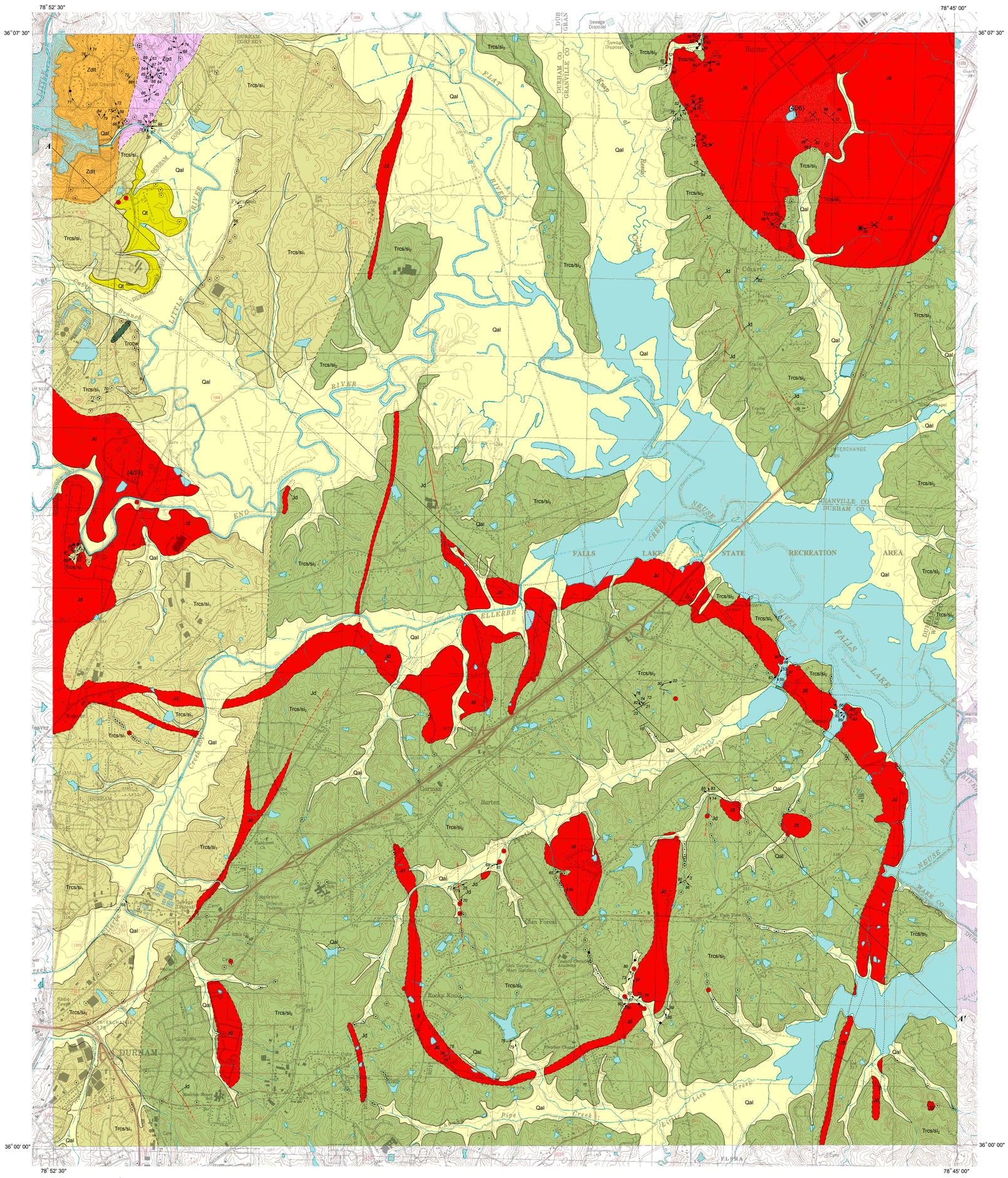
NORTH CAROLINA GEOLOGICAL SURVEY
OPEN FILE REPORT 2004-03b Revision -01 (2010)



Description of Map Units

The majority of the map area is underlain by sedimentary rocks of the Durham sub-basin of the Deep River Mesozoic basin. Hoffman and Gallagher (1989) identified distinct lithofacies in the Durham sub-basin. These lithofacies were grouped in three lithofacies associations, identified as Lithofacies Association I (LA I), Lithofacies Association II (LA II), and Lithofacies association III (LA III). In general, LA I contains interbedded sandstone and siltstone and is interpreted as braided stream deposits. LA II also contains interbedded sandstone and siltstone, but is interpreted as a meandering fluvial system surrounded by vegetated floodplain. LA III contains poorly sorted sandstone, pebbly sandstone, and conglomerate. LA III is interpreted as alluvial fan complexes characterized by broad, shallow channels with high sediment concentrations, and locally, high-energy debris flows. LA III lithologies are not present in the map area. A review of Mesozoic sedimentary rocks in the vicinity of the map area is provided in Clark et al. (2001). Jurassic Diabase, present as dikes and sills, is abundant in the map area. Location of LAI and LAII contact in map area modified from Spencer (1987) to edge match with Hoffman and Gallagher (1989) contacts. Extent of diabase sills in some locations modified from Spencer (1987).

The northwest corner of the map is underlain by Late Proterozoic aged metamorphosed igneous rocks of the Carolina terrane. These units 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. This map replaces the Northeast Durham quadrangle portion of NCGS Open-File Report 2004-03 (Phillips et al., 2004).

Sedimentary Units

Qal

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

Qt

Qt – Quaternary terrace deposits: Unconsolidated clay, silt, sand and pebbles on flat plain above current floodplain level; cobble and boulder float (up to 40 cm diameter) consisting of diabase, granodiorite and various volcanics (tuffs and lavas).

Trcs/si1

Trcs/si1 - sandstone with interbedded siltstone of the 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 sub-rounded 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. These rocks are assigned to the Lithofacies Association I of Hoffman and Gallagher, 1989 and Watson, 1998.

Trcs/si2

Trcs/si2 - sandstone with interbedded siltstone of the Chatham Group Lithofacies Association II: cyclical depositional sequences of whitish-yellow to grayish-pink to pale red, coarse- to very coarse-grained, trough cross-bedded lithic arkose that fines upward through yellow to reddish-brown, medium- to fine-grained sandstone, to reddish-brown, burrowed and rooted siltstone. Bioturbation is usually surrounded by greenish-blue to gray reduction halos. Coarse-grained portions contain abundant muscovite, and basal gravel lags consist of clasts of quartz, bluish-gray quartz crystal tuff, and mudstone rip-ups. These rocks are assigned to the Lithofacies Association II of Hoffman and Gallagher, 1989 and Watson, 1998.

Trccw

Trccw - conglomerates of the western border of the Chatham Group: reddish-brown to dark brown, matrix to clast supported, pebble to cobble conglomerate; clasts are subrounded to rounded consisting primarily of quartz and foliated and unfoliated felsic volcanic rocks; matrix consists of coarse- to very coarse-sand.

Intrusive Units

Jd

Jd - Diabase: Black to greenish-black, melanocratic, fine- to medium-grained, dense, consists primarily of plagioclase, augite, and may contain olivine. Occurs as sills and dikes up to 100 ft wide. Locally gabbroic in sills. Typically occurs as dense, spheriodally weathered boulders with a grayish-brown weathering rind. Red station location indicates outcrop or boulders of diabase. Whole rock geochemistry data for several samples in the Durham area are presented in Gottfried et al. (1991).

CAROLINA TERRANE

Meta-Intrusive Units

Zgd

Zgd – granodiorite: Exhibits a variety of colors and textures ranging from grayish-white, fine- to medium-grained hornblende granodiorite; pinkish-white, medium-grained hornblende granodiorite; and gray, fine-grained granodiorite.

Metavolcanic Units

Zdlt

Zdlt - Dacitic lavas and tuffs: Distinctive dark-gray to black; siliceous; cryptocrystalline lava, porphyritic lava with plagioclase phenocrysts, and flow banded dacitic lavas. Interlayered with gray to black; welded and non-welded coarse tuff and lapilli tuff. Tuffs often contain black-colored fiamme, up to 10 cm, interpreted as flattened pumice. Clast types include black cryptocrystalline lava and porphyritic lava with plagioclase phenocrysts. Differentiation between lavas and massive tuffs is difficult in hand sample in most cases. The lavas are interpreted to have been coherent magma that were extrusive or very shallow intrusions associated with dacite domes. Tuff interlayers are interpreted as episodic pyroclastic flow deposits and air fall tuffs generated during eruption of domes.

References for map

Clark, T.W., Gore, P.J.W., and Watson, M.E., 2001, Depositional and structural framework of the Deep River Triassic basin, North Carolina, in Hoffman, C.W., editor, Field trip guidebook, 50th Annual Meeting, Southeastern Section, Geological Society of America, Raleigh, North Carolina, April 2001, p. 27-50.

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Hoffman, C. W., and Gallagher, P. E., 1989, Geology of the Southeast Durham and Southwest Durham 7.5-minute quadrangles, North Carolina Geological Survey Bulletin 92, 34 p.

Phillips, C.M., Witanachchi, C., Ward, A.N., Clark, T.W., 2004, Geologic map of the Northeast and Northwest Durham 7.5-minute quadrangles, Durham, Granville, Orange, and Wake Counties, North Carolina: North Carolina Geological Survey Open-file Report 2004-03, scale 1:24,000, in color.

Spencer, R.J., 1987, Geology of the Northeast Durham 7.5-minute Quadrangle, North Carolina, manuscript map, cross section and report in the files of the North Carolina Geological Survey, unpublished data.

Watson, M. E., 1998, Geology of the Green Level 7.5-minute quadrangle, Chatham, Durham, and Wake Counties, North Carolina, North Carolina Geological Survey Open-File Report 98-3, 28 p.

EXPLANATION OF MAP SYMBOLS

CONTACTS

Lithologic contacts - distribution and concentration of station locations and structural symbols indicates degree of reliability.

- Qal geologic contact
- inferred geologic contact
- concealed geologic contact
- diabase geologic contact
- observation station location
- diabase station location

PLANAR FEATURES

Observation sites are centered on the strike bar or are at the intersection point of multiple symbols. Planar feature symbols may be combined with linear features.

- 64 — strike and dip of foliation
- strike and dip of vertical foliation
- 14 — strike and dip of primary bedding and layering
- 82 — strike and dip of joint
- strike and dip of vertical joint
- horizontal joint

LINEAR FEATURE

- 22 — trend of plunge of slicken line

OTHER FEATURES

quarries and prospects
- active
- inactive
- (406) — USGS core - number indicates depth to bottom of diabase sill. Identified in Spencer, 1987.

Schmidt Equal Area Stereogram Data of Poles to Bedding of Triassic Sediments N = 7

Unidirectional Rose Diagram of Joints for All Lithologies N = 159

UTM GRID AND 1998 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

MAP LOCATION

SCALE 1:24 000

1 0.5 0 1 Miles

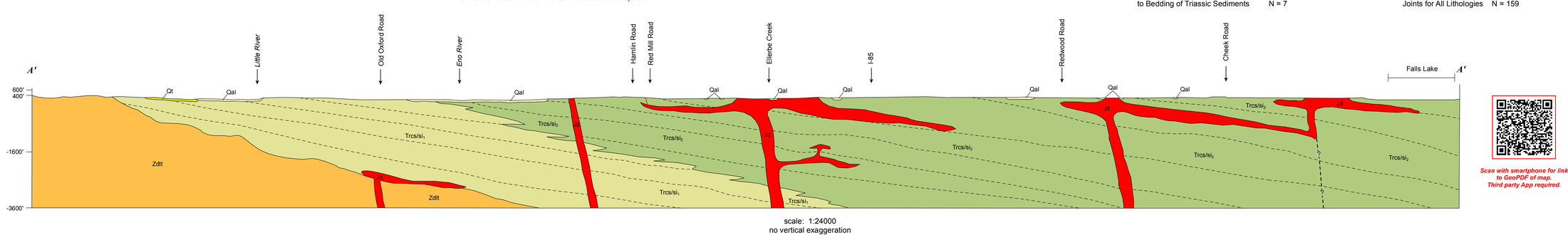
1,000 500 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

CONTOUR INTERVAL 10 FEET

Base topographic map is a digital raster graphic image of the Northeast Durham 7.5-minute quadrangle (1993), North Carolina State Plane NAD 83 meters coordinate system.

Geology mapped from August 2002 through September 2003 by Philips, Witanachchi, and Ward. Additional data collection in active quarry by Phil Bradley and Heather Hanna in 2009. Rock type data of Carolina terrane lithologies reinterpreted by Phil Bradley in 2009. Cross section updated by Phil Bradley.



scale: 1:24000
no vertical exaggeration

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

GEOLOGIC MAP OF THE NORTHEAST DURHAM 7.5-MINUTE QUADRANGLE, DURHAM, GRANVILLE AND WAKE COUNTIES, NORTH CAROLINA

By Cindy M. Phillips, Channa Witanachchi, Amy N. Ward and Timothy W. Clark

Digital representation by Michael A. Medina, and Cindy M. Phillips

2010

NOTE: This map replaces the Northeast Durham quadrangle portion of NCGS Open-File Report 2004-03 (Phillips et al., 2004).

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.