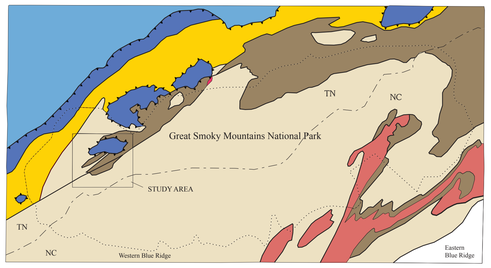
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE NATIONAL PARK SERVICE

OPEN-FILE REPORT 99 - 175

REGIONAL GEOLOGIC INDEX MAP



Great Valley

Paleozoic Sedimentary Rocks

Geologic Contacts

Great Smoky Thrust Fault

Fault

Contact

Park boundary

Western Blue Ridge

Cambrian and Ordovician Sedimentary Rocks

Late Proterozoic Metasedimentary Rocks
Ocoee Supergroup

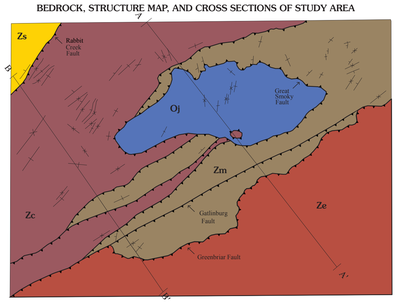
Walden Creek Group

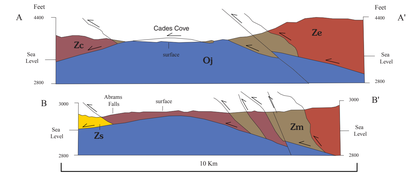
Great Smoky Group

Snow Bird Group

Middle Proterozoic Gneiss

BEDROCK, STRUCTURE MAP, AND CROSS SECTIONS OF STUDY AREA



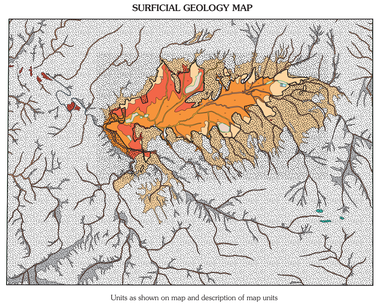


Folds

Anticlines -- Anticline in bedding or arch in foliation

Synclines -- Syncline in bedding or trough foliation

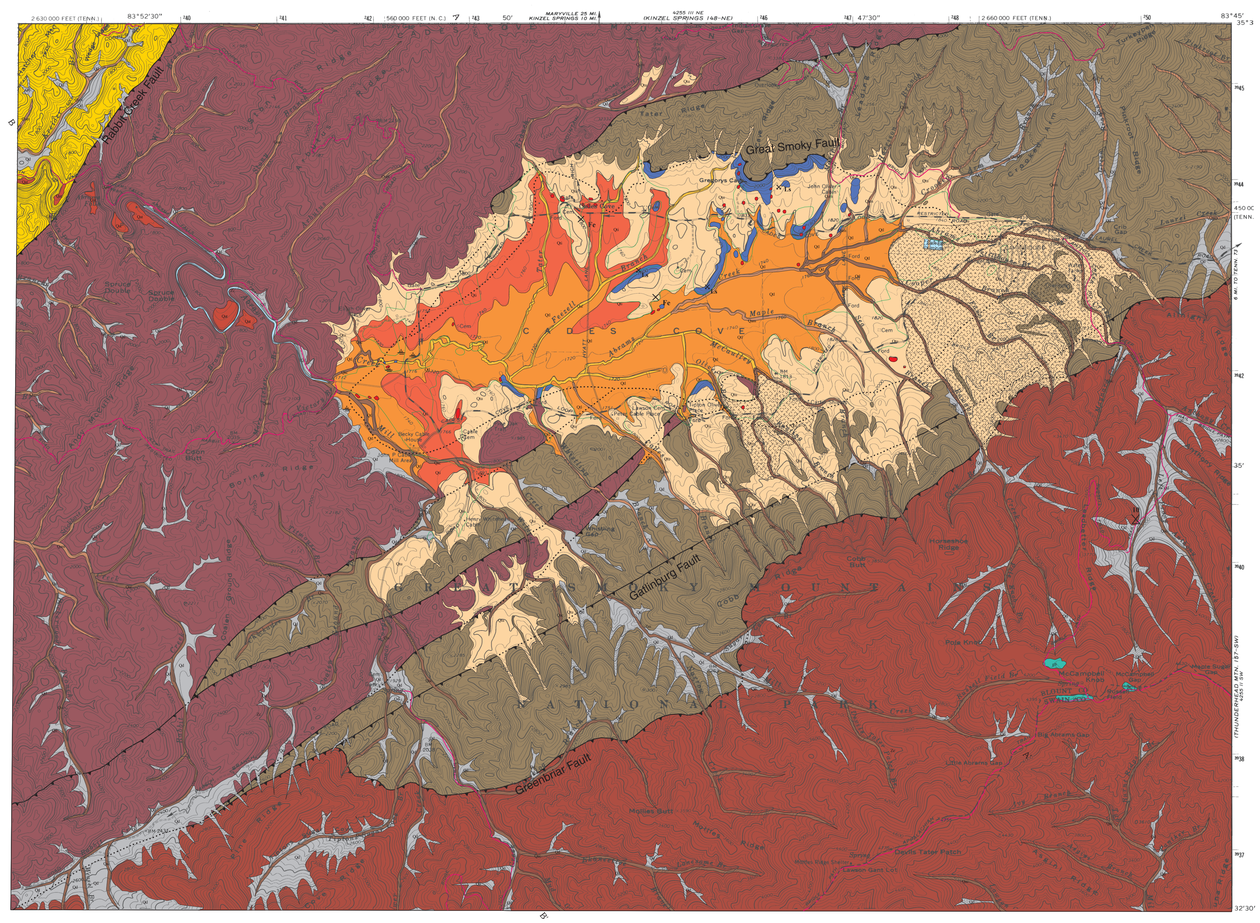
SURFICIAL GEOLOGY MAP



Units as shown on map and description of map units

Forest

Open pasture in Cades Cove



Base from USGS 7.5' Quadrangles, 1964.

Basemap layers were scanned, and edgematched to form grayscale background.

Polyconic projection. 1927 North American Datum
10,000-foot grids based on Tennessee and North Carolina coordinate systems
1000-meter Universal Transverse Mercator grid ticks, zone 17.

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

1 .5 0 1 MILE

1 .5 0 1 KILOMETER

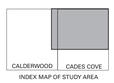
0 .5 1 1.5 2 THOUSAND FEET

Contour Interval 40 Feet

QUADRANGLE LOCATION

Geology mapped by Scott Southworth, 1997

Digital Compilation and Cartography completed by Trevor Putbrese and Peter Chirico, 1998



INDEX MAP OF STUDY AREA

GEOLOGIC MAP OF PARTS OF THE CADES COVE AND CALDERWOOD QUADRANGLES, TENNESSEE AND NORTH CAROLINA, GREAT SMOKY MOUNTAINS NATIONAL PARK

By

Scott Southworth, Peter Chirico, and Trevor Putbrese

1999

EXPLANATION OF MAP SYMBOLS

GEOLOGIC CONTACTS

Contact--Solid where approximately located

Thrust fault--Solid where approximately located; dotted where concealed Sawteeth on upper plate

OTHER FEATURES

Boulders and cobbles--Metasandstone that underlie upper-level alluvial-colluvial debris terraces (Qtu)

Sinkhole

Entrance to Gregorys cave

Swamp

P **Photograph locality (see WEB site)**

Fe **Prospect for iron ore (hematite)**

Ls **Quarry for limestone**

10 **Backcountry campsite--10 Ledbetter Ridge**

NPS Trail

Stream, creek,or branch

1750 **Topographic contour line with elevation in feet above sea level**

Grassy bald

Open pasture in Cades Cove

AGE AND DESCRIPTION OF MAP UNITS

Unconsolidated Surficial Deposits and Landforms

Holocene (11,000y to present)

Alluvium (Holocene)--Fine, medium, and coarse material underlying floodplains and exposed in beds of creeks and branches

Qaf **Fine alluvium**--Mixtures of clay, silt, sand, and gravel

Qam **Medium alluvium**--Mixtures of coarse gravel and cobbles

Qac **Coarse alluvium**--Mixtures of small to large boulders

Qd **Diamicton (Holocene)**--Poorly sorted mixture of cobbles and boulders of dominantly metasandstone locally supported by a matrix of sand and silt. Transported by gravity and debris flow, and modified by running water and freeze-thaw processes. Concentrated in hillslope depressions, drainages, and coves

Holocene and Pleistocene (200,000y to present)

Alluvial terrace (Holocene and Pleistocene)--Cobbles of metasandstone scattered on nearly flat benches as much as 200 ft above Abrams Creek

Qat **Alluvial plain (Holocene; 11,000y to present**--Mixture of clay, silt, sand, gravel, and cobbles that underlie the nearly flat plain of Abrams Creek

Qap **Alluvial and colluvial debris terrace (Holocene and Pleistocene)**--Mixture of clay, silt, sand, gravel and cobbles that underly aprons that slope from ridges into Cades Cove where they are nearly flat terraces. Thickness of deposits range from 1 m veneer to possibly tens of meters. Deposits are terraced fans with coarse material only locally at the surface. Result of a combination of gravity and debris flow modified by freeze-thaw and incised by Holocene streams

Qtl **Lower terrace**--Ranges in elevation from 1720 to 1760 ft asl and is obvious only at the lower (west) end of Cades Cove

Qtu **Upper terrace**--Ranges in elevation from as much as 1760 to 2400 ft asl

Fossiliferous Lower Ordovician Bedrock
(Exposed in Cades Cove beneath the Great Smoky fault)

Knox Group

Ordovician (425my)

Oj **Jonesboro Limestone**--Gray, limestone with regular bedding and clay partings, scattered quartz sand grains, white to gray chert, and massive dolomite. Contains conodont microfossils and silicified macrofossils, including brachiopods, mollusks (gastropod operculae and orthocone cephalopods), trace fossil tubes, and trilobites. Well exposed along the Loop Road west of John Olivers Cabin and at Gregorys Cave

Metamorphosed Neoproterozoic Sedimentary Bedrock

Ocoee Supergroup

Walden Creek Group
(Exposed west of Abrams Falls Beneath the Rabbit Creek fault)

Neoproterozoic (800 - 545my)

Zs **Shields Formation**--Gray to white, quartz pebble conglomerate and quartzose sandstone in graded beds. Conglomerate pebbles consists mostly of oblate milky vein quartz as much as 1 in long and some dk gray chips of phyllite in a quartz sand matrix. Well exposed along the Abrams Falls trail west of Abrams Falls

Great Smoky Group

Ze **Cades Sandstone**--Gray to brown, fine to medium grained sandstone with minor conglomeratic beds containing clasts of metagranite, interbedded with finely laminated gray to blue black sillstone. Well exposed at Abrams Falls

Great Smoky Group

Zc **Elkmont Sandstone**--Gray to brown, medium to coarse grained conglomeratic sandstone with poorly sorted and graded beds interbedded with laminated gray to black sillstone. Sandstone contains distinctive subangular grains of milky vein quartz and white feldspar

Snowbird Group?

Zm **Metcalf Phyllite**--Gray to green phyllite, sillstone and rare sandstone. Phyllite is a tectonite, a strongly foliated and retrograde-metamorphic variety of sillstone. Rare relict beds seen as fine laminations. Well exposed on north side of Laurel Creek Road west of Crib Gap