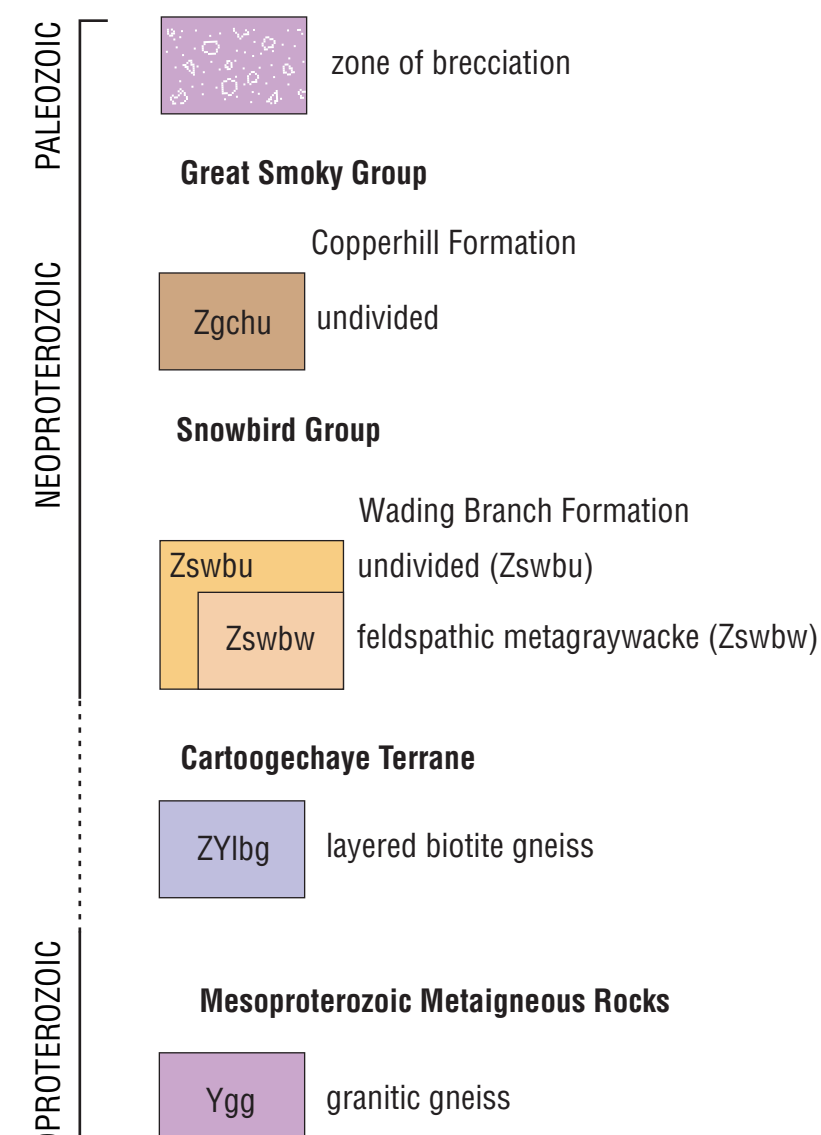
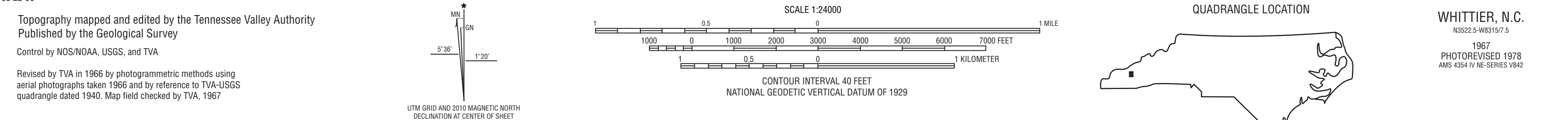
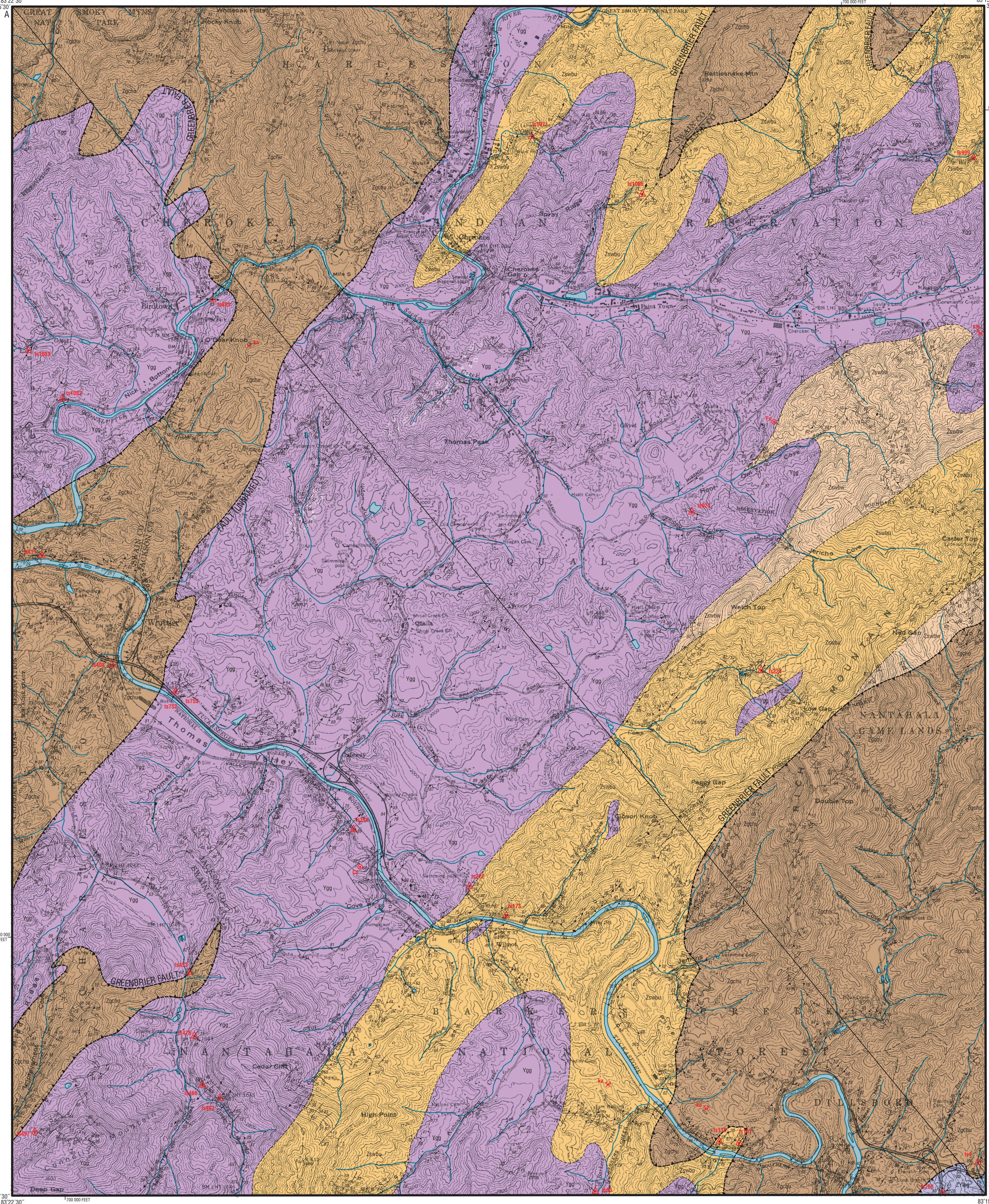
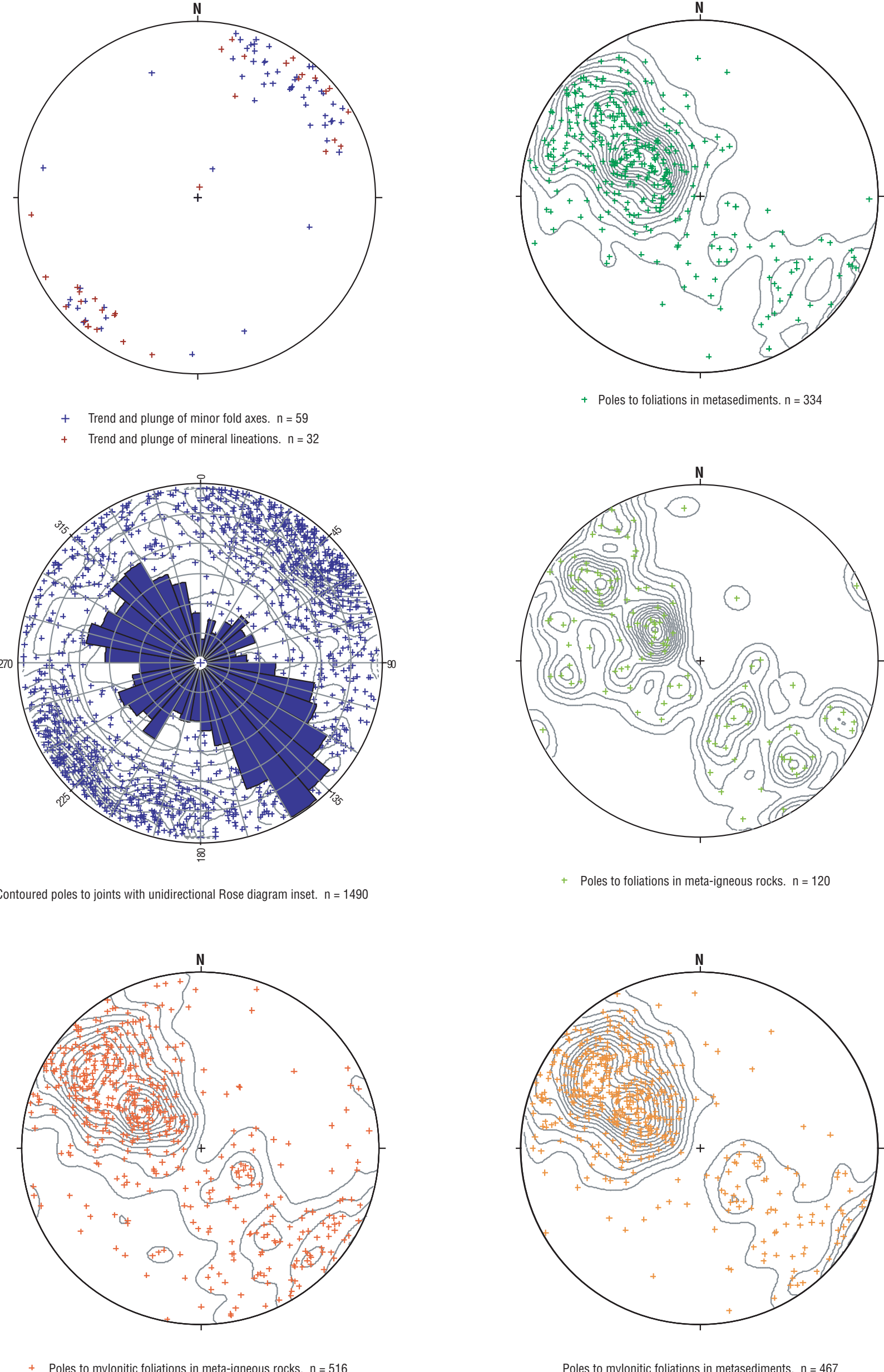


This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program

MAP UNITS



SCHMIDT EQUAL AREA STERIONET DATA



WHOLE ROCK ICP ANALYSIS¹ OF SELECTED SAMPLES

Sample #	COORDINATES (State Plane NAD 83)	ROCK TYPE	MAP UNIT	OXIDES IN PERCENT														ELEMENTS IN PPM ²										
				SiO ₂	Al ₂ O ₃	FeO _T	MgO	CaO	MnO	K ₂ O	TiO ₂	P ₂ O ₅	Na ₂ O	CO ₂	SO ₃	Ca	Ba	Zn	Co	Cr	Y	Nb	Sn	Li	Sr	Mo	Bi	SUM ³
101198	200.574; 220.006	mylonitic metagraywacke	Zswbu	51.8	17.29	5.13	0.96	1.88	1.17	0.16	0.01	0.12	0.45	1.17	0.1	0.05	100	121	34	19	13	3.1	90.93					
101197	189.2630; 220.736	muscovite schist	Zswbu	56.5	19.55	5.59	1.28	0.73	1.35	0.26	0.05	0.24	0.05	0.009	51	1038	265	53	27	94	132	144	45	13	17	6.5	99.98	
101071	201.0490; 218.896	mylonitic schistose metagraywacke	Zswbu	55.08	15.18	11.32	0.42	0.52	0.51	0.01	0.12	0.12	0.1	0.1	18	594	89	38	43	216	222	81	31	23	2.9	99.94		
101082	198.2890; 213.232	mylonitic granitic gneiss	Ygg	68.58	14.21	3.75	1.2	1.62	1.79	0.56	0.54	0.13	0.05	0.007	< 1401	46	< 20	25	215	205	121	34	18	8	1.3	99.98		
101103	198.8670; 212.881	biotite gneiss	Ygg	72.90	19.29	3.15	0.22	0.18	0.22	0.13	0.04	0.003	0	1478	29	< 20	387	400	64	48	7	6	0.7	100				
101110	189.2940; 220.098	sandstone	Zswbu	72.47	11.86	4.17	1.56	1.16	2.14	2.64	0.66	0.12	0.05	0.001	15	559	64	< 20	29	183	323	62	29	10	8	1.4	99.97	
101170	192.0300; 218.096	mylonitic metagraywacke	Zswbu	77.71	16.41	3.58	0.72	1.78	2.39	1.47	0.65	0.14	0.06	0.003	19	272	55	< 20	179	559	91	22	12	6	1.5	99.98		
10222	192.2980; 217.724	potassium feldspathic gneiss	Ygg	67.51	14.95	4.69	1.07	2.53	3.32	3.75	0.53	0.13	0.08	0.004	5	1232	66	< 20	414	248	124	27	13	10	1.4	99.99		
10283	188.5700; 223.087	layered migmatite	ZYtbg	52.98	20.56	10.44	0.39	1.56	2.37	4.4	1.13	0.34	0.16	0.016	48	1039	167	22	31	208	376	171	70	24	23	2.3	99.95	
10284	194.7060; 221.296	metagabbro	Zswbu	61.3	5.46	1.99	0.16	0.07	0.23	3.68	0.42	0.03	0.02	0.005	5	862	9	< 20	28	95	201	92	11	10	2	0.6	100	
10391	193.1100; 216.406	metagabbro	Zswbu	58.87	30.78	7.87	0.24	2.13	0.48	0.23	0.93	0.22	0.14	0.006	< 5	62	10	< 20	103	163	488	117	16	12	9	2.7	100	
104	188.8140; 223.016	schistose metagraywacke	Zgchu	48.21	24.9	11.02	3.17	0.88	1.29	3.07	1	0.23	0.18	0.015	57	842	283	66	37	172	178	164	73	20	27	2.7	99.95	
10408	195.1870; 213.976	metagraywacke	Zgchu	75.15	10.58	4.33	1.27	1.35	2.51	2.52	0.89	0.15	0.05	0.007	6	688	83	< 20	29	183	479	74	36	15	7	1.2	99.98	
10420	193.5270; 214.418	metagraywacke	Ygg/Zgchu	72.41	12.25	5.25	1.58	1.33	1.85	2.89	0.42	0.19	0.05	0.01	55	625	85	27	24	478	72	27	16	10	1.3	99.94		
10480	190.2120; 214.518	mylonitic granitic gneiss	Ygg	70.92	14.85	2.8	0.68	2.13	3.45	4.59	0.35	0.11	0.04	0.004	< 1662	40	< 20	24	513	164	35	5	4	4	0.2	99.99		
10481	190.0230; 214.708	mylonitic granitic gneiss	Ygg	69.73	14.42	3.42	0.82	1.25	2.86	3.46	0.41	0.13	0.06	0.003	< 1309	41	< 20	21	442	188	60	14	7	6	0.7	99.94		
10476	190.7830; 214.448	mylonitic granitic gneiss	Ygg	57.45	17.36	8.41	2.71	3.43	2.73	2.83	1.1	0.26	0.12	0.008	7	487	128	< 20	33	354	364	76	16	11	13	3.4	99.96	
10475	189.5230; 212.832	gneiss	Ygg	69.02	14.42	3.42	0.82	1.25	2.86	3.46	0.41	0.13	0.06	0.003	< 1309	41	< 20	21	442	188	60	14	7	6	0.7	99.94		
10463	188.7770; 219.046	mylonitic granitic gneiss	Ygg	62.01	8.32	1.71	0.18	0.22	0.88	5	0.58	0.02	0.002	< 1347	81	25	23	180	343	< 20	22	12	3	0.7	100			
10750	194.8100; 214.096	mylonitic granitic gneiss	Ygg	69.02	14.42	3.42	0.82	1.25	2.86	3.46	0.41	0.13	0.06	0.003	19	249	163	< 20	217	445	181	37	26	5	1.8	99.98		
10753	194.8230; 214.887	ultra mylonite	Ygg	60.84	15.78	6.92	1.09	4.87	3.33	3.59	1.12	0.8	0.11	0.003	6	1649	175	< 20	220	436	173	53	22	15	1.1	99.99		
10811	196.4680; 212.881	mylonitic metagraywacke	Zgchu	61.16	7.36	3.95	0.16	0.24	0.4	0.22	0.02	0.04	0.004	6	1198	4	< 20	222	211	222	19	6	5	1	0.9	99.99		
10850	199.2680; 215.512	graniferous felsic gneiss	Ygg	67.87	12.0	4.16	0.65	1.32	1.86	4.36	0.56	0.17	0.11	0.01	18	1916	55	< 20	232	311	56	25	21	10	3.6	99.99		
10854	196.4430; 220.112	chlorite schist	Ygg	56.08	6.67	1.65	0.08	0.11	0.23	3.85	0.18	0.02	0.002	< 5	920	13	< 20	25	65	106	11	12	< 5	1	0.8	100		
10899	200.0230; 223.026	metagabbro	Ygg	66.08	6.67	1.65	0.08	0.11	0.23	3.85	0.18	0.02	0.002	< 5	920	13	< 20	25	65	106	11	12	< 5	1	0.8	100		

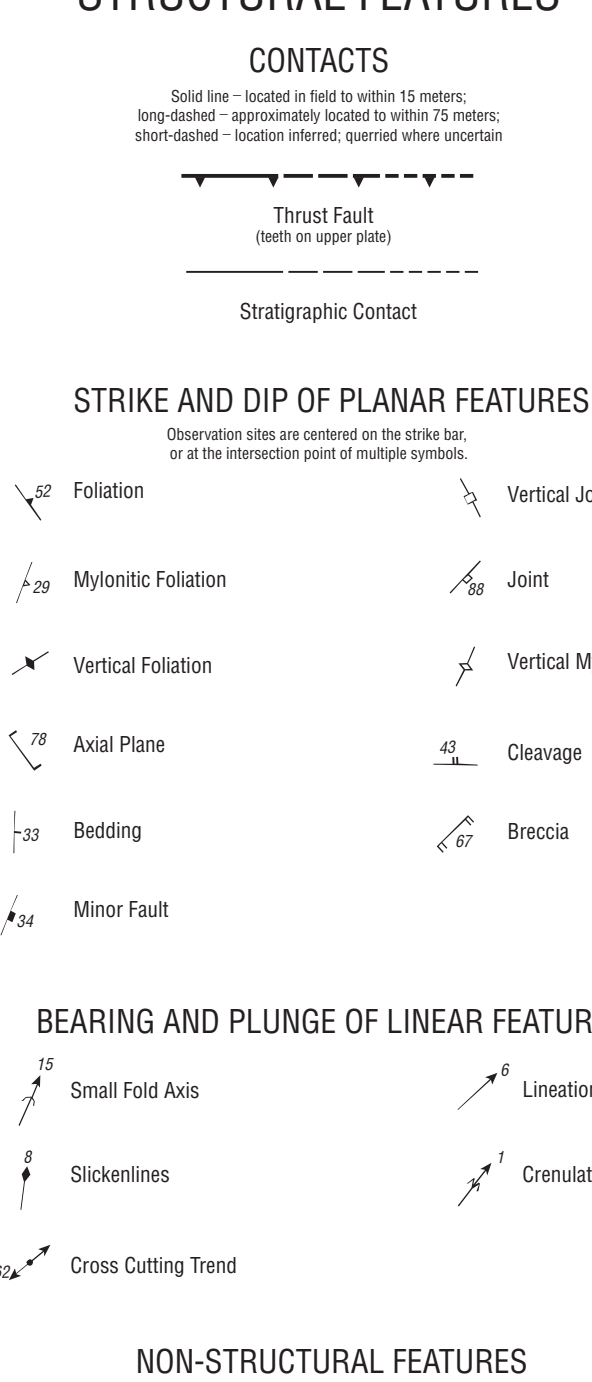
¹Whole Rock Inductively Coupled Plasma - Atomic Emission Spectrometry (ICP) analysis conducted by Acme Analytical Laboratories, LTD., 852 E. Hastings St., Vancouver, BC
²Sample numbers correspond to this section and whole rock sample locations shown on map
³PPM = parts per million
⁴Σ = sum of oxides in percent
⁵ΣUM = sum total in percent

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

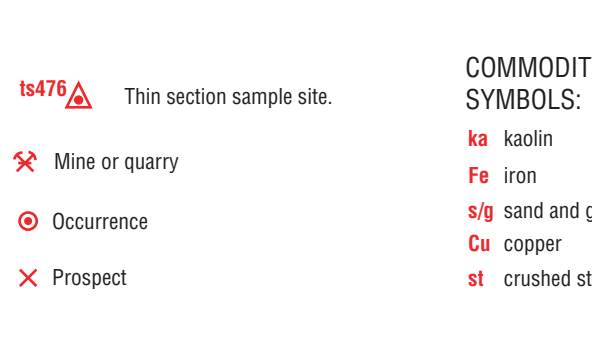
Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G09AC00183. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either express or implied, of the U.S. Government.



STRUCTURAL FEATURES



MINERAL RESOURCES



ROCK DESCRIPTIONS

GREAT SMOKY GROUP
COPPER HILL FORMATION UNDIVIDED (Zgchu) — Thick, interbedded sequence of metagraywacke, schistose metagraywacke, schist, granule metaconglomerate and calc-silicate.

Metagraywacke is medium light gray to medium dark gray; medium- to coarse-grained; equigranular to inequigranular; foliated; locally migmatitic; locally sulfidic; consists of quartz, plagioclase, muscovite, potassium feldspar, garnet, epidote group minerals and minor accessory minerals.

Schistose metagraywacke is medium gray to medium dark gray, commonly stained yellowish dark gray; strongly foliated; fine- to medium-grained; inequigranular to lepidoblastic; locally migmatitic; locally sulfidic; consists of quartz, plagioclase, muscovite, biotite, garnet, kyanite and/or sillimanite, and iron sulfide minerals (pyrrhotite, pyrite).

Schist is medium gray to medium dark gray to dark gray; medium- to coarse-grained; inequigranular; lepidoblastic; thinly foliated; locally sulfidic; locally graphitic; consists of muscovite, biotite, quartz, garnet, kyanite and/or sillimanite, pyrrhotite, pyrite, graphite, and other accessory minerals.

Granule metaconglomerate is medium gray to dark gray; medium- to coarse-grained; poorly sorted to graded; subangular to subrounded grains; granule to pebble conglomerate with a sandy matrix in which the larger grains are usually well sorted and consist of clear to white quartz, white feldspar, and finer blue quartz.

SNOWBIRD GROUP
WADING BRANCH UNDIVIDED (Zswbu) — Dominantly schistose metagraywacke interbedded with metagraywacke, muscovite schist and granule metaconglomerate. Schistose metagraywacke is medium gray to dark gray; medium-grained; inequigranular; lepidoblastic; well foliated; thinly layered; consists of quartz, muscovite, potassium feldspar, plagioclase, biotite, ilmenite and other black opaque minerals, and minor accessory minerals. Metagraywacke is pinkish gray to grayish-pink; coarse-grained; feldspathic.

WADING BRANCH FELDSPATHIC METAGRAYWACKE (Zswbw) — Feldspathic metagraywacke interbedded with granule conglomerate with minor schistose metagraywacke and muscovite schist. Feldspathic metagraywacke is moderate reddish orange to pinkish gray to tan; medium- to coarse-grained; well foliated; commonly mylonitic; poorly to moderately well sorted; subrounded fragments; medium- to thick-bedded; consists of quartz, potassium feldspar, plagioclase, sericite and minor accessory minerals.

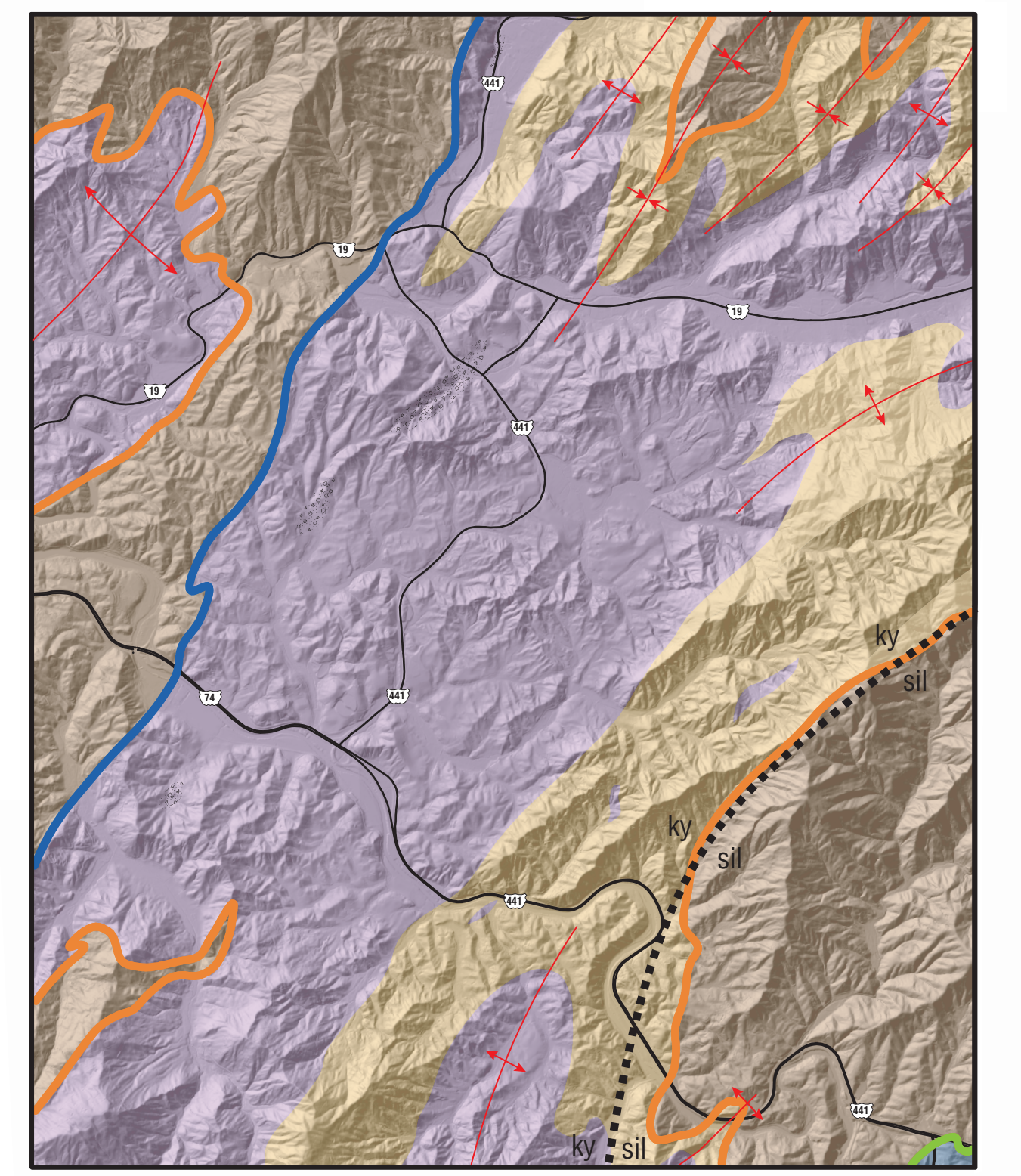
CARTOOGECHAYE TERRANE

LAYERED BIOTITE GNEISS (ZYtbg) — medium gray to dark gray; inequigranular; granoblastic to lepidoblastic; well foliated; migmatitic, highly layered; layer thickness ranges from millimeters to meters; consists of plagioclase, quartz, biotite, hornblende, garnet, potassium feldspar, epidote group minerals, muscovite, ilmenite and minor accessory minerals. Interlayered with biotite gneiss, amphibolite, and biotite schist.

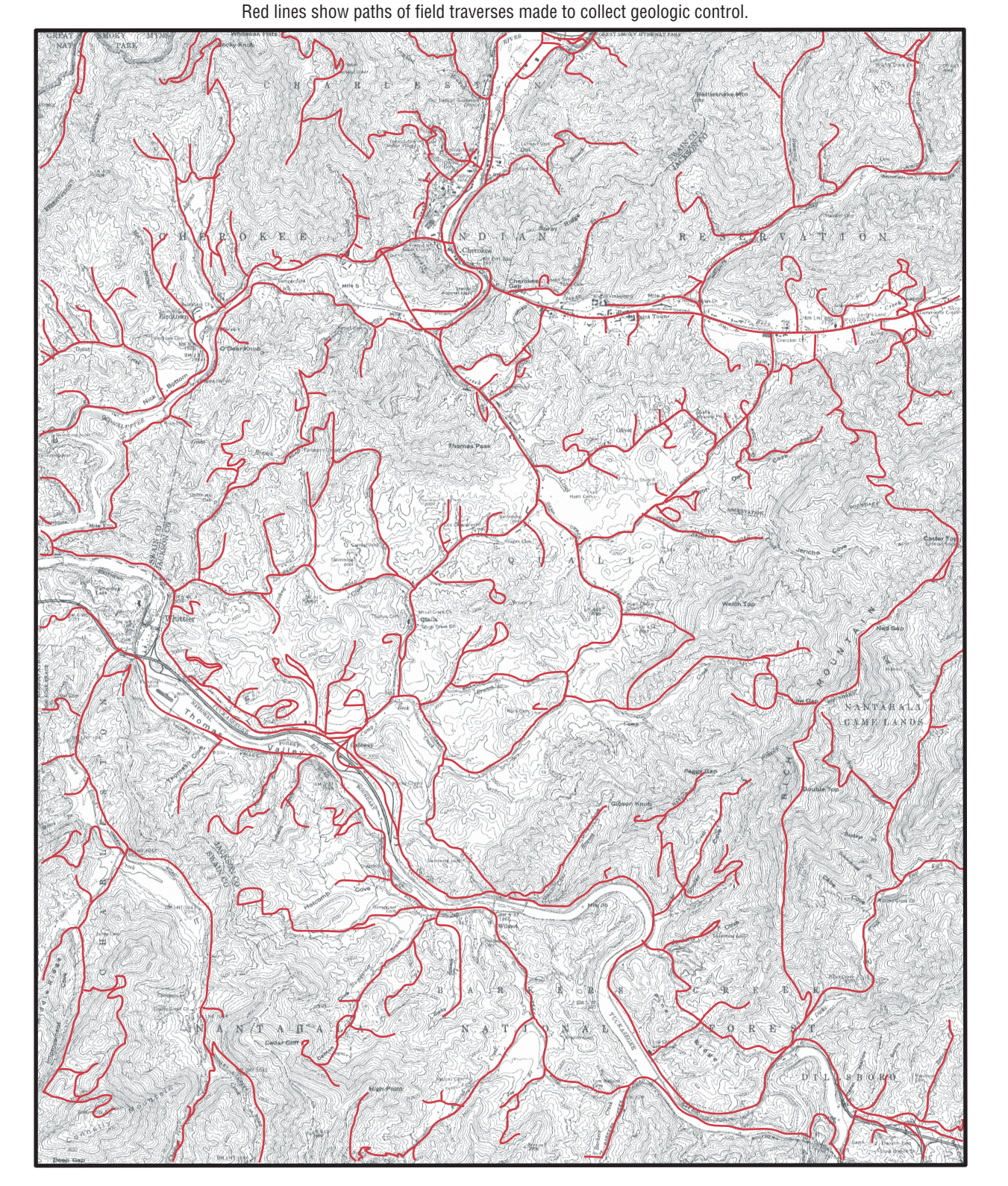
MESOPROTEROZOIC METAIGNEOUS ROCKS

GRANITIC GNEISS (Ygg) — A heterogeneous metamorphosed igneous unit dominated by granitic gneiss interlayered with biotite granitic gneiss, amphibolite and garnetiferous granofelsic gneiss. Granitic gneiss is pinkish gray to brownish gray to light gray; medium- to coarse-grained; inequigranular; granoblastic to lepidoblastic; mylonitic to weakly foliated; consists of plagioclase, quartz, potassium feldspar, biotite, sericite, epidote group minerals, garnet, hornblende and accessory minerals. Amphibolite occurs as minor pods and lenses ranging in size from millimeters to meters.

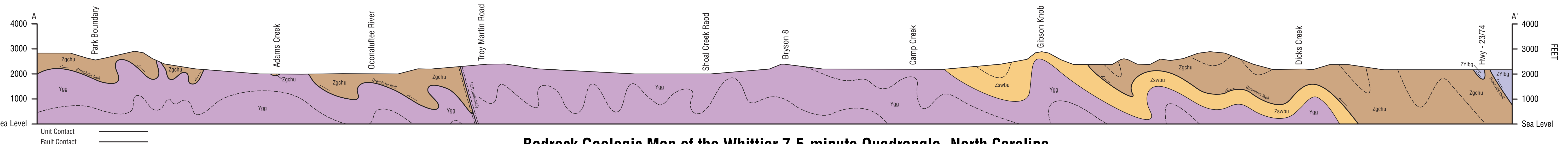
TECTONIC AND METAMORPHIC CONDITIONS



TRAVERSE MAP



CROSS SECTION A-A'



Bedrock Geologic Map of the Whittier 7.5-minute Quadrangle, North Carolina

By
Bart L. Cattanaach and G. Nicholas Bozdog

Geology mapped from August 2009 to June 2010. Map preparation, digital cartography and editing by G. Nicholas Bozdog and Bart L. Cattanaach.
2010