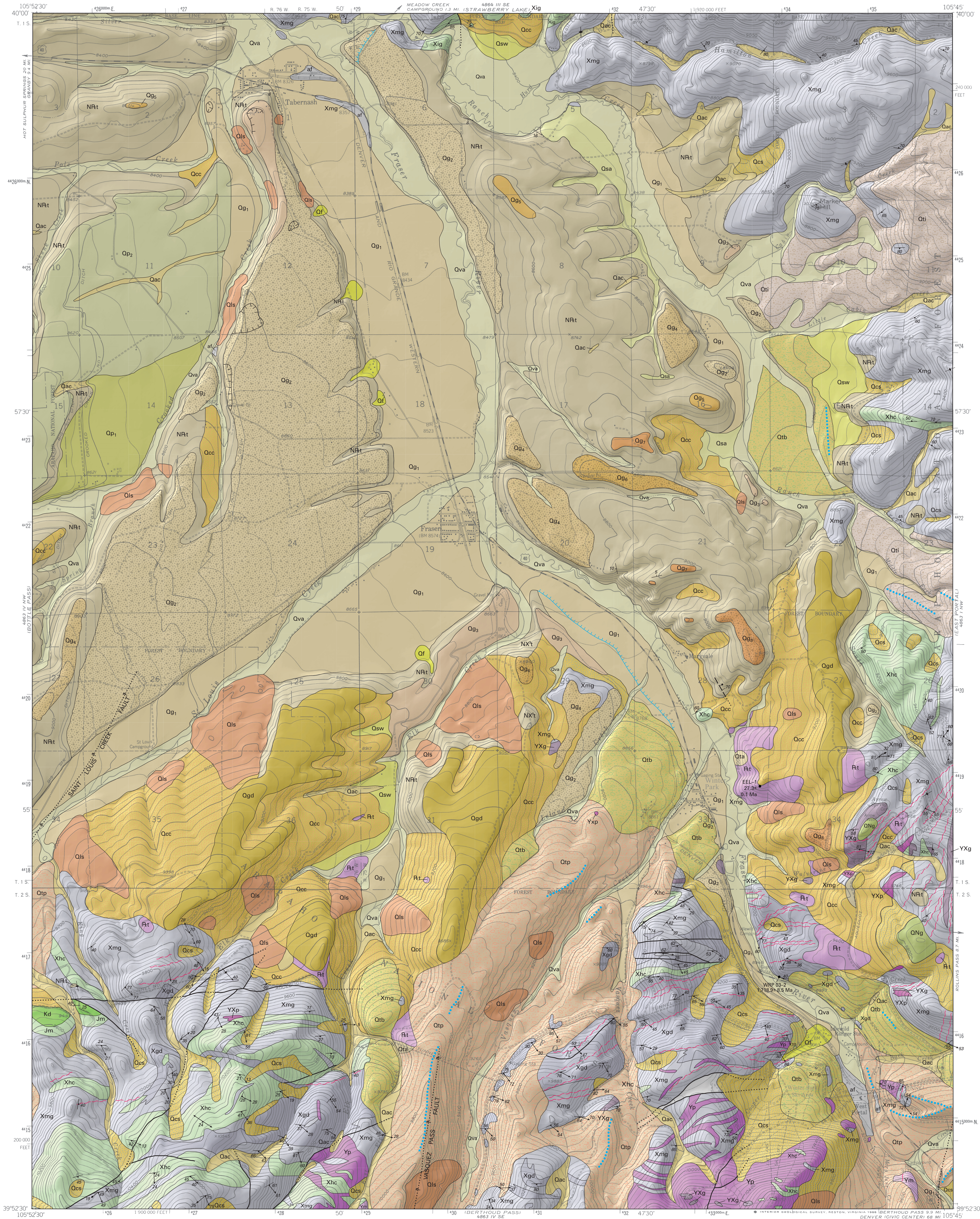
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

SCIENTIFIC INVESTIGATIONS MAP 3130
Version 1.0
Pamphlet accompanies map

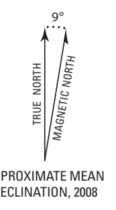

105°52'30"
40°00'
T. 1 S.
R. 76 W.
R. 75 W.
50'
47'30"
105°45'
MEADOW CREEK CAMPGROUND 1.3 MI. (STRAWBERRY LAKE) 4864 III SE
HOT SULPHUR SPRINGS 20 MI. GRANBY 9.4 MI.
4863 IV NW (BOTTLE PASS)
(EAST PORTAL) 4863 I NW
ROLLINS PASS 8.7 MI.
57'30"
55'
T. 1 S.
T. 2 S.
39°52'30"
(BERTHOUD PASS) 4863 IV SE
BERTHOUD PASS 9.9 MI. DENVER (CIVIC CENTER) 68 MI.
Tabernash
Fraser
Winter Park
Marker Hill
Maryvale
Winter Park Ski Area
West Portal
Idlewild Campground
Idlewild Ranger Sta
St Louis Campground
Fraser River
Silver Creek
Pole Creek
Crooked Creek
Hamilton Creek
Cabin Creek
Little Cabin Creek
Ranch Creek
Elk Creek
St Louis Creek
Vasquez Creek
Cooper Creek
Leland Creek
Jim Creek
Buck Creek
Wolverine Creek
King Creek
Arrow Spring
SAINT LOUIS CREEK FAULT
VASQUEZ PASS FAULT
ARAPAHO NATIONAL FOREST
DENVER AND RIO GRANDE WESTERN
EEL-1 27.3± 0.1 Ma
WRP 03-2 1,718.9± 8.5 Ma
INTERIOR GEOLOGICAL SURVEY, RESTON, VIRGINIA 1968

Base from U.S. Geological Survey, Fraser, 1957, 1:24,000. The base was modified by removing the obsolete name Hideaway Park, and replacing it with Winter Park. The name Winter Park Ski Area was added just to the west of West Portal

Polyconic projection. 1927 North American Datum

10,000-foot grid based on Colorado Coordinate System, north zone

1000-meter Universal Transverse Mercator grid ticks, zone 13


9°
TRUE NORTH
MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 2008

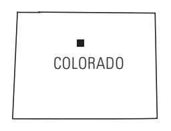
SCALE 1:24 000

1 1/2 0 1 MILE

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929



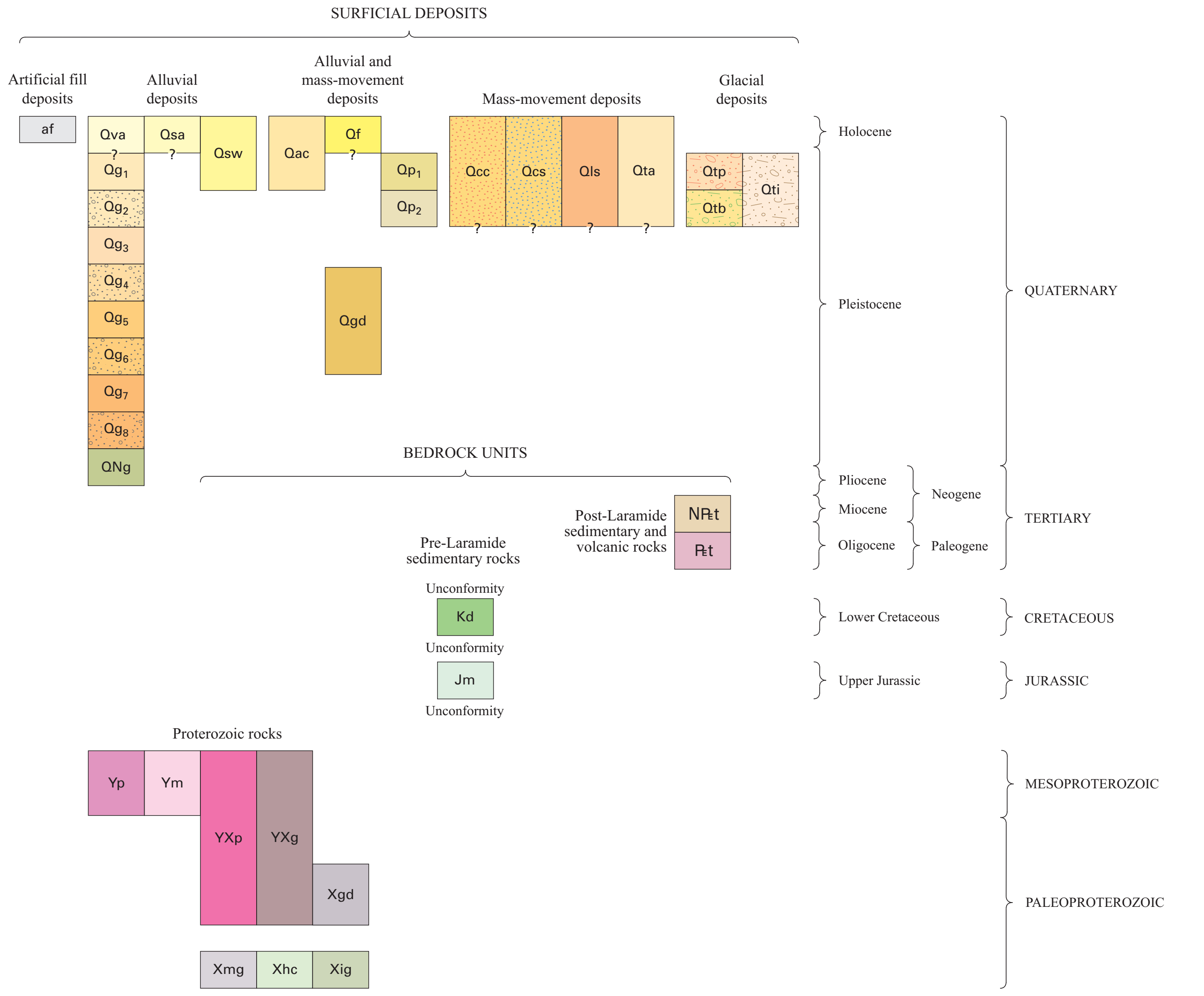
QUADRANGLE LOCATION

Geology mapped by P.K. Theobald in 1959–1963, Bruce Bryant in 1974 and 2005–2006, and R.R. Shroba in 2003 and 2005–2008

T.R. Brandt prepared the digital compilation of the geologic map and the GIS database.

Manuscript approved for publication June 9, 2010

CORRELATION OF MAP UNITS


SURFICIAL DEPOSITS
Artificial fill deposits
Alluvial deposits
Alluvial and mass-movement deposits
Mass-movement deposits
Glacial deposits
af
Qva
Qsa
Qsw
Qac
Qf
Qp1
Qp2
Qcc
Qcs
Qls
Qta
Qtp
Qtb
Qti
Qg1
Qg2
Qg3
Qg4
Qg5
Qg6
Qg7
Qg8
QNg
Qgd
?
Holocene
Pleistocene
QUATERNARY
BEDROCK UNITS
Pre-Laramide sedimentary rocks
Post-Laramide sedimentary and volcanic rocks
NR̶t
R̶t
Unconformity
Kd
Unconformity
Jm
Unconformity
Pliocene
Miocene
Oligocene
Neogene
Paleogene
TERTIARY
Lower Cretaceous
CRETACEOUS
Upper Jurassic
JURASSIC
Proterozoic rocks
Yp
Ym
YXp
YXg
Xgd
Xmg
Xhc
Xig
MESOPROTEROZOIC
PALEOPROTEROZOIC

LIST OF MAP UNITS

[Due to the addition of a shaded relief base, colors in the map may not exactly match unit colors in the List of Map Units.]

SURFICIAL DEPOSITS

Artificial fill deposits

af	**Artificial fill (latest Holocene)**

Alluvial deposits

Qva	**Valley-floor alluvium (Holocene and late Pleistocene?)**
Qsa	**Sheetwash deposits and valley-floor alluvium, undivided (Holocene and late Pleistocene?)**
Qsw	**Sheetwash deposits (Holocene and late Pleistocene)**
	Gravelly stream-terrace alluvium (late to early? Pleistocene)
Qg1	**Unit 1 (late Pleistocene)**
Qg2	**Unit 2 (late and middle Pleistocene)**
Qg3	**Unit 3 (middle Pleistocene)**
Qg4	**Unit 4 (middle Pleistocene)**
Qg5	**Unit 5 (middle Pleistocene)**
Qg6	**Unit 6 (middle Pleistocene)**
Qg7	**Unit 7 (middle or early Pleistocene)**
Qg8	**Unit 8 (middle or early Pleistocene)**
QNg	**Old gravelly stream alluvium (early Pleistocene or Pliocene)**

Alluvial and mass-movement deposits

Qac	**Alluvium and colluvium, undivided (Holocene and late Pleistocene)**
Qf	**Fan deposits (Holocene and late Pleistocene)**
Qp1	**Lower pediment deposits (late Pleistocene)**
Qp2	**Higher pediment deposits (late and middle Pleistocene)**
Qgd	**Gravelly stream alluvium and diamicton, undivided (middle Pleistocene)**

Mass-movement deposits

Qcc	**Clayey-silt matrix colluvium (Holocene to middle? Pleistocene)**
Qcs	**Sandy matrix colluvium (Holocene to middle? Pleistocene)**
Qls	**Landslide deposits (Holocene to middle? Pleistocene)**
Qta	**Talus deposits (Holocene to middle? Pleistocene)**

Glacial deposits

Qtp	**Till of Pinedale age (late Pleistocene)**
Qtb	**Till of Bull Lake age (late and middle Pleistocene)**
Qti	**Till of Pinedale age and till of Bull Lake age, undivided (late and middle Pleistocene)**

BEDROCK UNITS

Post-Laramide sedimentary and volcanic rocks

NR̶t	**Troublesome Formation (upper Miocene to upper Oligocene)**
R̶t	**Rhyolite tuff (Oligocene)**

Pre-Laramide sedimentary rocks

Kd	**Dakota Group (Lower Cretaceous)**
Jm	**Morrison Formation (Upper Jurassic)**

Proterozoic rocks

Yp	**Pegmatite of the Berthoud Plutonic Suite (Mesoproterozoic)**
Ym	**Monzogranite and granite of the Berthoud Plutonic Suite (Mesoproterozoic)**
YXp	**Pegmatite (Mesoproterozoic or Paleoproterozoic)**
YXg	**Granodiorite and monzogranite (Mesoproterozoic or Paleoproterozoic)**
Xgd	**Foliated granodiorite, tonalite, and diorite of the Routt Plutonic Suite (Paleoproterozoic)**
Xmg	**Migmatitic biotite schist and gneiss (Paleoproterozoic)**
Xhc	**Hornblende gneiss and calc-silicate gneiss (Paleoproterozoic)**
Xig	**Interlayered gneiss (Paleoproterozoic)**

EXPLANATION

Contact

Fault, type unspecified—Dotted where concealed beneath surficial deposits. The Saint Louis Creek fault and Vasquez Pass fault are inferred beneath and near the floors of relatively straight valleys. The nearest exposures of these faults are about 9 km southwest and south, respectively, of the Fraser quadrangle (Kellogg and others, 2008)

70
Normal fault—Dashed where approximately located; dotted where concealed beneath surficial deposits; bar-and-ball symbol on apparent downthrown side. Tick shows dip value and direction

5
Inclined bedding—Showing strike and dip

70
Inclined foliation—Showing strike and dip

Vertical or near vertical foliation—Showing strike

Lineation

19 49
Mineral lineation—Showing bearing and plunge, depicted with an arrowhead

49
Crenulation lineation—Showing bearing and plunge, depicted with a diamond

24
Horizontal mineral lineation—Showing bearing

▨ **Cataclastic rock**—Northeast-trending zone composed of thoroughly brecciated rock and (or) abundant fault gouge near the southeast corner of the map area. Locally may include blocks of ductilely deformed rock. Probably derived from the adjacent migmatitic biotite schist and gneiss (Xmg) and pegmatite of the Berthoud Plutonic Suite (Yp). Formed later than the 1.42-Ga mylonites in the main part of the Saint Louis Lake shear zone in the Byers Peak quadrangle (McCoy and others, 2005). Age uncertain; cataclasis may be have occurred during the Neoproterozoic, later during Laramide compression, and possibly during mid-Tertiary deformation

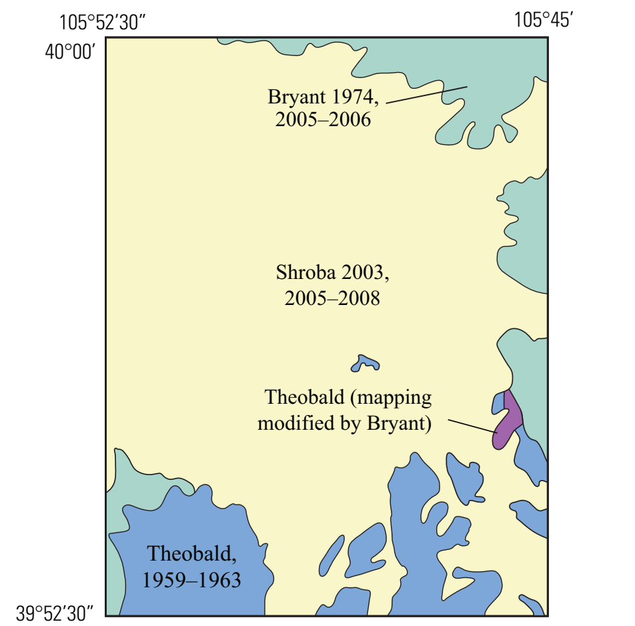
Ductile deformation fabric in Proterozoic rocks (mylonite and related fabrics)

EEL–1
27.3± ●
0.1 Ma
Location and age of dated rock—With sample number and ^{40}Ar/^{39}Ar age

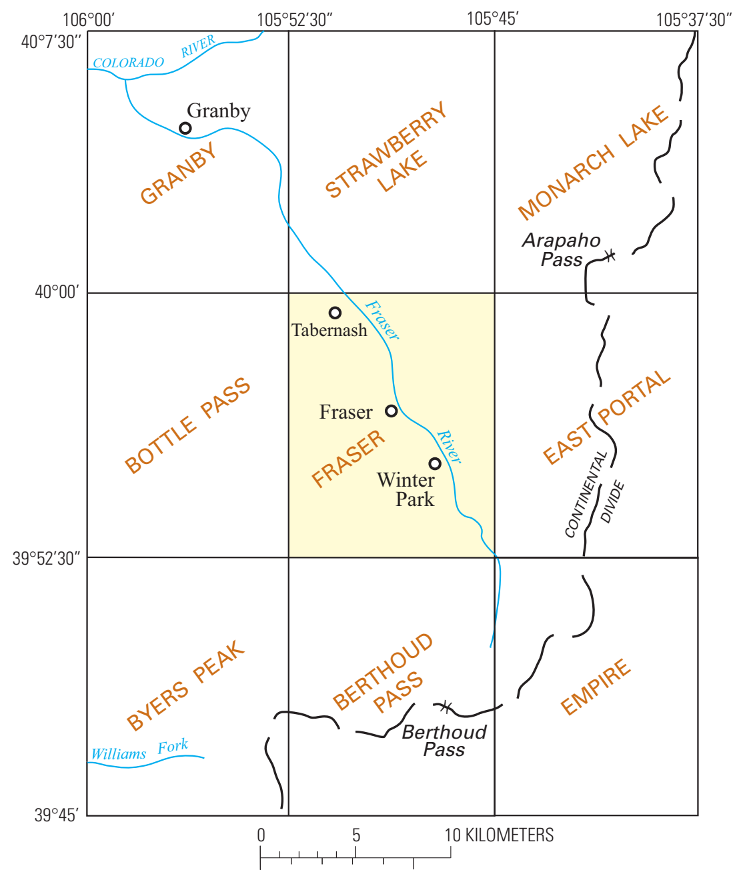
Crest of moraine

Fluvial terrace scarp—Hachures are on or near riser between lower and higher terrace treads

Gravel pit—Approximate boundary


105°52'30"
105°45'
40°00'
39°52'30"
Bryant 1974, 2005–2006
Shroba 2003, 2005–2008
Theobald (mapping modified by Bryant)
Theobald, 1959–1963

Sources of mapping for Fraser 7.5-minute quadrangle. Mapping by Bryant in green, Shroba in yellow, Theobald (modified by Bryant) in purple, and Theobald in blue.


106°00'
105°52'30"
105°45'
105°37'30"
40°7'30"
40°00'
39°52'30"
39°45'
COLORADO RIVER
Granby
GRANBY
STRAWBERRY LAKE
MONARCH LAKE
Arapaho Pass
Tabernash
Fraser
Fraser River
Winter Park
BOTTLE PASS
FRASER
EAST PORTAL
CONTINENTAL DIVIDE
BYERS PEAK
BERTHOUD PASS
Berthoud Pass
EMPIRE
Williams Fork
0 5 10 KILOMETERS
0 5

Index. U.S. Geological Survey 7.5-minute maps adjacent to the Fraser quadrangle. Map names in brown. Fraser quadrangle in yellow.

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GEOLOGIC MAP OF THE FRASER 7.5-MINUTE QUADRANGLE, GRAND COUNTY, COLORADO

By

Ralph R. Shroba, Bruce Bryant, Karl S. Kellogg, Paul K. Theobald, and Theodore R. Brandt

2010