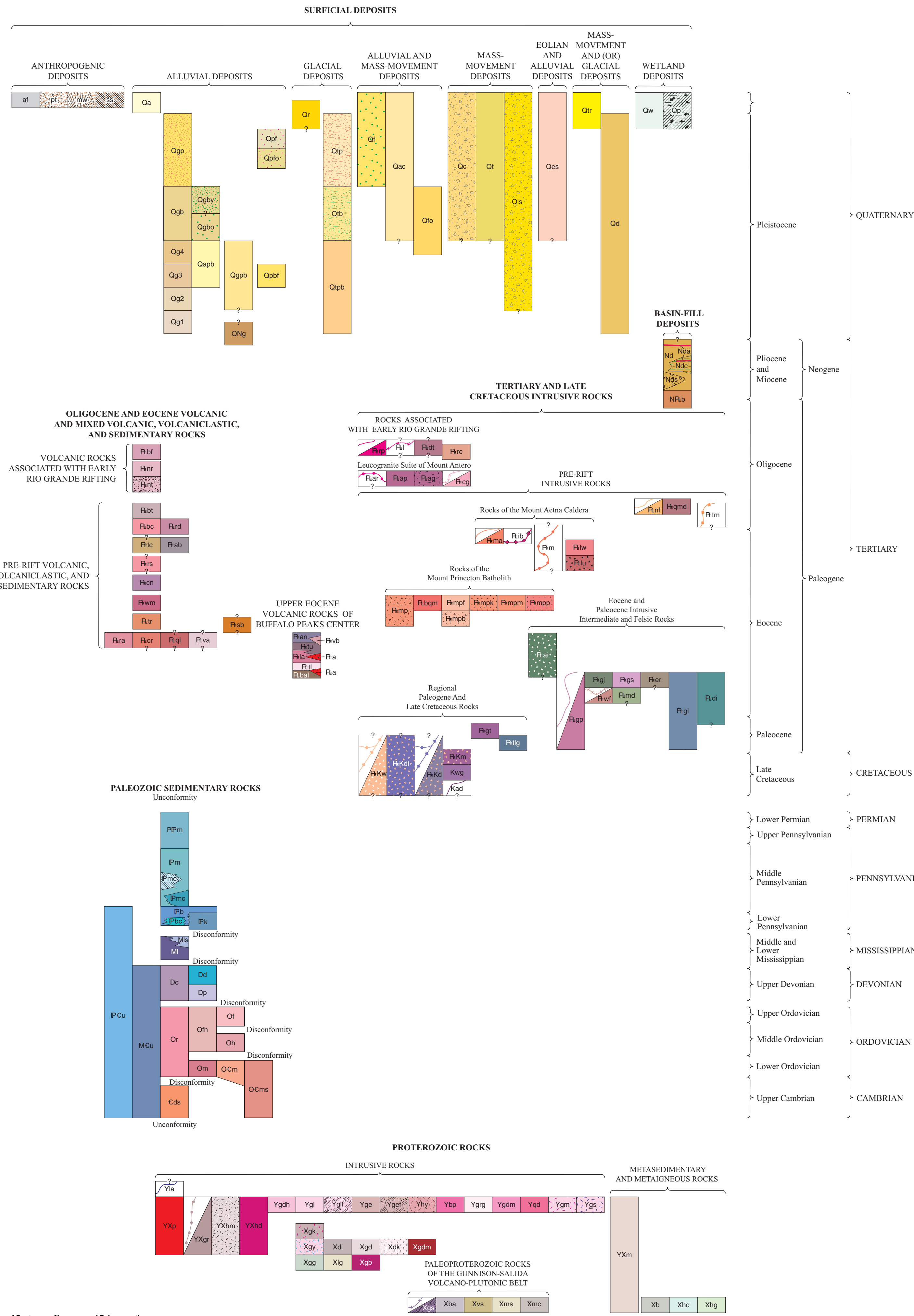


CORRELATION OF MAP UNITS



Divisions of Quaternary, Neogene, and Paleogene time used in this report

Period or subperiod	Epoch	Age
Quaternary	Holocene	0-11.5 ka
	Ice middle	11.5-152 ka
Pleistocene	late	152-780 ka
	early	780 ka-2.588 Ma
Neogene	Pliocene	2.588-5.332 Ma
	Miocene	5.332-23.03 Ma
Paleogene	Oligocene	23.03-33.9 Ma
	Eocene	33.9-55.8 Ma
	Paleocene	55.8-65.5 Ma

*Note: Ages of time boundaries are those of the U.S. Geological Survey Geologic Names Committee (2010) except those for the late-middle Pliocene boundary and middle-early Pliocene boundary, which are those of Rockwood and Foland (1966). Ages are reported in ka for kilo-annum (thousand years) and Ma for mega-annum (million years).*

LIST OF MAP UNITS

LIST OF MAP UNITS

- SURFICIAL DEPOSITS**
  - ANTHROPOGENIC DEPOSITS**
    - at Artificial-fill deposits (latest Holocene)
    - Placer-tailings deposits (latest Holocene)
    - Qa Young stream-channel and overbank alluvium (Holocene)
    - Qgp Outwash gravel of Pinedale glaciation (late Pleistocene)
    - Qp1 Younger flood gravel and channel deposits of Pinedale glaciation (late Pleistocene)
    - Qp2 Older flood gravel and channel deposits of Pinedale glaciation (late Pleistocene)
    - Qp3 Outwash gravel of Bull Lake glaciation, undivided (late and middle Pleistocene)
    - Qp4 Younger outwash gravel of Bull Lake glaciation (late and middle Pleistocene)
    - Qp5 Older outwash gravel of Bull Lake glaciation (late and middle Pleistocene)
    - Qp6 Outwash gravel of pre-Bull Lake age (middle and early Pleistocene)
    - Qp7 Gravely stream alluvium of pre-Bull Lake age (middle Pleistocene)
    - Qp8 Outwash gravel of pre-Bull Lake age, undivided (middle and early Pleistocene)
    - Qp9 Outwash gravel of pre-Bull Lake age, level 3 (middle Pleistocene)
    - Qp10 Flood gravel of pre-Bull Lake age (middle Pleistocene)
    - Qp11 Outwash gravel of pre-Bull Lake age, level 2 (middle or early Pleistocene)
    - Qp12 Very old alluvial gravel of Arkansas River (early Pleistocene? or Pliocene)
  - ALLUVIAL DEPOSITS**
    - Qd Outwash gravel of pre-Bull Lake age (middle and early Pleistocene)
    - Qapb Gravelly stream alluvium of pre-Bull Lake age (middle Pleistocene)
    - Qagb Outwash gravel of pre-Bull Lake age, undivided (middle and early Pleistocene)
    - Qg3 Outwash gravel of pre-Bull Lake age, level 3 (middle Pleistocene)
    - Qpbf Flood gravel of pre-Bull Lake age (middle Pleistocene)
    - Qg2 Outwash gravel of pre-Bull Lake age, level 2 (middle or early Pleistocene)
    - Qg1 Outwash gravel of pre-Bull Lake age, level 1 (early Pleistocene)
  - GLACIAL DEPOSITS**
    - Qr Rock-glacier deposits (early Holocene and latest Pleistocene?)
    - Qtp Till of Pinedale glaciation (late Pleistocene)
    - Qtb Till of Bull Lake glaciation (late and middle Pleistocene)
    - Qtpb Till of pre-Bull Lake age (middle and early Pleistocene)
  - ALLUVIAL AND MASS-MOVEMENT DEPOSITS**
    - Qf Fan deposits (Holocene and late Pleistocene)
    - Qac Alluvium and colluvium, undivided (Holocene to middle? Pleistocene)
    - Qfo Old fan deposits (late and middle Pleistocene)
  - MASS-MOVEMENT DEPOSITS**
    - Qc Colluvium (Holocene to middle? Pleistocene)
    - Qt Talus deposits (Holocene to middle? Pleistocene)
    - Qld Landslide deposits (Holocene to early? Pleistocene)
  - EOLIAN AND ALLUVIAL DEPOSITS**
    - Qes Eolian sediments and alluvium, undivided (Holocene to middle? Pleistocene)
  - MASS-MOVEMENT AND (OR) GLACIAL DEPOSITS**
    - Qv Talus and rock-glacier deposits, undivided (Holocene and late Pleistocene)
    - Qd Diamicton (Pleistocene)
  - WETLAND DEPOSITS**
    - Ow Wetland deposits (Holocene and late Pleistocene)
    - Pe Peat deposits (Holocene and late Pleistocene)
  - BASIN-FILL DEPOSITS**
    - Nd Dry Union Formation (lower Pliocene? and Miocene)
    - Nba Volcanic-ash beds (late Pliocene? and Miocene)
    - Nbc Clay subfacies (Miocene)
    - Nbs Slide-block subfacies (Miocene)
    - Nbf Browns Canyon Formation (Miocene or upper Oligocene)
- TERTIARY AND LATE CRETACEOUS INTRUSIVE ROCKS**
  - ROCKS ASSOCIATED WITH EARLY RIO GRANDE RIFTING**
    - Rbt Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
    - Rbc Rhyodacite flow and tuff (lower Oligocene or upper Eocene)
    - Rbd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
    - Rba Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
    - Rbc Rhyodacite flow and tuff (lower Oligocene or upper Eocene)
    - Rbd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
    - Rba Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
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    - Rbd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
    - Rba Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
  - PRE-RIFT INTRUSIVE ROCKS**
    - Rm Andesite
    - Rba Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
    - Rbc Rhyodacite flow and tuff (lower Oligocene or upper Eocene)
    - Rbd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
    - Rba Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
    - Rbc Rhyodacite flow and tuff (lower Oligocene or upper Eocene)
    - Rbd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
  - ROCKS OF THE MOUNT AETNA CALDERA**
    - Rmc Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
    - Rmb Rhyodacite flow and tuff (lower Oligocene or upper Eocene)
    - Rmd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
  - ROCKS OF THE MOUNT PRINCEON BATHOLITH**
    - Rpn Andesite
    - Rpa Basalt, andesite, and latite flows, and associated plugs (upper Eocene)
    - Rpb Rhyodacite flow and tuff (lower Oligocene or upper Eocene)
    - Rpd Tallahassie Creek Conglomerate (lower Oligocene and upper Eocene?)
  - Eocene and Paleocene Intrusive Intermediate and Felsic Rocks**
    - Ric Intrusive andesite (late Eocene?)
    - Rip Gray porphyry group, undivided (Eocene or Paleocene)
    - Rij Johnson Gulch Porphyry (Eocene)
    - Rir Sacramento Porphyry (Eocene)
    - Rie Eagle River Porphyry (Eocene?)
    - Ril Lincoln Porphyry (Eocene or Paleocene)
    - Rid Diorite of Buckskin Gulch (Eocene? or Paleocene?)
    - Rif Felsic plutons and dikes of Fridrich and others (1998) (Eocene)
    - Rim Monzonitic porphyry (Eocene?)
- GLACIAL DEPOSITS**
  - Qr Rock-glacier deposits (early Holocene and latest Pleistocene?)
  - Qtp Till of Pinedale glaciation (late Pleistocene)
  - Qtb Till of Bull Lake glaciation (late and middle Pleistocene)
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PALEOZOIC SEDIMENTARY ROCKS

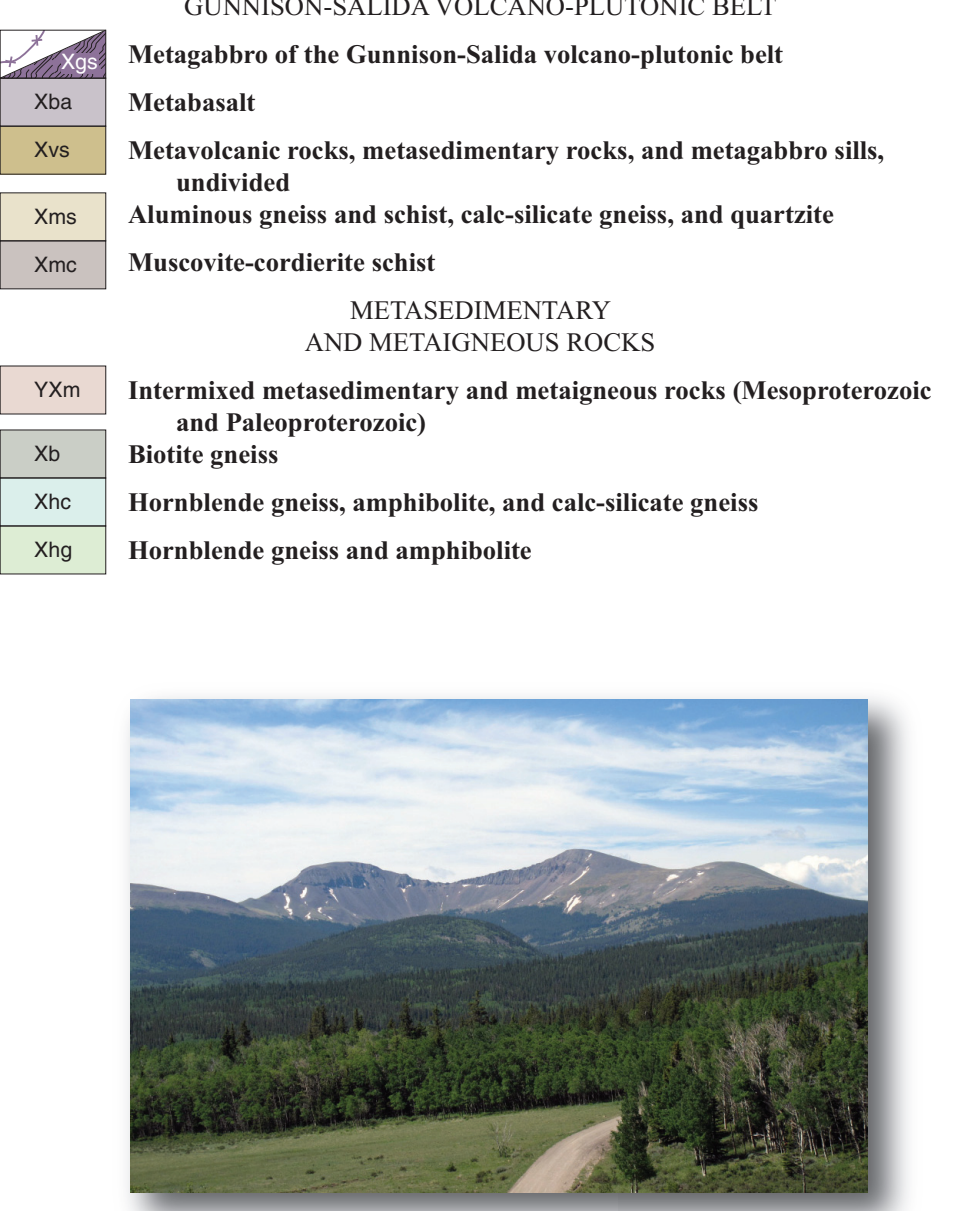
- PPm Maroon Formation (Lower Permian to Middle Pennsylvanian)
- Pm Minturn Formation (Middle Pennsylvanian)
- Pme Evaporite facies
- Pmc Coffman Member
- PCu Middle and Lower Pennsylvanian, Mississippian, Devonian, Ordovician, and Cambrian rocks, undivided
- Pb Belden Formation (Middle and Lower Pennsylvanian)
- Pbc Quartz-pebble conglomerate and sandstone member
- Pk Kerber Formation (Lower Pennsylvanian)
- MI Leadville Limestone (Lower Mississippian)—Queried where the identification is not certain
- Mis Quartzite of Sheep Mountain
- MCu Mississippian?, Devonian, Ordovician, and Cambrian rocks, undivided (Mississippian? to Cambrian)
- Dc Chaffee Group, undivided (Lower Mississippian? and Upper Devonian)
- Dd Dyer Dolomite (Lower Mississippian? and Upper Devonian)
- Dp Parting Sandstone (Upper Devonian)
- Or Ordovician rocks, undivided
- Oh Fremont Dolomite and Harding Sandstone, undivided (Upper and Middle Ordovician)
- Ou Fremont Dolomite (Upper Ordovician)
- Of Harding Sandstone (Middle Ordovician)
- Om Manitou Dolomite, upper part (Lower Ordovician)
- OCm Manitou Dolomite, including Upper Cambrian Taylor Pass Member of Myrow and others (2003) (Lower Ordovician and Upper Cambrian)
- OCds Manitou Dolomite (Lower Ordovician and Upper Cambrian) and Dotsere Formation and Sawatch Quartzite, undivided (Upper Cambrian)

PALEOZOIC SEDIMENTARY ROCKS

- Yxm Andesite
- Xba Volcanic breccia
- Xbc Upper tuff
- Xbd Air-fall and ash-flow tuff
- Xbe Lahar deposit
- Xbf Lower tuff
- Xbg Basal andesite

EXPLANATION

- Contact—Dashed where approximately located, short dash where inferred. Queried where identity or existence is questionable.
- Fault—Dashed where approximately located. Dotted where concealed. Tick shows dip value and direction.
- Normal fault—Dashed where approximately located, short dash where inferred, dotted where concealed. Bar and ball on downthrown side. Traces of inferred faults were identified on lidar imagery.
- Reverse fault—Dashed where approximately located, dotted where concealed. Rectangles on upthrown block.
- Lineament—As observed on lidar imagery.
- Anticline—Trace of axial plane.
- Syncline—Trace of axial plane, dotted where concealed.
- Quartzite layer—A Paleoproterozoic quartzite layer (qz) in units Xgv, Xbs, and Xms that is interpreted as being a metachert. Consists of light- to dark-gray, very fine- to fine-grained quartz-magnetite-bearing rock. Quartzite beds are as thick as 8 m and hundreds of meters long.
- Breccia zone—Marked by sheared to granulated deformation fabric in bedrock.
- Inclined bedding—Showing strike and dip.
- Overturned bedding—Showing strike and dip.
- Inclined foliation—Showing strike and dip.
- Vertical foliation—Showing strike.
- Sample or site location—Letter correlates with field number (see table 1 in pamphlet).
- Location of Lava Creek B ash bed—Identified at two localities by Scott (1975): (1) on the east side of the Arkansas River, about 8 km northwest of Buena Vista, where the ash overlies bouldery flood gravel of unit Qpbf, and (2) at one locality by Scott and others (1975) on the west side of the Arkansas River about 4 km southwest of Natrop where the ash overlies deposits of unit Qg5. Ash has a <sup>40</sup>Ar/<sup>39</sup>Ar mean age of 639±2 ka (Langhans and others, 2002).
- Location of Bishop ash bed—Identified at one locality by Scott and others (1975) on the west side of the Arkansas River, about 7 km southwest of Natrop, where the ash overlies deposits of unit Qg2. Ash has a <sup>40</sup>Ar/<sup>39</sup>Ar age of 759±2 ka (Sama-Wojcicki and others, 2000).
- Water body



View to the north of Buffalo Peaks, which are composed mostly of andesite flows, andesite breccia, lahars, and welded tuff deposited on Mesoproterozoic granite. The peak on the left is West Buffalo Peak (4,062 m; 13,336 ft) and the peak on the right is East Buffalo Peak (4,054 m; 13,330 ft). Figure 10 in pamphlet. Photograph by Karl Kellogg, 2011.

Geologic Map of the Upper Arkansas River Valley Region, North-Central Colorado

By

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