

# Geology of the Black Canyon City and Squaw Creek Mesa Quadrangles, central Arizona

by  
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### Map Units

**Quaternary Stream Deposits**

- Qacy (Holocene) - Younger alluvial channel deposits
- Qaco (Holocene) - Older alluvial channel deposits
- Qac (Holocene) - Alluvial channel deposits, undivided
- Qay (Holocene) - Younger alluvial terrace deposits
- Qato (Late Pleistocene to Holocene) - Older alluvial terrace deposits
- Qat (Late Pleistocene to Recent) - Alluvial terrace deposits, undivided
- Qa (Late Pleistocene to Recent) - Alluvium, undivided
- Qg (Pleistocene) - Stream gravel
- QTg (Late Tertiary to Quaternary) - Older stream gravel

**Quaternary Slope Deposits**

- Qt (Holocene) - Talus
- Qc (Quaternary) - Colluvium
- Qct (Quaternary) - Colluvium and talus, undivided
- Ql (Quaternary) - Landslide deposits and colluvium

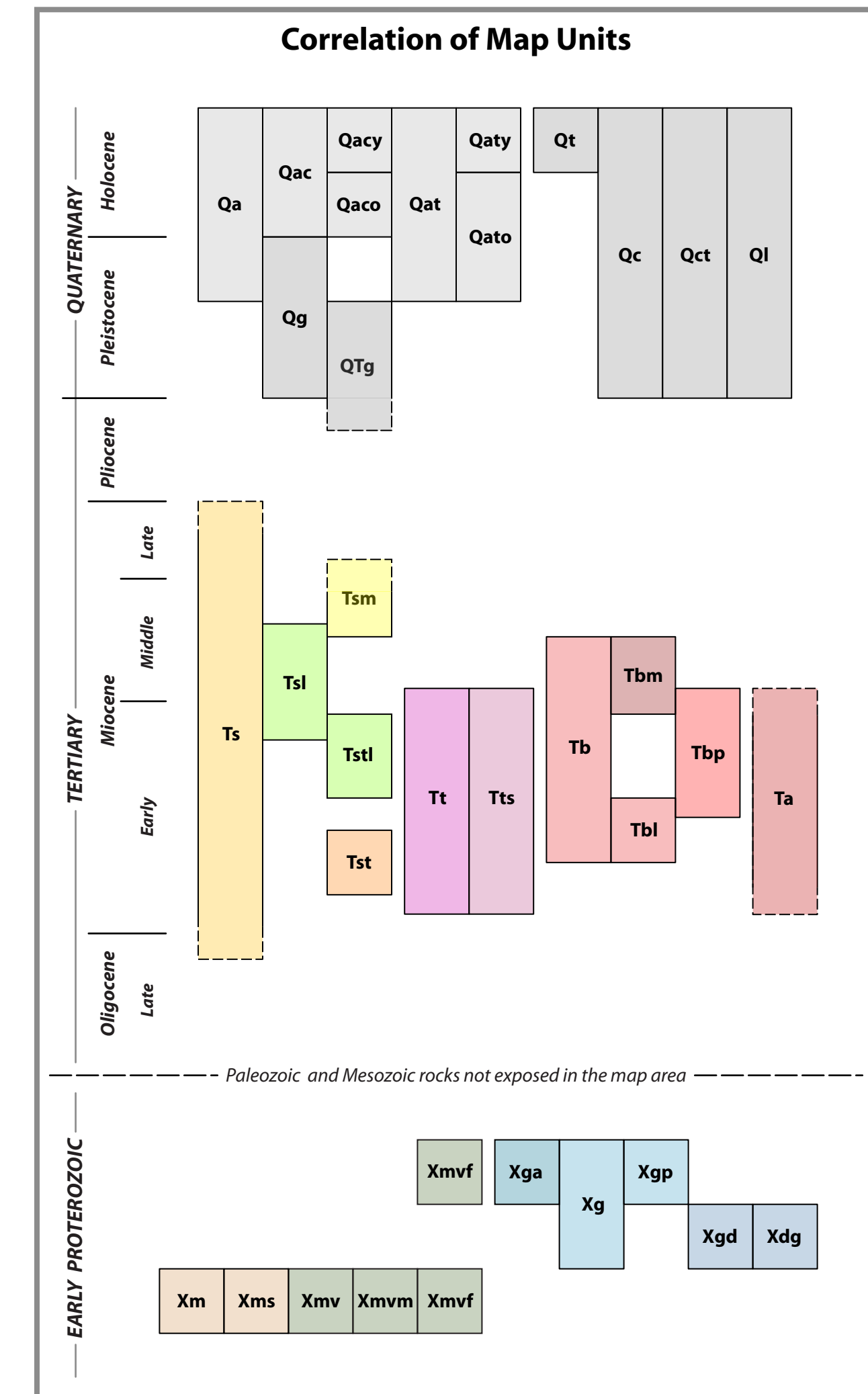
**Middle and Late Tertiary Sedimentary and Volcanic Rocks**

- Tsm (Middle Miocene to Late Miocene) - Mesa-capping boulder conglomerate
- Tst (Late Early Miocene to Middle Miocene) - Lacustrine sedimentary deposits
- Tbm (Late Early Miocene to Middle Miocene) - Basaltic volcanic rocks (Hickey Formation)
- Tstl (Late Early Miocene to Middle Miocene) - Fluvial-lacustrine deposits and minor tuff
- Tt (Early Miocene to Middle Miocene) - Basaltic volcanic rocks, undivided
- Ts (Early Miocene to Middle Miocene) - Tuff, tuffaceous sandstone, and minor sandstone
- Tbp (Early Miocene to Middle Miocene) - Basaltic pyroclastic deposits
- Tbl (Early Miocene) - Basaltic volcanic rocks (Chalk Canyon Formation)
- Tst (Early Miocene) - Conglomerate, sandstone, tuffaceous sandstone, and tuff
- Ta (Miocene) - Andesitic volcanic rocks
- Ts (Late Oligocene to Miocene) - Clastic sedimentary rocks, undivided

**Precambrian Igneous and Metamorphic Rocks**

- Xg (Early Proterozoic) - Granitic rocks
- Xgp (Early Proterozoic) - Granitic pegmatite
- Xga (Early Proterozoic) - Aplitic granite
- Xgd (Early Proterozoic) - Gneiss, diorite, and tonalite
- Xgdg (Early Proterozoic) - Diorite, gabbro, and diabase
- Xmvm (Early Proterozoic) - Mafic to intermediate metavolcanic rocks
- Xmvf (Early Proterozoic) - Felsic to intermediate metavolcanic rocks
- Xmv (Early Proterozoic) - Metavolcanic rocks, undivided
- Xms (Early Proterozoic) - Metasedimentary rocks, undivided
- Xm (Early Proterozoic) - Metamorphic rocks, undivided

\* Map units that include unit symbols in parentheses denote the location of a specific lithologic sub-unit within the larger map unit (e.g., Xmvf in Xmv, Tbl in Ql, etc.).



### Map Symbols

**Contacts (dashed where inferred; dotted where concealed)**

- Depositional and intrusive
- Intra-unit contact
- Normal fault (fall on down-thrown side; amount of throw in feet, if known)

**Orientation of planar geologic features**

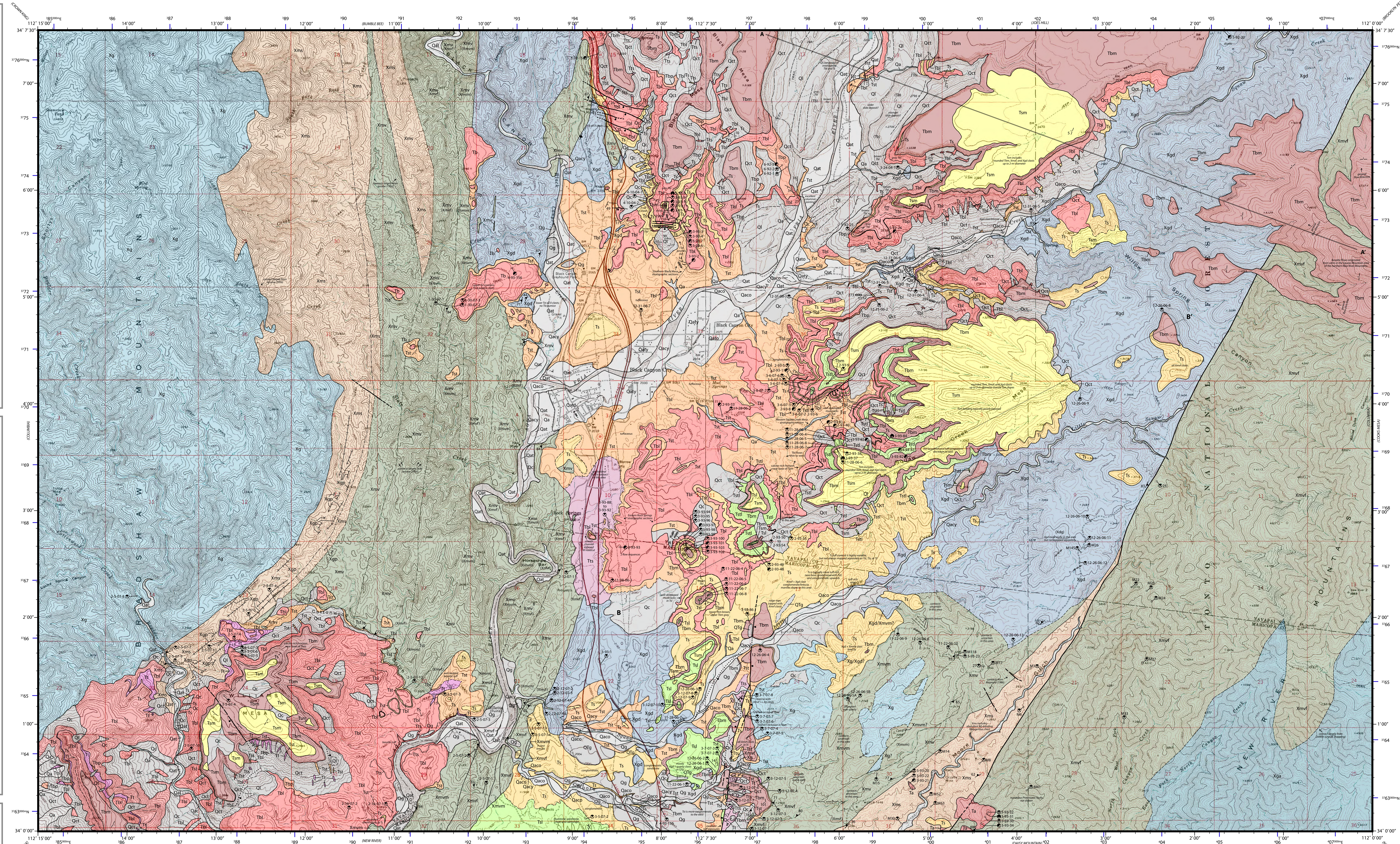
- Strike and dip of bedding (horizontal, upright, vertical, overturned, and approximate dip amount shown)
- Primary igneous foliation (horizontal, upright, and vertical; dip amount shown)
- Strike and dip of metamorphic foliation (upright and vertical; dip amount shown)

**Bearing of current from primary features**

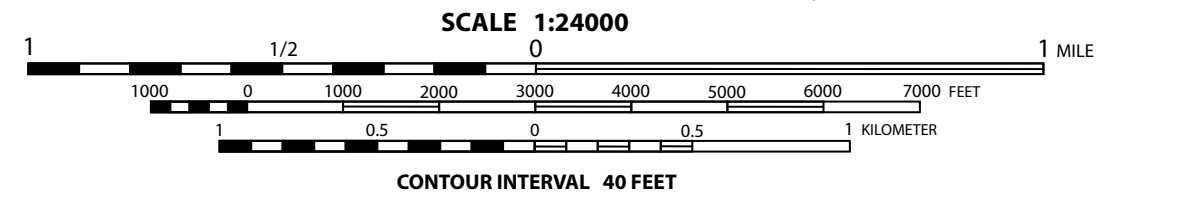
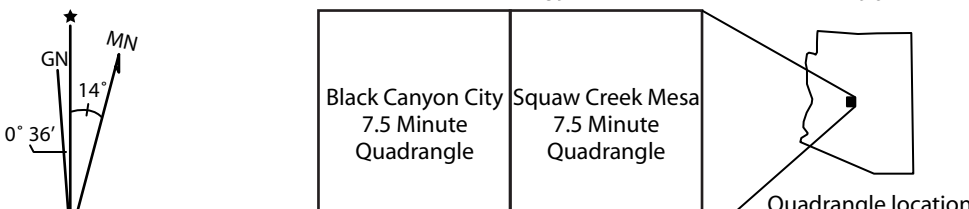
- Clast imbrication (includes bearing and number of measurements)
- Cross bedding (includes bearing)

**Other data**

- Dike (mafic, intermediate, felsic attitude shown if known; dashed where inferred; dotted where concealed)
- Iron formation, quartz vein (attitude shown if known; dashed where inferred; dotted where concealed)
- Rock data location (includes Leighty sample ID; M prefix denotes sample of Maynard (1986); shaded area denotes data type)



Topographic base maps published by the U.S. Geological Survey  
Black Canyon City (1969) Squaw Creek Mesa (1969)  
1927 North American datum  
1000 meter UTM grid, zone 12



Leighty mapping completed during portions of 1992-1993 and 2004-2007  
Other map data taken from Jerome (1956), Maynard (1986), and DeWitt (unpub. data)

### Summary of Geologic History

#### Early Proterozoic

1840 to 1740 Ma  
> Deposition of Yavapai Supergroup rocks (Xms, Xmv, etc.)  
1740 to 1720 Ma  
> Deposition of dioritic plutons (Xgd)  
~1700 Ma  
> Yavapai Orogeny  
> Intrusion felsic plutons (Xg)  
> Emplacement of New River Felsic Complex (Xmvf, Xg)  
1675 to 1650 Ma  
> Mazatzal Orogeny

Plate 1. View east across Moore Gulch toward the New River Mountains.

#### Tertiary

**Early Tertiary (~50 to 30 Ma)**  
> Erosion from possible N-flowing fluvial drainage system from highlands to the south

**Early Miocene (~20 to ~17 Ma)**  
> Deposition of pre-volcanic fluvial sediment (Tt)  
> Eruption and deposition of Chalk Canyon Formation tephra (Tl, Ts), basaltic lava (Tbl, Tt), and fluvial sediment (Ts, Tst)  
> Initiation of minor normal faulting related to E-W to NE-SW-directed crustal extension

Plate 2. View southeast across Squaw Creek toward Squaw Creek Mesa. The New River Mountains form the skyline.

#### Quaternary

**Late Early Miocene to Early Middle Miocene (~17 to 15 Ma)**  
> Continued fluvial-lacustrine deposition (Tt, Tstl)

**Early Middle Miocene (~15 to 14 Ma)**  
> Eruption of Hickey Formation basaltic lavas (Tbm)  
> Major slope failure (landslides) along the margins of the larger mesas (Ql)  
> Continued fluvial-lacustrine deposition (Tt, Ts)

**Middle Miocene to Late Miocene**  
> Deposition of post-Hickey Formation fluvial sediment (Tsm)  
> Waning extensional tectonism

Plate 3. View east toward Squaw Mountain in the northern New River Mountains.

**Pleistocene and Holocene (<2 Ma)**  
> Continued fluvial erosion and deposition related to major modern drainages (Qa, Qac, Qat, Qg, QTg)  
> Major slope failure (landslides) along the margins of the larger mesas (Ql)  
> Ubiquitous hillslope mass wasting processes (Qc, Qt, Qct)

Plate 4. View northwest across the Agua Fria River canyon toward Black Mesa. The Bradshaw Mountains form the skyline.

### Cross Sections

**Section A:** Shows a profile from the Black Mesa area to the New River Mountains. It illustrates the relationship between the Tsm, Tst, Tt, and Tl units, and the underlying Xmvf and Xmv units. The profile shows a major slope failure (landslide) along the margins of the larger mesas (Ql).

**Section B:** Shows a profile from the Squaw Creek area to the New River Mountains. It illustrates the relationship between the Tsm, Tst, Tt, and Tl units, and the underlying Xmvf and Xmv units. The profile shows a major slope failure (landslide) along the margins of the larger mesas (Ql).