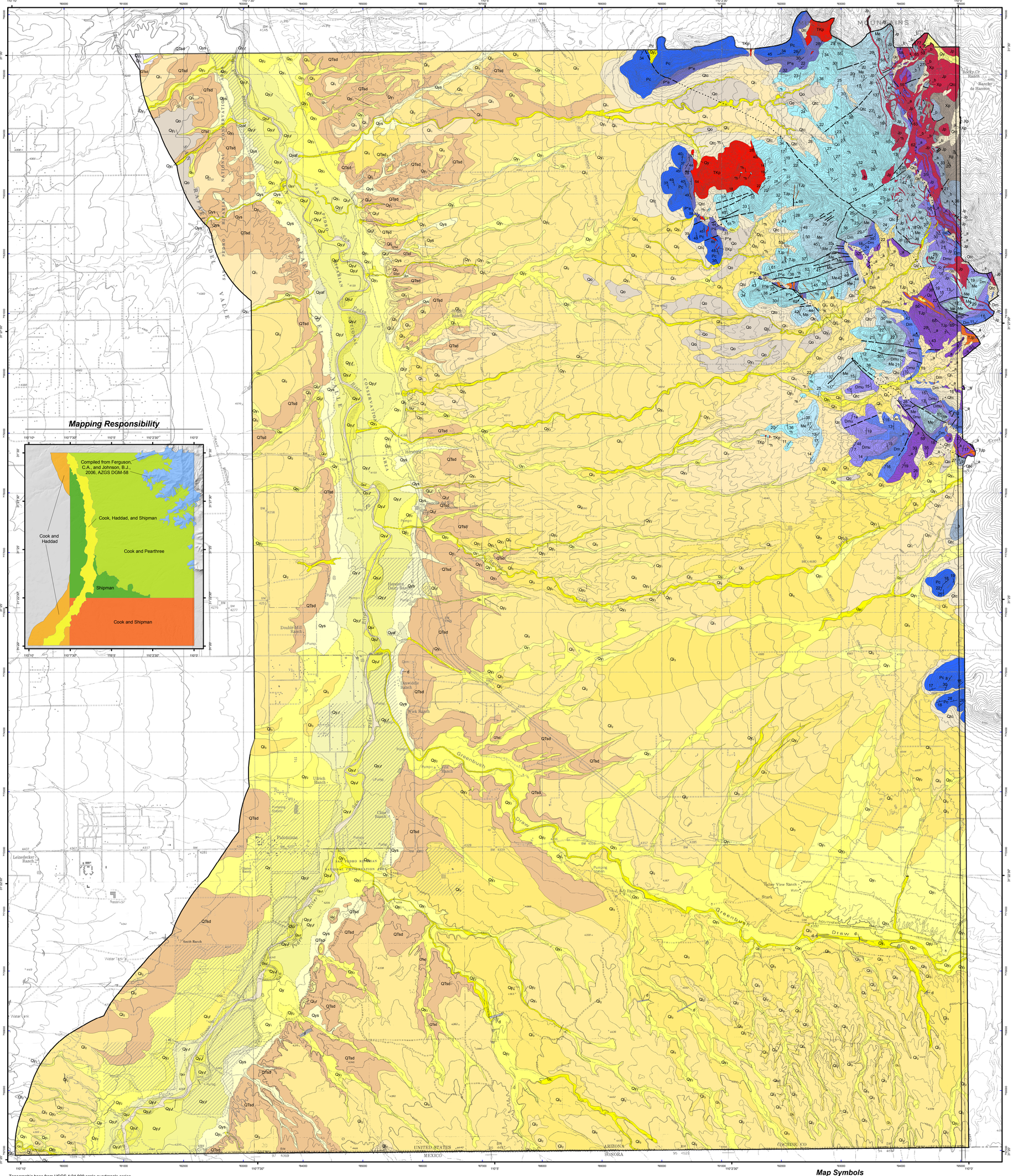


# GEOLOGIC MAP OF THE HEREFORD 7½' QUADRANGLE AND THE NORTHERN PART OF THE STARK 7½' QUADRANGLE, COCHISE COUNTY, ARIZONA

**Joseph P. Cook, Todd C. Shipman, Philip A. Pearthree and David E. Haddad**

**Arizona Geological Survey Digital Geologic Map 57 (DGM-57), version 2.0**

**April 2009**

**1:24,000 scale**

**Citation for this map:**
**Cook, J.P., Shipman, T.C., Pearthree, P.A., and Haddad, D.E., 2009, Geologic Map of the Hereford 7½' Quadrangle and the Northern Part of the Stark 7½' Quadrangle, Cochise County, Arizona: Arizona Geological Survey Digital Geologic Map 57 (DGM-57), version 2.0, 1 sheet, layout scale 1:24,000, with text.**

(also available in Adobe pdf format on CD-ROM)

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***Note – All bedrock geologic mapping was compiled from a preliminary, unreviewed version of:***
**Ferguson, C.A., and Johnson, B.A., 2006, Bedrock geologic map and cross sections of the Hereford 7.5' Quadrangle, Cochise County, Arizona: Arizona Geological Survey Digital Geologic Map DGM-58, scale 1:12,000.**

Acknowledgements:
Genevieve Pearthree was the cartographer for DGM-57, version 2.0.

## *Map Unit Descriptions*

**Other units**

**Plowed areas** - historically or actively plowed fields, irrigated pastures, and other lightly disturbed ground

d — **Disturbed ground** - disturbed due to agriculture, extensive excavation, and blockage of drainages for cattle tanks

Qtc — **Quaternary hillslope talus and colluvium** - unconsolidated to moderately-consolidated talus and colluvium deposits mantling the lower slopes of bedrock outcrops

**San Pedro River alluvium**

Qyaf — **Active river channel deposits** - unconsolidated, very poorly sorted sandy to cobbly beds in active river channels

Qyaf — **Flood channel and low terrace deposits** - unconsolidated sand, gravel and silt deposits on bars, low terraces and flood channels

Qyaf — **Historical river terrace deposits** - unconsolidated sand, gravel and silt deposits on low terraces inset below the abandoned early historical floodplain

Qyaf — **Latest Holocene to historical river terrace deposits** - silt, clay, sand and minor gravel deposits underlying the early historical floodplain

Qyaf — **Late to early Holocene river terrace deposits** - silt, clay, sand and minor gravel terrace deposits slightly above the early historical floodplain

Qlaf — **Late Pleistocene river terrace deposits** - gravelly, sandy river terrace deposits up to 10 m above the active river channel

Qlaf — **Middle to late Pleistocene river terrace deposits** - older, higher gravelly, sandy river terrace deposits

**Piedmont Deposits**

Qy1 — **Modern stream channel deposits** - unconsolidated deposits in active piedmont channels consisting of very poorly sorted sand, pebbles, cobbles, and isolated boulders

Qy2 — **Latest Holocene alluvium** - unconsolidated, very poorly sorted silty to cobbly low terrace and overflow channel deposits

Qyaf — **Late Holocene alluvium, active fan deposits** - active portions of young fan deposits exhibiting distributary drainage patterns

Qy2 — **Late Holocene alluvium** - young deposits located primarily near active channels including floodplain, low-lying terrace, and tributary channel alluvium which are part of the modern piedmont drainage system

Qy1 — **Older Holocene alluvium** - terrace deposits located primarily along the flanks of incised drainages at higher elevations than Qy2 deposits

Qys — **Fine-grained Holocene alluvium derived from the St. David Formation** - Holocene alluvium derived from distal Saint David basin fill deposits

Qy — **Holocene alluvial deposits, undifferentiated** - Holocene alluvium, undivided

Ql3 — **Late Pleistocene alluvial fan and terrace deposits** - moderately dissected, relatively planar to gently rounded alluvial terraces exhibiting moderate soil development, calcium carbonate accumulation, and tributary drainage networks

Ql2 — **Middle to late Pleistocene alluvial fan and terrace deposits** - broad, moderately to well-rounded piedmont surfaces exhibiting moderately dissected tributary drainage networks located at significantly higher elevations than younger deposits

Ql1 — **Early to middle Pleistocene alluvial fan and terrace deposits** - high standing, very well rounded, highly dissected piedmont surfaces exhibiting reddish, well-developed soils and strong calcium carbonate accumulation

Qo — **Early Pleistocene alluvial fan deposits** - deeply dissected, very well-rounded remnant alluvial fan deposits exhibiting thick, exposed, indurated petrocalcic subsurface horizons

**Quaternary to Tertiary Basin Fill alluvium**

QTsd — **Pliocene to early Pleistocene Saint David Formation** - basin fill sediments from the middle to upper member of the Saint David formation exposed in arroyo cuts along the San Pedro River

**Bedrock units**

TKp — **Coarse-grained rhyolite porphyry (Late Cretaceous-Early Tertiary)** - felsic porphyry containing 10-30% phenocrysts of subhedral quartz (2-6 mm), euhedral to subhedral potassium feldspar (1-5 mm), euhedral to subhedral plagioclase (1-3 mm), and biotite (1-3 mm)

TJp — **Phenocryst-poor rhyolite porphyry and aplite (Late Cretaceous-Early Tertiary or Jurassic)** - phenocryst-poor rhyolite porphyry containing <5-7% <2-3 mm feldspar phenocrysts that grades into aplite towards the margins of dikes

Jp — **Coarse-grained rhyolite porphyry (Jurassic)** - felsic porphyry containing 10-30% phenocrysts of subhedral quartz (2-6 mm), euhedral to subhedral potassium feldspar (1-5 mm), euhedral to subhedral plagioclase (1-3 mm), and biotite (1-3 mm)

Pc — **Colina Limestone (Permian)** - medium- to thick-bedded, amalgamated skeletal limestone, typically with matrix-supported texture

P*e — **Earp Formation (Permian - Pennsylvanian)** - interbedded thin- to medium-bedded red shale, mudstone, silty mudstone, and fine-grained ripple cross-laminated sandstone with subordinate thin- to medium-bedded carbonate beds, dominated by massive micrite and skeletal wackestone

*h — **Horquilla Limestone (Pennsylvanian)** - medium- to thick-bedded cherty limestone with subordinate interbedded siliciclastic units; dark shale throughout the main part of the unit and red shale, silty shale and rare fine-grained ripple cross-laminated and cross-stratified sandstone in the upper part

Me — **Escabrosa Limestone (Mississippian)** - Medium- to thick-bedded limestone, dominated by thick-bedded, amalgamated, crinoid columnal grainstone, especially towards the base of the unit, which is typically a cliff-former

Dmu — **Upper Martin Limestone (Devonian)** - a two-part sequence that grades upward from lithologies typical of the lower Martin; recessive, medium-bedded micritic carbonate and sparsely skeletal wackestone (typically dolostone) with shale or mudstone interbeds, into lithologies typical of the Escabrosa; medium- to thick-bedded crinoid columnal skeletal packstone and grainstone

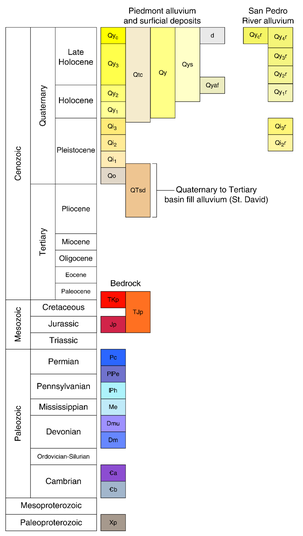
Dm — **Lower Martin Limestone (Devonian)** - dolostone, limestone, and shale. A complex sequence of thin- to medium-bedded skeletal wackestone, sparsely skeletal micrite, rare skeletal packstone, shale, calcareous mudstone, and minor quartz sandstone

_a — **Abrigo Formation (Cambrian)** - thin to medium-bedded carbonate, siltstone, silty mudstone, and fine-grained argillaceous sandstone

_b — **Bolsa Quartzite (Cambrian)** - medium- to thick-bedded, cross-stratified quartz sandstone, and pebbly feldspathic quartz sandstone

Xp — **Pinal Schist (Paleoproterozoic)** - medium- to fine-grained sericitic schist ranging from light green to dark gray

## *Unit Correlation*

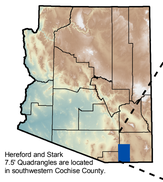



## *Mapping Responsibility*




## *Location Index Map*

Quadrangle Location Shown in Blue

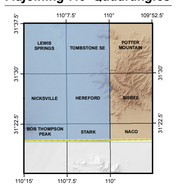


Hereford and Stark 7.5' Quadrangles are located in southwestern Cochise County.

## *Cochise County*

Mapped Area Shown in Blue

## *Adjoining 7.5' Quadrangles*




Topographic base from USGS 1:24,000 scale quadrangle series.
North American Datum of 1983 (NAD83). Projection and 1,000-meter grid: Universal Transverse Mercator, zone 12.

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MN
10½°
2007 MAGNETIC NORTH DECLINATION (APPROXIMATE)

SCALE 1:24,000
1 0.5 0 1 Miles
1 0.5 0 1 Kilometers
0 1000 2000 3000 4000 5000 Feet
**CONTOUR INTERVAL 25 FEET**

## *Map Symbols*

**Faults**
- fault, accurate
- fault, approximate
- fault, concealed

**Contacts**
- accurate contact
- approximate contact

**Structure Symbols**
- bedding, inclined
- bedding, inclined with tops known
- generic foliation, inclined
- fault attitude
- vein orientation

**Dikes**
- mafic dike