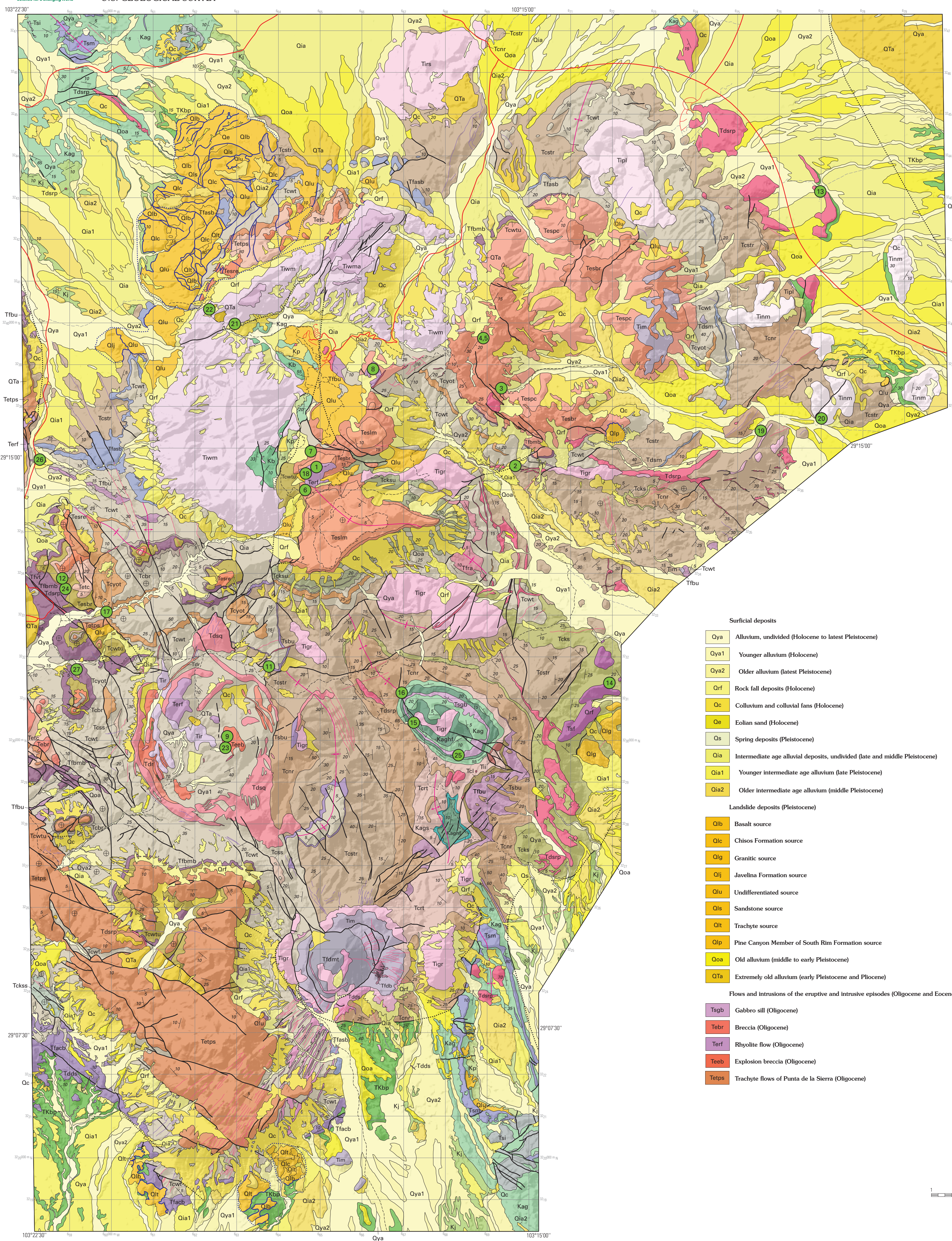


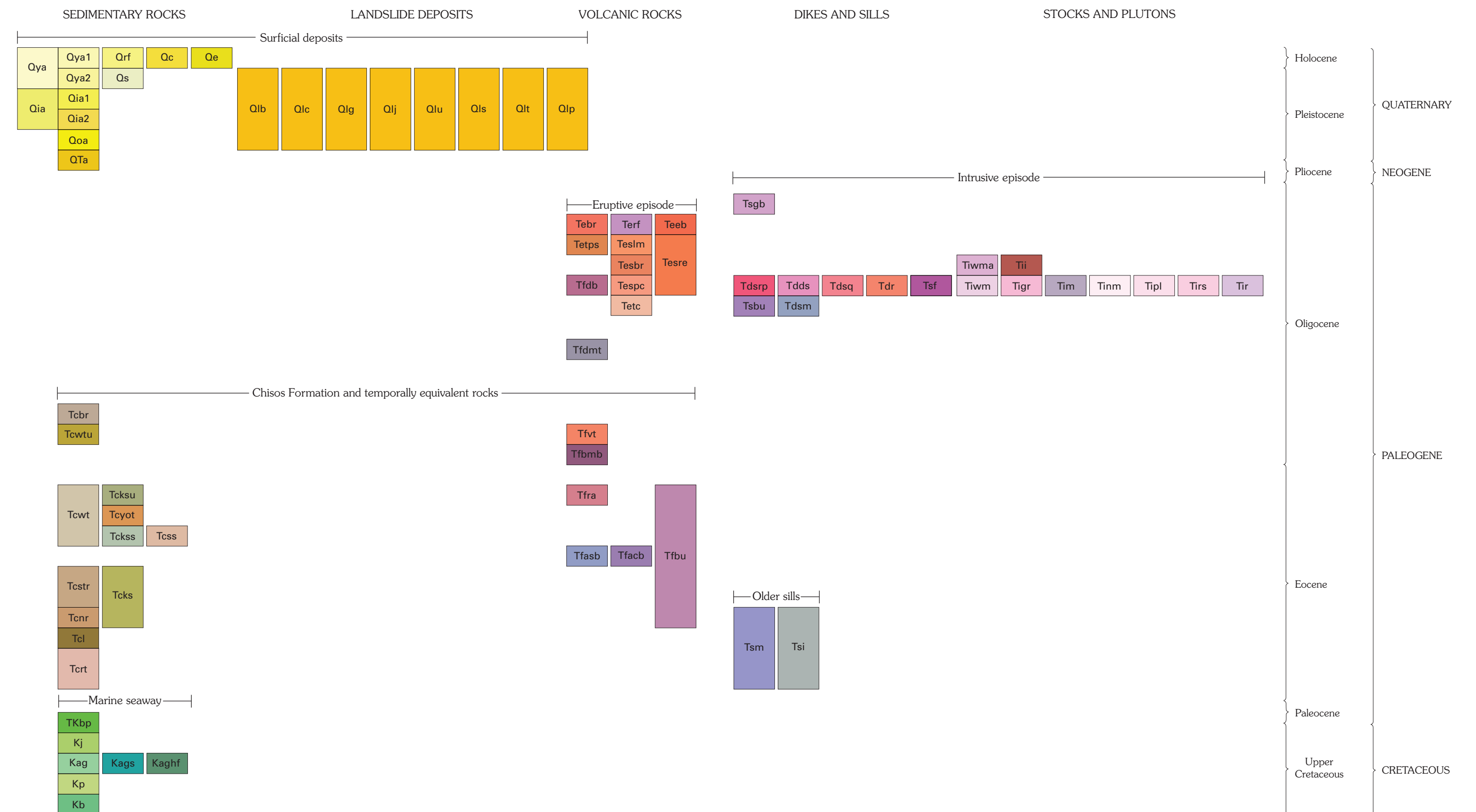


Base from U.S. Geological Survey
Digital Elevation Model 10-meter
digital data
Cultural data from digital files provided
by U.S. National Park Service
Universal Transverse Mercator
projection, zone 13
1984 World Geodetic System

APPROXIMATE MEAN
DECLINATION, 2010



See "Support and Data Sources"
Digital map database prepared by
Paco R. Van Sistine
Editing and digital cartography by
Gayle M. Dumonceaux
Denver Publishing Service Center
Manuscript approved for
publication November 5, 2010

CORRELATION OF MAP UNITS
(Due to the addition of a shaded-relief base, colors on the map
may not exactly match colors in the Correlation of Map Units)LIST OF MAP UNITS
(Due to the addition of a shaded-relief base, colors on the map
may not exactly match colors in the List of Map Units)

- Surficial deposits**
- Qya Alluvium, undivided (Holocene to latest Pleistocene)
 - Qya1 Younger alluvium (Holocene)
 - Qya2 Older alluvium (latest Pleistocene)
 - Qrf Rock fall deposits (Holocene)
 - Qc Colluvium and colluvial fans (Holocene)
 - Qe Eolian sand (Holocene)
 - Qs Spring deposits (Pleistocene)
 - Qia Intermediate age alluvial deposits, undivided (late and middle Pleistocene)
 - Qia1 Younger intermediate age alluvium (late Pleistocene)
 - Qia2 Older intermediate age alluvium (middle Pleistocene)
- Landslide deposits (Pleistocene)**
- Qlb Basalt source
 - Qlc Chisos Formation source
 - Qlg Granitic source
 - Qlj Javelina Formation source
 - Qlu Undifferentiated source
 - Qls Sandstone source
 - Qlt Trachyte source
 - Qlp Pine Canyon Member of South Rim Formation source
 - Qoa Old alluvium (middle to early Pleistocene)
 - QTa Extremely old alluvium (early Pleistocene and Pliocene)
- Flows and intrusions of the eruptive and intrusive episodes (Oligocene and Eocene?)**
- TsGb Gabbro sill (Oligocene)
 - TsGb Breccia (Oligocene)
 - TsGb Rhyolite flow (Oligocene)
 - TsGb Explosion breccia (Oligocene)
 - TsGb Trachyte flows of Punta de la Sierra (Oligocene)

- South Rim Formation (Oligocene)**
- Taslm Lost Mine Member
 - Tesbr Boot Rock member (informal)
 - Tespc Pine Canyon Rhyolite Member
 - Tesre Rocks equivalent to South Rim Formation (Oligocene)
 - Tiwna Altered parts of Ward Mountain pluton (Oligocene)
 - Tir Intermediate to mafic intrusion (Oligocene)
 - Tdsrp Rhyolite porphyry dikes and sills (Oligocene)
 - Tdds Dominguez Mountain dike swarms (Oligocene)
 - Tdsq Sierra Quemada dike complex (Oligocene)
 - Tdr Rhyolite dikes of Sierra Quemada (Oligocene)
 - Tsf Felsic sill (Oligocene)
 - Tiwn Ward Mountain pluton (Oligocene)
 - Tigr Granite (Oligocene)
 - Tfdb Young basalt flows at Dominguez Mountain (Oligocene)
 - Tim Mafic intrusions of Pine Canyon caldera and Dominguez Mountain (Oligocene)
 - Tinn Nugent Mountain intrusion (Oligocene)
 - Tipl Panther lacolith (Oligocene)
 - Tirs Rough Spring lacolith (Oligocene)
 - Tir Rhyolite intrusions of Sierra Quemada (Oligocene)
 - Tetc Tuff and conglomerate (Oligocene)
 - Tsbu Undifferentiated basalt sills (Oligocene)
 - Tdsm Mafic dikes and sills (Oligocene)
 - Tidmt Dominguez Mountain flows (Oligocene? and Eocene?)
- Chisos Formation and equivalent volcanic rocks (Oligocene and Eocene)**
- Towtu Upper white tuff facies (Oligocene)
 - Tlvt Vitric tuff (Oligocene)

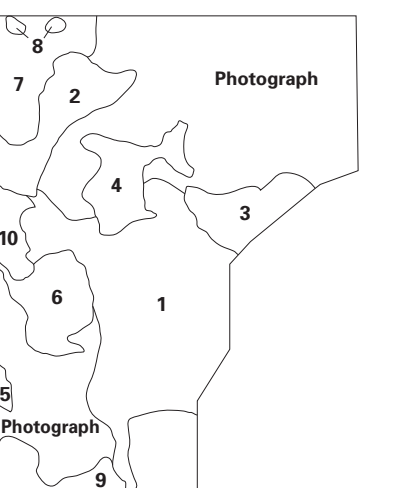
- Older sills (Eocene)**
- Tsm Mafic sill
 - Tsi Intermediate sill
- Marine seaway deposits (Paleocene and Cretaceous)**
- TKbp Black Peaks Formation (lower Paleocene and Upper Cretaceous)
 - Kj Javelina Formation (Upper Cretaceous)
 - Kag Agua Formation (Upper Cretaceous)
 - Kagp Metamorphosed sandstone and quartzite facies
 - Kp Hornfels facies
 - Kp Pen Formation (Upper Cretaceous)
 - Kb Boquillas Formation (Upper Cretaceous)

MAP EXPLANATION

- Contact
- Dike, leucocratic—Light colored, mostly rhyolite and rhyodacite porphyry
- Dike, intermediate—Dark colored, mostly andesite and dacite
- Fault—Dashed where approximately located; dotted where concealed
- Mass movement sole and related faults—Dotted where concealed
- Anticline
- Syncline
- Strike and dip of bedding
- Inclined
- Horizontal
- Road, paved—Suitable for all vehicles
- Road, service—Official use only
- Trails
- Dirt road—High clearance recommended
- Sample for age determination—Showing sample number keyed to results reported in rock descriptions

SUPPORT AND DATA SOURCES

This map was produced under the partial auspices of the U.S. National Park Service (NPS). Cartography for roads and trails was provided by Geographic Information Specialists (GIS) at the NPS Park Headquarters. The geologic data came from a variety of sources and the map represents the work of several geologists from the U.S. Geological Survey (USGS), University of Texas at El Paso (UTEP), University of Texas at Austin (UTA) and Texas Tech University (TTU). All of the geology is primarily based on the author's interpretation of ortho-rectified USGS color-infrared photogrammetry. This facilitated a uniform locational accuracy of geologic features to within 2 m throughout the mapped area. Large parts of the map also benefited from field studies conducted by numerous geologists (see figure below). All of the surficial deposits (rocks of Quaternary age) have been studied to various degrees by Margaret Berry and Van Williams (both USGS), Dan Maginn (USGS and UTEP), provided age and petrographic data for specific sites over much of the area. Areas 1 and 2—the author (USGS), areas 3, 4, and 5—Kenzie Turner and the author (both USGS), area 6—Robert Scott, Lawrence Snee, and Kenzie Turner (all USGS), area 7—Tom Lehman (UTA and TTU), area 8—Robert Scott (USGS), area 9—Ric Page (USGS), and area 10—Dan Barker (retired) and Robert Scott (USGS). Other parts of the map (photograph) have not been field checked.



Any use of trade names is for descriptive purposes only and does not imply endorsement by the U.S. Government. This map was produced on request, directly from digital files, on an electronic plotter. For sale by U.S. Geological Survey Information Services, Box 25286, Federal Center, Denver, CO 80225. 1:800 ASK USGS. ArcInfo coverages and a PDF for this map are available at <http://pubs.usgs.gov/sim/3140/>. Suggested citation: Bohannon, R.G., 2011, Geologic map of the Chisos Mountains, Big Bend National Park, Texas: U.S. Geological Survey Scientific Investigations Map 3140, scale 1:50,000.

CONVERSION FACTORS			
Multiply	By	To obtain	
inches (in.)	2.54	centimeters (cm)	
feet (ft)	0.3048	meters (m)	
miles (mi)	1.609	kilometers (km)	

GEOLOGIC MAP OF THE CHISOS MOUNTAINS, BIG BEND NATIONAL PARK, TEXAS

By
Robert G. Bohannon
2011