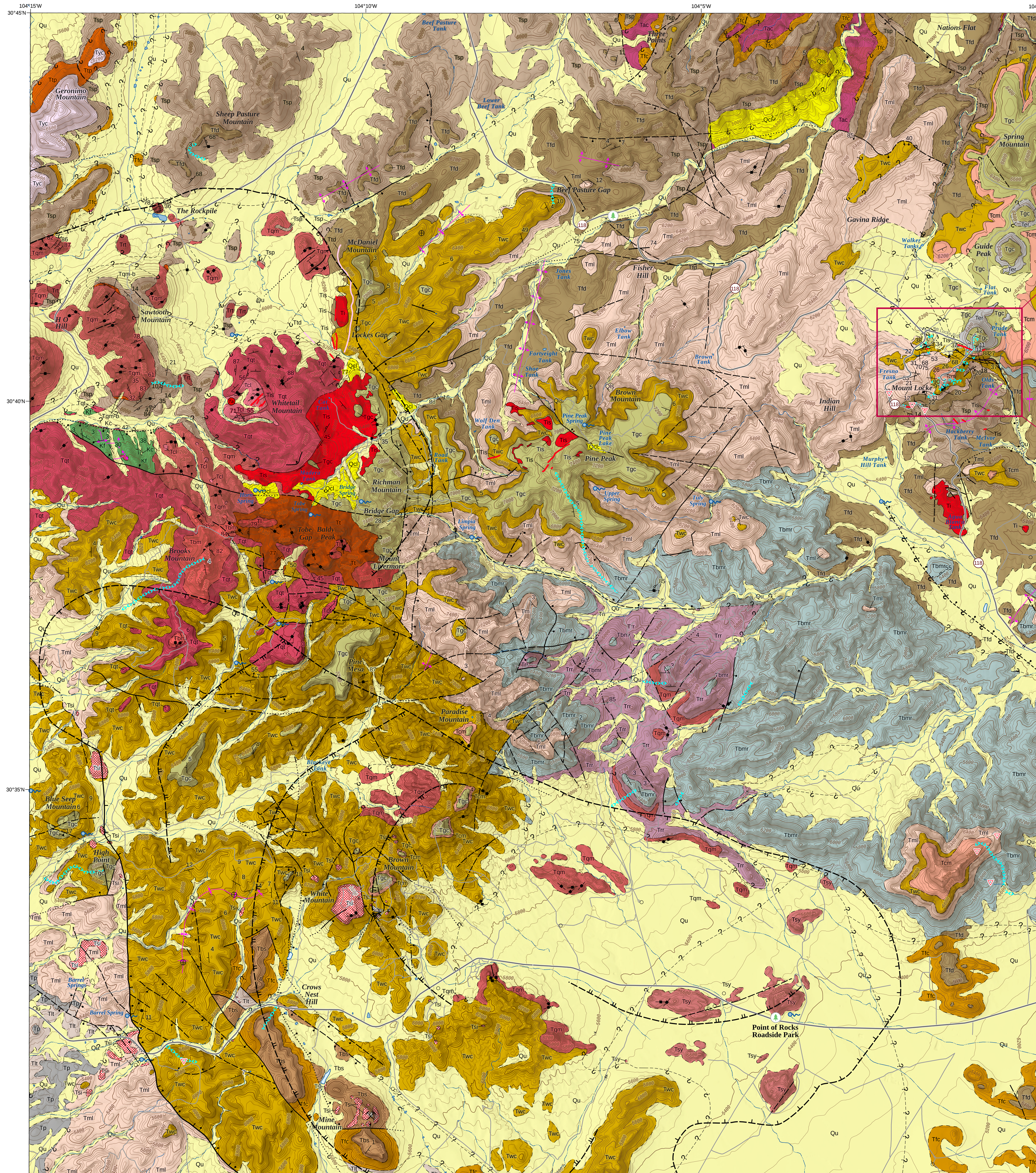
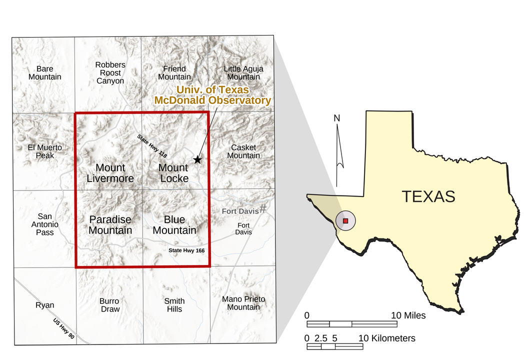
BUREAU OF ECONOMIC GEOLOGY
LORENA G. MOSCARDELLI, DIRECTOR
JACKSON SCHOOL OF GEOSCIENCES, THE UNIVERSITY OF TEXAS AT AUSTIN

In cooperation with the State of Texas Advanced Resource Recovery (STARR) Program
and the U.S. Geological Survey National Cooperative Geologic Mapping Program
under STATEMAP award No. G24AC00508, 2024



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SCALE 1:50,000

0 1 2 4 MILES

0 1 2 4 KILOMETERS

UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 13N NAD 83
CONTOUR INTERVAL 40 FT
DATUM IS MEAN SEA LEVEL

MN GN 0°27' 8 MILS 6°20' 113 MILS

UTM GRID AND 2026 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

GEOLOGIC MAP OF THE CENTRAL DAVIS MOUNTAINS, JEFF DAVIS COUNTY, TEXAS

Brian B. Hunt, Shannon Rudine, and Mark A. Helper

2025

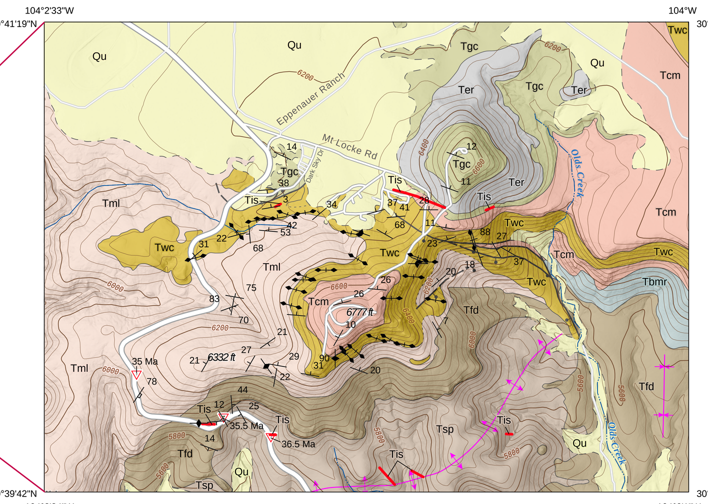
ACKNOWLEDGMENTS AND DISCLAIMERS

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GEOLOGIC MAP OF THE MCDONALD OBSERVATORY AREA, DAVIS MOUNTAINS

Shannon Rudine



GEOLOGIC MAP SYMBOLS

Contacts and Faults

- Contact
- Contact, approximate
- Contact, inferred
- Contact, concealed
- Contact, questionable
- Internal contact
- Fault
- Fault, approximate
- Fault, inferred
- Fault, concealed
- Normal fault; ball and bar on down side
- Normal fault, approximate; ball and bar on down side
- Caldera margin (Henderson, 1989); dashed where inferred based on Airborn Magnetic data (Scheirer and Walter, 2026).
- Internal caldera structures based on Airborn Magnetic data (Scheirer and Walter, 2026).

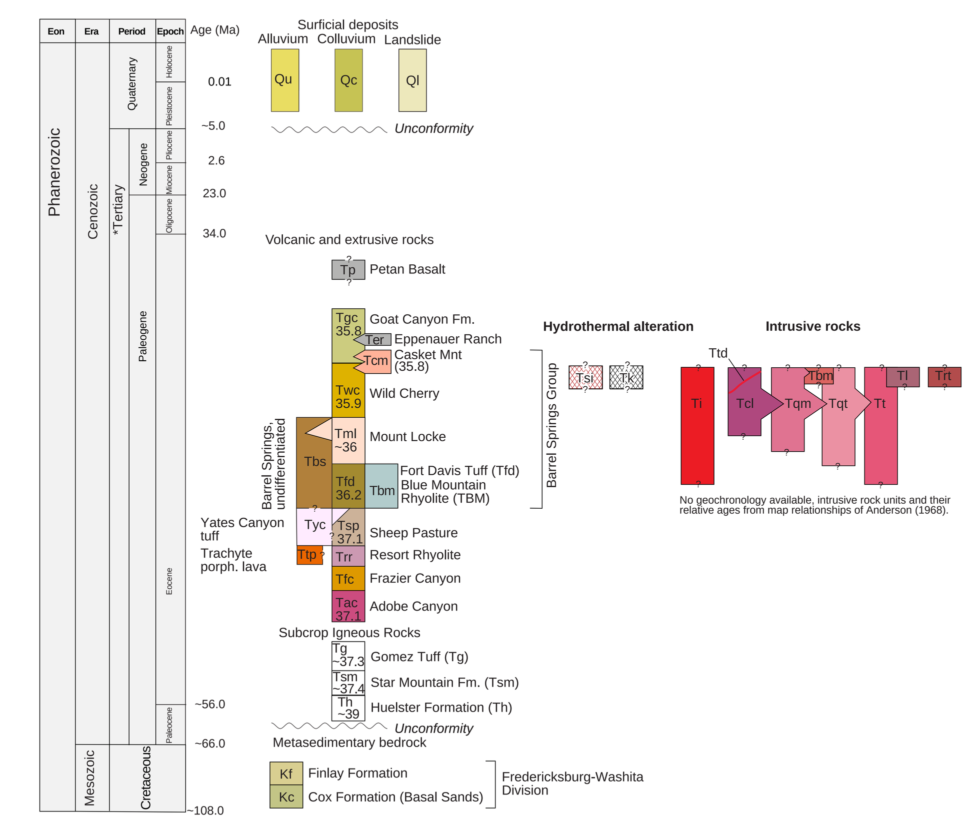
Basemap Symbols

- Topographic contour (40 ft interval)
- Intermittent stream
- Road (inset map)
- Local road
- Spring
- Gaging station
- Water well
- Windmill
- Gravel pit
- Mine
- Prospect
- Roadside park

Geologic Lines and Points

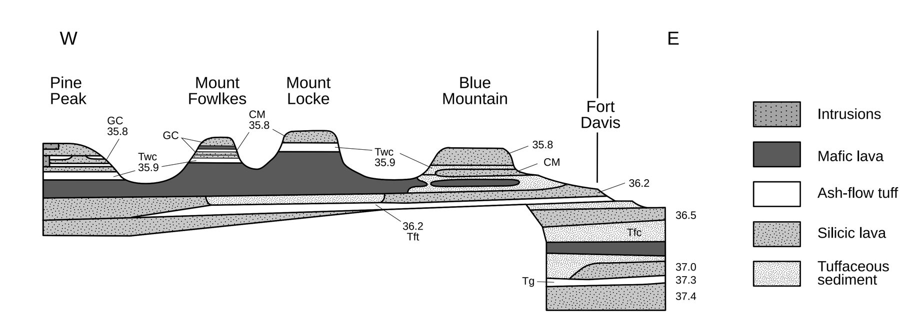
- Axial trace of anticline
- Axial trace of syncline
- Scratch contact
- Measured section
- Strike and dip of fault
- Strike and dip of bedding
- Ar-Ar Age sample locations, (Henry and others, 1994)
- Lineation
- Dip direction
- Dip, vertical
- Fault dip
- Vertical joint
- Joint
- Horizontal bedding
- Strike of fracture trend
- Strike and dip of fabric

CHRONOSTRATIGRAPHY AND CORRELATION OF MAP UNITS, CENTRAL DAVIS MOUNTAINS



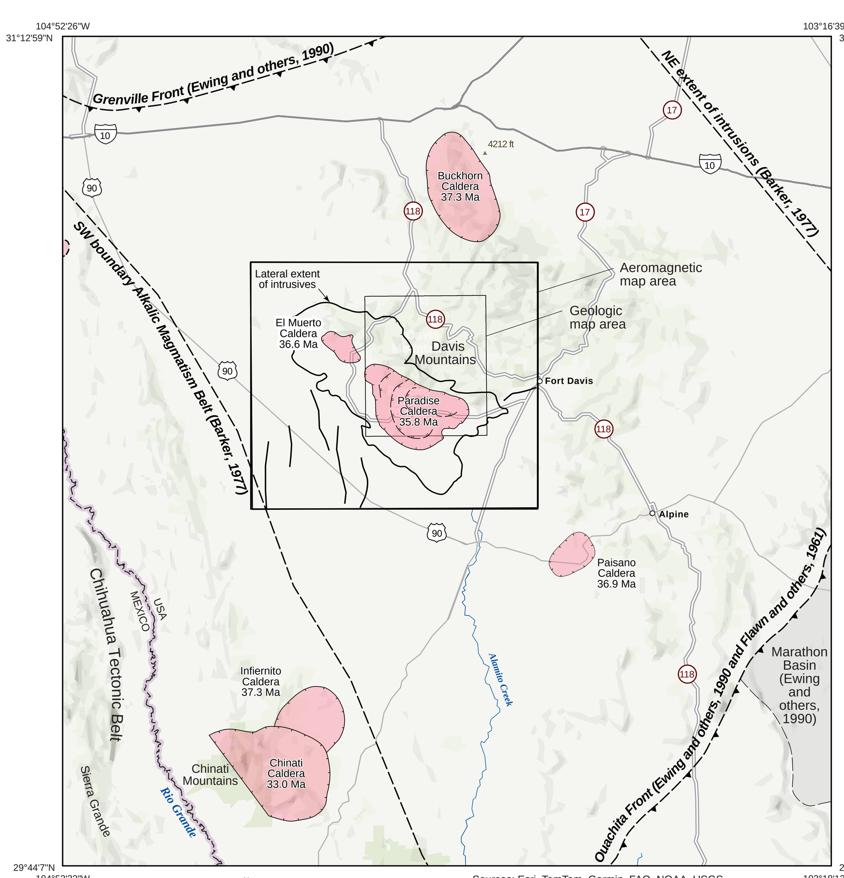
Lithostratigraphy and Chronostratigraphy from Anderson,1968; Smith and others, (2000; Cretaceous stratigraphy), Ewing (2016); Henry and others (1994); Parker and others, (2017); and Parker and Henderson (2021). Vertical geochronology bar not to scale.
*Tertiary Period has been deprecated and now replaced by the Paleogene and Neogene periods.

REGIONAL VOLCANOSTRATIGRAPHY



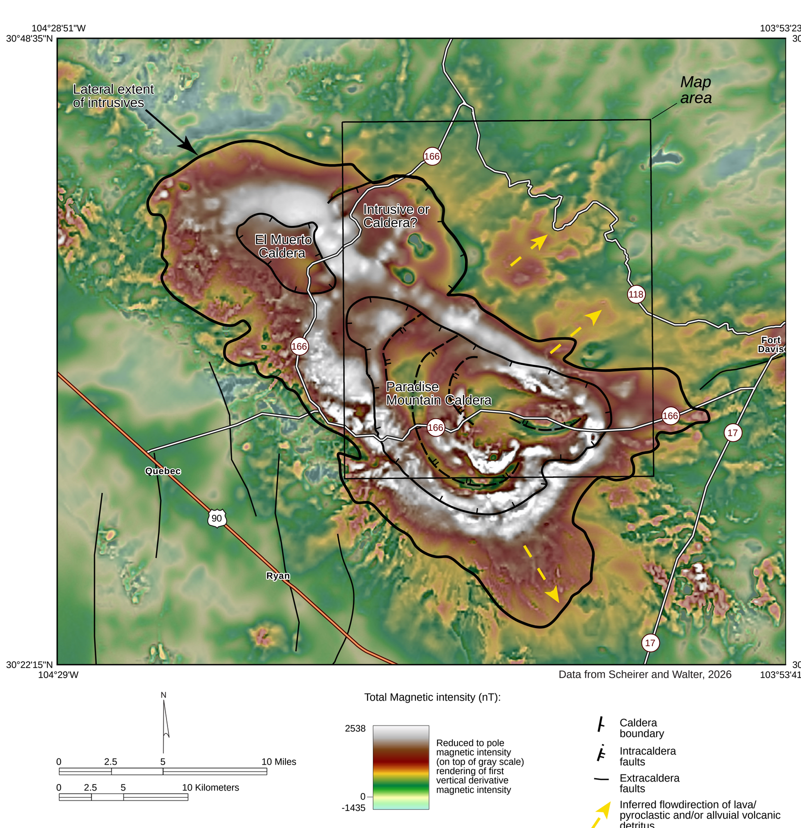
Regional volcanic stratigraphy that includes part of this map area modified from Harrington (2024) based originally on Henry and others (1994). Ages updated from Parker and others (2017) recalculations. GC: tuff of Goat Canyon; CM: lavas of Casket Mountain; Twc: Wild Cherry Formation; Tml: Mount Locke Formation; Tsp: Sheep Pasture Formation; Tbs: Barrel Springs Formation (silicic lava and ash-flow tuff); Tsl: Sleeping Lion Formation; Tfc: Frazier Canyon Formation (tuffaceous sediment and mafic lava); Tl: Limpia Formation; Tac: Adobe Canyon Formation; Tg: Gomez Tuff; Tsm: Star Mountain Formation; Th: Huelster Formation; Tp: Pruett Formation.

REGIONAL TECTONIC MAP



Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Caldera and locations, Ewing and others 1990.
Ages and location of Paradise and El Muerto calderas from Parker and Henderson, 2021.

REDUCED TO POLE AND FIRST VERTICAL DERIVATIVE AEROMAGNETIC MAP OF THE DAVIS MOUNTAIN REGION



Surficial Deposits

Qcl—Colluvium (Quaternary)—Cobbles, sand, silt, and clay. An unconsolidated mass of poorly sorted soil, angular rock fragments, and sediments located along hillsides and the base of slopes. Deposited by processes such as downslope creep and sheetwash.

Qls—Landslide (Quaternary)—Characterized by chaotic terrain distinctly visible on aerial photographs. May also contain colluvium, alluvium, and alluvial fan materials.

Qu—Alluvium, undifferentiated (Quaternary)—Cobbles, sand, silt, and clay. Consists of unconsolidated and generally poorly sorted, angular colluvium laterally merging into alluvial materials near channels. May contain landslide and other assorted surficial deposits.

Hydrothermal Alteration

Tsi—Silicified Rocks (Eocene)—Hydrothermally altered volcanic rocks, including welded and non-welded tuffs, exhibiting varying degrees of silicification (McMillan and others, 1949). Characterized by hard, chert-like textures to soft, granular kaolinite and cristobalite-rich zones. Composed primarily of microcrystalline quartz, with coarse quartz patches and opaque material. Occur as both lateral and vertical transitions from unaltered rock, often associated with faults, fractures, and stratigraphic contacts, indicating fluid pathways (Anderson, 1968). Based upon mapping relationships of Anderson (1968), silicification postdates the Wild Cherry Formation and predates the Goat Canyon Formation.

Tk—Argillic Alteration (Eocene)—Clay deposits and associated altered volcanic rocks resulting from hydrothermal alteration of ash-flow tuff of the Paradise Mountain Caldera. Mineral assemblage includes kaolinite, quartz, tridymite or cristobalite, and alunite resulting from acidic hydrothermal fluids reacting with volcanic rock (Parker and others, 1991). Kaolin deposits at the Mueller mine are relatively soft, white to grayish white to pink, massive with no bedding evident. Alteration appears to have occurred along faults and stratigraphic contacts (Anderson, 1968). Mueller deposit is associated with a NW-trending shear zone (McMillan and others, 1949). Kaolin deposits may represent former hot springs that formed about 35.9 Ma during the waning stages of volcanic activity in the Paradise Mountain Caldera (Parker and others, 1991).

Intrusive Rocks

Ti—Intrusive rocks, undifferentiated (Paleogene (?))—Undifferentiated small stocks, dikes, and sills. Generally felsic in composition.

Tis—Sills and dikes (Paleogene (?))—Largely felsic and porphyritic sills and dikes (Rudine, 2025c).

Ta—Agglomerate (Paleogene (?))—Breccia or vent agglomerate comprising limited exposures southwest of Whitetail Mountain, described by Hempkins (1962) as the Whitetail vent(?) area. Composed of volcanic rock fragments up to 3 cm in diameter (devitrified glass, trachyte) in a syenitic matrix. Exhibits variable composition: 70% lithic fragments, 23% quartz-feldspar matrix, 5% kaolinized feldspar, 2% magnetite-ilmenite, trace hornblende, aegirine-augite, and biotite (Anderson, 1968).

Ttd—Trachyte dikes (Paleogene (?))—Localized trachyte dikes occurring in the west-central map area. Characterized by 5–7% alkali feldspar phenocrysts, orthophyric to allotriomorphic-granular alkali feldspar matrix with bimodal grain size, anhedral magnetite-ilmenite (2%), faintly zoned aegirine-augite (1%), trace quartz, and trace apatite (Anderson, 1968). Map pattern (Anderson, 1968) indicates dikes intrude small stocks of Tcl.

Tcl—Chlorite Latite (Paleogene (?))—Latite dikes and small stocks found in the west-central map area. Contains large alkali feldspar phenocrysts, seriate alkali feldspar matrix, chlorite (interstitial, within phenocrysts and matrix), and magnetite-ilmenite (intergranular and rims on chlorite). Shows compositional variations from north to south (Anderson, 1968). Map pattern suggests small dikes intrude the voluminous Tqm stocks.

Tqm—Quartz Microsyenite (Paleogene (?))—Quartz microsyenite characterized by alkali feldspar (zoned phenocrysts with perthitic cores, clear rims), quartz (0–15%), and mafic minerals (biotite, aegirine-augite, hornblende or riebeckite) with accessory apatite, zircon, and chlorite. Exhibits fine- to medium-grained textures, with local coarse-grained phases showing subhedral granular texture and late-stage fine-grained interstitial material. Originally mapped by Anderson (1968), it is generally equivalent to the various quartz syenite units mapped by Henderson (1989). Outcrops are generally rounded and highly fractured with limonite staining. The unit can be distinguished from volcanics by its rough outcrop visible on aerial photos and lidar. This unit is the most widespread intrusive rock of the map area forming stocks, sills, and dikes. Sawtooth Mountain is a large sill with pronounced flow foliation and radial jointing, suggesting magma movement from southwest to northeast. Bloys Campground (south-central map area, south of SH 166) exposure shows yellow coloration due to limonite, lower phenocryst content, and trace chlorite, indicating possible hydrothermal alteration (Anderson, 1968).

Tqm-b—Quartz Microsyenite, breccia (Paleogene (?))—Brecciated mass of Tqm found around Sawtooth Mountain.

Tsy—Syenite (Paleogene (?))—Porphyritic, gray-brown intrusive rock, distinguished by its coarse-grained, gray alkali feldspar phenocrysts that can be up to 2 cm in length. These euhedral, boat-shaped phenocrysts are optically zoned, somewhat altered, and comprise approximately 20 percent of the rock. Alkali feldspar also makes up the fine-grained groundmass, accounting for about 56 percent. Other minerals present in the groundmass include colorless to pale brown clinopyroxene (~5%), two types of amphibole (~10%) that often occur as an alteration product around clinopyroxene, and opaques (~7%). The remaining 2 percent consists of accessory minerals like zircon, apatite, and biotite. Notably, the Syenite lacks modal quartz, setting it apart from other intrusions in the study area. Petrographic and geochemical data indicate that this rock is a crystal cumulate of alkali feldspar, amphibole, and clinopyroxene. Found in the southeastern portion of the study area near the Point of Rocks Roadside Park (Henderson, 1989).

Tbm—Brooks Mountain Formation (Paleogene (?))—Brown, aphanitic to fine-grained, porphyritic trachyte with orthophyric matrix and colorless to gray alkali feldspar phenocrysts. Forms steep cliffs with prominent talus piles. Locally occurs at Brooks Mountain and is 985 feet thick. Consists of multiple trachyte exposures separated by covered zones. Contact relations are obscured; the orthophyric texture, limited areal extent, and significant thickness suggest an intrusive origin. However, conclusive evidence for either intrusive or extrusive nature is lacking (Anderson, 1968).

Tqt—Quartz Trachyte (Paleogene (?))—Widespread unit in the west-central map area forming both concordant sills and discordant intrusives cross-cutting the Wild Cherry Formation. Brownish red with small white porphyritic feldspars. Characterized by 5–30% alkali feldspar phenocrysts, 0–12% quartz, and mafic minerals (biotite, aegirine-augite, amphibole). Alkali feldspar is the dominant matrix mineral. Notably high magnetite-ilmenite content (5–10%). Texturally porphyritic and orthophyric to sub-trachytic. Grain size decreases away from the White Hills (Anderson, 1968).

Tl—Latite (Paleogene (?))—Found exclusively as sill-like body on Mount Livermore. Lithologically similar to the Trachyte (Tt) and distinguished by higher iron-oxide "dust" (Anderson, 1968). Contains 10% alkali feldspar phenocrysts, iron-oxide obscured matrix with seriate feldspar, chlorite, and magnetite-ilmenite (Anderson, 1968). Map pattern suggests intrusive relationships with the Tt and volcanic units on southeastern side of Mount Livermore.

Tt—Trachyte (Paleogene (?))—Mapped exclusively on Mount Livermore. Fine-grained equivalent of a syenite. Mount Livermore is a volcanic dome, intrusive at lower elevations and extrusive at summit (Parker personal communication). Rock composed of 25% alkali feldspar phenocrysts, matrix with plagioclase and alkali feldspar, interstitial quartz, augite, hornblende (?), biotite mantles on magnetite-ilmenite (4%) per Anderson (1968), who originally called the rock a trachyandesite.

Trt—Rhyolite-trachyte undifferentiated (Paleogene (?))—Isolated exposures of diverse rock types, including rhyolite and trachyte, located primarily north of Sawtooth Mountain. These rocks have not been assigned to specific intrusive formations due to uncertain relationships. The abundance of intrusive rocks in the area suggests these exposures may represent xenoliths within a larger intrusion (e.g., quartz microsyenite). A single exposure of greenish-gray, porphyritic trachyte, like the Goat Canyon Formation, may represent a xenolith, or downthrown fault block (Anderson, 1968).

Volcanic Rocks

Tp—Petan Basalt ((Paleogene (?))—Hard, black basalt forming low, gentle hills with abundant surface cobbles and boulders in the southwestern portion of the map area. Consists of intergranular augite, hornblende, and chlorite after augite, with olivine altered to iddingsite and antigorite (?). Up to 4.5 meters thick at type section in Merrill Canyon, base unexposed. Possibly the youngest igneous rock in the area as it is not overlain by other igneous and volcanic units (Twiss, 1979). Unit overlies the Wild Cherry units of Anderson (1968). Originally mapped as the Jones Formation (Tj) by Anderson (1968).

Tlt—Lower Tuff Trachyte (Paleogene (?))—A reddish-brown, informal unit in the western and central portions of the study area, consisting predominantly of rhyolitic ash-flow tuff and trachyte porphyry. The rocks are porphyritic; the basal ash-flow tuff contains abundant (~25%) anorthoclase phenocrysts with lesser biotite, opaques, and clinopyroxene (?) in a fine-grained, hemihyaline groundmass of glass and devitrified glass shards. The unit's internal stratigraphy is variable, often including a lower welded ash-flow tuff, an overlying trachyte porphyry flow (a characteristic rhomb-porphyry), and an upper welded ash-flow tuff (partly vitrophyre). It generally forms the lower slopes of hills and is overlain by the dark Petan (Tp) basalt in the southwest, or the white bedded tuff of the Frazier Canyon Formation (Tfc) in the south-central area. Exposed thickness varies from approximately 25 m (80 ft) to 75 m (240 ft) across the map area (Henderson, 1989).

Tgc—Goat Canyon Formation (Eocene)—Diverse volcanic sequence of ash-flow tuffs and lava flows known best through detailed mapping around Pine Peak and Brown Mountain (Rudine, 2025b). Anderson (1968) initially described it as hard, gray trachyte lavas with alkali feldspar phenocrysts. Rudine (2025b) subdivided the formation into eleven distinct units (Tgc1–11), including aphyric to porphyritic anorthoclase-rich trachyte lavas, pumiceous ignimbrites, sedimentary tuffs, and lahars. Thickness ranges from meters to over 60 meters per sub unit. Compositionally dominated by alkali feldspars, pumice, and various clasts. Significant color variations include reddish-browns, rusty browns, grays, dark grays and blacks, pinks, off-whites, greenish hues, and a unique "red glass" found in some trachyte flows, reflecting diverse lithologies and alteration processes (Rudine, 2025b). The Goat Canyon Formation is not associated with the Paradise Mountain Caldera (Parker and Henderson, 2021). Dated to ~35.80 +/- 0.06 Ma, it is essentially the same age as both the underlying Casket Mountain Formation on Mount Fowlkes (White and others, 2025) and nearby Wild Cherry Tuff (Henry and others, 1994; Parker and others, 2017).

Ter—Eppenauer Ranch (Eocene)—Massive to vesicular trachyandesite (White and others, 2025) originally described as basalt (Anderson, 1968). Medium gray to reddish brown, massive to vesicular aphanitic trachyandesite with black phenocrysts (~1% to 1 mm). Pahoehoe flows with dense lithoidal core and vesicular margins, locally brecciated at base. Vesicles rounded to stretched and occasionally filled with chalcedony. Scoriaceous in part with thin partings of olive drab tuff. The flow thickens from 19 m on Spur 77 to ~109 m on the eastern slope of Mount Fowlkes and may be equivalent to Goat Canyon Formation unit Tgc8 on Pine Peak (White and others, 2025).

Tbs—Barrel Springs Group (Eocene)—Volcanic units encompassing multiple formations associated with the Paradise Mountain Caldera. Primarily consists of ignimbrites, with local occurrences of silicic lava flows (Parker and Henderson, 2021). The group includes, in ascending order: the Fort Davis Tuff, Blue Mountain Rhyolite, Mount Locke Formation, Wild Cherry Tuff, and Casket Mountain Lava. Originally named for exposures near Barrel Springs in the southwestern corner of the Paradise Mountain quadrangle (Anderson, 1968), the group represents a revised stratigraphic framework to accommodate Ar/Ar dating that revealed a 0.3 Ma age difference between the Barrel Springs and Wild Cherry ignimbrites (Henry and others, 1994). This revision elevated Barrel Springs to a group status (Parker and Henderson, 2021), unifying units interpreted as erupting from the Paradise Mountain Caldera, aligning with previous mapping and regional geologic interpretations. The southwest portion of the map area is mapped as undifferentiated Barrel Springs (Tbs) (Henderson, 1989).

Tcm—Casket Mountain Lava (Eocene)—A suite of coarse porphyritic silicic lava flows (trachyte to low-silica rhyolite). Reddish brown to brownish gray porphyritic trachyte up to 300 meters thick, characterized by 20–30% phenocrysts, including alkali feldspar, clinopyroxene, zircon, and opaque minerals, with distinctive zoned feldspars (Henry and others, 1994). Forms prominent benches and cliffs, with columnar jointing, flow folds, and banding. It lacks evidence of a rheomorphic tuff origin, displaying instead, features indicative of lava flows, such as abrupt terminations. Vesicular textures, gas cavities, and a capping vitrophyre are present near the top, along with an upper breccia, block and ash flows, and reworked tuffs (Rudine and others, 2023). The Casket Mountain Formation overlies Fort Davis Tuff and other units, with a likely source near Blue Mountain (Henry and others, 1994). Dated to approximately 35.8 Ma old (Henry and others, 1994; Parker and others, 2017). Casket Mountain Lava is inferred to be equivalent to Medley Mountain (Tmm) of Anderson (1968). Bears a resemblance to Mount Locke Formation and was mapped as such in portions of Henderson (1989) in some areas below Tgc. Smith (1975) originally mapped two flows totaling 100 m thick on Casket Mountain as Mount Locke Formation. These were later reassigned to the Casket Mountain Formation (Henry and others, 1994).

Twc—Wild Cherry Tuff (Eocene)—An ignimbrite unit comprising foliated porphyritic rhyolite, vitric tuff, and vitrophyre. Brown, densely welded, flow-banded, with rheomorphic textures, forming prominent ledges. Vitrophyre and breccia zones in western exposures suggest multiple ignimbrite flows (Anderson, 1968). Includes lower reworked air-fall tuffs (locally absent) overlain by an upper breccia that transitions into block and ash flows and reworked sedimentary vitric-lithic tuffs (Rudine and others, 2023; Rudine, 2025a). The Wild Cherry Tuff interfingers with the lowest Casket Mountain Formation and varies in thickness from 9 to 114 meters, thickening significantly (>350 m) within its presumed source area, the Paradise Mountain Caldera (Parker and Henderson, 2021). Dated to 35.92 Ma (Henry and others, 1994; Parker and others, 2017).

Tml—Mount Locke Formation (Eocene)—Dark brown to red, coarsely porphyritic trachyte lava flows, with up to ~30% rhomb-shaped feldspar phenocrysts (plagioclase to calcic anorthoclase cores with sanidine rims) and oxidized mafic phenocrysts including augitic clinopyroxene, magnetite, apatite, zircon, and altered olivine (Kunk and others, 1994; Parker and Henderson, 2021; White and others, 2025). Consists of numerous thin (~10–15 m) lava flows, sometimes interbedded with quartz trachyte, exhibiting massive to platy bedding, and locally vesicular textures with discontinuous benches and upper and lower breccias (Henry 1989; Parker and Henderson, 2021; Rudine and White and others, 2023). Geomorphologically, unit forms steep cliffs transitioning to hummocky slopes (Anderson, 1968; Parker and Henderson, 2021). The thickness is highly variable, reaching up to 250 meters on the northern edge of the Paradise Mountain Caldera, thinning to 93 m at its type section (White and others, 2025). Anderson (1968) reported a thickness of 177 m but included beds now recognized as Wild Cherry Tuff and Casket Mountain Formations (Rudine and others, 2023). The unit thins to zero 7 miles west of and within 2 miles of the type section. Beds mapped as Mount Locke on Casket Mountain by Smith (1975) were reassigned to the Casket Mountain Formation by Henry and others (1994). Unit overlies the Fort Davis Tuff (Tfd) and underlies the Wild Cherry (Twc) and Casket Mountain (Tcm) Formations (Henry and others, 1994). Coarsely porphyritic trachyte lava previously mapped as Merrill Formation (Anderson, 1968) in the western Paradise Mountain Caldera wall is now included within the Mount Locke Formation (Parker and Henderson, 2021). Age estimated to be about 36 Ma (White and others, 2025).

Tbmr—Blue Mountain Rhyolite (Eocene)—Undivided rhyolite lava flows equivalent to the Barrel Springs lavas of Parker and Henderson (2021). Equivalent to the Fort Davis Tuff (Tfd) (White and others, 2025).

Tfd—Fort Davis Tuff (Eocene)—Strongly rheomorphic ignimbrite characterized by its foliated, porphyritic welded rhyolitic tuff (Parker and others, 1991; Parker and Henderson, 2021; White and others, 2025). Locally contains a thin basal breccia (0.9–1.5 m thick) and a thick upper autobreccia with rhyolite blocks up to 1+ m (Parker and others, 1991; White and others, 2025). The main body of the ignimbrite is a medium purplish-gray, porphyritic welded tuff with milky alkali feldspars (5–10%) and minor black minerals. Upper half displays prominent horizontal foliation (5–25 mm thick) and increasing rheomorphism, including ramps and recumbent folds. The unit is capped by friable beds of greenish-yellow to maroon reworked sedimentary vitric tuff, often hydrothermally altered (Parker and others, 1991). Thickness varies from 20 to 90 meters, with a measured section of 88 meters on Highway 118 dated to 36.2 Ma (Henry and others, 1994; Parker and Henderson, 2021; White and others, 2025). Equivalent to the "Lava 3" of Eifler (1951).

Tyc—Yates Canyon Tuff (Eocene)—The Yates Canyon Tuff (Tyc) is the second most widespread unit in the northern El Muerto Peak area. Described as a platy quartz trachyte tuff by Hoy (1986). It is a red-brown to gray, aphanitic, and slightly porphyritic, densely welded ash-flow tuff that varies significantly in welding and character, leading to three recognized zones (Hoy, 1986). The unit averages ~120 m thick. It generally overlies the Sheep Pasture Formation and is only overlain by the Moore Tuff (outside the map area). Possibly correlative to a part of the Fort Davis ash-flow tuff (Hoy, 1986).

Ttp—Lower Trachyte Porphyry lava (Eocene)—The Lower Trachyte Porphyry Lava flow is the oldest exposed flow unit in the El Muerto Peak quadrangle, forming the hummocky slopes in the northern study area. It is a holocrystalline, coarsely porphyritic, aphanitic trachyte porphyry with a red-brown (weathered) to light-brown (fresh) surface. The rock contains a high abundance of anorthoclase phenocrysts (25–30%) up to 5 mm, which are often resorbed and occur as glomeroporphyritic aggregates with microphenocrysts of sodic clinopyroxene (~3%) and minor apatite (~2%). The base is not exposed, but the unit is at least 70 m thick. It is overlain by Yates Canyon Tuff or by Sheep Pasture Formation. In places, a thin volcaniclastic sedimentary rock separates the units. The unit resembles other trachyte porphyry and rhomb porphyry lavas in the central and northern Davis Mountains, but a definite correlation is currently difficult (Hoy, 1986).

Tsp—Sheep Pasture Formation (Eocene)—Densely welded ash-flow tuff comprised of a basal grayish-purple to reddish-brown, foliated, slightly porphyritic rhyolite grading upward into indurated to friable, fine-grained vitric tuff (Anderson, 1968; Smith, 1975; Robinson, 1982). Unit consists of 38 m of a basal light tan-gray, massive granular rhyolite with an upper flow breccia, overlain by 34 m of bedded, poorly to moderately welded ash-flow tuffs rich in pumice, and topped by 13 m of poorly indurated pink to red reworked sedimentary tuff (Rudine and others, 2023). Crystal content increases from 5% at the base to 30% near the top, with extensive devitrification (Robinson, 1982). Approximately 165 meters thick, thickening westward. Occurs below the Moore Tuff in the El Muerto area. Age is constrained by the El Muerto Tuff as >36.6 Ma +/- 0.13 Ma (Henry and others, 1994; Parker and others, 2017). Overlies the tuffaceous Frazier Canyon Tuff and is conformably overlain by the Fort Davis Tuff (Tfd) (Robinson, 1982). Chemical data suggests that the Sheep Pasture Formation is a composite of unrelated flows (Parker and others, 2017). Parker (personal communication) has not seen evidence of rheomorphic tuffs, and considers the Sheep Pasture Formation a "flood rhyolite." Furthermore, Parker and others (2017) demonstrate that the Sheep Pasture Formation (Tsp) is distinct from the underlying Adobe Canyon Rhyolite, which was previously grouped together by Henry and others (1994).

Trr—Resort Rhyolite (Eocene)— A white to gray, rhyolite unit distinguished by a spotted appearance from dark minerals and typical weathering to low, rounded outcrops, though it can form steep cliffs where uplifted by intrusions. It is conformably overlain by the Blue Mountain Rhyolite; but its base is nowhere exposed. The exposed thickness is at least 122 m (400 ft). Composed of minor (1–5%) subhedral, altered alkali feldspar phenocrysts, approximately 5% anhedral opaques, and trace zircon, set in a devitrified groundmass with a coarse granophyric (alkali feldspar and quartz) texture. Includes both lava flows and volcanic dome complexes and thin, highly foliated, welded ash-flow tuff horizons, indicating multiple emplacement events of localized origin (Henderson, 1989). Dated to approximately 37.6 Ma (Parker and McDowell, 1979). Anderson (1968) and Smith (1975) mapped Sheep Pasture Formation in the Davis Mountains Resort area that was later renamed the Aquilla Creek Formation by LaRocca (1984). Parker and Henderson (2021) renamed LaRocca's Aquilla Creek to the Adobe Canyon Rhyolite, then corrected the name to the Resort Rhyolite in White and others (2025).

Tfc—Frazier Canyon Tuff (Eocene)—Tuffaceous sediments interbedded with mafic lava flows, primarily aphyric to sparsely porphyritic basalts. Mafic lava flows, serving as distinctive marker beds, are thickest in the southeastern Davis Mountains and thin northward and westward. The formation variably overlies several older units and is overlain by younger formations, representing a volcanic hiatus in the eastern Davis Mountains (Henry, 1989). Distributed across the eastern Davis and Barrilla Mountains, the formation is present in the northern portion of the map area based on Twiss (1979) and in the southern portion based on Henderson (1989). Near Fort Davis, the Frazier Canyon Formation age is constrained by the overlying Sleeping Lion Rhyolite dated at 36.5 Ma (Henry and others, 1994, Parker and others, 2017 ; Parker and Henderson, 2021).

Tac—Adobe Canyon Rhyolite (Eocene)—Silicic lava flow or flood rhyolite (~125 km³), consisting of sparsely to moderately porphyritic, low-silica rhyolite flows (Parker and others, 2017). Initially mapped as upper (Tur) and lower (Tlr) rhyolite by Anderson (1968), these flows were later unified as Adobe Canyon by Twiss (1979), Henry and others (1994), and Parker and others (2017). The formation, up to 300 m thick, exhibits basal cliffs transitioning to talus slopes, with individual flows showing basal and upper breccias and flow banding (Henry, 1989). Dated at ~37.1 Ma and overlies the Gomez Tuff (Henry and others, 1994; Parker and others 2017). Two flows in the north-central Davis Mountains are 80–180 meters thick (Parker and others, 2017). Henry and others (1994) considered the Sheep Pasture (Tsp) as equivalent to Adobe Canyon (Tac), but Parker and others (2017) demonstrated distinct geochemical and stratigraphic differences.

Subsurface Igneous Rocks
(Not exposed in map area)

Tg—Gomez Tuff (Eocene)—Unit underlies portions of the map area. Welded, peralkaline, rhyolitic tuff that is the oldest major ash-flow in the Davis Mountains with a source in the Buckhorn caldera (Parker and White, 2008). Rheomorphic, extending significantly southward to approximately 10 km north of Alpine. 40Ar/39Ar dating yields an age of 37.33 (Parker and others, 2017; Parker and others, 2026), identical to the underlying Star Mountain Formation (Henry, 1989; Henry and others, 1994, Parker and others, 2017; Parker and others, 2026).

Tsm—Star Mountain Rhyolite (Eocene)—Silicic trachyte lava flows (flood rhyolites), characterized by flow banding, breccias, and vitrophyres. Exhibits features indicative of lava flows, such as uniform thickness, distinct flow fronts, and feeder dikes, (Henry and others, 1989). Oldest known major eruptive rock of the Davis Mountains at 37.4 Ma (Henry and others, 1994; Parker and others, 2017).

Th—Huelster Formation (Paleogene)—The Huelster and Pruett Formations are stratigraphically equivalent, composite units of early Tertiary age, primarily composed of tuffaceous sediments, mafic to intermediate lavas, and tuffs that unconformably overlie Upper Cretaceous rocks (Eifler, 1951). The Huelster Formation, found in the eastern and northern Davis and Barrilla Mountains, averages 75–120 meters thick and is characterized by tuffaceous mudstones, siltstones, sandstones, conglomerates, and local freshwater limestones, along with aphyric to sparsely porphyritic basalts or mafic trachytes. The mafic lavas are likely from local sources, such as the Madera volcano, while the origins of the tuffaceous material, particularly biotite-bearing tuffs, are debated, with potential sources in distant volcanic centers. The formations are dated as greater than 37–38 Ma (Eocene or Early Oligocene), with Ar-Ar dating indicating ages up to 39.3 Ma (Henry and others, 1988).

Meta-sedimentary Bedrock
(Small exposure in the west-central map area)

Kf—Finlay Limestone (Cretaceous)—Fine-grained, gray to white marble with thick, blocky bedding and solution-fluting that shows evidence of silicification and possible skarn formation at its western edge. Brecciated limestone inliers are present within Quaternary alluvium, and a phyllite dike cuts the marble. Distorted fossil gastropods indicate a marine origin, supporting its correlation with the Cretaceous Finlay Limestone (Hempkins, 1962; Anderson, 1968; Murley, 1987).

Kc—Cox Sandstone (Cretaceous)—Quartzite containing chert pebbles and relict cross-bedding. Sparse outcrops and bedding attitudes are preserved in small anticline crests. Lithologic characteristics and regional context support a correlation with the Cretaceous Cox Sandstone (Hempkins, 1962; Murley, 1987).

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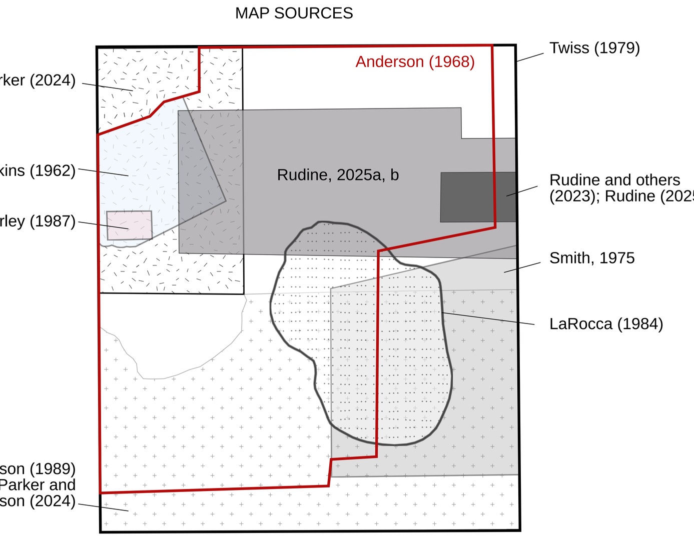
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