GEOLOGIC MAP OF THE WEST OF AVRA 7.5' QUADRANGLE, PIMA COUNTY, ARIZONA

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digital cartography by
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MAP EXPLANATION

Geologic Symbols

- contact (solid where accurate; dashed where approximate)
- intraformational contact
- F0-866 sample location
- 16 flow foliation (showing dip)

Geologic Map Units

Piedmont Alluvium

Quaternary and late Tertiary deposits cover the piedmont areas southeast and northwest of Brawley Wash. This sediment was deposited primarily by streams that head in the mountains. Smaller streams that head on the piedmont have eroded and reworked some of these deposits. Deposits range in age from modern to Pliocene or late Miocene. Deposits derived from the Sierrita and Coyote mountains typically are finer-grained, primarily sand and pebbles with some cobbles. Alluvial fan deposits derived from the fine-grained volcanic rocks of the Roskruge Mountains typically contain more cobbles and boulders. The lower margin of the piedmonts are defined by their intersection with stream terraces and the basin-floor deposits of Brawley Wash. Approximate age estimates for the various units are given in parentheses after the unit name. Abbreviations are ka, thousands of years before present, and Ma, millions of years before present.

Qy2 **Late Holocene alluvium (<~2 ka)**
Unit Qy2 consists of channels, low terraces, and small alluvial fans composed of sand, cobbles, silt, and boulders that have been recently deposited by modern drainages. In areas proximal to the Roskruge Mountains, channel sediment is generally sand, pebbles and cobbles, with some boulders; terraces typically are mantled with sand and finer sediment. On lower piedmont areas, young deposits consist predominantly of sand and silt, and some cobbles in channels. Channels generally are incised less than 1 m below adjacent terraces and fans, but locally incision may be as much as 2 m. Channel morphologies generally consist of a single-thread channel or multi-threaded channels with gravel bars adjacent to low flow channels. Downstream-branching distributary channel patterns are common on the Sierrita piedmont. In these areas, channels typically are discontinuous, with small, well-defined channels alternating with broad expansion reach where channels are very small and poorly defined. Local relief varies from fairly smooth channel bottoms to the undulating bar-and-swale topography that is characteristic of coarser deposits. Terrace surfaces typically have planar surfaces, but small channels are also common on terraces. Soil development associated with Qy2 deposits is minimal. Terrace and fan surfaces are brown, and on aerial photos they generally appear darker than surrounding areas, whereas sandy to gravelly channels appear light-colored on aerial photos. Vegetation density is variable. Channels typically have sparse, small vegetation. The densest vegetation in the map area is found along channel margins and on Qy2 terraces along channels. Along the larger washes, tree species include mesquite, palo verde, and acacia; smaller bushes and grass may also be quite dense. Smaller washes typically have palo verde, mesquite, large creosote and other bushes along them.

Qy1 **Holocene alluvium (0 to ~10 ka)**
Unit Qy1 consists of low terraces and broad, minimally dissected alluvial fans. Qy1 surfaces are slightly higher and/or farther from active channels, and thus are less subject to inundation than Qy2 surfaces. Qy1surfaces are generally planar; local relief may be up to 1 m where gravel bars are present, but typically is much less. Qy1 surfaces are less than 2 m above adjacent active channels. Surfaces typically are sandy but locally have fine, unvarnished open gravel lags. Qy1 surfaces generally appear fairly dark on aerial photos, but where a gravel lag is present, surfaces are light colored. Channel patterns on alluvial fans are weakly integrated distributary (branching downstream) systems. Qy1 terrace surfaces support mesquite and palo verde trees, and smaller bushes may be quite dense. Qy1 fans support scattered trees along channels, but creosote and other small bushes are dominant. Qy1 soils typically are weakly developed, with some soil structure but little clay and stage I to II calcium carbonate accumulation (see Machette, 1985, for description of stages of calcium carbonate accumulation in soils).

Qly **Holocene to late Pleistocene alluvium (0 to ~130 ka)**
Broadly rounded alluvial fan surfaces approximately 1 m above active channels composed of mixed alluvium of late Pleistocene and Holocene age. Drainage networks consist of a mix of distributary channel networks associated with larger drainages and tributary channels associated with smaller drainages that head on Qly surfaces. Qly areas are mainly covered by a thin veneer of Holocene fine-grained alluvium (unit Qy), but reddened Pleistocene alluvium (unit Ql and less commonly, Qm) is exposed in patches on low ridges and in roads and cut banks of washes. The Holocene surfaces usually are light brown in color and soils have weak subangular blocky structure and minor carbonate accumulation. Qly fans support palo verde and mesquite trees along washes and low shrubs and grass in interfluve areas.

Ql **Late Pleistocene alluvium (~10 to 130 ka)**
Unit Ql consists of moderately dissected relict alluvial fans and terraces found on the upper, middle and lower piedmont. Well-developed, moderately incised tributary drainage networks are typical on Ql surfaces. Active channels are incised up to about 2 m below Ql surfaces, with incision typically increasing toward the mountain front. Ql fans and terraces are commonly lower in elevation than adjacent Qm and older surfaces, but the lower margins of Ql deposits lap out onto more dissected Qm surfaces in some places. Ql deposits consist of pebbles, cobbles, and finer-grained sediment. Ql surfaces commonly have loose, open lags of pebbles and cobbles; surface clasts exhibit weak rock varnish. Ql surfaces appear light orange on aerial photos, reflecting slight reddening of surface clasts and the surface soil horizon. Ql soils are moderately developed, with orange to reddish brown clay loam argillic horizons and stage II calcium carbonate accumulation. Dominant forms of vegetation include creosote, bursage, and ocotillo.

Qm **Middle Pleistocene alluvium (~130 to 500 ka)**
Unit Qm consists of moderately to highly dissected relict alluvial fans and terraces with moderate to strong soil development. Qm surfaces are drained by well-developed, moderately incised tributary channel networks. On the low-relief Sierrita piedmont, Qm areas they are traversed by larger distributary channels that are typically one to several meters below adjacent Qm ridges. Well-preserved, planar Qm surfaces on the Roskruge piedmont are smooth with pebble and cobble lags; rock varnish on surface clasts is typically orange or dark brown. More eroded, rounded Qm surfaces typical of the Sierrita piedmont are characterized by loose cobble lags with moderate to strong varnish, broad ridge-like topography and carbonate litter on the surface. Well-preserved Qm surfaces have a distinctive dark color on aerial photos, reflecting reddening of the surface soil and surface clasts. More dissected Qm surfaces show up as complex, light-colored ridges. Soils typically contain reddened, clay argillic horizons, with obvious clay skins and subangular blocky structure. Soil carbonate development is typically stage III to IV, but indurated petrocalcic are uncommon. Qm surfaces generally support bursage, ocotillo, creosote, cholla, and saguaro.

Axial Stream Deposits

Sediment deposited by Brawley Wash covers the eastern part of the map area. Surfaces consist of channels, young stream terraces that compose the geologic floodplain, and older relict floodplain deposits that date to the Pleistocene. Deposits are primarily sand and finer, with minor gravel, and channels are generally quite small and discontinuous. Much of the area covered by axial stream deposits has been altered by agricultural activity. In these areas, deposits are subdivided into Holocene and Pleistocene units based on soils information obtained from a soil survey of this area (Gelderman, 1972).

Qy2r **Late Holocene proximal floodplain (<~2 ka)**
Generally fine-grained deposits on the active floodplain of Brawley Wash. Deposits generally consist of sand, silt, and clay, with local gravel concentrations in small channels and fans. Shallow, small, discontinuous channels are common; many of them are linear, suggesting that channels developed along roads or wagon tracks. Soil development is minimal, consisting of brown A horizons and carbonate filaments (weak stage I calcic horizons); surface colors are brown to grayish brown. Vegetation typically is creosote and low grass and shrubs, with local concentrations of mesquite, acacia, and palo verde trees along channels. Variegated surface color depends mainly on vegetation density, dark brown color along channels and where vegetated, brown where more sparsely vegetated. These areas are prone to inundation in floods and may be subject to intense erosion along existing small channels.

Qy1r **Holocene distal floodplain and terrace deposits (0 to ~10 ka)**
Deposits associated with low terraces of Brawley Wash. Typically, they are flat surfaces that are on the fringes of and less than 1 m above the active floodplain, but small channels exist in some places within this unit. Deposits are generally fine-grained, but locally surfaces have weak, discontinuous gravel lags composed of mixed lithologies. Soil development is weak, with cambic horizons and carbonate filaments (stage I calcic horizons). Surface color typically is light brown, and surface clasts have no varnish. Very limited low (0.5 m high), heavily bioturbated coppice dunes are associated with creosote bushes. Portions of the Qy1r surfaces may be inundated in the largest floods.

Qyre **Holocene stream terrace deposits and eolian deposits (< 10 ka)**
Mixed young river terrace deposits and eolian deposits. Landforms consist of low coppice dunes and intervening flat surfaces with minimal gravel lags and no pavement development, less than 1 m above adjacent floodplains. Drainage networks typically are discontinuous and channels are very small. Low coppice dunes are abundant. Soil development is weak, with cambic horizons and carbonate filaments (stage I calcic horizons). Surface color typically is light brown. Vegetation is sparse, desert shrubs are relatively concentrated in dunes and along small channels. The preservation of eolian deposits indicates that these areas have not been subject to substantial flooding recently.

Qyr **Holocene floodplain and terrace deposits (0 to ~10 ka)**
Holocene deposits underlying areas that have been impacted by intensive agricultural activity, generally irrigated fields. In these areas, it is not possible to subdivide Holocene deposits.

Qmlr **Middle to late Pleistocene river deposits (~10 to 500 ka)**
Relict late or middle Pleistocene river terrace deposits on the basin floor. Deposits are dominated by clay, sand and silt, with some fine gravel. Soil development is moderate to strong, with reddish brown clay loam to clay argillic horizons and soft carbonate nodules and whitening of calcic horizons (stage II to III calcic horizons). Reddish brown surfaces are typically fairly flat and slightly elevated above the adjacent floodplain. In areas that have been cultivated, topographic differences between Pleistocene and Holocene surfaces are generally undetectable. In these areas, Qmlr deposits are distinguished from Holocene deposits based on soil survey mapping (Gelderman, 1972).

Hillslope Deposits

Qc **Quaternary hillslope colluvium**
Unit Qc consists of very poorly sorted, angular deposits mantling bedrock on hillslopes. This unit is generally very thin, probably less than a few meters in all cases.

Bedrock

Ttx **Trachyte of El Cerrito de Represso (Oligocene or Miocene)**
Several crystal-rich (25-40%) trachyte lava flows containing plagioclase, biotite, and sparse clinopyroxene or amphibole, sanidine, and quartz phenocrysts.

Ttn **Trachyte of Nessie's Hill (Oligocene or Miocene)**
Moderately crystal-poor, dark gray trachyte lava containing crystals of plagioclase up to 4mm diameter, biotite, and sparse clinopyroxene or amphibole.

REFERENCES

Gelderman, F.W., 1972, Soil survey of the Tucson - Avra Valley area, Arizona: U.S. Dept. of Agriculture, Soil Conservation Service, 70 p., 32 maps, scale 1:20,000.

Machette, M.N., 1985, Calcic soils of the southwestern United States: in Weide, D.L., ed., Soils and Quaternary Geology of the Southwestern United States: Geological Society of America Special Paper 203, p. 1-21.

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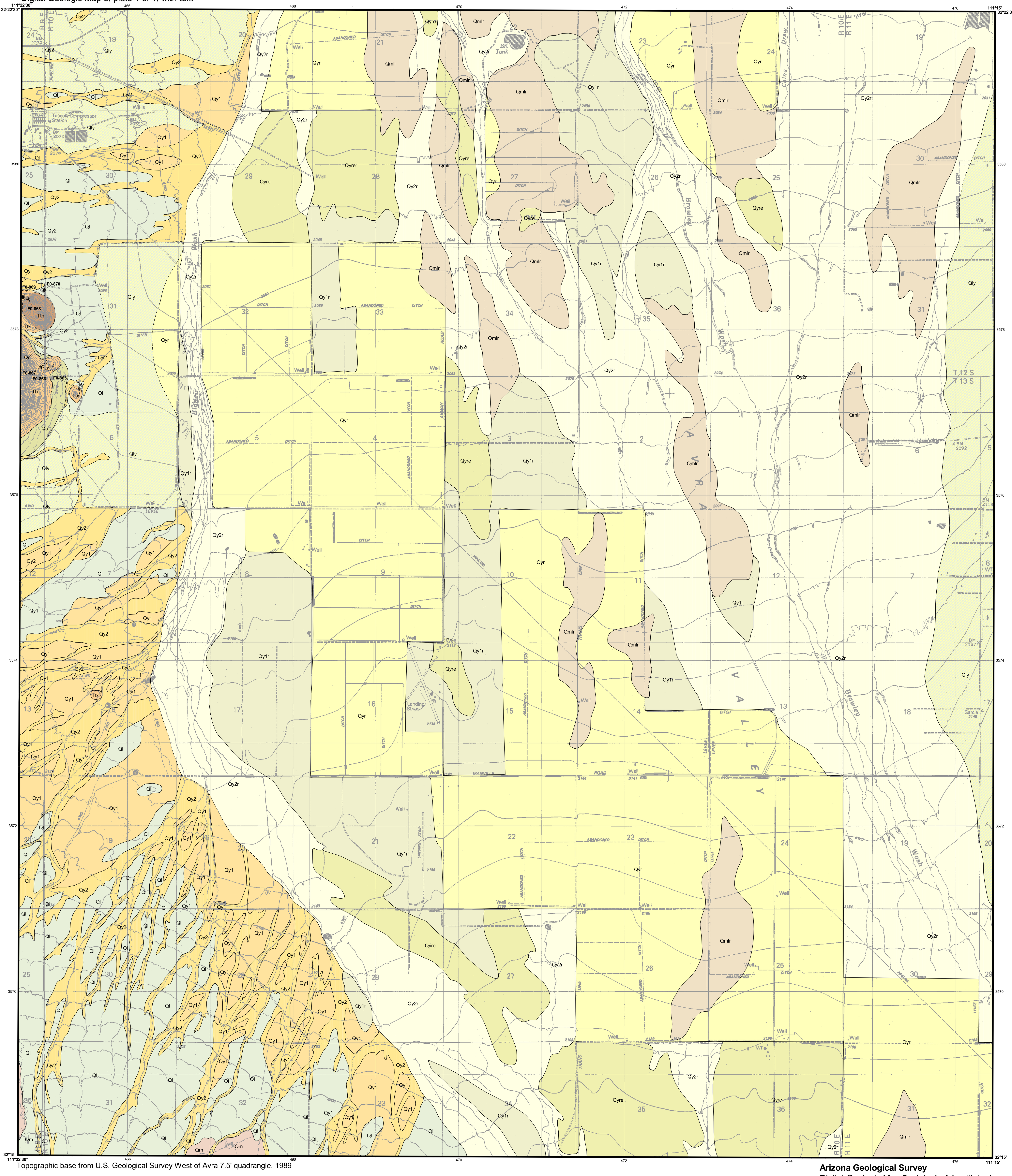

Topographic base from U.S. Geological Survey West of Avra 7.5' quadrangle, 1989

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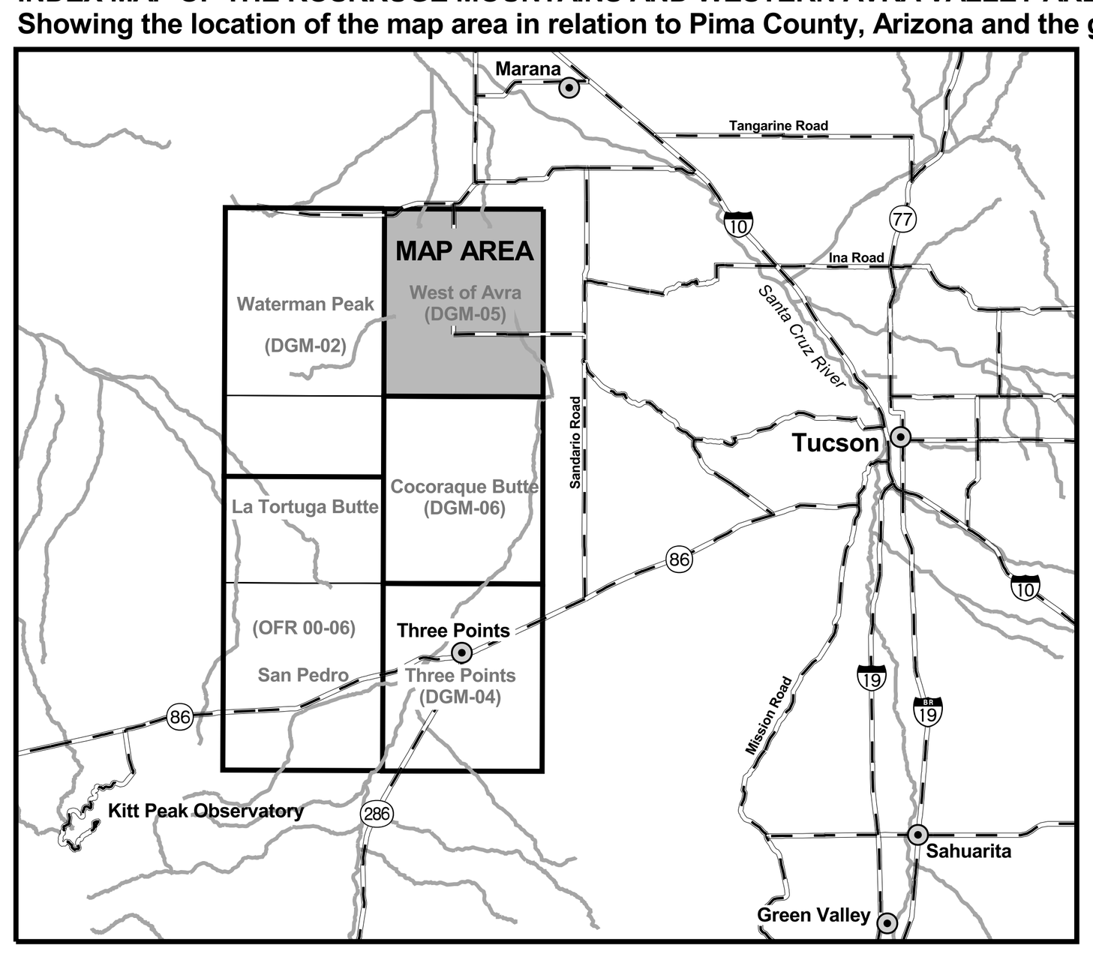
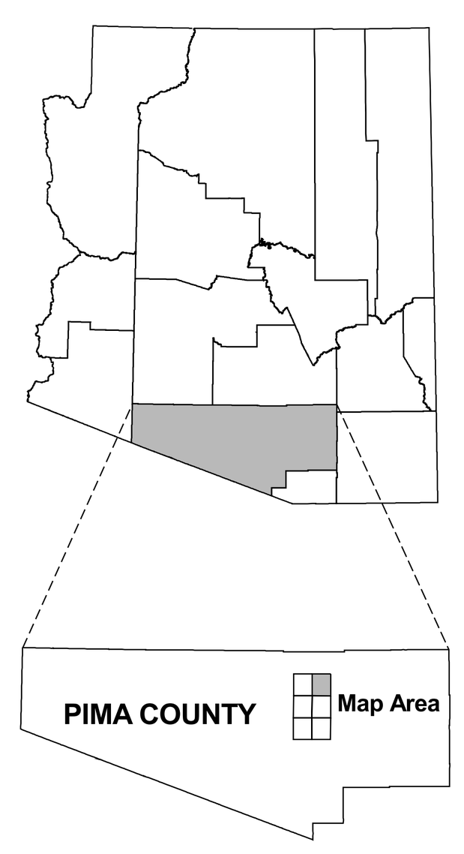
INDEX MAP OF THE ROSKRUGE MOUNTAINS AND WESTERN AVRA VALLEY AREA
Showing the location of the map area in relation to Pima County, Arizona and the greater Tucson region





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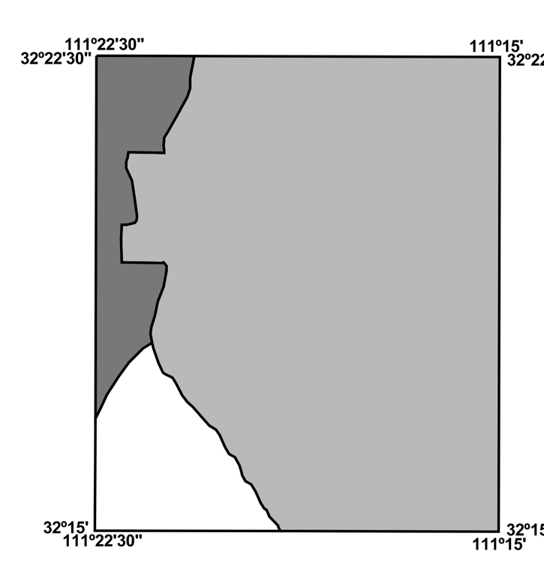

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