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Field trip guide: Urbanization, landscape, and geologic history along the Salt River, eastern Maricopa County, AZ

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Figure 1: View upstream (east) along the lower Salt River. Scarp of Blue Point terrace on right in middle ground near river; remnants of Mesa terrace on bedrock knob on far right. Goldfield Mountains in background (after Péwé, 1978). This is the view from Stop 5.

Abstract

This field trip will follow the Salt River from Arizona State University east into the Superstition Mountains and include several stops to discuss the changing uses of the river landscape from Hohokam, Hispanic, and Anglo irrigation to landfills and urban lakes as well as the classic landforms along the river including terraces, pediments, and channels. The last few million years of development of the Salt River is well recorded in the positions of these landforms, their relative ages, and related channel and overbank deposits.

Contents

1 Geologic overview of the greater Phoenix area

1.1 Introduction

The geologic history of a region determines the distribution and type of materials within it. The geologic processes operating there (or that have operated there) produce the landscape. The materials and geometry of rocks and landforms are the framework for the ecological processes that operate in the region. Those ecological processes include the human settlement and interaction with the environment.

This section presents an overview of the geologic history of the greater Phoenix area to establish the framework for human interaction with the rocks and landscape (Figure 2; note that much of this comes from Arrowsmith and Péwé, 1999). The rocks and landscape of Greater Phoenix area and vicinity have developed as a result of a history that began in the Proterozoic eon about 1.7 Ga (billion years ago) when this portion of the North American craton was assembled by convergent margin deformation and igneous activity (such as that seen today in western South America). These rocks formed the basement for deposition of passive margin rocks (such as those that were deposited in the Grand Canyon region) during the Paleozoic and Mesozoic (550 Ma to about 68 Ma–million years ago). Regional uplift and erosion during the Laramide orogeny of the early Tertiary (about 50 Ma) eroded the Paleozoic and Mesozoic rocks, stripping them to the Proterozoic basement. In the Tertiary, the region underwent two periods of extension during which basins that formed were filled with debris and one period of extensive volcanism. During the Quaternary period (1.6 Ma to the present), aggradation and incision of debris aprons driven by drainage integration in the lower Colorado River system developed the current landscape, setting the final stage for human settlement of the region.

The Greater Phoenix area geology is presented in a generalized form on the state geologic map (Reynolds, 1988). The regional geology is reviewed succinctly in Reynolds, 1987. Figure 2 shows the regional geology of central Arizona. Note how the Proterozoic basement is overlain unconformably by the Tertiary basin fill and volcanic rocks and how the Quaternary basin and river deposits have accumulated in the low relief central portions of the Valley (Figure 3 is a Landsat image that shows the regional landscape and the landuse patterns).

1.2 Proterozoic Geology

The oldest bedrock in greater Phoenix area is principally composed of rocks of the Proterozoic (1.7-1.4 Ga). Two distinct ages of Proterozoic rock are present. The earlier Proterozoic rocks are quartzites, phyllites, greenschists, and metavolcanic rocks of various types. These rocks from the high peaks of the McDowell and Phoenix Mountains with the predominant metamorphic rock type being northeast trending, southerly dipping foliated metarhyolite and metatuff. This entire sequence of sediments and volcanic rocks has undergone at least one episode of metamorphism and folding which has resulted in a series of folds with axes plunging northeast, parallel to the foliation in the rocks.

Intrusion of igneous rocks occurred in later Proterozoic time, their compositions ranging from diorite to granite. Altered metamorphic rocks within and around the intrusive rocks retain the consistent northeast strike and southerly dip common to other metamorphic rocks in the area. Contact relationships indicate a post-metamorphic age for the granitic intrusions. The plate tectonic setting interpreted for the formation of the Proterozoic rocks is one of a convergent margin of the Andean type in which regional southeastward directed shortening of rocks (developing the northeast-striking foliation) that were forming as sediments adjacent to or as igneous rocks within an active magmatic arc.

1.3 Paleozoic and Mesozoic Geology

A large gap in the geologic record exists between the Precambrian rocks and the Tertiary fanglomerates. No known record of Paleozoic or Mesozoic history (i.e., that which is clearly evident in the walls of the Grand Canyon) is preserved in this region. These rocks were deposited on a subsiding passive margin throughout the western portion of North America during this time. However, regional uplift and erosion in the early Tertiary removed these materials, stripping them to expose the Proterozoic basement rocks.

1.4 Tertiary Geology

The Cenozoic (younger than 65 Ma) geologic history of the greater Phoenix area is dominated by basin deposits accumulated in fault-bounded basins and by extensive volcanism. The first stage is syn-extension coarse-grained basin fill [$\sim 30 - 12$ Ma]. The basins developed as a consequence of low angle normal faulting such as that along

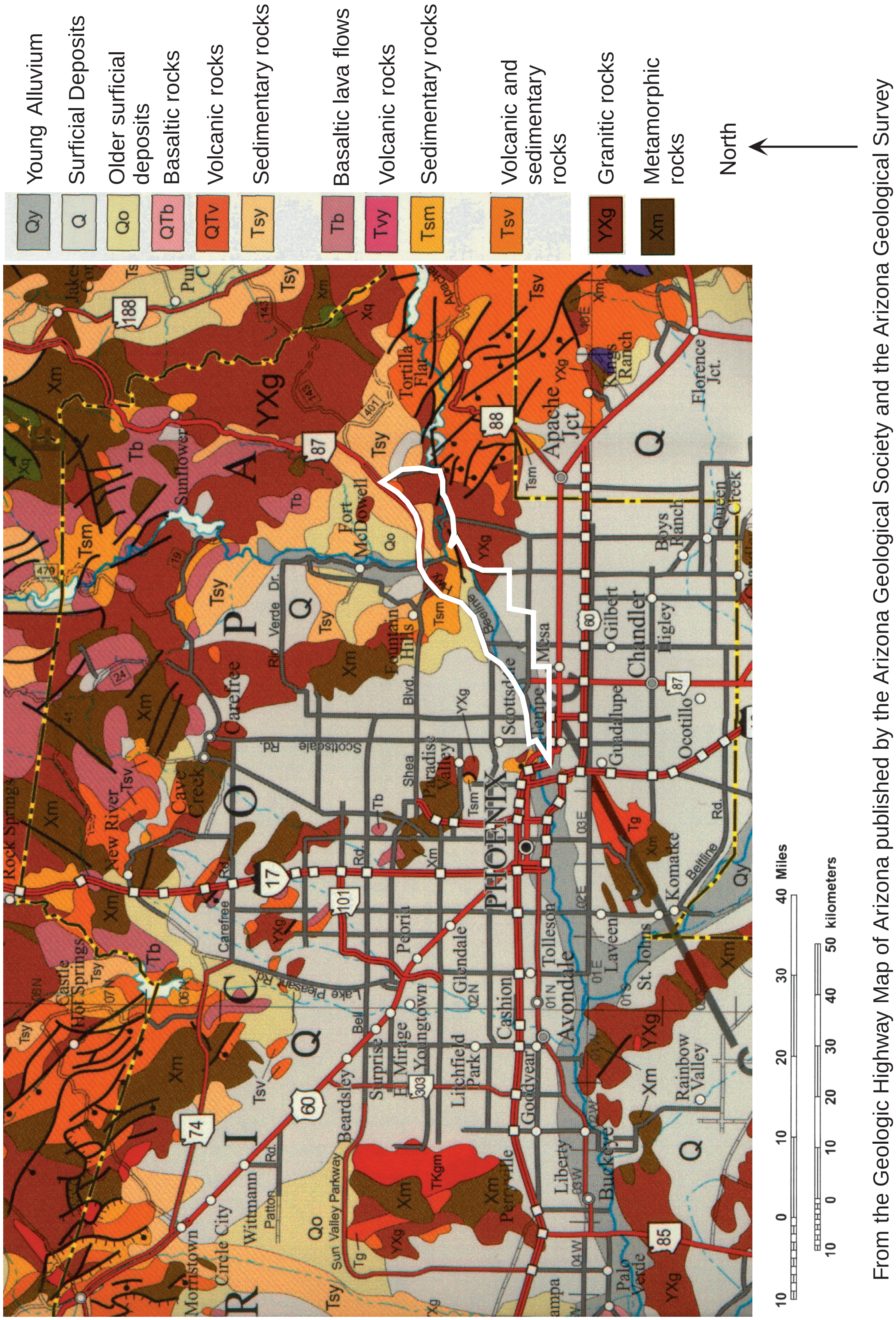

Figure 2: Highway geologic map of the greater Phoenix area. Field trip route is shown in white.

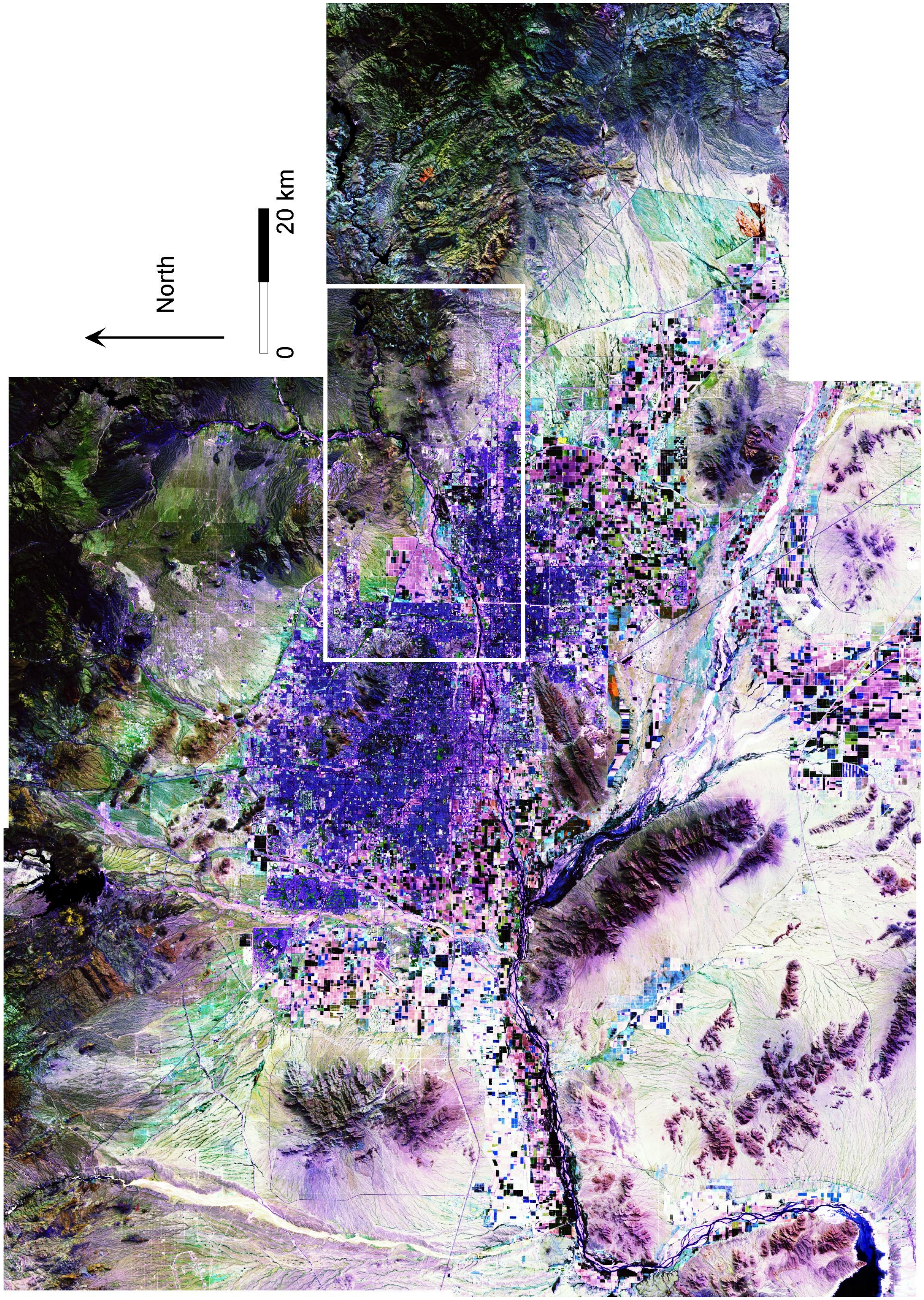

Figure 3: Landsat 753 image of the greater Phoenix region illustrating its alluvial setting near the confluence of the Salt, Verde, and Gila Rivers and the surrounding mountains. Rectangle shows the location of Figure 11 on which the field trip is outlined.

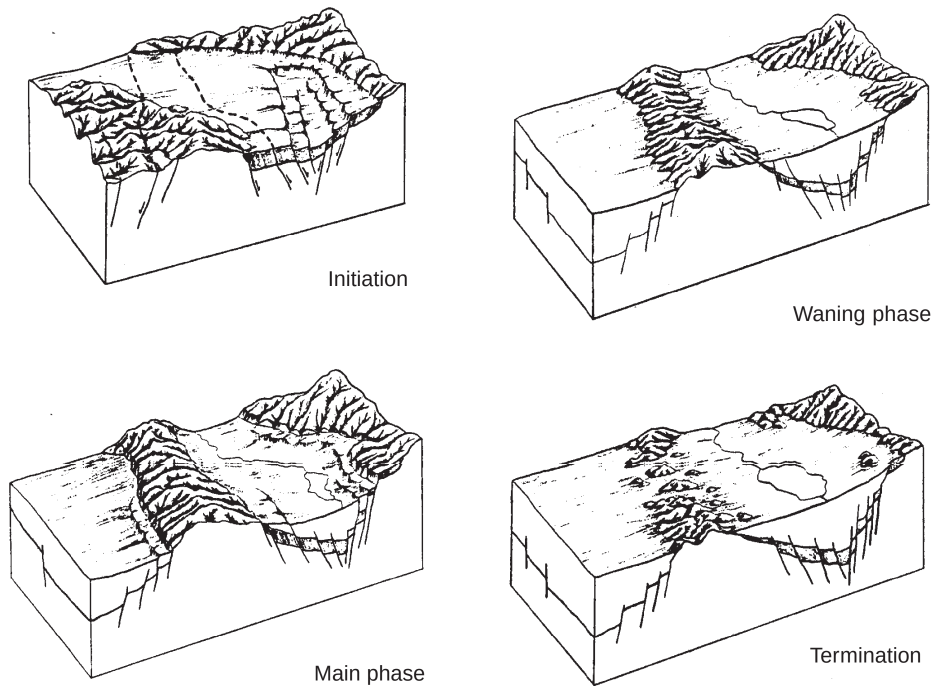

Figure 4: An idealized sequence of landforms developed during evolutionary stages of the Basin-Range disturbance in Arizona (from Menges and Pearthree 1989). Many of the ranges in the area developed as a fault bounded range during the extension of the Basin and Range disturbance and owe their current form to the culmination of such a sequence of events. The throughgoing drainage depicted in the termination phase would be the Salt River and other large rivers of the greater Phoenix area.

which the South Mountains were moved about 40 km to the west-southwest from below approximately Red Mountain (Reynolds, 1985). These rocks are exemplifed by those coarse-grained breccias of the Camelshead formation, Papago Buttes, and the red rocks of the area around Fountain Hills in the southern McDowell Mountains. Extensive volcanism associated with Superstition volcanic field ($\sim 30 - 10$ Ma) comprised the second stage of Tertiary geologic history. Finally, the third stage of the Tertiary geologic history is syn-extension basin fill (high angle normal faulting of the Basin and Range disturbance [8-2 Ma]).

The Tertiary fanglomerates include a coarse red unit overlain by a coarse grey unit (Tsm–Stage 1), which is in turn overlain by Tertiary basalt flows, welded ash-flow tuffs, and various (volcaniclastic) rocks (Tsy–Stage 2). Many of the major ranges of the are such as the McDowell Mountains developed as a fault bounded range during the extension of the Basin and Range disturbance (Figure 4; Menges and Pearthree, 1989). In the main phase, the mountains were higher than at present and had a much straighter range front. As deformation waned and faulting slowed, erosion lowered the range and made the range front more irregular.

1.5 Quaternary Geology

Considerable erosion of the fault block mountains occurred in late Tertiary and Quaternary time, forming large alluvial fans and pediments and depositing sediments in the basins. The aggradation and incision of debris aprons was apparently driven by drainage integration in the lower Colorado River system and uplift of the Colorado Plateau (including the Verde River; see termination phase of Figure 4). As the mountain blocks eroded, piedmonts developed with variable covers of alluvium. The foot of mountains or "piedmont" should not be confused with the more narrowly defined term "pediment." A pediment is a gently sloping bedrock erosional landform with a thin (< 5 m) veneer of granitic alluvium. An ever-thickening wedge of alluvium worn from the pediment and the mountains buries the edges of the pediments that extend into the basins.

1.5.1 Salt River Terraces

A major manifestation of the integration of the lower Colorado River drainage and its subsequent history is recorded in the landscape along the large rivers of the greater Phoenix region. The Salt River drains most of east central Arizona including the high elevations of the eastern Mogollon Rim of the Colorado Plateau. Before the 20th Century, it was a perennial river. Because it was confined in a relatively shallow channel, it was easy to pull water up onto the adjacent surfaces and irrigate but also avoid the large spring floods that were common. For this reason, the Hohokam people had a large population in this area in the beginning of the second millenium. They had extensive cnals which still define the settlement patterns and some of which are followed by modern canals (Figure 5.. The Salt River is now contained by several large dams upstream and no longer regularly flows. In the Tempe area, the channel is now occupied by the Tempe Town Lake (see stop 1).

Professor T. L. Péwé and his students of the Arizona State University Department of Geology mapped the Salt River and determined a history of incision and aggradation manifest by successively lower terrace levels along the Salt River and other large drainages here (Péwé, 1978). The terraces are abandoned floodplains that were formed when the river flowed at a higher topographic level than at present. Topographically, a terrace consists of two parts: a *tread*, which is the flat surface representing the former floodplain, and the *scarp* or *riser*, which is the steep slope connecting the tread to any surface standing lower in the valley (Ritter, et al., 1995). Péwé (1978) names the terraces along the lower Salt River from youngest to oldest as: modern floodplain, Lehi, Blue Point, Mesa, and Sawik (Figure 6). Correlative terraces are evident along the other large drainages of the region (Figure 7), attesting to their regional significance. The formation of these terraces probably results from the interplay of the relative rates of sediment transport capacity to sediment supply in the river system. When sediment supply is high and transport rates low, aggradation will occur. On the other hand, when the transport capacity increases relative to the sediment supply, the river cuts down. An interesting aspect of the terraces of the greater Phoenix area is that their topographic profiles tend to fan upstream (Figure 7). This fanning may result from internal variations in the river systems, or may represent relative uplift of the northeastern part of the region (southern Colorado Plateau) as part of a broad wavelength tectonic signal (Péwé, 1978).

The ages of the terraces of the lower Salt River provide a useful temporal framework for interpreting the regional geologic history and have implications for landscape stability and regional erosion rates. Relative dating of the terraces is possible by consideration of their elevations, surface morphology, and degree of soil development. The modern floodplain is regularly inundated. The Lehi surface is flooded in large floods along the Salt River. The largest known flood in the Salt River Basin occurred in February 1891 when a flow of 300,000 cubic feet per second (cfs) was recorded. Flood waters at that time invaded most of the downtown area of Phoenix and covered the Lehi Terrace. “The water was described as being waist deep, or belly deep to a pony” (Péwé, 1978). That the terrace was flooded occasionally provides a minimum age for it. Stop 1 of the field trip (see below) will provide further discussion of Salt River flooding and its recent history. An early Holocene ($\sim 5-10$ thousand years old (ka)) turtle was found in the upper silts of the Lehi Terrace (Péwé, 1978). Soil development in the near surface of landforms is another relative dating tool. The terraces of the Salt River show clearly differentiated soil development. The accumulation of calcium carbonate (“caliche”; $CaCO_3$) in the near surface is one of the indices that are commonly used. Figure 8 illustrates stages of carbonate accumulation (Péwé, 1978). The Mesa terrace shows a well-developed Stage III-IV soil carbonate and regional correlations suggest that takes more than 500 kyr to develop. Finally, numerical ages of the terraces are consistent with the relative ages. Minimum numerical ages for the Mesa (439 ± 62ka) and Sawik ($1,265 \pm 230$ ka–unpublished date) terraces were determined by the application of ^{36}Cl cosmogenic isotope dating (Campbell, 1999). Cosmogenic nuclides accumulate by the interaction of thermal neutrons and muons with target nuclei in rocks in the near surface. The production rate of the nuclides may be estimated for a point on the earth and depends on the local erosion rate, the latitude and elevation, and geomagnetic field variations. The total number of atoms then depends on the time since deposition and any inherited nuclides. Given the production rate and the number of atoms, one can determine the age of the landform. These numeric ages are roughly coincident with those expected from regional correlation: the Mesa Terrace is consistent with the degree of soil development and Sawik-equivalent surfaces along the Gila River about 80 km west may be overlain by a 2 Ma lava flow (Péwé personal communication, 1996).

The current path of the lower Salt River is roughly west to east from the narrows below Stewart Mountain Dam (holding back Saguaro Lake; see Figures 2, 3, and 11) across east Mesa, through north Tempe and the Papago Narrows just north of ASU (see stop 1) and onward south of the Phoenix Sky Harbor Airport to join the Gila River northwest of the South Mountains. The terraces dissapear progressively upstream with the Lehi Terrace evident east of approximately the airport, the Blue Point Terrace east of the settlement of Lehi in

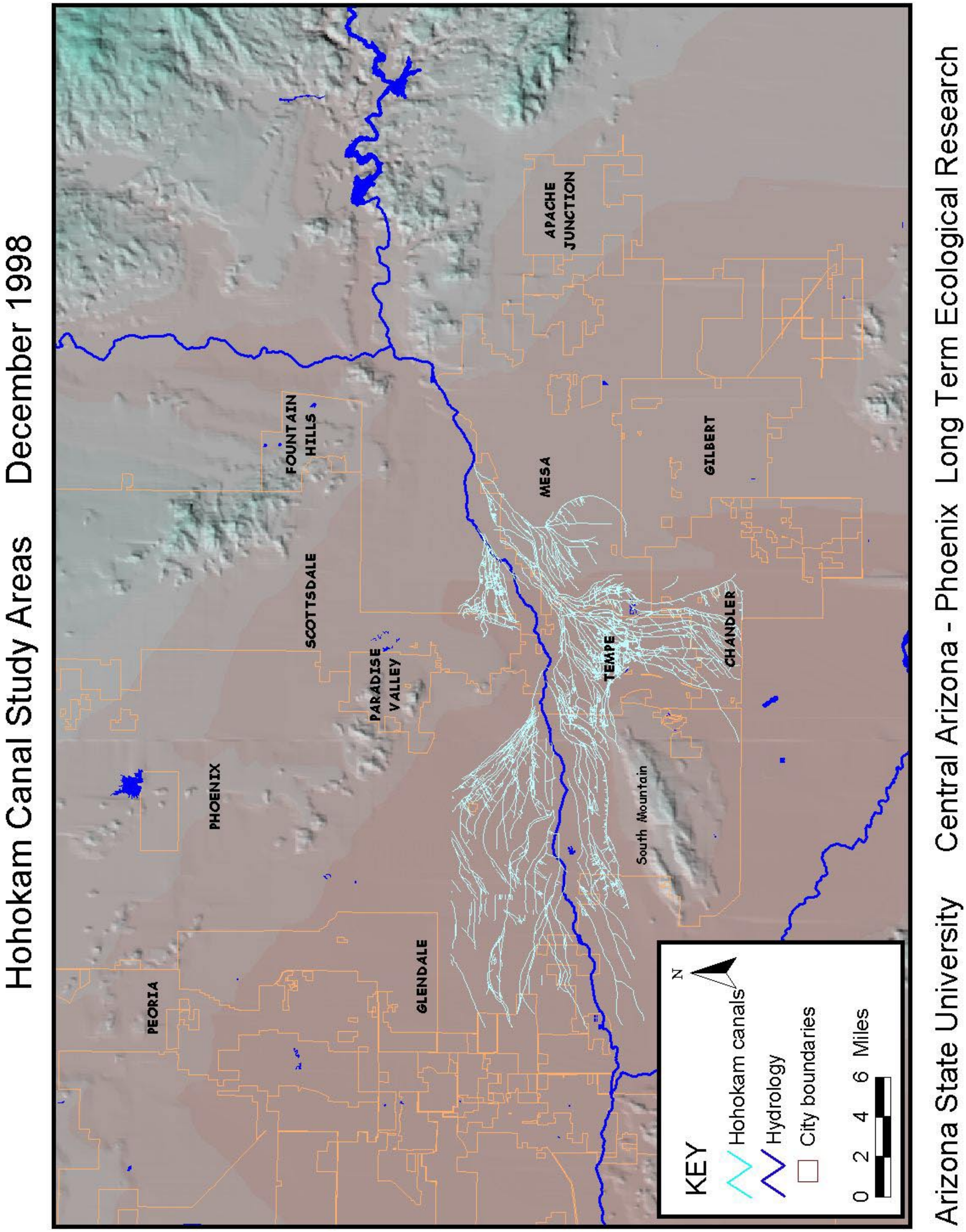

Figure 5: Hohokam canal system along the Salt River. These canals exploited the shallow incision of the Salt River and low gradient broad surfaces on either side for successful irrigation. Image from CAP-LTER at ASU.

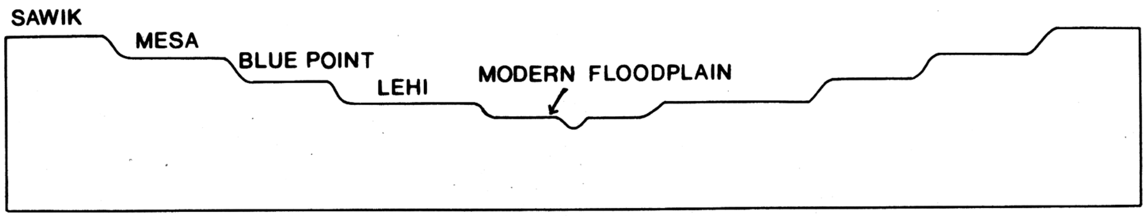

Figure 6: Diagrammatic transverse profile of paired terraces along the lower Salt River Valley. Note that the Lehi and Blue Point terraces are not separable below east Mesa. From Péwé, 1978.

Figure 7: Physiographic diagram of the greater Phoenix area showing sets of converging terraces along the river valleys entering the basin. (Base through courtesy of the Salt River Project, Tempe, Arizona). From Péwé, 1978.

north Mesa, the Mesa an exeption, but east of approximately ASU, and the Sawik east of east Mesa. Well data indicate that Salt River gravels are evident in the shallow subsurface in the Chandler area (Figure 9). They are about 10 to 100 m below a Mesa Terrace–correlative surface and indicate that the Salt River once flowed through the southeast portion of the greater Phoenix area, joining the Gila River south of the South Mountains (Roberston, et al., 1985; see also Laney and Hahn, 1986).

2 Urban growth in the greater Phoenix area

The greater Phoenix Arizona region comprises a desert landscape transforming to an urban center (Figures 3 and 10). The population of the region has doubled in the last 20 years and is expected to double again in the next 20. However, 2 out of every 3 people moving into the region leave. ASU has made urban environmental research an important part of its research agenda and this growth is studied by ASU researchers working in collaborations centered around the Central Arizona-Phoenix Long Term Ecological Research (http://caplter.asu.edu) and urban ecology IGERT (http://www.asu.edu/ces/igert.htm). In addition, numerous ASU colleagues from diverse disciplines have come together in a new project called *Greater Phoenix 2100* which seeks to use the combined intellectual resources of academic and government scientists, along witht he latest simulation tools, to better inform the debate about the future of our region.

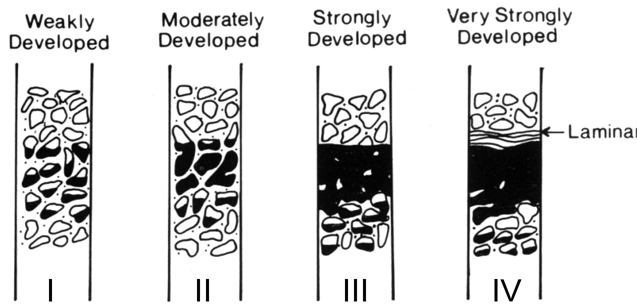

Figure 8: Development stages of caliche surrounding the pebbles and cobbles in gravelly sediment. From Péwé, 1978.

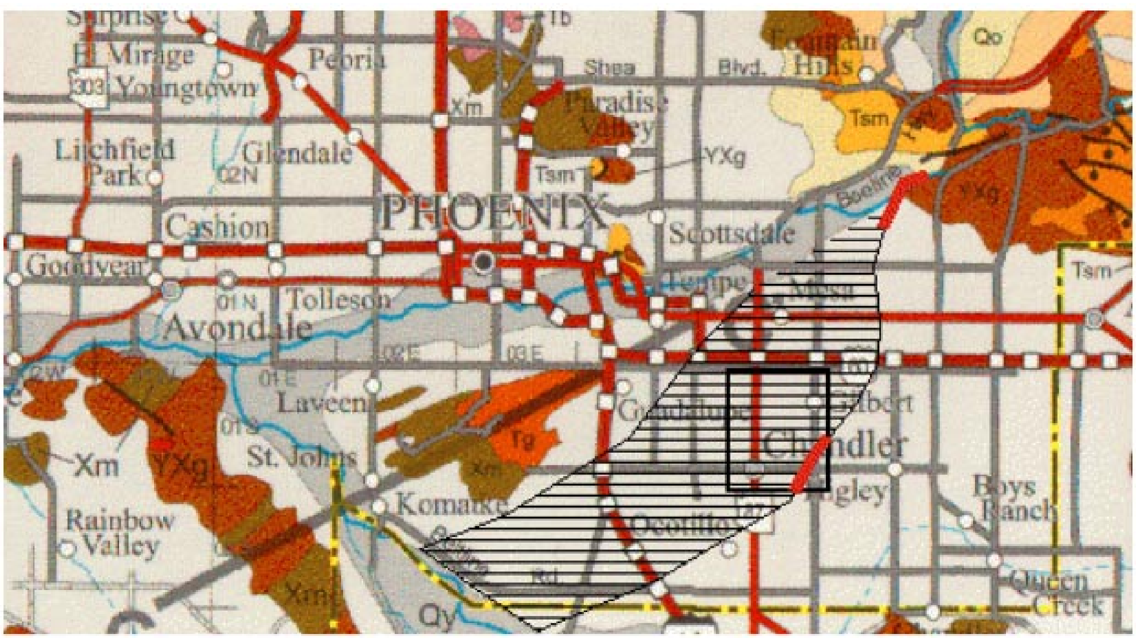

Figure 9: Possible extent of the Salt River paleochannel in the the southeast Valley of Maricopa County. The hachured area is the approximate extent of the paleochannel. It is constrained by well data (especially in the Chandler quadrangle [rectangle] where the channel edge is defined in red) and by the westernmost preserved Sawik Terraces (red bold line in east).

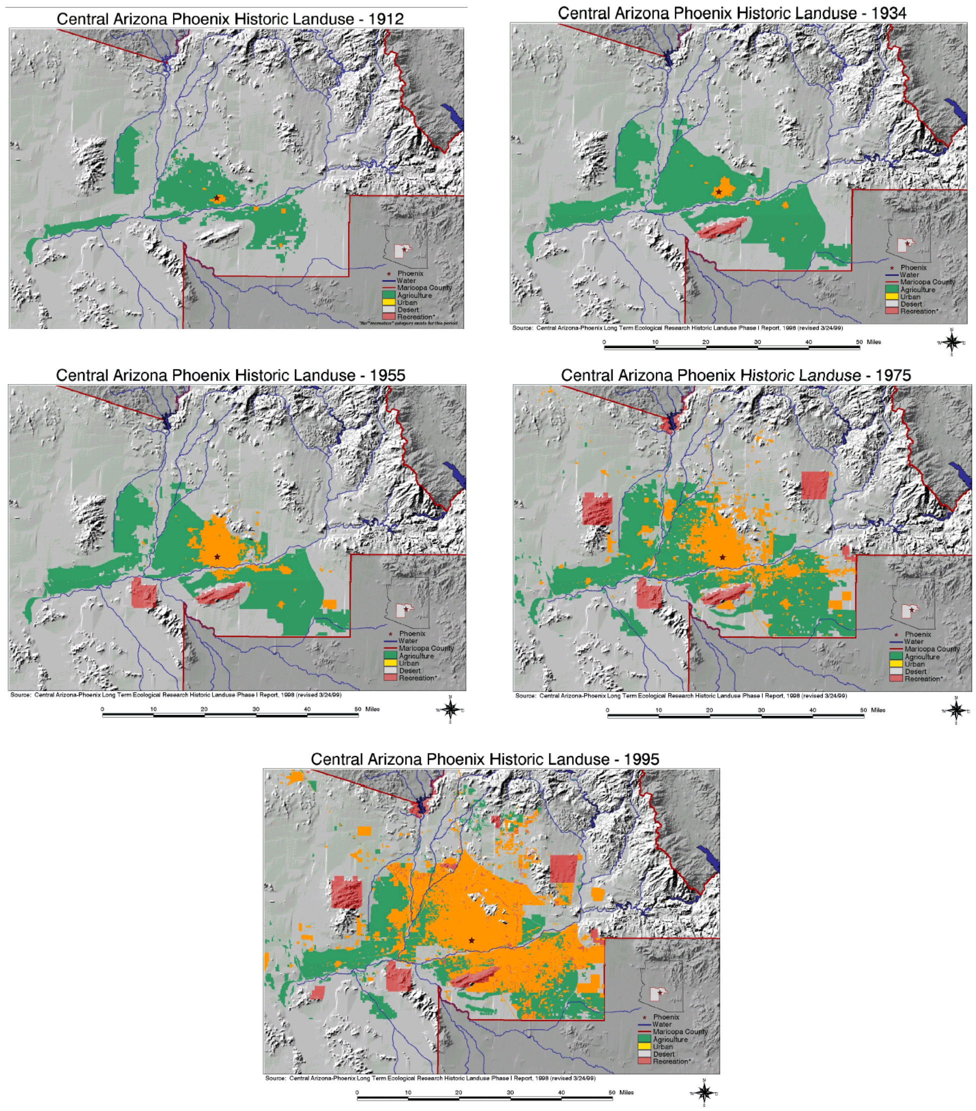

Figure 10: Landuse in the Phoenix area has rapidly converted from desert (grey) and agricultural (green) to urban (orange-yellow) over the 20th century (Knowles-Yánez, et al., 1999). Red is recreational landuse (mostly county and city parks).

3 Field Trip guide along the Salt River

3.1 Introduction

Directions to each stop are followed with site-specific commentary. Refer to earlier overview text as well. Figure 11 depicts the field trip route on a LANDSAT image base.

3.2 Stop 1: Tempe Town Lake southeast shore–TTL well 9

Directions: Depart ASU Memorial Union at 1 pm. Go north on Mill Avenue, turn east on Rio Salado Parkway and go past Rural and turn into ASU parking lot just north of the Karsten Golf Course.

3.2.1 Geography/geomorphology introduction

See Figure 12 for terrace and channel pattern. We are located near the 14 about $\frac{1}{2}$ mile east-northeast of Tempe Butte.

3.2.2 Flood history along the Salt River

See commentary in overview about the flood history. The Salt River was perennial prior to early 20th century dam construction upstream. The largest historic flood was about 300,000 cfs in 1891 where Lehi terrace was flooded belly high to a pony. Our heads would probably just be above water here on the levee. Figure 13 shows the historic discharge values along the Salt River below the Stewart Mountain Dam (stop 6). The gage is near stop 5 (Figure 11). Photographs by ASU Geological Sciences professor Donald M. Burt show this area during bankfull flooding in 1978 (Figures 14 and 15).

3.2.3 Tempe Town Lake

We have undertaken a study of the subsurface geology, hydrogeology, and surface-subsurface water interactions at the Tempe Town Lake (Figures 16 and 17; Fergason, 2001). The construction, filling, and management of Tempe Town Lake in the alluvium-filled Salt River channel have influenced the elevation of groundwater near the lake. Since the filling of the lake in June 1999, water table elevations have been dependent upon the water retention and recovery activities associated with the lake operation (Figures 18 and 19). In particular, water recovery wells are actively returning water from the subsurface to the lake in its eastern half (TTL well 9 is one of these). We have monitored well levels and applied detailed microgravity studies to enhance understanding of the lake operations. While groundwater elevations have not shown large variations, the relative shape of the water table has changed, which may cause a shift in flow directions. Our estimations of groundwater storage enhanced with the gravity studies provide a valuable complement and extension of City of Tempe management procedures. We find that the Tempe Town Lake affects groundwater levels out to approximately 1 km from the lake boundaries. These studies provide background on the broader applied and societal issues concerning the temporal and spatial dimensions of artificially induced changes in groundwater parameters. This work is done in collaboration with Ken Fergason and Jim Tyburczy of the ASU Geological Sciences Department.

3.3 Stop 2: Road cut in Mesa Terrace on Higley Road. Péwé, 1978 stop 9.

Directions: Rural Road north to 101 east to Country Club south to University east to Gilbert north to McKellips east to Higley north just past Thomas for a roadcut stop.

This is the surface of the Mesa Terrace at an elevation of 1,391 feet. See the map in Figure 20 to see the terrace configuration. The road cut exposes highly calichified coarse gravel with lenses of silt and sand. It exemplifies well the completely plugged stage III of soil carbonate development as well as the capping laminar package associated with stage IV (Figure 8). The caliche formation has driven fracturing of some of these clasts. The clasts are noteworthy in that they are a sampling of much of the geology of east-central Arizona.

3.4 Stop 3: Sawik Terrace near TRW plant.

Directions: North on Higley. Turn a hard right and go up hill to TRW plant. Park in flat area outside of guard house.

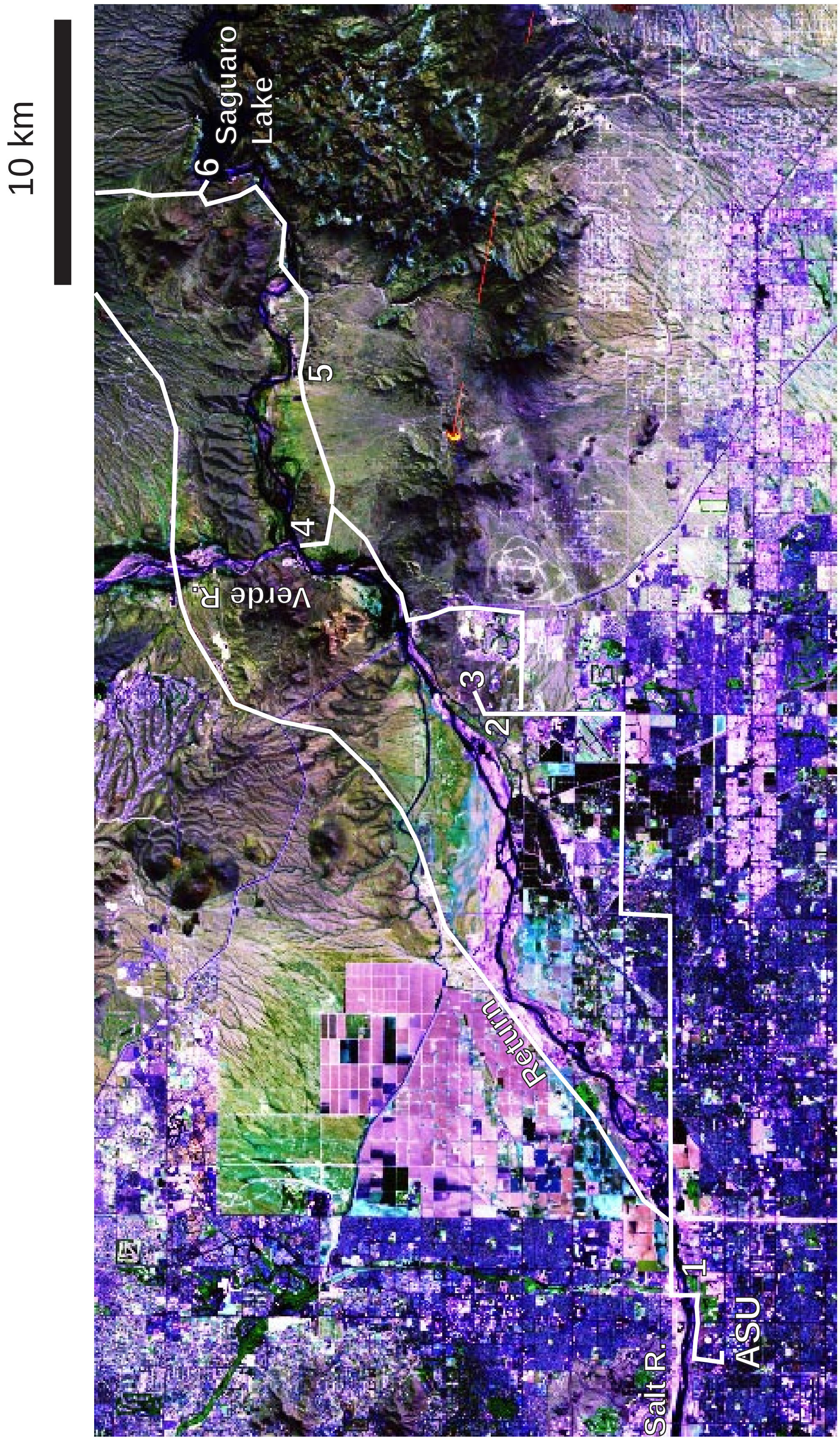

Figure 11: Landsat 753 image of the eastern part of the greater Phoenix area showing the field trip route in white with the numbered stops and the principal landmarks.

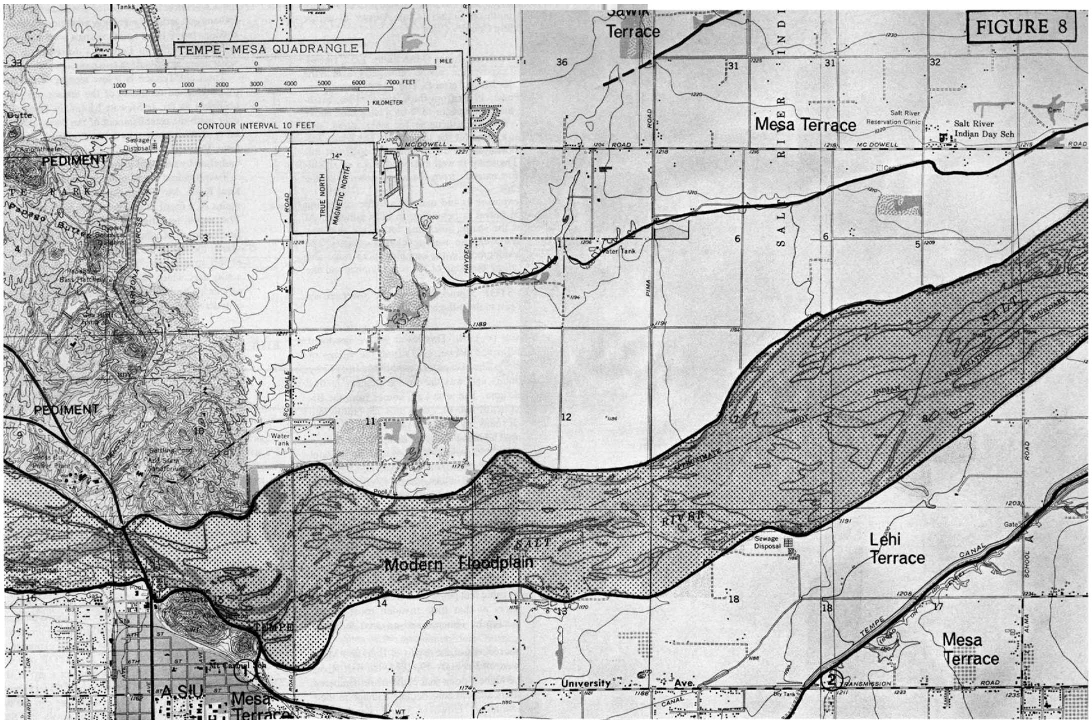

Figure 12: Salt River Terraces near Arizona State University. Map base is pre-modification of the modern floodplain channel. Note the position of the eastern portion of Tempe Butte in the outside of a meander bend of the Salt River. From Péwé, 1978.

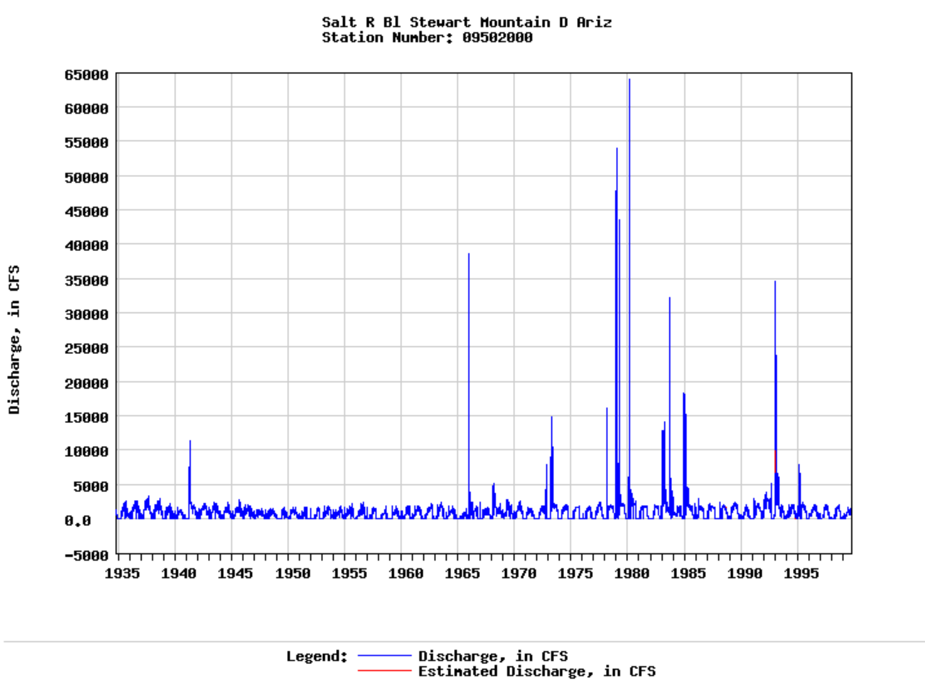

Figure 13: Daily discharges on the Salt River below Stewart Mountain dam (near stop 5). This is the nearest gage with a long record. The data are from the U.S. Geological Survey (http://az.water.usgs.gov/). The peak values may be underestimates.

Figure 14: Flooding along the Salt River near ASU in 1978. Photos by D. M. Burt.

Figure 15: More flooding along the Salt River near ASU in 1978. Photos by D. M. Burt.

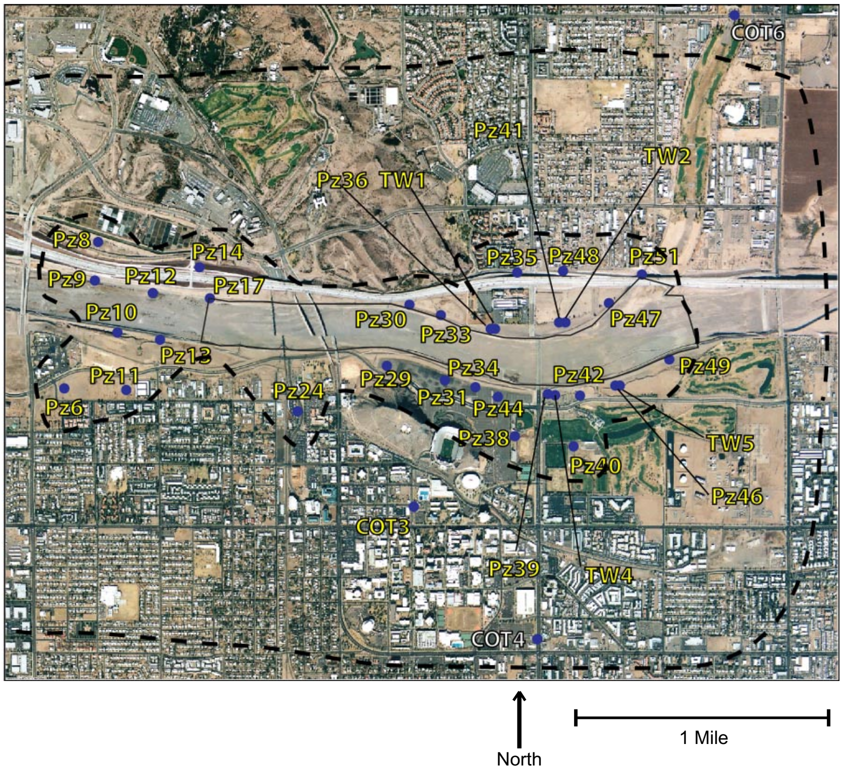

Figure 16: Well Locations. Image showing the location of wells used in this study. The solid black outline shows the location of Tempe Town Lake. The dashed lines show the local zone and extent of lake influence respectively. From Fergason, 2001.

Figure 17: View northeast over Tempe Town Lake and the Rural Road Bridge from the top of Hayden Butte. Compare this view with that on the lower left in Figure 15. From Fergason, 2001.

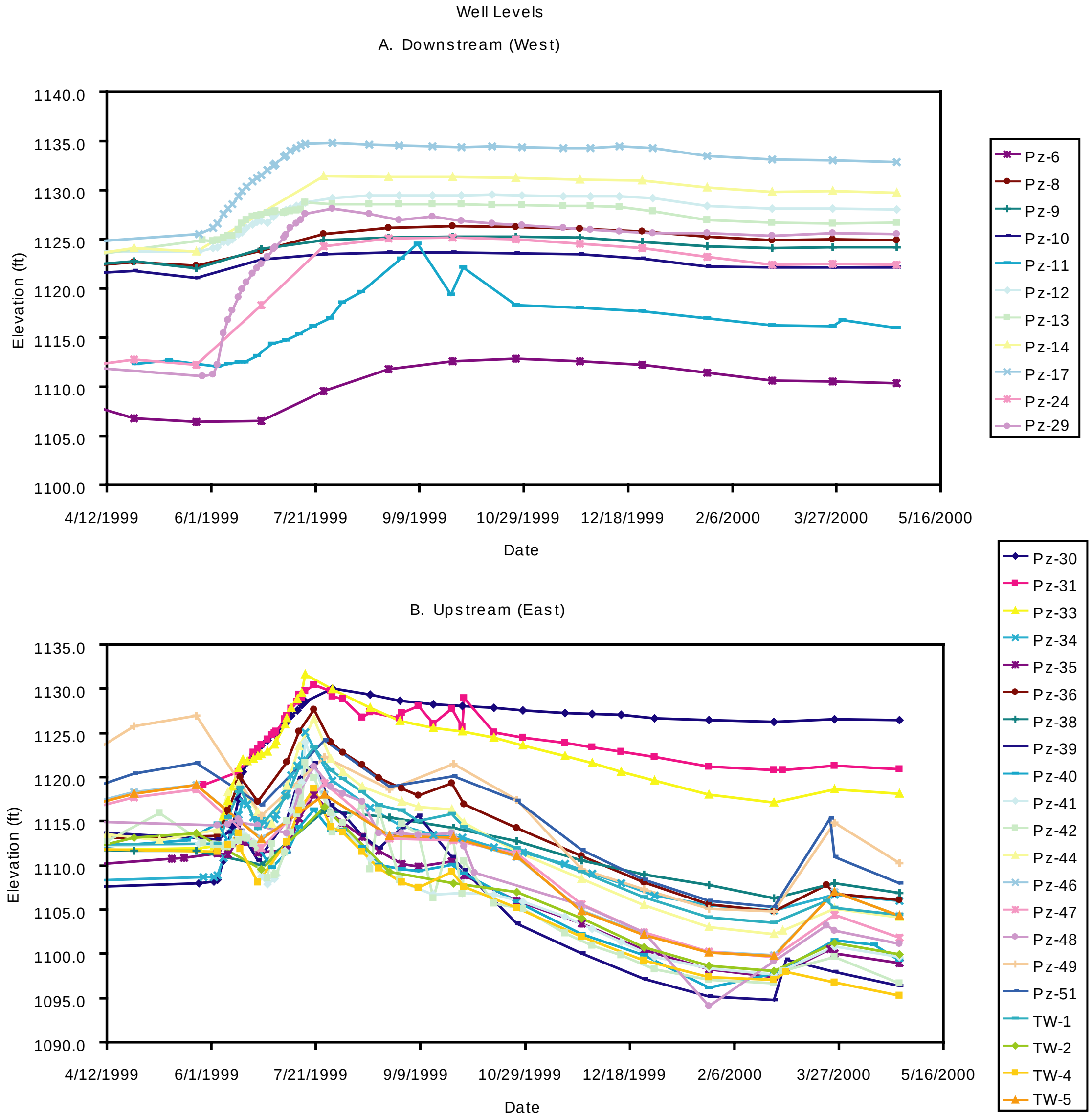

Figure 18: 2-D Well Graphs for Tempe Town Lake. A shows groundwater levels for the downstream half of the lake, and B shows well levels for the upstream half of the lake for the period of April 1999 through May 2000. Note that in B, Pz-30, 31, and 33 are located in the middle of the lake, and show trends that are a combination of the upstream and downstream trends. In A the lake well levels all rise after the lake fill begins and then remain fairly constant, while in B the well levels are more erratic due to recovery well activity and end at lower elevations than those at which they began. Tempe Town Lake began filling on June 2, 1999 and was full on July 14, 1999. From Fergason, 2001.

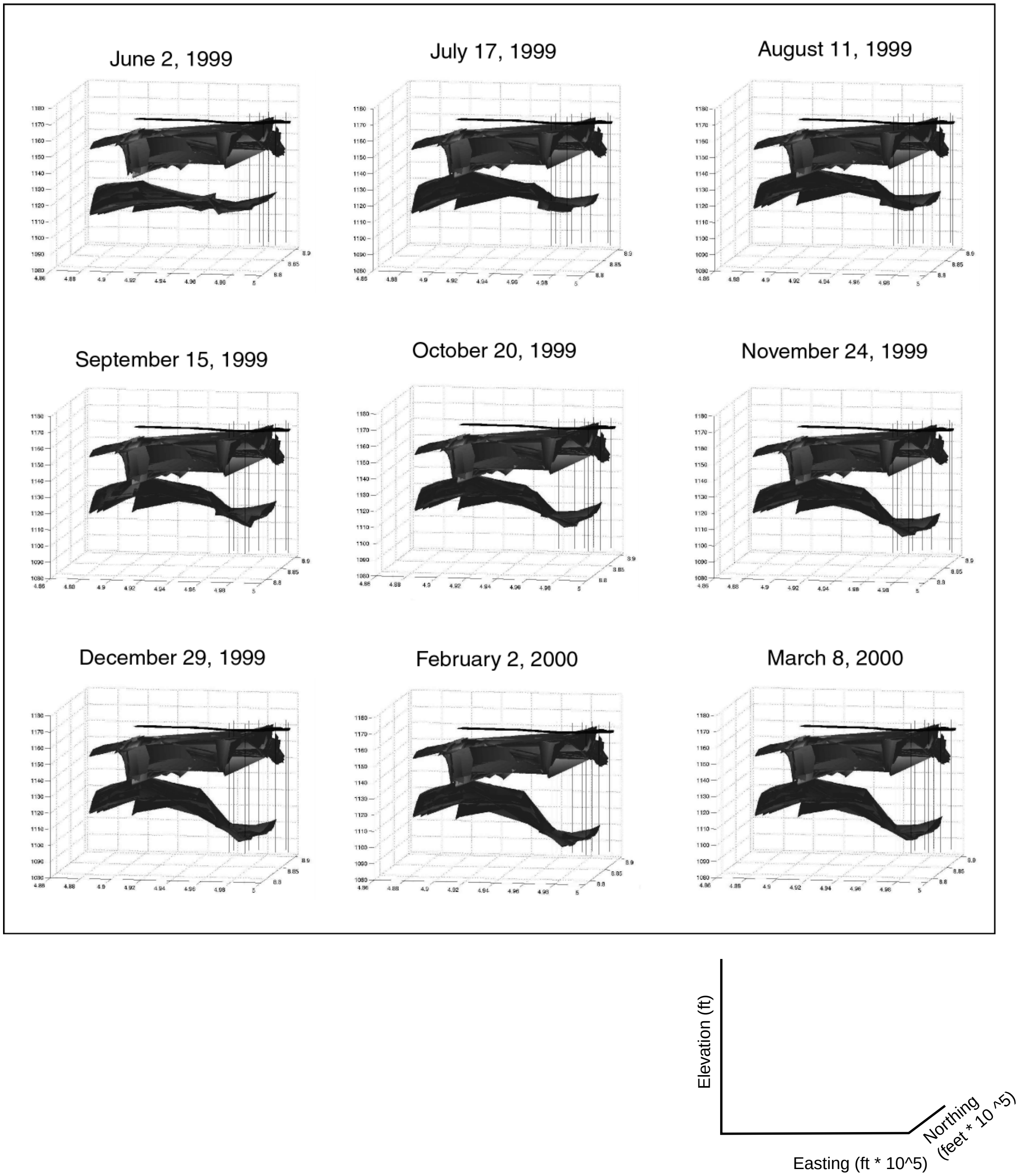

Figure 19: 3-D Water Table Surface For Tempe Town Lake. These plots represent the surface of the groundwater table below Tempe Town Lake derived from well levels. The upper elongate shape shows the approximate location of Tempe Town Lake, the middle lumpy surface shows crude topography, the lower surface shows the groundwater table, and the vertical black lines represent the recovery wells. The view is from the south of the lake to the north, with the downstream end of the lake to the left. The lake began filling on June 2, 1999 and prior to filling groundwater conditions were about the same as shown for June 2, 1999 prior to filling. The first few frames show an increase in water levels almost everywhere. Beginning around September, 1999 the water table at the east end of the lake begins to decrease significantly. This creates a water table that is has a noticeably different shape than prior to the lake fill. Note that the groundwater table surface does not take into account elevations directly under the lake. From Fergason, 2001.

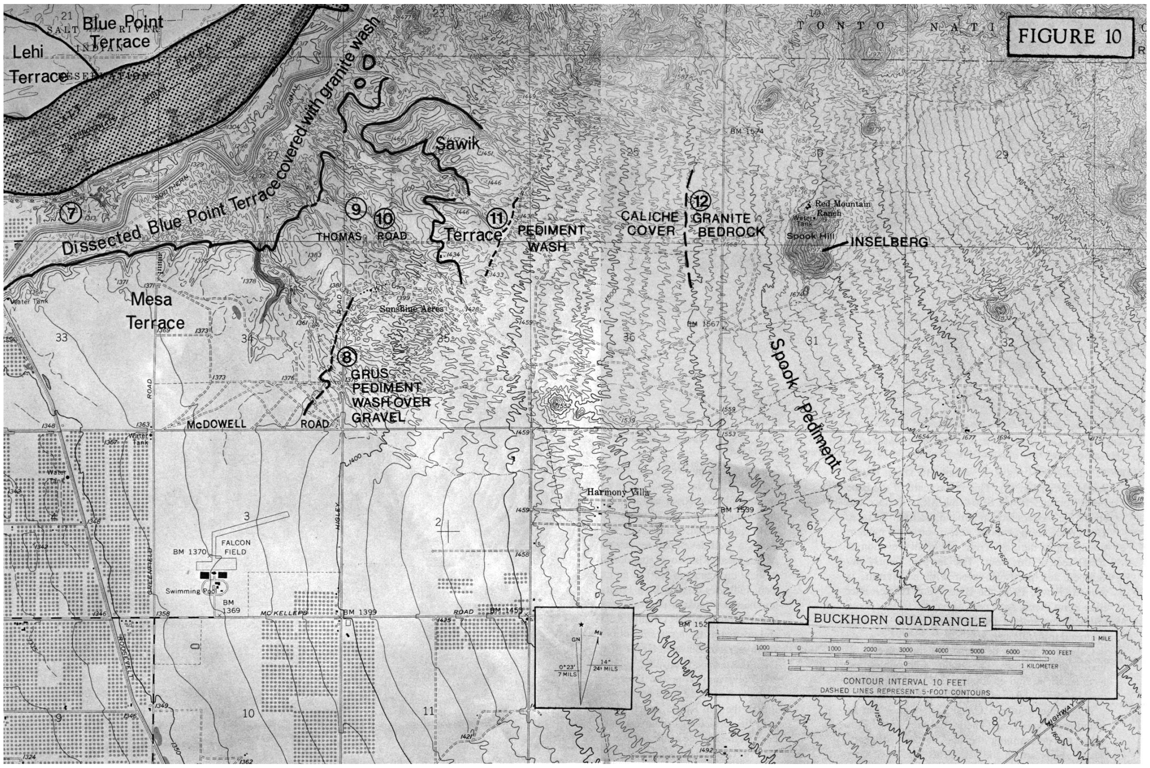

Figure 20: Salt River Terraces in east Mesa. All terraces are evident in this map. From Péwé, 1978.

This is the surface of the Sawik Terrace at about 1,457 feet elevation. Notice on the road up here that the terrace gravels directly overly granite and include large granite clasts in their lower portion. See the map in Figure 20 to see the terrace configuration.

Topics:

- Clast morphology and compositions: look for percussion marks indicating strong bedload transport in the river and also strong clasts (mostly quartzites).
- Terrace sequence and ages. Recall relative and numerical age discussion in section on Salt River terraces above.
- Paleogeography: magnitude of local erosion, paleo-Salt River in the southeast Valley, and implications for landscape stability (1-2 million year old surfaces in Southern California would be tilted on end!).

3.5 Stop 4: Phon D. Sutton Recreation area. Péwé, 1978 stop 14.

Directions: Return on Higley south to Thomas east to Power Road north to Saguaro Lake Road east to the Phon D. Sutton Recreation area (1 mile north of main road).

This picnic area is on the Blue Point Terrace (Figure 21). We are at the confluence of the Verde and Salt Rivers. The Fort McDowell Indian Community is to the north. The rocks exposed along the river here are called the Geronimo Head formation. These rocks were probably deposited as tuff-rich mudflows eroded from the adjacent Superstition Volcanic complex (manifest by the sharp mountains to the east). The Geronimo Head Formation has a tuff-rich matrix with numerous volcanic and other basement clasts incorporated. The Superstition Volcanic field was formed by voluminous ($> 10,000 \text{km}^3$) outpourings of high silica volcanic rocks and shallow intrusives. One or more large calderas may have developed within the field. The volcanic activity in the Superstitions is dated at about 16 Ma, and the Geronimo Head formed around 15.2 Ma (Sheridan, 1987).

Immediately to the south of the parking lot is Coon Bluff on which both the Mesa and Sawik Terraces are preserved. The Mesa Terrace here is about 160-180 feet above the modern river. The Sawik gravels are another 50-60 feet higher.

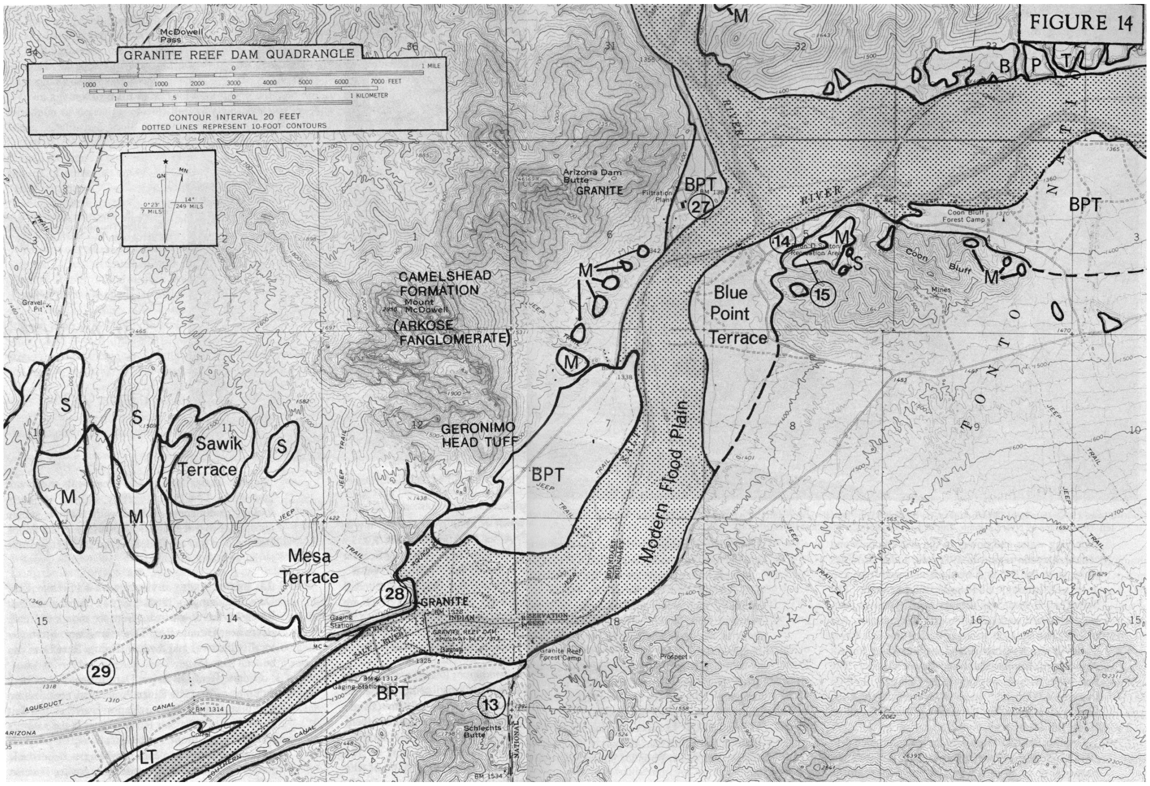

Figure 21: Salt River Terraces near the Verde River confluence. From Péwé, 1978.

3.6 Stop 5: Mesa and Sawik Terrace remnants and Lone Creek cross section. Péwé, 1978 stops 16 and 17.

Directions: Return to Saguaro Lake Road and travel east to about one mile past the Usury Pass Road turn off into the parking lot.

See Figure 22 for the map pattern of terraces in this area. Be sure to note the Bush Pediment to the south and consider its erosion as driven by Salt River downcutting. Figure 23 shows an aerial photograph of this area looking south. Figure 1 was taken looking east over this area.

This is an important site geomorphically in that we clearly see the preservation of Mesa and Sawik gravels at 200 feet and 250-260 feet above the modern channel respectively. The diverse and well rounded gravels overlie granite providing a distinct contrast in rock types. The association of downcutting along the river and the removal of debris along the Bush pediment is compelling. The pediment must have been graded to the level of Sawik, Mesa, and Blue Point progressively. Now incision occurs as it responds to the post Blue Point incision along the main river. The Blue Point is covered by interfingering overbank deposits from the river and "pediment wash"–a monolithic coarse sand and silt that is derived from the granites of the pediment. The vertical association of pediment wash over gravels cut into bedrock is evident in the channel walls of Lone Creek (Péwé stop 17). With an assumption that the pediment was graded to the terrace, the age of the Mesa Terrace and its height above the adjacent pediment provides a rare opportunity to determine kyr-scale erosion rates of bedrock: $\sim$ 20 m erosion in about 500 kyr is 4m/Myr. Calculations by Campbell, 1999 indicate that almost 300,000,000 m^3 of granite has been eroded in that time over the entire pediment surface. He determines a range of 2 to 100 m/Myr erosion rates. These results are consistent with many other bedrock erosion rates (e.g., Heimsath, et al., 1997).

3.7 Stop 6: Saguaro Lake. Péwé, 1978 stop 20.

Directions: Continue east on Saguaro Lake Road and turn in to the Recreation Facility. Park in the Marina parking lot.

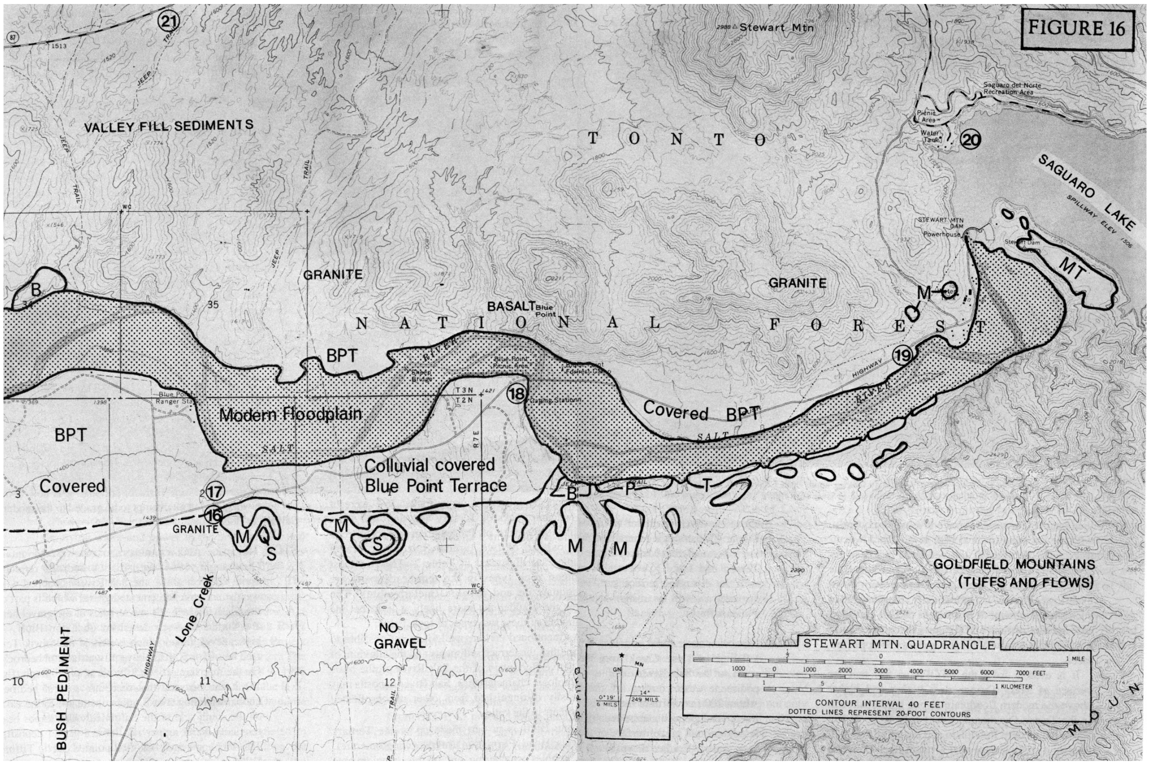

Figure 22: Salt River Terraces above the Verde River confluence and below Saguaro Lake. Our stops are shown on this map as 16, 17, and 20. From Péwé, 1978.

See Figure 22 for the map pattern of terraces in this area, and Figure 24 for an aerial view of Saguaro Lake. Saguaro Lake is part of the Salt River Project (http://www.srpnet.com). The Salt River Valley Water Users' Association, a private corporation, delivers nearly 1 million acre-feet of water to a service area in central Arizona. An extensive water delivery system is maintained and operated by the Association, including reservoirs, wells, canals and irrigation laterals. The six lakes on the Salt and Verde rivers are formed by reclamation dams operated by the SRP. Water used to produce electricity from hydroelectric generating stations also is used for recreation and irrigation in the greater Phoenix area. Saguaro Lake is impounded behind the Stewart Mountain dam. The Lake is 10 miles long, has 22.2 miles of shoreline, contains a maximum of 69,765 acre-feet of water, and has a maximum depth of 116 feet.

3.8 RETURN

Directions: Return to Saguaro Lake road and travel north to the Bush Highway (AZ 87). Turn left and travel west to 202 west to Rural south to University west to Mill Avenue south to Memorial Union. Returning from Saguaro Lake this way to ASU takes about 45 minutes.

4 Acknowledgments

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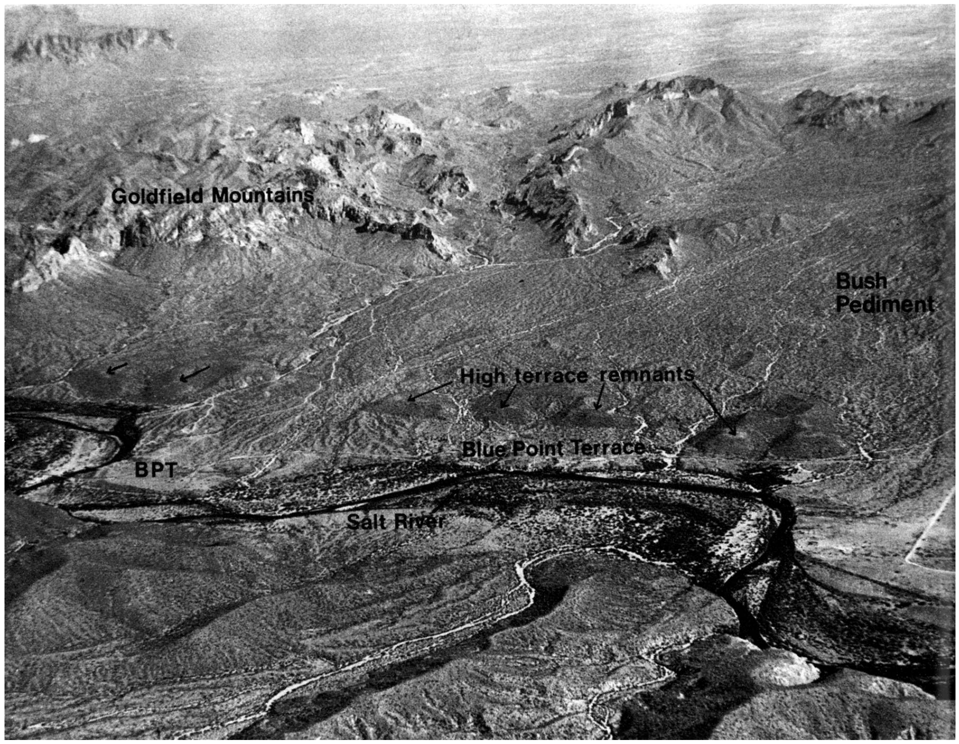

Figure 23: Aerial view of the Salt River Valley looking south from Lone Creek to Blue Point. Remnants of Sawik and Mesa Terraces on bedrock knobs are clear in middle ground on south side of river. From Péwé, 1978.

Figure 24: Aerial view of Saguaro Lake and Stewart Mountain Dam, looking south. Long finger of land extending toward dam is capped with gravel of the Mesa Terrace and is 220 feet above the river. Goldfield Mountain of the Superstition Volcanic Field is in middle ground byond lake. Our stop 20 si at the marina on the west end of the lake. From Péwé, 1978.

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