



Cave and Karst Resources Summary

Tuzigoot National Monument

Arizona

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Location & Area

Tuzigoot National Monument (TUZI) is located on the east bank of the Verde River in the upper end of the Verde Valley in central Arizona (Peck 1956). It is located between the towns of Clarkdale and Cottonwood in Yavapai County, Arizona (NPS 1992).

TUZI is an ancient village or pueblo inhabited by the Sinagua culture from approximately AD 1000 to 1450. The pueblo consisted of approximately 110 rooms including two and possibly three story structures. Tuzigoot pueblo is located along a high ridge of the eroded Verde formation (Matthew Guebard, Chief of Resource Management written communication 10 February 2014). The ruins are located on ridges overlooking terraces that they farmed (Matthew Guebard, Chief of Resource Management written communication 10 February 2014). Tavasci Marsh (one of the largest marshes in Arizona) and Peck's Lake are the remains of an abandoned meander of the Verde River (NPS 2006) and are units of the monument. TUZI encompasses 328.5 hectares (811.8 acres), 157 ha (388 acres) of which are under Federal administration (Tweet et al. 2008).

Caves and Karst

There are no known caves at TUZI. However, limestone is present at the monument and represented by the Verde Formation (Ek 2001; NPS 1992). According to the GRE Scoping Summary Report, Tavasci Marsh has the potential for caves and karst features although an inventory has not been conducted (NPS 2006).

Geology

TUZI is located in the Verde Valley and is part of the Central Highlands of Arizona, a transition zone between two physiographic provinces: the Basin and Range to the south and west and the Colorado Plateau to the north and east (Twenter and Metzger 1963; NPS 2006). The ruin of Tuzigoot is situated

on a ridge of horizontal strata of the Verde Formation. The ridge rises steeply from the valley floor for a height of about 36.5 m (120 ft.) (Caywood and Spicer 1935).

Rocks from the late Cenozoic and younger events are exposed on the surface at TUZI. Most of these rocks are either lake deposits of the Verde Formation (Middle Miocene-Pliocene) (13.8 million years ago), Quaternary (2.6 million years ago) river terraces from the Verde River, and Recent artificial fill (mine tailings); with Recent river wash as well (Tweet et al. 2008).

The Middle Miocene-Pliocene Verde Formation is a heterogeneous formation formed by faulting, erosion, and volcanic activity (Twenter and Metzger 1963; Tweet et al. 2008). The Formation was deposited in an ancient valley whose boundaries were about the same as those of the present Verde Valley in an environment consisting alternately of a large swamp, shallow lake, and playa. The Verde Formation is a freshwater limestone that contains some halite, clay beds, and volcanic ash that is interbedded with basalt flows. Lava flows and tectonic activity periodically obstructed this swamp-like playa system, shifting the system from an open to a closed basin (NPS 2006). The Formation is a complex assemblage of rocks having a variety of lithologic characteristics. In general, the formation is divided into facies based on lithologic characteristics. The thick limestone facies are mainly limestone and marl and mainly white although light gray, grayish orange, and pinkish gray are also common. Many beds contain lenses and nodules of white, light-gray, and yellowish-gray chert. The lower, middle, and upper limestone faces are mainly limestone and marl. They are characteristically white, pinkish gray, and light gray. Some beds contain lenses and nodules of white, pale-blue, greenish-gray, yellowish-gray, and brownish-gray cherts (Twenter and Metzger 1963). The deposition of the formation began in the Miocene (23 million years ago) with unfossiliferous clastic material leading to the deposition of limestone, dolomite, and evaporites later in the Miocene followed by mostly limestone deposition in the Pliocene (5.3 million years ago) (Tweet et al. 2008).

Archeological/Cultural Resources

No reports associated with cave/karst resources were obtained during the compilation of the summary. However, the monument holds invaluable archeological information. Don Antonio de Espejo, made the first exploration of the Tuzigoot ruins in 1583 (Peck 1956). No other information about the ruins was recorded until 1835. The excavation and repair of the TUZI was initiated in 1932. The cultural material that was uncovered was not the manifestation of a single unified body of people who lived at TUZI for a short time; but more like the compilation of different populations who made and utilized the site for a period of several centuries (Caywood and Spicer 1935).

Paleontological

At TUZI, the Verde Formation contains invertebrates (e.g. brachiopods, corals, mollusks, stromatolites, and conodonts) (NPS 2006; Tweet et al. 2008).

Biological

There are at least sixteen species of bats at TUZI. This includes the pocketed free-tailed bat (*Nyctinomops femorosaccus*), big free-tailed bat (*Nyctinomops macrotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), pallid bat (*Antrozous pallidus*), big brown bat (*Eptesicus fuscus*), western red bat (*Lasiurus blossevillii*), hoary bat (*Lasiurus cinereus*), southwestern myotis (*Myotis auriculus*), California myotis (*Myotis californicus*), eastern small-footed myotis (*Myotis leibii*), little brown bat

(*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), cave myotis (*Myotis velifer*), Yuma myotis (*Myotis yumanensis*), western pipistrelle (*Pipistrellus Hesperus*), and Townsend's big-eared bat (*Plecotus townsendii*) (NPS species website).

A biological study of the bat occurrence and use of archeological sites at the monument was conducted by Bucci and others (2011). Results found roosting bats and small amounts of guano in the tower room of the pueblo at TUZI, which is the only room that has a roof and is enclosed. The study concluded that bats were not causing damage to the archeological structures at the monument and recommended the removal of the guano on a regular basis to avoid harming the structure. The study also recommended that entry to the tower be restricted when bats are present to prevent visitors contact with bats and that educational information regarding bats be provided (Bucci et al. 2011).

White-Nose Syndrome (WNS) is a disease affecting hibernating bats caused by a fungus, *Pseudogymnoascus destructans*. Since 2007, the disease has spread from the northeastern into central United States (WNS website). WNS has not been detected in the western United States or at TUZI.

Hydrological

Water is and has been a significant resource at TUZI (NPS 1992). The present day Verde River is an active system with dynamic channel morphology, which is a potential threat to the road into the monument. The river is known to overflow its banks during floods (NPS 2006).

The Tavasci Marsh is the largest freshwater marsh in Arizona and was isolated about 10,000 years ago when natural climatic conditions altered the rivers course, cutting off the oxbow. Directly upstream, in the first half of the oxbow is the artificially impounded Peck's Lake, which is fed by the Verde River, one of the two primary sources of water into the marsh. The other main source is a series of natural springs that seep from the canyon walls, which surround the marsh (Ryan and Parsons 2009). The most obvious of these is Shea Spring. These spring fed areas or cienagas probably promoted establishment of Wet Meadow, Freshwater Marsh, and Riparian Woodland wetland communities (Ryan and Parsons 2009). The Verde River flows into Peck's Lake before emptying into the Tavasci marsh (NPS 2006).

References:

- Bucci, M., Petryszyn, Y., and Krausman, P.R. 2011. Bat Occurrence and Use of Archeological Sites at Three National Monuments in Central Arizona. Journal of the Arizona-Nevada Academy of Science 43(1): 1-5.
- Caywood, L.R. and Spicer, E.H. 1935. Tuzigoot: The excavation and repair of a ruin on the Verde River near Clarkdale, Arizona. Field Division of Education. Berkeley, CA.
- Ek, D.A., 2001. Caves and Karst of the National Park Service. Proceedings of the 2001 National Cave and Karst Management Symposium. Tucson, AZ. p. 16-32.
- Tweet, J.S., Santucci, V.L., and Kenworthy, J.P. 2008. Paleontological resource inventory and monitoring – Sonoran Desert Network. Natural Resource Technical Report NPS/NRPC/NRTR—2008/130. National Park Service, Fort Collins, CO.

National Park Service, 1992. Water resources management plan, Montezuma Castle and Tuzigoot National Monument, Arizona. NPS Water Resources Division, Ft. Collins, CO.

National Park Service, Geologic Resources Division. 2006. Geologic Resource Evaluation Scoping Summary: Tuzigoot National Monument, Arizona. U.S. Department of the Interior, National Park Service, Washington, D.C.

NPSpecies website. Information on Species in National Parks, Part of IRMA.
<https://irma.nps.gov/NPSpecies/Search/SpeciesList/TUZI> (accessed 8 January 2014).

Peck, F.R. 1956. Area History. Tuzigoot National Monument. National Park Service. Clarkdale, Arizona

Ryan, A. and Parsons, L. 2009. Tavasci Marsh Wetland Assessment-Wetland Vegetation Communities, Condition, and Functions. National Park Service. Yavapai County, AZ.

Twenter, F.R. and Metzger, D.G. 1963. Geology and Ground Water in Verde Valley – the Mogollon Rim Region Arizona. U.S. Geological Survey Bulletin 1177. U.S. Government Printing Office. Washington.

White-Nose Syndrome Website. <http://whitenosesyndrome.org/> (accessed 6 January 2014).