

## Exploring the Geology of Arizona National Parks with Geologic Resource Inventory Products Colorado

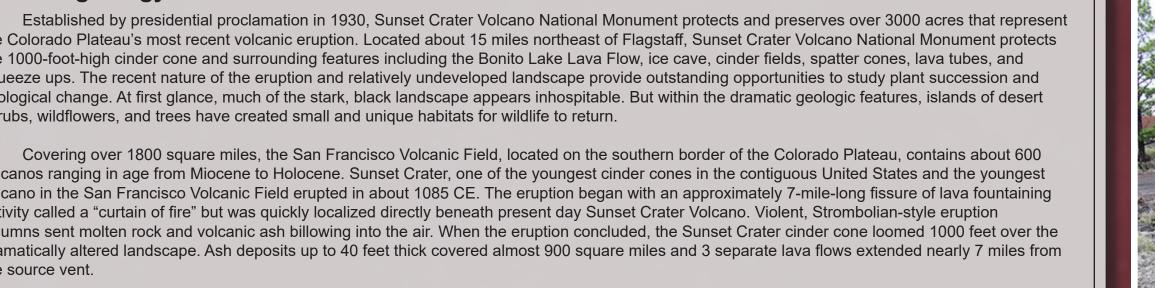
Colorado State University, Department of Geosciences

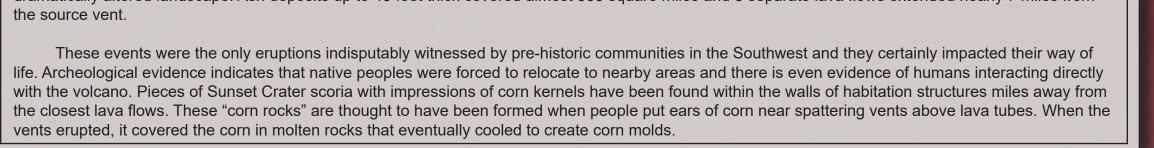
Ronald D. Karpilo Jr., Stephanie A. O'Meara, Trista L. Thornberry-Ehrlich, James R. H. Winter, Georgia A. Hybels, and James R. Chappell

Notable geology of Canyon de Chelly



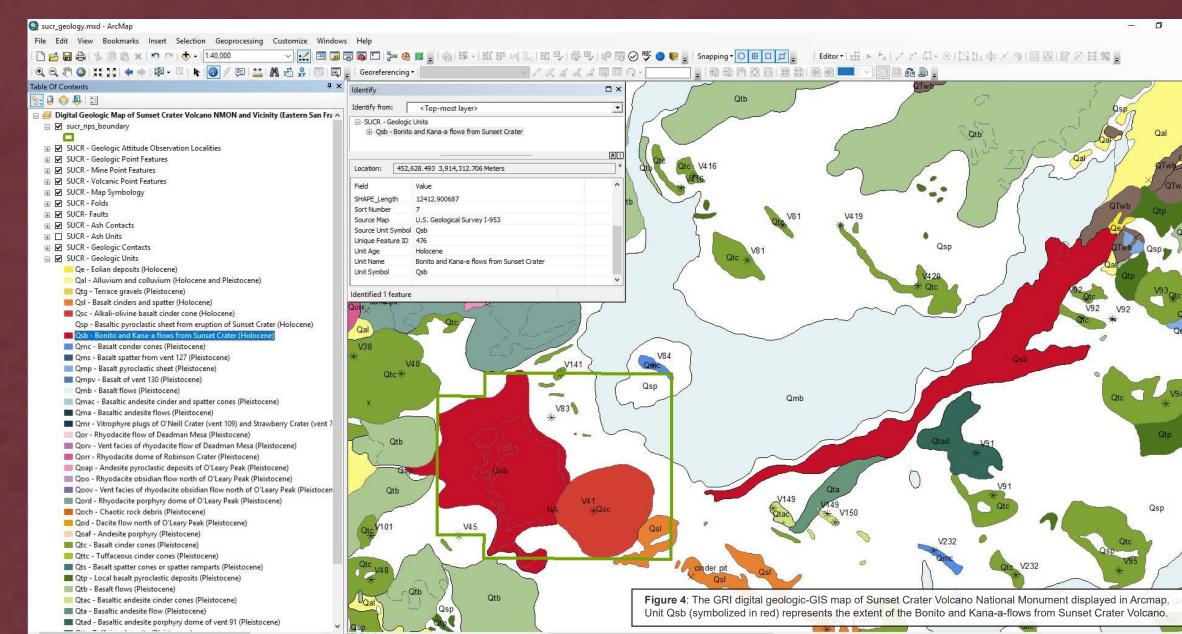






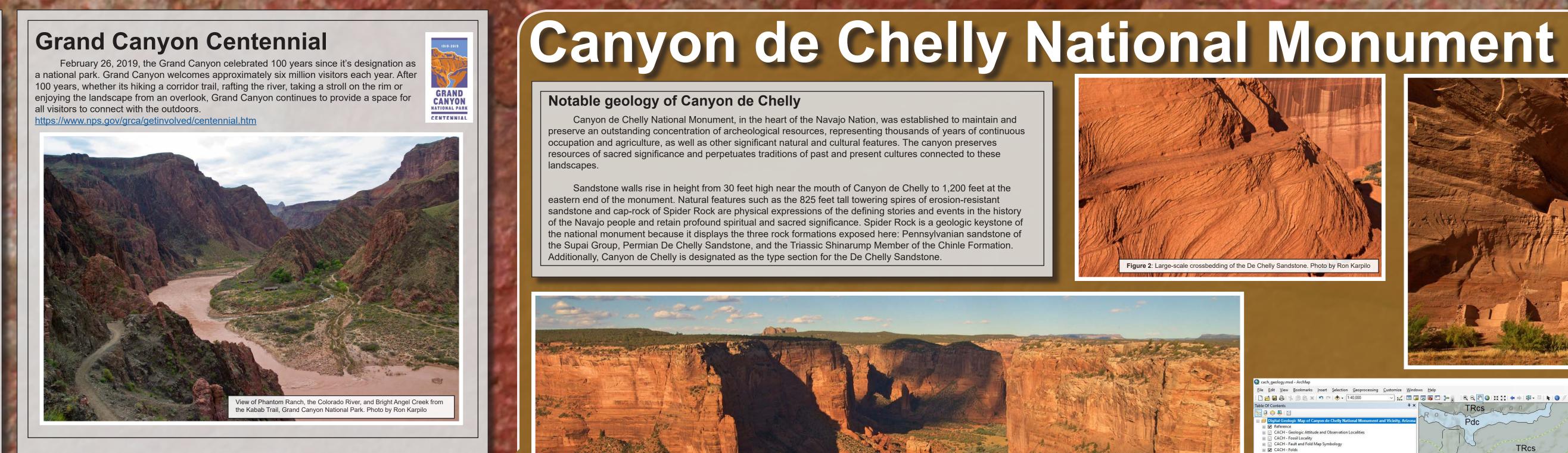


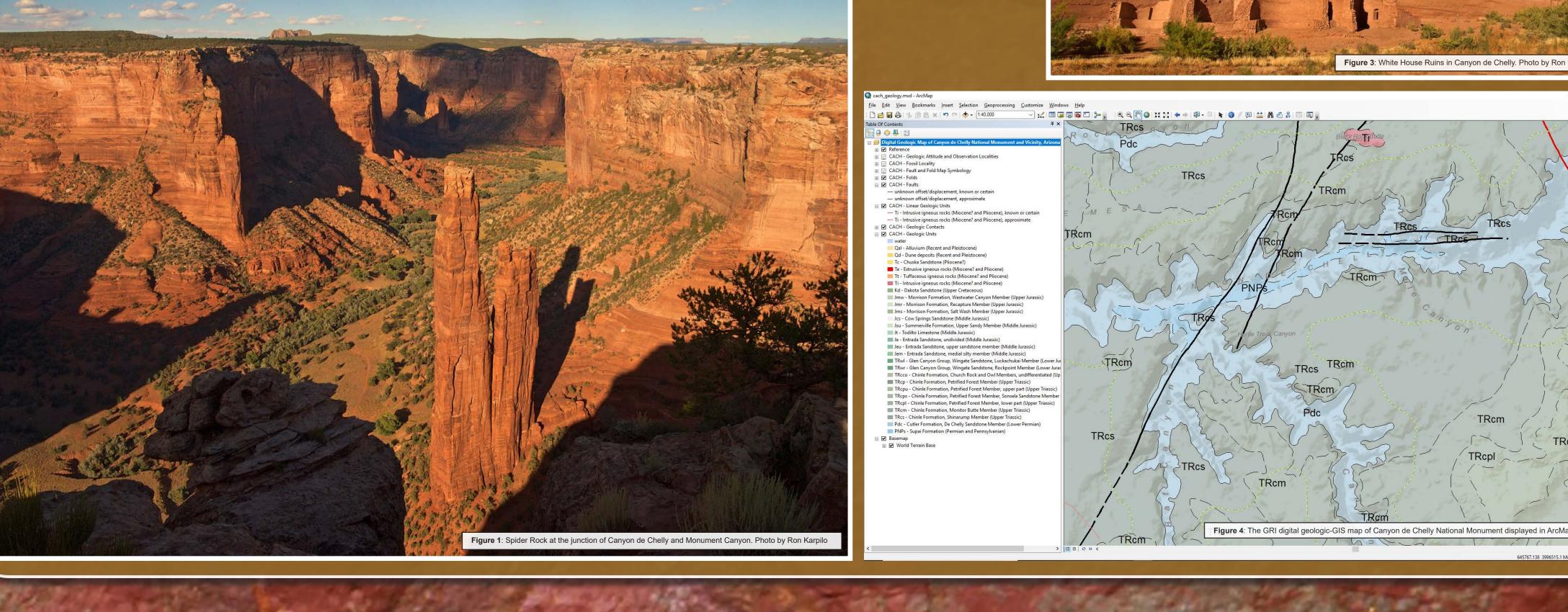




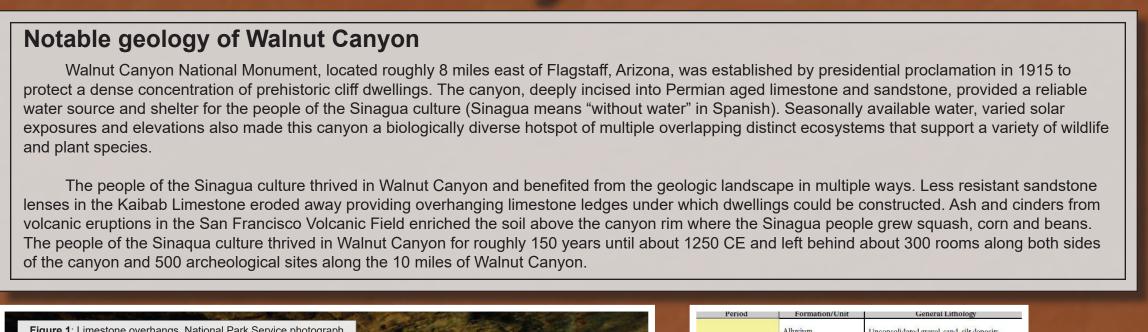
## The Geologic Resources Inventory issues, features, and processes. Additional information about the GRI program can be found at: https://www.nps.go **Overview of GRI Products** The GRI produces several products to assist park staff in the management and protection of their park. These products include a digital 1) ESRI 10.X file geodatabase and accompanying 10.0 ArcMap document for use with ESRI ArcGIS software In addition to the digital geologic-GIS map product, the GRI also produces a basic cartographic layout and a geologic report. The layout

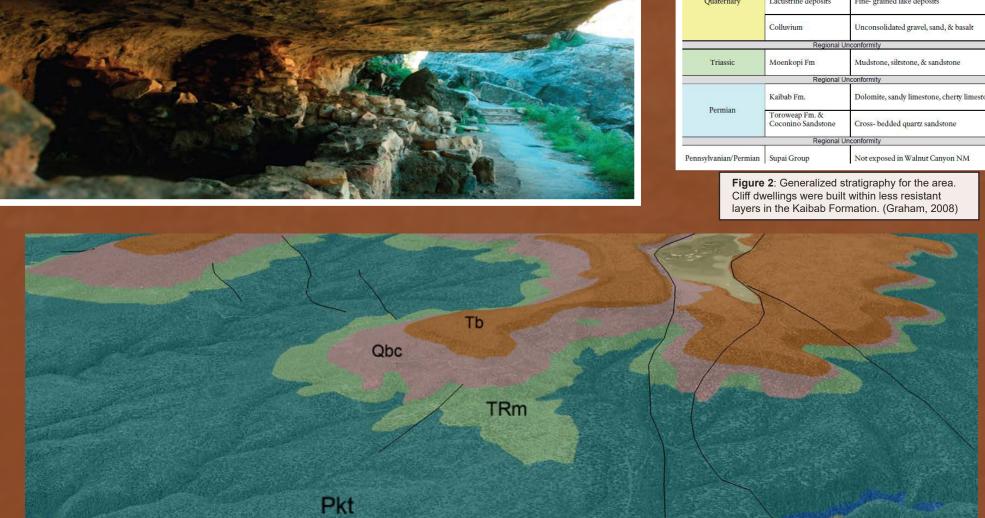
Completed GRI products, digital geologic-GIS maps, layouts and reports, as well as GRI scoping meeting reports, are available online at

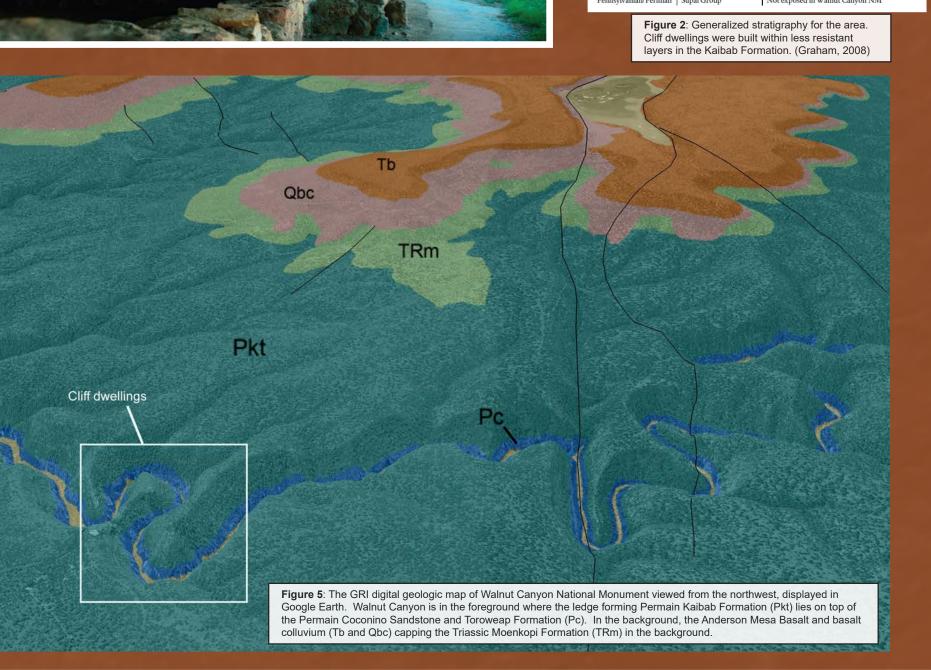


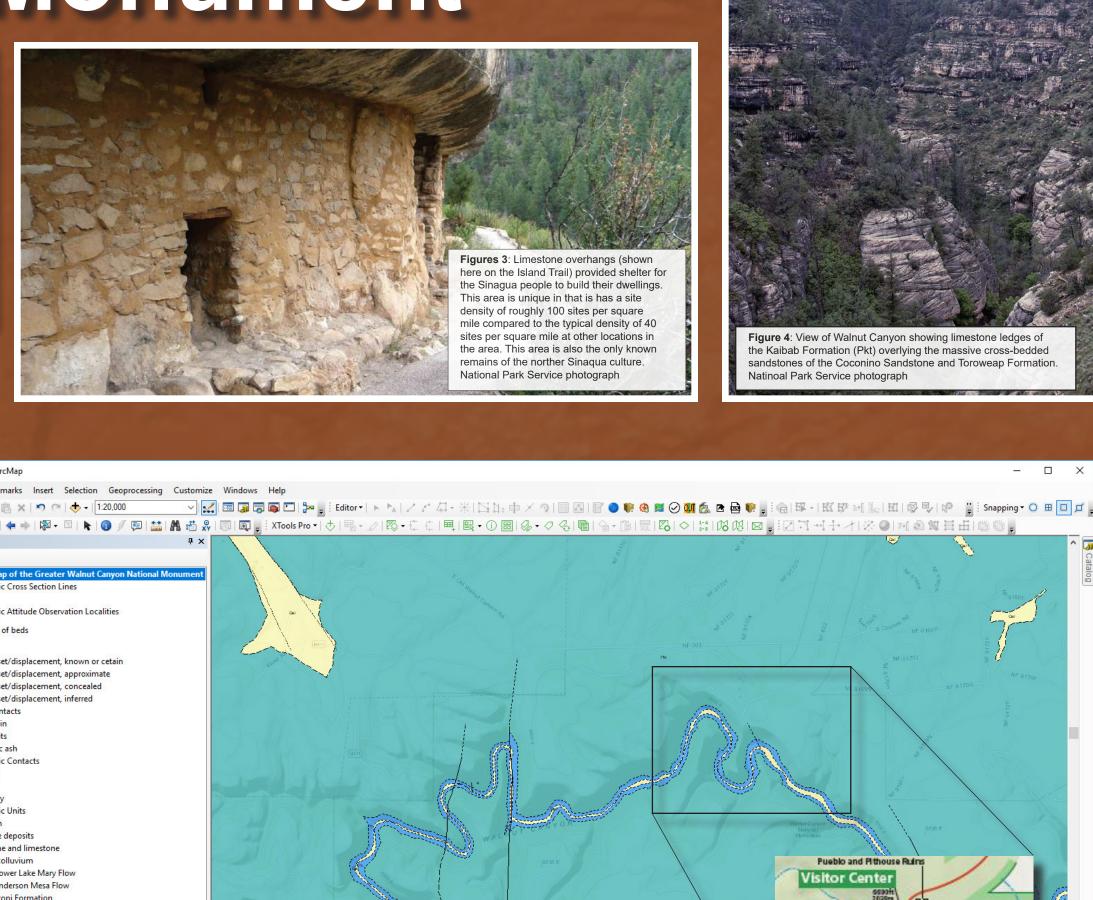


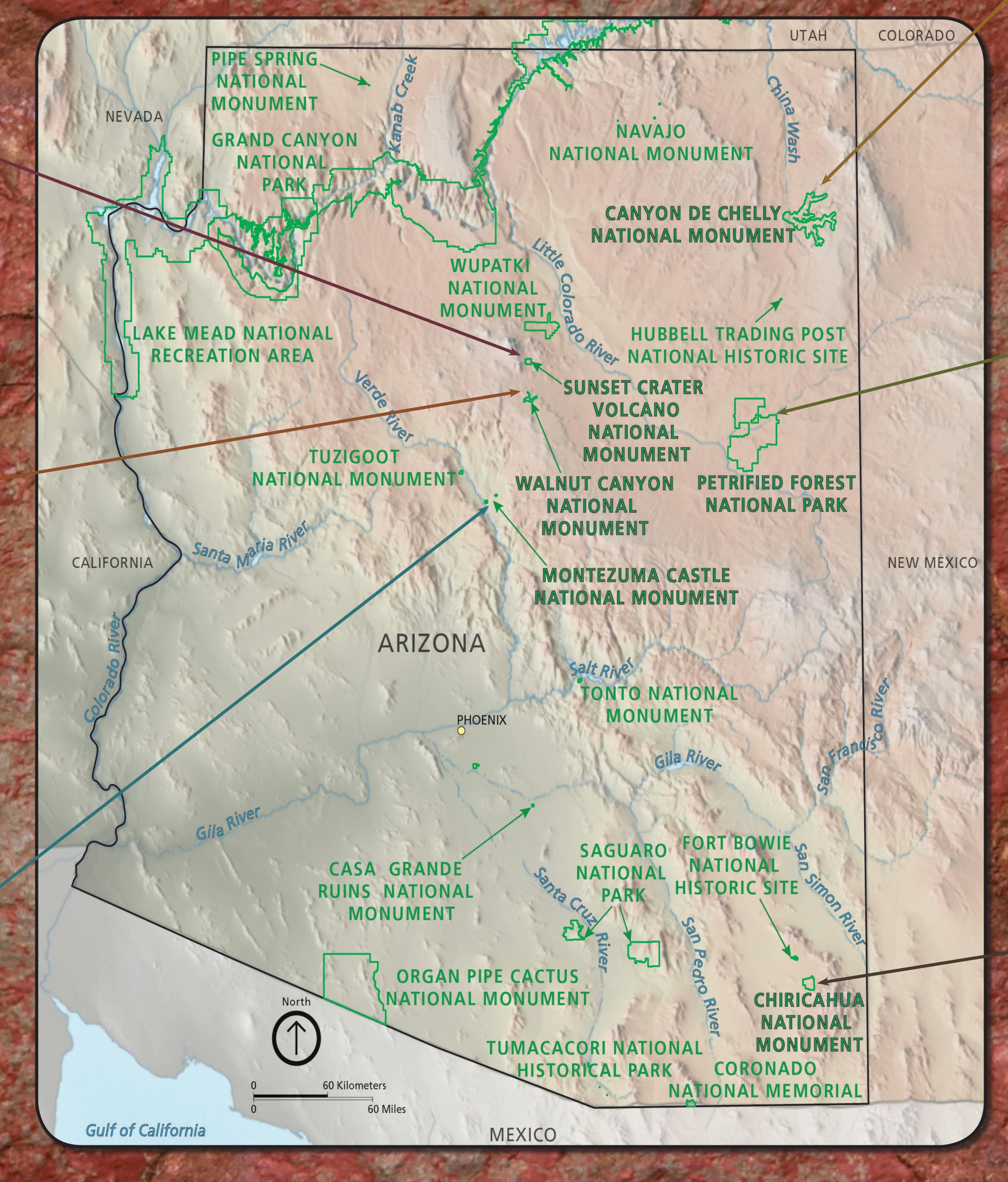
## Walnut Canyon National Monument

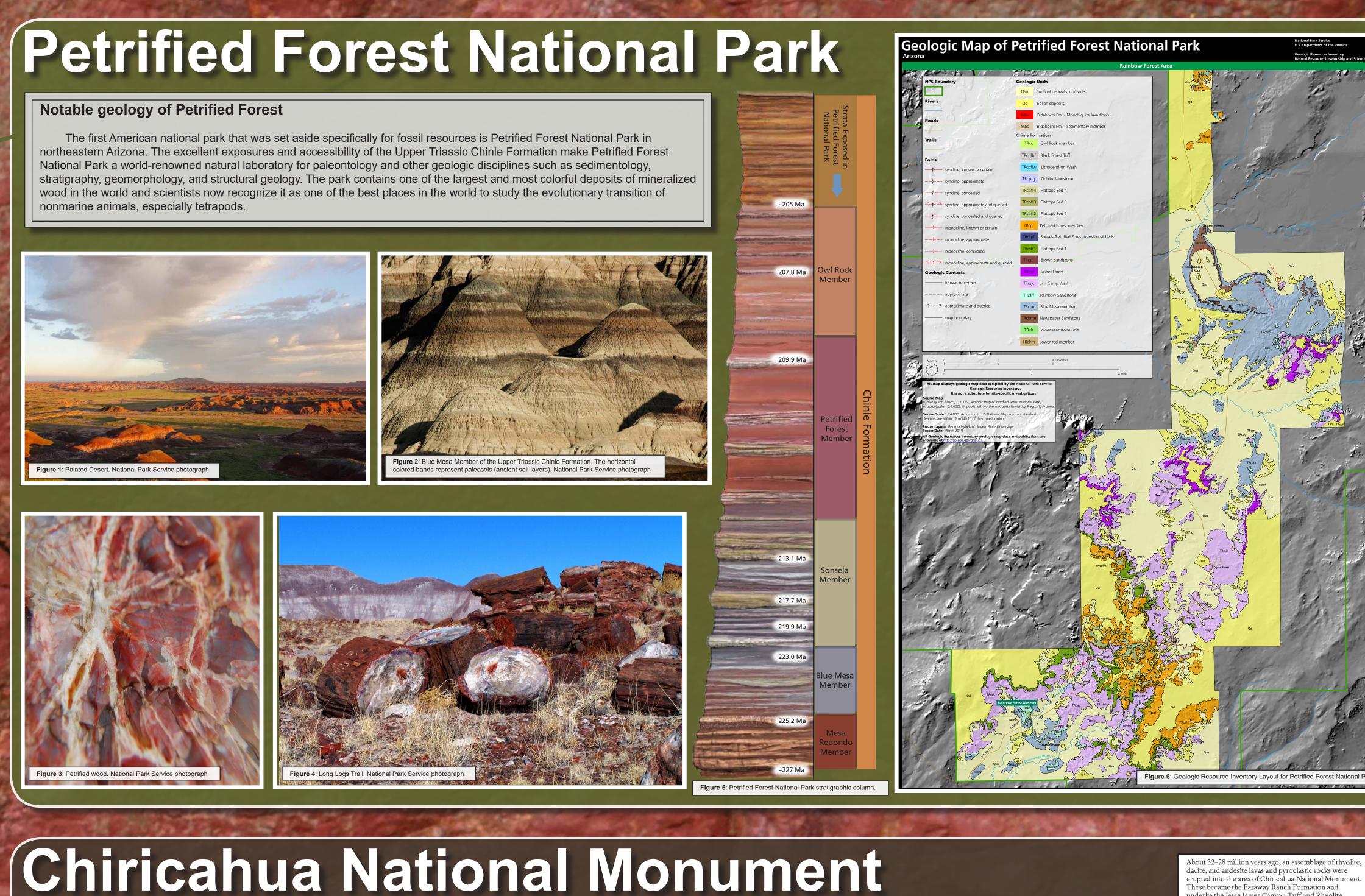






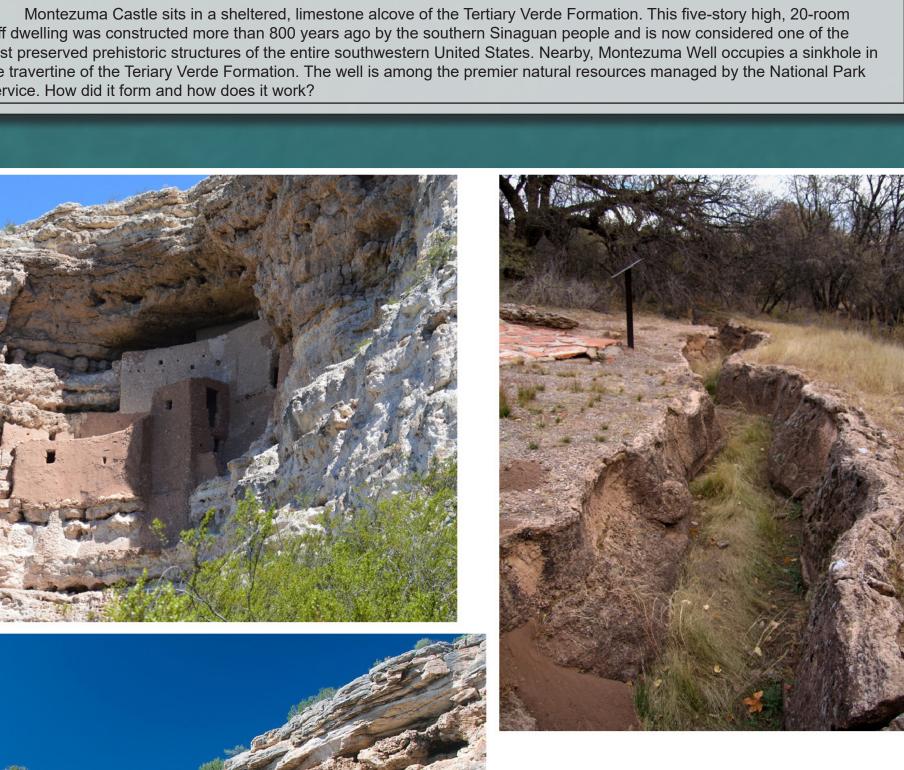






## Montezuma Castle National Monument

cliff dwellings (displayed as green dashes



na Well is lined with deposits of travertine. A smaller dwelling is wedged into a smaller alcove

ontezuma Well. View from the surface of the water in Montezuma Well of the surrounding

e walls. National Park Service photographs

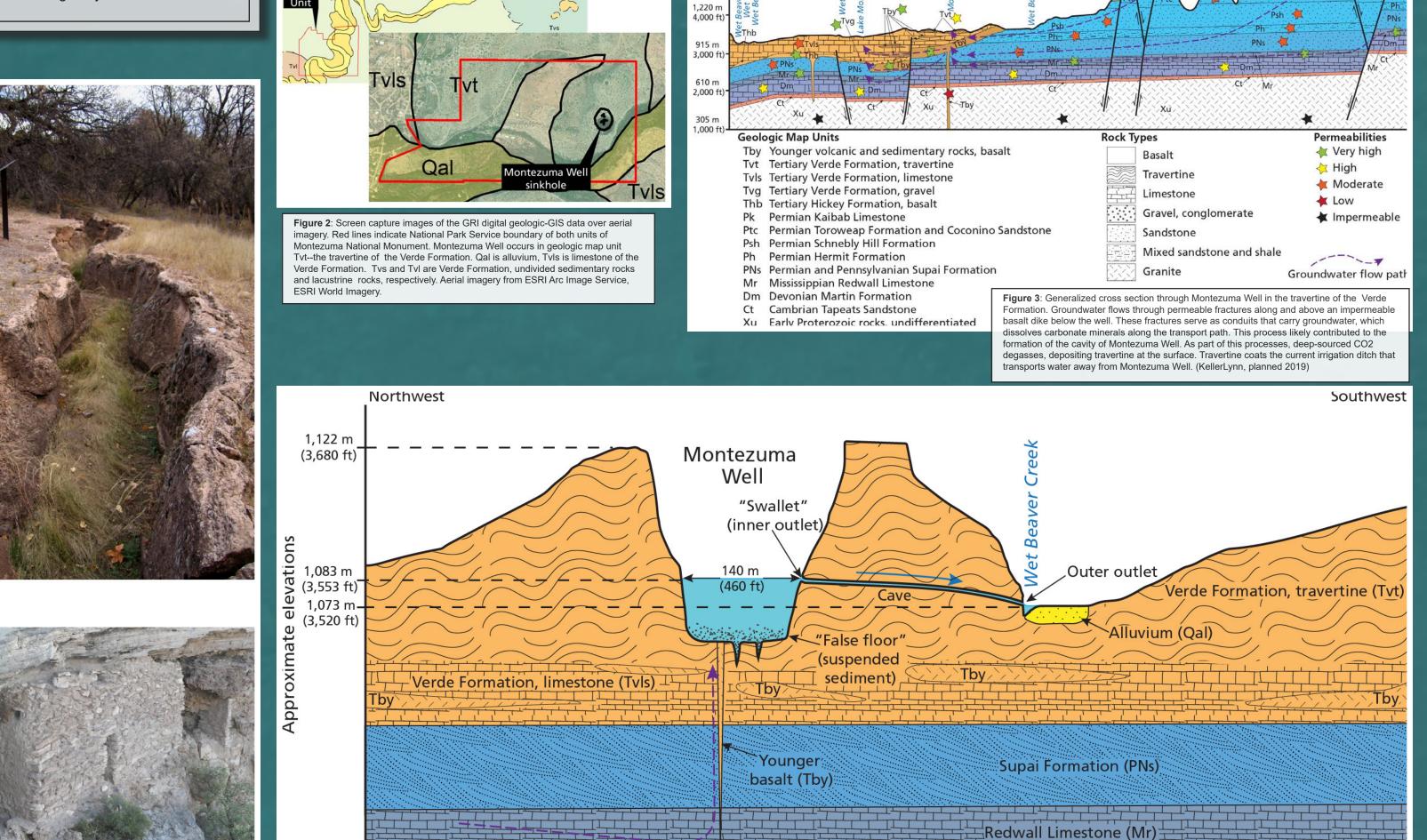
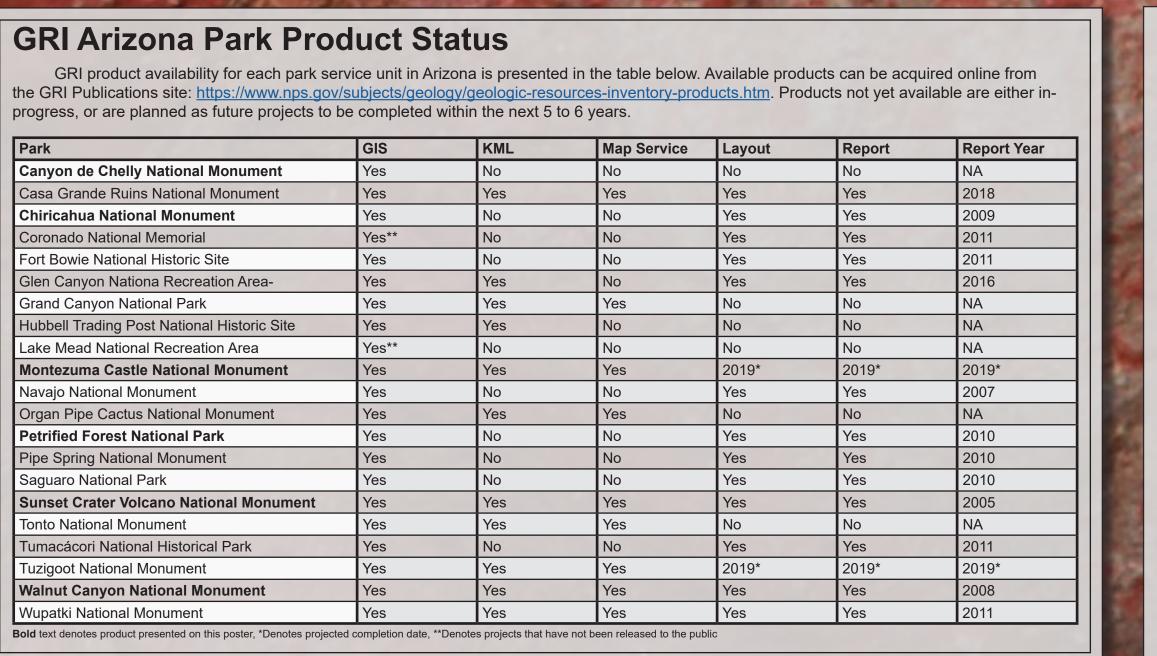


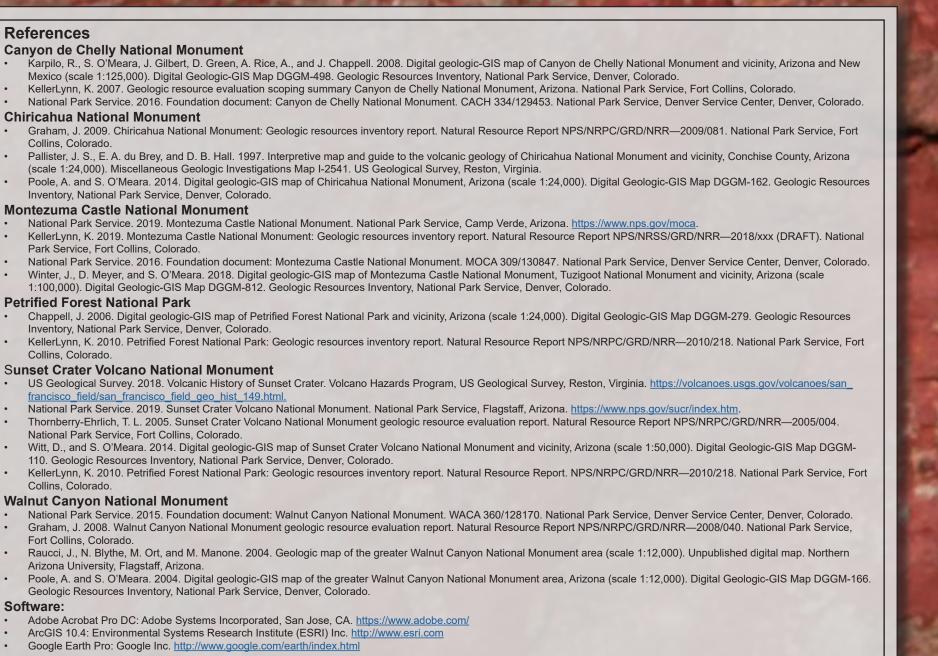
Figure 4: Cross section showing rock units, permeabilities to groundwater flow, and groundwater flow paths. Beneath Montezuma Well, permeable

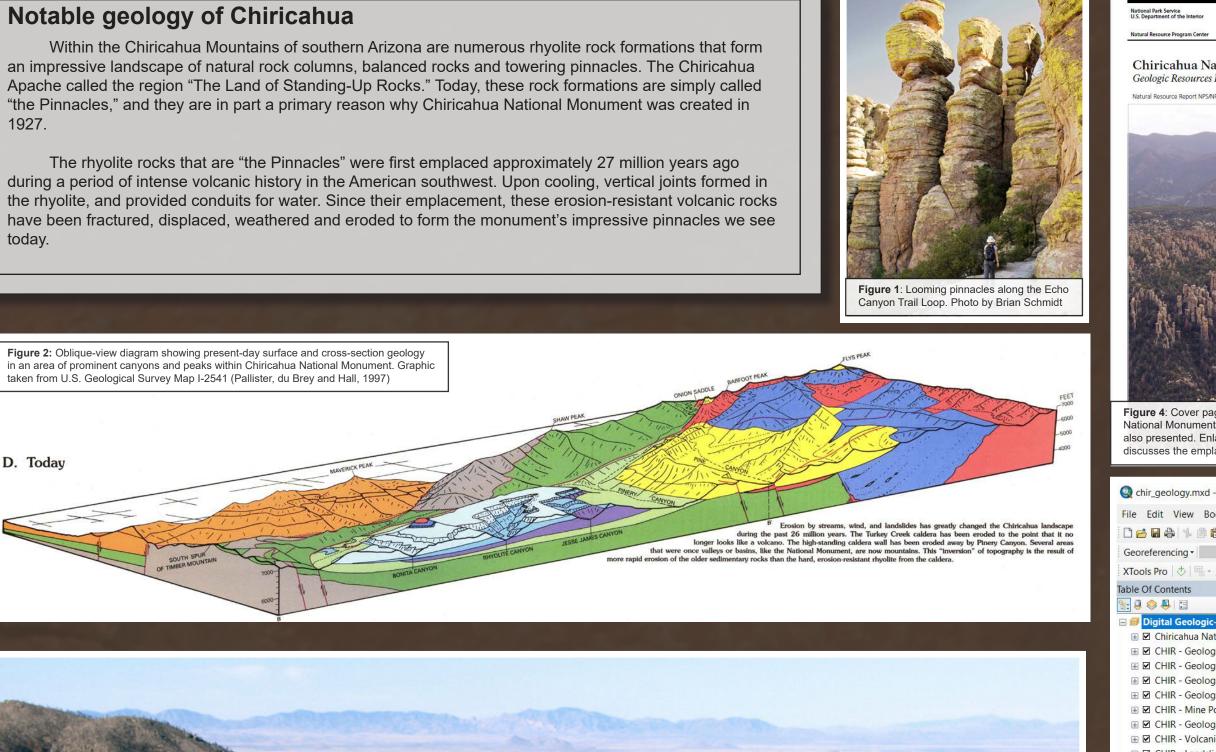
ts and karstic Redwall Limestone, and a low permeability basalt dike control groundwater flow by (1) rapid movement of groundwater tl

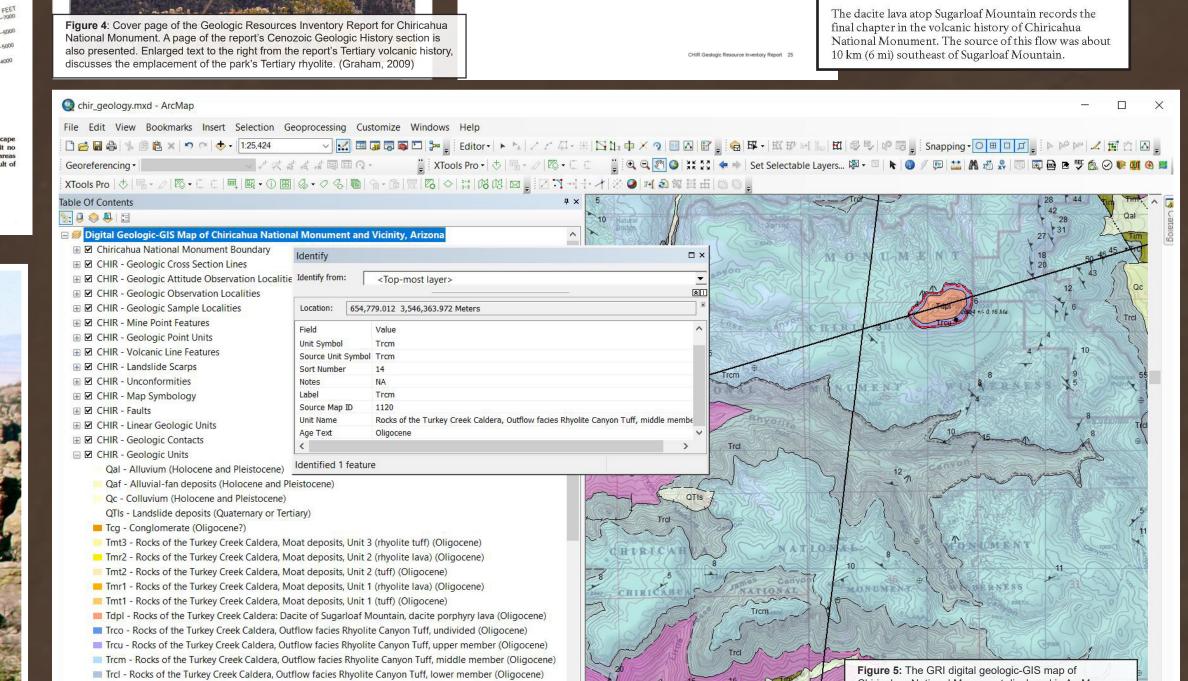
asalt flows, (2) the Redwall Limestone providing a very permeable pathway for groundwater flow at depth, and (3) the basalt dike creating a bar

oundwater flow that forces groundwater to the surface. The higher ground is the upgradient recharge zone. (KellerLynn, planned 2019)









Tjj - Jesse James Canyon Tuff (Oligocene)

Tfre - Faraway Ranch Formation, Rhyolite of Erickson Ridge (Oligocene

Tfpe - Faraway Ranch Formation, Pyroclastic flow deposits of Erickson Ridge (Oligocene)

mice. The roof of the magma chamber collapsed, ducing the Turkey Creek caldera (Pallister et al.

aring the caldera-forming eruption, pyroclastic flow

led valleys adjacent to the volcano, including the va

re Chiricahua National Monument is todav. B

osit has not completely eroded away during the

600 ft) of pyroclastic flows still remain in the

ts dense welding and great thickness, this valley-fi

9 million years. After millions of years, at least 490

658595.82 3543921.2 Meters