

Wupatki Sunset Crater

Official Map and Guide

Wupatki and Sunset Crater
National Monuments
Arizona

National Park Service
U.S. Department of the Interior



Sinagua Indians occupied the pueblo now called Wupatki—Hopi for "tall house"—from about 1100-1225 AD.

Kathleen Norris Cook



A vividly colored rim capping the thousand-foot cone distinguishes Sunset Crater from neighboring volcanoes.

Jerry Sieve

The dwellings at Wupatki were long abandoned when Capt. Lorenzo Sitgreaves documented for the first time the sun-baked stone walls, barely distinguishable from the parched landscape. It was 1851, and Sitgreaves was charged with seeking out overland transportation routes through the recently acquired New Mexico territory, an assignment that brought him to the canyon-riddled Colorado Plateau where ancestors of the Pueblo Indians had lived centuries earlier. Others followed Sitgreaves, notably John Wesley Powell. The Civil War soldier-turned-geologist in 1869 became the first in historical times to navigate his way down the Colorado River through the Grand Canyon. In 1885, as head of the U.S. Geological Survey, Powell explored the San Francisco volcanic field. One bright-rimmed cone particularly impressed him. "The contrast in the colors is so great," he wrote in his journal, "that on viewing the mountain from a distance the

red cinders seem to be on fire. From this circumstance the cone has been named Sunset Peak."

As the era of exploration drew to a close and the era of scientific advancement took hold, both sites enjoyed scrutiny by a number of interested parties. Around the turn of the century archeologist Jesse W. Fewkes carefully mapped and photographed the Wupatki area, using appropriate Hopi terms to label geographical and cultural phenomena. But no one offered up substantial evidence that Wupatki might be in any way connected with Powell's "Sunset Peak" until archeologists began excavations. Twentieth century scientists did not have to guess the age of the artifacts they unearthed; modern techniques allowed them to accurately position their material findings within the time frame of the Southwest. A major breakthrough for archeologists and geolo-

gists alike came in the 1930s with the refinement of dendrochronology, or tree-ring dating. This process matches the pattern of growth rings from a tree of an unknown date with patterns from a cross-section of a tree of the same species whose age has been established. Because new rings are produced annually, this method can date timbers to the year they were cut. Many of the ruins—the ash-covered pithouses near Sunset Crater as well as the Wupatki pueblos—employed timbers as roof beams or structural supports. Researchers noted the ring patterns. They compared pottery sherds found in pueblo rooms and prehistoric trash dumps with known types of earthenware. In the 1960s, through paleomagnetic dating, geologists determined the directional alignment of iron particles in the solidified lava flows, then precisely measured the deviation from today's magnetic north to yield the number of years since the particles were set in their

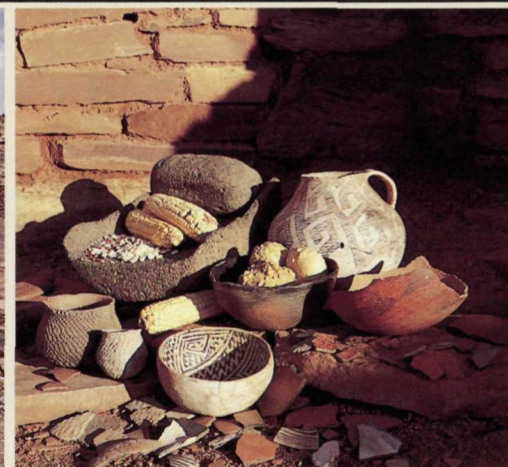
present configuration. Piece by piece like a jigsaw puzzle, they constructed a picture of an ancient farming people who fled when a volcanic cone emerged from their cornfields, and who returned to the area along with other Indian groups to build settlements, and exchange goods and ideas.

Each mystery solved gives rise to a host of new uncertainties. We know that the Indians left their pueblos about a century after they migrated to Wupatki, but why did they leave and where did they go? We know the date of the last volcanic eruption, but when and where will be the next explosion of debris, the next lava flow? A current archeological survey of the several thousand Wupatki sites will undoubtedly turn up some answers—and many more questions.

Wupatki: A Mosaic of Southwestern Cultures



Masonry ballcourts such as this are usually found much farther south.



At least 125 different types of pottery have been found within the monument, suggesting a rich culture during Wupatki's heyday.

Kathleen Norris Cook



Indians left this petroglyph, probably an image of an antelope.



The amphitheater, about 50 feet in diameter, most likely served as a ceremonial gathering place for the Sinagua of the Wupatki pueblo.

The people living northeast of what is now Flagstaff, Arizona, in the winter of 1064-65 AD must have heard rumblings and felt the earth shake before debris exploded out of the ground and rained down on their pithouses in much the same manner that the cinder cone Parícutin burst into existence in a Mexican cornfield nine centuries later. These Indians, now called the Sinagua (Spanish for "without water"), were forced to vacate the rocky land they had cultivated for 400 years.

Lava flows and several feet of cinders and rock obliterated their old farmland in the immediate vicinity of Sunset Crater. But just a few decades after the eruption, the Sinagua discovered that

they could grow crops in previously uncultivated terrain. Not far north of the cone, a combination of forces was at work: a thin ash layer from the volcano absorbed precious moisture, helped to prevent evaporation, and conserved heat, slightly lengthening the growing season. And, evidence suggests, a change in climate made water more plentiful. Some of the Sinagua—along with Kayenta Anasazi from the northeast and Cohonina from the west—migrated to the Wupatki area. Southwestern Indians had long been trading among themselves. Now three diverse groups advanced as never before by sharing construction and farming methods, learning new pottery techniques, participating in religious ceremonies

and athletic competitions, and intermarrying.

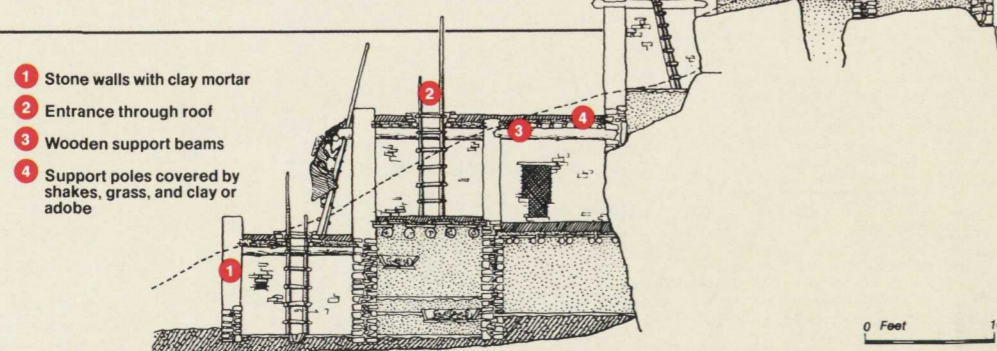
Whether it was because of disease, dispersal of the life-producing ash cover, exploitation of natural resources, or an extensive drought beginning in 1215, Wupatki's mosaic of cultures had disbanded by about 1225. Small groups of Sinagua and Anasazi scattered in different directions. And the Wupatki pueblos were never again to have permanent residents.

Wupatki Pueblo

Sinagua homes at Wupatki ranged in size from single-story, single-family houses to a multi-level "high-rise" pueblo (right), the largest dwelling in the area, which probably contained more than a hundred rooms.

When the Sinagua moved to the Wupatki basin in the early 12th century, they found the native materials ideal for construction of freestanding masonry

dwellings. Slabs of sandstone, limestone, and basalt with a clay-based mortar yielded sturdy buildings that, despite weathering and vandalism, remain partially intact more than 700 years after their owners departed.



- 1 Stone walls with clay mortar
- 2 Entrance through roof
- 3 Wooden support beams
- 4 Support poles covered by shakes, grass, and clay or adobe

0 Feet 10

Sunset Crater: A Colorful Volcanic Cone



Viscous molten rock, whose surface cooled faster than the lava beneath, produced the

rough-textured "aa" of the Bonito flow.



Ice is present most of the year in this cave, a dead-end tube from which lava drained.



A spatter cone, red-hued from oxidized iron particles, formed when a gas vent

opened through the surface of a cooling lava flow.



A chunk of limestone encased in solidified lava forms a xenolith.

The cones and lava flows of the San Francisco volcanic field, which covers about 2,000 square miles of the southwestern Colorado Plateau, result from several million years of volcanic activity. These powerful underground forces created a new addition to the region in the winter of 1064-65 AD.

Sunset Crater appeared when molten rock sprayed out of a crack in the ground high into the air, solidified quickly, and fell to earth as large bombs or smaller cinders. As periodic eruptions continued over the next 200 years, the heavier debris accumulated around the vent creating a 1,000-foot cone. The lightest, smallest particles—

ash—blew the farthest, eventually dusting 800 square miles of northern Arizona. Perhaps less spectacular than the original pyrotechnics, two subsequent lava flows, the Kana-a flow in 1150 and the Bonito flow in 1220, destroyed all living things in their paths.

The processes that created Sunset Crater also created a sculpture garden of extraordinary forms at its base. As new gas vents opened suddenly, spatter cones sprouted from the ground like miniatures of the cone itself. Moving lava developed a crust on the surface where it cooled; caves were formed as the hotter material beneath drained away. Partially cooled lava pushing through cracks

like toothpaste from a tube solidified into wedge-shaped squeeze-ups, grooved from scraping against the harder rock.

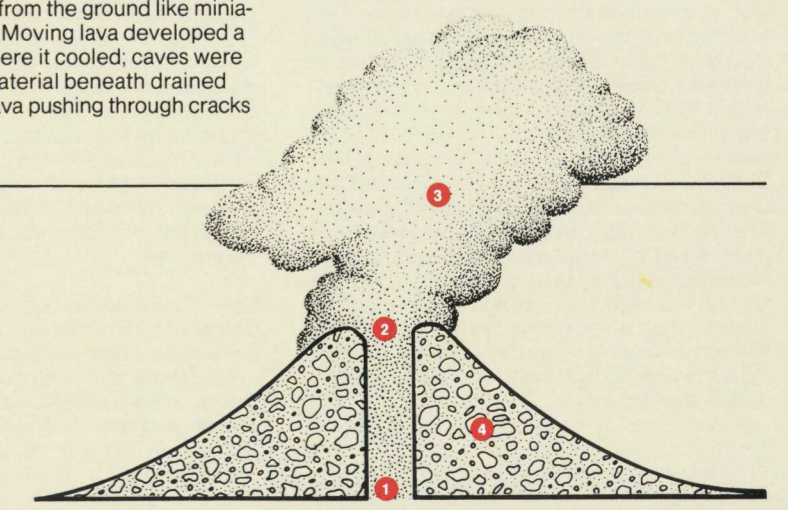
In a final burst of activity, in 1250, lava containing sulfur and iron shot out of the vent. The red and yellow oxidized particles fell back onto the rim as a permanent "sunset" so bright that the cone appears still to glow from intense volcanic heat.

Formation of a Cinder Cone

Cinder cones, such as Sunset Crater, are formed by explosive eruptions. Magma, a mixture of molten rock and highly compressed gases, rises upward from its underground source. As the magma ascends, the extreme pressure drops and gases are released. The relatively thick magma and the high gas percentage causes an explosion out of the central vent.

Solidified rock pieces—of various sizes—fall back down around the vent, creating a mound. Another kind of eruption, involving thinner magma with a lower gas content, produces lava flows that may issue from the side or base of the cone.

- 1 Magma—molten rock and gases
- 2 Central vent
- 3 Cloud of ash, cinders, and bombs
- 4 Cone formed from larger lava fragments



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Wukoki ruin—"big house" in Hopi—was built entirely from blocks of Moenkopi sandstone.



The Steller's jay, named after German naturalist Georg W. Steller, lives in the area year-round.



Citadel ruin stands beside the Citadel Sink, where a portion of Kaibab limestone collapsed to form a sinkhole.



The mullein, which can reach 6 or 7 feet, is one of many plants that grow on the surface of lava flows.



The largest ruin within the park boundary is the Wupatki pueblo, situated near the visitor center. A self-guiding tour

highlights important features of the site; rangers are on duty in summer to answer questions.



Ponderosa pines, abundant in the Coconino National Forest, were often used in pueblo construction.



Standing on the edge of a 3/4-mile-long earth crack is the ruin known as Lomaki, or "pretty house." Earth cracks,

resembling canyons, are fractures in the Kaibab limestone usually associated with earthquakes or volcanoes.

The volcanic field so crucial to the lives of southwestern Indians eight centuries ago has not changed drastically from the time when three cultures gathered for a time in the vicinity of the newly erupted Sunset Crater. Lava flows near the cone seem to have hardened to a rough surface only yesterday. And the ruined pueblos at Wupatki look from a distance as though they could still be home to an isolated people living, like the hardy Sinagua, practically "without water."

Today a paved road through these two protected areas provides easy access to Sunset Crater and some of the Wupatki ruins. Walking trails allow visitors close-up views. Equipped with a container of drinking water, thick-soled footwear, a hat, a map, and perhaps a camera, explorers on foot will see the unusual artistry of nature and ancient man.

A short trail alongside the Wupatki pueblo passes within touching range of what was once a multi-story residential complex, as well as the nearby amphitheater and ballcourt. The geological features along the trail are also worth inspecting. A monocline—a one-sided fold in the underlying sedimentary layers where the land rises slightly—acts as a backdrop for the ruins. The youngest rock layer, the reddish Moenkopi sandstone which provided the principal building material for the pueblo, is visible in several spots. Near the ballcourt is a good example of a blowhole, an opening in the Kaibab limestone layer that "inhales" and "exhales" air moving through interconnected underground cavities. Earthquake activity created fissures in the limestone, called earth cracks, in the western half of the monument. Doney Mountain, an elongated cinder cone to the west of the visitor center, commemorates 19th century prospector Ben Doney.

At the base of Sunset Crater, a 1-mile trail loops through the desolate volcanic landscape. The brittle *aa* (pronounced ah ah), much like lava from Hawaiian volcanoes, and the deep loose cinders at Sunset Crater do not seem a hospitable environment for plants and animals, yet many species eke out a living. Ponderosa pines, straight and tall in surrounding areas, grow stunted and twisted beside the cone, compensating for the lack of moisture with unusually shallow root systems that attempt to absorb moisture before it sinks deep into the cinders. In areas of solid lava, pinyon pines and one-seed junipers take root where small niches of soil have accumulated. Aspens grow in low-lying areas where water collects. The pink penstemon, an endangered species, makes its home exclusively in the crater area and on the northern slopes of the San Francisco peaks. The Wupatki basin receives even less rainfall than Sunset Crater, 7 to 9 inches

annually; it is less densely forested, its plantlife that of a high desert. Vegetation is not abundant at either site, yet there is enough to support a diverse animal population. Chipmunks live on pinyon nuts and juniper berries. Cottontail rabbit, blacktail jackrabbit, and the long-eared Abert's squirrel feed on seeds and leaves. Several types of lizards bask in the sun, occasionally scampering over the rocks. These small animals are food for predators such as snakes, coyotes, bobcats, and—though rarely seen—mountain lions. Mule deer, pronghorn antelope, and, in the winter, elk, roam the grassy meadows. Striped and spotted skunks are omnivorous, eating cactus fruit, small rodents, insects, and bird eggs. Of all the species of birds—migratory or year-round residents—the Steller's jay, with its royal blue feathers and tufted crown, is perhaps the most noticeable. A careful observer will be able to catalogue a large variety of wildlife.

Exploring the Parks

Established by President Calvin Coolidge in 1924, **Wupatki National Monument** occupies 56 square miles of dry, rugged land on the southwestern part of the Colorado Plateau directly to the west of the Little Colorado River. A paved loop road connects at both ends with U.S. 89; the Wupatki visitor center is 14 miles from the northern end of the road, 24 miles from the southern end, and 14 miles from Sunset Crater National Monument. This visitor center, also the administrative headquarters for both monuments, is open year-round except December 25 and January 1 from 8 a.m. to 5 p.m. Park rangers are available to provide information and answer questions. Also inside the visitor center are exhibits depicting the daily lives of the inhabitants of the Wupatki dwellings in the 12th and 13th centuries.

A short self-guided walking tour of the main Wupatki pueblo, the largest ruin within monument boundaries, begins behind the visitor center.

Other ruins within the monument may also be reached by trails. Lomaki ruin lies ½-mile off the main loop road. Citadel and Nalakihi ruins are situated beside a roadside pullout. A 3-mile road beginning ¼-mile from the visitor center leads to Wukoki ruin. Guided tours are scheduled in summer; groups may request special tours during other times of the year.

Sunset Crater National Monument became part of the National Park system in 1930 by proclamation of President Herbert Hoover. The prominent features are an unusual 1,000-foot volcanic cone and its subsidiary formations. The visitor center is 2 miles from the southern entrance to the loop road off U.S. 89. In the summer months, rangers run a contact station at the base of the crater. Nearby begins a self-guiding nature trail. The 1-mile loop allows visitors to examine several interesting volcanic features. One stop along the trail is an ice cave; because of a collapse in 1984, the cave is unstable and closed to visitors.

Related Sites: This section of the Colorado Plateau contains several other noteworthy Indian sites, all within a day's drive from Flagstaff. Sinagua ruins are located at Tuzigoot and Montezuma Castle National Monuments, south of Flagstaff, and at Walnut Canyon, just outside the city to the east. The Anasazi, some of whom inhabited Wupatki during the time of the ashcover, also built cliff dwellings at Canyon de Chelly and Navajo National Monuments in northeastern Arizona.

Administration: Wupatki and Sunset Crater National Monuments are administered by the National Park Service, U.S. Department of the Interior. A superintendent, whose address is Wupatki National Monument, HC 33, Box 444A Flagstaff AZ 86001, is in charge of both monuments.

About Your Visit

Camping and picnicking: No gasoline, food service, or overnight accommodations are available in either park. Picnic areas are situated along the loop road. Open fires are allowed only where fire grates are provided; wood collecting is not permitted. Pets must be on a leash at all times and are not allowed in buildings or on trails. No backcountry camping is permitted. Just west of the Sunset Crater park boundary is the Bonito Campground, managed by the National Park Service. The campground, containing 44 sites without trailer hookups, is open from April through mid-November and may be occupied on a first-come, first-served basis. One site is accessible to the handicapped. An amphitheater is located in the campground not far from the visitor center. From June through August, rangers present nightly campfire programs.

For Your Safety: The loop road through the monuments is narrow and winding, with soft shoulders. Stop only at designated pullouts. In congested areas, speed limits are reduced for the safety of pedestrians. Be on the lookout for wildlife; livestock often cross the road in the fall, winter, and spring, when the area becomes open range. Do not approach wildlife closely. Though most animals are shy and run from humans, they may charge or bite when threatened. Rattlesnakes, though not often observed by visitors, inhabit both monuments.

Stay on trails and do not allow children to explore unsupervised. While hiking, please make sure to carry an adequate water supply as dehydration is a real danger in the arid climate. At Sunset Crater, sharp lava can puncture shoes and cause scrapes and cuts. Both parks are at a relatively high elevation; roads can quickly freeze up in the colder months.

Please help protect the resources: All features within the monuments are quite fragile. Some ruins at Wupatki are situated along cliff edges, their ancient walls unstable. To preserve them for the future, please do not damage the buildings in any way. Where trails are provided, please stay on them at all times for your own safety as well as protection of natural and man-made resources. Removal of plants, rocks, or antiquities—potsherds, projectile points, building fragments, and all other artifacts—is prohibited by Federal law. Climbing is no longer permitted on Sunset Crater, due to severe erosion brought about by years of that activity. For those who have the time and interest, there are other cinder cones in the area, such as nearby O'Leary Peak, that visitors are welcome to explore. See one of the rangers for further information.

