United States Department of the Interior
NATIONAL PARK SERVICE
ORGAN PIPE CACTUS NATIONAL MONUMENT
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Ajo, Arizona 85321

PREHISTORIC LITHIC ARTIFACTS COLLECTED FROM BATES WELL RANCH AZ Z:13:39(ASM)

ORGAN PIPE CACTUS NATIONAL MONUMENT, PIMA COUNTY, ARIZONA

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ABSTRACT

Agency: Organ Pipe Cactus National Monument (Organ Pipe), National Park Service (NPS or Park Service), U.S. Department of the Interior.

Land Jurisdiction: NPS and State of Arizona

Title: *Prehistoric Lithic Artifacts Collected from Bates Well Ranch, AZ Z:13:39(ASM), Organ Pipe Cactus National Monument, Pima County, Arizona.* NPS Cultural Resources Report No. ORPI 2010A.1.

Project Description: In conjunction with a Class III intensive archeological survey of the historic Bates Well Ranch headquarters area performed in January 2010, curated prehistoric lithic artifacts collected in previous archeological surveys of the area were examined at the NPS Western Archeological and Conservation Center (WACC) in Tucson, Arizona. The artifacts were inspected for use-wear and classified according to morphology, technological manufacturing techniques, and stylistic and functional attributes. Projectile points were typed and general time periods assigned to the point styles to contribute to the Organ Pipe Cultural Resources Management Plan (CRMP) and to promote regional syntheses.

Location: Organ Pipe Cactus National Monument, northwestern quadrant.
Legal Description – Township 14 South, Range 07 West, Section 35 NE ¼; Section 36 NW ¼; Section 25 SW ¼; & Section 26 SE ¼.
Bates Well USGS 7.5' topographic quadrangle, provisional edition 1990. Gila River Baseline and Meridian.

Acreage: N/A

Area of Potential Effect (APE): N/A
The artifacts in this study were collected previously at Bates Well Ranch and curated at the NPS Western Archeological and Conservation Center (WACC) in Tucson, Arizona.

The Class III intensive survey of a 100-acre area surrounding the Bates Well main ranch headquarters undertaken in January 2010 (NPS Cultural Resources Survey Report No. ORPI 2010A) resulted in no diagnostic prehistoric artifacts identified or collected at that time. This surprised the Park Service because Bates Well is at a pivotal junction of the Cherioni and Cuerda de Leña washes where they coalesce to form the Growler Wash, an area of high probability for cultural sites, both historic and prehistoric. The area is said to have been a major crossroads on the ancient salt and shell trade route that ran from Puerto Peñasco in Mexico to the Gila Bend, and in fact, there was an O'odham village located where the Growler Mine Group recorded mining patents west of Bates Well, *T junikaatk* ("place of the saguaro fruit") (Doyel & Eiler 2003; Zepeda 1985). It is believed that although substantial prehistoric archeological sites, trails, and prehistoric rock art are located within 1 mi. of the Bates Well Ranch headquarters, any remaining prehistoric artifacts at the headquarters compound itself were collected during the historic period of ranch occupation and subsequent use by the NPS and Border Patrol.

The ranch headquarters saw extensive occupation during the mid-to-late nineteenth century when George Bates (or W. B. Bates according to some sources), Rube Daniels and other first settlers dug wells to provide water to the nearby Growler Pass mines and later the Growler Mine Group; again during the early to mid-twentieth century when the Gray family resided there and operated a cattle ranch to provide beef for the miners; from 1937 until the present day when the National Park Service acquired ownership of the ranch and surrounding 330,000 acres and continues to manage those acquired lands; and finally during modern times the U. S. Customs and Border Protection (Border Patrol) used the area as a Forward Operating Base (FOB) from 2003 until 2010 for interdiction of illegal aliens and smugglers. The area has been impacted by cattle grazing; pedestrian and horse traffic; wagons and ore carts; and motorized vehicles including all-terrain vehicle (ATV) traffic. If research is accurate, the area may have been impacted by thousands of years of prehistoric and protohistoric use as well. The purpose of this study is to identify prehistoric artifacts found in the vicinity and curated in order to establish that at some point previously, there had been a prehistoric artifact component, and to document it before it is forgotten.

Area Surveyed: N/A

Number of Sites: One: historic Bates Well Ranch, AZ Z:13:39(ASM).

Register Eligible Properties: One. Bates Well Ranch, AZ Z:13:39(ASM), was listed on the National Register of Historic Places in 1994.

Register Ineligible Properties: None

Recommendations: For accurate research and future ranch interpretive considerations, Organ Pipe Cactus National Monument needs not to lose sight of the prehistoric/protohistoric components that existed in the vicinity before the early twentieth century ranching heyday of Bates Well Ranch. Archeologists need to record other prehistoric archeological sites and mines in the surrounding landscape, possibly as archeological districts. The projectile points typed during this study should be synthesized into regional studies. Pinto, Gypsum, Cortaro, Sobaipuri and Pueblo Snaketown Side-Notched types are represented in the lithics assemblage. Other formal tools in the assemblage are usual and without any distinctive characteristics, other than a few which could be representative of Paleoindian artifacts, but exact provenience information prohibits a definitive classification.

Further research is recommended to:
a) locate and record the lost village of *T junikaatk* or *T junikáatto* (various spellings), and explore its relationship to the ancient salt and shell trade network. Apparently the Salt Trail passed through this village and it stood at the crossroads of the north-south and east-west trade routes. The Salt Trail is significant at a national level, and should be recorded as such on the National Register of Historic Places. A Class III intensive archeological survey of the Salt Trail and search for the village would be the first steps towards recording these very important sites on the National Register. Therefore an intensive archeological survey is recommended of the Salt Trail and the village of *T Junikaatk*;

b) intensively survey the surrounding landscape for evidence of akchin farming and desert water control devices—particularly at the confluence of Cherioni and Cuerda de Leña Washes where they coalesce to form Growler Wash southeast of Bates Well. Aerial photographs depict a charco, canals, and extensive akchin fields there, though they have not yet been intensively surveyed or recorded. Southwest of Bates Well along Growler Wash is also a high probability area for as-yet unrecorded akchin fields and water control devices—canals have been located where Growler Wash crosses the Bates Well Road. The Growler Wash environs and Bates Well Ranch together form a prehistoric and historic cultural landscape (district) representative of many water control devices utilized on the Sonoran Desert. Therefore an intensive archeological survey is recommended of the canals, represo, charco, akchin farming fields, and other prehistoric features (including possible village site) located at the confluence of the Cherioni and Cuerda de Leña Washes;

c) better document the extensive rock art at the mouth of Growler Canyon (where the motifs are nearly all related to early akchin agriculture and are believed to be associated with the [possible] village site at the confluence of the Cherioni and Cuerda de Leña washes). Informants from the Tohono O'odham Nation and H'ia C'ed O'odham should be consulted and invited to participate in the interpretation of the motifs;

d) research, date, and record the stone-walled structures south of Growler Wash believed to be ruins of O'odham habitations, in consultation with O'odham Nation tribal informants;

e) put to good use the Organ Pipe Cactus National Monument prehistoric lithic assemblages previously collected from all sites in the park that remain unanalyzed and unclassified. A ground stone study should be undertaken and the stone tools analyzed, documented, photographed, and published to enable regional syntheses, especially the stone ax heads. A projectile point typology should be developed that draws upon different lithics analyses undertaken for different locations in the park, to identify stylistic inferences. This data should then be integrated into regional lithics studies to aid in dating sites and affiliation of cultural groups, and to contribute to the study of migrations, demographics, populations, subsistence and settlement practices, the beginnings of agriculture and food storage, water control on the Sonoran Desert, and a greater understanding of the lifeways of those who went before us;

Concerning historic features near the Bates Well Ranch headquarters:

f) research and document completely El Camino del Diablo and its relationship to Bates Well Road and Armenta Ranch Road on Organ Pipe;

g) intensively survey the locations of the historic ranch/store at Growler Mine Group and the other historic mines, prospect pits, mining camps, and features and consider recording the camps and features as a historic mining district—the Growler Historic Mining District (a cultural landscape);

h) research and date the arrastra near the cowboy bunkhouse within the Bates Well Ranch headquarters compound. This important early mining appliance is the only known arrastra still in existence in the entire region. It is significant in that it represents the earliest method of

processing ore in the development of the mining industry and economy of Arizona (state level significance); and

i) the 1994 National Register nomination form for Bates Well Ranch should be updated to add to the areas of significance—currently the ranch is listed as significant in the area of Agriculture, specifically frontier cattle ranching. Areas of significance should be added: Water Control Devices on the Sonoran Desert; and Early Mining and Prospecting. Additional features should be added to the list of contributing elements, including the historic gravesite; the fencing/trigger gates; prospect pits, and others.

To summarize, it is recommended that additional research directed at prehistoric, protohistoric, and historic concerns be undertaken as soon as time and funding permit.

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CURATED AT THE NATIONAL PARK SERVICE
WESTERN ARCHEOLOGICAL AND CONSERVATION CENTER, TUCSON ARIZONA

INTRODUCTION

In January 2010, the University of Arizona Anthropology Department collaborated with the Organ Pipe Cactus National Monument (Organ Pipe) Cultural Resources Office in performance of an intensive Class III archeological survey of approximately 100 acres surrounding the headquarters of an early twentieth century cattle ranching operation on the Sonoran Desert, historic Bates Well Ranch, AZ Z:13:39(ASM) (Jelinek & Cutright-Smith 2010) (Figures 1 and 2).

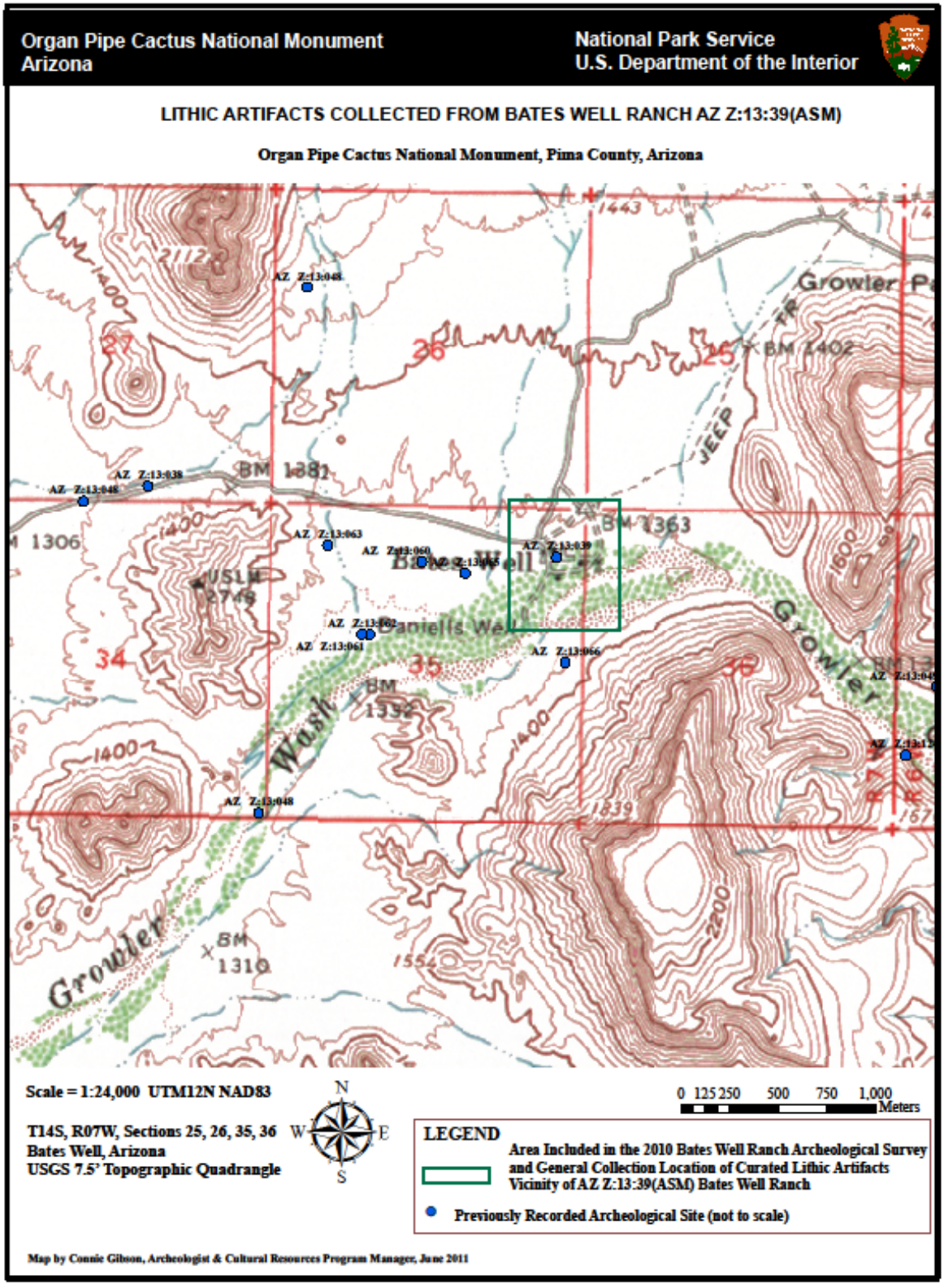


Figure 2. Boundaries of the 100-Acre Intensive Archeological Survey of January 2010 (1:24,000 Scale View). 1990'Bates Well Arizona' Provisional Edition USGS topographic quadrangle. Salt River Baseline and Meridian.

Bates Well Ranch is located in a scenic arid valley in the northwestern quadrant of Organ Pipe. It is situated on an alluvial flat bordered by low rocky mountains approximately 2.5 mi. south of the northern park boundary and 8 mi. east of the western park boundary. It is a remote location known to smugglers and undocumented aliens who tend to 'overnight' in the historic buildings, and there is an on-going battle between Organ Pipe resources personnel trying to preserve the historic character of the cattle ranch, and vagrants and vandals who tend to damage and destroy the historic buildings. In addition to anthropic threats, there are forces of nature at work on the old wood and natural weathering occurring. A program to stabilize and prevent further deterioration of the historic buildings is underway at the park, where three ruins preservation field schools have been held in recent years in collaboration with the University of Arizona Schools of Architecture and Anthropology. Much was accomplished in the way of securing underpinnings of several structures, but much still needs to be done to preserve the ranch structures and features. There are few early twentieth century cattle ranching operations representative of frontier settlement on the Sonoran Desert still surviving and open to visitors for interpretation. The ranch was listed on the National Register of Historic Places in 1994, significant to the statewide level for Agriculture (Cattle Raising) during the periods 1913–1944; and significant for being associated with early settler Robert Louis Gray, Sr.

The 2010 intensive archeological survey resulted in no prehistoric artifacts identified or collected at that time. This surprised the Park Service because Bates Well is at a pivotal junction of the Cherioni and Cuerda de Leña washes where they coalesce to form Growler Wash. The vicinity is said to have been a major meeting place on the ancient salt and shell trade route that ran from Puerto Peñasco in Mexico to the Gila Bend area, and was at one time very populous; in fact, akchin floodwater farming fields, irrigation canals and at least one represo have been identified in aerial photographs near this confluence. It is not known how early or how late the salt and shell trade routes developed, only that they were utilized since ancient times, and were very active during the Hohokam cultural phases (A. D. 150 to 1450). The O'odham still have a coming-of-age ceremony that involves elder and young men traveling to the Gulf of California to bring back salt (Lumholtz 1912:268–273; Underhill 2000:60).

Numerous research sources indicate that an O'odham village was located where the Growler Mine Group recorded mining patents ½ mi. west of Bates Well at *T junikáatto,* also variously spelled as *Juni Ka:ack* or as *Jun kaij* (in O'odham "place of the saguaro fruit" or "where there is organ pipe fruit") (Doyel & Eiler 2003:27, Zepeda 1985:9; Greene 1977:121). Approximately 1 mi. south of Bates Well are located extensive petroglyphs that portray hundreds of early akchin floodwater farming motifs and images of village life (Nacho Flores of the Eagle Clan, Tohono O'odham Nation, personal communication to Connie Gibson, March 3, 2011), as opposed to much prehistoric rock art that portrays hunting themes (Stokes 2002). The motifs follow the entire agricultural sequence from spring equinox through the fall equinox, and include images of fields, men holding hoes (long pointed sticks), maize, squash blossoms, rain, monsoons, lightning, and plan views of a village (Figure 3). Additionally, there are motifs of fish, turtles, two flute players (kokopelli figures) (one female and one male), and a creation myth rock.

Figure 3. Petroglyphs portraying floodwater farming and village life motifs, in proximity to the Bates Well Ranch.

The Salt Trail is considered to be significant at the national level, and plans in 2005 were to record the trail on the National Register in an effort to protect it. Apparently this plan was never developed due to a lack of funding, and this project needs to be restarted as soon as time, staffing, and funding permit. There are few resources on Organ Pipe that are significant at the national level, and this is one. Research related to the village of *Juni Ka:ack* as the junction of the Salt Trail would be integral to this effort.

It is believed that although substantial prehistoric archeological sites, trails, and extensive rock art are located within 1 mi. of the Bates Well Ranch headquarters, any remaining prehistoric artifacts at the headquarters itself were collected during the historic period of ranch occupation and subsequent use by the NPS and the U. S. Customs and Border Protection (Border Patrol).

The Bates Well vicinity is first encountered in the literature surrounding the Coronado Expedition. In 1540, Melchior Diaz left the main body of the Coronado Expedition at Corazones, Sonora and headed for the mouth of the Colorado River. Diaz and his party were a support group for the expedition intent on finding the fabled wealthy seven cities of gold, or Cíbola. It is believed Diaz traveled to the mouth of the Colorado with guides along a southern trail route that became famous as El Camino del Diablo. An access trail component of El Camino del Diablo is now called Bates Well Road, and is traveled daily by Organ Pipe personnel, U. S. Fish and Wildlife personnel en route to the Cabeza de Prieta Wildlife Refuge, and Border Patrol.

Father Kino, who may have been the first white man to traverse the Ajo-Sonoyta Valley ca. 1698, noted the region as an agricultural area, describing the Indians here using crude but effective irrigation and raising pumpkins, squash and beans. Thomas Childs, Sr., a former soldier, found remnants of Mexican and Indian mining ventures when he came through Ajo in 1847 (Cook 1967). Thomas Childs, Sr. is said to have visited the western Papaguería after inquiring where the Yuma Indians in the lower Colorado River area obtained mineral paint to paint their faces (Hoy 1970:89). The Organ Pipe vicinity is mentioned in the literature as being the location of mining activity by local Native Americans around 1856. Spude (2010) quotes A. B. Gray in *Survey of a Route for the Southern Pacific Railroad, on the 32nd Parallel:*

…..while at Sonoyta "the Indians represented rich Placers existing throughout this region, and large numbers of them have lately come in with considerable quantities of the dust. They were trading it off for trifles to the Mexicans" (Gray 1856:115)

The Bates Well area saw extensive occupation during the mid-to-late nineteenth century when prospectors arrived to mine gold and silver. A. B. Gray reported that the Mexicans and Indians had worked mines in the Ajo area and Papaguería, but both were driven off by the Apaches. Gray learned the Indians had used the copper paint found in the red oxide and green carbonate of copper in the mountains to paint their bodies, and viewed the mines as being of great value. In 1848 with the discovery of placer gold in California, many traversed the Sonoran Desert en route to southern California, traversing El Camino del Diablo; after 1854 there began a back migration into the Gadsden Purchase lands south of the Gila River, and those prospectors are among the first we can document as settling on Organ Pipe lands (Spude 2010). The first mining company to operate in Arizona and profit from the rich copper mines at Ajo during 1854–1859 developed trail systems running from Ajo to Sonoyta with a crossing at the border called "Dunbar's Store" (now Dowling Well on Organ Pipe-managed lands) (Hoy 1970:94; Spude 2010). Edward E. Dunbar operated a storehouse west of present-day Lukeville. Pack trains of burros hauled ore from Ajo to the border, then west to the Colorado River for shipment to Wales in Great Britain for processing. In 1879, investigation by Major General O. O. Wilcox indicated no settlements west of Quitobaquito along the Camino del Diablo. A later charting in 1893 showed almost no change except for "an additional village at Growler Well" (Cook 1969).

Some research sources claim a prospector named George S. Bates dug the first well that became known as Bates Well; the well provided water to prospect and also a little water for an arrastra (Spude 2010:7). Other reference sources say Bates Well was first dug by W. B. Bates in 1886 (Doyel & Eiler 2003; Greene 1977:89) or in 1870 (Hoy 1976:164). W. B. Bates is the name used in the 1994 National Register nomination form prepared by Lawrence F. Van Horn (Van Horn 1994). This would suggest 1886 as a date when the arrastra was present and operating. W. B. Bates may have been a Confederate soldier who dug the first Bates well and then later gave or sold it to Rube Daniels (Hoy 1976). Bates may have been involved with the arrastra and the mining referenced by Carl Lumholtz during his visit to the area ca. 1909–1910. Lumholtz observed that "Some of the former sand people live here. At present this is a mine and store, a few Americans residing. Good well" (Lumholtz 1912:378). This reference to mining was used to date the arrastra to at least 1909. The name of the area was changed for a while to Growler Well, an indication of how important the well was to the Growler mines (Greene 1977:89). Kirk Bryan's 1922 work concerning water sources on the desert and areas surveyed in 1917, shows two wells at Bates Well, none at Growler Mine, and did not show the rumored "numerous

springs in the nearby mountains" associated with the O'odham village of *Juni Ka:ack* (Bryan 1922; Hoy 1976).

Rueben Daniels (Figure 4) was the first person known to have run cattle on the Bates Well property, which he is said to have obtained from W. B. Bates ca. 1913 (Van Horn 1994). Daniels dug a well at the southwestern corner of the property, which was ruined during a massive flood that tore through Growler Wash ca. 1951 (Figure 5). Ruins of the Daniels well and troughs can still be seen south of the western corrals and cattle chute.

Figure 4. Reuben Daniels, first person known to have run cattle at Bates Well Ranch. The demand for beef by miners was the driver behind the beginning of cattle ranching on what became Organ Pipe lands. Photo: Organ Pipe Cactus National Monument Cultural Resources Office.

Figure 5. Growler Wash, facing west.

At least two structures for which there are no known dates of construction are located south of Growler Wash up a hillside beyond the reach of rushing waters (Figures 6 and 7). Research has found reference to a stone house outline in literature dating to 1977 (Greene 1977:121), and photographs of a similar structure to a feature found by University of Arizona archeologists during the 2010 Bates Well headquarters survey (Jelinek & Cutright-Smith 2010) were found in the ORPI Cultural Resources Office files. The two structures have now been identified as the remains of Hia C'ed O'odham or Tohono O'odham houses or habitations. They could date to the Protohistoric period or earlier, the true date of construction is still unknown at present. The structures are very similar, circular with hard-packed earthen floors covered over with loose earth on which little grows; and both have doorway openings. They likely were surrounded with sheaves of grasses or brush along the inside walls to serve as windbreaks; or covered over with bent saplings, brush, and mudpack to form a jacal roof. An intensive survey is planned of the environs in the future to ground-truth the 2007 and 2010 photographs.

The ranch headquarters area saw extensive impact from settlers who dug wells to provide water to the nearby Growler Pass mines and the later Growler Mine Group; again during the early-to-mid twentieth century when the Gray family resided there and operated a cattle ranch to provide beef for the miners; since 1937 when the Park Service acquired ownership of the ranch and surrounding 330,000 acres; and finally during modern times when Border Patrol used the area as a Forward Operating Base (FOB) for interdiction of illegal aliens and smugglers (Figures 8 and 9). The area has been impacted by more than 150 years of historic pedestrian, horse, wagon/ore cart, vehicular, motorcycle, and ATV traffic; and possibly by thousands of years of prehistoric occupation (based upon projectile point styles typed in the lithic assemblage, see BATES WELL RANCH FLAKED STONE).

Figure 6. Stone-walled Structure No. 1 near Bates Well Ranch. Facing west. A palo verde is growing in the doorway (break in rock wall). Photo: Jelinek & Cutright-Smith 2010.

Figure 7. Stone-walled Structure No. 2, facing southwest. Photo: Joe Tuomey.

Figure 8 (left). Border Patrol diesel generator and vehicle at Bates Well ca. 2009, facing west. Figure 9 (right). Border Patrol Conex living units at Bates Well ca. 2009, facing west.

Over the years, most historical artifacts of value at Bates Well Ranch, such as the desert cooler, were either scavenged or collected and removed to the National Park Service Western Archeological and Conservation Center (WACC) in Tucson. The still-standing ranch structures are currently in ruins, though in 2010, and again in early 2011, Ruins Preservation Workshops were held in collaboration with the University of Arizona School of Architecture and Landscape Architecture. The field school workshops provided much-needed stabilization to several ranch structures in imminent danger of collapse. Additional preservation work is planned and funding is being sought to stabilize the remaining historic ranch buildings and features at the ranch. The 100-acre intensive archeological survey was performed in early 2010 as baseline documentation for the proposed ruins preservation activities.

Because there had never been an intensive Class III archeological survey of the ranch headquarters until 2010, prehistoric artifacts were not collected in a systematic fashion and most were left in place on the ranch land. Various NPS personnel told us of the existence of many artifacts they had come across during their fieldwork over the years, including ceramic sherds, shell, and lithic items. WACC has a collection of 17 items and a desert cooler collected over a period of several decades from the ranch. Unfortunately for researchers, the Bates Well Ranch appears to be the latest in a series of federal sites looted and collected by unknown individuals in recent years in violation of the Archeological Resources Protection Act, the Antiquities Act, the Organic Act, the National Historic Preservation Act, and other federal and state legislation designed to protect and preserve our heritage sites for future generations to learn from and enjoy.

The 2010 archeological survey was significant in what was not found—prehistoric and/or protohistoric artifacts that were believed to be present in meaningful if not substantial quantities just a few years ago have gone missing, collected and taken off the site by persons unknown. The results of the 2010 100-acre survey (see Figure 2) were negative for prehistoric artifacts, and the unfortunate outcome of that is a situation where present and future researchers will not have sufficient data to draw reliable conclusions concerning what peoples or cultures may have been present at Growler Wash and Bates Well Ranch in ages past, or to learn about their lifeways. The only consolation is that there remains a significant amount of rock art petroglyphs on boulders to

instruct and inform on early agricultural practices related to floodwater farming and village life in the vicinity of the confluence of the Cuerda de Leña and Cherioni washes near Growler Canyon, where Bates Well Ranch is located—and the handful of lithic artifacts collected and curated at WACC and studied for this report.

This study was undertaken to document the few prehistoric lithic artifacts that were collected from the Bates Well area during earlier controlled research and curated at the NPS Western Archeological and Conservation Center and to remind researchers that at one time there may have been a meaningful prehistoric artifact component at the headquarters area, which due to uncontrolled collection, is now lost.

ENVIRONMENT

Organ Pipe lands are on the Sonoran Desert within the Basin and Range physiographic province, a geologic term describing a series of separate and parallel mountain ranges with broad valleys interposed, extending over a wide area. The land is hot and arid, characterized by cacti and thorny, scrubby vegetation. The Monument contains portions of the Ajo Range to the east and the Growler Mountains to the northwest; the Bates Mountains, Diablo Mountains, and Puerto Blanco Mountains all are within the boundary of the park. Moderately sloping bajadas created by alluvial fans connect the mountains and the valley lowlands. Flat plains lay between the mountain bajadas with dry washes that flood the surrounding plains with sheetwash during summer monsoon rains. The original bedrock in this area was formed by volcanic action between 1.5 and 2 billion years ago. Balsaltic volcanism began approximately 23 million years ago and was especially intense about 10 million years ago. Underlying these later depositions is granite bedrock that provided the source of the intruding mountain ranges that characterize the region and of the weathered soils that were eventually deposited on the bajadas and, ultimately, the plains. Aeolian sand and areas of tightly packed pebbles and stones are common in the region (USDA Soil Conservation Service 1972:2).

The Papaguería is defined as that region bounded by the Gila River to the north; the Santa Cruz River to the east; Puerto Peñasco, Mexico and the Sea of Cortez to the south; and the Colorado River to the west. Organ Pipe lands are within the western Papaguería. A generalized west-to-east increasing rainfall gradient means that farming in the western Papaguería is made much more difficult than in the eastern Papaguería. Rainfall and other weather parameters are recorded by automated weather stations at 10 sites within the park, along with eight data-logging rain gauges at other sites. Inverse distance weighted interpolation of 2010 annual rainfall from 17 rain gauges at Organ Pipe resulted in annual rainfall totals ranging from a high of 12.74 in. at Mt. Ajo to a low of 4.58 in. at Quitobaquito (Organ Pipe Cactus National Monument 2010). The Colorado, Gila, and Sonoyta rivers are the only permanent rivers in the region. During ancient times and more modern times, humans had to rely on springs and tinajas for water. The nearest water flows to the project area are believed to have been river courses at one time that have since gone underground and now are intermittent washes that run only during the summer monsoon floods. The nearest water flow to Bates Well is the large braided and convoluted Growler Wash, which runs south of the Bates Well Ranch. The Cuerda de Leña Wash and the Cherioni Wash coalesce at the mouth of Growler Canyon and feed into Growler Wash before traveling north to

the Gila River. Prehistoric irrigation canals, akchin farming fields, and at least one represo or charco can be seen in aerial photographs of the vicinity, and nearby rock art confirms that floodwater farming was taking place. There are upwards of 300 rock art petroglyphs portraying images of early farming practices and village life within 1 mi. of Bates Well Ranch.

The average annual temperature for 2010 was 70.5° F, 0.4° higher than the long-term average of 70.1° for the period 1949–2010. Temperatures have increased by approximately 2° F from the previous period and have varied widely from year to year. Increasing temperature is also apparent in all seasons as well as for overnight lows and daily highs (Organ Pipe Cactus National Monument 2010). Temperatures above 100° are common.

Soils in the vicinity of Bates Well Ranch are characterized as mostly Antho fine sandy loams, though of a very gravelly variant. They are derived from andesite, schist, granite, quartzite, rhyolite, and tuffs, congregating on alluvial fans and floodplains. Slopes range from 1 to 3 percent and inclusions are approximately 15 percent torrifluents. The Growler Wash has become braided and twists and divides upon itself over large areas of lands characterized as Torrifluvents, a nearly level and gently sloping soil unit that consists of recently deposited stratified alluvium along eroded stream channels. Slopes range from 0 to 5 percent, and texture varies from gravel to loamy sand with stones and cobble that are mainly found in the upper reaches of the drainages (U. S. Department of Agriculture Soil Conservation Service 1972). Deep sands are found in the stream beds, which make walking somewhat difficult, and it is not unusual to sink into soft knee-level sands in the dry washes.

Vegetation consists of mixed scrubs, predominating are palo verde (*Cercidium microphyllum*), catclaw acacia (*Acacia greggii*), ironwood (*Olneya tesota*), saguaro (*Carnegiea gigantia*), organ pipe cactus (*Stenocereus thurberi*), cholla (various species of *Opuntia*), ocotillo (various species of *Fouquieria*), and creosotebush (*Larrea tridentata*).

The portion of the Sonoran Desert that contains Organ Pipe Cactus National Monument supports hundreds of species of large and small mammals, birds, and reptiles. Mammals found within Organ Pipe include ground squirrels (*Ammospermophilus harrisii* and *A. leucurus*, *Spermophilus tereticaudus*), desert mule deer (*Odocoileus hemionus crooki*), javelina (*Dicotyles tajacu),* coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotus*), bobcat (*Lynx rufus baileyi*), mountain lion *Puma concolor azteca*), bighorn sheep (*Ovis canadensis nelsoni*), and endangered Sonoran pronghorn antelopes (*Antilocapra americana sonorensis*). Other mammals include the ring tailed cat (*Bassariscus astutus*), desert cottontail (*Sylvilagus auduboni arizonae*), and black-tailed jackrabbit (*Lepus californicus eremicus*). There are a variety of smaller mammals found in Organ Pipe, such as the lesser long-nosed bat (*Leptonycteris curasoae*), common cactus mouse (*Peromyscus eremicus*), kangaroo rat (species *Dipodomys*), pocket mouse (species *Chaetodipus*), and numerous other species of bats, shrews, and rodents (Organ Pipe Cactus National Monument 2010). The most commonly seen mammals in the current project area include javelinas, desert cottontails, jackrabbits, coyotes, bobcats, and occasionally mountain lions and pronghorn antelope.

Hundreds of bird species make their permanent or seasonal home in Organ Pipe. Birds are the most taxonomically diverse vertebrate group in the monument with more than 100 species recorded through recent monitoring. During 2010, 42 survey points were sampled on six

transects at Organ Pipe. Two transects were in xeroriparian habitats and four were in upland (desert scrub) habitats. There were seven point count stations along each transect and each point was surveyed twice in May. During 2010, 1,411 birds of 59 species were detected within the park. White-winged doves were the most commonly detected species, accounting for 17% of total detections. Gambel's quails (10%), mourning dove (9%), Gila woodpecker (9%) and brown-crested flycatcher (8%) were also common. No new species were detected in the park in 2010. Many bird species favor the abundance of seasonal flowers and lush new growth from seasonal rains, particularly along the narrow xeroriparian washes which support large ironwood, mesquite, desert willow and palo verde trees. The most commonly seen birds are Gambel's quail, roadrunners, doves, hawks, vultures, and ravens.

Reptile species in Organ Pipe include, among others, desert iguana (*Dipsosaurus dorsalis*), gila monster (*Heloderma suspectum*), chuckwalla (*Sauromalus obesus*), many varieties of lizards including horned lizards (species *Phrynosoma*), rattlesnakes (species *Crotalus*), shovel-nosed snakes (species *Chionactis*), leaf-nosed snakes (species *Phyllorhynchus*), desert tortoise (*Gopherus aggasizii*), and a variety of toads (species *Bufo*; *Scaphiopus couchii*) (Organ Pipe Cactus National Monument 2010). The most commonly seen reptiles in the region are lizards and snakes.

Before 12,000 years ago, environmental conditions were cooler and moister than at present (Palacios-Fest & Rankin 2008). For the last 9,000 years, however, climatic conditions have been such that the fauna, flora, and humans have had to adapt to an extremely arid, hot, and harsh desert environment. The primary consideration and greatest delimiter of human life and archeological sites has always been the scarce and scattered sources of water, among prehistoric hunters and gatherers, early Native American cultures, Spanish entradas, explorers, prospectors and gold miners, frontier cattle ranchers, and others who traversed and settled the region.

CULTURE HISTORY

Southwestern Arizona has a powerful and vivid history and prehistory that goes back thousands of years. Human occupations left traces of their culture history as material remains in archaeological and historical sites throughout what is now Organ Pipe Cactus National Monument land. Less than 5 percent of Monument lands have been surveyed for cultural resources, and conservative estimates of a possible 1,000 archaeological sites that have not yet been recorded due to staffing and time constraints, most dating to the prehistoric era. There have been several cultural chronologies developed for southern California, southwestern Arizona, and northwestern Sonora, Mexico that examine different periods of human occupation in the Papaguería. The Papaguería was named for the Papagos, former name of the Tohono O'odham. However, the region was home to various O'odham, Mexican, and Yuman peoples and plays a major part in Hopi and the Zuni Pueblo of New Mexico traditions. The culture history presented here is intended as a general identification of cultural sequences and a summary of the history of human occupation of Monument lands. It is drawn primarily from Mabry (1998), Ahlstrom (2001), Hartmann & Thurtle (2000), Hayden (1967; 1969; 1970; 1976), Rogers (1929; 1945;1958), Rankin (1995), Foster et al. (2002), Altschul & Rankin (2008), and Beck and Jones (2010), although it is based upon the work of many different researchers over the years (Table 1).

Table 1. General Culture History of Organ Pipe Cactus National Monument Lands.

PERIOD	*APPROXIMATE DATES*
PRE-CERAMIC & PRE-AGRICULTURAL	**Time Prior to ~2000 B.C.**
Pre-Paleoindian Period	**Time Prior to 10,000 B.C. (may date as early as the Malpais Tradition 30,000–40,000 years ago)**
Paleoindian Period	**10,000 B.C. to 7500 B.C.**
Archaic Period-Early, Middle, and Late	**7500 B.C. to A.D. 200**
Invention & Spread of the Bow & Arrow	**~A.D. 500–700**
EARLY AGRICULTURAL	**2000 B.C. to A.D. 200**
Late Prehistoric Period	**A.D. 200 to 1400**
CERAMIC	**A.D. 150 to 1900**
Hohokam	**A.D. 150 to 1500**
Patayan	**A.D. 700 to 1850**
Trincheras	**A.D. 700 to 1900**
Protohistoric Period	**A.D. 1400 to 1540**
Early Historic Period	**A.D. 1540 to 1848**
Mid Historic Period	**A.D. 1848 to 1940**
Arizona Territorial Period	**A.D. Feb 24, 1863–Feb 14, 1912**
World War II & Cold War Period	**A.D. 1940 to 1989**
Modern Period	**A.D. 1989 to Present**

Adapted 2010 by Connie Thompson Gibson from Ahlstrom (2000, 2001); Huckell (1984); Mabry (1998); Foster et al. (2002); Beck & Jones (2010); Rogers (1929-1945-1958), Hayden (1967-1969-1970-1976); Rankin (1995); Hartmann & Thurtle (2000); Altschul & Rankin (2008).

Culture Ecology is an anthropological theory that considers adaptation to the environment as the paramount driver behind human cultural changes. Adaptations to climate change at the end of the Pleistocene and beginning of the Holocene, extinction of megafauna, changes in subsistence lifeways during the Archaic period, all led to different adaptive strategies, migrations, population shifts, contact with other cultures and diffusion of technologies, and warfare. The Spanish entradas and European immigrations were the ultimate environmental factors that forced indigenous populations to change and adapt to vastly different lifeways in order to survive—adaptation to changing environmental variables is the nature of survival. Changes in the Sonoran Desert environment over time subsequently led to changes in human cultural behaviors—hunting/gathering and subsistence practices; mobility/settlement patterns and resulting site types; the beginnings of agriculture, desert water control devices and technology, floodwater farming, and food storage; the introduction of new lithic technologies as represented by changes in projectile point styles and the introduction of the bow and arrow; the increase in use of ground stone technology; and the invention and spread of ceramic technology. Environmental factors are seen as the driving force behind human cultural changes that took place on the Sonoran Desert over the millenia.

Pre-Paleoindian Period

Some scientists believe humans were here well before the 12,000 B.P. (Before Present) date generally promulgated by archeologists (Adovasio et al. 1977; Hayden 1976; Whitley & Dorn 1993; Mabry 1998; Dillahey 1997; Meltzer et al. 1997). The history of human cultures in the Organ Pipe area may well begin with a pre-Paleoindian period, which could date to 30,000–

40,000 years B.P. This date is associated with the Malpais pluvial which lasted from 30,000 B.C. to 18,000 B.C. Julian Hayden (1976) identified the pre-Paleoindian Malpais human cultural tradition that evolved into the San Dieguito tradition in the Sierra Pinacate region of northern Sonora, Mexico, immediately southwest of Organ Pipe Cactus National Monument. Malcolm Rogers used the term Malpais to refer to pre-Paleoindian artifacts he identified along the Colorado River, but he later changed the term to San Dieguito, and Hayden revived the term to refer to a pre-Paleoindian tradition he believed evolved into the San Dieguito. The phase sequence goes: Malpais, which refers to the earliest inhabitants with a pre-projectile point horizon who entered the area 30,000–40,000 years ago and who used a basic flake and core tool technology (flakes and 'choppers'); followed by San Dieguito I, II, and III phases. San Dieguito describes a long-lived industry widely spread over southeastern California, northern Baja California, northern Sonora, Mexico, southern and western Arizona, and southern Nevada (Huckell 1998). Bruce Huckell has identified a San Dieguito site in proximity to Organ Pipe at Dateland on the Lower Gila River in southwestern Arizona (1998:145).

Malpais tradition sites and San Dieguito sites are ephemeral on the cultural landscape. They are surficial and the cultural remains rest on top of ancient land surfaces characterized by desert pavements and desert varnish (Huckell 1998). They consist mainly of crude percussion-flaked lithics (primarily bifacial choppers), shell tools, and earthen features. Malpais tools are distinguished by a heavy coat of 'desert varnish.' Lithic tools include notched and beaked tools, and choppers made primarily from tabular basalt or basaltic pyroclastic ejecta (Rankin 1995). Shell tools include gouges, scrapers, and knives. Cultural features called intaglios or geoglyphs were constructed by scraping the desert pavement back to expose lighter pavement beneath. Other Malpais features include 'sleeping circles,' trails, and trail shrines (Hayden 1976). Organ Pipe lands are located on an important salt and shell trading route between the Gila River environs, the Pacific Ocean, and the general vicinity of Puerto Peñasco in Mexico and the Sea of Cortez (Hayden 1972; Doyel and Eiler 2003:8; Lyon et al. 2008). The trading trails appear to come together at the vicinity of the Growler Wash, where the protohistoric village of *Juni Ka:ck* once stood at a crossroads (Zepeda 1985). It is not known how early or how late the salt and shell trade routes developed, only that they were utilized since ancient times, and were very active during the Hohokam cultural phases (A. D. 150 to 1450). The O'odham still have a coming-of-age ceremony that involves elder and young men traveling to the Gulf of California to bring back salt (Lumholtz 1912:268–273; Underhill 2000:60).

Beck and Jones (2010) have recently argued that initial colonization of the intermountain west region most likely involved groups moving inland from the Pacific coast carrying a non-Clovis technology which was already in use before Clovis technology arrived. They note the presence of an early prehistoric human presence in the region associated not with Clovis, but with a different technology altogether, the main diagnostic of which is the large, contracting stemmed projectile point. Dates associated with this technology are comparable to Clovis dates on the Plains (Beck and Jones 2010:81).

Paleoindian

After the pre-Paleoindian period, the Organ Pipe Cactus National Monument culture history is generally divided between the Pre-Ceramic period and the Ceramic period. The Pre-Ceramic period covers time from approximately 10,000 B.C. to A.D. 200, which includes

Paleoindian and Archaic cultural time periods. Cultural time periods are based upon large changes in human subsistence, hunting and gathering, and settlement strategies.

The Paleoindian period refers to an indisputable period of human occupation in the southwest, from ~10,000 B.C., a time when humans hunted Pleistocene megafauna, especially mammoths and giant sloths, to ~7500 B.C. and the dawning of the Archaic period, when human cultures had to adapt to climatic changes and extinction of the megafauna. Paleoindian artifact assemblages include distinctive fluted dart projectile points and blade technology used for hunting and butchering large game.

Early Paleoindian hunter-gatherers hunted megafauna including giant bison, giant sloths, and mammoths with spears and atlatls (darts). A fluted Paleoindian Clovis dart point was found near the northwestern corner of Organ Pipe lands, and mammoth remains have been uncovered near Quitovac, Mexico, south of Organ Pipe—suggesting that Clovis sites could be found within the Monument. The Clovis tradition has until recently been thought of as the oldest Paleoindian tradition in present-day southwestern Arizona, but this theory continues to be challenged by researchers (Hayden 1976, Beck and Jones 2010). The earliest dated context for a Clovis point in southwestern Arizona continues to be 9350 B.C. at Ventana Cave (Haury 1950). Rogers (1958) and Hayden (1976) have argued that the Clovis tradition at Ventana Cave is actually a San Dieguito tradition with an intrusive Clovis-style projectile point. McGuire and Schiffer (1982) have suggested that the Ventana complex may be intrusive between the Clovis and San Dieguito and reflects the environmental gradient between the lush grasslands of southeastern Arizona and the woodlands and desert scrub of southwestern Arizona. San Dieguito was a widespread complex found in western Arizona, southern California, and northern Sonora, Mexico. San Dieguito I chipped stone artifact assemblages include utilized flakes, scrapers, bifaces, cleavers, planes, choppers, and hammerstones, manufactured by percussion flaking. San Dieguito I points have been found on Organ Pipe lands, at a now extinct spring near Quitobaquito. Ventana Cave, located just 30 miles distant from Bates Well Ranch on the Tohono O'odham Reservation, yielded the earliest radiocarbon dates for human occupation in southwestern Arizona to date at 9,350 years B.C. (Haury 1950), and its proximity to Organ Pipe lands signifies there may well be similar as-yet undiscovered sites on Monument lands.

Subsistence strategies changed to hunting of smaller mammals and the inclusion of more plant foods with the beginning of the Archaic period. Artifact assemblages also show a dramatic increase in ground stone tool technologies during this time and the appearance of roasting pits. In other regions of the Southwest, roasting pits are generally more expansive in appearance, especially in Texas and in the Chihuahua Desert of New Mexico, where they are referred to as BRMs (burned rock middens), but all are believed to have been used for roasting bulbs, tubers, agave hearts, and similar foodstuffs.

Archaic Period

The Archaic period began ~7500 B.C. and lasted until the Late Prehistoric period began around A.D. 200. The Early, Middle, and Late phases of the Archaic period are divided by changes in artifact assemblages, primarily projectile point styles, which signify changes in lifeways. Manos, metates, mortars, pestles, and similar ground stone tools became more prevalent in artifact assemblages, and roasting pit features, where agave hearts, yucca roots, and

other tough foods were roasted, became common (Gibson 2003). Organ Pipe is located between two distinct Archaic populations, the Amargosa to the west, and the Cochise to the east. The assemblage at Ventana Cave illustrates the cross-cultural influences, establishing the region as a sort of meeting ground between the two Archaic cultures (Haury 1950).

Agricultural to Late Prehistoric Periods

Sometime around 2000 B.C. near the end of the Pre-Ceramic period marked a monumental time in Southwestern cultural history—the beginnings of agriculture, the intensified storage of food, and the shift away from mobile hunting and gathering societies to more sedentary lifestyles. Around 2000 B.C., groups adopted maize horticulture from Mexico with the subsistence base centered on floodplains where akchin farming was practiced (Long et al. 1989; MacNeish 2000; Foster et al. 2002:17). The earliest canals known in the entire Southwest have been discovered near floodplain villages (Mabry 2000; Tennesen 2009). Recent evidence has established that agriculture was introduced into the American Southwest from Mesoamerica ca. 1,000 years before the advent of pottery-making (Huckell 1995). Corn, squash, beans, and possibly tobacco and cotton were adopted as a crop complex between 1500 and 1000 B.C. (Ahlstrom 2000). The Ceramic period, from roughly A.D. 200 to A.D. 1900 signified the intensification of agriculture, irrigation and water control, food storage, sedentism, and pottery-making (Ahlstrum 2000; Hartmann & Thurtle 2000). The introduction of the bow and arrow around A.D. 500–700 resulted in a changeover in projectile point styles from large atlatl dart points to smaller arrowheads and by the end of the Late Prehistoric period (~A. D. 1400) tiny 'bird points' had become commonplace.

The Ceramic Period (A.D. 150–1900) is defined by the introduction of ceramic technology into cultural artifact assemblages, first plainwares, followed by redwares and then decorated wares. Ceramic technology was driven by the need for secure storage of foodstuffs and water. In southern Arizona three main prehistoric ceramic cultural traditions have been identified: the *Hohokam*, *Patayan*, and *Trincheras* traditions (Haury 1976; Mabry 1998; Ahlstrom et al. 2001); some extend into Protohistoric times. The Late Prehistoric period lasted from approximately A.D. 200 to A.D. 1400 or thereabouts, and corresponds roughly to the rise and fall of the Hohokam.

Traditionally, archaeologists have viewed the Papaguería as representing the scattered surface remains of mobile peoples who shifted their occupations seasonally. The ethnographic tradition of akchin farming on the sheetwashed plains during the summer monsoons and wintering in the nearby mountains is known and documented, but the presence of longer-term settlements such as *T junikaatk*, the Reservoir Site, a newly discovered 30-acre village site in the Diablo Mountains (AZ Z:14:162), the presence of water-control features including wells, represos, charcos, canals, and raised berms all across Organ Pipe lands together reflect more permanent year-round occupation based in a large part on agriculture where there were year-round water sources.

Hohokam

The Hohokam tradition is the best known in southern Arizona, and numerous sites have been shown to demonstrate Hohokam occupation. Significant aspects of the Hohokam tradition are Mesoamerican-based, including ballcourts, macaw feathers, pyrite mirrors, and copper bells.

The Hohokam culture is said to have centered on the Gila-Salt River Basin to the northeast, with widespread water control systems extending outwards across the desert. Between A.D. 150–A.D. 1450, the Hohokam built thousands of acres of irrigation canals and harvested maize, beans, squash, and cotton from extensive outlying farm fields (Haury 1976). Haury (1950) considered the prehistoric Papaguerían of the Ceramic period to be basically Hohokam, and divided them into two groups based on differences in pottery, architecture, subsistence patterns and pottery. Better known than the Desert Branch in the western Papaguería was the riverine branch represented in the Phoenix and Tucson Basins. The Desert Branch lifestyle included akchin floodwater farming and less elaborate irrigation agriculture then that practiced by the Riverine Branch of the Hohokam. Famous for building canals and growing crops, the Hohokam were skilled artisans, and ceramics, stone tools, and shell jewelry were traded over extensive trade networks. Varieties of native plants were harvested from the desert, such as agave and hearts of sotol, cactus fruits, and mesquite and ironwood beans. Cottontails, jackrabbits, and small game animals made up their diet, supplemented by occasional antelope, deer, and bighorn sheep.

Although the Papaguería was viewed for many years as representing mobile populations who practiced dual residence by akchin floodwater farming during the summer and moving to the mountains during the winter, there is recent evidence for acknowledging that may not have always been the case. There is new evidence that some villages may have been utilized year-round, specifically those that had a permanent water supply. The Reservoir Site may have been a year-round village site. An accelerated mass spectrometry (AMS) calendar date of A.D. 1170 to 1280, or 800 years +/- 40 years was obtained recently from a hearth washing out of a cutbank at the Reservoir Site on Organ Pipe lands, AZ Z:13:1(ASM) (Beta Analytic Inc. 2010). This Hohokam site has evidence of a year-round walk-in well and is an extensive site covering nearly 300 acres with numerous artifact concentrations, ground stone, ceramics, and is located in an area of known akchin farming fields. Archeological evidence for other year-round village sites on Organ Pipe lands is accumulating as more signs of year-round water sources and prehistoric/historic water control devices are discovered, such as the recent discovery of a possible village site at the confluence of the Cherioni and Cuerda de Leña washes.

Patayan

The Patayan culture occupied western Arizona along the Lower Colorado River Basin, the lower reaches of the Gila River, and the peripheral desert regions. The Archaic period may have lasted longer in western Arizona than in many other areas of the Southwest. Patayan sites are not common in the literature and their identification and dating is often based upon ceramics found within Hohokam sites. We have limited knowledge about the Patayan tradition because few Patayan sites have been excavated.

Patayan sites are represented by clearings in the desert pavement, typically include trails, rock shrines, and habitation sites with rock rings, rock piles/cairns, geoglyphs or intaglios and earth figures, and artifact scatters. Features include roasting pits, hearths, and sleeping circles (cleared areas) with gravel rims (Rankin 1995). Patayan sites seem to stand for a vast ritualistic landscape where geoglyphs reenact ceremonial or mythic events or religious or cosmological features. Pottery did not appear along the Lower Colorado River until A.D. 700, at which time a Patayan tradition appears in the archaeological record in the Lower Colorado River and Lower Gila River areas and is believed to have extended into the historic period (A.D. 1750).

There is an absence of multi-component or otherwise deeply stratified Patayan sites, compounded by confusion associated with ceramic typologies. Lower Colorado Buff Ware is the primary Patayan diagnostic artifact. Characteristic attributes of Patayan I ceramics include the manufacturing techniques of basket molding and hemispherical casting, attributes such as Colorado shoulder, incising, lug and loop handles, burnishing, red slip, and rim notching. Patayan II attributes include fine-lined geometric decorations, recurved rims, and some stucco finishes. A new ceramic trait in the Patayan III (Protohistoric) era was the new vessel form of a small-mouth high-necked olla (Rankin 1995).

The Patayan cultural tradition was first identified by Rogers and termed Yuma, and it has since been divided into three phases (I, II, III) and renamed Patayan (Rogers 1945). Patayan sites have been identified in the western portion of Organ Pipe lands, and there seems to be cultural similarities between the Quechan (Yuma) artifact assemblages with the Patayan, suggestive of a cultural affiliation (Rankin 1995).

Ethnographic studies have shown that Protohistoric Yuman settlements, and likely those of the Patayan, were seasonal and ephemeral—they practiced a dual residence akchin floodwater farming system. Fields were planted in the Colorado River floodplain just before or after the summer monsoon rains and the groups moved away from the river in the winter, presumably to tinajas in the mountains. Many of the temporary structures and seasonal settlements that were constructed in the floodplain have likely been deeply buried by subsequent annual flooding. Typical habitations were jacal or brush structures, which appear as rock rings in the archaeological record. Few Patayan sites with architectural features have ever been excavated.

Trincheras

Whereas the Trincheras tradition is present in the western Papaguería, it is primarily found to the south in Sonora and Chihuahua states in Mexico. They are among the most impressive prehistoric features in the southwestern U.S. and Mexico. They consist of terrace complexes built on the summits and upper slopes of hills and mountains. These sites typically consist of shallow agricultural terraces and fortress-like dry-laid masonry walls built on isolated volcanic hills. They are presumed to be defensive formations, though there is recent evidence for residential occupation, and they occur throughout Chihuahua and Sonora into southern New Mexico and Arizona. The Trincheras tradition dates from approximately A.D. 200 to A.D. 1450 and has been divided into three phases (II, III, IV). A massive Late Archaic Cerros de Trincheras site (Cerro Juanaqueña) was found on a mountaintop beside the Rio Casas Grandes in northwestern Chihuahua that was radiocarbon-dated to ~3000 calendar years B.P. (Hard & Roney 1998); it is recognized as one of the earliest agricultural sites in the southwest with abundant evidence of maize, squash, amaranth, chenopodium, and chia cultigens. The inhabitants were practicing floodplain agriculture and moving massive amounts of earth to form the agricultural terraces on top of the mountain (Hard & Roney 1998:1662).

Trincheras ceramics include Trincheras Purple-on-Red, Trincheras Purple-on-Brown, and a reddish plainware. Phase III brought more ground stone into the assemblages, including drop-end manos, rectangular molcajetes, and narrow metates. The fortifications were believed to have been constructed primarily during phase IV. Two Cerros de Trincheras sites have been identified

in the immediate vicinity of Organ Pipe, and numerous Trincheras sites have been found on the neighboring Tohono O'odham reservation.

Protohistoric

The Protohistoric Period (A.D. 1450–1700) is not currently well documented in southern Arizona. Protohistoric archeological sites in Organ Pipe and in the Trincheras area of Mexico have not been firmly tied to any particular existing ethnographic population. Ethnographic studies have shown that Protohistoric Yuman settlements were seasonal and ephemeral—they practiced a dual residence system and floodwater farming, much as the Patayan populations that preceded them. There is an Apache presence during this period, and tales of warfare and raiding abound, though Apaches were the original "leave no trace" people, and no sites have been tied specifically to Apaches. Signs of Apache encampments are metal items and flaked glass and metal projectile points (Holly Houghton, TPHO of the Mescalero Apache Tribe, personal communication to Connie Gibson 2006, Carlsbad, New Mexico).

Protohistoric sites in southeastern Arizona have a strong affiliation with the Sobaipuri O'odham populations, and the southwestern Arizona populations with the Hia C'ed O'odham (Areñenos or sand people) and Tohono O'odham. Protohistoric period sites in southwest Arizona and in Sonora Mexico are characterized by unique artifact assemblages of lithics and ceramics that are unlike prehistoric Hohokam materials (Rankin 1995). Ceramics are of a thin, sand-tempered paddle-and-anvil manufactured plainware whose surfaces are finished with hand-wiped marks. In the Tucson Basin and San Pedro River valley, typical protohistoric ceramics are Whetstone Plain. The chipped stone assemblages differ from Hohokam assemblages in that they were consistently made from higher quality materials. Chert was used to manufacture fine thumbnail scrapers, and projectile points are small, triangular, with a deep basal notch, often serrated. Ground stone and clusters of firecracked rock indicative of roasting pits are associated with protohistoric sites. What happened to the Hohokam after A.D. 1450 is unclear. Few archaeological sites dating between the collapse of the Hohokam and the arrival of the Spanish entradas have been found.

A Protohistoric period Hia C'ed O'odham village site once existed at the location of present-day Bates Well; another was at Quitobaquito. The village near Bates Well was called *Juni Kaa:ck* or *Juni Ka:c* (Zepeta 1985:8–9, 23). One of Zepeta's informants remembered Juni Ka:ck because the people would travel to Quitobaquito (A'al Wappia), harvest figs and take them back to Juni Ka:ack and turn the figs into jun (jam). The phrase "Juni Ka:ck" translates to "the place of jam, or where the jam is" (Zepeta 1985:23). Another informant recalled as a child traveling back and forth between Quitobaquito and Juni Ka:ck in order to plant or harvest (Zepeta 1985:28); another informant remembers actually living at Juni Ka:ck as a very small child, signifying the village must have been still in existence around the turn of the twentieth century. This same lady (Juanita Bailey, born 1907) remembered an arrastra or a mill at Quitobaquito as being used to grind wheat "….that big thing that the donkey goes around and around and around," and moving to Juni Ka:ck where "a lot of Indians lived around there." An unidentified male informant told Zepeta that the village of Juni Ka:ack was called *Oigan Daha*, and he remembers sleeping there as a small child. A recent 2010 archeological survey of 100 acres of the main Bates Well Ranch headquarters compound area failed to discover any signs of

prehistoric or protohistoric occupation of that particular 100-acre parcel (Jelinek & Cutright-Smith 2010) other than the two circular stone walls believed to be habitation sites south of Growler Wash. An intensive archeological survey of the surrounding environs is planned for the future.

Although the Papaguería was named for the Tohono O'odham people formerly known as the Papago, the region was the nexus of a major trade route for shell and salt during ancient times, and was a crossroads for various O'odham and Yuman peoples, the Hopi, Zuni, and their predecessors. The salt and shell trade corridor ran directly through the Bates Mountains before splitting to the east and west in the Bates Well Ranch vicinity, where the village of *T junikaatk* may have served as a crossroads.

Historic Period

The Historic period begins with the first sustained contact between Europeans and local Native groups. First contact occurred in 1540 when a small group dispatched from the Coronado Expedition entered the Western Papaguería. En route to the Colorado River, a band of 25 men under the command of Melchior Diaz traveled along the Camino del Diablo under the direction of local native guides. The party reached the Colorado, but Diaz was killed in the process, and it would be another 160 years before the Spanish again ventured into the Western Papaguería (Hoy 1970). The Coronado Expedition is credited with the introduction of cattle and horses into the Papaguería.

The first serious Spanish attempt at colonization and exploration of the Western Papaguería took place in 1699 under the direction of Father Eusebio Kino. Kino and subsequent entradas set up a series of Jesuit missions that began growing crops and cattle ranching on a small scale throughout the Western Papaguería. When Kino first entered the Pimeria Alta, he wrote of encountering several distinct groups of Yuman and Piman speaking tribes. Father Kino distinguished three tribes of Pimas or Piman-speakers: the Sobaipuris, the Pima Sobas, and the Pima of the East. The Pima Sobas and Pima of the East were all located in present-day Sonora, Mexico; the Sobaipuris lived in the river valleys of present-day southern Arizona. Kino also distinguished among three tribes of Yuman-speakers: the Cocomaricopa, the Opa, and the Quechan.

The Akimel O'odham and the Sobaipuri O'odham occupied the green valleys of the Santa Cruz, San Pedro, and Gila Rivers historically. The Hia C'ed O'odham occupied the dry areas of the Sierra Pinacate and western Papaguería. The Tohono O'odham occupied the lands between the two. Present-day Organ Pipe lands were inhabited by both the Hia C'ed O'odham and the Tohono O'odham (Rankin 1995), and perhaps inhabited and traveled by a number of other tribes, including the Hopi, Zuni Pueblo of New Mexico, Seri of Mexico, and Yuman tribes from the Colorado River area.

The traditional Tohono O'odham subsistence economy relied heavily on gathering of wild plants, particularly mesquite and palo verde beans; fruits of cacti, most often saguaro, organ pipe cactus, and prickly pear; and occasional hunting of deer, pronghorn antelope and bighorn sheep. The traditional lifeway of the Tohono was dual residences—winter village rancherias located near springs, frequently in the mountains, and summer villages (temporales) located

along alluvial fans (ak-chin) where the floodwaters spread out after the monsoon rains. Water was diverted from arroyos by weirs made of mesquite and other plants, and canals were dug for irrigation purposes. Tohono O'odham dwellings were circular domes of brush (jacals) built with mesquite saplings, grasses, ocotillo and saguaro ribs, with dirt-covered roofs and shade ramadas. Rectangular adobe houses became common after the turn of the twentieth century. Traditional Tohono use of Organ Pipe lands was primarily for the gathering of cactus fruits and hunting.

The Hia C'ed O'odham lived in the area from the Bates and Growler Mountains west to the Colorado River, from Puerto Peñasco on the Sea of Cortez north to the Gila River. They lived historically in *Schuk Toak* in the Sierra Pinacate region of Mexico and in the Gran Desierto along the coast of the Gulf of California. Their territory encompassed 10,000 sq. mi. from the Sea of Cortez to the Gila River. Traditional Hia C'ed O'odham settlement patterns included seasonal mobility with long-term settlements at Ajo, Darby Wells, Quitobaquito, Juni Ka:ack (Bates Well), Chico Shunie, and Antelope Hill (Tagg 2007:39). Their main base rancheria was called *Hotunikat*, located west of Tinajo de los Chivos and south of Pinacate. Father Kino's early writings place the Hia C'ed O'odham in the Pinacate of Mexico and along the Camino del Diablo west of Quitobaquito. Their method of subsistence was hunting and gathering, with camps located at year-round tinajas. They ate sand root, mesquite beans, crabs, clams, fish, and shellfish, cactus fruits, greens of evening primrose and lambsquarters, bighorn sheep and jackrabbits. Traditional Hia C'ed O'odham dwellings consisted of boulder-lined open campsites, sometimes boulders placed two-high, with grasses placed against the boulders to break the force of the wind. Archeologically, these former camp dwellings resemble boulder-outlined cleared areas or 'sleeping circles.'

In addition to the Tohono O'odham, Hia C'ed O'odham, Quechan and other Yuman tribes, the Hopi Tribe of Arizona and the Zuni Pueblo of New Mexico claim traditional heritage lands in the Organ Pipe area. The Hopi Tribe has an origin story that all the people came from Central or South America from a place called *Palatkwapi*. They left there because of the rising water and floods, and came to where the present day Arizona-Mexico border is. They were told by the Creator to circle the land and mark it for Hopi. They were to leave behind 'footprints' to mark the land in the form of ruined villages, stone tools, petroglyphs, and pottery. After a while, they went in all directions from there, and became stewards of the land (Jim Tawyesva, translated by Lee Wayne Lomayestewa, Hopi Tribe). The Hopi claim cultural heritage lands all over the state of Arizona, including the Organ Pipe area. The remnants of old Puebloan villages and trails comprise the footprints of Hopi clan migrations. The Zuni Pueblo of New Mexico claims affiliation with Organ Pipe Cactus National Monument lands as well, and have traditional stories of living, traveling, and trading in the area (Kenny Bowekaty of Zuni Pueblo, personal communication to Connie Gibson July 9, 2009). A place in the Grand Canyon called *chimik' yana 'kya deya* is a place of Zuni clan origin, located at the depths of Bright Angel Canyon. From there, the Zuni moved to the base of the San Francisco peaks for over 100 years, then moved on and joined with other people to become the Zuni (Coder 2006:7).

After Father Kino established missions and began the growing of agricultural crops and cattle raising in the early 1700s, the Spanish mission system fell into disrepair in the mid-1700s, followed by the expulsion of the Jesuits in 1767. This was followed by the expansion of the

Franciscans and Spanish military into the area in the 1770s. By this time colonization by the Spanish was expansive and contact with the native populations was considerable (Hoy 1970).

The Western Papaguería became more populated and extensively surveyed following the Mexican American War (1846–1848). The formalizing of the boundary line under the Gadsden Purchase (1853) brought surveying parties into the area and along with them came Anglo and Mexican miners and ranchers. After the California Gold Rush ca. 1849, mining interests dominated the area, and became the premier economy of Arizona. The demand for beef by the miners drove the establishment of cattle ranching on the Sonoran Desert and on what would become Organ Pipe lands.

Territorial Period through Modern Period

The Territory of Arizona was an organized incorporated territory of the United States that existed from February 24, 1863 until February 14, 1912, when it was admitted to the Union as the 48th state. A forerunner, identical in name but largely differing in location and size, was the Confederate Territory of Arizona that existed officially from 1861 to 1863, when it was re-captured by the Union, after which the Union created in 1863 their Territory of Arizona—though the Confederate Arizona government continued to rule in exile until the end of the war in 1865. The two territories played a significant role in the western campaign of the American Civil War.

Many Anglo settlers arrived in the Ajo and present-day Organ Pipe region to prospect, ranch, and engage in other business ventures, among them: Tom Childs Sr. and Jr., John W. Cameron, Bill and Birdie Miller, Lon Blankenship, Frank Williams, Rube Daniels, John H. Merrill, Elmer Montgomery, Emanuel G. Levy, and Sam Clark (Hoy 1970).

One of the earliest Anglo-American arrivals on Monument lands was Andrew I. Dorsey, who moved to Quitobaquito Spring in 1860, built the pond and developed the springs, and dug irrigation ditches. Dorsey remained in the area as a prospector, farmer, and store owner until his death around 1900 (Hoy 1970:34). During Dorsey's tenure, other individuals moved to the area around Quitobaquito to try their luck at mining and related enterprises, including Emanuel G. Levy and Louis Orosco (Hoy 1970:35). José Lorenzo Sestier, a frenchman, settled at Quitobaquito where he acted as storekeeper for M. G. Levy until Sestier's death in 1900.

By the mid-1800s, claims that included mines within Organ Pipe that later became known as Lost Cabin, Baker, Milton, Victoria, and Martinez mines were worked. Silver was taken by Ariano Smith and Sam Purdy as early as 1879 (Greene 1977:54–55). By the 1890s, local entrepreneurs such as Cipriano Ortega, Patrick Dowling, and M. G. Levy were busy with mining claims and other commercial interests of their own in the south-central portion of Monument lands (Greene 1977:55; Hoy 1970:129). Levy operated a store at Victoria Mine and at Quitobaquito. However, the most intensely mined area was the Growler Pass District to the north, in proximity to Bates Well, where the Growler mines obtained their water. Named after early prospector John Growler, this area was home to numerous companies and individuals operating over 100 claims, with operations continuing well into the modern era after peaking between 1900 and 1920 (Greene 1977:52, 56).

Miners' demand for beef drove the establishment of cattle ranching in Organ Pipe by around 1912. Among the first settlers to ranch Monument lands were Bill and Birdie Miller, who ran cattle near Alamo Canyon beginning around 1914 (Hoy 1970:154, 159). At about the same time, Lonald Blankenship arrived and set to the task of consolidating water rights. Lon Blankenship was a tall man "with a cold eye who told you who was right" (Hoy 1970:159). Lon lived with his wife and two sons, Lonald, Jr. and Joe, at the southeastern portion of what would become Organ Pipe land, next to two small hills or *lomitas*. Lon ran cattle and carried pistols, as most everyone did in those days, in what was surely a hostile unfenced border country. He built a house and dug a well in 1914. The ranch name would later be changed to Dos Lomitas Ranch when the Gray family assumed control, and Lon Blankenship's tenure in the region lasted only a few years (Greene 1977:58; Hoy 1970:159). Blankenship moved to Ajo around 1920, and became a customs agent. He was killed shortly after while trying to apprehend a smuggler (Hoy 1970:160).

Reuben Daniels dug a well and settled along the Growler Wash near present-day Bates Well Ranch around this same time. Rube Daniels was said to be a "miner, cowman, and deputy sheriff" by Kirk Bryan (1925), and seems to have been the only frontier settler who attained prominence in all three endeavors (Hoy 1970). According to Hoy, Daniels acquired, probably as a gift, Bates Well. Reportedly, the original Bates Well had caved in and Daniels dug another one. After that, he and another settler named Charlie Puffer dug a second well southwest several hundred yards at the present Bates Well west corrals. Daniels installed windmills at both wells and corrals and concrete troughs at the western well, which came to be called Daniels Well. The Daniels Well was in use since 1912 or 1915, but a flood in 1951 of the Growler Wash destroyed the well and troughs and the NPS filled in the well for safety reasons.

William G. Miller and Reuben Daniels ran 600 and 800 head of cattle, respectively. Birdie Miller remembered Rube Daniels as a "tall, thin, and nice man who liked to drink and swear a lot." Henry Gray, who later took over the Daniels ranch, described Rube Daniels as a fairly tall, sandy-haired, sunburnt man who carried a .45 automatic. (Hoy 1970:161). Daniels later sold and re-bought the Bates Well Ranch from John and Samuel McDaniels, and the ranch passed through the ownership of a handful of other settlers before being purchased by the oldest son of Robert Louis Gray, Sr., Henry Gray, who remained at the ranch until his death in 1976.

In the early twentieth century, foremost among the historic ranch constructions at Organ Pipe were those leased or controlled by the Gray family: Bates Well Ranch, Dos Lomitas Ranch, Pozo Neuvo, Cipriano Well, Gachado and Pozo Salado Line Camps, Dowling Well, Bonita Well, Alamo Well, and other water-control construction that form the framework for interpreting the beginning (and end) of cattle ranching on Organ Pipe Cactus National Monument land (Figures 10–13). Robert Lee Gray and his family settled in the Sonoyta Valley north of the International Boundary in 1919. He had purchased improvements, wells, water rights, and cattle belonging to Lon Blankenship. Robert Lee Gray and his three sons, Henry, Jack, and Robert Lewis, expanded their control over the desert landscape by purchasing or leasing all other water-control improvements south of Ajo.

In 1937 the National Park Service acquired the property that is now known as Organ Pipe Cactus National Monument. President Franklin Delano Roosevelt proclaimed over 330,000 acres

as land to be set aside for the preservation of the unique natural and cultural resources present on the land for the enjoyment of future generations, and Organ Pipe Cactus National Monument was born. It was designated an international Biosphere Reserve by the United Nations, due to the limited distribution of the organ pipe cactus, senita cactus, and the threatened and endangered species that have critical habitat in the area—among them desert pupfish, Sonoran pronghorn antelopes, bighorn sheep, Sonoyta mud turtles, and desert tortoises.

The National Park Service allowed the Grays to continue cattle grazing under a lifetime permit arranged in 1941. The Grays built numerous ranching structures and water facilities throughout the Monument, including Pozo Salado and Gachado Line Camps. The Grays also built and/or lived in four homes at Bates Well, Alamo Canyon, Dos Lomitas and Dowling Well. Consequences of long-term overgrazing drove the National Park Service to attempt to buy out the Gray ranching operation in 1966 and to terminate grazing in 1968. The three Gray sons continued to run cattle on monument lands without a permit until the death of the last member of the partnership in 1976. The last of the Gray cattle was finally removed in 1978.

Figure 10. Overview of Bates Well Ranch environs, photographed March 2010, facing north from the bajada south of Growler Wash.

Figure 11 (left). Ruins of the Bates Well Ranch main ranch house, photographed January 2010, facing southwest.

Figure 12 (right). The southeastern windmill (Windmill #2), elevated water tank, deteriorating sandwich corral fences, and cowboy bunkhouse at the Bates Well Ranch headquarters 2010, facing west.

Figure 13. Collapsing corral fences at the Bates Well eastern corral, January 2010, facing south.

STONE TOOL TECHNOLOGIES

A study of stone-age tools includes the study of the two lithic (stone) technologies: (a) ground stone (Table 2) and (b) flaked or chipped stone (Table 3). Diverse analytical techniques are used to identify general archeological classifications, sub-types, technological attributes, design, stylistic variations, primary/secondary contexts, and associations in order to answer basic questions of taxonomy, archeological site types, tool manufacturing techniques, subsistence practices associated with certain tools, and adaptations to changing environments portrayed in changing lithic technologies down through the ages. The most telling changes in lithic technologies were the increased use of ground stone at the beginning of the Archaic period (~7500 B.C.), when populations came to rely more and more on plant foods, especially tough roots and tubers that required baking, and roasting pits became a common feature; and the introduction of the bow and arrow around A.D. 700. At the beginning of the Archaic period, megafauna such as mammoths and giant sloths had become extinct, and human populations had begun to rely on hunting of smaller animals for meat. There came to be a greater reliance on plant foods, agriculture and storage of foodstuffs to carry populations through times of want. There was a general trend away from use of the atlatl spear thrower and large dart points towards smaller projectile points suited to the hunting of smaller animals. When the bow and arrow came into general use around A.D. 500–700, small 'bird points' came to be used more.

Research questions center around identifying specific problems solved by the use of one lithic technology over the other; and how and when change happened—whether through shifting

climate and environmental variables, diffusion and intergroup contact, resource distribution/redistribution, or other subsistence and settlement issues. At times stylistic isocrestic variation, design, raw material sources, or other attributes can fingerprint or identify a time period or ethnographic affiliation, and these are questions lithic technology researchers look to lithic analysis to attempt to answer (Sackett 1990). Underlying lithic technology research and the study of lithic artifacts and the questions of 'what is it' and 'how old is it,' are archeologists and materials analysts looking beyond those questions to overarching theoretical issues, e.g., the beginnings of agriculture and sedentary life, the ethnographic identity of cultural groups that occupied a land, lifeways and traditions of peoples, and adaptations to changing environments. This preliminary classification of the (few) stone tools collected at Bates Well Ranch begins a quest into the types of lithic tools found on the mostly unexplored lands and unrecorded archeological sites of Organ Pipe Cactus National Monument.

The artifacts in the assemblage collected from Bates Well Ranch and curated at WACC include primarily unifacial scrapers, hafted bifaces (including several projectile points and knife blades), a large ground stone pestle, and several multi-purpose tools that could have served as projectile points and been retouched as knives or gravers, and utilized flakes (Artifact Catalog Table 6). One incomplete vesicular basalt grinding slab located near the Bates Well chicken coop in situ (not collected) is included in the catalog list and described since it may have been used at an earlier time period and recycled during the historic ranching period. The arrastra with dragstone is included as a ground stone site appliance; it's date of construction is uncertain.

ARTIFACT DISCUSSION - GROUND STONE TOOLS

General Classifications

Ground stone tools are typically classified into general categories of handstones, netherstones, implements (including compound tools), ornaments, and ritual (ceremonial) items as listed in Table 2 (Gibson 2003).

Table 2. Five General Classifications of Ground Stone Tools and Examples of Each Type (Gibson 2003).

(1) HANDSTONES	(2) NETHERSTONES	(3) IMPLEMENTS	(4) ORNAMENTS	(5) RITUAL ITEMS
Manos (often subdivided into 1-hand or 2-hand types. 1-hand manos usually appeared earlier in the archeological record and 2-hand with the introduction of maize and agriculture)	Grinding Slabs (term used for early netherstones used mostly for grinding seeds before advent of agriculture	'Waco Sinkers' or Net Weights	Gorgets	Pipes
Hammerstones	Grinding Slicks (boulder or bedrock; considered site appliances)	Bola Stones	Pendants	Censors
Pestles	Basin Metates	Plummets	Figurines	Cloudblowers

(1) HANDSTONES	(2) NETHERSTONES	(3) IMPLEMENTS	(4) ORNAMENTS	(5) RITUAL ITEMS
Polishing/Burnishing/Rubbing Stones (primarily used in ceramics manufacture)	Trough Metates (along with 2-hand manos, generally came into use with beginnings of agriculture and intensive maize cultivation)	Atlatl Weights (Bannerstones)	Incised or Inscribed Stones	Any item found in a religious, burial, or ritual context regardless of original function
Gyratory Crushers	Bowls/Vessels	Arrastras-Dragstones (top stones used w/ Arrastra Netherstones, usually left in place as site appliances)	Beads	
Abraders (Rasps)	Boulder or Bedrock Metates (left on site as site appliances)	Hoes (hafted & made into compound tools)	Nose Plugs	
Arrow/Dart Shaft Straighteners (wet and heated sapling drawn through V-shaped stone repeatedly to straighten shaft)	Anvil Stones and Lap Stones (used for cutting or pounding upon)	Mauls	Rings	
Awls/Perforators	Palettes (for mixing of paints)	Axes (hafted & made into compound tools)	Discs	
Balls	Boulder or Bedrock Mortars (site appliances)		Painted Stones	
Gravers				
Worked Stones or 'Rabbit Stones' (flat slabs laid over rabbits during cooking)				
Celts				

Generally, ground stone tools are classified according to their function and morphology and where they received the most use-wear, though many stones were multi-functional. Primary archeological context is important in establishing both general classifications of ground stone tools and sub-types. Often tools were multi-functional and served more than one function during their use-life. A mano used as a handstone for grinding seeds until small enough and smooth enough might be drilled/perforated and become a perfectly polished pendant. Large ground stone features such as arrastras and mill stones, together with the associated dragstones are considered site appliances, usually left at the site in situ. Most important are thorough documentation of a

stone's provenience, site type, and attributes—number of utilized facets, measurements, context, presence of pecking or handhold modifications, amount and type of use-wear, and associated artifacts/features, all important in classifying ground stone tools.

Depending upon context, any item might be classified as a ritual item if included in a burial or found in association with sacred or funerary items. Grave goods are the most reliable evidence for religion or ritualistic behavior among aboriginal peoples. For example, a mano with edge-sharpening for use as a chopper was found in a Paleoindian burial at the Wilson-Leonard archeological site in Williamson County, Texas which dated to ca. 11,200 years B.P. (Before Present) (Collins 1998 (3):710). Though functionally classified as a handstone and sub-typed as a mano/chopper, the ritualistic use of the item in a burial context was of such note that the general archeological classification could have been 'ritual item.'

Ritual ground stone burial items are rare. Prized or heirloom stone tools or items were deposited in burials as offerings and gifts of respect to the departed. The more usual place of deposition for ground stone tools is a domestic location used for preparing food; a place used for manufacturing and maintaining tools, where often the ground stone tools were pecked or roughened to restore their usefulness; discarded in a trash midden; or re-used as fill stones in walls or floors—such as seasonal campsites returned to year after year; caves; rockshelters; and pithouses.

BATES WELL RANCH GROUND STONE

Grinding Slab

One incomplete netherstone, a grinding slab fragment (Figure 14), was found in situ near the chicken coop during the 100-acre January 2010 archeological survey in association with a metal poultry feeder. It is believed to have been used during the historic period to crack corn for the chicks; it could have been recycled from an earlier time period.

Figure 14. Grinding slab fragment believed to have been used for cracking corn for chicks.

Arrastra

The arrastra is used in the 'patio' process for extracting silver from ore, an intricate amalgamation process utilizing mercury (Figure 15). The process is said to have been used by Indians in America before the arrival of Europeans and draft animals, and was further developed by a Spanish Dominican theologian, Bartolomé de Medina in 1557 while mining in Pachuca, Mexico. The process was then introduced to European countries. The process proved especially useful in America where water and fuel were scarce (Encyclopædia Britannica 2010).

An arrastra (ground stone site appliance) is still present at Bates Well Ranch near the cowboy bunkhouse, very close to the old Bates Well (Figures 15–17). Many believe the arrastra existed before George (or W. B. as the case may be) Bates arrived and was already in use, but research has so far found no record of who constructed it. The mining taking place at Bates Well at the time of Carl Lumholtz's visit there ca. 1909–1910 was taken as an indication the arrastra was present at that time, though still no mention of who constructed it (Lumholtz 1912). There are deep prospect pits nearby south of Growler Wash, and many pits spread throughout the western and northern perimeter of the headquarters compound.

Figure 15. An arrastra. A draft mule or burro (or sometimes the miner himself) dragged a large boulder around and around large flat boulder netherstones set in a circle to pulverize and grind ore. Photo: Encyclopædia Britannica Online.

Figure 16. One of two dragstones at the Bates Well Ranch arrastra. A second dragstone was moved to just outside the main ranch house door (as a doorstop?).

Figure 17. The remains of the arrastra at Bates Well Ranch. A large (ore-cart?) axle is used as the central fulcrum around which the burro dragged the heavy boulder to pulverize and separate the ore. The axle is likely not the original fulcrum. The cowboy bunkhouse (left) was moved to its location after the arrastra fell into dis-use, because there is not enough clearance to operate the arrastra at present. A small cowboy boot shrine was placed on the arrastra in memory of an unknown cowboy. Facing north.

Pestle/Gyratory Crusher

The pestle collected at Bates Well Ranch is a large handstone fashioned from a natural torpedo-shaped quartz stone, a nearly perfect cylindrical shape (Figure 18). The pestle is so large and heavy that it was probably used in conjunction with a bedrock mortar; it shows use-wear all along its length and not just on either end, on all six facets. It might also have served as a 2-hand mano or rolling pin. Attributes are summarized in Table 3. Both tool ends exhibit crushing, the smaller pestle end has a large 9-cm-long flake scar located 17 cm from the tip, a comfort handhold modification to enable grasping the tool at that end for crushing. Signs of pecking (re-roughening) are visible mainly in the central portion. The overall use-wear is moderate (Figure 19). This tool could have been used at any time from pre-Paleoindian times through the historic period or into modern times. Often tools such as the pestle are scavenged and re-used, or left purposefully at sites as site appliances.

Figure 18. Ground quartz pestle collected at Bates Well Ranch. The large 9-cm-long flake scar shown on the right 1/3 of the tool surface in the photograph appears to have been a handhold modification to aid in grasping the pestle at the smaller end. Both ends exhibit crushing, the smaller end has breakage, and most of the tool surface shows use-wear at the macro and microscopic levels (see Figure 19). The tool was likely multi-purpose and used in the manner of a gyratory crusher, mano, hammerstone, and rolling pin.

Table 3. Bates Well Pestle Measurements and Attributes

Length	Diameter	Circumference	Weight	Attributes	No. of Utilized Facets
45 cm	9.8 cm	40 cm	4.412 kg	Crushing on both ends. Smoothing from grinding all over body. Pecking visible mainly in central portion. Handhold modification at smaller end.	All 6 – frontal, dorsal, both laterals, both ends.

Similar pestles to the cylindrical Bates Well pestle were found at Ventana Cave, where most dated to pre-ceramic periods (time prior to ~ A. D. 150) and where they were believed to have been used in the bedrock mortars of the cave (Haury 1975:320–323).

Figure 19. Microscopic use-wear appears as worn blue-gray areas on the cortex of the Bates Well pestle. Approx. 25X.

In addition to the arrastra, the large pestle and the fragmentary grinding slab used for cracking corn, a hammerstone of basalt and a quartz mano fragment are included in the ground stone assemblage. The hammerstone is a flat stone exhibiting cortex on both ventral and dorsal, flaked all around with heavy use-wear and crushing on all sides. The mano fragment is of fine-grained quartz and exhibits moderate use-wear from grinding.

ARTIFACT DISCUSSION - FLAKED STONE TOOLS

General and Sub-Type Classifications of Flaked Stone Tools

Often stone tools are the only artifacts remaining from the cultures and traditions of peoples who went before us. Chipped or flaked artifacts, particularly those considered 'diagnostic' are some of the most valuable artifacts encountered on an archeological site and most often are the only evidence of human occupations that have survived the thousands of years since deposition—once a particular 'type' has meaning in terms of its temporal and geographic distribution, it can be used as a 'date stamp' or time marker for an archeological site, and for dating other artifacts in association with it. Classification of tools using artifact taxonomy is a regional and site-specific practice. Artifact typologies are developed, modified, added to and subtracted by experienced researchers in every region of the country. Typologies are continually refined by professionals with years of experience in the field. Most projectile points have regional geographic distributions; most were manufactured during a fairly limited time span; and are preceded or replaced by point styles of different shapes, raw materials, or manufacturing technique. Although it is not exactly clear why aboriginal cultures changed point styles over time—they may represent changes in technological aspects such as hafting techniques; a shift in the breeds of animals hunted; adaptations to suitable local raw materials; diffusion or movements of cultural groups to other territories; absorption of a population into a different social or political entity; or creative stylistic preferences such as the isocrestic model according to Sackett (1990).

Lithic Technology is the study of stone tools from the first procurement of raw material, the initial manufacture, use of the tool, re-use and/or retouching, and eventual discard (deposition). Raw material selection, techniques used to flake and shape the tool, the resulting morphology and design, function, attributes, use-wear, context, association, deposition and eventual provenience where the tool is collected are all parts of lithic tool study, both macroscopic and microscopic. Stone chipping or flaking technology is a subtractive process designed to reduce a suitable stone cobble to a desired shape in order to accomplish a certain task.

Table 4. General Classifications of Chipped/Flaked Stone Tools. C. Gibson 2011.

General Classifications of Chipped or Flaked Stone Tools
Core (cobble left over from manufacturing process; usually described as bipolar, unidirectionally or multidirectionally flaked; or blade core)
Core Tool (core used as chopper, hammerstone, burin, plane, etc.)
Biface (knife blade, drill, scraper, etc.)
Uniface (scraper, adze, gouge, plane, etc.)
Projectile Point (typically a biface used as a dart point, spear point, arrow point, or 'bird' point)
Flake (includes primary, secondary, tertiary flakes and biface thinning flakes; often used to classify burin spalls)
Utilized Flake (signs of use-wear but not retouched as a uniface or biface is generally retouched)
Blade
Preform or Trade Blank
Lithic Shatter (raw material chunks, debitage, broken flakes, etc. - part of manufacturing process)
Eccentric (unusual flake pattern)

Table 5. Some Sub-Types of Bifaces, Cores, Unifaces, Flakes, and Utilized Flakes. C. Gibson 2011.

Some Subtypes of Bifaces, Cores, Unifaces, Flakes and Utilized Flakes
Blade Core
Chopper
Burin
Scraper (Side Scraper, End Scraper, Discoidal Scraper, "Thumbnail" Scraper)
Adze
Burin Spall
Plane
Primary Flake
Secondary Flake
Tertiary Flake
Drill
Gouge
Graver
Knife
Biface Thinning Flake
Perforator
Unidirectional Core
Bidirectional Core
Multidirectional Core

Flakes are the initial product of lithic reduction; a primary flake is the first reduction flake from a cobble and contains cortex on one side; a secondary flake shows both previous flake scar(s) and traces of primary cortex. A tertiary flake has no remaining cortex. If a flake is further retouched or trimmed on one facet only, a uniface is formed. If both sides of the stone are reduced or trimmed to shape a useful stone tool, it is called a biface. Most projectile points, knife blades, choppers, and drills are forms of bifaces. Different forms of unifaces and bifaces are fabricated to serve different purposes. Many gouges, adzes, and planes are unifaces; many choppers and knives are bifaces; and many tools were re-worked and re-used over their life span for different purposes. In the lithic assemblage from Bates Well Ranch, there are several projectile points that may have been re-used as gravers and some bifaces that may have been projectile point 'preforms' or trade blanks.

Raw materials are the stone cobbles chosen for lithic reduction. Cobbles are generally reduced using percussion in the early stages, and refinement flaking is performed using pressure flaking. The best stones for this purpose have suitable 'breaking' characteristics, i.e., they break according to the desired pattern and are not friable or blocky. Chert and obsidian are the best stones for flaking—unfortunately for prehistoric populations, there are no known good sources of those materials in the Bates Well Ranch or Organ Pipe region; any artifacts of good quality chert or obsidian use exotic stones originating from elsewhere. An Energy Dispersive X-ray Florescence (EDXRF) spectrometer analysis of 79 obsidian artifacts from Organ Pipe performed by Steven Baumann in 1992 identified two primary sources of obsidian for prehistoric populations extending over Archaic through Late Prehistoric periods of archeological context: the Sauceda Mountains directly north of Organ Pipe; and the Los Vidrios location south in the Pinacate region of Mexico (Rankin 1995). These two obsidian source locations dominated in

over 83 percent of the sample artifacts; two obsidian samples originated from the Superior (Picketpost Mountain) location approximately 135 km northeast of Organ Pipe (Baumann 1995:705–713). Prehistoric populations here chose mostly igneous-volcanic raw materials locally available such as basalt, rhyolite, and stone that resembles chert called 'rhyolitic jasper'; sedimentary stone such as quartzite; and occasionally minerals such as chalcedony for tool manufacture.

There are two major forms of projectile points in the Southwest—dart points that were used with atlatls and spears; and smaller arrow points including tiny 'bird points' that became numerous after the invention (and diffusion) of the bow and arrow around A. D. 500–700. At this time, there is no definitive projectile point typology available for the southwestern Arizona region for use by researchers, though data is accumulating from a variety of sources to enable typing some projectile points fairly reliably, and additional data is accumulating as more sites are excavated, documented, and published. Morphology and attributes are important as stepping stones to identification but context and association are the final arbiters. For a projectile point style to be useful as a chronological marker, it has to show consistency in morphological attributes and have a continuous distribution temporally, demonstrated through stratigraphic and chronological studies (Loendorf & Rice 2004).

Bruce Huckell (Baumann 1995) identified dart point styles collected from Organ Pipe during Rankin's 1989–1991 survey as having been produced during particular periods with ties to cultural-chronological affiliations, and assigned them accordingly as he reviewed a collection of 145 points during the 1992 analysis (no points were present in the collection that could be tied to a Paleoindian, Pre-Paleoindian, or Early Archaic time period cultural presence according to Huckell):
Middle Archaic—Gypsum Cave, Pinto Basin, Chiricahua types
Middle to Late Archaic—Cortaro type
Late Archaic—Cienega, San Pedro, Elko Eared, Elko Corner-notched types.

Of the 70 arrow points from Organ Pipe in the assemblage analyzed for the Rankin report, Huckell assigned 29 specimens to the Hohokam cultural-chronological framework; the points are not necessarily Hohokam in origin, but they exhibit style attributes that date approximately to the Hohokam time period. Arrow point styles encompass a period roughly from A. D. 700 to when stone points were last made locally shortly after the end of the nineteenth century (Russell 1908).

BATES WELL RANCH FLAKED STONE

The Bates Well Ranch lithic tools were manufactured primarily from basalt, rhyolite, obsidian (non-local), chert (non-local), and quartz. The assemblage contains 9 utilized flakes; 8 unifaces (side and end scrapers, graver, blade, and possible knife); 20 bifaces, including 7 projectile points typed as dart points (used with atlatls), 1 possible Paleoindian spear point and 1 possible Paleoindian projectile point, and 2 arrow points; and 4 core tools (chopper/hoe, hammerstone, end scraper). All tools are of usual and expected materials and styles, and only a few are diagnostic. The diagnostic lithics are discussed below.

Figure 20. Lithic artifacts from AZ Z:13:39(ASM), unifaces and utilized flakes representative of the collection.

Figure 21. Lithic artifacts from AZ Z:13:39(ASM): bifaces and unifaces representative of the collection.

Figure 22. Lithic artifacts from AZ Z:13:39(ASM), bifaces and projectile points representative of the collection.

Several dart points and two arrow points were typed using multiple lines of reasoning and different reference sources, though types are subject to change over time as new research data is presented. A couple bifaces appeared suspiciously Paleoindian-like in their morphology and technological manufacturing techniques. However, the exact proveniences of these artifacts are questionable, no exact UTM coordinates are available, and no records are available concerning who collected them. Therefore they are listed only as 'bifaces' (Figures 23 and 24) until they can be studied further. If they are later determined to be Paleoindian artifacts, that would fit with other research for the area, e.g., the Paleoindian points from the Ventana Cave Red Sand layer is described as an early form of Pinto type, followed by a uniformity of type of which the main characteristics were a triangular–shaped blade with paralled-sided or slightly expanding stem, base straight or somewhat rounded, edges occasionally serrated (Haury 1975:203). The leaf-shaped points from Bates Well fit with the leaf-shaped points found at Ventana Cave, (believed to be) from a pre-ceramic context and similar in morphology.

If determined to be Paleoindian, they could be part of the Lanceolate Plano Cluster, Milnesand Type (Justice 2002:76–96), which consist of thin finely-flaked leaf-shaped bifaces with oblique parallel flaking. Other attributes include irregular straight base; un-notched; fine pressure flaking on margins; and convex blade-margin shape, all attributes which the Bates Well artifacts display, one also displays slight alternate beveling. One (spearpoint?) has a wedge-shaped base, and is thicker towards the distal end and thinner towards the proximal base, a characteristic of Milnesand points. If they are indeed Milnesand type, the points would date to from 8200–7200 B.C. (Turner & Hester 1999:156). These types of Paleoindian points are associated with bison (*Bison antiquus*) hunting (Justice 2002:94).

Figure 23. Biface.

Figure 24. Biface.

Two projectile points were typed as Pinto or Pinto Basin points of an Archaic cultural tradition. Attributes of Pinto points include: lanceolate shape; parallel shoulders; no barbs; straight stems; and concave bases. They usually exhibit obtuse shoulder-to-stem angles. Some are serrated. Pinto points appeared by 8700 B.P. on the northern Colorado Plateau. Points similar to serrated Pinto points have been called San Jose points and Armijo points. Pinto points have definite haft elements demarcated from the blade and bifurcation or indenture of the base as their most identifiable organizing traits (Justice 2002:138–150). Pinto point styles were manufactured using soft hammer percussion of bifaces and preforms followed by various degrees of pressure flaking. Pinto points are considered to be harbingers of the Early Archaic period by some researchers, and date from ca. 9500–2800 B.P. according to Mabry (1998:145). Others, such as Justice date Pinto points to the Middle Archaic approximately 6000–5000 to ca. 3000 B.C. (Justice 2002:143). Most agree on the distribution of Pinto points as a widespread area mostly found in the Great Basin but Pintos are well known in Nevada; western Utah; desert regions of California; north into southern Idaho and Oregon; southern Arizona; New Mexico; and even into northern Mexico.

Figure 25. Pinto point of black basalt from AZ Z:13:39(ASM).

The Pinto points from Bates Well are comparable to Haury's 'Chiricahua-Amargosa II' phase (Haury 1975:290 Plate 22). One point has an alternately beveled haft, with one blade margin convex—the other blade margin concave, producing a slight 'hook' at the distal end and blade tip.

Figure 26. Gypsum projectile point from AZ Z:13:39(ASM).

Two projectile points in the Bates Well assemblage were typed as Gypsum or Gypsum Cave variants (Figure 26). The Gypsum points have tapering or contracting stems and slight indentures (basal notches) in straight bases. Gypsum points generally have straight edges running most of the lengths of the triangular blades, and sharply contracting stemmed bases with abrupt sides. Gypsum points are widely distributed over Arizona. Gypsum points were found in association with Pinto points at Ventana Cave, are found most often with Middle Archaic styles, but also in Late Archaic contexts. The Bates Well Gypsum points were originally cataloged as drills; however, drills are usually more recurved. Gypsum points date to ca. 4700 to 3100 B.P. on the Sonoran Desert (Loendorff & Rice 2004:29).

Two projectile points from Bates Well were typed as Cortaro points (Figure 27). Cortaros lack notching and stems. They are medium-sized leaf-shaped to triangular forms with excurvate sides and straight to slightly concave bases. Although well dated to the Middle Archaic, they also occur with some regularity with Cienega and San Pedro types into the Early Agricultural period, and are important in establishing continuity between the two periods in the Sonoran Desert. Cortaro point styles date to ca. 4300–2300 B. P. (Mabry 1998:147). Cortaros have been reported in southern Arizona and southwestern New Mexico; none have yet been reported north of the Gila River. They occur eastward into southern New Mexico as far east as El Paso (Justice 2002:182).

Figure 27. Cortaro projectile point of black basalt from AZ Z:13:39(ASM).

Two different types of arrow points were collected from Bates Well Ranch: a small un-notched triangular point, typed as a Western Triangular Cluster, Cottonwood Triangular Sobaipuri Type (Justice 2002:261–274); and a Pueblo Side-notched Snaketown Cluster arrow point (Justice 2002:289–319). Both arrow points may be part of the Late Prehistoric Hohokam tradition.

The Cottonwood Triangular Sobaipuri point is of non-local obsidian (Figure 28); although termed a 'Sobaipuri,' it might more accurately be called Papago or later Gila River Pima. It is lightweight; has serrated straight blade edges; lacks a stem; and has a deeply concave V-shaped base. This point dates to the Late Prehistoric period ca. A.D. 900 into the Historic period around A.D. 1500–1800 in Arizona (Justice 2002:265, 273). Cottonwood Triangular points are usually recovered in only the later levels of stratified sites across the Great Basin. Similar small un-notched triangular points were almost entirely restricted to the upper levels of Ventana Cave (Haury 1950:Plate 22 facing p. 291). Cottonwood Triangular points have a large range of distribution all over the Southwest, the Great Basin, California, and Mexico. The term 'El Muerto' is used for the same type in Mexico.

Figure 28. Arrow point of exotic obsidian from AZ Z:13:39(ASM). Typed as a Western Triangular Cluster, Cottonwood Triangular Sobaipuri Type (Justice 2002:261–274); or more accurately Papago or Pima type.

The second arrow point was typed as a Pueblo Side Notched Cluster, Snaketown Side Notched Type (Justice 2002:294), a type representative of Hohokam occupations in south-central Arizona (Figure 29). Pueblo Side Notched points date to the Late Prehistoric period, but do not appear in assemblages until after A.D. 1150 or become a standard item until ca. A.D. 1300–1500. The Snaketown Side Notched variant places between A.D. 1200 to 1400 in the Soho and Civano phases of the Classic Hohokam period. It is the most common type of point recovered from the Snaketown excavations; over 500 specimens were recovered (Justice quoting Gladwin 1937, 2002:311). In Arizona, Snaketown Side Notched variant is most prominent at Snaketown and other areas near the confluence of the Salt and Gila Rivers, representing areas where there were villages and trade centers with other groups. A side note of interest is that there is a similar arrow form with narrow blade and square projections in northeastern Baja California—and Hohokam salt and shell trade routes are known to have extended to the Pacific Coast. The similar arrow form with narrow blade and square projections in northeastern Baja California; and the fact that Hohokam salt and shell trade routes are known to have extended to the Pacific Coast, adds to the cachet surrounding the village of *Juni Ka:ack*, believed to be at the nexus of the Puerto Peñasco-to-Bates Mountains trade route, the connection to Gila River-east and Pacific Ocean-west trade routes. It has become increasingly important to locate this village and to document it completely.

Figure 29. Arrow point of black basalt from AZ Z:13:39(ASM) typed as a Pueblo Side Notched cluster Snaketown Side Notched Type (Justice 2002:294).

The Pueblo Side Notched Cluster is distributed as far west as the Colorado River, northward into Glen Canyon, Mesa Verde, and Chaco Canyon, across New Mexico and into west Texas. It is distributed an unknown distance into Mexico and represented at hundreds of open campsites, shelters, and pueblos across the Southwest.

CONCLUSIONS AND RECOMMENDATIONS

To ancient hunters and gatherers, Native American cultures, and early frontiersmen Organ Pipe Cactus National Monument was home. All of those things that make a hearth a home: living, sleeping, and cooking quarters; a school, cathedral, hospital, mortuary; farming fields; quarries and tool manufactories; animal husbandry and corrals; everything made up a multitude of separate and unique homes and living spaces that are now archeological sites in the wilderness of Organ Pipe. Remnants of over 1000 of these homes and features, large and small, still exist all across the landscape. They exist on the flats and plains, on mountains and hill tops, in caves and rock shelters, and they exist along the washes and in proximity to springs, tinajas, and wells where desert water control was a necessity. In nearly all cases, prehistoric remains are ephemeral on the landscape, and only noticeable to the experienced eye.

For accurate research and future ranch interpretive considerations, Organ Pipe Cactus National Monument needs not to lose sight of the prehistoric/protohistoric component that existed in the vicinity before the early twentieth century ranching heyday of Bates Well Ranch. Archeologists need to record other prehistoric archeological sites in the surrounding landscape, possibly as a prehistoric archeological district. The extensive mines and mine features in the vicinity should be recorded as the 'Growler Historic Mining District.'

The ancient Salt Trail should be archeologically surveyed and recorded on the National Register of Historic Places as of national significance. As far back as 2005, Organ Pipe management was looking at ways to protect the Salt Trail from being overrun by Border Patrol agents in their interdiction of smugglers and illegal aliens (memo from Mary Kralovec, Chief of Resources to Kevin Harper re archeological buffer protection areas dated 07/12/2005 on file at the Organ Pipe Cultural Resources Office). At that time, the Salt Trail was recognized as being significant at the national level, and plans were to record the trail on the National Register in an effort to protect it. Apparently this plan was never developed due to a lack of funding, and this project needs to be restarted as soon as time, staffing, and funding permits. There are few resources on Organ Pipe that are significant at the national level, and this is one. Research related to the village of *Juni Ka:ack* as the possible crossroads of the Salt Trail should be integral to this effort.

The historic alignment of Bates Well Road as a component of El Camino del Diablo should be investigated and recorded as part of that eligible linear site. El Camino del Diablo may be significant at the national level as well.

Diagnostic projectile points from Bates Well include Pinto, Gypsum, Cortaro, Sobaipuri, and Pueblo Side Notched Snaketown types—and there could have been a Paleoindian presence there as well, though this has not been proven at this time. These point styles indicate a long

range of Native American presence in the Bates Well vicinity from the Middle Archaic (or possibly Early Archaic) period through the Late Prehistoric and Historic periods (roughly 6,000 B.C. to A.D. 1900). Pinto point styles are considered a harbinger of the Early Archaic period, ca. 9500–2800 B.P. according to Mabry (1998:145). Others, such as Justice date Pinto points to the Middle Archaic approximately 6000–5000 to ca. 3000 B.C. (Justice 2002:143). Cortaro projectile points date to the Late Archaic period 4300 to 2300 B.P. (Mabry 1998:147); or from 2300 to 300 B.C. (Justice 2002:179). Gypsum projectile points date to ca. 4700 to 3100 B.P. on the Sonoran Desert (Loendorff & Rice 2004:29). Sobaipuri point styles are representative of the Late Prehistoric period ca. A.D. 900 into the Historic period around A.D. 1500–1800 in Arizona (Justice 2002:265, 273). The Pueblo Snaketown Side Notched variant (Justice 2002:294) is a type representative of Hohokam occupations in south-central Arizona and places between A.D. 1200 to 1400 in the Soho and Civano phases of the Classic Hohokam period. Therefore Native American presence ranges from at least 6000 B.C. to the early twentieth century, or approximately 1907 (Lumholtz 1912). Euroamericans have resided at Bates Well from approximately A.D. 1870 (or 1886) or earlier until the last of the Gray family ranchers died in A.D. 1976.

Further research is recommended to:
a) locate and record the lost protohistoric (prehistoric?) village of *T junikaatk* or *T junikáatto* (various spellings), and explore its relationship to the ancient salt and shell trade network. Apparently the Salt Trail passed through this village and it stood at the crossroads of the north-south and east-west trade routes. The Salt Trail is significant at a national level, and should be recorded as such on the National Register of Historic Places. A Class III intensive archeological survey of the Salt Trail and search for the village would be the first steps towards recording these very important sites on the National Register. Therefore an intensive archeological survey is recommended of the Salt Trail and the village of *T Junikaatk*;

b) intensively survey the surrounding landscape for evidence of akchin farming and desert water control devices—particularly at the confluence of Cherioni and Cuerda de Leña Washes where they coalesce to form Growler Wash southeast of Bates Well. Aerial photographs depict a charco, canals, and extensive akchin fields there, though they have not yet been intensively surveyed or recorded. Southwest of Bates Well along Growler Wash is also a high probability area for as-yet unrecorded akchin fields and water control devices—canals have been located where Growler Wash crosses the Bates Well Road. The Growler Wash environs and Bates Well Ranch together form a prehistoric and historic cultural landscape (district) representative of many water control devices utilized on the Sonoran Desert. Therefore an intensive archeological survey is recommended of the canals, represo, charco, akchin farming fields, and other prehistoric features (including possible village site) located at the confluence of the Cherioni and Cuerda de Leña Washes;

c) better document the extensive rock art at the mouth of Growler Canyon (where the motifs are nearly all related to early akchin agriculture and are believed to be associated with the [possible] village site at the confluence of the Cherioni and Cuerda de Leña washes) in conjunction with the intensive archeological survey of the water control devices at the confluence of the Cuerda de Leña and Cherioni washes. Informants from the Tohono O'odham Nation and H'ia C'ed O'odham should be consulted in the interpretation of the motifs;

d) research, date (if possible), and record the stone-walled structures south of Growler Wash believed to be ruins of O'odham habitations, in consultation with O'odham Nation tribal informants;

e) put to good use the Organ Pipe Cactus National Monument prehistoric lithic assemblages previously collected from all sites in the park that remain un-analyzed and un-classified. A ground stone study should be undertaken and the stone tools analyzed, documented, and photographed, especially the stone ax heads. A projectile point typology should be developed—before the typology is created, several different lithics analyses need to be undertaken for different locations in the park to draw upon for stylistic inferences. This data should be published and distributed to be integrated into regional lithics studies to aid in dating sites and affiliation of cultural groups, the study of migrations, demographics, populations, subsistence and settlement practices, the beginnings of agriculture and food storage, water control on the Sonoran Desert, and a greater understanding of the lifeways of those who went before us.

Concerning historic features near the Bates Well Ranch headquarters:

f) research and document completely El Camino del Diablo and its relationship to Bates Well Road and to Armenta Ranch Road on Organ Pipe. The historic Bates Well Road has not been recorded on AZSITE as of August 2, 2011 and its National Register status remains undetermined;

g) intensively survey the locations of the historic ranch/store at Growler Mine Group and the other historic mines, prospect pits, mining camps, and features and consider recording the camps and features as a historic mining district—the Growler Historic Mining District (a cultural landscape);

h) research and date the arrastra near the cowboy bunkhouse within the Bates Well Ranch headquarters compound. This important early mining appliance is the only known arrastra still in existence in the entire region. It is significant at the state level in that it represents the earliest method of processing ore in the development of the mining industry and economy of Arizona; and

i) the 1994 National Register nomination form for Bates Well Ranch should be updated to add to the areas of significance—currently the ranch is listed as significant in the area of Agriculture, specifically frontier cattle ranching. Areas of significance should be added: Water Control Devices on the Sonoran Desert; and Early Mining and Prospecting. Additional features should be added to the list of contributing elements, including the historic gravesite; the fencing/trigger gates; prospect pits, and others.

In summary, the NPS continues to identify, document, stabilize, repair, and preserve the historic and prehistoric lands on the Sonoran Desert and manage them for the benefit of future generations. It is recommended that additional research directed at prehistoric, protohistoric, and historic concerns be undertaken as soon as time and funding permit.

Table 5. Bates Well Ranch Lithics Artifact Catalog.

Organ Pipe Cactus National Monument
BATES WELL RANCH AZ Z:13:39(ASM) ARTIFACT CATALOG 2010-2011
Connie Gibson, Archeologist & Cultural Resources Program Manager Artifacts from AZ Z:13:39 (ASM) Surface Collections

GROUND STONE ARTIFACTS

Parentheses =Incomplete Measurement

WACC Lot No.	Description	Raw Material	Artifact Classification	Count (N=)	Length	Width	Thickness	Remarks
1499		Tan Cortex Quartzite	Pestle/Gyratory Crusher	1	45 cm	9.8 cm	9.12 cm (diameter); 40 cm (circum-ference)	Large heavy multi-purpose tool likely used as a gyratory crusher and in the manner of a 2-hand mano & rolling pin.
Not Collected		Reddish-brown Vesicular Basalt	Grinding Slab Fragment	1	16.5 cm	(11 cm)	~ 8 cm	Likely used for cracking corn for chicks. Found approx. 2 m west of chicken coop & in association with a metal poultry feeder.
5348		Fine-grained White Quartzite	Mano Fragment	1	(6.45 cm)	(4.32 cm)	(50.72 mm)	Incomplete. Only 2 facets are present, mainly 1 lateral side + small bit of dorsal/ventral facet; both facets show use-wear.
5314		Olivene Basalt	Hammerstone	1	8.53 cm	7.5 cm	36.2 mm	Cobble with cortex both sides. Large flakes were struck from all around the edges to produce a working tool. Exhibits heavy use-wear. Crushing on all sides.
Not Collected		Local Granite	Arrastra Netherstones + Dragstones Site Appliance	1			N/A	Date of construction unknown. Believed to be present by 1909. Builders unknown. Not used since the cowboy bunkhouse was moved next to it, ca. 1930s–1940. Rare site appliance, no others known still in existence in the entire region.

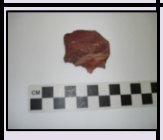
Table 5. Bates Well Ranch Lithics Artifact Catalog (continued).

Organ Pipe Cactus National Monument
BATES WELL RANCH AZ Z:13:39(ASM) ARTIFACT CATALOG 2010
Connie Gibson, Archeologist & Cultural Resources Program Manager — Artifacts from AZ Z:13:39 (ASM) Surface Collections

FLAKED STONE ARTIFACTS

Parentheses =Incomplete Measurement

WACC Lot No.	Description	Raw Material	Artifact Classification	Count (N=)	Length	Width	Thickness	Remarks
5735		Obsidian	Biface. "Arrow" Projectile Point. Western Triangular Cluster, Cottonwood Triangular Sobaipuri Type (Justice 2002:261–274).	1	(2.0 cm)	1.35 cm	3.8 mm	Non-local obsidian source. Serrated straight blade edges. Lacks notches or stem. Deeply concave V-shaped base. Small un-notched triangular points were almost entirely restricted to the upper levels of Ventana Cave (Haury 1950:Plate 22 facing p. 291). Could be called a 'Pima' or 'Papago' type as opposed to a 'Sobaipuri' (which is found mostly in southeastern Arizona). Dates to Late Prehistoric period ca. A.D. 900 into Historic period.
5735		Black Basalt	Biface. Dart Point. Pinto type (Justice 2002:138–150). (Haury 1975:290 Plate 22; Mabry 1998:145).	1	3.57 cm	1.67 cm	3.6 mm	Triangular/Lanceolate blade shape. Parallel shoulders, no barbs. Straight stem, concave base. Obtuse shoulder-to-stem angle. Incomplete-missing a medial portion of blade. Pinto point styles are considered a harbinger of the Early Archaic period, ca. 9500–2800 B. P. according to Mabry (1998:145). Others, such as Justice date Pinto points to the Middle Archaic approximately 6000–5000 to ca. 3000 B. C. (Justice 2002:143). Comparable to Haury's 'Chiricahua-Amargosa II' phase (Haury 1975:290 Plate 22).
5735		Red-Brown 'striped' Chert	Biface. Dart Point? If so, could be Paleoindian Lanceolate Plano Cluster, Milnesand Type. (Justice 2002:76–96).	1	(3.62 cm)	1.92 cm	5.5 mm	Thin finely-flaked leaf-shaped biface (point?) with oblique parallel flaking. Irregular straight base. Un-notched. Fine pressure flaking on margins. Convex blade-margin shape. Incomplete-missing distal tip. Slight alternate beveling. If Milnesand dates to 8200–7200 B.C. (Turner & Hester 1999:156). Associated with bison hunting.
5735		Black Basalt	Biface. Dart Point. Pinto Cluster (Justice 2002:138–150; Haury 1975:290 Plate 22; Mabry 1998:145).	1	3.57 cm	1.89 cm	4.9 mm	Lanceolate. Alternately beveled haft. Concave base. 1 blade margin convex—the other blade margin concave, producing a slight 'hook' at distal end & blade tip. Pinto point styles are considered a harbinger of the Early Archaic period, ca. 9500–2800 B. P. according to Mabry (1998:145). Others, such as Justice date Pinto points to the Middle Archaic approximately 6000–5000 to ca. 3000 B. C. (Justice 2002:143). Comparable to Haury's 'Chiricahua-Amargosa II' phase (Haury 1975:290 Plate 22).

WACC Lot No.	Description	Raw Material	Artifact Classification	Count (N=)	Length	Width	Thickness	Remarks
5735		Quartz	Biface. Dart Point.	1	(3.27 cm)	1.57 cm	7.4 mm	Lanceolate, serrated. Incomplete-missing medial portion, distal tip, & base. Base has step fracture. Not enough stone to type reliably.
5735		Black Basalt	Biface. Dart Point. Cortaro Type (Justice 2002:179–182).	1	2.90 cm	1.84 cm	5.2 mm	Somewhat crudely flaked. Triangular or Lanceolate. Un-notched, no stem. Shallow concave base. Cortaro Type dates to Late Archaic period 4300 to 2300 B.P. (Mabry 1998:147); or from 2300 to 300 B.C. (Justice 2002:179).
5745		Brown/ Gray Basalt Porphory	Biface. Spear Point? If so, could be Paleoindian Lanceolate Plano Cluster, Milnesand Type.	1	(6.64 cm)	2.9cm	8.6 mm	Lanceolate. Straight to slightly convex base. Base is wedge-shaped. Missing distal end & tip. Thicker towards the distal end, thinner towards the basal proximal. If Milnesand dates to 8200–7200 B.C. (Turner & Hester 1999:156). Milnesand associated with bison (*Bison antiquus*) hunting (Justice 2002:94).
5745		Brown Fine-grained Rhyolite	Biface. Dart Point. Cortaro Type (Justice 2002:179–182).	1	(3.83 cm)	2.85 cm	10 mm	Missing distal end & tip. Triangular. Straight to slightly concave base. Cortaro Type dates to Late Archaic period 4300 to 2300 B.P. (Mabry 1998:147); or from 2300 to 300 B.C. (Justice 2002:179).
5002		Gray Basalt.	Utilized Flake Tool. Large multi-purpose side scraper & chopper. Extensive shaping and edge retouching.	1	12.3 cm	7.5 cm	34.1 mm	Strategically modified with thumbhold grip. Heavily used, all edges show use-wear.
5008		Pink Chert	Utilized Flake. Secondary, some cortex remains.	1	5.1 cm	4.68 cm	10.4 mm	Minimal use-wear.
5796		Red-pink Rhyolite	Uniface. Graver.	1	3.72 cm	4.32 cm	10.86 mm	2 sharp projections from scraper with strategic fitted thumbhold.
5747		Olivine Basalt w/ Chert Inclusions & Crystal Geode Embedded in Cortex	Uniface. Side & End Scraper.	1	5.56 cm	3.25 cm	10.84 mm	Compact and unique tool. Chrystalline geode cortex remains as decoration for what was likely a prized possession. Small size and "daintiness" suggests it may have been a woman's or child's tool.
5742		Brown Andesite	Biface. Dart Point. Gypsum Cave type. Dates to Middle Archaic approx. 4500–4000 B.P. (Mabry 1998:75).	1	5.25 cm	2.34 cm	11 mm	Triangular, contracting stem. Slight basal notch in straight base. Gypsum Cave type dates to Middle Archaic period (Baumann 1995:579; Mabry 1998:75). (Originally cataloged as a drill.)

WACC Lot No.	Description	Raw Material	Artifact Classification	Count (N=)	Length	Width	Thickness	Remarks
6000		Brown Basalt	Biface. Dart Point. Gypsum (or Gypsum Cave) type (Justice 2002:186–194).	1	5.9 cm	2.15 cm	15.6 mm	Gypsum variant. Tapering or Contracting Stemmed. Slight indenture (basal notch) in straight base. Originally typed as a drill; however, drills are usually more recurved. Shows use-wear along both lateral edges suggesting it was re-used as a knife/scraper. Gypsum dates to Middle Archaic period approx. 4500–4000 B.P. (Baumann 1995:579; Mabry 1998:75).
5004		Brown Rhyolite	Utilized Flake.	1	7.33 cm	3.84 cm	13.9 mm	Some retouch, light-to-moderate use-wear.
5653		Black Basalt	Biface. “Arrow” Projectile Point. Pueblo Side Notched type, Straight Base, Snaketown Cluster (Justice 2002:289–319).	1	2.85 cm	1.16 cm	2.8 mm	Long, thin blade. Alternately beveled. Missing part of distal tip. Dates to Late Prehistoric period, approx. A.D. 1200–1400, the Soho and Civano phases of the Hohokam Classic.
5006		Pink Chert (could be same source as #5008 above)	Flake. Secondary.	1	3.76 cm	2.0 cm	5.2 mm	Use-wear is slight-to-none. Some cortex present.
5316		Gray Basalt	Core Tool. Ground on 1 facet; flaked around 3 edges to form chopper or handheld hoe.	1	7.0 cm	8.87 cm	21.8 mm	Cortex remains on dorsal & ventral facets. Crushing around edges, thumbhold shows wear.
5651		Tan Basalt	Utilized Flake	1	6.74 cm	5.43 cm	21.5 mm	Poor quality raw material. Small amount of retouch. Moderate use-wear.
5652		Dk. Greenish-Brown Chert	Core Tool/ Hammerstone. Multidirectionally flaked.	1	5.43 cm	5.85 cm	40 mm	Cortex present on primary striking platform. Use-wear on lateral edges and on ventral striking facet.
5652		Milky Quartz	Utilized Flake.	1	3.57 cm	3.9 cm	13.9 mm	Primary flake. Light use-wear.
5652		Gray Basalt	Utilized Flake – Blade. Used as endscraper unifacial tool.	1	3.0 cm	1.1 cm	6 mm	Tertiary flake. Crushing on blade platform. Use-wear on lateral edges.

WACC Lot No.	Description	Raw Material	Artifact Classification	Count (N=)	Length	Width	Thickness	Remarks
5652		Brown Rhyolite	Core Tool.	1	3.87 cm	2.91 cm	12.3 mm	Multidirectional exhausted core tool. Used as knife/graver.
5652		Brown Chert	Uniface.	1	4.0 cm	2.69 cm	9 mm	Primary flake retouched on 3 sides. Serrating along 2 edges.
5652		Milky Quartz	Utilized Flake.	1	2.2 cm	2.7 cm	7 mm	Incomplete flake fragment.
5746		Gray Basalt	Biface. Knife.	1	(5.92 cm)	2.67 cm	14.4 mm	Incomplete. Some use-wear along both lateral edges.
5746		Milky Quartz	Uniface - Blade	1	3.4 cm	1.61 cm	5.3 mm	Finely flaked secondary flake. Use-wear along both lateral blade edges + platform edge.
5746		Pink-orange Rhyolite	Uniface. Side & end scraper.	1	5.24.cm	3.43 cm	9.3 mm	Rectangular shaped. Use-wear on 3 sides.
5746		Gray-pink basalt w/ fossilized inclusions	Uniface. Side & End Scraper. May be preform.	1	6.0 cm	4.0 cm	14.4 mm	Teardrop shaped. Retouched all around edges. Comfort thumb grip.
5746		Striped gray-brown Chert	Uniface. Side & End Scraper	1	5.1 cm	3.47 cm	11.2 mm	Use-wear on 1 lateral side and on end. 'Paddle' shaped. Missing proximal portion.
5746		Gray Basalt	Biface. Could be remains of a projectile point.	1	(3.75 cm)	2.28 cm	6.3 mm	Incomplete. Lanceolate. Finely flaked. Missing distal end and tip. Short fluted flake scar at base.
5746		Lt. Gray Basalt	Biface. Knife, possibly re-used Projectile Point.	1	(4.6 cm)	2.37 cm	10.2 mm	Alternately beveled. Thick. Incomplete, missing base. Use-wear along one lateral edge.
5746		Gray Basalt	Biface. Knife.	1	5.25 cm	2.3 cm	12.8 mm	Lanceolate. Slanted straight base, neither convex nor concave. Thick center, alternately beveled. Shows use-wear along one lateral edge.

WACC Lot No.	Description	Raw Material	Artifact Classification	Count (N=)	Length	Width	Thickness	Remarks
5746		Brown Basalt (lt. and dk. Brown mottled)	Biface.	1	3.76 cm	2.46 cm	6.1 mm	Incomplete. Lanceolate. Missing distal end & tip. A slight projection at larger end.
5746		Gray Basalt	Biface. Graver, End and Side Scraper.	1	3.6 cm (may or may not be complete measure-ment)	2.43 cm	11.2 mm	2 projections at one end. Retouched. Use-wear all 3 sides.
5746		Gray Basalt	Biface. Knife.	1	5.1 cm	2.4 cm	20.5 mm	Teardrop shape. Alternately beveled. Assymetrical convex base w/ short fluted flake scar. Slight hook at distal tip Moderate use-wear along both lateral blade edges. Thick and alternately beveled.
5746		Brown-gray Basalt	Biface. (Probable) Knife.	1	(4.19 cm)	3.33 cm	9.9 mm	Incomplete.
5746		Gray-brown (striped) Basalt	Uniface. Used as Knife, possibly re-used Projectile Point.	1	5.0 cm	(2.5 cm)	10.29 mm	Incomplete. Missing portion of proximal on 1 side. Use-wear along both lateral edges. If originally a projectile point, base is straight to convex, 'hooked' teardrop shape.
5746		Gray-brown Basalt w/ inclusions	Biface.	1	(4.7) cm	3.0 cm	8 mm	Very little signs of (macroscopic) use-wear along lateral edges. Has a short flute at slightly convex base.
5005		Brown Basalt	Utilized Flake. Side & End Tool. Graver.	1	6.1 cm	3.35 cm	12.8 mm	Projection at distal end. Heavy use-wear on 3 sides.
5007		Brown Basalt	Utilized Flake.	1	(7.0 cm)	5.8 cm	17.9 mm	Incomplete. Missing distal end. Paddle-shaped.
5003		Brown Basalt	Exhausted Core Tool. Unifacial end scraper.	1	5.13 cm	3.88 cm	19.2 mm	Small hole on dorsal face near distal end, probably natural.

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