

ARCHAEOLOGY SOUTHWEST *magazine*

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Immigrants and Population Collapse in the Southern Southwest

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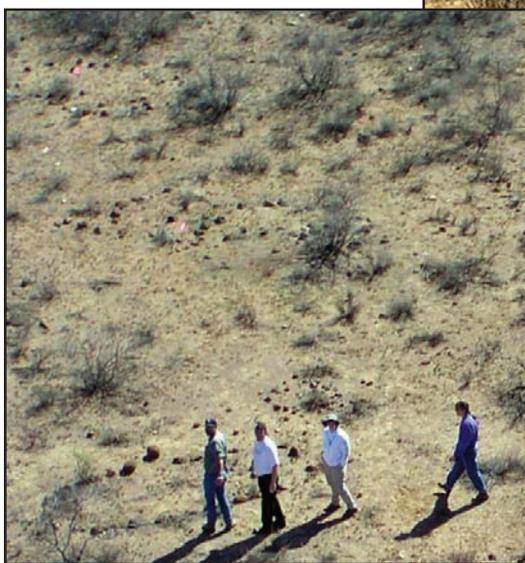
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WHAT HAPPENED TO THE HOHOKAM? is a question that has long intrigued and vexed Southwestern archaeologists. Recent research by archaeologists from the Center for Desert Archaeology has rephrased this question. We are now asking “How did more than 40,000 people vanish from the archaeological record of southern Arizona nearly a century before the arrival of the Spaniards?”

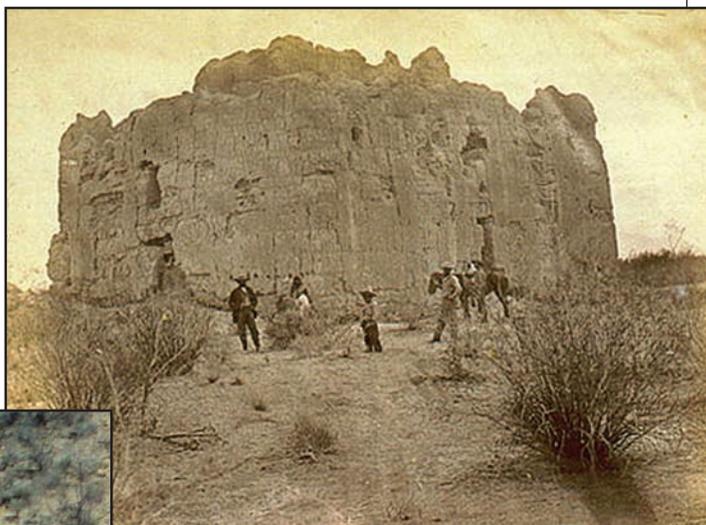
Estimating past population using archaeological information is difficult. However, only by using rough population estimates can we put our rephrased research question into perspective. The loss of 40,000 people represents a more than seventy-five percent decline in population, a staggering amount.

In comparison, the Black Death, one of the deadliest pandemics in history, killed at least thirty-three percent of Europeans between A.D. 1347 and 1350. And although the Civil War accounted for more American deaths than all other wars from the American Revolution through the Vietnam War combined, the number of people

Reine Muñoz



Contrasts in architecture: The Casa Grande, a four-story adobe structure in use from 1350 to 1450, was part of a large settlement with many adobe compounds (courtesy Library of Congress). In the late 1600s, the Sobaipuri Indians, who spoke the O'odham (Piman) language, lived in small oval structures that left faint traces in the archaeological record. The rocks were used to anchor the bent-pole frames of these houses.



Carlo Gentile

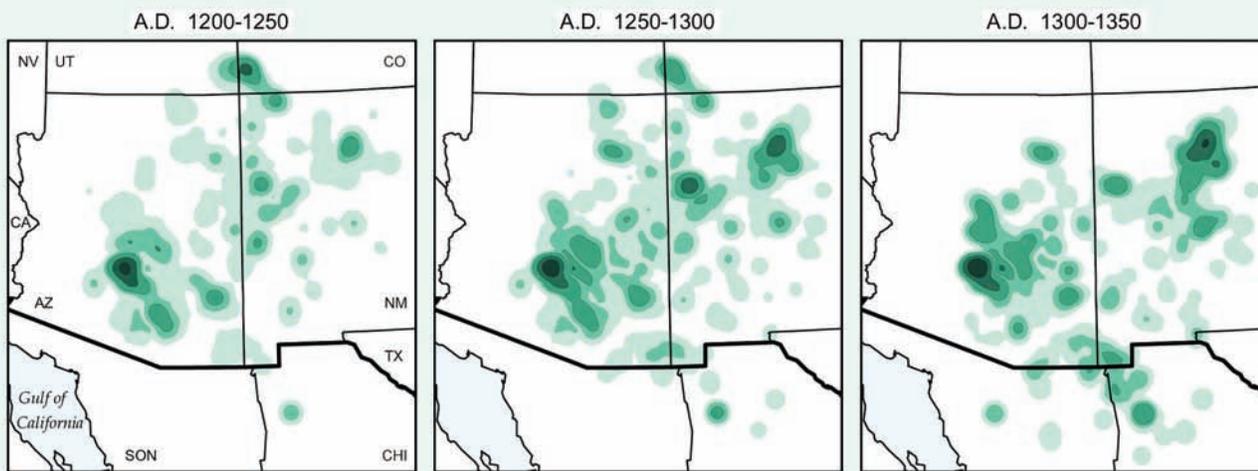
killed represented only two percent of the United States population in 1860.

These two examples involved population loss and extreme social disruption that occurred over time frames of five years or less. Our research indicates that population decline in the Southwest involved a much longer time frame.

In 2003, the Center received a National Science Foundation (NSF) grant that allowed us to pursue new research to address this dramatic demographic decline. This issue of *Archaeology Southwest* outlines the background and the results of this research. The contrast in population between 1400 and 1700 is highlighted in documents and

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Population distribution across the Southwest in fifty-year intervals from 1200 to 1500. Density intervals per 100 km²: 10, 50, 100, 250, 500.

in the archaeological record. In 1697, Captain Juan Mateo Manje accompanied Father Eusebio Francisco Kino on an exploratory journey along the length of the San Pedro River and then westward along the Gila. Manje wrote in his journal about the impressively thick adobe walls of the Casa Grande Ruin. He described the large irrigation canal that not only brought water to the area, but also, in Manje's assessment, could have served as a defensive moat. He compared the numerous decaying *casas grandes* to European castles. In contrast, when he and Kino arrived at a nearby O'odham village several miles to the west, Manje made no mention of irrigation canals and stated that the houses were "built with poles and covered with mats."

The archaeological record in southern Arizona contains very few securely identified sites that date between 1450 and 1650. However, several indigenous sites have been excavated that date to the late 1600s, at approximately the time of Manje's travels. The photographs on page 1 show the contrast between the structures built in late Hohokam times and those built in the 1690s.

Most archaeologists agree that these differences point to a drastic population decline in the indigenous communities in southern Arizona prior to arrival of the Spaniards. Nevertheless, an explanation

for a decline of this magnitude has been debated for more than fifty years, with migration, floods, drought, disease, overpopulation, and warfare offered as possibilities.

Understanding this phenomenon requires both detailed studies of individual valleys and a broad geographic and temporal perspective. With respect to the latter, the Center, in collaboration with the Museum of Northern Arizona and Western Mapping, Inc., developed the Coalescent Communities Database. This ambitious project created a Geographic Information System (GIS) database that contains all known sites in the Southwest having more than twelve rooms and dating from 1200 to 1700. These data have been used to estimate how many rooms were occupied at each site in each fifty-year interval during this 500-year period. These room counts are the basis for site-level population estimates and regional demographic reconstructions across the Southwest (see population trends figure, above and page 3).

Several trends bear directly on this population collapse. First, beginning in the late 1200s, there was a general southward movement of people from the Four Corners area. Groups that were dependent on rainfall farming moved into river valleys where irrigation agriculture could be

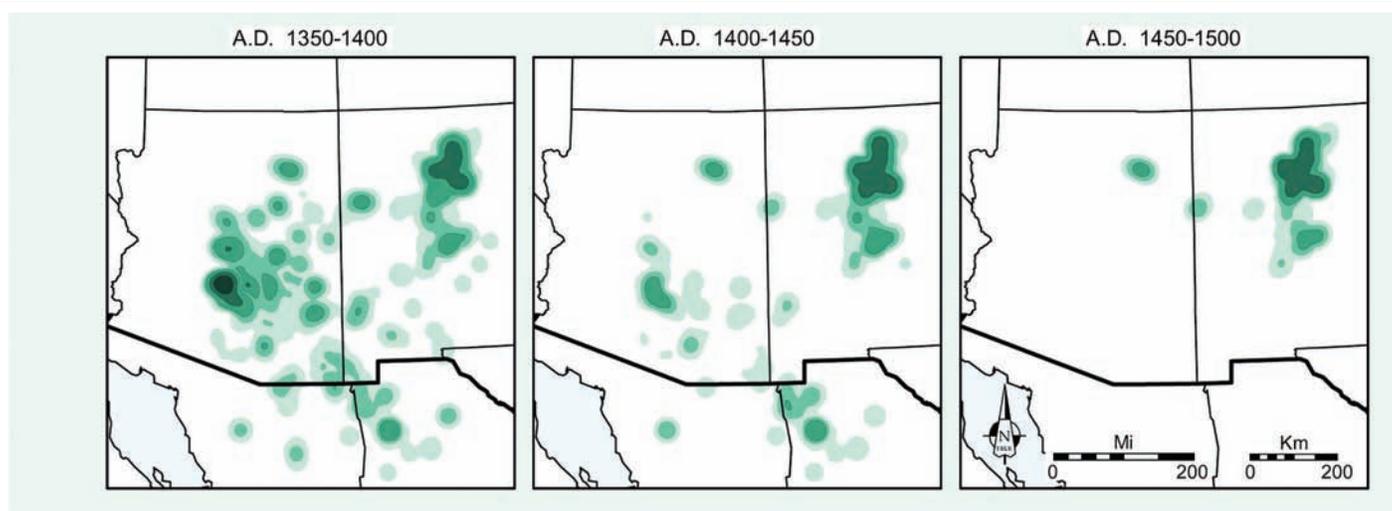


Mathew A. Devitt



Jannelle Weakly

Contrasts in ceramics: Salado polychrome vessels were widely made and traded between 1300 and 1450. In contrast, only a few plain wares were being made and used by the Sobaipuri in the late 1600s (both photos courtesy Arizona State Museum).



practiced. The depopulation of southwestern Colorado coincided with a substantial population increase in the northern Rio Grande. Small migrations of Ancestral Puebloan groups from northeastern Arizona can be traced to river valleys in southern Arizona. At about the same time, people who had been living in smaller settlements aggregated into fewer, but larger, settlements. We believe that migration and aggregation were related parts of a single process we call *coalescence*.

Second, the time around 1300 was the period of maximum population in the Southwest, with the greatest concentration by far in the Phoenix Basin.

Finally, substantial population loss is indicated across southern Arizona by 1400, several generations after coalescence occurred. This loss cannot be attributed to a single catastrophe, but instead, took place over at least several generations and perhaps as long as 150 years. At the same time, the mountainous zones in central Arizona were depopulated, creating a demographic and perhaps communication “fault zone” between the inhabitants of the Sonoran Desert and the Colorado Plateau. No major population centers survived in southern Arizona after 1450.

Using the broad trends identified by the Coalescent Communities Database, the Center conducted detailed research in five study areas that represent the range of environmental and social diversity in late pre-contact southern Arizona. The goals of our research were to understand the role that Ancestral Puebloan migration played in coalescence and to evaluate possible connections between coalescence and the subsequent population collapse.

In addition to the lower San Pedro Valley, study areas in the NSF project included the lower Salt River Valley, Perry Mesa area, Tonto Basin, and the Safford Basin. Our focus was on re-examining existing museum collections, primarily those from recent cultural resource management projects. This was augmented by small-scale fieldwork.

This issue of *Archaeology Southwest* presents preliminary results of this research project. We begin with an overview of migration. Then, the methods and artifact analyses used to achieve our research goals are discussed, and we present a summary of past research and project results for each of our five study areas. A final section identifies common themes and broad patterns in population coalescence and its subsequent decline across southern Arizona.

Overview of Migration

TO PUT OUR RESEARCH in context, it is helpful to first consider the scale and sources of population movement, or migration. We believe that Ancestral Puebloan immigrants initiated changes across much of the southern Southwest that contributed greatly to the dramatic population decline evident in the archaeological record. The number of immigrants moving to any one valley was likely fairly small. The Perry Mesa study area was essentially entirely inhabited by immigrants, but in our other four study areas, a combined total of between

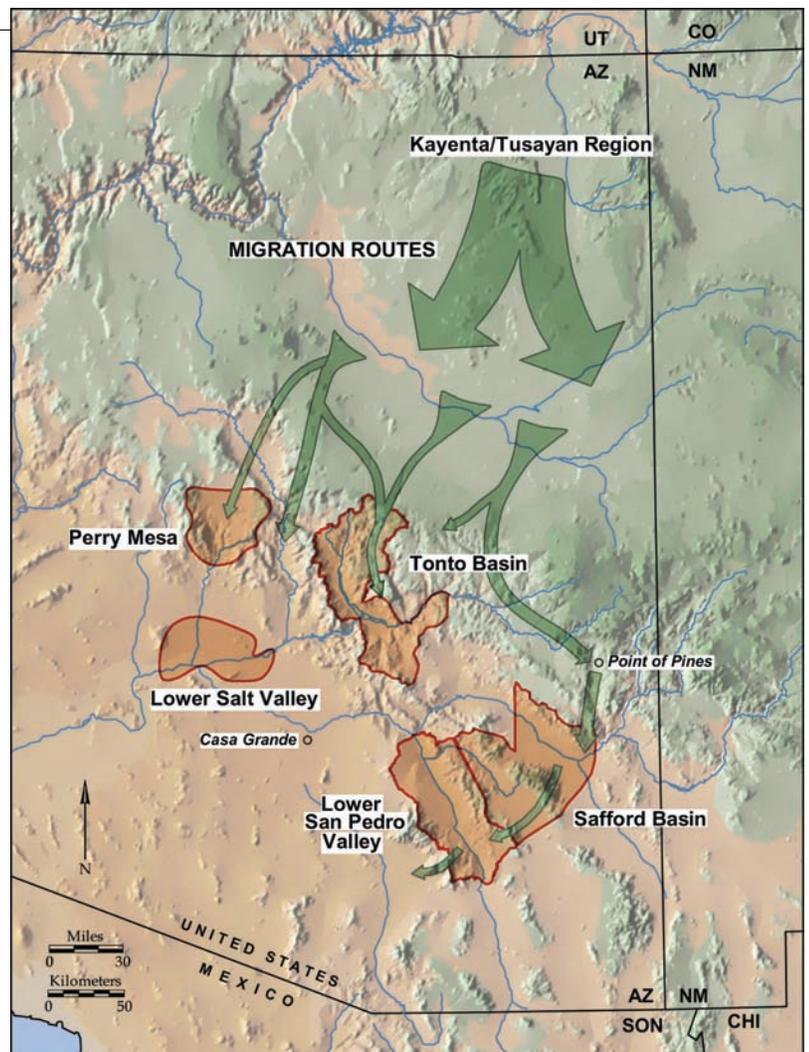
1,500 and 3,000 immigrants is believed to have been present. The small number of immigrants makes the ultimate magnitude of their impact particularly interesting.

The map on page 4 illustrates the general source area of these immigrants in the Kayenta/Tusayan region of what is now northeastern Arizona. The term *Kayenta* refers to the area around Navajo National Monument. The Kayenta region was permanently abandoned by Ancestral Pueblo groups in the late 1200s. The term *Tusayan* refers to the area immediately to the south, bounded by the Little

Colorado River, and includes the Hopi Mesas. Although there was some population movement out of this area, it remains the home of the Hopi Tribe to the present day. Because we cannot precisely track the movement of immigrants from each region, and because it is likely that these groups sometimes mixed during migration, we refer to the source area for these populations more generally as the Kayenta/Tusayan region.

Our research indicates that there were probably two distinct streams of immigrants who moved southward. First, there was an eastern stream in which small, multifamily groups moved into territories long occupied by irrigation farmers in the Safford, Aravaipa, and lower San Pedro valleys. Second, a western stream of immigrants—less distinct archaeologically—is evident in the western portion of the Tonto Basin. Groups from the Flagstaff area appear to have colonized the Perry Mesa area, which was sparsely populated immediately prior to their arrival.

The most-cited reason for people moving out of the Four Corners area has been the so-called Great Drought of the late 1200s. Although this time of distinctly drier conditions is documented in the narrowed ring patterns of ancient trees, archaeologists often argue that there were many reasons for the departure of people from Mesa Verde and the Kayenta region. What is not debated, however, is that nearly everyone left. As the sidebar below shows, the role of Salado migration in explaining change has a long history in Southwest archaeology.



This map summarizes the general routes of immigrants from the Kayenta/Tusayan area and shows the Center's five study areas.

The Original Salado Migration Concept

IN THE 1930S, as researchers like Harold Gladwin and Emil Haury at Gila Pueblo attempted to define the Hohokam culture, they documented a long-term continuity in pithouses, red-on-buff pottery, other craft items, and burial practices, followed by very rapid change around 1300. A Salado migration was proposed as an explanation for that change.

Haury's doctoral dissertation focused on the unpublished work of the Hemenway expedition of the late 1880s, when important late sites in the Phoenix Basin, such as Los Muertos, were excavated. He writes, "The main event of the Classic Period was the arrival of new people—a people ethnically separable from the Hohokam. This was the Salado migration."

Haury suggested that the Great Drought of the late 1200s and the resulting abandonment of the Four Corners area, generated a wavelike push of people southward. Ultimately, the Salado, whose residential focus was in the Tonto Basin, spilled over into the Salt and Gila River valleys. Gladwin viewed Hohokam and Salado people as living "side by side without exercising any perceptible influence on one another." Archaeologist Julian Hayden saw things differently, suggesting that "the Hohokam appear to have been submerged by the in-rolling wave of the Salado."

The present analysis clearly derives from the general outline of the original Salado migration concept. However, new excavations, analysis methods, and theoretical perspectives allow a much more detailed formulation of past events that emphasizes the importance of interaction between immigrants and local inhabitants. Even so, our work is not the final synthesis. It is, we hope, a useful step toward that goal.

Methods

BECAUSE STUDYING the connection between migration and demographic decline in the southern Southwest is a complex research problem, we could not investigate all of its aspects. Instead, we chose techniques and sources of data that would allow us to address the issue on a larger geographic scale than generally has been considered. Our approach is intended to provide new insights that can structure future stages of a long-term research effort. We had four objectives: (1) to take advantage of existing archaeological data; (2) to employ recent advances in archaeological method and theory related to migration and demography; (3) to apply refined ceramic dating information to better understand changes over time; and (4) to use current methods for sourcing pottery and obsidian.

Where possible, we have relied on existing archaeological collections, in some cases, taking advantage of work done more than a century ago, and especially benefiting from the many cultural resource management projects completed over the past twenty years. The Coalescent Communities Database (see page 2) is the source of our basic demographic data. Our research tapped the resources of the Amerind Foundation, Arizona State Museum, Arizona State University, Crow Canyon Archaeological Center, Eastern Arizona College, Museum of New Mexico, Museum of Northern Arizona, the National Park Service Western Archeological Center, Pueblo Grande Museum, and the site files of various U.S. Forest Service offices.

In less intensively studied areas, our review of previous research was supplemented by limited fieldwork. The latter included Center efforts in the lower San Pedro Valley and Safford Basin. Fieldwork by the Museum of Northern Arizona, Arizona State University, and the Verde Valley Chapter of the Arizona Archaeological Society supplemented the Perry Mesa sample.

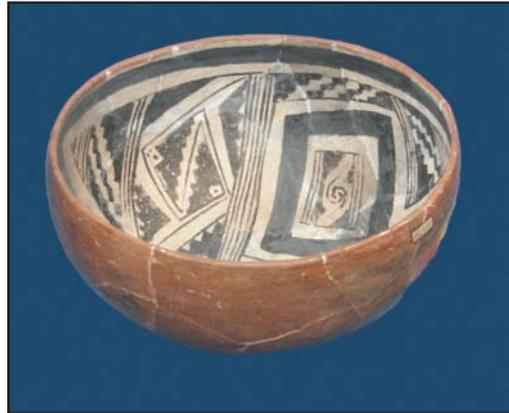
Major advances in archaeology over the past two decades have helped us to shed light on demographic changes in the southern Southwest. New methods allow archaeologists to differentiate migration from other processes that widely distribute artifacts with little population movement, such as trade and emulation (*Archaeology Southwest* 22[2]). These methods use utilitarian items that reflect the cultural background of their makers in order to track population movements. Such items include architectural details, like entry boxes, and pottery-making tools, such as perforated plates (see photo on page 10),

that can be tied to immigrants from the Kayenta and Tusayan areas of northern Arizona (*Archaeology Southwest* 17[3]). Wall-construction techniques, settlement layout, and ceremonial architecture provide additional information.

Salado polychrome ceramics, the dominant decorated pottery in southern Arizona, have been extensively studied by many researchers. Of particular value for the present study is the outcome of recent Center research that recognized Cliff Polychrome as a later pottery type than Gila Polychrome (see illustration at left). This allowed us to identify more-precise time periods in the later portion of the span from 1200 to 1450. Many decorated types of pottery brought to the southern Southwest from the northern Southwest also serve as fairly precise time markers. The re-examination of existing collections has improved our understanding of site occupation spans.

Knowing where pottery was produced and where it was recovered archaeologically can provide significant insights into past ceramic production and exchange. Ceramic petrography was the principal

tool for establishing where ceramic vessels were made. This technique matches the sands that potters added to clay to the areas where these sands were collected. More than 1,400 sherds, each from a separate vessel, were analyzed using this technique. The majority were from Salado



Patrick D. Lyons



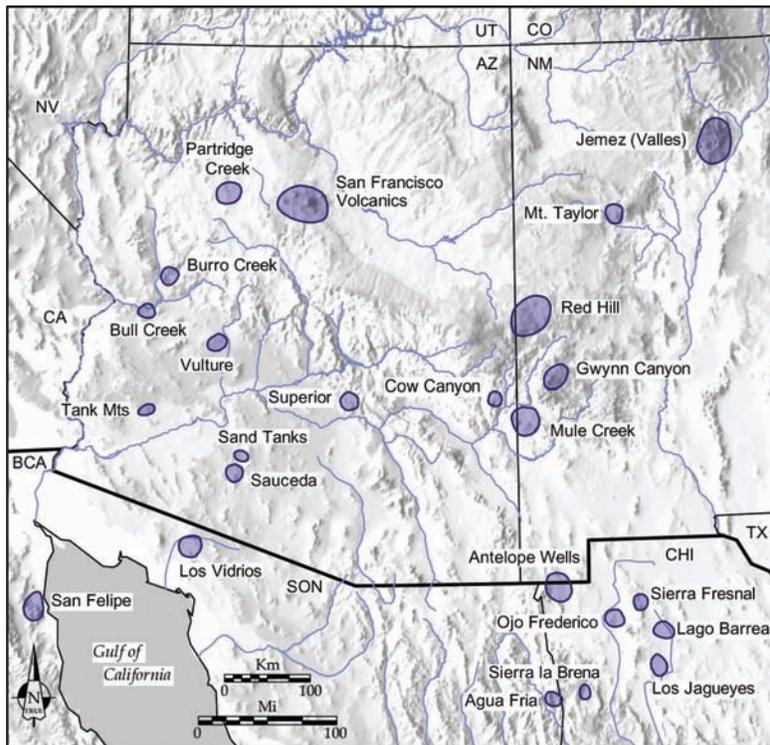
Mathew A. Devitt

Salado polychrome types that help archaeologists date fourteenth- and fifteenth-century sites in the southern Southwest: (top) Gila Polychrome, widely manufactured from A.D. 1325 to approximately 1400, and (bottom) Cliff Polychrome, widely manufactured from A.D. 1350 to approximately 1450. Cliff Polychrome bowls can be easily distinguished from Gila Polychrome bowls based on their curved rims and design fields above the banding line (the thick black line that runs along the inner circumference of the bowl).

polychrome pottery. Sherds from Maverick Mountain Series vessels (see photo on page 13) and perforated plates rounded out the sample.

Obsidian was an important commodity that was circulated widely in southern Arizona in the 1300s. Obsidian can be found in exposed outcrops of cooled lava and, more commonly, in drainages that have eroded into these outcrops. Each outcrop contains a unique combination of trace elements that can be determined using an analytical technique called X-ray Fluorescence (XRF).

More than 1,600 obsidian artifacts from nearly sixty late prehistoric sites in the Center's five study areas were ana-



Known sources of obsidian that have been identified through previous research. Analysis of obsidian artifacts from our five study areas shows changes in use over time that are related to the behavior of Kayenta/Tusayan immigrants.

lyzed by personnel at the Archaeological XRF Laboratory at the University of California at Berkeley (see map at left).

Most archaeological research is carried out at the level of individual sites or on the scale of the settlements in a single valley. The greatest advantage of the current research effort is that five areas with different environmental settings and contrasting settlement histories were compared. In each area, we examined population history, outlined the effect of immigrants, and we tracked two key indi-

The Lower Salt River Valley

THE PHOENIX BASIN includes both the lower Salt River Valley and the portion of the middle Gila River Valley immediately east of the confluence of the Salt and Gila rivers. Because of its proximity to these rivers, the Phoenix Basin was the most densely populated region in the Southwest for hundreds of years. The Phoenix Basin is generally considered the Hohokam heartland. In contrast, other valleys in southern Arizona are considered hinterlands.

Many of the artifacts and architectural traditions that archaeologists associate with the Hohokam originated in the Phoenix Basin and were subsequently traded to or copied by their neighbors. These include red-on-buff ceramics, schist palettes, ballcourts, and platform mounds.

Today, the lower Salt includes downtown Phoenix, Tempe, Mesa, and Chandler. Prior to urban expansion, the region was extensively cultivated, removing many of the small surface settlements and damaging large sites before they were adequately recorded. Fortunately, a few large sites have been extensively studied, including Los Muertos

and Pueblo Grande. Much of the information available to archaeologists comes from work at these and other platform mound sites, such as Las Colinas. Recent contract archaeology work has shed some light on many small Classic period (1200–1450) sites. In addition, prehistoric canal systems have been studied in great detail.

The population increased gradually in the lower Salt until the early 1300s. By that time, tens of thousands of people were living in the region. Most of their food came from irrigation farming. In addition to smaller systems, two large canal networks—containing hundreds of miles of canals—were constructed on either side of the Salt to meet the demands of the expanding settlements.

Fields near canal headgates were degraded from overuse, causing problems in nearby population centers, such as Pueblo Grande (*Archaeology Southwest* 21[4]), where severe nutritional stress is evident in the site's large burial population. As centers near canal headgates failed, the importance of settlements near the ends of canal systems, still surrounded by fertile land, increased.

The time of greatest population in the lower Salt coincided with the arrival of Kayenta/Tusayan immigrants in adjacent valleys to the north and east. Although those immigrants do not seem to have taken up residence along the lower Salt initially, their presence in surrounding areas may have been a factor in the increased population density in the Phoenix Basin. Significant buffer zones along the lower Verde and across the northern Phoenix Basin developed at this time.

Evidence for tensions related to population movements is most apparent at Perry Mesa (see next section). The establishment of large, defensible sites on Perry Mesa radically changed obsidian procurement patterns in the lower Salt River Valley. Previously, people in the lower Salt had ready access to the San Francisco volcanic field and Vulture obsidian sources to the north and northwest. XRF sourcing of obsidian collections from major fourteenth-century sites indicates access to these sources was almost entirely cut off. Instead, people in the valley turned southward, to the Saucedo and Los Vidrios sources.

Salado polychrome ceramics were first imported into the lower Salt from outlying areas already harboring Kayenta/Tusayan groups. The movement of these groups or their descendants into the area occurred at a relatively small scale after 1350, when the irrigation-based economy was already under severe stress and the local population was declining. At this time, groups in the lower Salt may have accepted immigrants into their communities to meet the labor demands associated with maintaining massive canal systems that were built for much larger populations.

As indicated by large quantities of recovered perforated plates and petrographic evidence for local Salado polychrome pottery production, many immigrants moved into settlements nearer the ends of canals, particularly at Los Muertos and Las Colinas, which were becoming increasingly important. This shift in settlement status and increase in cultural diversity may have created deep social rifts at a time when valley-wide cooperation was necessary to maintain the large irrigation systems.

Thus, in the lower Salt, small groups of Kayenta/Tusayan immigrants may have found themselves in conflict with communities already in crisis. Over the course of



Neil M. Judd

This aerial photograph from the 1930s shows the very large platform mound (left foreground) of the site of Mesa Grande. Most of the village was beneath plowed fields and now is under modern Mesa, though the mound is still preserved (courtesy National Anthropological Archives).

a century, the large villages and the extensive irrigation systems underwent continual decline, and few archaeological traces of indigenous occupation can be found after 1450. Unlike the Gila River to the south, the lower Salt remained sparsely settled until the arrival of American settlers in the late 1800s.

Perry Mesa

THE MASSIVE VOLCANIC FORMATION known as Perry Mesa, north of the Phoenix Basin, is unlike the other four areas studied by the Center, which are situated in valleys. Although Perry Mesa has little permanent water, a number of large, late prehistoric sites have been found there.

J. W. Simmons conducted the first archaeological research in the Perry Mesa region in the 1920s. In the 1970s, Museum of Northern Arizona personnel surveyed the area and excavated sites. In the 1990s, archaeologists David Wilcox, J. Scott Wood, and their colleagues investigated local settlement patterns. This work ultimately led to the



The densely packed rooms and massive enclosing wall of this village are set in the rugged topography of the Perry Mesa study area.

establishment of the 71,000-acre Agua Fria National Monument in 2000.

The defensible settlements on Perry Mesa, as well as the low agricultural potential of the region, led Wilcox and others to infer that these sites were part of what they termed the Verde Confederacy, which included settlements in the nearby Verde Valley. They suggested that sites in the fertile Verde Valley supplemented the food supply of Perry Mesa, thereby maintaining a large population in this strategic location as a buffer against the densely occupied Phoenix Basin.

In 2003, researchers from Arizona State University began to map sites and conduct small-scale excavations on Perry Mesa, as well as on nearby Black Mesa. By 2006, this work had expanded into a larger research project, headed by David Abbott and Katherine Spielmann, which was designed to test the Verde Confederacy model by using

ceramic sourcing, architectural analyses, and agricultural studies.

As part of the Center's research, decorated ceramics from Perry Mesa and several Verde Valley sites were reanalyzed and obsidian samples were submitted for XRF analysis. We determined that the large settlement clusters on Perry Mesa and Black Mesa developed rapidly in the late 1200s and early 1300s. XRF sourcing of obsidian collected from eight sites yielded a rare perfect pattern in archaeology: all 200 samples came from either the San Francisco volcanic field or nearby sources. This indicates a strong connection with the Flagstaff area. At the same time, groups in the lower Salt River Valley were cut off from

these sources, indicating social tensions between the two regions.

Hopi yellow and white ware vessels made in the Tusayan region dominate Perry Mesa ceramic assemblages, with imported Salado polychrome pottery a distant second. However, these groups were not from the Kayenta/Tusayan region, as indicated by the absence of perforated plates, Maverick Mountain ceramics, and kivas. Instead, the immigrants appear to have come from the area around Flagstaff, which had strong connections with the Hopi mesas. Other lines of evidence also show that the people living in this region were more influenced by cultures to the north. For example, Perry Mesa and Black Mesa settlements consisted of roomblocks constructed of shaped block masonry, not adobe compounds like those in the Hohokam region. Similar to other study areas, Perry Mesa was probably depopulated by 1450.

The Lower San Pedro Valley

TRACES OF NEARLY EVERY past settlement built there still remain in the San Pedro Valley. The northern, or lower, San Pedro stretches from north of the town of Benson to the river's confluence with the Gila. This part of the valley is a narrow, fertile ribbon flanked by high mountains with few passes. Access to the valley today is mainly via dirt roads.

Until the early 1990s, the lower San Pedro Valley area was the subject of only sporadic archaeological research. These efforts include work by the Amerind Foundation in the 1940s and 1950s, the Arizona State Museum Highway Salvage Program in the early 1970s, and by Central Arizona College in the late 1970s. In addition, amateur archaeologist Alice Carpenter spent nearly half a century

investigating and protecting the valley's most prominent ruins.

The lower San Pedro has been a focus of the Center's research for almost two decades. In the early 1990s, the Center conducted a volunteer survey that recorded more than 400 new sites. From 1999 through 2001, test excavations were accomplished at twenty-nine sites dating to the Classic period (*Archaeology Southwest* 17[3]).

By the 800s, many ballcourts had been constructed at pithouse villages throughout the lower valley as far south as Tres Alamos, just north of Benson. Buff ware pottery decreased in frequency from north to south along the river, and local decorated ceramic traditions became dominant in the southern half of the lower valley. The fertile area near the Aravaipa Creek confluence was the most densely settled, and groups that lived there maintained strong connections with the Phoenix Basin.

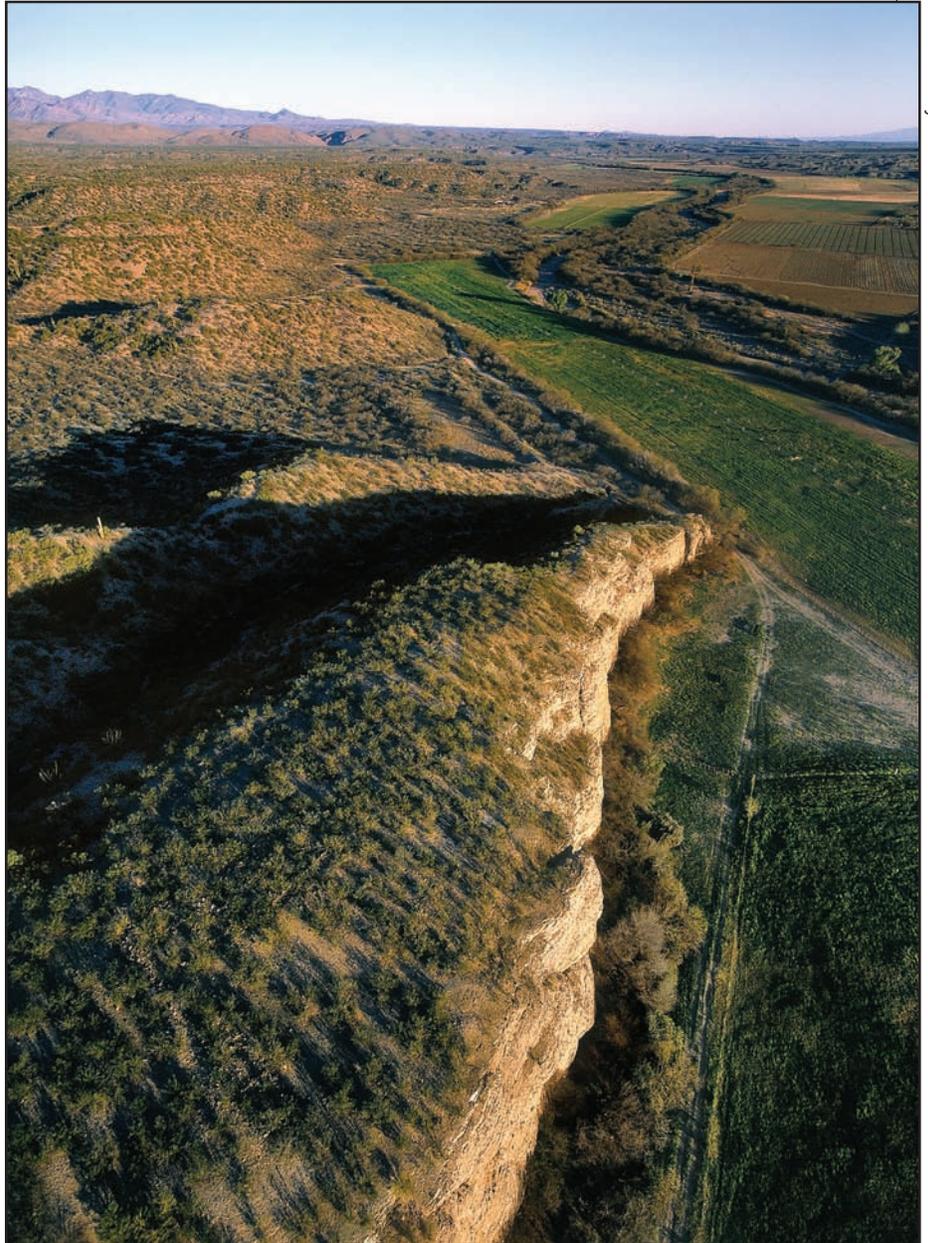
In the eleventh and twelfth centuries, ballcourts fell out of use. Residents of the major villages along the lower San Pedro remained nearby, but lived in hamlets and farmsteads that had no communal architecture and few decorated ceramics. In addition to growing maize in the floodplain, farmers built extensive rock-pile fields to cultivate agave. As indicated by large amounts of locally made corrugated pottery, immigrants from the Safford Basin and Mogollon Highlands entered the central portion of the lower valley in the late 1100s and early 1200s. These early immigrants were rapidly assimilated into existing settlements.

Beginning in the late 1200s, Kayenta/Tusayan groups from northeast Arizona moved into the region. These few immigrant families created a cluster of enclaves in the southern portion of the lower valley. Using local materials, they produced artifacts and architecture according to their own traditions. The distinctive items they made include shaped block masonry walls, entry boxes, kivas, Maverick Mountain Series ceramics, and perforated plates.

The immigrants' segregation and conspicuous display of identity may have been viewed with suspicion by local groups, particularly those in the Aravaipa area. These

locals moved into walled villages, and revived their decorated ceramic tradition as a way to assert their own identity. They also built platform mounds that marked their claims to agricultural land.

After a generation of relatively high tension, social boundaries began to dissolve in the early 1300s. Kayenta/Tusayan groups assimilated at least partially, abandoning



The Reeve Ruin was settled by Kayenta/Tusayan immigrants who built their village above very steep cliffs that overlook the San Pedro River. Double walls protected the back side of the village.

kivas and changing the color scheme on their pottery to Salado polychrome, perhaps to increase its appeal among local groups. Petrographic analysis ties Salado polychrome ceramic production to settlements with Kayenta/Tusayan immigrants, at least initially. Salado polychrome vessels

©Adriel Heisey

were produced at Reeve Ruin and probably also at the Davis Ranch site. These vessels were made for local consumption and trade to local platform mound settlements. Salado polychrome pots were also produced in late settlements near the Gila confluence, and these sites exhibit aspects of both local and Kayenta/Tusayan traditions.

No obsidian sources suitable for making stone tools exist in the San Pedro Valley. The Center's test excavations established that, prior to the influx of Kayenta/Tusayan people, almost no obsidian was being used in the region. However, access to obsidian increased dramatically after the Kayenta/Tusayan groups arrived. Immigrant enclaves, particularly Davis Ranch, had four times more obsidian than local platform mound settlements. More than 80 percent of this obsidian was obtained from the Mule Creek and Cow Canyon (upper Gila) sources east of the Safford Basin, where Kayenta/Tusayan enclaves have also been identified. This evidence



Peter Pilles, courtesy Sharlot Hall Museum

Perforated plate possibly used as a turntable or base mold for pottery production. These items are indicators of Kayenta/Tusayan immigrants.

suggests that the immigrants obtained obsidian from the upper Gila by maintaining connections with their relations near the source areas. The San Pedro Kayenta/Tusayan immigrants then traded obsidian to local groups that previously had limited access to it.

Despite close interaction between locals and immigrants, both groups remained in their own villages for much of the 1300s. Many of these settlements failed. Instead of dispersing, the dwindling populations continued to aggregate into smaller territories, heading

north toward the Gila River and leaving large, unsettled areas to the south. The artifacts, architecture, and burial practices associated with the final settlements display a complex mix of Kayenta/Tusayan and Hohokam traditions. This suggests the emergence of a new group that embodied aspects of both cultures. By 1450, even these final settlements were abandoned; the last remaining inhabitants either migrated or reverted to a mobile lifestyle.

The Tonto Basin

AT THE NORTHERN EDGE of the Sonoran Basin and Range province, the Tonto Basin is surrounded by high mountains on all sides. The region can be divided into upper and lower basins; the Center's research is concentrated on the lower basin.

The lower Tonto Basin is also divided into two areas: the eastern Salt River arm and the western Tonto Creek arm. Much of the Salt River floodplain and lower Tonto Creek floodplain has been inundated by the Roosevelt Lake reservoir, which was created by construction of Roosevelt Dam in 1911.

In the late 1800s, archaeologist Adolph Bandelier mapped many of the large ruins in the lower Tonto Basin. Tonto National Monument was established in 1907 to protect two large cliff dwellings along the Salt River arm. In the 1920s, archaeologist Erich Schmidt conducted the first formal excavations in the area. In the 1930s, archaeologists from Gila Pueblo investigated sites in the upper and lower Tonto Basin. Much of this work was directed by Emil Haury.

Following this initial activity, little work was conducted in the Tonto Basin for the next fifty years. However, from the mid-1980s to the present, tens of millions of dollars have been spent on contract archaeology by the Bureau of Reclamation and the Arizona Department of Transporta-

tion. Ongoing research by Tonto National Forest has also helped to make the Tonto Basin one of the most intensively studied regions in the Southwest.

Locally made utilitarian pottery, domestic architecture, and settlement layouts suggest that small groups of Hohokam immigrants entered the Tonto Basin in the 700s and 800s. These early immigrants preferred the Salt River arm because of its greater irrigation potential. The Tonto Creek arm was occupied primarily by local groups that maintained connections with both Hohokam and Ancestral Puebloan peoples. By 1100, a major shift in exchange networks occurred throughout the lower basin: Cibola White Ware made on the Colorado Plateau to the north replaced imported Hohokam buff ware.

By the early 1200s, many small irrigation communities had claimed much of the prime agricultural land. Settlements were built on nearly every ridge overlooking the Salt and Tonto floodplains. In the late 1200s, immigrants from the nearby mountains entered the region, bringing their corrugated ceramic and roomblock architectural traditions with them. These groups settled on the margins of local communities and filled most of the habitable upland areas. Many local communities built platform mounds that served as both ceremonial centers and territorial markers.

A dramatic shift in settlement occurred in the lower Tonto Basin in the early 1300s. Except for a few large upland sites, nearly every settlement along the Salt River arm was burned and abandoned. Many people left the area, perhaps moving south near the town of Globe. The remaining inhabitants built a large roomblock on Schoolhouse Point. Major construction at the Tonto cliff dwellings also occurred at this time. Along the west side of Tonto Creek, nearly every settlement was abandoned, while settlements on the east side grew larger. New roomblocks were built on and near Cline Terrace, where a large and elaborate platform mound was constructed using gypsum-block walls.

Important changes in material culture also occurred at this time. Early Salado polychrome pots were imported from the Silver Creek area near the eastern Mogollon Rim in the late 1200s and early 1300s. Local production of decorated wares in the Tonto Basin was extremely limited until the 1300s. Petrographic evidence indicates that this changed suddenly in the 1300s with the large-scale local production of Gila Polychrome and other late Salado polychrome pottery. Although

Salado polychrome vessels dominate decorated ceramic assemblages throughout the region, our analysis suggests that many were made around Cline Terrace on Tonto Creek. In addition, Jeddito Yellow Ware vessels were imported from the Hopi area to Tonto Creek settlements.

Obsidian, which had been used rarely in the Tonto Basin prior to the 1300s, became much more popular at this time. The very high proportion of obsidian at Cline Terrace from the San Francisco volcanic field suggests that people living in Tonto Creek settlements controlled the trade of this resource. At Schoolhouse Point, along the Salt River arm, the inhabitants relied on the local Superior source and, to a lesser extent, upper Gila sources, as well as the San Francisco volcanic field. The latter was probably obtained through trade with people living at Cline Terrace.

If a new wave of Ancestral Puebloan immigrants along Tonto Creek was responsible for these changes, their specific affiliation remains unknown. They included, however, skilled masons who built cliff dwellings and gypsum-block walls. They also had access to decorated ceramics and northern obsidian. Although they made large quantities of Salado polychrome pottery, they seemingly used few perforated plates and did not build entry boxes or kivas.

The inhabitants of Schoolhouse Point, the only major settlement along the Salt River arm in the 1300s, obtained



Excavations in the 1990s by Arizona State University at the site of Cline Terrace focused on this large platform mound. A portion of the massive enclosing wall for this village is visible at the bottom of the photograph.

most of their Salado polychrome vessels through trade with Tonto Creek settlements. Schoolhouse Point was built almost exclusively with cobble and adobe walls and, except for its roomblock layout, it exhibits few Ancestral Puebloan attributes.

The construction of the Tonto cliff dwellings in the sparsely occupied zone between the Tonto Creek settlements and Schoolhouse Point suggests that relations between these two communities were not always cordial. Sites constructed in the 1300s and later were built in areas that were more easily defended. Many of these sites were intentionally burned, and others seem to have been hurriedly vacated, based on the kinds and diversity of artifacts found on their floors. It appears that considerable social tension arose in the 1300s. Despite trade between settlements, the area was abandoned by the early 1400s.

The Safford Basin

A BROAD, FERTILE VALLEY situated along the Gila River, the Safford Basin is upstream from the Phoenix Basin. Straddling the boundary between the Sonoran and Chihuahuan deserts, it is surrounded on all sides by mountains. Among the regions in this study, the Safford Basin is second only to the Phoenix Basin with respect to arable land and access to water. Although poorly studied, it supported a large prehistoric population.

The Safford Basin is divided into two areas: the relatively undeveloped San Carlos district to the west, which lies inside the boundaries of the San Carlos Apache Indian Reservation, and the Pueblo Viejo district to the east, where Safford, Pima, Thatcher, and other Mormon farming communities have flourished for more than a century.

Until recently, the Safford Basin has been virtually ignored by Southwestern archaeologists. The rich and diverse cultural resources of the region were noted only in passing by archaeologists Jesse Walter Fewkes, Adolph Bandelier, and Walter Hough near the turn of the nineteenth century. These features included several large settlements and massive canals. Some of the canals were cleaned out and reused by early Mormon settlers. Unfortunately, farmers plowed many surface ruins before they could be recorded.

In the 1930s, Oscar Tatman carried out significant excavations at Buena Vista Ruin. By the 1960s, the pace of work by academic, contract, and amateur archaeologists gradually increased in the region. Much of this work was in the more accessible Pueblo Viejo district. Research, however, has increased substantially in the last two decades. This is due to a renewed academic interest in migration and cultural contact as well as to the rise in contract archaeology projects related to Safford's expansion. These efforts include the University of Texas excavations at the Goat Hill site, highway projects along U.S. 70 and U.S. 191, and Anna Neuzil's regional study of late prehistoric sites (*Archaeology Southwest* 20[2]).

In prehistoric times, people from a variety of backgrounds interacted in the Safford Basin. A large Hohokam

ballcourt was built at Buena Vista Ruin, a settlement near the head of the basin that was probably occupied continuously for at least a millennium. In the eleventh and twelfth centuries, the Pueblo Viejo district was a destination for immigrants from both the Mimbres Valley, in New Mexico, and the Mogollon highlands. In the late 1200s and early 1300s, Kayenta/Tusayan groups from northeastern Arizona moved to this area. Some immigrants established their own enclaves, such as the short-lived Goat Hill site. Other families moved into existing settlements, and still others continued on to the San Pedro Valley.



Sunset and moonrise over Goat Hill, the prominent knoll in the center of the photograph. In the late 1200s, Kayenta/Tusayan immigrants built a roomblock and kiva atop this defensible position.

Although a minority, Kayenta/Tusayan immigrants probably composed a larger percentage of the Safford Basin population compared to the other areas examined in our study. Local groups, which had a long history of accepting new ideas and new people into their communities, seem to have been more tolerant of these immigrants than locals were in the other study areas. For example, sites dating to the late 1200s contain decorated ceramics that exhibit both local styles, including imitations of Hohokam buff ware as well as Maverick Mountain Series types (see photo on page 13) introduced by Kayenta/Tusayan people. In addition, some of these settlements have architectural layouts that combine the construction techniques of local people with the roomblock style of immigrants.

Henry D. Wallace

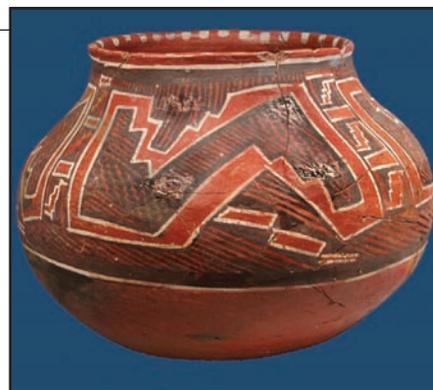
There seems to have been a significant increase in obsidian use in the late 1200s and 1300s, after the arrival of Kayenta/Tusayan immigrants. Almost all of the obsidian samples subjected to XRF analyses were from the nearby Mule Creek and Cow Canyon sources upstream along the upper Gila tributaries. The inhabitants of the region could have collected obsidian nodules directly from these sources or obtained them from the nearby Gila floodplain. Upper Gila obsidian was circulated well beyond the Safford Basin in the 1300s and is found in substantial quantities as far west as Casa Grande Ruin and the Tonto Basin.

As in the other study areas, the population aggregated into a few large villages in the early 1300s, suggesting either an increase in social tension or the emergence of new social institutions that fostered aggregation. Major settlements included the Marijilda site, Spear Ranch site, and Buena Vista Ruin. Unfortunately, little is known about these sites and only Marijilda has not been severely damaged.

Descendants of immigrants mingled with local groups and continued to thrive throughout much of the 1300s. Locally made Salado polychrome vessels dominated the decorated ceramic assemblage at all sites, replacing earlier local and Kayenta/Tusayan traditions. The preliminary petrographic evidence suggests that many of these vessels were made in settlements south of the Gila River in the central and western Pueblo Viejo district. This area includes the late population centers associated with perforated plates and other Kayenta/Tusayan markers.

The Marijilda site, one likely producer of Salado polychrome pottery, has a strong Ancestral Puebloan signature, with shaped block masonry walls, slab-lined hearths, and a typical room-block/plaza layout. The Spear Ranch site, another probable producer, was built using local construction techniques, but is associated with a kiva similar to one built at the Davis Ranch enclave in the lower San Pedro Valley.

Buena Vista Ruin was not associated with Salado polychrome pottery production despite the large number of these vessels recovered from the site. This settlement may have retained its local identity and Phoenix Basin connections well into the 1300s. However, as other nearby settlements failed in the late 1300s and early 1400s, people resettled at the site, bringing their Salado polychrome pots with them. Buena Vista Ruin appears to have been occupied until 1400, if not later. At this time, the Safford Basin's population declined dramatically, and there is little evidence of occupation after 1450 until the arrival of the Apaches.



Maverick Mountain Polychrome jar from the Safford Basin (courtesy Arizona State Museum).

Conclusions

THE STARTING POINT for our research was the evidence from the Coalescent Communities Database of a major population decline in the southern Southwest prior to European contact. Over the course of no more than 150 years, gradual decline—rather than a single catastrophe—led to the loss of more than seventy-five percent of the regional population. The five study areas reviewed here were chosen to shed light on this population collapse, to look for common trends, and to identify regional differences. We focused on refining local population histories and assessing the role of immigrants in each study area from 1250 to 1450.

The strongest common theme in all five study areas was population aggregation. In the lower Salt River Valley, where aggregation had been a way of life, communities gained additional population and lost access to land as buffer zones opened up to the north and east. As a result, the population increased even more in an area that had long had a very high population density. In the lower San

Pedro Valley, Safford Basin, and Tonto Basin, the larger communities that formed also increasingly focused on a narrower range of riverine resources, which would have left them fewer options in dealing with fluctuations in food production. Finally, when immigrants settled the Perry Mesa area, they established aggregated settlements from the outset.

Because all five study areas have evidence for aggregation, we believe that it was the prime cause of population decline. Presumably, many factors related to aggregation would have been at work. Poor sanitation, nutritional stress when crop yields were down, and access to fewer subsistence resources are just a few factors that could have led to a decline in health conditions. This decline contributed to lower survival rates for children and/or increased death rates across the community. In some cases, the social tensions that developed due to the presence of immigrants may have led to direct conflict and casualties. Because our studies did not focus on individual sites, we cannot trace

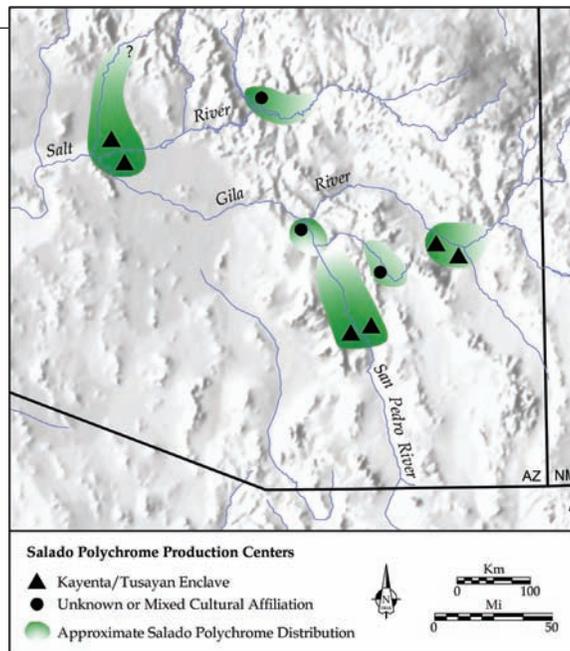
these processes in any one place. Rather, we see these as common trends at the scale of each study area, though with local differences.

Another strong pattern in our analyses was the importance of several kinds of interaction networks that linked immigrants across substantial distances. First, in the Tonto Basin, Safford Basin, and lower San Pedro study areas, there was evidence of an earlier immigrant population from the surrounding mountains. It appears likely that it served as an “advance guard” for subsequent Kayenta/Tusayan immigrants into these areas.

Second, there is a great deal of evidence that regular economic and social interaction was maintained by both male and female immigrants after they arrived in their new southern settings. Immigrant men obtained obsidian from several important source areas around Flagstaff and northeast of Safford. It seems likely that immigrants helped to create new demands for obsidian, establishing a flow of this valued raw material into areas where it had been used only rarely in earlier times.

As for pottery, we assume that Salado polychrome was produced by women. Because of the stylistic uniformity of this pottery over a very large area, we also infer that these potters remained in direct contact with immigrant women in other communities. When pottery is made locally, it is difficult to maintain a consistent style if the potters do not interact directly. In four out of our five study areas, it was clear that Salado polychrome was manufactured at one or a few settlements. Where cultural affiliation could be determined, these settlements contained Kayenta/Tusayan immigrants.

Clearly, immigrants maintained networks despite being dispersed over a wide area. Paradoxically, there were also signs that our study areas were undergoing processes of localization—that is, they were developing more locally based lifeways and interests. In part, this was a consequence of aggregation and the buffer zones that arose after the arrival of immigrants in the region. As a result, the population began to settle in “clusters,” with areas of unoccupied land between the clusters. Because more-distant neighbors tend to interact less often, this kind of population distribution can lead to local differentiation over time.



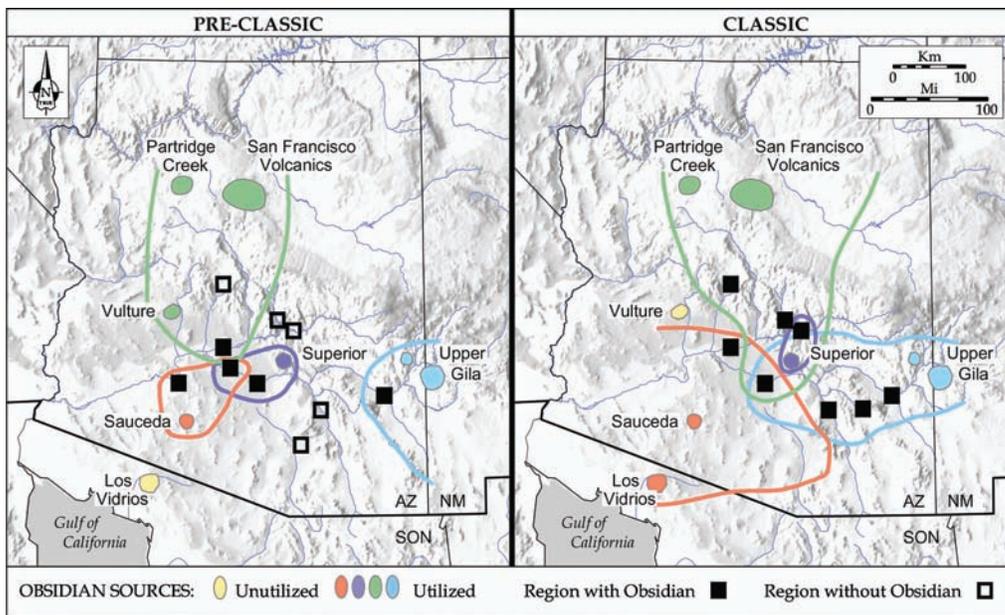
Salado polychrome was produced by local potters in all but the Perry Mesa study area. This map shows the locations of the production centers for Salado polychrome that our study identified. In many cases, we could also show that these were places where Kayenta/Tusayan immigrants were concentrated, which suggests that they were the primary producers of this pottery.

One example of localization is the different patterns of leadership that are suggested for the five study areas. In the Tonto Basin and northern San Pedro Valley, platform mounds were constructed to make a visible claim to territory, to encourage aggregation of local residents, and perhaps to help integrate local and nonlocal populations into a new organizational framework. This concept was borrowed from the Phoenix Basin, where this architectural form had a long history. These mounds provided a setting for ritual activity and served to reinforce the status of increasingly powerful leaders. The nature of community-level leadership is not clearly reflected in the architecture of either Safford or Perry Mesa. However, it can be assumed that increased author-

ity was present in some form in the aggregated settlements of both areas. As conditions declined in the different study areas, leaders likely made decisions within their local frame of reference. That may have contributed to competition or even conflict between areas.

There were also some trends that would have helped to counter localization. For example, its vivid designs and uniformity of style over a large area suggest Salado polychrome pottery had high symbolic value. An even stronger inference drawn from this is that these elaborately decorated vessels played an important role in the emergence of a new “Salado” ideology. Previous research by Patricia Crown, of the University of New Mexico, explored the concept of a regional cult, of which Salado polychrome was an important component. Our research suggests not only that immigrants developed these ceramics but also that these groups and their descendants likely remained the primary producers. Thus, people with a northern affiliation may have had a special role in the ideological realm.

A final critical factor to consider is that irrigation farmers need adequate labor to maintain canals and carry out agricultural tasks. Particularly in the lower Salt River Valley, the extensive canal systems had very high labor demands. Given that all areas were gradually losing population after a millenium or more of growth, the Phoenix Basin would have felt the loss of labor most strongly. Once the population was in decline, leaders there may have tried to recruit workers from outlying areas. Indeed, there is an



These maps highlight the differences in the circulation of obsidian. In the pre-Classic, the only settlements in southern Arizona that widely used obsidian were in the Phoenix Basin. Gila River groups emphasized sources in southwest (Saucedá) and central (Superior) Arizona. In contrast, lower Salt residents used the northern Vulture and San Francisco volcanic sources. The Classic period map shows that the arrival of Kayenta/Tusayan immigrants radically altered these patterns. Obsidian use increased dramatically in areas outside the Phoenix Basin settled by these people. Kayenta/Tusayan immigrants in the eastern migration stream helped to distribute obsidian from Upper Gila sources as far west as Casa Grande Ruin and the Tonto Basin. Immigrants in the western stream controlled the San Francisco volcanic source, which was heavily used by groups on Perry Mesa and in the western Tonto Basin. Immigrants on Perry Mesa nearly stopped the flow of northern obsidian into the lower Salt, suggesting hostile relations between these two areas. The inhabitants of the lower Salt turned to the Saucedá and Los Vidrios sources in southwest Arizona to meet their obsidian demands. The Vulture source, in a hostile buffer zone between Perry Mesa and the lower Salt, fell out of use.

indication that Kayenta/Tusayan-affiliated immigrants may have moved into the area after 1350 and continued to make Salado polychrome pottery.

The events and processes that took place over the two centuries between 1250 and 1450 were undeniably complex. In this closing summary, we review the major elements of a model that we believe accounts for what is observed in the archaeological record.

Hohokam or Salado disappeared—or rather, they changed and became “archaeologically invisible.” The small, remnant, late pre-contact groups no longer practiced the behaviors associated with the “cultures” defined by archaeologists. However, some of these late remaining populations may have traveled north to Zuni or perhaps Hopi, whereas others remained and became the ancestors of today’s O’odham groups.

The first demographic process was a significant flow of immigrants from the Kayenta/Tusayan region into the southern Southwest. The broad response of population aggregation helped foster conditions of decreased health and increased social tensions that led to population decline. Population decline created competition for people between local communities as well as between regions.

As the remaining populations declined and communities became more varied in their cultural makeup (including descendants of both the locals and immigrants), it became difficult for people to maintain their traditions. There were fewer people in the last remaining widely spaced communities to fill social and economic roles and to pass customs on to the younger generations. Eventually, behaviors that resulted in artifacts and architecture that archaeologists define as

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See the Center for Desert Archaeology website for more information: <<http://www.cdarc.org>>

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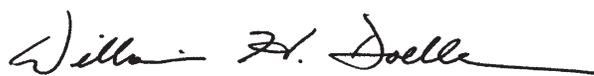
Back Sight

OVER THE COURSE OF THIS YEAR, the pace of change in the modern world has been jarring. Gasoline prices have more than doubled, and then plunged, all within mere months. The housing industry, home ownership, the entire financial industry, Wall Street, and Main Street—the list of anticipated collapses seems to grow daily. We feel these changes, and, even worse, they create fear and uncertainty on a daily basis.

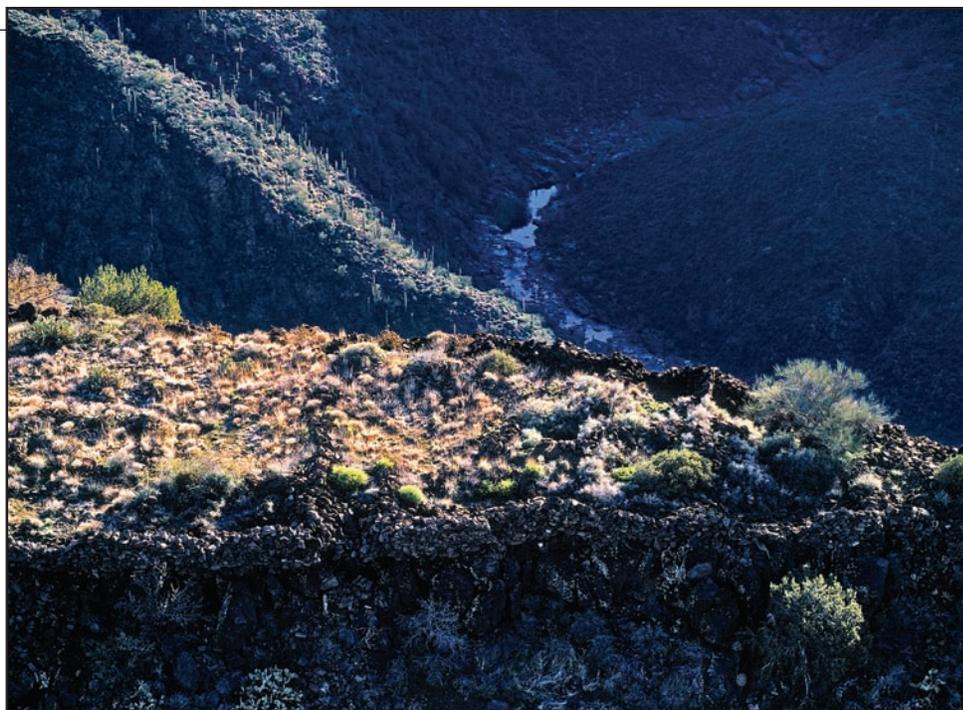
Nevertheless, I do not believe we have reached the level of “world-changing times” the residents of the southern Southwest appear to have experienced by the first half of the 1400s. The research presented in this issue of *Archaeology Southwest* deals with a time some six centuries in the past. The archaeological record does not yield the emotional content that we experience in our daily lives as we live through uncertain times. However, we can imagine that the ancestors of today’s tribes did experience change in deeply personal, and deeply unsettling, ways. The various O’odham nations of the southern Southwest have oral histories that may be reflections and distant memories of such extreme times. Hopi and Zuni oral histories may also shed light on the ways in which the connections between the southern and northern regions of the ancient Southwest underwent extreme change.

When Center researchers carried out the collaborative San Pedro Ethnohistory project with tribal consultants from Hopi, Zuni, Western Apache, and Tohono O’odham tribes,

their oral histories were found to be relevant to the archaeological evidence of migration found in the San Pedro Valley. Center researchers are initiating an even larger collaborative research effort to understand whether the mutual exploration of two very different information sources—oral histories and the archaeological record—may be able to shed significant new light on the world-changing era of the 1300s and 1400s. This goal of collaboration will build upon relationships that have developed slowly and will, we hope, be expanded significantly. We will continue to report on these results as the research moves forward.



*William H. Doelle, President & CEO
Center for Desert Archaeology*



This site in the Perry Mesa study area is protected by both its natural setting and the massive stone walls built by its residents. A pattern of building settlements in defensible locations is just one indicator of the social tensions that likely affected residents of all five of our study areas.

back sight (băk sīt) n. 1. a reading used by surveyors to check the accuracy of their work. 2. an opportunity to reflect on and evaluate the Center for Desert Archaeology’s mission.

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