

## EARTHWATCH INSTITUTE FIELD REPORT 2005



**Project Title:** Sociopolitical Organization of Chevelon Ruin and its Role in the Homol'ovi Settlement Cluster, Northeastern Arizona

**Principal Investigator:** E. Charles Adams

**Position / Title:** Curator of Archaeology

**Affiliation:** Arizona State Museum, University of Arizona

**Research Site:** Chevelon Ruin is an ancestral Hopi village of 500 rooms located in northeastern Arizona that was occupied from the A.D. 1280s to 1380s.

**Local management status:** Chevelon is situated on land managed by Arizona Game and Fish Department (ASM Permit No. 2002-106ps)

**Team Dates In Field:**

Team I:	June 5-18, 2005
Team II:	June 19-July 2, 2005
Team III:	July 3-July 16, 2005

**Total Number of Earthwatch Volunteers:** 23 attended

**KEY RESEARCH OBJECTIVES:**

- Complete wall tracing of Chevelon to define the layout, growth, and exact size of the village.
- Auger in open spaces to locate subterranean features, such as kivas and pit houses.
- Excavate in new areas of the village to complete our understanding of the chronology of growth of the village and how those areas were used in comparison to previously excavated areas.
- Excavate in a defined plaza area (public space) to understand the location of features and the sequence of occupation surfaces.
- Excavate in a third ceremonial structure (kiva) to broaden our understanding of ritual life at Chevelon.
- Focus excavations in burned structures to enable a better understanding of why and how 100 or more structures were burned at Chevelon.
- Excavate in new areas of the village to gain a better understanding of household size and configuration.
- Focus excavations on burned storage rooms to collect extensive samples of domestic crops, especially maize.

**DATA COLLECTION AND RESULTS:**

A) CONCISE ACCOUNT OF DATA COLLECTED DURING THE PAST FIELD SEASON

The 2005 Earthwatch expedition at Chevelon Ruin was very efficient in collecting data critical to our research objectives. During this field season we excavated part or all of 11 structures: 107, 120, 123, 158, 161, 279, 603, 702, 704, 726, 901; as well as test trenching the plaza (RB900) and augering another plaza (RB800). For these excavated areas, 3200 bags of artifacts were collected, nearly all containing multiple artifacts. A rough guess would be a total of 100,000 artifacts were collected during the field season. All of these artifacts are presently housed in the Homol'ovi Research Program laboratory at the University of Arizona, where analysis will be conducted by graduate students, staff, and outside research specialists.

Structure Excavations:

1. One of the goals for 2005 was to excavate two ceremonial structures in the oldest part of the village, the 200 and 300 room blocks (Figure 1). To this end, two kivas, str. 279 and 901, were excavated. Both kivas were built early in the occupation of the village, but abandoned and partly filled with trash prior to village abandonment (Table 1). As a result, a detailed history of

continued use of the surrounding room blocks is contained in the middens of these two structures; as well as an important history of the last half of the occupation of Chevelon that will allow a detailed reconstruction of the history of use of other areas of the village.

2. A second goal for 2005 was to excavate several rooms surrounding the large south plaza (RB 000) of Chevelon (Figure 1). Five structures were partially excavated in RB100, and another three in RB700. One in RB600 was completely excavated. All of these structures are one story and six were burned: str. 120, 123, 158, 161, 702, and 704. Two of the structures (158 and 603) have hearths and are considered habitation structures; six of the structures are storage structures and the use of one is unknown. All of the structures suffered some vandalism with str. 107 completely vandalized and str. 161, 704, and 726 mostly vandalized (Table 1).

#### Other Fieldwork:

1. An 8 m-long trench was excavated into the east side of plaza 900 to determine its life history through location of occupation surface and to find the limits of the plaza on its south side where rooms from RB300 are located. Four occupation surfaces and two features were located in this trench (Table 2). Additionally, a better understanding of the plaza limits was achieved. One of the features is the ventilator system to kiva 901 and numerous artifacts were retrieved from this feature. The other feature was a small firepit. The surfaces all lie above the kiva ventilator suggesting use of the plaza after the kiva stopped being used.
2. Over 100 auger holes were put into plaza 800 between RB100, RB200, and RB400. These auger holes were drilled at 2 m intervals to evaluate several features that were located during the 2003 geophysical testing. These features appear to have been large holes in the natural surface of the hill, which defines the plaza, and could be kivas, pit houses, or vandal's holes. The auger can drill to a depth of 1.6 m and the nature of the soil retrieved from the auger helps define the type of feature present. A total of six features were identified on the basis of auger holes exceeding 50 cm deep and occurring in a cluster (Figure 2). Four of the features appear to be either natural or a result of vandalism. The presence of considerable cultural fill and depth in two of the features suggests they are probably structures, with at least one a possible kiva.
3. The other fieldwork was wall tracing in RB500. In 2004 attempts to trace the walls in RB500 were mostly unsuccessful. However, with success in other areas of Chevelon a new strategy was adopted for locating the primary north-south walls of the room block and nearly all the cross walls. When wall tracing was completed, 43 rooms had been identified and mostly traced. RB500 appears to be all two rooms wide. On the north end of RB500 there is a gap of about 4 m between its north wall and the south wall of RB300. This gap appears to be the only entry along any of the room blocks surrounding plaza 000. Mapping of these structures and the excavated structures and features resulted in 542 mapping shots. With the completion of this work, the mapping of walls and room blocks at Chevelon has been completed. At least 350 ground floor rooms and 135 second-story rooms have now been traced at Chevelon giving a minimum of 485 structures, not counting kivas. With the likelihood of additional second-story

rooms and the fact that some rooms are always missed in mapping, the figure of 500 rooms still seems like a good estimate for village size.

## B) PROGRESS TOWARDS ACHIEVING ORIGINAL OBJECTIVES

1. Complete Wall Tracing: Wall tracing of Chevelon was completed this summer with the tracing of the outlines to 43 structures in RB500. This brings total ground floor rooms at Chevelon to about 350 and second floor rooms to at least 135 (Figure 1). Additionally three kivas have seen excavation, a fourth has been traced in RB400, and one to two others were identified in augering RB800 for a total of five to six.

2. Auger in Open Spaces: Over 100 auger holes were placed at 2 m intervals in RB800 to look for large features that may be kivas or pit houses. As noted in the previous section, the three anomalies identified with the 2003 geophysical work plus three others were located through the augering. Two of the features had considerable trashy fill with pottery suggesting deposition during the Chevelon occupation. The size, depth, and nature of this fill indicate that one and possibly both are kivas. Their location in a plaza space is consistent with the other kivas known at Chevelon. The other features were filled with sand and had very few artifacts. Their irregular size suggests they are probably vandal's holes.

3. Excavate in New Areas of the Village: Central to understanding the bigger picture of Chevelon's history, is to excavate in as many areas as possible and in as great a variety of structure locations and types as possible. The first two years of excavations focused in RB200 and 300, which are the oldest sections of the village. This field season excavations focused in RB100, 600, and 700, which are believed to be the youngest parts of the village. Additionally, excavations were conducted in front (typically habitation) and rear (typically storage) rooms with respect to the large south plaza (RB000). Excavations in nine structures in these three room blocks allow a better understanding of the chronology of the areas as well as how rooms were used (Figure 1). Based on the chronology we have been able to establish in RB200 and 300, it should be possible to relatively date the period of construction and use of this part of the village. The ability to identify use of eight of the structures suggests that the typical pattern described above pertains to all room blocks around the south plaza. This pattern is also consistently observed in the other Homol'ovi villages of the same period.

4. Excavate in a Defined Plaza (Public) Area: An 8 m test trench was excavated into RB900, which is the plaza space for RB300 (Figure 3). A 10 m trench in 2004 was able to define the intensity and extent of use of this plaza space. This year's excavations were to focus on better defining the boundaries to the plaza and possible continued use of space throughout the history of occupation of RB300. There was mixed success in the plaza excavations. Four new and later plaza surfaces were defined and mapped, indicating continued use of the plaza probably up to the end of the RB300 occupation. This is significant because use of the kiva, str. 901, stopped decades before the room block was abandoned. Additionally, the ventilator system for the kiva was located and partly excavated, giving additional information on the life history of that structure. However, the south edge of the plaza was not clearly defined simply because there was not enough time. A rough estimate of the edge of the plaza, however, can still be made.

5. Excavate a Third Ceremonial (Kiva) Structure: Two kivas had been tested in RB200 and a basic understanding of their layout and period of use and filling was understood. The kiva, str. 901, discovered in 2004 was poorly understood in terms of size and period

of use. Therefore, a 3 m by 3 m test into the kiva was conducted to answer these questions. Much to our surprise, this test did not locate any of the structure's walls; however, expected floor features did emerge allowing us to orient the kiva in terms of size and direction. Excavation of a 3 m x 1 m extension to the south and 1 m x 1 m extension to the east of the original excavation unit discovered the south wall and bench of the kiva. Unexpectedly, the kiva is minimally 6 m north-south and 7 m east-west, making it among the three largest of more than 20 kivas excavated in the Homol'ovi villages by the Homol'ovi Research Program (Figure 3). The excavations were successful in understanding the history of use and filling of the kiva. Two distinct middens in terms of space and time were recovered from the kiva fill. The earliest midden has a ritual signature with many more unusual artifacts, whole or nearly whole ceramics, and unusual animal bones. The later midden seems more typical of domestic trash. The different pottery types and frequencies are in line with the stratigraphic relationship of the two middens and should enhance our chronology building in the village.

6. Focus Excavations in Burned Structures: Because our previous excavations and mapping had indicated Chevelon was extensively burned in all room blocks, a priority of excavations this field season was burned rooms. This focus is appropriate because surface indications suggest 100 or more structures had been burned at Chevelon; whereas, burning was rare at the other Homol'ovi villages, particularly the contemporary large villages of Homol'ovi I and II. This suggests a very different village history. Additionally, among archaeologists in general and those who work in the American Southwest in particular, there is much debate on the causes of burning (Darling, LeBlanc 1999, Walker). For these reasons, we focused excavations in structures that appeared from the surface to have been burned. Excavations determined that str. 120, 123, 158, 161, 702, 704, and 901 were burned. Str. 120, 704, and 901 had their roofs burned, but involved no other fuel. Str. 123, 158, and 702 all were burned with the aid of corncobs. Str. 161 was too vandalized to be certain whether or not corn was used to increase the fuel load to burn the structure. Pending completion of analysis of artifacts and corn samples, it is not possible to state that all the rooms were burned at the same time. However, the extensive nature of the burning and the indications that all the rooms that were burned were still in use up to that moment indicates the burnings ended use of each involve structure. Because so many of the rooms are contiguous, it appears the rooms were all burned at relatively the same time. The nearly complete absence of floor artifacts with the notable exception of whole manos placed near hearths or storage features indicate the burning was planned and may have been a closure of the village. The presence of a whole mano in unburned str. 603 amplifies the argument that its placement is associated with ritual closure of the structure. It certainly indicates the burning was not accidental or caused by some outside group attacking Chevelon. Thus, the preliminary findings from the excavation of these and four other burned rooms excavated in prior years are that the burning was synchronous, is associated with abandonment of Chevelon, was purposefully done by the residents, and may have been done to prevent others from using the village. Why this event occurred is still poorly understood because the burned storage rooms filled with maize suggest shortage of food was likely not the cause. Experiments conducted in a simulated structure built just like the ones excavated at Chevelon indicate that heavy fuel loads, such as store rooms filled with corn, provide excellent sources for successful fires. Additionally, it is relatively easy to place a lighted torch in the dry vegetal elements of the roofs and ignite the roof, burning at least part of it to the degree to cause structural collapse.

7. Excavate to Better Understand Household Size and Configuration: Previous work at Chevelon had focused on excavating primarily to understand the chronology of the village so its growth could be understood. However, another important element to understand in ancient communities is to try to identify the household. The household is the building block to village society and to human society in general. As noted above, our excavations were able to demonstrate that structures closest to the large south plaza had hearths and are considered living or habitation rooms where most daily indoor activities took place. In contrast the rooms farther away and behind the living rooms had no hearths and are considered storage rooms with only occasional activity. It was these rooms where the maize was stored. Additionally, in every room excavated a doorway connecting it to the adjacent room was documented. In all instances, these doors connected the storage room in back to the living room in front. This classic pattern seems to hold unerringly in the small, excavated sample from these room blocks, which generally are only two rooms wide. It would appear, then, that in the late room blocks where patterns are clearer, a household minimally used one living room and one storage room. The lack of doors between storage rooms or between living rooms suggests that most households used only the two rooms. The limited nature of the excavations and even the level of wall tracing means that these patterns may not hold for the remainder of the room blocks or for the entire village. Excavation in additional contiguous rooms is needed to better determine the patterns of room use and whether two rooms is or is not typical for household size.

8. Focus Excavations on Burned Storage Rooms Having Abundant Plant Remains: This has already been partially treated under (6). Surface disturbance from vandalism left abundant evidence of burned domestic plants, primarily ears of corn, on the surface. Excavations in 2005 focused on three areas where burned corn was abundant. The surface evidence led directly to three burned storage rooms, two of which (strs. 123 and 158) had corn stored on the cob within the room whereas the third (str. 702) had burned corn stored or drying on its roof. Especially in the rooms where the corn was stored, over 80 bags of corn were removed as samples to try to assess the diversity of the maize. These are our best opportunities to determine if different races or varieties of maize are present, as they are today among the Hopi. Also recovered in str. 158 were numerous beans. It is likely other domestic and perhaps some wild crops will be discovered as the samples are analyzed.

### C) SUMMARY OF RESULTS

Excavations were conducted in parts of 11 structures and within plaza 900. Forty-three rooms in RB500 were also traced and mapped to complete the Chevelon map. In addition, 107 auger holes were drilled into plaza 800, which identified one kiva and possibly a second. The excavated structures included two kivas, two habitation rooms, six storage rooms, and a room of unknown use. Five of the six storage rooms were burned as was one habitation room and one kiva. Two of the storage rooms were filled with ears of corn when burned while another one had ears of corn on its roof when it burned. The placement of a single mano next to either the hearth or storage bin in four of the five unvandalized structures strongly suggests that they had been ritually closed and readied for abandonment. The fact that three of the four structures with the manos were then burned indicates that burning is one option for closure and probably the one chosen only when occupation of the room and village is no longer planned. This is likely because wood is such a precious commodity at Chevelon and the other Homol'ovi villages. It is extremely scarce and is obtained primarily through the acquisition of

driftwood brought down by floods of the nearby Little Colorado River or Chevelon Creek (Adams and Hedberg 2002). Additionally, burning of large stores of ears of corn, the most precious commodity to these and other sedentary groups in the American Southwest point to village abandonment in association with the burning. The ritual closure of the rooms together with the burning of the roof of str. 901, a kiva long out of use, point to the cause of burning to be by residents leaving the village and wishing for no one else to use it. There is no evidence that points to natural or outside causes of the fire. Experimentation also suggests that the nature of pueblo village construction makes it impossible that all of the structures were burned from a single or even a few ignition points. It is likely that nearly every room was ignited individually. This also points to residents starting the fires.

Excavation in the two kivas has greatly enhanced our understanding of variability in kiva architecture. We now know there were two kivas in the small central plaza of RB200 and one very large kiva in RB900, which is the plaza within RB300. All three kivas were probably built quite early in village history, the two in RB200 by A.D. 1300 and the one in the RB300 plaza soon thereafter. The fact there are two in RB200 and a single large kiva in RB300 suggests different forms of religious and social organization that we hope will be clarified through analysis of artifacts from within the kivas as well as from surrounding rooms. The additional fact that none of the kivas was in use when the village was burned and abandoned suggests a probable reorganization of ritual in the lives of Chevelon people when the room blocks surrounding the enormous south plaza were constructed.

The order and organization of village growth are also well understood. RB200 was the first built, shortly before 1300. Between 1300 and the appearance of imported yellow ware pottery by 1330, RB300 was built. Both these room blocks were organized around small plazas and grew by accretion with rooms added as the population increased. Both these room blocks were occupied and continued to be so when the long linear room blocks surrounding the south plaza (RB000) were constructed. The four numbered room blocks, 100, 500, 600, and 700, were constructed similarly by building multiple long walls their full length, then subdividing them into nearly uniform size rooms, mostly two wide with a few three or four wide. All of these rooms were a single story, unlike their counterparts in RB200 and 300, which were mostly two story. The planning of this massive addition, the relatively rapid construction of the four room blocks, the lack of additions following their construction, suggest a different level of political and religious authority within the village. There are too many rooms for them to have been occupied by existing members of the community. It seems likely that many, if not most, were new immigrants to the village who brought new forms of village organization and possibly the new katsina religion that is so visible at nearby Homol'ovi II (Adams 1991, 2002). Further analysis and possibly additional excavation should shed light on these possibilities.

## **SIGNIFICANCE/BENEFITS OF RESEARCH**

### **A) LOCAL LEVEL**

The research affects four local entities: Hopi Tribe, Homolovi Ruins State Park (HRSP), City of Winslow, and Arizona Game and Fish Department (AGFD).

Hopi Tribe: Since the inception of research in the area in 1984, Arizona State Museum (ASM) archaeologists have worked with the Hopi Tribe, first through its Vice Chairman and more recently through its Cultural Preservation Office (CPO) to share information

and invite participation in the archaeological research among the Homol'ovi villages and most recently at Chevelon. This cooperation has included invitations to visit the excavations at any time, meetings with members of the tribe, the CPO and advisors to the CPO, and sharing of all information by providing reports, articles, books, theses and dissertations produced by ASM researchers. In addition to our excavation work at Chevelon, ASM staff has prepared a preservation plan for Chevelon Ruin that has been reviewed by the Hopi CPO and will be sent to AGFD, who manage the land on which Chevelon sits.

Homolovi Ruins State Park: The park benefits from our research because it enhances the interpretation of the Homol'ovi ruins, which are actively managed by the park. It also stirs local and tourist interest in the ruins through their ability to visit our excavations or our field laboratory, which is in the maintenance yard of the park. Park personnel also benefit by additional training and instruction on the local archaeology of the area through visits to the site and talks given by the PI and his staff at the park visitor center.

City of Winslow: The citizens of Winslow benefit through local and regional press coverage of our research, which enhances tourism in the area. We also stimulate the local economy by the presence of an average of 35 team members over the course of seven weeks during the summer. A lot of local citizens are interested in the ruins in their area and our research is intended to educate them in preserving these ruins rather than vandalizing them, which has been the ethic for many generations.

Arizona Game and Fish Department: Because Chevelon is located on land managed by AGFD, they stand to benefit greatly by our research. Part of our work at Chevelon has been to work with the Hopi CPO and AGFD to develop a preservation and management plan for Chevelon. A draft of this plan has been completed and will be submitted to AGFD this fall. The major recommendations are to increase protection of the site, to fill in looter's holes, and to develop interpretive information for potential visitors to the site.

## B) NATIONAL AND INTERNATIONAL

Research: The primary national benefits are related to research on burning at Chevelon. For too long research on burning has relied on individual investigator's personal protocols in data collection to assess the causes of burning and to attribute the explanations for these causes. Beginning in 2004 and expanding in 2005, research at Chevelon has focused on improving data collection techniques for evaluating ancient fires. This has been done by hiring fire investigator experts, Timothy Huff and David Icove, and through the dissertation research of A.J. Vonarx, a doctoral student in anthropology at the University of Arizona. In addition to improving documentation of the archaeological record, in 2005 ASM constructed a simulated room of identical dimensions and materials to those at Chevelon to study burning. This was accomplished through a Student Challenge Award Program from Earthwatch and enabled the PI and Vonarx to study two burning scenarios that were videotaped and measured using thermocouples. The results of this research will be presented at regional and national archaeology meetings including the Southwest Symposium held in Las Cruces, NM in January 2006 and at the Society for American Archaeology Meetings in San Juan, Puerto Rico in April 2006.

These meetings will allow dissemination of results to archaeological colleagues all over the world. The primary goal of the research is to make studies of burning replicable over the archaeological discipline nationally and internationally so that causes can be more

systematically studied. The assistance of fire investigators has been instrumental in developing these protocols. Ironically, the work on ancient fires has revealed to the participating fire investigators that there are many structures made of materials for which they have no standards and that more work needs to be done by them in laboratories in the United States and elsewhere. For example, fires in third world countries often involve materials similar to those used at Chevelon, yet fire investigators have no computer models to predict fire behavior in these circumstances. Vonarx is using Branzfire software developed by fire investigators to model the fires created experimentally in the simulated Chevelon structure. Another year of research with fire investigators using the simulated structure plus a second attached structure are planned for 2006.

#### B) HOW DO THESE FINDINGS CONTRIBUTE TO ISSUES OF SUSTAINABILITY?

Our research at Chevelon is intended to learn about the history of the village, which was occupied by perhaps 300 people over a 100-year period beginning about 1285-1290. This 100-year period of successful adaptation to a marginal agricultural environment is worthy of study to understand how a small village population was able to successfully sustain itself for a century. In addition, Chevelon was one of only seven villages, five of which were contemporary, along a 20-mile stretch of the Little Colorado River holding a population of perhaps 2000. We are studying the subsistence base and resource acquisition strategies of the Chevelon people during this period to understand how they lived in balance in an area where extremes of temperature and drought are frequent. One finding, for example, has been that the Little Colorado River and Chevelon Canyon not only provide essential perennial water flows for domestic crops, but through driftwood brought by floods they also provide critical wood resources for housing, heating, and cooking (Adams and Hedberg 2002). A paper furthering this research will be presented at the Society for American Archaeology Meetings in San Juan, Puerto Rico in April 2006.

#### **DISSEMINATION OF RESULTS**

Scientific Papers: Results of previous research were disseminated in three posters presented at the Society for American Archaeology meetings in Salt Lake City, UT in March 2005. A paper on structural fire research by A.J. Vonarx and E. Charles Adams will be presented at the biannual gathering of the Southwest Symposium to be held in Las Cruces, NM in January 2006. A proposal for a symposium entitled, Recent Research at Chevelon Ruin, an Ancient Hopi Village in Northeastern Arizona, has been organized by Adams and submitted to be presented at the annual Society for American Archaeology meetings to be held in San Juan, Puerto Rico in April 2006. Nine papers with three discussants are included in this symposium.

Management Plans: As previously noted, a draft management and preservation plan has been written for Chevelon Ruin in consultation with the Hopi Cultural Preservation Office and will be submitted this fall to Arizona Game and Fish Department, which manages the land on which Chevelon sits.

Presentations: The PI will be presenting results of this summer's and previous years research at two public gatherings in November 2005. Each presentation is expected to attract an audience of about 30 individuals. Previously, results of this research were presented at the Earthwatch PI Conference in November 2005, and to several groups in Arizona by the PI and associate project director, Richard C. Lange. Lange presented the

results of the 2005 research at the annual Pecos Conference held in Bandelier National Park, NM in August 2005.

Popular Articles or Films: Phokus Studio spent two weeks this summer filming research at Chevelon and the simulated fires. A half-hour video presentation will be made by Adams and Vonarx at the Southwest Symposium in Las Cruces, NM in January 2006. Newspaper articles on the research appeared in the Winslow Mail and Arizona Daily Star (Tucson) in July 2005. Video from this summer will be incorporated into a new permanent exhibition at Arizona State Museum entitled *Journeys of our Ancestors*, which is being developed by the PI and is scheduled to open in 2009 or 2010 in Tucson.

Books, Chapters, Illustrations: The papers presented in the Society for American Archaeology symposium will be the basis of a new book on research at Chevelon, which will be written by the PI during his sabbatical in 2006-07. The chapters in this book will be written by past and present graduate students in various programs at the University of Arizona plus several consultants to the project. One master's thesis on Chevelon data has been completed in the department of anthropology at the University of Arizona. Another thesis is in the works and at least two dissertations are also using Chevelon data. Additionally, several articles are in the planning stages based on research at Chevelon that will be published in archaeological journals. Copies of all publications have always been sent to Earthwatch.