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On the Front Cover: The HuHugam Va'aki at the City of Phoenix Pueblo Grande Museum. Photograph (January 29, 2009) © Adriel Heisey, all rights reserved.

On the Back Cover: Pahukini Heiau, Kailua Ahupua'a, Island of O'ahu . Photograph (June 1, 2018) courtesy of Jesse W. Stephen, <https://shouldbedigging.com>, all rights reserved.

JOURNAL OF  
ARIZONA  
ARCHAEOLOGY

Chris Loendorf  
Hoski Schaafsma  
guest editors





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### **Editorial Staff of the *Journal of Arizona Archaeology***

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### **About the *Journal***

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The *Journal of Arizona Archaeology* is a peer-reviewed journal that focuses on the presentation of emerging ideas, new methods, and current research in Arizona archaeology. It endeavors to be a forum for the scholarly, yet simple communication of research and management related to Arizona's archaeological record. The *Journal* is published twice a year by the Arizona Archaeological Council (AAC) in both electronic and paper formats. At least one issue per year is devoted to the theme of the AAC annual fall conference. The remaining issues of the *Journal* are intended for open submissions. Invited guest editors assist with the compilation of each issue.

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### **Subscription**

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Members of the AAC receive an annual subscription to the electronic format as part of their annual membership fee of \$35, and may order an annual paper format for an additional \$10 per year. Non-members may purchase a single issue of the *Journal* for \$5 per electronic copy and \$15 per paper format, which includes postage and handling.

To apply for AAC membership please visit the website: <http://arizonaarchaeologicalcouncil.org>.

For inquiries about the *Journal* please send an email to [editor.jaza@gmail.com](mailto:editor.jaza@gmail.com).

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### **Instructions for Authors**

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The format of all submitted papers should correspond to the SAA style guide, which can be accessed at this web address: <http://www.saa.org/AbouttheSociety/Publications/StyleGuide/tabid/984/Default.aspx>. Manuscripts must be submitted as a MS Word document, as all review and editing will be conducted electronically. Authors should be familiar with the "track changes" and "comments" functions of MS Word. Authors are encouraged to contact the editor with questions regarding the content or formatting of their manuscripts prior to submitting their papers. The editor will review each paper prior to peer review to determine if the manuscript meets content and formatting guidelines. If the paper meets these guidelines, the editor will send the manuscript out for peer review. The editor makes the final decision to accept a manuscript on the basis of the reviews of the peer referees. If a manuscript is accepted for publication, authors must submit images in at least 300 dpi. All permissions for photographs and figures are the responsibility of the author and must be obtained prior to publication.

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### **Editorial Contact Information**

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# EDITORIAL

## WHY IS THERE A JOURNAL OF ARIZONA ARCHAEOLOGY?

Glen E. Rice, M. Scott Thompson, Sophia E. Kelly

The *Journal of Arizona Archaeology* is published by the Arizona Archaeological Council (AAC) as a platform for scholarly, peer reviewed articles abstracted from the voluminous literature of Cultural Resource Management (CRM) monographs, agency reviews, dissertations, and theses related to the Arizona archaeological record. Our first issue was published eight years ago and this seems an appropriate time to review the history of the founding of the *Journal* based on the available oral and written accounts.

The idea of a journal was first discussed by the AAC Board in the latter part of 2009 as one of several ways of promoting the professional efforts of the Council. The following year James Watson, the new president, asked for a proposal for a journal, a task accepted by Scott Thompson (Member at Large) and Sophia Kelly (Secretary). In February of 2010 the AAC Board received and acted on their proposal for launching the *Journal of Arizona Archaeology*. Thompson and Kelly became the *Journal's* first General Editor and Managing Editor respectively. A planning meeting in August of 2010 settled on a format and selected the distinctive three-field design of the *Journal's* cover from a set of five mockups by Kelly. The first issue was published shortly after in the fall of 2010 and was followed by an issue each succeeding year through 2013.

By 2013 Thompson and Kelly had accepted jobs outside of Arizona, responsibilities that prevented them from continuing as editors. With Kelly already departed, Thompson made plans for a transition in the editorship but following his departure those plans did not advance, leading to a two-year hiatus in publication. In the summer of 2015 Glen Rice heard from Christopher Garraty (then the AAC Past President) that the AAC Board was considering discontinuing the publication and, valuing the need for the *Journal* and the efforts of Thompson and Kelly in launching the publication, volunteered to serve as the Editor. The offer was accepted by the Board and the *Journal* resumed publishing in the late fall of 2015.

Rice asked Erik Steinbach to be the Managing Editor, expanded the existing Editorial Panel to nine, and continued the practice of using one or more guest editors for each issue. He moved to publishing two issues a year, initially as a means of catching up on four backlogged issues of conference papers, but in the spring of 2018 the *Journal* for the first time published an issue comprised of general submissions, with J. Simon Bruder as guest editor. This fulfilled the original goal to publish biannually with one issue devoted to proceedings of the AAC Fall Conference and the other open to general submissions.

The AAC Board voted in 2017 to switch to publication in an electronic format while continuing small print runs of paper copies for subscribers desiring the older format. This reduced the cost of publishing the *Journal*, hopefully making it more sustainable.

### The Evolving Charter of the *Journal*

Two documents serve as the charter for the *Journal*. The first is the original proposal drafted by Thompson and Kelly in 2010 and the second is the description of the Editor's duties prepared by Chris Loendorf and Glen Rice in August of 2017 and amended by vote of the Electoral Panel. These documents are included below.

The 2010 proposal states the mission, editorial policy and purpose of the *Journal*. This is the legacy under which we operate and the enduring part of the document. The proposal also addresses practical matters of content and layout, most of which remain current, some of which have changed, and some of which remain aspirational (such as the "New Publications and Site Reports" section).

What the proposal does not do, and was not intended to do, is to define the organization of the *Journal* and the function of the General Editor, Managing Editor, the Editorial Panel and the guest (visiting) editors, although all these offices existed from the inception of the publication. The proposal provides guidance for the Editor on editorial policy, but there is no mention of the Managing Editor. There is greater detail about the Editorial Panel, which was intended to be a group of 10 to 20 colleagues who would

review the manuscripts, but these functions have since been expanded and peer reviewers now include colleagues in the community at large. The “visiting editor” is mentioned only in passing in a description of the organization of sections.

The absence of a formal statement of organization did not hamper the effectiveness of the organization “on the ground.” The *Journal* officers and members of the AAC Board shared the tasks of compiling, reviewing, and editing articles and successfully published issues. Indeed it was the guest editors and members of the Editorial Panel who, following the two-year hiatus in publication, provided the institutional continuity Rice needed to reinstitute the publication and catch up on four backlogged issues. The organization itself was strong, but in 2013 the absence of a procedure for replacing the Editor left the *Journal* officers and the AAC Board in limbo.

This void was filled by the second document written in August of 2017 by Chris Loendorf and Glen Rice defining the duties of the *Journal* officers, the relationship of the Editor to the AAC Board, and the procedures for filling vacancies. The document began as a job description for the Editor and developed into the needed statement on the organization of the *Journal*. In brief, the General Editor decides editorial policy and the Board makes management related decisions (funding, subscriptions, and so forth). The General Editor appoints the Managing Editor, the members of the Editorial Panel, and the guest editors. The Editorial Panel in turn selects the new General Editor when the position is vacant, and their vote is ratified by the AAC Board.

Rice’s retirement at the end of the 2018 and the election of Douglas Mitchell as the replacement editor is the first test of the new organization and bodes well for the continuity of the *Journal*.

### **Why does Arizona Archaeology need another Journal?**

The *Journal* serves the research needs of the Cultural Resource Management community through the timely publication of new results, methods, and syntheses arising out of our research. Advances and new findings reported in CRM monographs, student papers, agency overviews, and academic projects are “almost too voluminous to navigate” and yet it can take years before the theoretical contributions in these works are disseminated to a larger archaeological audience as articles.

There is the added risk that findings of considerable relevance to Arizona researchers may not be reported as articles in regional journals because they are too narrowly focused to interest a regional audience. Work that is highly relevant to the Industry may fail to capture the interest of the Academy. The *Journal* was launched as a vehicle for “the timely presentation of emerging ideas, new methods and current results” buried in the grey literature of compliance reports, theses, and dissertations. It expedites the publication of data, methods, and syntheses with direct relevance to our formulation of research contexts, data analyses, interpretation and resource evaluation.

Our short history already demonstrates the need for the *Journal*. Two articles by Abbott and others (2012) and Sorrell and others (2018) are exemplary methods using ceramic attributes to date Hohokam and Cohonina sites respectively. The first grew out of cultural resource management projects (Wallace 2004) and the other began as an MA thesis (Sorrell 2005). For all the innovativeness of the methods and prominence of the authors, these articles are specific in application and unlikely to attract a broad readership beyond our own research community. But they are of considerable importance for those of us working in Arizona. It is much the same for provenance studies (Lack et al. 2012; Ownby and Miksa 2012), syntheses of local areas (Bostwick and Deats 2015; Russell 2017; Schaafsma and Countryman, this issue) and many site-specific reports. And it is from these very local advances in interpretation and methods that the big pictures of the past are constructed (Altschul 2016; Bayman, this issue; McManamon and Kintigh 2016; Loendorf et al. 2017; Peeples et al. 2016).

The *Journal* is the vehicle for the the publication of work abstracted out of longer data recovery reports, theses, and dissertations. It is a place for voicing emerging ideas that are grounded in data, reflect a solid understanding of where we have been, and push the envelope. They need not have full backing of the Industry or Academy to captivate our imagination and advance the discourse, and they come from all segments of our community of researchers.

Glen E. Rice, General Editor, 2015-2018  
M. Scott Thompson, General Editor 2010-2013  
Sophia E. Kelly, Managing Editor, 2010-2013

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## THE JOURNAL OF ARIZONA ARCHAEOLOGY: A PRELIMINARY PROPOSAL

M. Scott Thompson and Sophia E. Kelly, February 12, 2010

### Summary Description

The *Journal of Arizona Archaeology* will focus on the presentation of emerging ideas, new methods, and current research within Arizona archaeology. It endeavors to be a forum for the scholarly, yet simple communication of research and management related to Arizona's archaeological record. As such, it will publish concise, peer-reviewed articles relevant to professional archaeologists with an active interest in Arizona. The journal will accept open submissions from authors, and will also print suitable papers delivered at the Arizona Archaeological Council's annual fall conference.

### Manuscript Details

- **Estimated length in number of words:** between 23,000 and 30,000 words
- **Estimated length in number of pages:** 80 – 100 pages per issue (dbl-space in 10 pt)
- **Estimated number of articles per journal issue:** min. 4 articles, and max. 10 articles
- **Estimated length of individual article in number of words:** max. 3,000 words
- **Estimated length of individual article in number of pages:** max. 10 pages

- **Anticipated manuscript delivery date:**  
Issue 1 (General Submissions) – April 15th  
Issue 2 (Fall Conference Papers) – October 15th

## Contents

- **Potential Table of Contents:**  
Instructions to Authors (on the back of the front cover)  
Editor/Visiting Editor(s) Preface  
Articles  
New Publications and Site Reports (a list of citations)
- **Title and paragraph description of each of the journal sections:**  
Editor's/Visiting Editor's(s') Preface  
The "Editor's Preface" serves as an introduction to the collection of papers presented in each of the journal volumes. The editor may discuss the broad scale implications of the theme that binds the group of papers together, or simply reflect on the individual papers within the volume. In addition, he or she may elect to offer comments to subscribers and potential authors about the state of the journal. The preface will be limited to a single page.  
Articles  
Peer-reviewed articles are the core of the journal. The articles will present new concepts and/or methods directly applicable to archaeological research in Arizona, or will discuss synthetic results of archaeological projects conducted, at least partially, in the state of Arizona. Each piece will include relevant figures and/or tables and will provide a bibliography of references cited. Individual articles are limited to a maximum of 10 pages.  
New Publications and Site Reports  
The "New Publications and Site Reports" section is a bibliographic list of recent book titles and site report volumes that address archaeological research in the state of Arizona. This timely bibliography will be presented in *American Antiquity* format.

## Editorial Style of the Journal

- **General Description of Editorial Style**  
The editor of the *Journal of Arizona Archaeology* will strive to maintain a balance between careful scholarship and ease of timely publication. He or she should ensure that each of the published papers present relevant, interesting, and accurate research that meets a professional standard. However, he or she should also preserve an informal atmosphere that allows authors to communicate developing ideas and on-going research without difficulty.
- **Details of the peer-review process**  
Peer-review of articles will be conducted by members of a 10 to 20 person panel. The editor will evaluate a submitted manuscript first to ensure that it meets the journal's basic standards, and to aid in the selection of two panel members who will review the piece. The editor will distribute manuscripts to members of the panel at his or her discretion. Each member of the panel will review no more than two articles during a one year term.

## Justification of Need for the Journal

Each year an enormous amount of research is conducted on the archaeological record in the state of Arizona. Academic projects are performed through Arizona's three major research institutions; innumerable reconnaissance and data recovery projects are completed by private contractors and/or non-profit research agencies; and volumes of management projects are executed through government agencies. At present, the theoretical contributions and results from many of these projects are disseminated to larger audiences outside of Arizona some time long after the completion of the research. Even more problematic, synthetic conclusions and recommendations for the vast majority of these projects are buried in so-called "grey literature," which is almost too voluminous to navigate.

The *Journal of Arizona Archaeology* endeavors to fill this void in the timely presentation of emerging ideas, new methods, and current results. It will serve as a vehicle for the publication of novel concepts and recent project results. Thus, it will be a forum for researchers to communicate their ideas to other Arizona archaeologists before more broad, formal dissemination. Moreover, it will be a hub for the synthetic presentation of project results that may not otherwise be circulated to professionals working in Arizona.



## Audience

- **For whom will the articles be written?**

The *Journal of Arizona Archaeology* will be written for professional archaeologists who are interested in the current state of archaeological research in Arizona. It will strive to appeal equally to archaeologists working in all three primary employment sectors: academic, private, and government. Foremost, the journal will actively solicit contributions from authors in all of these professional environments. A diversity of contributions and perspectives should ensure that the audience in each of these communities finds material relevant to their work with Arizona's archaeological record. Moreover, the editorial style of the journal should encourage authors to focus upon the broader implications of new concepts and/or results for research in Arizona. This focus should guide the papers towards statements of relevance for a variety of professional readers.

- **Who will subscribe to the journal?**

All AAC members will receive the journal as a membership benefit. This includes professional archaeologists as well as those non-professionals who maintain an interest in archaeological research in Arizona. In addition, libraries associated with academic and/or research institutions would hopefully subscribe in order to offer it to their patrons/employees. Finally, compliance agencies and contractors that conduct research in the state of Arizona might subscribe to provide it to their employees.

## Compare and Contrast to Other Successful Journals

The *Journal of Arizona Archaeology* will fill an open niche in the publication market serving archaeological research in the state of Arizona. As discussed above, it will endeavor to publish developing ideas and on-going research prior to more formal preparation for print in more rigorous formats. It will also strive to print the synthetic results of projects that may not otherwise be disseminated to a wider audience. Thus, the journal's content, style, and target audience lie between those of the regional journal *Kiva* and the Center for Desert Archaeology's newsletter entitled *Archaeology Southwest*. The attributes of both of these publications are presented below for comparison with the proposed *Journal of Arizona Archaeology*.

- ***Kiva***

A regional publication, with a somewhat broad geographic focus  
An academic editorial style, and a rather rigorous peer-review process  
A concentration on intensively developed (and consequently long-completed) research  
A large, predominantly professional audience

- ***Archaeology Southwest*** (The Center for Desert Archaeology newsletter)

A regional publication, but often focused on Arizona's archaeology  
An informal editorial style that targets a popular audience  
A concentration on glossy presentation and overviews of research  
A broad and diverse audience

## THE JOURNAL OF ARIZONA ARCHAEOLOGY EDITOR DUTIES, AS AMENDED

Chris Loendorf and Glen Rice, August 2017

The Editor shall:

1. Set the editorial policy of the *Journal of Arizona Archaeology (JAZArch)*, and using input from peer reviewers and guest editors make final decisions on articles published in the *JAZArch*.
2. Promote the mission of the *JAZArch* through the publication of scholarly communications regarding Arizona's archaeological record. Manuscripts are expected to be original research that improves our understanding of the past in Arizona.
3. Ensure that the procedures and the decision-making process for *JAZArch* are posted on the website in order to inform potential authors.
4. Identify and avoid potential conflicts of interest among those involved in the publication process, including the authors, peer reviewers, guest editors and members of the editorial panel.
5. Review all content that is published in *JAZArch* for clarity and accuracy.
6. Make editorial decisions on a timely basis and communicate them in a clear and constructive manner.
7. Insure the effective peer review of submitted manuscripts, and if any problems or conflict arise, work



- to resolve them as quickly as possible.
8. Maintain effective communication with authors regarding submitted manuscripts and acceptable scholarly practice.
  9. Organize and oversee the printing of electronic and paper copies of the *JAzArch* and distribute copies to the subscribers.
  10. Designate an Editorial Panel to assist with review, editing, development of editorial policy, and to nominate candidates for the editorship in the event of a vacancy.
  11. Designate a Managing Editor to assist with the formatting and publication of the *JAzArch*.
  12. Select Guest Editors for *JAzArch* issues as necessary.
  13. The Editor may be dismissed by a majority vote of the AAC Board for failure to publish on a regular schedule or due to irreconcilable differences.
  14. In the case of a vacancy in the position of Editor, the Editorial Panel will nominate a candidate to the AAC Board and the Board will by a majority vote accept or reject the panel's candidate.
  15. Request the AAC Board to approve expenditures for *JAzArch* publication, including an honorarium of \$750 per issue to the Editor, \$750 per issue to the Managing Editor, and expenses for printing, postage and supplies.
  16. Regularly update the Board members on the journal status and document all expenditures.
  17. Attend and support the AAC annual conference.

**Amendments:**

18. **Procedures for Selection of the Editor.** The term of service for the Editor shall be three years. Terms of service will begin on January 1st of a given year and extend for the next three calendar years. Sitting Editors will announce their intention to continue or retire from the position by July 1st of the final year of their term. The Editorial Panel will then recognize the Editor's decision, and by a majority vote to either accept an offer from the Editor to continue another term or initiate a search for a replacement editor. The Editorial Panel's selection of a candidate will be forwarded to the AAC Board for ratification at the Board's meeting in the third quarter of the year. If the proposed Editorial candidate is rejected by a majority of the Board then the Editorial Panel will repeat the process. When the sitting Editor is retiring, it is expected that the new Editor will work with the outgoing Editor for the last quarter of his/her term (a period of about three months) to ensure an orderly transition of duties. (Passed unanimously by Editorial Panel April 9, 2018; Ratified by AAC Board June 8, 2018.)
19. **Formation of a Marketing Committee.** The Editorial Panel will designate a Marketing Committee to work with the AAC Board for soliciting support of the AAC through the use of promotional notices within each *Journal* publication. The committee will consist of at least one member from the Editorial Panel who will serve as lead, and other members as they are deemed necessary. (Passed unanimously by Editorial Panel April 9, 2018; Ratified by AAC Board June 8, 2018.)
20. **Formation of the Editorial Panel.** The Editor of the AAC journal is responsible for selecting the members of the journal's Editorial Panel. Members of the Editorial Panel may serve as long as they are in good standing. The AAC journal Editor may request that the AAC Board members vote to remove any member of the Editorial Panel who is not in good standing. The AAC journal Editorial Panel should include at least 5 members who are in good standing. (Passed unanimously by Editorial Panel April 9, 2018; Ratified by AAC Board June 8, 2018.)

[This text has been excerpted from the document *AAC Board Members Duties and Responsibilities* (2017) by Chris Loendorf and has been modified with the assignment of numbers to the duties and the addition of amendments.]

# FROM HOHOKAM ARCHAEOLOGY TO NARRATIVES OF THE ANCIENT HAWAIIAN ‘STATE’

James M. Bayman

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## ABSTRACT

*Interpreting political economies of early complex societies that lacked texts is a profoundly difficult challenge for anthropological archaeology. Such models compel archaeologists to examine material evidence of agricultural intensification, community organization, craft specialization, monumental construction, and mortuary practices. In this comparative study, I consider such evidence to examine the political economies of ancient societies in two regions: the Arizona desert and the Hawaiian archipelago. A comparison of archaeology in the two regions confirms that Southwestern scholars have underestimated the degree of social stratification among the Hohokam -- if we accept claims that ancient ‘states’ developed in the Hawaiian Islands. This finding underscores the limitations of using conventional archaeological correlates to characterize ancient societies elsewhere in the world.*

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## INTRODUCTION

Anthropologists once had a perennial fascination with classifying ancient societies into categories such as chiefdoms and states but such research is viewed as anachronistic in contemporary theory (e.g., Birch 2013; Pauketat 2007; Yoffee 2009). However, a protracted critique of neo-evolutionary theory notwithstanding, many archaeologists *still* rely on some variant of it (Jennings 2016:1-7). Characterizing early complex societies such as the Hohokam is further confounded by the difficulty of interpreting political economies without texts (Fish and Yoffee 1996). Consequently, many archaeologists use ethnographic analogues or the direct historical approach to construct models of political organization, although the challenges of using this approach are widely acknowledged. Moreover, an increasing number of archaeologists are investigating early complex societies in a comparative and cross-cultural perspective (e.g., Kohler et al. 2017; contributors in Smith 2012) in the wake of a sustained critique of such approaches (e.g., Pauketat 2001).

To evaluate the consequences of interpreting ancient societies without texts, I compare societies in two widely separated regions in the world: the Arizona desert in North America, and the Hawaiian archipelago in East Polynesia. I focus on societies in these two locales for two reasons. First, in late prehistory both societies harbored the largest populations and highest degrees of cultural elaboration in their respective region. Second, although the Hawaiian Islands were documented in detail following the arrival of James Cook in 1778, there are virtually no documentary records for the Hohokam in Arizona. Even though the end of the Hohokam era (as we know it archaeologically) took place as late as A.D. 1450, this was almost a century before the first Europeans (i.e., Spanish) entered Arizona in A.D. 1539 and encountered its traditional societies. While there is direct cultural and biological continuity between contact-period O’Odham and the ancient Hohokam (Loendorf and Lewis 2017:133), O’Odham traditions offer conflicting interpretations of the identity of those who lived on platform mounds (see Bahr et al. 1994; Lopez 2007:118). Interpretations of certain aspects of Hohokam political economy must therefore rely on analyses of the archaeological record. Because the archaeological records of Arizona and Hawai’i are so well-documented (syntheses in Bayman and Dye 2013; Clark and Abbott 2017; Fish and Fish 2007; Kirch 1985, 2010) they provide an opportunity to apply a comparative cross-cultural approach (sensu Smith and Peregrine 2012). The Hohokam and Hawaiian chronological sequences both neared a millennium, but this comparison emphasizes the latter end of their respective development: the Hohokam Classic Period (ca. A.D. 1150 to 1450), and, in Hawai’i, the Late Expansion and Protohistoric Periods (A.D. 1400 to 1778).

The economic domain of Hohokam society encompassed 40,000 sq. mi. (or 65,000 sq. km) (Doyel

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James M. Bayman / University of Hawai’i-Mānoa, Honolulu / jbayman@hawaii.edu



(1991:231), whereas ancient Hawaiian society encompassed 6,428 sq. mi (or 10,345 sq. km) on eight main islands in the archipelago, not including their surrounding seascapes. Both regions include significant micro-environmental variation and their precipitation ranges are quite different: annual rainfall in Phoenix, Arizona ranges between 4.3 to 9.2-inches, whereas Hawaii's rainfall (depending on location) ranges between 8 to 404 inches. Access to marine resources in Hawai'i offered an opportunity that was not easily available in Arizona, but Hohokam did acquire marine shell and salt from the distant Pacific coasts of Mexico (270 km) and California (585 km). Both societies also spanned vast regions, were sedentary, practiced intensive agriculture, and exhibited trends toward cultural elaboration.

To illustrate the shortcomings of prevailing interpretations of the ancient Hohokam, I make comparisons with Hawaii's archaeological record. The direct historic approach is regularly applied in the islands since contact-period Hawaiians were unequivocally descended from the earliest Polynesians to settle the archipelago about 1,000 years ago (Dye 2011). In the Arizona desert, however, the direct historical approach is fraught with a major complication: some (but not all) of the native populations observed during the early contact-period were direct descendants of Hohokam society (Rice 2016). Consequently, archaeologists who interpret Hohokam society are at an arguable disadvantage compared to those who labor in the Hawaiian archipelago where detailed documentary records by both native and non-native observers are abundant (e.g., Beaglehole 1967; ʻŪi 1963; Kamakau 1964; Malo 1951).

This comparative analysis reveals the challenges of using conventional archaeological correlates to infer ancient political economies in societies without textual information. In the Hawaiian Islands, contact-period records illustrate that its reported degree of social stratification is not robustly materialized in the archaeological record. This finding raises questions about archaeological models of political economy for ancient societies such as the Hohokam that lacked historical documentary records. If Hawai'i witnessed the development of states, as many archaeologists claim (e.g., Allen 1991; Hommon 2013; Kirch 2010; Seaton 1978; Trigger 2003), Southwestern archaeologists have underestimated the degree of social stratification in ancient Arizona.

## HOHOKAM AND HAWAIIAN POLITICAL ECONOMY

Investigations of political economy explore the dynamic interplay of social stratification with the production, circulation, and consumption of goods and materials (see Earle and Spriggs 2015:516). This analysis focuses on comparing ancient Hohokam and Hawaiian political economies with respect to archaeological evidence of agricultural intensification, community orga-

nization, craft specialization, monumental construction, and mortuary practices. Anthropological archaeologists have long investigated these phenomena in the archaeological record and a battery of methods for their comparative study has been devised over the past several decades (e.g., Drennan and Peterson 2012; Smith and Peregrine 2012). My comparisons include a mix of qualitative and quantitative observations. This approach is necessary given significant differences in the cultural contexts and conditions of archaeological preservation in the two regions. Given the vast amount of research in the two regions, after more than a century of research, this comparison offers a preliminary assessment for investigating new interpretations.

### Agricultural Intensification

Farming was the economic foundation of Hohokam and Hawaiian societies and their communities were dependent on large, labor-intensive field systems. The organization of agricultural production by Hohokam and Hawaiians was comparable and both societies expanded dryland farming in the latter part of their sequences. At times, irrigation and dryland farming in both locales sustained the production of surpluses and although the Hohokam stored food (e.g., Lindauer 1992) in the arid desert of Arizona, conclusive evidence for food storage in Hawai'i has not been detected (Kirch 1977:269).

Hohokam irrigation entailed the construction of labor-intensive networks of canals along the Salt and Gila rivers to water cultigens such as maize, beans, squash, and cotton. At least one canal extended up to 33.6 km in length (Woodson 2010:9) and the largest canals are multiple meters in depth and width. Major canals along the Lower Salt River spanned an aggregate length of 579 km (Neitzel 1991:194), irrigated 210.4 sq km, and produced crops sufficient to support an estimated population as high as 5,800 people per platform mound community (Fish and Fish 2007:45-46). Canals along the Middle Gila River extended a total length of up to 242.7 km and watered as much as 195 sq. km (Woodson 2010:9-17). Together, Hohokam canal irrigation systems during the Classic period delivered water to 405 sq. km (or more) in the Phoenix Basin (see Fish and Fish 1992:99-100). Estimates of the population that could be supported with irrigation farming in the Phoenix Basin have ranged from as low as 18,000 (Doelle 1995:224-225) to as high as 133,000 persons (Fish and Fish 1992:100). Recent calculations by Woodson (2010:17) imply that the upper end of the range (i.e., 133,000) is more likely if his estimate of 32,000 to 48,800 for the Middle Gila River alone is extrapolated to the Lower Salt River Valley.

Away from the major rivers, floodwater farming along tributaries and on alluvial fans supplemented irrigation farming and also sustained neighboring communities (Fish et al. 1992a 41-52). Other forms of Hohokam dryland farming emphasized the construction of rock mounds to slow the evaporation of precipitation

for crops such as agave, and the placement of rock alignments to divert surface flow to crops (e.g., Fish et al. 1992b). Domesticated crops were also supplemented with protein-bearing fauna (e.g., deer, rabbit, and big-horn sheep), undomesticated plants (e.g., mesquite pods, cactus fruits, weedy annuals), and birds and riverine fish (e.g., James 2003).

Compared to the large size of Hohokam canals, Hawaiian irrigation entailed the construction of relatively small-scale ditches (*‘auwai*) that drew water from streams and diverted it onto gridded terraces with stone and earth-bordered pondfields (*lo‘i*) that were planted with taro, a root crop (e.g. Kirch 1977, 1994). Terrace facings often range between 50 cm to 1 m high and incorporate five to ten rock courses (Allen 1991:125-127). Pondfield sizes are variable but ranges between 148 to 223 m<sup>2</sup> are documented on O‘ahu (e.g., Allen 1991:127). The stone-lined ditches (*‘auwai*) that watered pondfields are also variable in size and range. Ditches on O‘ahu are generally 0.4 m to 1.1 m wide and 0.3 m to 0.5 m deep, but some on the island of Kaua‘i have depths up to 2 m and lengths up to 3 km (Spriggs and Kirch 1992:135).

Islands that were less suited to irrigation (e.g., Maui, and Hawai‘i) -- and where Hawaiian states purportedly developed -- required the construction of stone and earthen features for dryland farming. Such features included stone-and-earth mounds and alignments that reduced sheetwash and wind erosion, conserved moisture for crops such as sweet potato, taro, yams, and sugarcane, and possibly served as field boundaries (Kirch 1977:261-268; Hommon 2013:69-70). Breadfruit, banana, and coconut were also cultivated by Hawaiian farmers and were an important part of their daily diet. Although terrestrial mammals were lacking in the islands, dogs, chickens, and pig husbandry provided sources of protein (e.g., Dye 2014), as did birds, fish and other marine resources (e.g., Kirch 1982). During the historic-period, crops such as sweet potato and taro were fed to pigs and dogs (Dye 2014; Kirch 1977:269), and stone fishponds along the coasts (Kikuchi 1976) provided another source of protein for elites.

On Hawai‘i Island, the most intensively studied dry-farming field system (i.e., Leeward Kohala Field System [LKFS]) in the archipelago spans about 60 km<sup>2</sup>. Field mapping of a largely undisturbed 20.2 km area of the field system documented no less than 570 linear km of stone and earth alignments that are 0.5-1.5 m high and 1-2 m wide (Hommon 2013:69), and 190 linear km of trails (Ladefoged and Graves 2010:93-94). Estimates of populations that could be supported by this large system range from 15,480 to 51,600 individuals (Hommon 2013:69). More than forty kilometers away, the more extensive (but notably discontinuous) Kona Field System (KFS) spanned about 150 sq km and it likely sustained a high population, but it (and another dryland field system on the island [i.e., *Ka‘ū*]) remain to be well-documented (Quintus and Lincoln 2018:2).

## Community Organization

Settlements patterns are well-studied in both Hohokam (e.g., Fish and Fish 1992) and Hawaiian archaeology (e.g., Green 1980). Regional surveys in both locales indicate that their societies were organized into modular territorial units that corresponded to zones of agricultural production and resource extraction. To some extent, the size of territories in both societies was governed by variation in the abundance of water and other resources; territories that lacked opportunities for irrigation tended to be relatively large, whereas those with perennial streams and other resources were more compact in scale (see Fish and Fish 1992:101 for Hohokam; see Hommon 2013:12, Table 1.1 for Hawaiian).

Hohokam researchers have identified communities along the Salt and Gila Rivers in the Phoenix Basin (Figure 1) on the basis of archaeological site complexes along irrigation canals that shared one or more public monuments, such as a platform mound (Doyel 1974). Settlement hierarchies are evidenced by variation in site function, size, and spacing along and beyond canals (e.g., Fish and Fish 1992:100). Monuments at the largest sites in Hohokam communities include massive platform mounds and concentrations of high-value goods (e.g., Fish and Fish 2000:163-164), and evidence of feasting (e.g., Bostwick and Downum 1994:370-374). Other communities with platform mounds were established in locales that did not permit large-scale irrigation (e.g., Fish and Fish 1992). Because the direct historical approach cannot be applied to all aspects of Hohokam archaeology, the identification of community boundaries (Figure 1) has been approximated with Thiessen polygons (e.g., Fish 1996:110). Hohokam communities in the Phoenix Basin (N=29 total) averaged 24 sq km, each had estimated populations of 2,300 to 5,800, and they were likely modular segments of mega-communities (Fish and Fish 2007:46-47).

Contact-period documentary sources in Hawai‘i reveal that its traditional society was also organized in a modular and territorial fashion. Islands were divided into large-scale districts (*moku‘āina*) that were further segmented into communities (*ahupua‘a*) and a nested series of smaller land parcels (e.g., *‘ili ‘āina*, *mo‘o‘āina*, and *kīhāpai*) (Figure 2). The precise boundaries of such units are rarely accessible in the archaeological record, but post-contact documentary records indicate that communities were often narrow sections of land that spanned the coastline and the uplands (Figure 2); this arrangement facilitated access to non-agricultural materials along the coasts (e.g., salt and marine resources) and in the uplands (e.g., wood, birds, and lithic raw material). Archaeological communities in Hawai‘i include (but are not limited to) rock mounds, terraces, and walls for agriculture; domestic features such as stone enclosure dwellings, temporary camps, and activity areas; and trails, shrines (*ahu*), fishponds, and temples (*heiau*) (Kirch 1985:247-283) with lithic artifacts from non-



local sources that indicate some degree of inter-island circulation (Kirch et al. 2012). Hawaiian communities (*ahupua'a*) averaged 9.7 sq km and each had estimated populations of 540 or so (Hommon 2013:14). However, the abundance of such communities across the islands must have contributed to the high populations that are reported in early contact-period documentary sources.

Archaeological excavations indicate that both Hohokam and Hawaiian households were comprised of multiple structures and domestic and ritual activities were spatially segregated. The lack of documentary sources on Hohokam households has not hindered their archaeological delineation because groups of domestic buildings encompassed by adobe wall compounds are easily distinguished at large Classic period settlements (Doyel 1991:253-254). Similarly, documentary descriptions of Hawaiian households (*kauhale*) offer traditional guidelines for the inferring archaeological households in the islands (e.g., Weisler and Kirch 1985). Hawaiian women and men were compelled by the custom of *'ai kapu* to consume their meals in different buildings; other activities were also spatially segregated according to gender. In short, gender was a significant organizing principle of political economy among both Hohokam (e.g., Crown and Fish 1996) and Hawaiians (e.g., Weisler and Kirch 1985).

The repetitive and modular organization of communities in Hohokam and Hawaiian society implies that they were not overtly hierarchical, at least in their archaeological manifestations (see Crumley 1995, and Rice 2000 for relevant discussions). Settlements were dispersed, monumental architecture was widely scat-

tered, and ranking of community functions is not obvious among either the Hohokam or Hawaiians. Moreover, archaeological evidence of emergent urbanism -- a necessary precursor of many states (Jennings 2016) -- is potentially present among the Hohokam (e.g., Rice 2000:165-166), but is lacking in the Hawaiian Islands (Hommon 2013:129; Jennings and Earle 2016; Kirch 2010:75, 167).

### Craft Specialization

The archaeological records of craft economy in Hohokam society and Hawaiian society are strikingly different. Hohokam artisans crafted a rich variety of goods including (but not limited to) ceramic vessels, chert and obsidian arrowpoints, marine shell ornaments, ground stone tools, tabular "agave" knives, polished stone axes, bone awls, turquoise, and plant-fiber textiles (Doyel 1991). Hohokam sherds from plain and painted ceramic bowls and jars are common and their production and circulation within and beyond the Phoenix Basin is well-documented (e.g., Harry 2003). The assumption of Abbott et al (2007:475, Note 2) that each resident required a new ceramic pot each year implies that tens of thousands of vessels were produced and circulated within the Phoenix Basin. Similarly, the importation of marine shell across hundreds of kilometers, and its production into ornaments such as bracelets, beads, pendants, and trumpets (conch shells) was also widespread in Hohokam society (e.g., Bayman 2001, 2002).

Although Hohokam sites offer an abundant array of crafted goods, many Hawaiian sites rarely yield much, save for an occasional stone adze, chipped stone, a shell

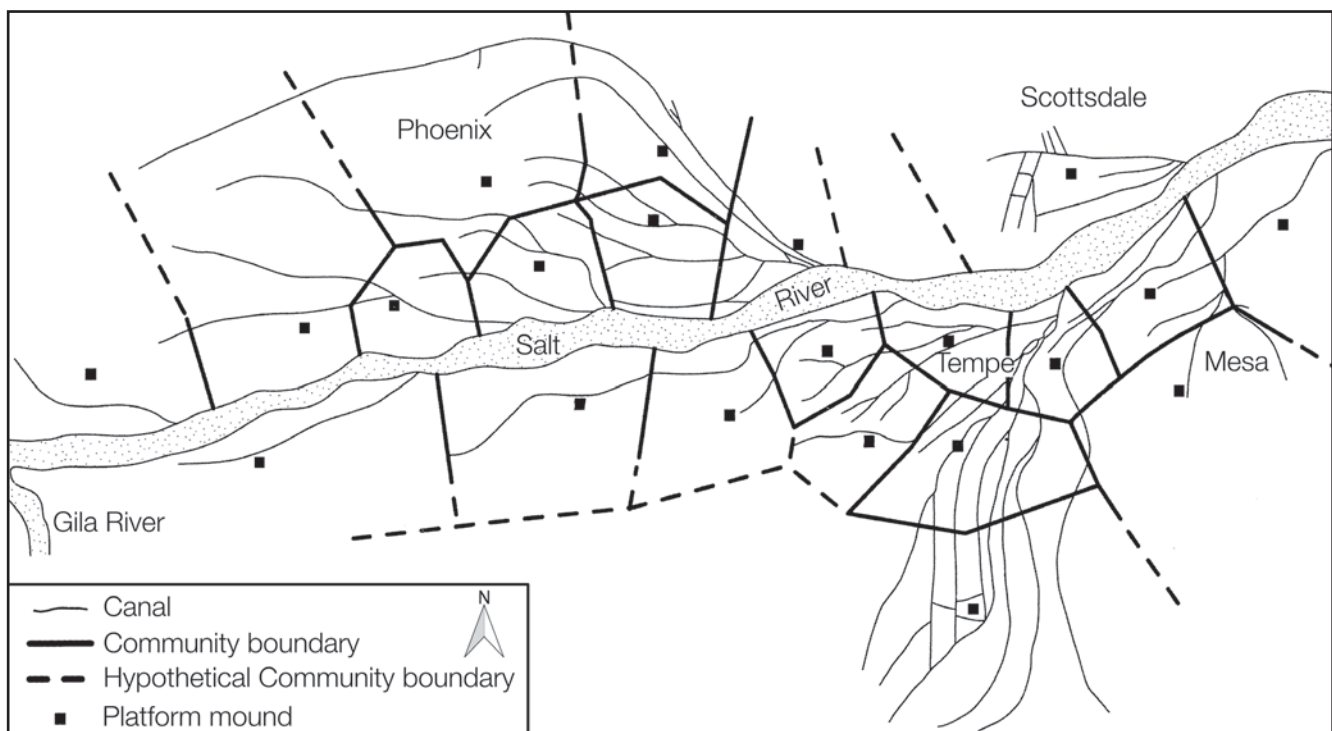


Figure 1. Classic Period communities along the Salt River in the Phoenix Basin (Adapted from Fish 2007:46, Figure 5.8).

or bone fishhook, and/or a pecked-stone food pounder (*poi pounder*). Still, selected locales near favored fishing grounds offer rich assemblages of fishhooks made of shell, bone (pig, bird, dog, and human), dog teeth, turtle shell that were possibly made by fishing specialists (Emory et al. 1968). Similarly, the Mauna Kea adze quarry on Hawai'i Island includes workshops, enclosures, rockshelters, shrines, and petroglyphs that are scattered across a 12 km<sup>2</sup> area (McCoy 2009). The widespread distributions of adzes from the quarry imply that it was a common-pool-resource (sensu Bayman and Sullivan 2008) that was shared by communities throughout the islands (Lass 1998:25). The production and circulation of Hawaiian stone adzes within and among islands has been documented geochemically (e.g., Bayman and Moniz-Nakamura 2001; Mills et al. 2011), but evidence that their movement exceeded the intensity and scale of Hohokam goods, such as ceramic vessels, marine shell, obsidian, turquoise, and other materials is lacking.

Archaeological models of Hawaiian political economy (e.g., Earle 1987; Kirch 2010; Hommon 2013) invoke contact-period documentary accounts of a specialized and ritually-sanctioned craft economy (e.g. Lass 1998) that is rarely preserved in the archaeological record (Bayman and Dye 2013:82). Such goods include (but are not limited to) sacred feather standards (*kāhili*), capes and cloaks (*'ahu'ula*), and crown-like helmets (*mahiōle*) that were worn only by the highest-ranking elites; carved-wood images (*ki'i*) that were erected at religious temples; and gourd (*ipu*) containers, wood weapons and canoes, *olonā* cordage, barkcloth (*tapa*) mats, baskets, and sharkskin drums. Contact-period crafting in Hawai'i was an inherited and divinely ascribed undertaking by recognized specialists according to oral tradition and documentary accounts (Bayman 2014; Malo 1951:81; see Lass 1998:21). Hawaiian crafting was also a gendered enterprise and the ancestors (*'aumakua*) of females and males offered religious sanctions for their respective skills, and ruling elites offered political mandates for tribute payment (*ho'okupu*) (Lass 1998:26).

The archaeological records of Hohokam and Hawaiian craft economies are also strikingly different in terms of their preservation. Hawaii's relative lack of archaeological preservation is arguably mitigated by the direct historical approach and contact-period documentary accounts.

However, doing so highlights an important implication: there is no *archaeological* evidence that ancient Hawaiian craft specialization was qualitatively different than Hohokam specialization in terms of its organization and political economy.

### Monumental Construction

Monumental buildings in both Hohokam and Hawaiian society typically included one or more elevated flat-topped platforms that were bordered or encompassed by walls (Figures 3 and 4). The Hohokam built platform mounds using a combination of mounded earth and capped with caliche-rich adobe and plaster (Elson 1998:1; Gregory 1987:188). Hohokam platform mounds varied in size and configuration but their height above their surrounding ground surfaces averages approximately 2 to 2.5 meters (Rice et al. 2009:168-171), and they were enclosed by rectangular compounds of adobe walls. Rooms and other features were also constructed atop Hohokam mounds and inside their encompassing compounds (Figure 3).

Contact-period illustrations of large Hawaiian temples (*heiau*) confirm that perishable materials were used to construct wood-and-thatch buildings (*hale*), tow-

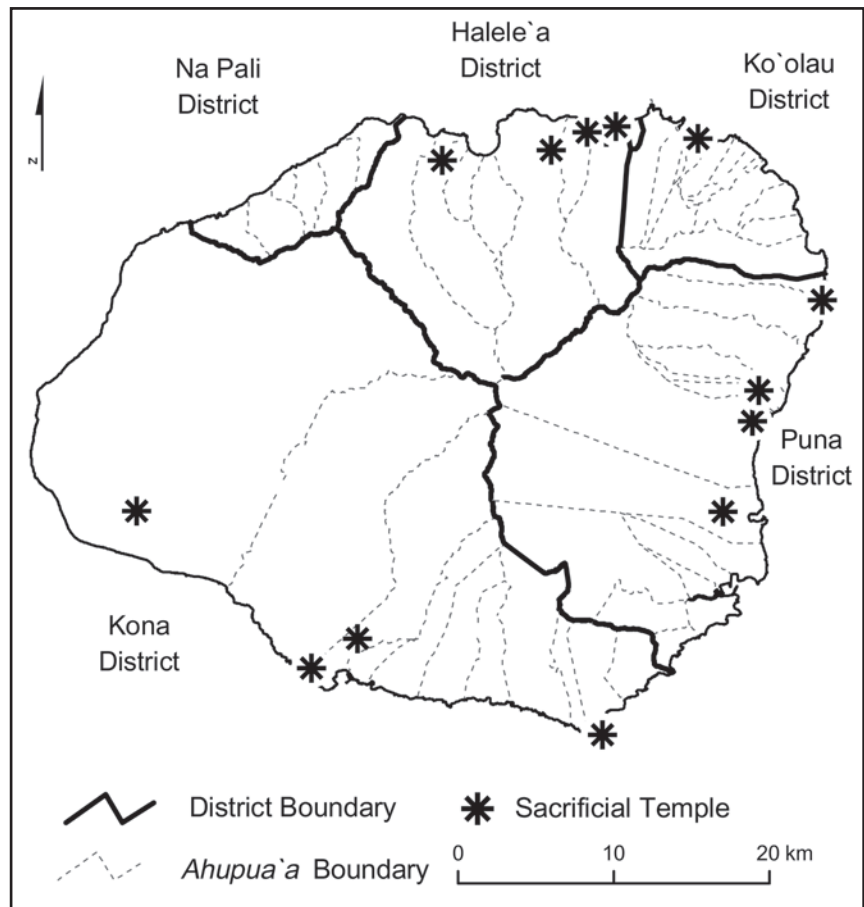


Figure 2. Early historic territorial divisions and sacrificial temples (luakini heiau) on Kaua'i Island (Adapted from Bayman and Dye 2013:88, Figure 6.2, Courtesy of Eric Komori).



ers, drums (*pahu*), and sacred images (*ki'i*) atop stone platforms that were enclosed by stone walls. The forms and sizes of Hawaiian temples (*heiau*) are bewilderingly variable, thus complicating interpretations of their specific functions (Stokes 1991; Valeri 1985). Small temples, such as fishing shrines (*ko'a*), household ancestral altars (such as a single upright stone), and agricultural temples (*hale o Lono heiau*) are widely distributed in the Hawaiian Islands. Hawaiian oral traditions of temple functions were gathered in the early 20th century (Stokes 1991) more than a century after contact. Temples for warfare and human sacrifice (*luakini heiau*) are among the largest (Figure 4), and yet they are also varied in their size and layout (Valeri 1985).

Ritual feasting was practiced at both Hohokam platform mounds and Hawaiian temples (*heiau*). Archaeological evidence of feasting at Hohokam platform mounds includes evidence of large communal cooking pits, hearths, stone food-processing tools (e.g., manos and metates), large ceramic vessels, and concentrations of deer bone (Bostwick and Downum

1994:370-374). Similarly, large Hawaiian temples (*heiau*) were also a nexus of ritual feasting on roasted pigs and other foods (e.g., breadfruit) (e.g., Kolb 1999). The sponsorship of feasts by elites at Hohokam platform mounds and Hawaiian temples materialized ideologies that ensured society-wide cooperation (e.g., Preucel 1996:130 [for Hohokam]; and Kolb 1999:103 [for Hawai'i]). Although archaeological evidence of food storage is well-documented at Hohokam platform mounds and their surrounding structures (e.g., Haury 1945; Lindauer 1992), comparable evidence is lacking at Hawaiian temples.

Precise calculation and comparison of construction labor is difficult for Hohokam platform mounds (e.g., Craig et al. 1998; Elson 1998) and Hawaiian temples (e.g., Kolb 1994) because they required different resources and were erected by varied population sizes. For example, Hohokam platform mounds necessitated the quarrying of hard caliche, the delivery of water, the preparation of adobe, wood-working, and many other tasks. Hawaiian temples did not entail the preparation

of adobe, but their construction required forest clearance, topographic leveling, wood-working, and other activities. Hohokam platform mounds and Hawaiian temples were often constructed and then remodeled over two or more centuries (e.g., Kolb 1994:525-526; Elson 1998:9-10), thereby complicating comparative estimates of their labor. Given these differences, comparing the sizes of areas that were demarcated for monumental construction offers an alternative and less problematic means to gauge their value. Metric calculations of the "footprints" of the largest monuments and their enclosing compound walls reveal that Mesa Grande (a Hohokam platform mound) is larger than Pi'ilanihale (a Hawaiian temple) (Bayman and Dye 2013:98, Table 6.1). Mesa Grande's footprint of 14,045 sq. m exceeds Pi'ilanihale's footprint of 12,126 sq. m (Figure 4). The demarcation of space for the largest temple monument in ancient Hawai'i was surpassed by Hohokam society.

Still, the scale of monumentality among the Hohokam and Hawaiians is broadly comparable and both societies constructed residential and non-residential buildings. Moreover, sizable monuments in both societies entailed the coordination of substantial public labor and would have legitimated elite power (e.g., Elson 1998; Kolb 1994). The lack of textual information for Hohokam platform mounds requires prehistorians to rely on a combination of archaeological information along with ethnographic analogy, rather than the direct historical approach. Together, such sources imply to Elson (1998:106) and other archaeologists that Classic period Hohokam society was at least ranked, if not highly stratified.

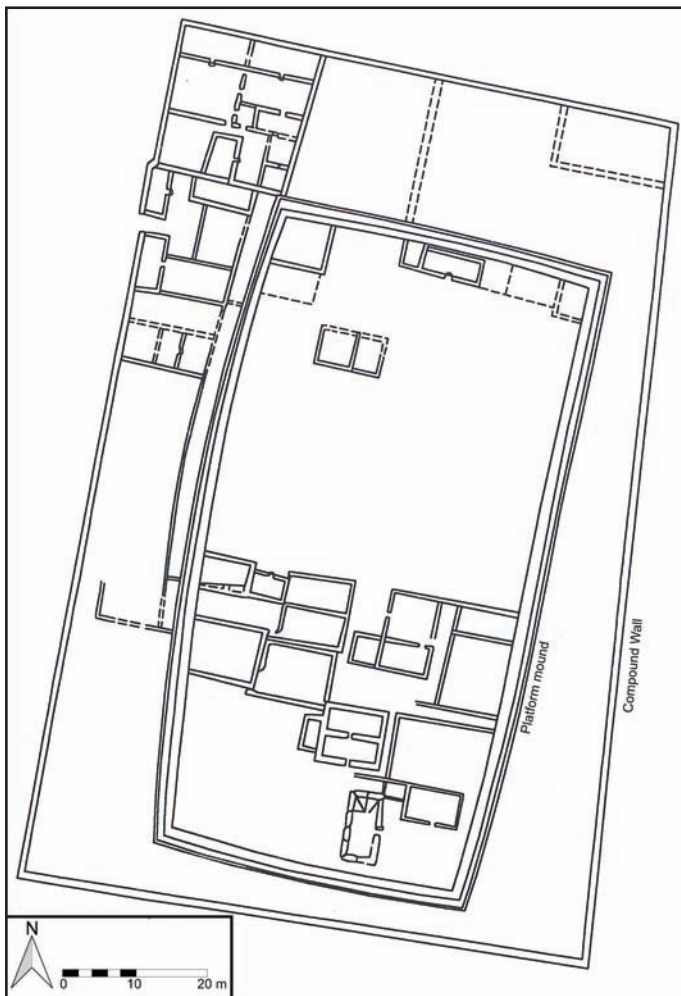


Figure 3. Plan of Pueblo Grande platform mound and its compound in Arizona (Adapted from Bostwick and Downum 1995:346, Figure 8.33).



Figure 4. Plan of Pi'ilanihale temple (heiau) on Maui Island.

### Mortuary Practices

Hohokam and Hawaiian mortuary practices are similar in some respects and dramatically different in others. Burials in both societies included inhumations in houses, cemeteries, caves, and religious temples (e.g., Hiroa 1957:569-574; Kirch 1985; Rice 2016:47-60). Unmarked burial in sand or earth was particularly common among Hawaiians (Kirch 1985:240). Cremation burial was also practiced among both the Hohokam and Hawaiians. However, cremation in Hawai'i was reserved for vanquished enemies, for slaves and outcasts (*papa kauwā*), and for individuals who violated sumptuary expectations (*kāpu*) (e.g., Malo 1951:20, 57). On occasion, both societies interred human remains in stone-marked graves, but this practice was most common in Hawai'i after the adoption of Christianity in 1821.

In rare instances, Hohokam and Hawaiians constructed special burial chambers, such as a "sarcophagus" or "crypt" among the Hohokam (e.g., Rice 2016:103), or a "mausoleum" among the Hawaiians (e.g., Bloxam 1925). The best-documented Hohokam sarcophagus was constructed during the 14th century at the Casa Grande ruin, a large settlement that approached 3.2 sq. km. in area (Fewkes 1912; Rice 2016). The sarcophagus was located alongside the exterior of an adobe wall compound that enclosed 11 rooms, and the outside of the tomb was painted with birds,

animals, and geometric representations. Burial accompaniments included a paint-grinding slab and pestle, numerous pigments, a double-bitted stone adze, and a quiver with a cluster of stone arrow and spear points (Fewkes 1912). Because the chamber was larger than the body in a supine position, it is possible (but cannot be confirmed) that it also included perishable objects such as baskets, clothing, and headdresses (Rice 2016:2). Nine crypts with multiple individuals, including children and adults, have been documented among the Hohokam (Rice 2016:172). Because Hohokam crypts are rare, and they entailed two to three times more effort to construct than other types of graves, they offer evidence of the high-status of their occupants (Rice 2016:172).

The Hawaiian mausoleum known as Hale-o-Keawe is located on Hawai'i Island. Although the date of its construction is not well-documented, oral traditions recall that it housed the bones of 23 high-ranking individuals (Cordy 2000:276, Table 9-4). Among its bones were perishables including carved wooden idols, barkcloth, gourd and wood containers with shells and fishhooks, a miniature canoe, two native drums, an English drum, and a Chinese mask (Bloxam 1925:74-76). Fragments of sailcloth of probable European origin and pieces of metal were also identified in a basketry casket (Rose 1992:41). Although the inclusion of European and Chinese goods with the bones is not surprising in light of

Hawaiian trade with China in the early 1790's, it underscores the fact that this "mausoleum" was used, and perhaps even constructed, after European contact in 1778 when surface-visible burials were more common (Bayman and Dye 2013:90).

Durable goods are routinely encountered in Hohokam and Hawaiian burials in other kinds of locations. Some Hohokam individuals were accompanied by personal possessions, tool kits (e.g., for weaving or hunting), and provisions of food (Rice 2016:62). Durable possessions also include varying combinations of jewelry, ritual objects, chipped stone tools, ground stone tools, stone figurines, pottery vessels, and minerals (Rice 2016:64-66, Tables 4.1, 4.2, and 4.3). Analysis of grave lot values at Hohokam platform mound sites, such as Pueblo Grande, has produced intriguing patterns (Mitchell and Brunson-Hadley 2001). Classic period burials with the highest grave lot values are dominated by adult males and children (Crown and Fish 1996:808-811). This pattern implies that certain members of Hohokam society inherited high-status (Crown and Fish 1996:810).

Durable goods are also frequent in some Hawaiian burial grounds. For example, excavation of 867 undisturbed burials in a Maui site (Honokahua) revealed that 61.4% of them were associated with durable goods (Donham 2000:8.14). Grave goods encountered in the Maui burials typically reflected economic activities, such as fishing (e.g., hooks and lures) or woodworking (i.e., stone adzes) (Donham 2000:7.12). Other durable goods were used for personal adornment, such as ornaments made of teeth from pigs, dogs, sharks, or humans (Donham 2000:7.19). Significantly, the sixteen burials with four or five burial goods included both adults and children, implying that some individuals inherited high status. Notably, a few adult and sub-adult females (and one adult male) were accompanied with whale tooth or shell pendants (*lei niho palaoa*) (Donham 2000:8.16). In the contact-period, Hawai'i high-status individuals wore such pendants to signify their societal role (e.g., Kamakau 1961:3).

The relative dearth of archaeological evidence of high-status males in ancient Hawai'i presaged the contact-period mortuary custom of *ho'onalonalo*, wherein burials of elite males were concealed to prevent their desecration (Kamakau 1964). In the early contact-period, elite males were secretly buried in unmarked graves so that their *mana* (spiritual power) could not be appropriated by rival elites who would make fishhooks with their bones (Kirch 2010:156). This contact-period custom explains why elite males are rarely discovered in Hawaii's archaeological record. Indeed, Donham (2000:8.19) concludes that the long-standing documentary hypothesis (e.g., Hommon 1976) that ancient Hawai'i was characterized by rigid class formation (i.e., elites versus commoners) is unsupported by the archaeological record.

## DISCUSSION AND CONCLUSIONS

This comparison reveals that the scale and organization of Hohokam and Hawaiian societies were similar with respect to their archaeological records. Surprisingly, however, there are significant differences in how their political economies have been interpreted by archaeologists. With few exceptions (e.g., Lekson 2008:223; Rice 2000:165-166), most Southwestern archaeologists are reluctant to classify the Hohokam into a stage of development such as 'state.' Still, the appropriate characterization of Hohokam complexity and political economy is far from settled (Fish et al. 2013:1). In contrast, numerous archaeologists working in Oceania have concluded that ancient states most definitely developed in the Hawaiian Islands (e.g., Allen 1991; Hommon 2013; Kirch 2010; Seaton 1978; Trigger 2003). This view is a striking contrast from the unspoken assumption of many Southwestern archaeologists that ancient states did not develop in Arizona. These divergent views are puzzling given the comparable scale and organization of the archaeological records in the two regions. What accounts for the reluctance of Southwestern archaeologists to infer that Hohokam society witnessed the rise of ancient states?

The timing of European contact with traditional Hawaiian society offers a partial explanation for these divergent views. Unlike the Hohokam, the use of monumental architecture was flourishing in Hawaiian society at the moment of European contact in the late 18th century. European eyewitness accounts of contact-period Hawaiian society were recorded in journals by Captain James Cook (Beaglehole 1967) and others in subsequent decades. Many of these early accounts were recorded shortly before the onset of catastrophic disease epidemics (see Stannard 1989) and they bear witness to the existence of highly stratified polities in Hawai'i. Hawaiian oral traditions also loom large in narratives of the ancient Hawaiian 'state.' The oral traditions used by archaeologists to interpret ancient Hawaii's political economy (e.g., Hommon 2013; Kirch 2010) are drawn from early 19th century accounts of Samuel Kamakau (1961, 1964), John Papa ʻŪi (1963), and David Malo (1951). Each of these men was educated by Christian missionaries in the early 19th century, only a few decades after contact, and their accounts convey snippets from older Hawaiians who recalled their lives before the introduction of Christianity and the profound changes it incurred.

Hawaiian traditions and contact-period accounts bear witness to multi-island polities, elaborate administrative bureaucracies, pervasive class stratification, human sacrifice at religious temples, and conquest warfare (e.g., Kamakau 1961). Accordingly, there were no less than three major endogamous social classes with inherited privileges for elites (*ali'i*) and sumptuary restrictions for commoners (*maka'āinana*) and outcasts (*papa*



*kauwā*). Within the elite class, there were as many as eleven grades of stratification (Hommon 2013:20; Kamakau 1964:5; Malo 1951:54-56). Following tradition, these hallmarks of Hawaiian statehood were introduced to the islands in the 14th century by Pā'ao, a Tahitian priest (Fornander 1996:33-38). Narratives of the ancient Hawaiian state also refer to studies (e.g., Kaeppler 1978) of perishable material culture that was collected by James Cook and other visitors during the early contact-period. Such goods are tangible dimensions of Hawaii's cultural heritage, and yet, they are not preserved in the archaeological record. Strangely, archaeological evidence of conquest warfare in ancient Hawai'i is also lacking (Bayman and Dye 2013:91-92).

The absence of texts in the Arizona desert has arguably hindered interpretations of Hohokam political economy (Fish and Yoffee 1996:292). European entry into Arizona only happened after platform mounds were no longer in use. O'Odham traditions that speak of the Hohokam platform mound era and the high levels of stratification were not recorded until the early to mid-20th century (e.g., Bahr et al. 1994; Fewkes 1912), at least four centuries after Hohokam society faded in the archaeological record. Circumstantial differences in Arizona and Hawai'i illustrate the complex challenges of using a cross-cultural approach in anthropological archaeology. The conventional material correlates that archaeologists currently use to interpret political economy (e.g., Flannery 1998) in the ancient world are insufficient and must be improved. In the meantime, this comparative study confirms that archaeologists in Arizona have underestimated the degree of social stratification among the Hohokam -- if we accept claims that ancient 'states' developed in the Hawaiian Islands.

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# QUEEN CREEK FROM FORTUNA PEAK TO GILA CROSSING: OUR MISSING RIVER

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## ABSTRACT

*Queen Creek is a discontinuous ephemeral stream that flows east to west through the central Phoenix Basin, providing a mesic corridor from Fortuna Peak in the eastern Superstition Mountains to the Gila River. On reaching the desert floor the flow sinks into the underlying gravels and it is only under rare flood conditions that the surface water reaches the Gila River. Prehistoric settlements, including Hohokam and Salado villages (associated with Tonto Basin) have been documented along this drainage. The archaeological record includes evidence for human occupation along Queen Creek beginning in the Archaic period and continuing through the Early Agricultural and Early Ceramic periods, the entire Hohokam sequence, and the Historical period, which included Apache, Yavapai, O'odham and Euroamerican peoples. Queen Creek Hohokam habitation sites ranged from single occupation sites to villages of several square miles in extent. Some of the largest sites, concentrated on the landform known as the Queen Creek Delta (technically an area where several alluvial fans merge), contain important features such as ballcourts, trash mounds, courtyard groups, and cemeteries ranging in time from the Colonial through the late Classic periods. In addition, recent studies have revealed that the Delta contained a ceramic production center that traded with populations to the north and south along the Salt and Gila Rivers. Other trade items may have moved along Queen Creek from the Globe Highlands to at least the western Phoenix Basin. Recent work has begun to shed light on the significance of Queen Creek in the Hohokam world, we present an overview of the mesic corridor centered on Queen Creek and how the populations along that corridor, from the Gila River at Gila Crossing to the uplands of the eastern Superstition Mountains near the modern hamlet of Top of the World integrated with peoples in the larger Phoenix Basin.*

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## INTRODUCTION

Research on the Hohokam in the Phoenix Basin has made much progress in relation to large-scale, canal-based irrigation communities along the Salt and Gila Rivers and their associated tributaries (Abbott 2003; Gladwin et al. 1937; Haury 1945, 1976; Midvale 1968; Patrick

1903; Schroeder 1940; Turney 1929; Woodson 2016; Woodward 1931). Researchers examining the portion of the Phoenix Basin dominated by the Salt River and its tributaries routinely incorporate into their work the significance of the tributary drainages of New River, Agua Fria River, Cave Creek, and the Verde River (e.g., Curtis and Wright 2012; Minnis and Redman 1992). Work in the southern Phoenix Basin focuses on the Gila River and its tributary drainages, such as McClellan and Santa Cruz Washes (e.g., Woodson 2016). Sites along Queen Creek have previously been documented by researchers including Midvale (1928), Schroeder (1940), and Turney (1929). Development in the area beginning in the 1980s initiated limited new research to the Queen Creek "Delta" and surrounding area (Crown and Sires 1984; Stone 1983; and Teague and Crown 1984). It must be noted that the area commonly referred to as the Queen Creek Delta is an alluvial fan, but an early description by Lee (1905:105) referred to the area as a "fan or dry Delta." The moniker 'Delta' stuck and when we use it herein it is capitalized reflecting that it is part of a longer place name, the Queen Creek Delta.

Recently, the rapid urban expansion into the Queen Creek Delta area has initiated a significant volume of research (e.g., Chenault 2015; Leonard et al. 2007). Similarly, archaeological data recovery excavations have been conducted in the upper Queen Creek drainage (e.g., Wegener and Ciolek-Torrello 2011). This summary of Queen Creek (also see Chenault, this issue; Ossa and Gregory, this issue; Rodriguez et al. this issue) contributes toward a larger syntheses of desert Hohokam settlement patterns away from major drainages, adding to research that exists for similar areas such as the northern Tucson Basin (e.g., Fish et al. 1992), and further north along the Santa Cruz River near Picacho Peak and the Santa Cruz Flats area (e.g., Ciolek-Torrello and Wilcox 1988). Other Hohokam settlements in non-riverine contexts have

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been well described in the research literature including sites in the Papaguería (e.g., Altschul and Rankin 2008) and the northern Phoenix Basin (e.g., Doyel and Elson 1985; Hackbarth 2002, 2007; Hackbarth et al. 2002). The settlements along Queen Creek provide one more example of Hohokam farmers who did not rely on large river-fed canal-based agricultural methods but instead used a variety of agricultural technologies that included *ak-chin*, floodwater, silt harvesting, reservoirs and short canals (Dart 1989; Doolittle 2000:331-335; Huckleberry 2017, 2015, 2011; Schaafsma and Briggs 2007).

While the larger sites in the Queen Creek Delta area are often mentioned, Queen Creek and the settlement patterns along the drainage are not typically examined either as a unified whole or within a framework of research questions relating to the variations and similarities to settlements on other Phoenix Basin drainages. Previous researchers have noted regional variation in Hohokam settlement patterns relative to various river systems (Abbott 2000:35-49; Fish and Fish 2007; Loendorf 2010; Woodson 2016). The thorough examination of regional trends along Queen Creek drainage is beyond the scope of this paper. Herein we touch upon the physiography, the prehistory and history of the creek and initiate a discussion of the prehistory of Queen Creek. For instance, large-scale canal irrigation technology, so commonly associated with Hohokam settlements of the Phoenix Basin, is absent at villages of the Delta and at the site of Gila Crossing (Rodrigues and Landreth 2014) at the western end of the Queen Creek corridor. We suggest these villages may have been able to accommodate demographic fluctuations more readily than canal dependent villages such as those on the Salt and Gila Rivers. This and the related papers in this issue (Chenault, this issue; Ossa and Gregory, this issue; Rodrigues et al., this issue) contribute to a better understanding of Queen Creek's place in Phoenix Basin prehistory and history and will generate further questions regarding trade and cultural interactions along the full length of the Queen Creek drainage through time, and further enrich our collective understanding of the previous inhabitants of this valley and the Hohokam in general.

## PHYSIOGRAPHY OF THE QUEEN CREEK DRAINAGE

Queen Creek is a discontinuous ephemeral stream (Bull 1997) that forms a mesic corridor through the central Phoenix Basin from the southeastern Superstition Mountains to the western side of the Phoenix basin (Figure 1). It begins as a channelized perennial stream in the uplands, transitions on the desert floor to an alluvial fan known as the Queen Creek Delta with rapidly infiltrating sheet flow and laterally shifting, poorly defined channels (Lee 1905:104), and back to a moderately channelized form, known as Lone Butte Wash, with

little surface flow through the western 17.5 miles (28.2 km) of the drainage (Graf 1987:21 Figure 7). Except during large flood events the majority of the waterflow infiltrated the valley floor in the Delta, and as Lee notes "[i]t is seldom, however, that floods occur of sufficient size and duration to reach the Gila, being more often lost in the valley fill long before reaching that river" (Lee 1905:105). The Queen Creek drainage is complex and dynamic, and people seldom experience it as a flowing stream over its entirety.

Perhaps for this reason, some researchers omitted it from maps provided for the Phoenix Basin (e.g., Fish and Fish 2007:vii, Map 1), represent Queen Creek as ending entirely at the Delta near the present town of Queen Creek (e.g., Henderson 2004:8, Figure 2.1) or show Queen Creek turning south to connect with the Gila River east of Gila Butte (e.g., Rice 2016:4, Figure 1.2).

For purposes of the discussion of this complex drainage, we elected to divide the Queen Creek Drainage into five reaches based on the noted topographic and hydrologic differences (Figure 2). In defining stream reaches we are following the definition of 'reach' per the United States Department of Agriculture, "[a] reach is a length of stream or valley used as a unit of study. It contains a specified feature that is either fairly uniform throughout, such as hydraulic characteristics or flood damages, or that requires special attention in the study, such as a bridge." (United States Department of Agriculture 1998:6-1). Each reach we define has different topography and hydrology, and Reaches 1 and 2 have large changes in altitude. Each reach had different resources and agricultural potential, reflected in differing settlement patterns.

The physiography of each reach will be described, and then a brief cultural overview will be provided for each reach. This drainage bisects the Hohokam heartland with significant sites situated along it, and has been recognized by some archaeologists (e.g., Garraty et al. 2011; Gregory 1991; Lack et al. 2012; Rice 2003; Teague and Crown 1984) and by those conducting ecological and irrigation-based investigations (DeJong 2001:10-11; Rea 2015: 447-449). Yet, the variability noted above in the representation of the Queen Creek drainage in research suggests (to us) that modern manipulation of the water flow in the Queen Creek area has diminished our ability to recognize both the morphological aspects of the fluvial system (see Graf 1988:289-292) and the archaeological settlement patterns and their relationship to the landscapes along the drainage. For instance, prior to installation of Whitlow Ranch Dam in 1960 (Stone 1977), floodwaters within Queen Creek flowed past the town of Queen Creek, and flooded portions of the municipalities of Gilbert and Chandler although only the largest floods continued on to join the Gila River near the modern village and prehistoric site of Gila Crossing.



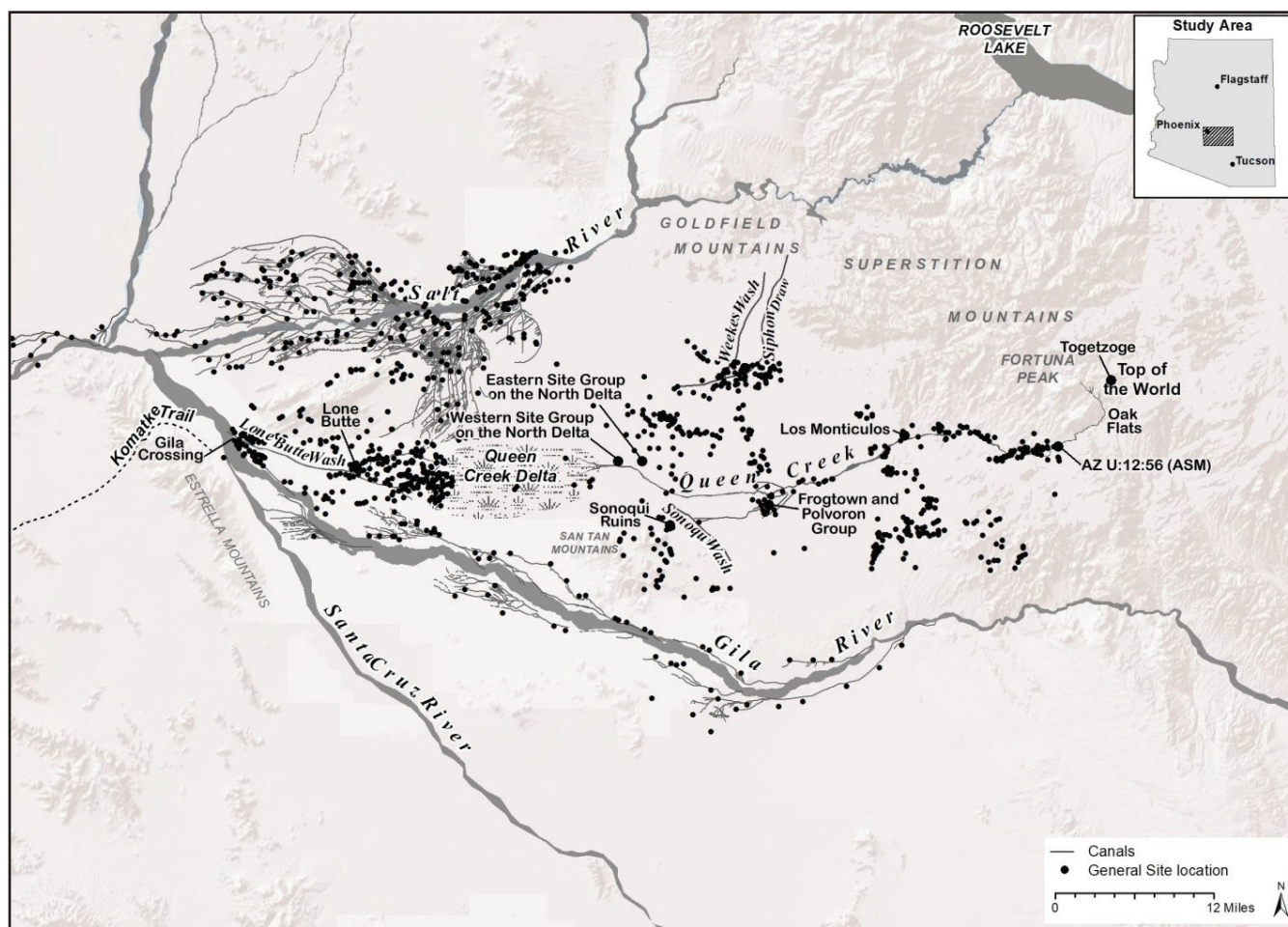


Figure 1. The Queen Creek drainage through the central Phoenix Basin depicting the general distribution of prehistoric sites.

Rea (2015:448) provides an oral and documentary history of the area around Gila Crossing in which he refers to the drainage entering from the east as Queen Creek rather than Lone Butte Wash.

Eventually, all the people moved out to the upper terraces on the east side of the Gila, clustering around either the parish and school of St. John's (Komatke) north of Queen Creek or the day school and Presbyterian Church of Gila Crossing, south of the drainage. The 1914 map already indicates 53 houses south of Queen Creek, 15 around St. John's, and an additional 29 to the northwest of St. John's [Rea 2015:448]

However, ever since the Roosevelt flood-control channels and subsequent Queen Creek Floodway (Brooks and Vivian 1978) were installed, the water of Queen Creek has been diverted south, into the Gila River near Gila Butte. Today the waters of Queen Creek never enter what had been the lower reach of the drainage. The disconnected water flow has resulted in a conceptual divide in the previously contiguous drainage. It is unclear at what point the western section of

the drainage (Reach 5) was renamed Lone Butte Wash, but it must have been sometime after 1922 (see Rea 2015:448). Also a 1914 U.S. Geological Map of the area calls out Lone Butte as 'Jackson' Butte (USGS 1914). Today Reach 5 is largely conceptualized and treated as a separate drainage. In this paper we consider the drainage from Fortuna Peak to its confluence with the Gila River as a single discontinuous, ephemeral watercourse.

Archaeological sites along Queen Creek span much of the sequence of human occupation of southern Arizona, with sites dating from the Middle Archaic, Late Archaic, Early Agricultural, and Early Ceramic, through the entire Hohokam temporal sequence and the Historical period (Figure 3). Reaches 1 and 2 were settled by the Hohokam during the Preclassic. During the Classic period, peoples participating in the cultural manifestation centered on the Tonto Basin (often referred to as 'Salado' [Dean 2000; Reid and Whittlesey 1999]) moved into the upper two reaches. Yavapai and Apache moved into the area during the early Historic period (Garraty et al. 2011; Goodwin 1942). Encroaching Euroamerican miners and ranchers created a period of conflict that ended around 1872, after which mining and ranching

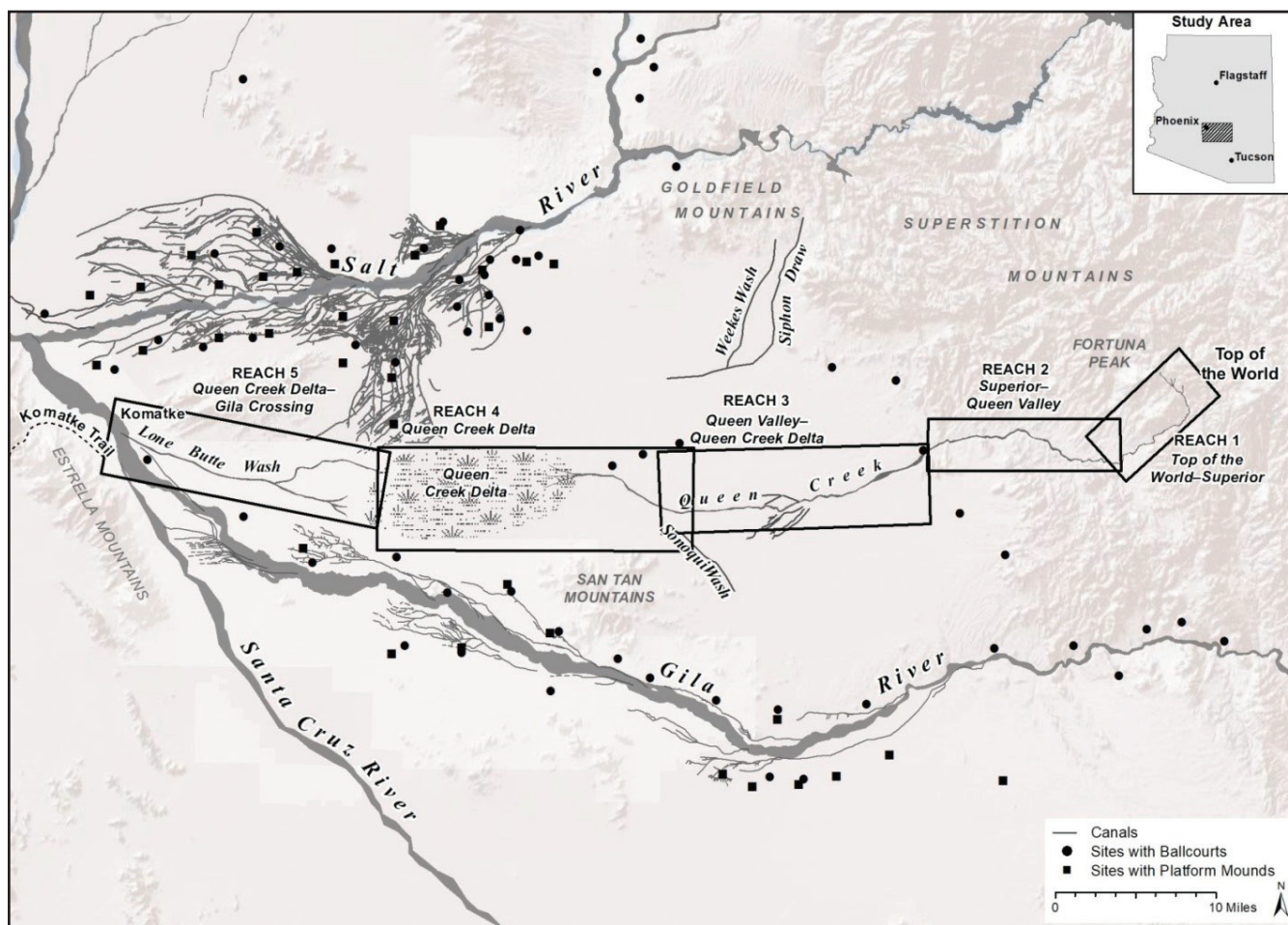


Figure 2. The five reaches of Queen Creek with the distribution of ballcourts and platform mounds in the Phoenix Basin.

became established (Chappell 1973; San Felice 2005). Reaches 4 and 5 contain Historic sites settled by Akimel O'odham, Tohono O'odham, Mexicans, and Euroamericans (Darling 2011; Eiselt 2003; Loendorf and Burden 2003; Ravesloot et al. 1992; Rice et al. 1983). Reach 5 is also noted for the presence of the Pee Posh (Spier 1933).

Queen Creek traverses a mere 75 miles (120 km); however, it passes through five distinct topographic zones, each with differing environments and histories of human occupation. From an anthropological perspective, and important to this study, these variations dictate differences in the resource base and in the social connections that would be available to occupants within that specific area (Table 1).

### Reach 1: Fortuna Peak to Town of Superior

Queen Creek originates at 5,000 feet above mean sea level (ft amsl) on the southern flank of Fortuna Peak, just west of the community of Top of the World in Mason's Valley. From its origin, Queen Creek flows south to Oak Flats where it turns abruptly west and drops swiftly through the steep and rugged Queen Creek Canyon to the town of Superior, at 2,830 ft amsl.

This segment runs for about 8 miles (12.8 km). The ground surface in the area is largely exposed, rugged granitic to dacite bedrock cut by narrow stream channels between rocky outcrops with little flat ground. Soils are generally poorly developed and sandy providing little arable land. Mason's Valley has some of the only arable land in this area.

This reach extends from the Transition Zone to the Basin and Range physiographic province (Chronic 1983). The upper reach of Queen Creek is located in the Upper Sonoran chaparral biotic community (Turner and Brown 1994) with a narrow riparian corridor in the bottom of Queen Creek Canyon. This is dominated by Arizona alder (*Alnus oblongifolia*), sycamore (*Platanus wrightii*) and velvet ash (*Fraxinus velutina*). Upland vegetation is dominated by Sonoran Uplands Chaparral community which includes scrub live-oak (*Quercus turbinella*), point leaf manzanita (*Arctostaphylos pringlei*), hop bush (*Dodonaea viscosa*), birch leaf mountain mahogany (*Cercocarpus betuloides*), jojoba (*Simmondsia chinensis*). Succulent species include prickly pear and cholla (*Opuntia* spp.), saguaro (*Carnegiea gigantea*), and agave (*Agave* spp.).



**Table 1. Queen Creek Reaches and Resources Available to Prehistoric Peoples**

Reach No.	Reach Description	Resource Base
1	Fortuna Peak to Town of Superior	Limited agricultural potential Access to upland resources including large game
2	Town of Superior to Queen Valley	Abundant dry land agricultural potential Moderate irrigation agriculture potential Easy access to upland resources Superior obsidian source
3	Queen Valley to the Delta	Abundant dry land agricultural potential Moderate irrigation agriculture potential Easy access to upland resources
4	The Delta to Lone Butte Wash	Extensive mesic landscape, abundant water High agricultural potential from near surface waters, wetlands and low velocity flooding
5	Lone Butte Wash to Gila Crossing	Extensive grasslands used for basket and seeds Extensive mesquite bosques: beans and wood

### Reach 2: Town of Superior to Queen Valley

Reach 2 begins at the lower end of Queen Creek Canyon in the town of Superior. The Creek runs west through Queen Creek Valley, a small basin at the eastern edge of the Basin and Range physiographic province. Picketpost Mountain, just west of Superior is formed of Tertiary volcanic rocks containing deposits of perlite with embedded obsidian nodules known as Apache tears or merikanites. This reach drops from 2,830 ft amsl, to 2,140 ft amsl at Whitlow Dam. After the dam the stream channel runs generally southwest through rapidly declining hills and the widening Queen Valley, at the end of which Queen Creek flows out onto a wide bajada, just east of where the channel crosses highway US 60 at 1,890 ft amsl. This segment runs for about 14.25 miles (23 km). Along this reach the floodplain has irrigable surfaces suitable for agriculture and the surrounding hills provide gentle slopes and well-developed soils amenable to dry-land agriculture (Wegener and Ciolek-Torello 2011; Wood 1979). Recovery of pollen from mesic obligate species from prehistoric contexts along this reach of Queen Creek indicates that the streamflow was permanent during most years, possibly retreating to pools during the summers of the driest years (Smith 2010).

Reach 2 bridges the transition from the Chaparral ecological zone to the Upper Sonoran Desert biome. The hills are dominated by palo verde (*Parkinsonia microphylla*), jojoba, catclaw acacia (*Acacia greggii*), and bursage (*Ambrosia deltoidea*). The drainages are lined with various leguminous trees and shrubs including mesquite (*Prosopis velutina*), palo verde (*P. microphylla* and *P. floridum*), ironwood (*Olneya tesota*), and shrubs including wolfberry (*Lycium pallidum*) and desert

hackberry (*Celtis reticulata*). A variety of cacti are also present in the area including buckhorn and chain-fruit cholla, prickly pear, and hedgehog cactus (*Echinocereus engelmanni*), and saguaro.

### Reach 3: Queen Valley to the Delta

As Queen Creek leaves the hills it flows through a moderately entrenched channel that widens and becomes shallow as it progresses over the bajada surface; this is the longest reach, flowing 23 miles (37 km) from the hills to the Delta, dropping from 1,890 to about 1,400 ft amsl. Queen Creek flows southwest until the northeast sloping bajada of the Santan Mountains forces the flow west, then northwest. Queen Creek flows in a single channel until just east of the alignment of the Southern Pacific Railroad where the waters of Queen Creek are slowed, and the channel diverges (today it is channelized) into a dendritic pattern of smaller channels (USGS 1907 Sacaton quadrangle). The behavior of the flow at the western end of this reach is characteristic of discontinuous ephemeral streams, a type of fluvial system defined by alternating reaches of entrenchment and aggradation. The inflection points between aggradation and entrenchment shift up- and down-stream based on variations in the discharge and sediment load (Bull 1997). At the end of this reach the slowing waters deposit much of the sediments carried down from the highlands, thus building an alluvial fan and causing periodic lateral shifts in channel and flow alignments (Graf 1987:291; Huckleberry 1993a, 1993b).

The area is within the Lower Colorado River Valley of the Sonoran Desertscrub biome. The native vegetation in the area is composed principally of creosote (*Larrea tridentata*), bursage and ocotillo (*Fouquieria splendens*).



YEAR	PERIOD		PHASE	
A.D. 1900	HISTORIC	Late	American Era	Blackwater
A.D. 1800		Early	Hispanic Era	
A.D. 1700	PROTOHISTORIC		--	Bachi
A.D. 1600				
A.D. 1500	Boundary not well defined			
A.D. 1400	POST-CLASSIC		Polvorón	
A.D. 1300	CLASSIC		Civano	
A.D. 1200			Soho	
A.D. 1100	SEDENTARY		Sacaton	
A.D. 1000				
A.D. 900	COLONIAL		Santa Cruz	
A.D. 800			Gila Butte	
A.D. 700	PIONEER		Snaketown	
A.D. 600			Estrella/Sweetwater	
A.D. 500	EARLY CERAMIC		Vahki	
A.D. 400			Red Mountain	
A.D. 300				
A.D. 200				
A.D. 100				
	Undefined Boundary			
100 B.C.	ARCHAIC	Early Agricultural	--	
500 B.C.		Late Archaic		
1000 B.C.			--	
2000 B.C.		Middle		
3000 B.C.			--	
5000 B.C.		Late		
7000 B.C.	PALEO-INDIAN		--	
9000 B.C.				
10,000 B.C.				

**Figure 3. Chronological periods and phases of Queen Creek (adapted from Rodrigues and Landreth 2014 and Deaver 2015).**

dens) on the flats between drainages. The more mesic drainages host a variety of species including mesquite, palo verde, ironwood, wolfberry, and desert hackberry. A variety of cacti are also present in the area including cholla, barrel cactus (*Ferocactus wislizenii*), and saguaro (Turner and Brown 1994:180–221).

#### Reach 4: Through the Delta to Lone Butte Wash

The transition between Reaches 3 and 4 shifted up- and down-stream over time. Geologically, the transition can be considered to be the point where confined flow became unconfined, diverging into a dendritic pattern of smaller channels and sheetflow. This reach is about 12.5 miles (20.1 km) long, dropping from around 1340 ft amsl to 1150 ft amsl. Linear deposits of sand and gravels in the Chandler area (Hoyos-Patino 1985; Huckleberry 1992) indicate that during the Pleistocene Queen Creek was likely a single channel that connected all the way to the Gila River, but since the beginning of the Holocene, Queen Creek has formed an alluvial fan system (Huckleberry 1993a:10).

The Queen Creek Delta is formed of more than just the sediments of Queen Creek. It is a complex of merging bajadas originating from several sediment and water sources. The northern bajada of the Santan Mountains forced the waters of Queen Creek to flow to the northwest, toward Phoenix-Mesa Gateway Airport, where the Queen Creek fan merges with bajadas off the Santan, Usury, Goldfield and Superstition mountains. Waters from Siphon Draw and Weekes Wash, which drain the west and north faces of the Superstition Mountains and southern slopes of the Goldfield Mountains, flow into the Delta area north of the Phoenix-Mesa Gateway Airport; Queen Creek and Sonoqui Wash converge just to the south. The drainage basin of Queen Creek above the Delta encompasses 191 square miles (497 km<sup>2</sup>) (Huckleberry 1993a; Turner and Halpenny 1952). The watershed off of the Usury, Goldfield and Superstition Mountains includes 247 square miles (640 km<sup>2</sup>), effectively doubling the size of the entire Queen Creek catchment at the Delta. These topographic and hydrologic conditions funneled sediments and waters from north, south and east onto a broad area where the waters slowed and deposited sediments in the vicinity of Chandler, Gilbert, and the Phoenix-Mesa Gateway Airport. The convergence of these waters formed a complex of bosques and grasslands (Figure 4).

Archaeologically recovered pollen from numerous mesic species including cottonwood (*Populus* sp.), willow (*Salix* sp.), desert willow (*Chilopsis linearis*), arrowweed (*Pluchea sericea*), peppergrass (*Lepidium* sp.), Sacaton grass (*Sporobolus* sp.), Arizona cottontop (*Trichachne* sp.), and tanglehead (*Heteropogon* sp.) indicate that the Delta maintained a relatively wet environment (Fish 1984:40–41; Miksicek 1984). The presence of sedge (*Cyperaceous* sp.) and particularly cattail (*Typha* sp.) (Fish 1984:40–41; Miksicek 1984), a mesic obligate, argue for the presence of permanent slow-moving or standing water. Sonoran mud turtle (*Kinosternon arizonense*) and duck (*Anas* sp.) remains recovered from the Siphon Draw site further indicate locally mesic conditions (Szuter 1984:87). What is not known at this time is whether these mesic conditions were due to anthropogenic waters such as reservoirs, or naturally occurring surface waters and reservoirs. Regardless, the Delta environs provided sufficient water to support both the human population and a host of mesic species.

Portions of the central and eastern Delta remained active as depositional locations during the Hohokam occupation and into the mid-1900s (Leonard et al. 2007).

Based on stability of the settlement patterns in the Delta the northern and southern margins of the Delta appear to have remained relatively stable from the Sedentary period through the Classic period (Crown 1984). While there may have been periodic flooding, it clearly was not sufficient to force changes in settlement location.

Within the Delta much of the water seeped into the ground and moved as sub-surface water to the west, re-emerging in an area of bosques, springs and seeps near the now abandoned Memorial Air Park and seeps and sloughs further west toward Gila Crossing (Lee 1904). Notably, geological maps prepared by the Arizona Geological Survey (Huckleberry 1992; Spencer et al. 1996) and soil maps provided by the Natural Resources Conservation Service web site (United States Department of Agriculture, Natural Resources Conservation Service 2018), show aligned and virtually contiguous bands of Holocene fluvial deposits (Torrifluvent soils) across this area, indicating fluvial continuity between Reaches 4 and 5. Another component of the northern part of this reach was a large area periodically covered by flood waters. Lee described these floods as

...large enough and lasting enough to reach the Gila pass over this last 15 miles as sheet washes.

These washes are said to vary from a few inches to 2 feet in depth and the water is so loaded with silt and floating vegetation that it works its way slowly over the plain without excavating channels even where the slope is comparatively steep [Lee 1905:105].

Historically, larger floods up to a mile wide periodically inundated Gilbert and Chandler (Figure 5) and surrounding farm fields (Lee 1905). Davis (1897) noted that in the late 1800's the largest Queen Creek floods resulted in broad areas of sheetwash covering modern day urban areas of Higley, Gilbert, and Chandler, and that this water would eventually reach the Gila River (Huckleberry 1993a:10). This formed a floodplain that was an extensive, generally flat area curving north and then west into what is today the northern channel of Lone Butte Wash (DeJong 2001:10-11; Rodrigues et al., this issue). The floodplain created extensive grasslands that were grazed historically and utilized for grass-seed harvesting during the Archaic and possibly subsequent times (Rodrigues et al., this issue). Rea (1997:40) quotes Sylvester Matthias (of the O'Odham community): "Up there where Chandler is—they call it Toota Muḍadkam. It's the name for a grass and the name for place, now [called] Chandler...[It] likes moisture, lots of moisture.

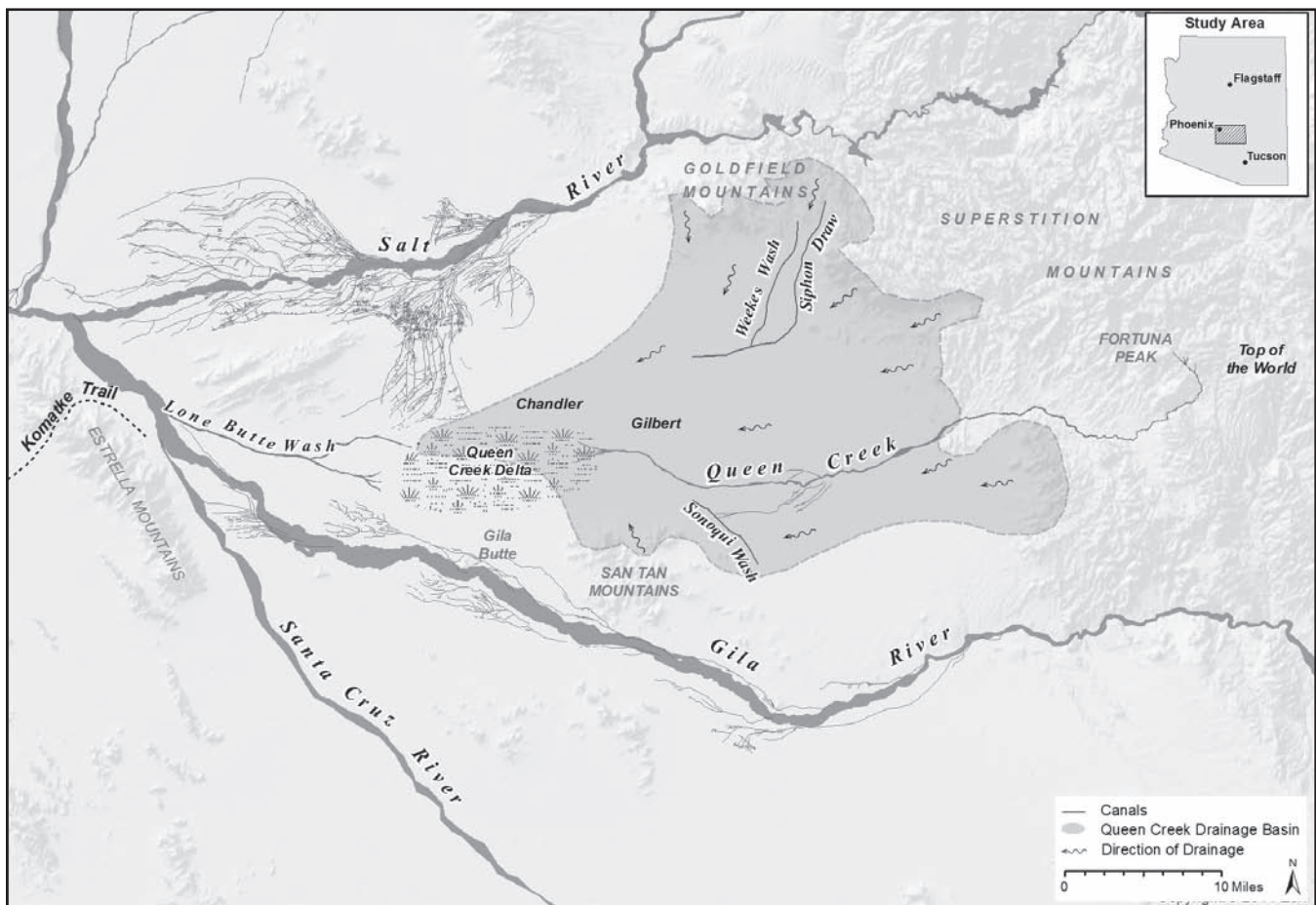


Figure 4. Water flow pattern of the Queen Creek basin converging on the Queen Creek Delta.



**Figure 5. Flooding in the town of Gilbert, Arizona in the 1930s. (Photo courtesy of HD South [Formerly Gilbert Historical Society])**

Where Chandler is now—Queen Creek [used to] flood all that area.”

It must be noted that there is some discrepancy in the descriptions of the trajectory of flood waters emerging out of the Delta. This is likely partially due to the fact that, as noted above, these floods did not scour a channel, thus leaving no clear visual path. Huckleberry (1993a:10) indicates that floods from Queen Creek turned south and entered the Gila just west of Sacaton; this is also depicted in maps of the area (e.g., Dart 1989:15 Figure 8). However, if one follows the path indicated on Dart’s map and Huckleberry’s description, there is no way for the waters on that course to have flooded Chandler. Topographically, if waters were flowing from east to west through Gilbert or Chandler, then they have to flow into the northern branch of Lone Butte Wash (Figure 6), not south to the Gila from Chandler—so, why the discrepancies? We offer two suggestions. One, that the floods originating from Weekes Wash and Siphon Draw were responsible for flooding through Gilbert and Chandler, while floods from Queen Creek turned south as described by Dart and Huckleberry. Or two, that floods from both or either rapidly shifted channels due to alluviation of the Delta altering the water flow into one or the other of the trajectories. It must be noted, however, that soil maps of the area do not indicate any fluvial deposits connecting Queen Creek to the Gila Butte area west of Sacaton (Huckleberry 1992; Spencer et al. 1996; United States Department of Agriculture, Natural Resources Conservation Service 2018) thus supporting the idea that Queen Creek waters traveled through the Lone Butte drainage until modern flood control measures were emplaced in the 1960s and 1970s to divert these floodwaters into the Gila east

of Gila Butte (Books and Vivian 1978: Figure 2c).

This reach is within the same biome as Reach 3; however, the complex of shallow groundwater, bosques and grasslands would have created a richer and more diverse resource base on this reach than that in reach 3. As noted above, archaeological pollen studies in the area indicate the presence of a diverse mesic plant community dependent upon permanent slow moving or still surface waters.

### **Reach 5: Lone Butte Wash to Gila Crossing**

The fifth and final reach of the Queen Creek drainage is today known as Lone Butte Wash, a name change that presumably occurred sometime after flood control channels were emplaced to divert floodwaters into the Gila River. Prior to these flood control measures the larger floods coalesced into the north channel of eastern Lone Butte Wash and continued on to Gila Crossing to merge with the Gila River. Holocene deposits have been mapped along the entire reach (Waters and Raveslout 2000:51, Figure 2) indicating sufficient flow and deposition occurred over time to build up recognizable alluvium. Because Queen Creek is a discontinuous ephemeral stream and the Delta breaks the continuity of flow, there is not a continuous channel linking the rest of Queen Creek to Reach 5. As noted by Lee (1905), the floods flowed slowly through the Delta and did not scour a channel. This reach drops in elevation from 1150 to 1000 at the confluence with the Gila, flowing over a distance of 17.5 miles (28.2 km) through a one-mile wide (1.6-km) valley, defined on the north by the base of South Mountain and on the south by a low ridge roughly parallel to Beltline Road.

The eastern portion of Lone Butte Wash is defined by small dendritic water courses coalescing into two primary channels. The northern channel received floodwaters from Queen Creek, Siphon Draw, and Weekes Wash, which periodically soaked the area resulting in wide grasslands (DeJong 2001:10-11; Rea 1997:40). The southern channel was fed by subsurface waters re-emerging as seeps and springs west of the Queen Creek Delta. The north and south channels merge at Lone Butte (hence the modern name of this reach), into a single channel, which follows a relatively straight west-northwest course to the confluence with the Gila River. While most of this section likely only carried water during floods, subsurface water was not far below the surface and supported large mesquite bosques. The shal-



low waters emerged as a large spring a mile and a half east of Gila Crossing (Lee 1904; Spier 1933:350-351).

Reach 5 vegetation is typical of the Lower Colorado River Valley subdivision of the Sonoran Desert Scrub biotic community (Brown and Lowe 1980, 1994). The prehistoric landscape would have been a semi-mesic mesquite forest and grassland. Mesquite likely dominated the woodland interspersed with large grasses such as Sacaton, Arizona cottontop, and tanglehead and numerous smaller seed-bearing grasses. Human activities including grazing, water-flow alterations and wood gathering during the Historic period have substantially altered the modern biotic communities (Darling 2011; Rice et al. 1983).

## CULTURAL HISTORY

### Reach 1: Fortuna Peak to Town of Superior

Few sites have been recorded in this mostly un-surveyed, rough and rocky upland landscape. The few small Preclassic Hohokam and Classic period Tonto Basin affiliated sites that have been recorded here primarily reflect resource gathering activities. Oak Flats is one of the few areas of flat terrain though it has poor, thin soil and there is little arable land. A second area of flat land, which does contain arable lands with well-developed soils, is found near the modern hamlet of Top of the World, located in Mason's Valley just east of the headwaters of Queen Creek. This valley also contains several small Preclassic Hohokam sites (Wood 2000; 2016), and the large, 100+ room, mid to late Classic period, Tonto

Basin affiliated village of Togetzoge (Hohmann and Kelley 1988; Schmidt 1926). Available water and good soils suggest that this valley was attractive due its agricultural potential as well as its strategic location on a convenient travel route between the Tonto Basin, Globe Highlands and the Phoenix Basin.

It appears that during the late Hohokam Pioneer period (AD 650 to 750), upper Queen Creek was utilized for seasonal resource gathering rather than settled farmsteads. During the Colonial and Sedentary periods small settlements were established in Mason's Valley, though this reach continued to be sparsely occupied despite the fact that other areas of the Globe Highlands were settled by farmers during this time (Doyel 1978; Doyel and Pinter 2006; Wood 2016). It is possible that the Hohokam seasonal resource gatherers maintained ties west along Queen Creek to the larger Hohokam sites on the Queen Creek Delta (Wood 1979, 2016), perhaps directly or through trade at the ballcourt site of Los Montículos located on Queen Creek at the east end of Reach 3. The interpretation of ballcourts as trade centers (Abbott, Smith, and Gallaga 2007) suggests that this ballcourt may have served as a link between the valley sites and upland sites along the eastern reaches of Queen Creek. During the Preclassic period, settlements in the highlands tended to concentrate along riverine corridors and alluvial floodplains reflecting their focus on an agrarian life way (Deaver 2012). During the early Classic period people participating in the Hohokam cultural tradition moved out of Reaches 1 and 2, perhaps into the Queen Creek Delta. The upper watershed appears to have been mostly devoid of any permanent settlements for the period between AD 1150 and the late AD 1200s (Wood 2016).

Around AD 1275 Tonto Basin affiliated peoples moved into the upper reaches of Queen Creek, establishing the large village of Togetzoge in Mason's Valley (Wood 1979; 2016). This location provided access from the Globe Highlands to the lower deserts and trade with the Hohokam living in the Phoenix Basin along Queen Creek. Togetzoge was settled during a time when people in the Tonto Basin were engaged in major construction of settlements that included large platform mounds. Togetzoge may have served as a center for the smaller Tonto affiliated sites in the area, including the Church site at the base of Queen Creek Canyon and the Horrell Ranch Site along Pinto Creek (Wood 2016) as

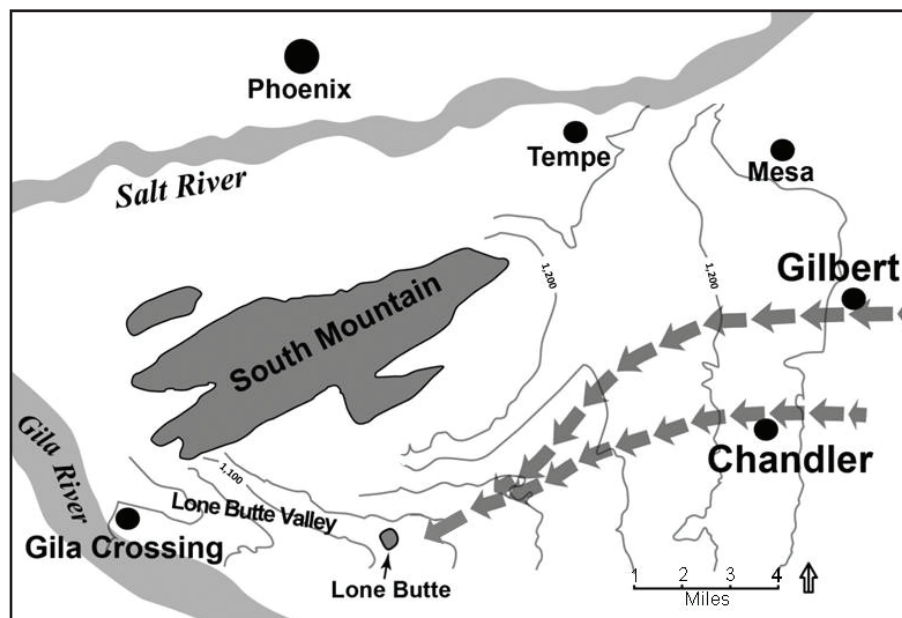


Figure 6. Paths of historic Queen Creek floods. Thin lines represent 25 foot contour intervals. Gray arrows depict trajectory of larger floods through Gilbert and Chandler. These floods entered the wide shallow valley of Lone Butte Wash and flowed into the Gila River near the village of Gila Crossing. Topographic lines based on USGS Topography maps: Phoenix, 1914 and Mesa 1915.

well as numerous smaller settlements along many of the larger waterways (Hohmann and Kelley 1988; Wood 1979). Togetzoge was occupied until around AD 1390 (Wood 2000). During the early Historic period Yavapai and Apache People moved into this portion of central Arizona (Ciolek-Torrello et al. 2005; Russell 2002). Oak Flats became and remains a Traditional Cultural Property to the Apache peoples (Welch 2017).

### **Reach 2: Town of Superior to Queen Valley**

Archaeological investigations have recorded a fairly dense concentration of sites along Queen Creek and the larger tributaries on this reach. It appears that this reach, along with Reach 1, was occupied by a small number of Hohokam farmers during the Sedentary period (Ciolek-Torrello and Wegener 2011; Wood 2016). This occupation appears to have been primarily in the form of small single-family homesteads rather than villages. The area appears to have been largely abandoned by AD 1150 (Wood 2016). Sometime around AD 1200 to 1250 a larger number of small villages and homesteads with accompanying dryland agricultural fields were established by Classic period Tonto Basin affiliated people who moved into the Queen Creek Valley from the Globe Highlands to the east (Garraty et al. 2011; Wegener et al. 2010; Wood 1979, 2016). These settlements remained occupied until sometime around AD 1400. One of the larger Tonto Basin affiliated villages (AZ U:12:56[ASM]) along Queen Creek was located on what is today the western edge of the town of Superior overlooking a wide, flat, floodplain where three smaller drainages join Queen Creek, and provide ideal agricultural conditions (Bruder and Fenicle 2014; Stokes et al. 2002). Numerous other small Classic period settlements have been recorded on the hills overlooking Queen Creek (Wood 1979).

Of particular note in this reach is the Superior obsidian source; it produced Apache tears, or merikanites. This readily identifiable material was traded extensively throughout southern Arizona, thus providing critical information pertaining to socioeconomic relationships through time (Ballenger 2016; Bayman and Shackley 1999; Rice et al. 1998:117-123; Shackley 1988; 1995; 2005). Stone from the Superior source was the most common type of obsidian used during the Preclassic period within the Hohokam core area; however, use of this material declined over time, and "Superior obsidian nearly disappears in the Classic period Hohokam sites in the Phoenix Basin", while the use of Sauceda obsidian increased (Shackley 2005:157). It is notable that during the late Historical period the Akimel O'Odham were using primarily Sauceda sourced obsidian (Loendorf 2012:113-114; Loendorf et al. 2013:278-279). Further evidence for trade from the east along Queen Creek was recovered in the form of schist nodules found at Gila Crossing, which were sourced to an outcropping on the Pinal Mountains above Globe (Eiselt et al. 2015:60).

Trails linking Gila Crossing and the Globe area would have most likely utilized the Queen Creek corridor.

While Spanish explorers first entered the larger region in the mid-1500s, Euroamericans did not settle in the drainage until the mid-1800s (Deaver 2012; Stone 1977), largely due to the presence of Apache peoples who kept settlers out until the 1870s. Silver deposits at the upper end of this reach near the town of Superior drew American prospectors who initiated mining operations in the area (Deaver 2012). The now abandoned town of Pinal was built on the banks of Queen Creek and the settlement later moved to the current site of the town of Superior (Deaver 2012). Mining and ranching were prevalent economic activities in the area during the late historical period and remain so today.

### **Reach 3: Queen Valley to the Delta**

The limited archaeological survey data available for Reach 3 indicates that habitation sites are present at the eastern and western ends of the reach; in the area between only a few artifact scatters have been recorded (AZSITE: Arizona's Cultural Resource Inventory, Accessed March 2016). Significantly, the relatively large ballcourt site of Los Montículos is located at the eastern end of this reach (Wilcox and Sternberg 1983), just as Queen Creek emerges from the hill country. This suggests a trade center for goods arriving in the valley from the highlands and for products leaving the valley for the highlands.

The long-term use of this reach is attested to by the presence of sites such as Finch Camp, a multicomponent site containing features dating from the Early Agricultural period through the Classic period (Wegener and Ciolek-Torrello 2011). Notably, some of the earliest utilitarian ceramics yet documented from the American Southwest were recovered from the Finch Camp Site (Garraty 2011). The Finch Camp Site is also notable for having an early reservoir feature dated to the pre-Hohokam Red Mountain phase (AD 1 to 400). Dates recovered from this feature suggest that it may have been used for over 200 years, indicating a stable population utilizing the upper portion of this reach for centuries (Wegener et al. 2010). This feature also establishes the use of reservoirs at an early time on Queen Creek, a type of water capture and storage facility that continued to be used on Queen Creek through the Classic period (Chenault, this issue; Leonard et al. 2007). Employing water storage technology such as reservoirs was clearly an advantage; it has been noted that reservoir technology often accompanied and likely assisted the colonization of new areas away from perennial rivers (Bayman 1992; Crown 1987).

Near the west end of this reach Queen Creek clearly had frequent enough and sufficient flow to support five relatively large water catchment systems that employed canal features which fed the villages of Frog Town, El Polvorón and smaller surrounding sites (Sires 1984). Due

to the fluctuating nature of the water flow in this reach of Queen Creek, these canals are more accurately considered to be a large water-harvesting system (Doolittle 2000:332-335). These were the only villages on Queen Creek to use larger canals. For instance, Frog Town is about a mile south of Queen Creek and was at least partially dependent upon canal water (Sires 1984). The cluster of sites fed by these canals became established in the Santa Cruz phase (AD 850 to 950) and reached their maximum extent during the Sacaton phase (AD 950 to 1150). Most of the sites in the Frog Town group were largely abandoned by the early Soho phase (~AD 1200) (Sires 1984). El Polvorón was the only canal-fed site on Queen Creek to persist into the late to post Classic (Sires 1984). Other sites on the Delta with late dates relied more heavily on water storage, and the mesic conditions of the Delta, rather than canal-delivered water (Chenault 2015; Greenwald et al. 1994; Neily and Cogswell 2007; Crown 1984). Interestingly, researchers working in other non-riverine Hohokam settlements have also noted the presence of small Hohokam populations persisting into the late Classic. Ciolek-Torrello and Wilcox (1988) noted that at the end of the Classic period, during the Polvorón phase, the Picacho Mountains may have become a region of refuge for Hohokam populations.

#### **Reach 4: The Queen Creek Delta to Lone Butte Wash**

The Queen Creek Delta was a broad, flat, resource rich, mesic area situated in an otherwise relatively dry portion of the Phoenix Basin. The eastern end of the Delta was the most mesic, encompassing the area where the waters and alluvium of Queen Creek merged with flows from the north. The eastern end of the Delta has some of the largest sites on the Queen Creek drainage. Hohokam settlements on the eastern Delta began in the late Pioneer to early Colonial periods, and by the Sedentary period large villages were well established (Chenault 2015, this issue; Deaver and Altschul 1994:130; Gasser et al. 1984:17; Leonard et al. 2007). Most of these villages persisted into the Classic period (Crown 1984) although with significantly reduced populations (Leonard et al. 2007).

While numerous small sites (primarily artifact scatters) are distributed over the eastern Delta, the village sites cluster in three areas on the more stable margins of the Delta (Leonard et al. 2007; Crown 1984:9-15). Two site clusters are on the north side of the Delta; the western cluster includes the Midvale site, the Northeast and Southwest Germann sites, and the eastern cluster includes the Germann's Bowl Site, Sand Dune Ruin and the Massera site. The sites of the northern clusters cover extensive areas with the easternmost consisting of a number of large sites spread across several square miles; while the western cluster is a relatively contiguous assemblage of large and small habitation sites cov-

ering an area of over twelve square miles (Leonard et al. 2007:9). The Southwest Germann site and the Midvale site extend south onto the more geologically active portions of the Queen Creek Delta (Leonard et al. 2007). A number of other sites to the north of these two (e.g., AZ U:10:61(ASM), AZ U:10:62(ASM), AZ U:10:65(ASM), AZ U:10:66(ASM), and AZ U:10:69(ASM) [Williams Gateway Airport Authority 2001, Figure 1]) are situated on less active surfaces. The southern site cluster includes Sonoqui Ruin and surrounding smaller sites covered an area roughly two miles long east to west by a mile wide (Leonard et al. 2007:8; Chenault, this issue). This site distribution and constancy of general site location through time is graphically depicted in illustrations of Delta settlements in Crown (1984:9-13, Figures 2-5).

Site structure within the more alluvially active areas of the Delta (e.g., the southern portion of the Southwest Germann site [Leonard et al. 2007] and in the Midvale Site [Gasser et al. 1984]) have a more sparse distribution of features with evidence of depositional episodes occurring during occupation. Leonard et al. (2007) report finding houses vertically separated by strata of alluvium. This finding suggests that despite the potential danger of losing one's house to flooding, some Hohokam people felt the risk was worth building homes in the area atop the newly deposited alluvium. Leonard et al. (2007) point out that the location of the larger sites along the edge of the Delta situated them close to large tracts of arable land with a high water table but on more stable ground.

The larger Delta sites included public architecture such as ballcourts and mounds as well as associated water control features including reservoirs and small canals (Chenault 2015, this issue; Ciolek-Torrello and Wegener 2011:29; Gasser 1984; Leonard et al. 2007; Turney 1929; Wilcox and Sternberg 1983). Studies of ballcourt interaction spheres, and the presence of ballcourts in the Delta, suggest close connections of trade and social interactions with communities to the north and south on the Salt and Gila Rivers (Abbott, Smith, and Gallaga 2007; Lack et al. 2012). Numerous trails extend north and south from the Delta (Darling and Lewis 2007; Ossa and Gregory, this issue; Rodrigues and McCool 2011) and ballcourt sites to the east and west along Queen Creek (Los Montículos and Gila Crossing respectively) suggest that the Delta sites were situated to serve as a trade center for goods moving in all four directions. Recent research on ceramics of the Queen Creek Delta indicate that the Delta was a production center of Red-on-buff wares that were traded north to the Salt River and likely south to the Gila River (Abbott, Watts, and Lack 2007; Lack et al. 2012).

Unlike many canal-dependent Phoenix Basin Hohokam settlements, occupants of the Delta did not rely on canal irrigation. Doolittle (2000:334) posits that the Queen Creek water flow was too low and infrequent to support canals other than for periodic water harvesting.



Instead, Delta residents utilized a variety of other strategies that included Ak-chin, floodwater, limited canal use, and reservoir water capture and storage (Chenault 2015, this issue; Leonard et al. 2007; Turney 1929). It appears that the naturally high water table of the area in combination with possible natural springs and charcos, constructed reservoirs and other hydro-engineering provided sufficient water for a relatively large population to thrive in the Delta for centuries, similar to other non-riverine settlements that surround the Phoenix Basin. As Bayman (1992) pointed out, in many ways Hohokam communities supported by reservoirs were critical for the survival of the riverine Hohokam settlements and the Hohokam culture as a whole.

Alternative water management strategies would have been necessary to maintain large settlements that did not have access to reliable water from river-fed canal irrigation. As noted above, the water from Weekes Wash and Siphon Draw merged with the flow of Queen Creek on the Delta, creating an area of rich soils over a shallow water table. This setting provided abundant water and other resources for people living in the villages located at the east end of the Delta. For example, the three Germann Sites (Southwest, Northeast, and Bowl), Rittenhouse Ruin, the Midvale Site, and Sonoqui Ruin, all maintained large reservoirs to capture surface flows for some portion of their water (Chenault 2015, this issue; Huckleberry 2015; Garraty et al. 2011). Excavations at the SW Germann site (Leonard et al. 2007) and at Pozos de Sonoqui (Chenault 2015, this issue) have shown that the Hohokam were successful in capturing non-riverine waters and storing water year round in reservoirs, further enhancing their ability to adapt to variability in water source and availability. These large villages were able to persist from the late Colonial through the Classic periods, with some enduring into the post Classic (Deaver and Altschul 1994; Garraty et al. 2011; Gasser et al. 1984; Teague and Crown 1984:9-13). Further, the flow off of the Superstition and Goldfield mountains alone was enough to supply sufficient water to maintain smaller farmsteads in areas up the bajada slope from the larger population center on the Delta (Gregory 1984; Ossa and Gregory, this issue).

One possible advantage for populations not dependent upon lengthy canals, as most large villages in the Phoenix Basin along the Salt and Gila Rivers were, is that smaller and more local labor forces were likely sufficient to maintain water infrastructure for each village. People dependent on canals were dependent on inter-village cooperation and large labor forces (Woodson 2010). In the late Classic period as populations declined across the region, the dwindling labor pool may have posed a larger problem for settlements dependent upon canals than it did for people on the Delta and other non-riverine settlements.

The Delta not only supported a large population during the Preclassic, but also had up to four ballcourts;

Wilcox and Sternberg (1983:98) identified five, but recent excavations (Chenault 2015) revealed that one was a reservoir. However, the presence of any ballcourts indicates that the people living on the Queen Creek Delta were fully participating in the Hohokam regional social and exchange network. As noted above, research has shown that people on the Delta were producing and trading ceramics within the Phoenix basin (Abbott, Watts, and Lack 2007; Lack et al. 2012; Lack et al. 2006). This link of goods indicates that the people here were participating in the larger Hohokam ballcourt trade system. Leonard et al. (2007) noted that the population of the Delta was persistent and cohesive enough to have several recognizably Delta-specific idiosyncratic traits, such as partially flexed burials while the rest of the basin was using primarily extended supine positions for the dead.

### **Reach 5: Lone Butte Wash to Gila Crossing**

This reach is also addressed in depth by Rodrigues et al. in this issue so we will only briefly summarize their reported trends here. Assessment of temporal contexts along Lone Butte Wash indicate land use during the Archaic, Early Ceramic, Pioneer, Colonial, Sedentary, Classic, and Historic time periods (Loendorf and Rice 2004; Plumlee and Loendorf 2013; Rice 2003; Rodrigues and Landreth 2014; Rodrigues et al., this issue). Land use is predominantly represented by artifact scatters, and isolated materials (including numerous ground stone specimens), suggesting that this reach was primarily a resource gathering area. With the exception of Gila Crossing, few habitation sites are present along Lone Butte Wash until the Historic period. Over half of all Archaic sites cluster along the north branch of Lone Butte Wash, while Pioneer, Colonial, and Sedentary period sites cluster at the east end of the southern branch and extend south to Snaketown along a north to south trail connecting Snaketown to sites along the Salt River (Woodson 2010). A small number of Classic period sites and components have also been recorded. Interestingly, branches of the Salt River Canal System 1 passing by the sites of Los Muertos and Los Guanacos appear to potentially shed tail waters into the north branch. Whether these waters actually flowed into the north branch or were utilized is unknown at this time.

Gila Crossing, a ballcourt village site at the west end of Queen Creek was located at a crossroads of trails and rivers, ideally situated for trade in any direction (Rodrigues et al., this issue). While the people of Gila Crossing appear to have been most closely affiliated with other people who lived along the Gila River, they had access to goods from along Queen Creek as well. The ballcourt may have provided a trade center for goods moving along the Gila River as well as east to west along Queen Creek, such as Delta-made Red-on-buff wares (Lack et al. 2012), Superior sourced obsidian (Loendorf et al. 2013) and schist from eastern sources

(Eiselt 2015:60). Data indicate that during the Preclassic Superior sourced obsidian was common on the Middle Gila, but by the Classic period obsidian acquisition for people on the Middle Gila was primarily obtained from the Saucedo sources (Loendorf et al. 2013; Shackley 2005). Superior sourced obsidian continued to be represented in the early Classic period Gila Crossing artifact collection (Loendorf 2018).

Gila Crossing was occupied from the late Colonial into the late Classic Period (Rodrigues and Landreth 2014). Interestingly, unlike other Middle Gila villages, but like many Delta villages, no prehistoric, river-fed canal irrigation features have yet been identified at Gila Crossing, suggesting that floodwater irrigation was the primary mode of agriculture for the village. The people of Gila Crossing also had access to abundant spring water and wetlands as well as the Gila River. Lee (1904:25) notes that a spring near the village of Gila Crossing had a discharge of about 25 gallons per minute, and that this was only one of many springs and surface water sources in the vicinity.

Perhaps, similar to the Delta, the lack of a reliance on labor-intensive canal irrigation contributed to the Gila Crossing settlement persisting into the late Classic. The Pee Posh practiced almost entirely floodwater irrigation (Spier 1933), and they may have found favorable conditions at Gila Crossing.

As noted above, the Gila Crossing area maintained relatively abundant water in the Historic period (Lee 1904; 1905) even as the waters of the Gila River were appropriated by upstream users. Because of the local relative abundance of water, Gila Crossing was resettled in the late 1800s by O'Odham and Pee Posh peoples (Rodrigues et al., this issue). Gila Crossing became a relatively important social center with several churches built in the area.

## SUMMARY

This journey down Queen Creek drops 4,000 feet in elevation as it enters and crosses the Phoenix Basin. Along its course it traverses differing terrain and encompasses large resource variation. Despite its short length, Queen Creek passes through quite varied topography, with headwaters high above the Phoenix Basin in rocky highlands providing a good watershed to collect and deliver water to the Basin. On its way to the Basin, in Reach 2, the creek provided water for small farming settlements that relied primarily on dryland agriculture and the permanent waters of the creek. Leaving the hills, Queen Creek encountered the rise of the Santan Mountains. This impeded the flow of Queen Creek and concentrated the flow of runoff from the Usury, Goldfield and Superstition Mountains resulting in an intersection of bajadas, forming the resource-rich Delta, an area that supported large villages and settlements. The reemerged waters of Queen Creek at the west end of

the Delta area provided a second resource-rich, mesic location in otherwise dry grasslands between the Salt and Gila Rivers. When the waters of Queen Creek finally reached the Gila, they were largely subsurface, but emerged in a series of springs around Gila Crossing, providing a third mesic, resource-rich environment, which together with the presence of the Gila River, supported the ballcourt village of Gila Crossing.

Queen Creek was utilized by a number of different cultural groups over time. The upper reaches witnessed the greatest cultural changes, with Archaic through Preclassic Hohokam living along Reaches 1 and 2. Then, as the Preclassic Hohokam population contracted into the Phoenix Basin, people from the Tonto Basin settled reaches 1 and 2 during the Classic period. Later Apache and Yavapai peoples inhabited the upper reaches to be subsequently displaced by intrusive Euroamerican miners and ranchers. In the lower reaches, the occupation pattern closely followed that of the larger Phoenix Basin, with Preclassic ballcourts spanning the length of Queen Creek from Los Montículos on the east side of the basin, though the Delta to Gila Crossing on the west side of the basin. Ballcourts along Queen Creek may have facilitated trade in such items as Delta-produced buff wares, obsidian from Superior, and schist from the Globe Highlands as well as providing a trade center for goods moving north and south through the Delta.

Within the Queen Creek drainage the skills of the Hohokam hydro-engineers are clearly visible, including extensive dryland farming in Reach 2, construction of one of largest water harvesting systems in the southwest, and building numerous large reservoirs to hold both streamflow diverted through canals and surface flow. Portions of the area likely needed little engineering beyond a short field-ditch to move water from springs or reservoirs to fields. The diverse wild resource base and varied agricultural and irrigation strategies practiced by inhabitants of Queen Creek sites aided these desert Hohokam in ample provisioning, as has been noted by many others who have studied groups occupying smaller drainages and utilizing non-river-based canal irrigation technologies.

It is notable that several villages in the Delta persisted into the late and post Classic; this may have been possible because a population that was not dependent on canals may have been better suited to survive large demographic fluctuations. This may have been particularly true near the end of the Classic period as population, and therefore available workforce, declined along many major canal systems. The reduced workforce may have inhibited the ability of members of large villages to maintain large canals. In contrast, more easily maintained water harvesting technologies, including reservoirs, short canals, and field-ditches were utilized by occupants of the Queen Creek Delta. Floodwater irrigation was also possible on the mesic Delta. It is proposed that the resource base along Queen Creek provided the

occupants an adaptive resiliency that the canal-based Hohokam did not enjoy.

Also of interest is the fact that the grasslands on the north branch of Lone Butte Wash were heavily utilized during the Archaic and again during the Historic period when ranchers grazed their livestock there, suggesting that pastoralists and non-agricultural peoples were attracted to the abundant grasses. The east end of the south branch of Lone Butte Wash where waters reemerged from the Delta was utilized from the Archaic through the late Classic, attesting to the permanence of this water source.

This paper is intended only to be an introduction to Queen Creek and its many contributions to our knowledge of prehistory and history in the Phoenix Basin, including the presence of some of the earliest production of utilitarian ceramics in the Southwest, and some of the latest Hohokam settlements to yet be recorded. Future work may be able to address such topics as understanding how the populations of Hohokam and Tonto Basin peoples populated and depopulated the upper reaches and how trade along the creek may have been influenced by these social changes. Were the peoples of Queen Creek some of the last of the Hohokam Era populations to reside in the Phoenix Basin during the late Polvorón phase? Did the hydrology of the Delta contribute to this persistence into the late and post Classic? Three other papers in this issue by Chenault, Ossa and Gregory, and Rodriguez et al. also tackle these questions, providing some answers and raising more questions. The recent increase in archaeological work in the area is beginning to reveal that Queen Creek was a major contributor to the prehistory and history of the Phoenix Basin. Further work should help bring Queen Creek into focus.

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# HOHOKAM WATER STORAGE AND SUBSISTENCE ECONOMY IN THE QUEEN CREEK REGION

Mark L. Chenault

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## ABSTRACT

*Archaeologists studying the prehistory of the Phoenix Basin have wondered how the Hohokam who lived in areas distant from perennial rivers could have survived in the dry desert climate. Research outside the Phoenix Basin, in arid environments such as the Papagueria, has shown that the Hohokam employed water storage features such as reservoirs to provide a source of domestic-use water. In this paper, I describe recent excavations at the village site of AZ U:14:49 (ASM), also known as Pozos de Sonoqui, located in the Queen Creek "Delta." Discovery of a large, prehistoric reservoir at the site shows that the inhabitants of that part of the Phoenix Basin, located far from the steady water supplies of the Salt and Gila Rivers, used similar storage technology to provide water to the village. The finding of reservoirs and perennial villages in non-riverine locales in the region has important demographic implications, suggesting that estimates of Hohokam population size should be increased.*

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## INTRODUCTION

Researchers have long known that the massive canal systems constructed by the Hohokam in the Phoenix Basin enabled that ancient culture to conduct large-scale irrigation agriculture and survive in the desert environment. But what is less understood is how those Hohokam who resided far from the Salt and Gila Rivers could have supported village-size populations without a supply of water from the major rivers. One such Hohokam community inhabited the Queen Creek area southeast of present-day Phoenix (Figure 1) during the Hohokam pre-Classic and Classic periods. That prehistoric community included the Germann sites, Rittenhouse Ruin, and many smaller sites, including those along the Salt-Gila Aqueduct, such as Frogtown and El Polvorón. The community also included the two sites forming AZ U:14:49 (ASM), known collectively as the Sonoqui Ruin and separately as the Sonoqui Pueblo and Pozos de Sonoqui (Figure 2).

Archaeologists from Jacobs Engineering and WestLand Resources conducted data recovery excavations at the Pozos de Sonoqui locus of AZ U:14:49 (ASM) ahead of construction of a section of Riggs Road in Queen Creek, Arizona (Chenault 2017). For simplicity in this article the locus is referred to as Site 49. The only remaining, largely intact portion of the village of the Pozos de Sonoqui locus of Site 49 is a swath running east-west through the northern half of the site. That transect includes the proposed alignment for the new section of Riggs Road, and this area therefore includes significant data regarding prehistoric subsistence and water control in the Queen Creek area.

During the data recovery effort within the project corridor, and while searching for a ball court noted by early visitors to the site, we discovered one piece of the water-source puzzle in the form of a large prehistoric reservoir. That reservoir could have provided drinking and domestic-use water, and perhaps some irrigation water, to the inhabitants of the village. Water storage, along with a system of small, opportunistic canals associated with seasonal flow, would have been combined with check dams and other water-control features to harvest runoff from the composite of channel fans forming the lower reach of Queen Creek (Huckleberry 2017:509-510).

The reservoir at Site 49 measured 38 m x 25 m (124 ft. x 82 ft.), with an irregular shape (Figure 3). A backhoe excavation near the center of the feature revealed it to be very deep, approximately 7.5 m (24.6 ft.) from the modern ground surface to the base (Figure 4), making it one of the deepest prehistoric reservoirs recorded, deeper than one documented by Dart (1983) that was 6.1 m (20 ft.) deep. It should be noted, however, that other deep reservoirs existed; Raab (1975), for example, stopped looking for the base of the reservoir at Santa Rosa Wash at a depth of 3.8 m (12.5 ft.) because of safe-

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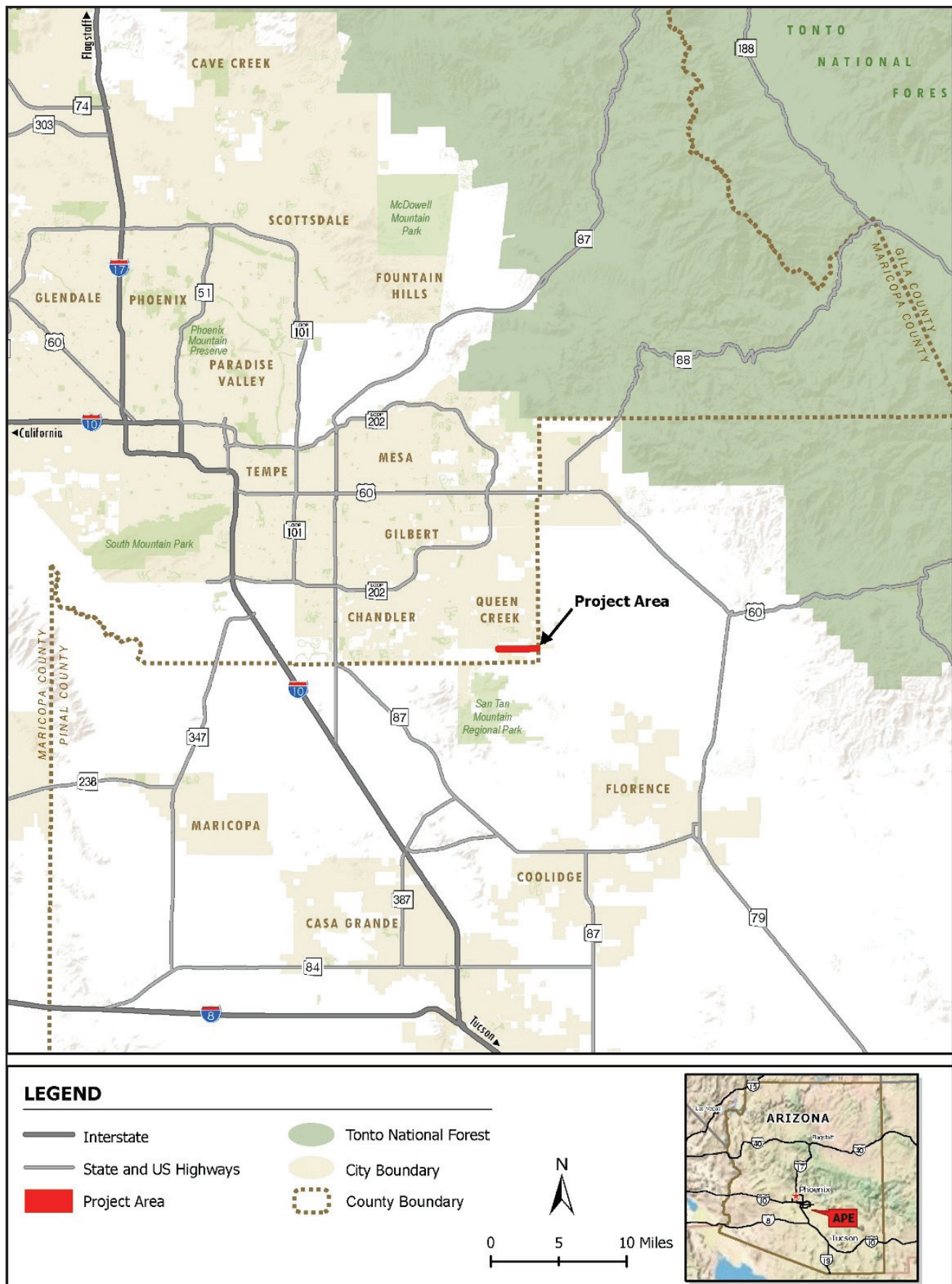


Figure 1. Vicinity map showing the location of the Riggs Road project area.

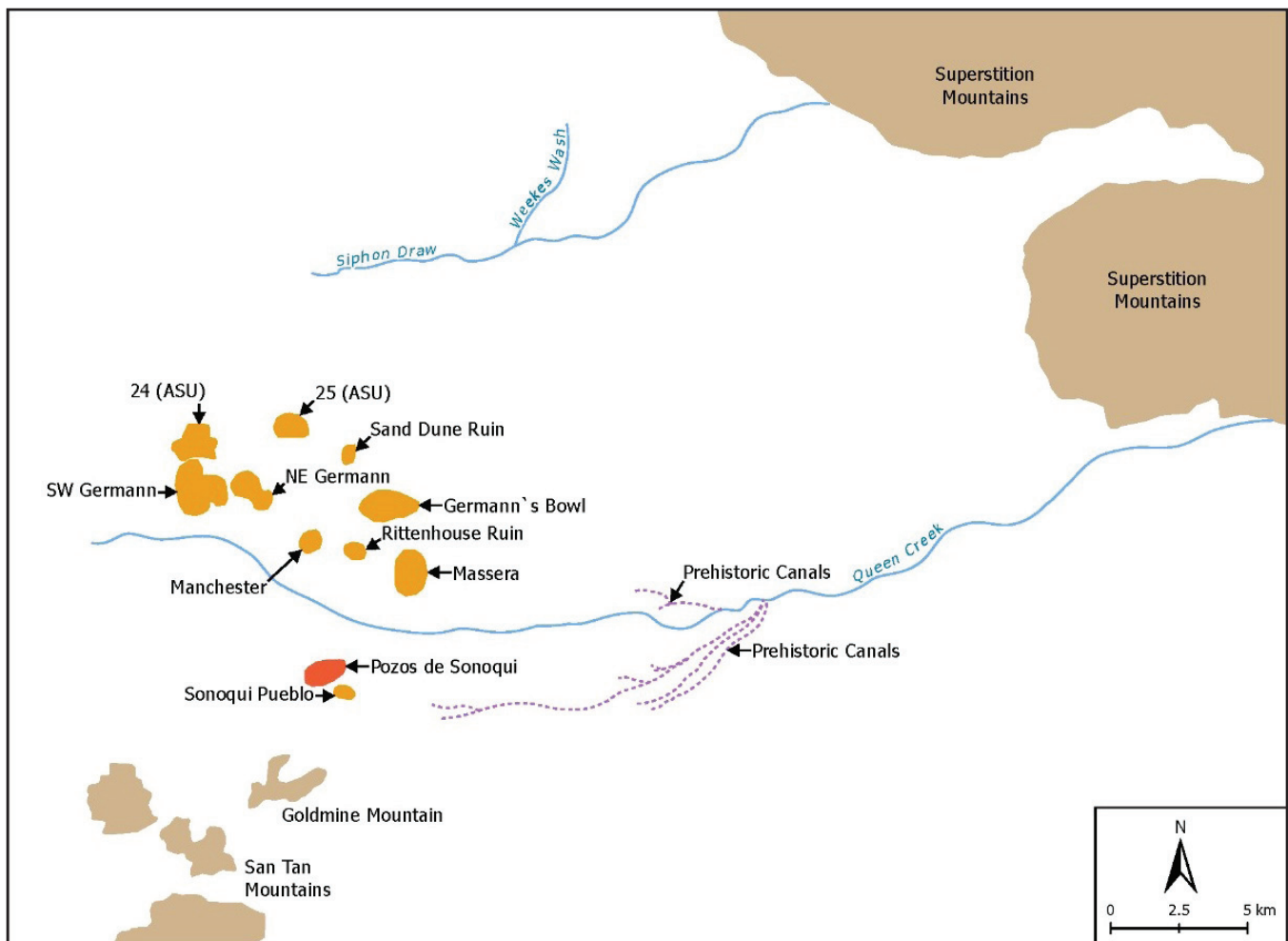


Figure 2. Queen Creek area sites including Pozos de Sonoqui and Sonoqui Pueblo comprising Site AZ U:14:49 (ASM).

ty concerns. Other Hohokam reservoirs with depths of 4 to 5 m (13.1 to 16.4 ft.) or more have been reported (Bayman et al. 2004).

The Site 49 reservoir was situated within a cluster of Gila Butte phase pithouses and a single Snaketown phase house (Figure 5). The reservoir extended outside

the project right-of-way to the south. We received permission from Maricopa County Department of Transportation (MCDOT) at the end of the field project to investigate the large feature. Limited time precluded extensive excavation of the reservoir, and its extreme depth created a safety hazard that prevented us from

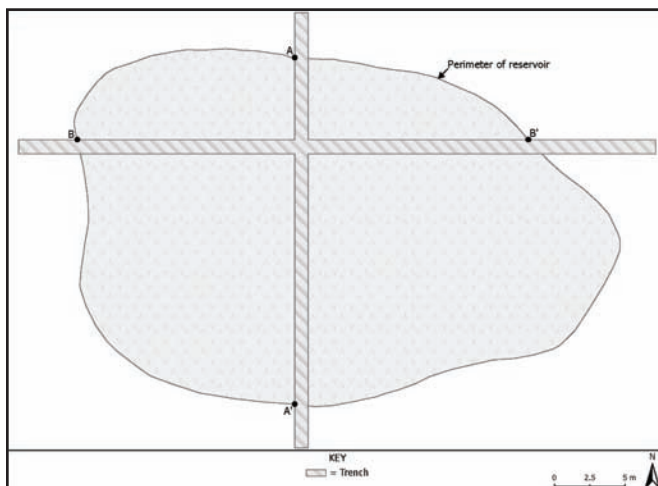


Figure 3. Plan map of the reservoir at AZ U:14:49 (ASM).

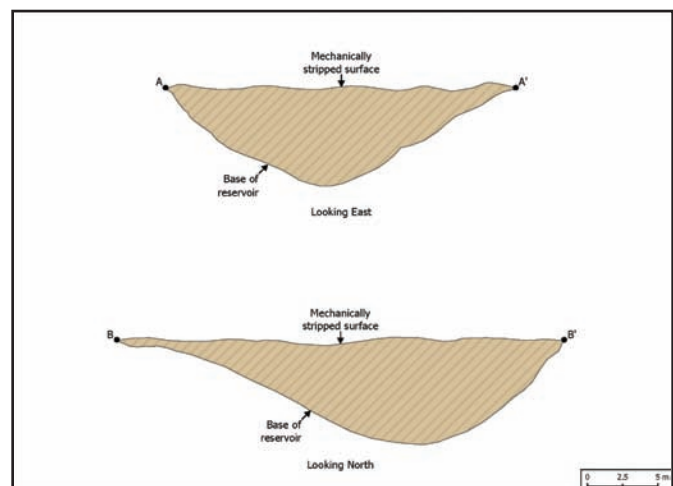


Figure 4. Cross sections of the reservoir.

examining or sampling the deepest deposits in the feature. Also, because it was outside the project area, most of the area surrounding the reservoir, could not be examined for the presence of inlets or other features. Nevertheless, the presence of the reservoir and some of its characteristics provides us with insight into Hohokam survival in the Queen Creek “delta.”

## SITE AZ U:14:49 (ASM), POZOS DE SONOQUI LOCUS

### Setting

The Pozos de Sonoqui locus of Site 49 is located on a large, level plain in the lower Queen Creek drainage. The Santan Mountains border the Queen Creek drainage to the south, the Gila River is located to the southwest, and the Salt River lies to the northwest. Sonoqui Wash runs through the site, and Queen Creek is located approximately 1 mile north of the site (Stubing et al. 2017). North of the Santan Mountains, the single main channel of Queen Creek diverged into a series of smaller, distributary channels, creating a zone of broad sheet flooding, sometimes referred to, incorrectly, as the “Queen Creek Delta” (Huckleberry 2017:492-494). Historic accounts state that the drainage supported grassland (Rea 1997), and mesquite bosques were present on the lower alluvial plains.

The Phoenix Basin has a hot, arid climate, with daily high temperatures from June through August exceeding 100° F. Only an average of 7.6 inches of precipitation falls in the region. Rain in the winter comes from Pacific Coast frontal storms, and summer brings monsoonal storms from the Gulf of Mexico and the Gulf of California (Stubing et al. 2017). Without perennial rivers and streams, or canals emanating from perennial sources,

the inhabitants of Site 49 had to look for other ways to create a supply of domestic-use water close to their homes.

Site 49 occupies a large, irregularly shaped area measuring approximately one mile in diameter. Based on evidence from previous investigations and on the data recovery reported here, the Pozos de Sonoqui portion of Site 49 was inhabited from the Pioneer period through the Sedentary period. The other part of Site 49 (Peters et al. 2007) is Sonoqui Pueblo, which lies just to the southeast of Pozos de Sonoqui and includes an adobe compound dating to the Classic period.

Site 49 was first documented by Turney (1929) and by Gila Pueblo (Gladwin and Gladwin 1929). Excavations at a portion of the ruin in the 1930s by Gila Pueblo (Crown 1984a) identified numerous cremations and a varied artifact assemblage (Stubing 2017). Schroeder (1940) visited the ruin in 1939 while conducting a survey for Pueblo Grande Museum; and Midvale conducted additional recording and excavation in the 1950s (Weaver 1973). Since then, scattered work at or near Site 49 has been conducted by cultural resource management firms. Cox and Rogge (2009) performed data recovery along Ellsworth and Cloud Roads and found eight features. Nealy and Orcholl (2007:1-4) conducted testing within the current project area as part of early investigations for the Riggs Road Extension Project. They identified more than 40 features in their test trenches.

Our excavations at Site 49 identified 104 cultural features within the project corridor, and we excavated and documented 85 of them. Those features included 19 pithouses and numerous pits and roasting pits. We also recovered and repatriated remains and artifacts from 12 cremation burials and 5 inhumation burials. Most of the structures and features we identified were

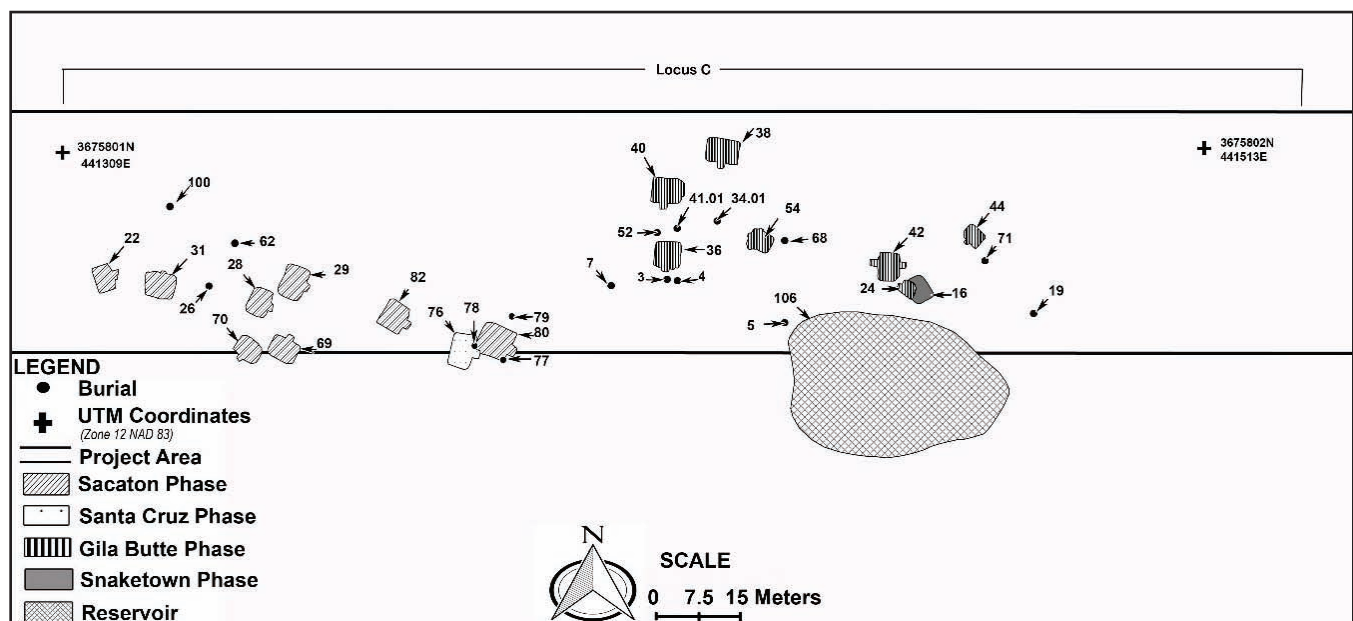


Figure 5. Map showing pithouses and burial features in Locus C.



in the central part of the site (Locus C) within the project corridor, as shown in Figure 5. Two other pithouses, one Santa Cruz phase and the other Early Sacaton phase, were located more than 300 m to the west of the main cluster, near Ellsworth Road.

By combining the mean ceramic dates with archaeomagnetic dates and radiocarbon dates, when available (Table 1), we were able to assign the 19 excavated pithouses to four phases of the Hohokam chronology: Snaketown, Gila Butte, Santa Cruz, and Early Sacaton (Deaver 2017). Thus, the occupational history of the portion of the site investigated extended from the late Pioneer period through the early Sedentary period.

The Snaketown phase was not well represented in the project area with only one pithouse (Feature 16) dating to that time. Another pithouse (Feature 24) was superimposed on that house, and both were intruded upon along their southwest edges by a historic or modern ditch. The upper structure dated to the Gila Butte phase. The Snaketown phase structure was a true pithouse in which the sides of the structure pit formed the base of the pithouse walls. The Gila Butte pithouse was of the house-in-pit variety, with the perimeter of the structure consisting of a wall trench with holes for wall posts.

In addition to the pithouse, several extramural features were assigned to the Snaketown phase based on associated ceramic dates. Those features consisted of a large roasting pit and a thermal pit. Another large roasting pit (Feature 41) contained an inhumation burial; ceramics from the fill of the pit indicated a Snaketown phase date.

One of the more substantial occupations within the project area dated to the Gila Butte phase. We found seven pithouses that could be assigned to the phase (Features 24, 36, 38, 40, 42, 44, and 54). Two of the structures were of the house-in-pit variety and the other five were true pithouses. One of the house-in-pit structures (Feature 36) had an extensive artifact assemblage on its floor, including complete ceramic vessels and effigy pots, and stone bowls and censers. The structure had burned, and several charred posts and timbers were found, some *in situ*.

**Table 1. Summary of dates for AZ U:14:49 (ASM), from Deaver (2017:70)**

Pithouse number	Pottery age	Mean ceramic date	Archaeomagnetic date	Radiocarbon date (combined calibrated 2 sigma range)
6	Early Sacaton	989	930–1020 (950/975)	-
22	Early Sacaton	998	-	-
28	Early Sacaton	974	-	-
29	Early Sacaton	956	-	-
31	Early Sacaton	991	905–1020 (925)	-
69	Early Sacaton	935	930–1020 (950/975)	-
70	Early Sacaton	1010	930–1020 (950/975)	-
80	Early Sacaton	947	930–1020 (950/975)	-
82	Early Sacaton	998	905–1020 (925)	-
	Average	978	956	-
21	Santa Cruz	899	-	-
76	Santa Cruz	913	905–1020 (925)	-
	Average	906	925	-
24	Gila Butte	717	830–870 (850)	-
36	Gila Butte	793	830–945 (900)	-
38	Gila Butte	858	805–845 (825)	-
40	Gila Butte	839	755–845 (775)	-
42	Gila Butte	813	805–845 (800)	-
44	Gila Butte	843	830–870 (850)	-
54	Gila Butte	862	-	-
	Average	818	835	-
16	Snaketown	704	705–770 (725)	656–763

The Santa Cruz occupation in the project area was minimal and the archaeomagnetic data suggest a hiatus in the occupation during the late Colonial period. The Santa Cruz phase was represented by two pithouses (Features 21 and 76) with Feature 21 being a very poorly preserved structure containing few diagnostic ceramics.

Following the hiatus in the Late Colonial period, the Early Sedentary occupation was again substantial. In fact, it represented the largest component within the project area, with nine pithouses dating from the Early Sacaton phase (Features 6, 22, 28, 29, 31, 69, 70, 80, and 82). No structures at the site dated to the Middle or Late Sacaton phase, and structures dating from the Classic period were not identified. Several of the Early Sacaton phase structures contained extensive floor assemblages (Figure 6), including whole and reconstructible ceramic vessels (Figure 7).

Our excavation of the 17 burial features at Site 49 resulted in the recovery of the remains of 18 individu-

als (Steinbach 2017). Most of the burials were secondary cremations and these did not include large bone weights. Due to the nature of the cremation process and secondary burial practice of most of the features, observations pertaining to age and sex, stature, paleopathology, and other trauma could not be made in most cases. Most of the inhumation burials were in abandoned roasting pits in the Gila Butte residential area.

Because the majority of the burials in the project area were cremations (72 percent), we had very little demographic information for the population of the site. The MNI for the cremation burials was 13, with one secondary cremation burial (Feature 77) containing the remains of two individuals. The inhumation burials consisted of a child (8 years  $\pm$  24 months), an adolescent (15 years  $\pm$  6 months), and three adults (two of indeterminate age and sex and one possible male of approximately 30 years of age) (Turner 2017). Analysis of the human remains provided indications of the health and diet of the inhabitants. One individual had very mild infections on the skull and long bones. Two other individuals exhibited enamel hypoplasia on the permanent teeth, indicative of childhood stressors. One of the inhumed individuals displayed heavy calculus buildup and several missing teeth. That individual was approximately 30 years old at the time of death and very gracile. As stated by Turner (2017), the gracility of this fairly young person—combined with the loss of teeth, caries, and calculus buildup suggestive of a soft-food diet—indicated that the individual might have suffered from some type of neuromuscular condition.

## Subsistence

Analysis indicated that nondomesticated plants constituted a substantial portion of the subsistence resources utilized by the inhabitants of Site 49 (Figure 8). In fact, “Nondomesticated foods made up the bulk of the economically significant plants identified in the Pozos de Sonoqui [Site 49] flotation samples and were well represented in the pollen assemblage, as well” (Jones 2017:482). Nondomesticated plants found in the analyzed samples included mesquite, several types of cactus, mustard, and little barley. Mesquite beans and fruit fragments were found in 26 of the 53 analyzed flotation samples, and mesquite pollen was found in 19 of 21 pollen samples. Cholla seeds were recovered from 19 flotation samples, and cholla pollen was found in 19 of the 21 samples. *Cereus*-type pollen was identified in 10 samples. Hedgehog cactus seeds were identified in 12 flotation samples, and saguaro seeds were found in 7 samples. Prickly pear seeds were found in 2 flotation samples, and prickly pear pollen was found in 7 samples. Seeds from the mustard family were found in only three flotation samples, but one sample—from a pithouse hearth—contained 2,520 seeds. *Chenopodium* fruit was identified in 12 of the 53 flotation samples, and *Amaranthus* seeds were found in 26 flotation samples. Little barley (*Hordeum*) was found in three samples. Chenopodium pollen was common in each of the pollen samples (Jones 2017).

Maize macrobotanical remains and pollen were also abundant in samples from the site. Maize cupules were recovered in 34 of the 53 flotation samples. Cob remains



Figure 6. Photograph of an Early Sacaton phase pithouse during excavation.





Figure 7. Whole and reconstructible ceramic vessels on the pithouse floor.

were found in 4 of those samples, and kernels were identified in 5. Maize pollen was found in 18 of the 24 analyzed pollen samples. Squash remains were found in the hearth in Feature 80, an Early Sacaton-phase house. But, again, gathered resources appear to have been relied upon as much or more than maize. This differs from sites along the Salt and Gila Rivers where maize and other cultivated plants were the dominant subsistence resources. Maize was generally more common, for example, at sites along the Gila River than at sites in the Queen Creek area, and agave, cotton, squash, and little barley grass were more prevalent at Gila River sites than at sites in the Queen Creek area (Gasser and Kwiatkowski 1991:422).

The results of the botanical analysis indicated that agave was not roasted in any of the features at the site. Evidence suggested that maize, squash, mesquite beans, cholla, saguaro, hedgehog cactus, and mustard were all roasted or parched in roasting pits, hearths, and thermal features (Jones 2017). The abundant ground stone assemblage from the site indicates that many botanical resources were ground as part of their preparation for consumption.

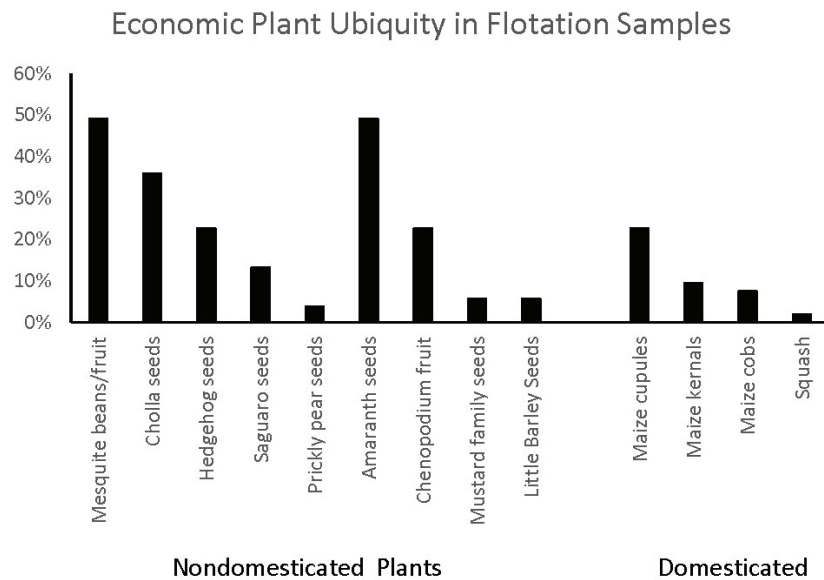
Jackrabbits, cottontail rabbits, and other small mammals provided the inhabitants of the site with most of their animal protein. Faunal remains from the site included lagomorphs, rodents, coyote/dog, fox, deer, antelope, several types of reptiles, and birds. Fish remains were not found at Site 49 (Gregory 2017).

### Material Culture

Evidence from the analysis of buff-ware ceramics from Site 49 indicated that Snaketown and Gila Butte phase pottery at the site came from the Santan Mountain area. However, by the Early Sacaton phase, the pottery originated primarily in the Snaketown area. Evidence also indicated that the bulk of plain ware could have been produced with sands from the immediate vicinity of Site 49 and would not need to have been obtained through exchange (Deaver and Hand 2017). The ceramic collection consisted of both bowls (i.e., serving vessels) and jars, supporting the interpretation that the site was a perennial village (Deaver and Hider 2017; Deaver and Hand 2017).

Exotic artifacts were not plentiful at the site. Non-local materials found within the project area consisted of shell, most of which originated in the Gulf of California, turquoise, and obsidian. It is not known, however, whether the artifacts made from those materials were manufactured at the village or arrived as finished artifacts. The presence of these materials suggested that the inhabitants of Site 49 participated in the pan-regional exchange system that brought materials such as shell to the Hohokam. Shell artifacts were found throughout the site and in a variety of contexts. Other materials, such as turquoise, were much more limited in distribution, but were present.





**Figure 8. Nondomesticated economic plants were more ubiquitous than domesticated crops in flotation samples for AZ U:14:49 (ASM).**

## HOHOKAM WATER STORAGE

Prehistoric water-storage features have been identified throughout the Southwest (Crown 1987; Wilshusen et al. 1997), especially in southern and western Arizona (e.g., Bayman et al. 1997; Bayman et al. 2004; Ciolek-Torrello and Nials 1987; Palacios-Fest et al. 2008; Dart 1983; Raab 1975). These discoveries suggest that reservoirs allowed substantial Hohokam populations to inhabit the desert in locations distant from the major rivers (Bayman 1992). Reservoirs have been reported at a few core-area sites along the Salt River, such as Pueblo Salado (Phillips and Droz 2007), Las Colinas, and La Ciudad (Bostwick et al. 2010), but they appear to be more common in the outlying areas such as the Papagueria and Queen Creek.

Crown (1987:211-212) developed a typology of water storage features in the Southwest, based on the way that water entered or was introduced to the feature. Introduction of water into a storage feature was accomplished through either conservation or diversion. Prehistoric wells, walled springs, catchment basins, and retention basins caught and conserved water or, in the case of wells and springs, had water sources internal to them. Reservoirs, on the other hand, had water diverted to them through canals or ditches.

Researchers have found botanical indicators of long-term, perhaps perennial, water storage in prehistoric reservoirs in southern Arizona. For example, Bayman et al. (1997) recovered uncarbonized duckweed seeds (*Lemna* sp.) from a Classic-period reservoir at a site located in a nonriverine setting between the Gila and Santa Cruz Rivers. The researchers also tested soil samples from that reservoir for ostracodes, but none were

found. The authors speculated that the chemistry of the water was not favorable for ostracode growth (Bayman et al. 1997:106). Botanical evidence for long-term water storage was also recovered from a prehistoric reservoir at a site in Organ Pipe Cactus National Monument (Bayman et al. 2004). The researchers recovered cattail (*Typha* sp.) pollen from auger samples ranging in depth from 63 cm to 275 cm (24.8 to 108.3 in.). They also found evidence of a single species of ostracodes (*Heterocypris antillensis*) in samples from the reservoir (Bayman et al. 2004:127). That reservoir, including the estimated height of the embankments, was almost 4 m (13 ft.) deep (Bayman et al. 2004:125).

Other water-adapted plant taxa have been reported from Hohokam reservoirs (Ciolek-Torrello 1987; Dart 1983; Fish 1983) and the remains of

an aquatic turtle (*Kinosternon* sp.) were found in association with a reservoir at Gu Achi, a nonriverine site in the Papagueria (Bayman et al. 1997:108). Common reed (*Phragmites*) remains were also recovered from that site.

All this evidence indicates that water was stored for long periods, possibly throughout the year, in some Hohokam reservoirs. That these reservoirs could have held water year-round is further bolstered by the fact that 20th century Tohono O'odham reservoirs (charcos) that measured between 2.44 and 3.05 m (8 and 10 ft.) deep were recorded as retaining water on a perennial basis (Bayman et al. 2004). Thus, Hohokam reservoirs that were that deep or deeper could have potentially stored water year-round. With a depth of as much as 7.7 m (25.3 ft.), including berms, the Site 49 reservoir if initially filled could have retained water throughout the year. Other large, deep Hohokam reservoirs have been identified at sites located far from the Salt and Gila rivers. The Red Rock Reservoir measured 39 m by 22 m (128 by 72.2 ft.) and was more than 5 m deep (Ciolek-Torrello and Nials 1987:274) and the reservoir at Frog-town (Dart 1983), mentioned above, was 27 m by 19 m (88.6 by 62.3 ft.) and was 6.1 m (20 ft.) deep at its lowest point. According to Ciolek-Torrello and Nials (1987:292), the evidence from both sediment and pollen indicate that Red Rock Reservoir probably contained at least some water on a year-round basis.

### The Site 49 Reservoir

Analysis of soil samples from the Site 49 reservoir (Palacios-Fest 2013), indicated that the very uppermost fill was deposited under low-energy conditions probably associated with abandonment of the feature. The fill be-

low the uppermost level indicated a high-energy environment with faster flowing water; whereas the lowest levels in the feature indicated a low-energy environment (Huckleberry 2017:503), as indicated by the rhythmite beds that resulted from standing water where sediment settled out of suspension (Figure 9).

We also had soil samples from the reservoir analyzed for ostracodes. However, fossils were not found in the samples, probably because of the dominant high-energy conditions in the upper strata of the feature. Those strata did, though, display abundant manganese nodules, indicating long-term standing water (Palacios-Fest 2013). Analysis of botanical samples, taken at a depth of 1.3 m and 2.8 m (4.3 ft. and 9.2 ft.), did not reveal the presence of aquatic plants, which can also be indicators of perennial water storage (Bayman et al. 1997). Instead, the upper flotation sample contained a fragment of possible juniper wood and noncarbonized seeds from bulrush (*Scirpus* sp.) and purslane. The deeper flotation sample contained a fragment of probable Fabaceae wood, a noncarbonized carpetweed seed, and a single carbonized *Chenopodium* fruit. A pollen sample taken from a depth of 2.8 m (9.2 ft.) contained low spine Asteraceae and *Ambrosia*, Chenopods, creosote bush and grasses, along with some globe mallow, pine, juniper, and mesquite grains. Cultigens were represented by maize grains. Other possible economic plants were represented by a single *Cereus* grain and a single cholla grain. These results suggest culturally disturbed soils and agricultural fields were in the area adjacent to the reservoir (Jones 2017).

We did not find any indications of ditches or canals that might have channeled water to the reservoir at Site 49, nor were there any indications of an inlet or an outlet in the area examined. However, recent work south of the Riggs Road right-of-way has reportedly identified a possible prehistoric ditch that might have conveyed water to the reservoir (Gary Huckleberry, personal communication 2017).

Diagnostic ceramics collected from the upper 2 m (6.6 ft.) of fill in the reservoir at Site 49 consisted entirely of sherds dating from the Classic period. This suggested that the people living at the Classic period component of the site (Sonoqui Pueblo) constructed and used the feature. During recent work on the reservoir, late Classic period ceramics were reportedly found in the deeper reaches of the feature (Gary Huckleberry, personal communication 2017).

The Site 49 reservoir could have held up to 610 cubic m of water, providing water for domestic use—and possibly limited irrigation—for the inhabitants of the site. Located as it was along Queen Creek, but between and distant from the major water sources of the Salt and Gila Rivers, the village would have needed the reservoir to supply much of its domestic water. Although a canal is reported to have run from Queen Creek toward the Sonoqui Ruin, it would have supplied water mainly to



Figure 9. Stratigraphy near the base of the reservoir.

agricultural fields, on a seasonal basis. The large and deep reservoir located among habitation features at Site 49 would have made survival throughout the year in the dry desert environment possible.

## SUMMARY AND CONCLUSIONS

Site 49 was the pre-Classic component of a Hohokam village site that included a Classic period reservoir. The site was occupied from the Pioneer period through the Early Sedentary period. The portion of the site within the Riggs Road corridor included 19 pithouses, numerous extramural pits and roasting features, 17 burials, and a large prehistoric reservoir. Subsistence data recovered from the site suggest that the inhabitants relied more on gathered foods than on agricultural products, although maize and other cultigens were present. Whereas some water might have been diverted from

the reservoir for irrigation, most of the water presumably was used for domestic purposes. The great depth of the storage feature and the absence of any identifiable outlet suggests that water was impounded in the reservoir and stored for drinking and other domestic uses—probably year-round.

The idea that reservoirs might have provided domestic-use water to the Hohokam living in outlying areas is not new. Bayman and others (Bayman 1992, 1993; Bayman et al. 1997; Bayman et al. 2004; Ciolek-Torrello and Nials 1987; Palacios-Fest et al. 2008) have long argued that deep earthen reservoirs supplied drinking water to Hohokam populations living outside the Phoenix and Tucson basins. The repeated finding by archaeologists that there were perennial villages in portions of the Sonoran Desert located far from the region's rivers has important demographic implications, suggesting that existing estimates of Hohokam populations are likely too low. In areas without perennial rivers or springs, such as the Papagueria and the desert between Phoenix and Tucson, reservoirs supplied the water needed to sustain even village size populations throughout the entire year. There is growing evidence that reservoirs were also an adaptive strategy of the Hohokam occupying the Queen Creek region—located within the Phoenix Basin but distant from the Salt and Gila rivers. In addition to the Site 49 reservoir and the reservoirs supplied by the Queen Creek canal system (Crown 1984b), there were other water storage features in the “delta.” For example, Huckleberry (2017) reports that a small (6 m by 10 m and 1.5 m deep) rectangular reservoir was found at the Southwest Germann site, and small retention basins have been identified near Site 49 (Rogge and Cox 2010).

As Bayman (1992) stated, villages with reservoirs might have been the glue that bound the Hohokam regional system together. Results of the analysis of ceramics from Site 49 indicated that the residents of the site participated in the exchange system that operated within the Phoenix Basin and resulted in a consistent buff-ware assemblage at sites across the region. Abbott et al. (2007) posited that the mechanism for that exchange might have consisted of marketplaces, subject to the laws of supply and demand, tied to ballcourts and ballcourt events. If this model accurately depicts the Hohokam exchange system, then other artifacts and materials must have been produced and exchanged by specialists, including ground stone, shell, certain flaked-stone tools (e.g., serrated projectile points), stone axes, and perhaps botanical resources (Abbott et al. 2007). The prehistoric community in the Queen Creek region would have been linked to this network by the presence of ballcourts at the larger sites and would have been further linked to the regional system through those ballcourts and markets. But, even though the inhabitants of the Queen Creek area obtained many items through the regional exchange system, they had to have a local supply of subsistence resources, especially water. Without a

continuous supply of water from rivers and canals, they had to sustain their population through the creative procurement and storage of ephemeral sources of water in reservoirs and other storage features. The reservoir at Site 49 was one such large and impressive feature.

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# SUBSISTENCE, CERAMIC PRODUCTION, AND EXCHANGE AT FARMSTEAD SITES ON THE QUEEN CREEK BAJADA

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## ABSTRACT

*Based on evidence recovered from residential contexts at two sites, AZ U:10:236 (ASM) and AZ U:10:310 (ASM), identified during the Powerline, Vineyard, and Rittenhouse Flood Retarding Structures project, outlying areas situated along the Queen Creek delta and bajada had a continued occupation beginning in the Pioneer Period, with peak use during the Sedentary Period and well into the Classic Period. We find evidence that these farmstead sites maintained contact with middle Gila River communities throughout this transitional period, providing a unique opportunity to analyze both continuity and fluctuations in exchange networks between the Hohokam settlements in Queen Creek and communities in the middle Gila and lower Salt rivers. One of the sites, AZ U:10:236 (ASM), located adjacent to the Siphon Draw site, had small amounts of Tusayan white ware ceramics and San Francisco Peaks (Government Mountain) obsidian from northern communities. Overall, these modest dry farming sites also show increasing involvement with ceramic production and botanical resources from the Sedentary Period through the early Classic Period, supporting their importance in helping to understand the circumstances of increasingly localized production identified during that era.*

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## INTRODUCTION

Communities living outside of the irrigation communities of middle Gila River and the Salt River, such as those found along the Queen Creek delta and bajada, provide an important look at Hohokam settlements in dry farming settings. We use excavated data from two small settlements, sites AZ U:10:236 (ASM) and AZ U:10:310 (ASM), to describe the subsistence, economic organization, and social relationships of these communities from the perspective of other Queen Creek settlements. These two sites have materials with a chronological range from the Pioneer into the Classic Periods (A.D. 675–1300), although their primary occupation, based on the decorated ceramics, spanned the Sedentary to

early Classic Periods (A.D. 950–1300). Because of their location outside of the more populated irrigated areas of the Phoenix Basin, the ways in which these settlements subsisted and the extent to which they participated in wider exchange networks provides insight into the degree of integration between irrigation communities and those from areas that have often been considered peripheral to the Hohokam (see Stone 1993). The two sites for our study provide evidence of subsistence, ceramic production, and far-flung exchange persisting outside of the major riverine canal zones of the Phoenix Basin.

The social and economic organization of these small settlements have often been described based on scale alone. Previous Hohokam site typologies (Crown 1984a, 1987) have defined small sites, such as many of those found within the Queen Creek area, as single function sites. Crown's (1984a) site typology defines farmsteads as very modest settlements made up of year-round occupied structures (houses-in-pits or pithouses) organized in a "cluster" that may represent one or two nuclear families whose main occupation is farming. Crown (1984a) based her original ideas on findings from the Salt-Gila Aqueduct (SGA) project, which showed a variety of different settlements located both within and outside the irrigated canal zone occupations. Based on these older typologies, the low number of domestic structures recovered from each of the two current sites puts them into the farmstead category. The original assumption behind calling such modest settlements farmsteads, however, also assumed that these places acted as subsidiaries of larger, more socially and economically integrated sites, and that exchange and even burial treatments were mediated through these larger affiliated sites (Gregory 1991). Stone's (1993) study of small sites in the northern periphery (New River and Verde River) found that some of the smaller sites were

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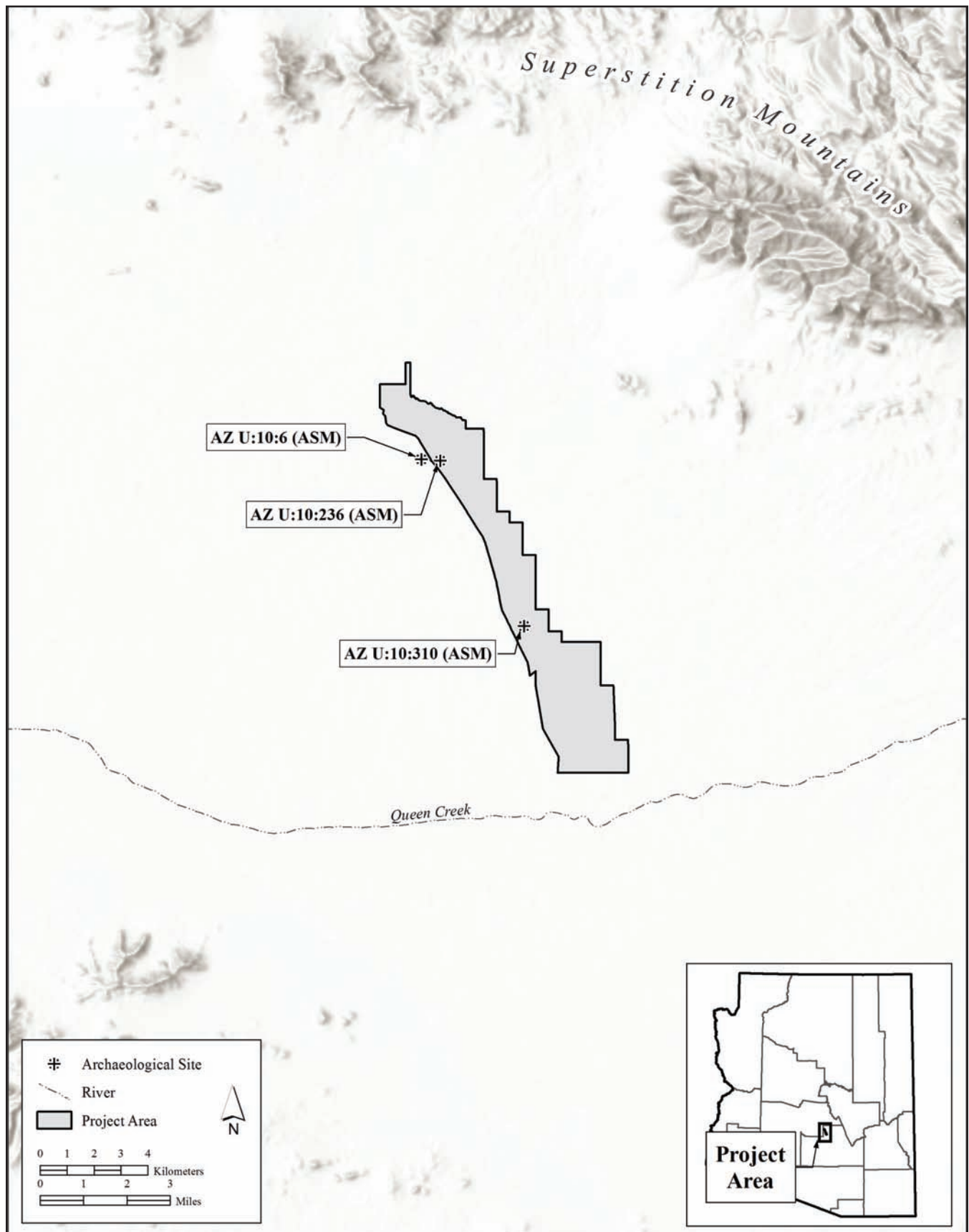


Figure 1. Project area and the two farmstead sites.

not functionally different based on their artifact inventories, and that at least some of the differences could be related to length of site occupation rather than, for example, the absence of ceremonial paraphernalia. Stone's (1993) findings suggest that small settlement site function should not be assumed *a priori* on the basis of size alone. Instead, Stone's study (1993) suggests that Crown's (1984a) characterization of small sites as single function sites and Gregory's (1991) inference that small sites are often subsidiary to larger communities and sites are questions that should be directly investigated for each small site individually. For the small settlements of Queen Creek, similar questions about site function and integration into larger social and economic networks also can be asked.

For this study, we used materials from residential contexts recovered from excavations of 81 and 50 features, respectively, at sites AZ U:10:236 (ASM) and AZ U:10:310 (ASM). The archaeological investigations were conducted by Archaeological Consulting Services, Ltd. (ACS) to assist with Section 106 compliance for the Powerline, Vineyard, and Rittenhouse Flood Retarding Structures project (PVR FRS). The project area encompasses over 6,000 acres on the eastern edge of the Phoenix Basin and is characterized by very gradually sloped bajadas and floodplains (Figure 1). The Superstition Mountains are located northeast of the project area, which is dissected by a number of drainages originating in those mountains, including Siphon Draw. Although the area is not associated with Hohokam canal irrigation, it includes several kinds of natural resources relevant to human occupation. These include local botanical and faunal resources, potential vesicular basalt ground stone sources (Fertelmes 2014), and a recently identified Queen Creek area temper source for pottery production (Lack et al.

2012). Previous investigations within the Queen Creek Watershed along the eastern edge of the Phoenix Basin provide a complex picture of settlement and subsistence in the prehistoric period.

## CHRONOLOGY AND FEATURE CHARACTERISTICS

Absolute dates were obtained using archaeomagnetic and radiocarbon determinations (Table 1). As per lab protocol by Beta Analytic, Inc., all radiocarbon dates were calibrated with tree ring dating (Beta Analytic 2016). Of the 14 archaeomagnetic and calibrated radiocarbon dates from AZ U:10:236 (ASM), eight fall in the Sedentary Period (AD 950–1125/1150), with three in the early Sedentary (AD 950–1050) and five in the late Sedentary (AD 1050–1150). Four dates range from the late Sedentary to the early Classic (AD 1050 to 1315) and one date ranges from the Colonial to the early Sedentary (Table 1, Figure 2). The absolute dates from AZ U:10:236 (ASM) are supported by artifact cross-dating, which suggest an occupation range from the Colonial through early Classic Periods (AD 750–1300), with a primary occupation during the Sedentary Period (AD 950–1150).

The 11 dates from AZ U:10:310 (ASM) cluster earlier but partially overlap those from AZ U:10:236 (ASM) (Figure 2). Four dates range from the late Pioneer through the Colonial Period (ca. AD 700 to 885), three from the Colonial to early Sedentary (ca. AD 770 to 1000), two fall in the early Sedentary (AD 950 to 1050), one in the late Sedentary (AD 1050 to 1150), and an archaeomagnetic date has two intercepts, one in the Sedentary and the second in the late Classic to Postclassic Period. The absolute dates from AZ U:10:310 (ASM) are supported

by artifact cross-dating, which suggests an occupation range from the late Pioneer through early Classic Periods (ca. AD 675–1300), with a primary occupation during the Sedentary through early Classic Periods (AD 950–1300).

The abandonment of structures at AZ U:10:236 (ASM) may have been more formal and/or planned than at AZ U:10:310 (ASM), where structures may have been abandoned quickly or left with the intent to return (Table 2). The lack of *de facto* floor assemblages in structures at AZ U:10:236 (ASM) is in contrast to floor artifact assemblages at AZ U:10:310 (ASM). Two of the four structures (Features 4 and 15) at AZ U:10:310 (ASM) showed both signs of being burned while also having some evidence of usable artifacts (*de facto*

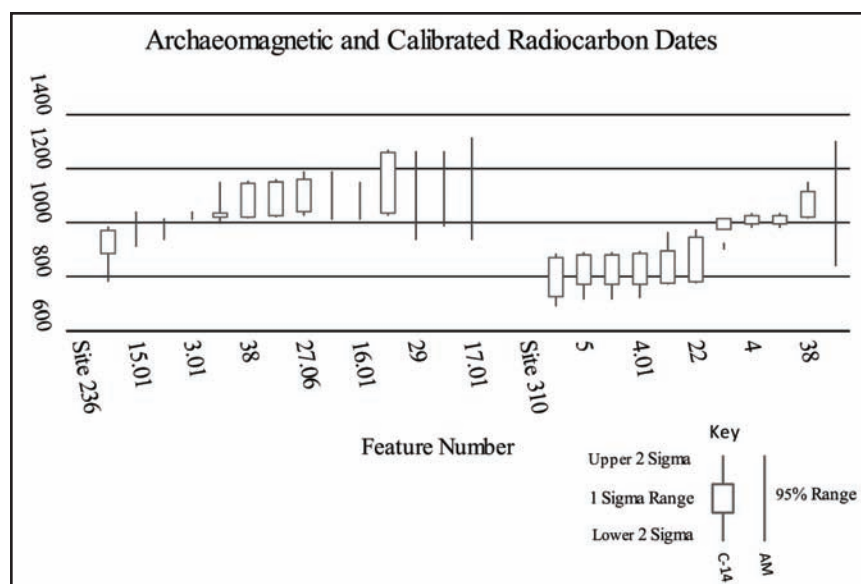


Figure 2. Inter-site comparison of archaeomagnetic (95% confidence interval) and calibrated radiocarbon (one and two sigma range) dates.

Table 1. Absolute Dates (AZ U:10:236 [ASM])

Site Number	Feature Number	Feature Type	Archaeomagnetic <sup>1</sup>	Radiocarbon Calibrated 2 Sigma Range	Radiocarbon Calibrated 1 Sigma Range
236	1.01	Hearth, prepared	AD 935–1015* <i>AD 1435–1590</i> <i>AD 1660–1790</i>		
236	1.02	Pit, undefined		AD 780–790 AD 870–895 AD 870–985	AD 885–970
236	2.01	Hearth, prepared	AD 1010–1190		
236	2.34	Pit, undefined		AD 995–1050 AD 1085–1125 AD 1140–1150	AD 1020–1035
236	3.01	Hearth, prepared	AD 1010–1040		
236	7	Water catchment basin		AD 1025–1165 AD 1165–1270	AD 1035–1155 AD 1215–1260
236	15.01	Hearth, prepared	<i>500 BC–AD. 113</i> AD 910–1040* <i>AD 1260–1790</i>		
236	16.01	Hearth, prepared	AD 1010–1150* AD 1100–1265	AD 1020–1160	AD 1025–1050 AD 1080–1150
236	17.01	Hearth, prepared	AD 935–1150* AD 1100–1315* <i>AD 1660–1690</i>		
236	26.01	Hearth, prepared	AD 985–1150* AD 1100–1265*		
236	27.06	Hearth, prepared		AD 1025–1190	AD 1040–1160
236	29	Hearth, prepared	AD 935–1150* AD 1100–1265*		
236	38	Pit, thermal		AD 1015–1155	AD 1020–1045 AD 1095–1120 AD 1140–1145

<sup>1</sup>*Italics* indicates anomalous results; \* indicates most appropriate date

deposits) remaining on a floor surface, and while four of the ten structures at AZ U:10:236 (ASM) had some sign of burning, often burned wall/roof fall, all of them had only primary and secondary refuse on the floor (Table 2). Neither site, however, had evidence of complete vessels or whole artifacts recovered from floors or even less than 5 cm above floor contexts, and the sole reconstructible vessel recovered from a house-in-pit (Feature 4) from AZ U:10:310 (ASM) was estimated to be well under 50 percent of the whole vessel.

## SUBSISTENCE PATTERNS

AZ U:10:236 (ASM) and AZ U:10:310 (ASM) included enough structure floors, pit features, and midden fea-

tures to allow a representative sampling of domestic spaces for both flotation and pollen analyses (Table 3). Based on the findings, these two settlements are consistent with Crown's (1984a) functional definition of farmstead sites, whose main purpose was the production of agricultural foodstuffs. The residential structures at the two sites do not represent hamlets, because these structures are not organized around open spaces, show a scattered spatial pattern, and their accompanying dates indicate that structures were not all contemporaneously occupied (Figures 3 and 4, Tables 1 and 3).

Maize appears to have been a primary resource in the project area, and the investigation demonstrated that it was being processed in various structures, and likely stored in pit features at both sites (Table 3).



**Table 1 (Continued). Absolute Dates (AZ U:10:310 [ASM])**

Site Number	Feature Number	Feature Type	Archaeomagnetic <sup>1</sup>	Radiocarbon Calibrated 2 Sigma Range	Radiocarbon Calibrated 1 Sigma Range
310	3	Midden		AD 770–905 AD 920–965	AD 775–790 AD 800–895
310	4	House-in-pit		AD 980–1035	AD 995–1025
310	4.01	Posthole		AD 720–740 AD 765–895*	AD 770–885
310	4.02	Posthole		AD 900–925 AD 945–1020	AD 975–1015
310	5	Midden		AD 715–745 AD 765–890	AD 770–880
310	15.01	Posthole		AD 690–750 AD 760–885	AD 725–740 AD 770–780 AD 790–870
310	21.01	Hearth, prepared	AD 935–1015* AD 1235–1690*		
310	21.04	Pit		AD 715–745 AD 765–890	AD 770–880
310	22	Midden		AD 775–975	AD 780–785 AD 880–900 AD 925–945
310	32	Pit, subfloor of pithouse F.21		AD 980–1035	AD 995–1025
310	38	Hearth, second hearth, subfloor pithouse F.21		AD 1015–1050 AD 1080–1150	AD 1020–1040 AD 1110–1115

<sup>1</sup>*Italics* indicates anomalous results; \* indicates most appropriate date

Maize pollen was identified in 53.6 percent of features and within nine of the 10 structures from AZ U:10:236 (ASM), including anthers identified in three of the 10 structures. At site AZ U:10:310 (ASM) maize pollen was recovered from 72.7 percent of features and maize pollen and anthers were identified within three of the four structures. These data indicate that processing (i.e., shucking or kernel removal) of maize was occurring within structures at both sites. Maize anthers were also found in over 21 and 50 percent of pits from AZ U:10:236 (ASM) and AZ U:10:310 (ASM), respectively, indicating storage of maize within these features. The relative paucity of maize remains from the flotation samples (from four of 10 structures at AZ U:10:236 [ASM] and two of four structures at AZ U:10:310 [ASM], mostly present as single fragments), however, suggests that although maize was an important agricultural product at the sites, much of the shucking or preparation was taking place outside the sites, perhaps at least in part in the nearby agricultural fields.

In addition, preparation and consumption of maize may not have been occurring at the sites at the same level as harvesting and initial processing. Maize flota-

tion fragments (Table 3) were identified in low numbers from only five extramural features at AZ U:10:236 (ASM) and from three extramural features at AZ U:10:310 (ASM)—all midden or hearth/thermal feature contexts. It is possible that after the harvesting and initial processing of maize, the agricultural products were taken to another location (e.g., hamlet or village) for cooking and consumption. These findings are consistent with Crown's (1984a) and Gregory's (1991) assumption that many farmstead sites were closely connected with larger sites for feasting and ceremonial or community-level activities.

Traces of beans, squash, and cotton (Table 3) also were found at AZ U:10:236 (ASM) and AZ U:10:310 (ASM), and because these plants all usually are underrepresented in archaeological sites, their presence alone implies they were important and likely to have been cultivated near both sites. The presence of a few cotton pollen grains likewise may indicate that cotton was processed in the sites. Spindle whorls (both disk and modeled), were present in the site collections in low but consistent numbers associated with domestic contexts, indirectly supporting the idea that processing

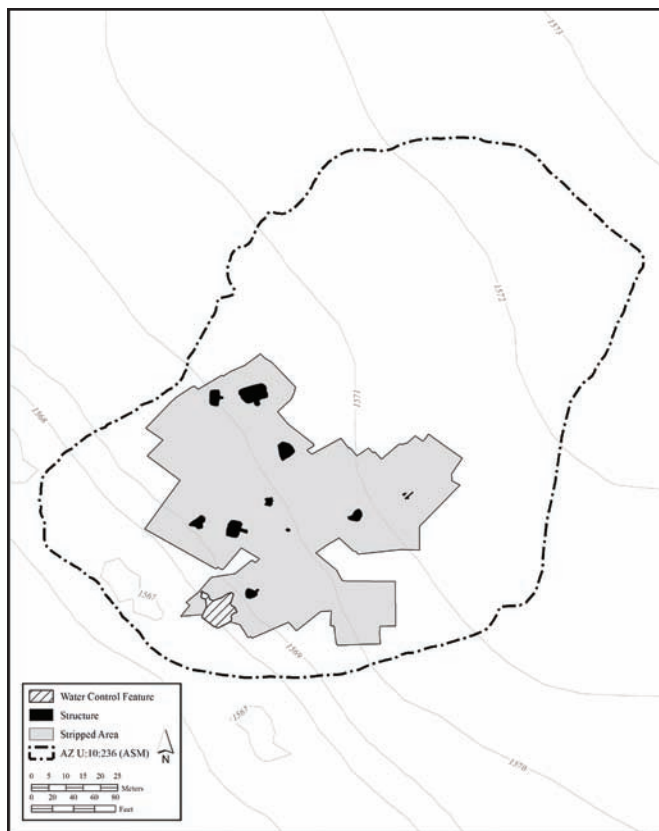


Figure 3. Excavation coverage, structures and water control feature at AZ U:10:236 (ASM).

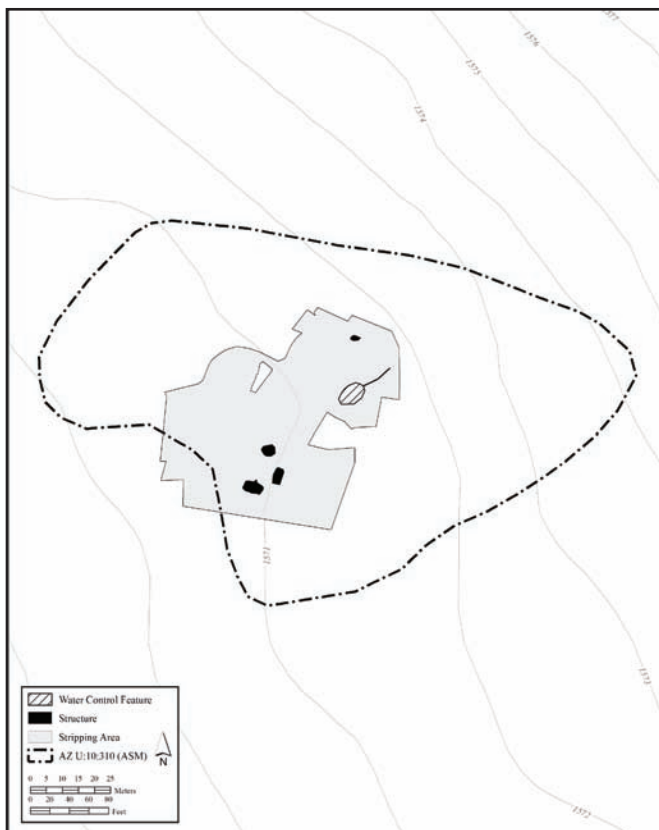


Figure 4. Excavation coverage, structures and water control feature at AZ U:10:310 (ASM).

of cotton or other fiber sources (e.g., agave) occurred in the project area. Cholla pollen was noted in 32.1 and 72.7 percent of features from AZ U:10:236 (ASM) and AZ U:10:310 (ASM), respectively, but seeds were absent, suggesting that while the prepared buds were being consumed, they probably were not being roasted/steamed at the sites.

As discussed in the findings from the adjacent Salt Gila Aqueduct project (Sires 1983:65-67), the current project area in the Queen Creek delta today likely bears little resemblance to what was present when the prehistoric sites were occupied, when higher plant species density and diversity would have been present. A lowered water table, paired with disruption of natural drainage patterns, dam construction, ground leveling, grazing, and road grading has modified the local landscape. Prehistorically, the environment would have been significantly more hospitable, with wild plant foods widespread (Sires 1983:73-74), and with trees providing resources and shade. The prehistoric environment also would have allowed the establishment of seasonally present water catchment basins and what probably were permanent or near permanent wetlands along the nearby streams and washes. Despite the lack of irrigation systems at these sites, water availability was sufficient to enable the population to practice runoff water agriculture where maize, cotton, squash, and beans were cultivated. This kind of dry farming benefited from water storage features, which were identified from approximately 6000 BC to historic times in the Southwest (Crown 1987).

Two water features—one at each site—were elliptical basins (Figures 3 and 4) that likely served the domestic needs of a small group of people at each site over a relatively short period of time, probably within one decade. Natural inlet channels were identified for each feature, with the AZ U:10:310 (ASM) basin fed by a natural stream channel likely prone to flooding during the summer monsoon. A lens of fine charcoal in the upper fill of the AZ U:10:236 (ASM) catchment basin Feature 7 suggests *in situ* burning of plant material, possibly as part of periodic cleaning of unwanted vegetation. Two radiocarbon samples from the burned stratum of this feature were dated, and results indicate a middle Sedentary to early Classic Period (AD 1025-1270) use of the feature (Table 1, Figure 2). The length of time the catchment basins stored water would have been short, as suggested by the lack of micro-invertebrates, and because they relied on storm runoff, they probably provided a temporary local water source for residents primarily during the summer rainy season. Similar water catchment basins and large reservoirs have been identified at sites investigated for the Salt Gila Aqueduct project (Dart 1983). Generally, water storage to catch run-off and slope wash in other bajada locations is documented throughout Arizona (see Bayman 1993; Crown 1987).

Table 2. Structure Attributes

Site	Structure Feature Number	Structure Type	Associated Hearths?	Length (m)	Width (m)	Feature Area (sq. m)	Burning observed?	Floor associations and Refuse characterization
236	1	House-in-pit	Yes	4.72	2.98	5.88	Some burning; Partially oxidized floor	Primary and secondary refuse
236	2	Adobe-lined pit structure	Yes	6.96	5.33	29.43	Intense burning; Charred wall fall, oxidized floor	Primary and secondary refuse
236	3	Undefined structure	No	3.93	2.58		Not burned	Primary and secondary refuse
236	4	Undefined structure	No	2.67	1.8		Not burned	Primary and secondary refuse
236	14	Undefined structure	Yes	3.9	3.28		Some burning; Traces of burned wall fall	Primary and secondary refuse
236	15	Pithouse	No	4.86	3.48	12.22	Some burning; Partially oxidized floor and fill	Primary and secondary refuse
236	16	Undefined structure	Yes	2.4	1.85		Not burned	Primary and secondary refuse
236	17	Undefined structure	Yes	4.5	3.2		Not burned	Primary and secondary refuse. One miniature Gila Plain (Gila variety) jar recovered subfloor
236	26	Undefined structure	Yes	1.12	1.08		Not burned	Primary and secondary refuse
236	27	House-in-pit	Yes	5.08	4.84	16.08	Not burned	Primary and secondary refuse
310	4	House-in-pit	Yes	5	2.44		Intense burning; Heavily oxidized floor	De facto refuse; half of a large jar, possible secondary refuse dump following abandonment as a room
310	15	Undefined structure	No	2.75	1.7		Burned; Charred roof/wall fall.	Primary and secondary refuse
310	16	House-in-pit	No	4.37	4.25		Not burned	De facto refuse; Broken vessel, one piece groundstone
310	21	Pithouse	Yes	3.23	3.9		Burned; Charred roof/wall fall.	De facto refuse; Groundstone

\*Floors were irregular and missing data in many cases, making direct areal calculations inaccurate. We show feature area in sq m as a proxy for floor areas.

Finally, the botanical data generated from excavations indicate that the residents of these two sites were involved with procuring and processing cultivated resources through runoff agriculture from at least the Colonial Period (AD 750), peaking during the Sedentary Period (AD 950–1125/1150), and continuing through the early Classic Period (AD 1300). The amount and

variety of plant processing indicates a more diversified subsistence strategy relative to Queen Creek and potentially middle Gila River irrigation communities with whom they were interacting. This subsistence risk-buffering strategy may have become increasingly important region-wide during the late Sedentary to early Classic Period (ca. AD 1100–1300), characterized by variable



**Table 3. Ubiquity Values for Cultigens and Potential Cultivars (Flotation, Pollen and Phytolith Analyses, Main Features Only)**

Context and Type of Analysis		Features Sampled	Feature Occurrences					Ubiquity				
			<i>Cucurbita</i> sp. (Squash)	<i>Cylindropuntia</i> sp. (Cholla)	<i>Gossypium</i> sp. (Cotton)	<i>Zea mays</i> (Maize)	<i>Phaseolus vul-garis</i> (Beans)	<i>Cucurbita</i> sp. (Squash)	<i>Cylindropuntia</i> sp. (Cholla)	<i>Gossypium</i> sp. (Cotton)	<i>Zea mays</i> (Maize)	<i>Phaseolus vul-garis</i> (Beans)
Site 236												
	Flotation	28		1		9			3.60%		32.10%	
	Pollen	28	1	9	3	15		3.60%	32.10%	10.70%	53.60%	
	Phytolith	13				5					38.50%	
Site 310												
	Flotation	22	1		1	5	1	4.50%		4.50%	22.70%	4.50%
	Pollen	22	1	16	3	16		4.50%	72.70%	13.60%	72.70%	
	Phytolith	5				2					40.00%	

streamflow, damage to riparian areas and canal system features, and water scarcity issues along the middle Gila River (Woodson 2016).

## SOCIAL AND ECONOMIC ORGANIZATION

The subsistence information about the two sites identifies them as primarily farmsteads, with most of their site activities related to farming and food processing. Based on other studies of smaller farmstead sites, domestic inventories should have ceramic inventories that represent the range of vessel forms and types in use, albeit lower to vanishing amounts of ceremonial items and trade items (Stone 1993:72). Based on our own experience with domestic excavations throughout the greater Phoenix Basin, we do not expect all of the domestic inventories to show homogeneity with each other in artifact type and vessel forms. Instead, we argue that at the site level, comparing the ceramic inventories of individual domestic features, including midden deposits and structures, to each other can help identify key aspects of the site function, occupation span, and social connections that characterized these smaller farming sites. Domestic structures and their characteristics are also part of our study into the social and economic organization of these modest communities.

Walls of houses-in-pits were typically constructed of wooden posts that provided support for the structure and roof. The general rarity of postholes identified in Preclassic pithouses (even along the exterior of the house pit) suggests they were used perhaps for framing rather than for support. Given the variability of floor preparation in both types of houses, one can reasonably presume that the interior walls above the floor were generally unprepared. Many prepared floors of pit-

houses might exhibit a “lip” on the house pit wall. Classic Period pithouses, however, were made with solid adobe or adobe-lined walls, as well as adobe-plastered floors. Postholes appear to be more common in these Classic Period pithouses (Crary and Craig 2001:41–43). For our two sites, we identified a variety of domestic dwelling structures with variable preservation (Table 2). At AZ U:10:236 (ASM), structural features included 10 structures comprising one pithouse, one adobe-lined pit structure, two house-in-pits, and six undefined-type structures (Table 2). At AZ U:10:310 (ASM), four architectural features (one pithouse, one house-in-pit, and two undefined-type structures) were excavated (Table 2).

In general, AZ U:10:236 (ASM) had more categories of ceramic types and vessel forms than AZ U:10:310 (ASM), while the latter had greater amounts of ceramic materials per individual feature, but slightly fewer categories of ceramic types and vessel forms (Tables 4 to 7). Ceramic type counts and percentages for features at AZ U:10:236 (ASM) did not show significant differences in type diversity, although house-in-pits and undefined-type structures showed higher counts of indeterminate Red-on-buff, Sacaton Red-on-buff, Tusayan white wares, and Sacaton Red, than did pithouses (Tables 4 to 7). Additionally, the house-in-pits had more buff wares (many indeterminate buff ware), that could indicate an earlier occupation range, and a slightly longer occupation than the pithouses. Almost all of the investigated structures and middens had some amount of decorated ceramics; none stood out as being markedly different socioeconomically from one another in terms of access to decorated types or special vessel forms (Tables 4 to 5). Some items from northern Arizona communities, including Tusayan white wares, were found at AZ U:10:236 (ASM), and they were from multiple contexts, including two

Table 4. AZ U:10:236 (ASM) Percentages of Ceramic Types and Wares for Domestic Structures and Middens

	Indeterminate buff	Indeterminate R/B	Sacaton or Santan R/B	Sacaton Red-on-buff	Gila Plain	Gila Red	Sacaton Red	Dogozhi Black-on-white	Black Mesa Black-on-white	Sosi Black-on-white	Total Sherds	Buff Ware	Plain Ware	Red Ware	Tusayan White Ware
Dump/midden															
5	0.0	2.3	0.0	0.8	93.2	1.5	2.3	0.0	0.0	0.0	132	3.0	93.2	3.8	0.0
18	0.6	0.0	0.0	0.0	94.2	1.9	2.6	0.6	0.0	0.0	155	0.6	94.2	4.5	0.6
22	0.0	0.0	0.0	0.0	100	0.0	0.0	0.0	0.0	0.0	11	0.0	100	0	0.0
30	0.0	2.7	0.0	0.0	93.3	2.7	1.3	0.0	0.0	0.0	75	2.7	93.3	4	0.0
Adobe-lined pit structure															
2	1.6	0.9	0.0	0.4	95.2	1.0	0.9	0.0	0.0	0.0	795	2.9	95.2	1.9	0.0
House-in-pit															
1	0.0	0.6	0.6	0.6	95.3	2.4	0.6	0.0	0.0	0.0	170	1.8	95.3	2.9	0.0
27	0.0	0.9	0.0	0.0	96.2	0.0	2.8	0.0	0.0	0.0	106	0.9	96.2	2.8	0.0
Pithouse															
15	0.0	1.1	0.0	0.4	95	0.0	3.1	0.4	0	0	262	1.5	95	3.1	0.4
Structure, undefined															
3	0.0	2.5	0.0	0.0	92.6	1.2	0.0	0.0	1.2	2.5	81	2.5	92.6	1.2	3.7
4	0.0	0	0.0	0.0	100	0.0	0.0	0.0	0.0	0.0	19	0.0	100	0.0	0.0
14	0.7	1.3	0.0	0.7	94.9	0.3	2.0	0.0	0.0	0.0	297	2.7	94.9	2.4	0.0
16	0.0	0	0.0	0.0	95.7	0.0	4.3	0.0	0.0	0.0	23	0	95.7	4.3	0.0
17	0.0	0.3	0.3	0.0	98.5	0.3	0.8	0.0	0.0	0.0	393	0.5	98.5	1	0.0
26	0.0	0.0	0.0	0.0	75	25	0.0	0.0	0.0	0.0	4	0.0	75	25	0.0
Trenches (disturbed contexts)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	66.7	3	0.0	0.0	0.0	100
All Structures	0.7	0.9	0.1	0.3	95.7	0.7	1.3	0.0	0.0	0.1	2150	2.0	95.7	2.1	0.2
Grand Total	0.6	1.0	0.1	0.3	95.4	0.9	1.5	0.1	0.0	0.2	2523	2.0	95.4	2.4	0.3

structures (one pithouse, Feature 15, and one undefined-type structure, Feature 3), a midden deposit, and trench (disturbed) contexts (Tables 4 to 5). An obsidian projectile point manufactured from material associated with Government Mountain (San Francisco Peaks) from the far northern communities (Ancestral Pueblo, as with the Tusayan white wares) was recovered from another feature, an adobe-lined pit structure (Feature 2) (see Table 8 below).

The findings of these northern community materials in multiple contexts (rather than just a single domestic feature) at AZ U:10:236 (ASM) offers support that the relationship between communities was not limited to a single person or family. The finding of Cibola white ware (from northern communities) at the adjacent Si-

phon Draw site, consistent with earlier time periods, suggests that a relationship between these closely associated Queen Creek settlements and northern communities spanned multiple generations (Gregory 1984). Other Hohokam sites have shown similar connections with northern communities. At the site of Snaketown, Tusayan white ware was recovered from excavated contexts in association with Santa Cruz and Sacaton Red-on-buff, indicating a Sedentary Period acquisition, consistent with our findings at AZ U:10:236 (ASM) (Gladwin et al. 1937:212–215, Figure 105). The site of Pueblo Grande also had domestic features with Cibola white ware (Snowflake Black-on-white and unidentified variants), albeit in very small quantities (Schilz et al. 2011). These results offer support for low levels of interac-

**Table 5. AZ U:10:310 (ASM) Percentages of Ceramic Types and Wares for Domestic Structures and Middens**

	Indeterminate buff	Indeterminate red-on-buff	Sacaton Red-on-buff	Santa Cruz Red-on-buff	Gila Plain (Gila variety)	Gila Red	Sacaton Red	Total Sherds	Buff Ware	Plain Ware	Red Ware
Dump/midden											
2	5.7	3.3	0.8	0.0	87.8	2.4	0.0	123	9.8	87.8	2.4
3	2.1	8.5	2.1	0.0	87.2	0.0	0.0	94	12.8	87.2	0.0
5	0.0	24.4	4.4	0.0	68.9	2.2	0.0	45	28.9	68.9	2.2
22	0.0	15.0	0.0	0.0	85.0	0.0	0.0	20	15.0	85	0.0
House-in-pit											
4	10.2	12.8	3.8	0.5	70.8	1.2	0.7	421	27.3	70.8	1.9
Pithouse											
21	3.4	5.6	1.0	0.0	86.9	2.6	0.4	496	10.1	86.9	3.0
Structure, undefined											
15	9.9	23.9	0.0	0.0	66.2	0.0	0.0	71	33.8	66.2	0.0
16	6.7	8.0	4.0	0.0	73.9	7.1	0.3	326	18.7	73.9	7.4
All Structures	6.8	9.5	2.6	0.2	77.4	3.1	0.5	1314	19.0	77.4	3.6
Grand Total	6.1	9.5	2.4	0.1	78.6	2.8	0.4	1596	18.2	78.6	3.2

**Table 6. AZ U:10:236 (ASM) Ceramics Vessel Forms for Domestic Structures and Middens.**

	Bowl	Disk	Jar	Ladle	Scoop	Spindle whorl	Unknown/Other	Zoomorph	Grand Total
Adobe-lined pit structure	74		19	1			442		536
2	74		19	1			442		536
Dump/midden	30	1	11				234		276
5	11		6				78		95
18	15	1	4				100		120
22	1						10		11
30	3		1				46		50
House-in-pit	29		5				184		218
1	19		4				88		111
27	10		1				96		107
Pithouse	18		8				120		146
15	18		8				120		146
Structure, undefined	77		21		1	1	421	1	522
3	11		1				69		81
4	5		2				18		25
14	27		10				155	1	193
16	5						23		28
17	28		8		1	1	152		190
26	1						4		5
Grand Total	228	1	64	1	1	1	1401	1	1698



**Table 7. AZ U:10:310 (ASM) Ceramics Vessel Forms for Domestic Structures and Middens**

	Bowl	Jar	Jar with appliques	Modeled	Neckless jar	Scoop	Unknown/ Other	Grand Total
Dump/midden	34	8					294	336
2	21	2					119	142
3	4	3					102	109
5	7	3					50	60
22	2						23	25
House-in-pit	17	84	1				372	474
4	17	84	1				372	474
Pithouse	46	20		1		2	507	576
21	46	20		1		2	507	576
Structure, undefined	54	28		2	1	1	365	451
15	4						86	90
16	50	28		2	1	1	279	361
Grand Total	151	140	1	3	1	3	1538	1837

tion between northern communities and the Hohokam realm, although Gladwin and others (1937) note that the northern communities do not have Hohokam ceramics, so whatever the nature of the trade or exchange was, it does not appear to be reciprocal vessels.

The features at AZ U:10:310 (ASM) also showed a similar ceramic type diversity distribution to AZ U:10:236 (ASM), but houses-in-pits yielded higher counts and percentages of buff wares than either pithouses or undefined-type structures at this site. This finding may support a slightly earlier occupation for the house-in-pit, but it is difficult to know for certain given that many of the buff wares were indeterminate to type because of eroded surfaces. Although AZ U:10:236 (ASM) had more and better preserved domestic structural features than AZ U:10:310 (ASM), the four investigated structures at AZ U:10:310 (ASM) yielded much higher ceramic count totals than did the investigated structures at AZ U:10:236 (ASM) (Tables 4 and 5).

There was no obvious differentiation between the two sites in access to decorated types, but there were differences in the wares present within domestic structures. Because many of the features did not have enough materials for a statistically valid analysis, ceramic wares were evaluated as percentages per structure, which has the effect of weighting counts by total ceramics (Tables 4 and 5). Viewed this way, the structures at AZ U:10:310 (ASM) had much greater percentages of buff wares than did structures at AZ U:10:236 (ASM). Although both red and buff wares were produced in the middle Gila River valley, the differences in ceramic materials and method of manufacture of each ware suggests they would have been made by different specialists; it is possible that the residents of these sites maintained varying degrees of economic ties to different specialist communities to obtain their preferred wares.

We do not make the assumption here that the differences between the exchange networks for the two sites are occurring with contemporaneous occupation within each site. Given the lack of organized spatial arrangement of structures within the sites and the range of dates recovered from different structures, the individual structures could represent different occupation episodes within each site and between the sites (Figures 3 and 4, Table 1), and the change in networks is likely linked to changes over time at the two sites. Most of the features with chronometric dates at AZ U:10:310 (ASM) show a Colonial Period occupation with some Sacaton phase represented (Table 1). For AZ U:10:236 (ASM), most of the features indicate Sacaton and Soho occupation (Table 1). The feature-based chronologies from both sites is consistent with different, albeit overlapping, temporal occupations.

Abbott (2009), in his examination of long-term specialization in the greater Phoenix Basin (which includes the lower Salt and middle Gila River valleys), argues that changes in exchange networks occurred over time, favoring localized production of ceramics in the Classic Period and a decline in the exchange of ceramics produced on the middle Gila. This process may be reflected by the residences at both sites. Most importantly, much of the plain and red ware, and some of the buff ware, in the project area sites was tempered with locally available Queen Creek–Petrofacies D, suggesting that at least some of these vessels were procured from producers in the vicinity of the sites.

Finally, while AZ U:10:310 (ASM) had almost three times as many ceramics as AZ U:10:236 (ASM), the latter had a higher diversity of identified vessel forms—10 types of distinct vessel forms in comparison to the former's seven vessel forms (Tables 6 and 7). The higher number of vessel forms, including plates and scoops, at

**Table 8. EDXRF Obsidian Samples and Sourcing Results by Site, Feature Type, and Context**

Site/ Feature No.	Feature Type and Context	Artifact Type	Artifact Count	Source
AZ U:10:236 (ASM)				
17	Undefined structure, undifferentiated	Bipolar core	1	Superior
2	Adobe-lined pit structure	Flake	6	Sauceda - South
2	Adobe-lined pit structure, subfloor	Projectile point	1	Government Mountain
AZ U:10:310 (ASM)				
37	Undefined pit, undifferentiated	Flake	1	Superior
21	Pithouse, undifferentiated	Flake	3	Superior
4	House-in-pit, cultural material present	Unmodified nodule	1	Superior
4	House-in-pit, roof/wall fall	Flake	1	Superior
4	House-in-pit	Flake	2	Superior

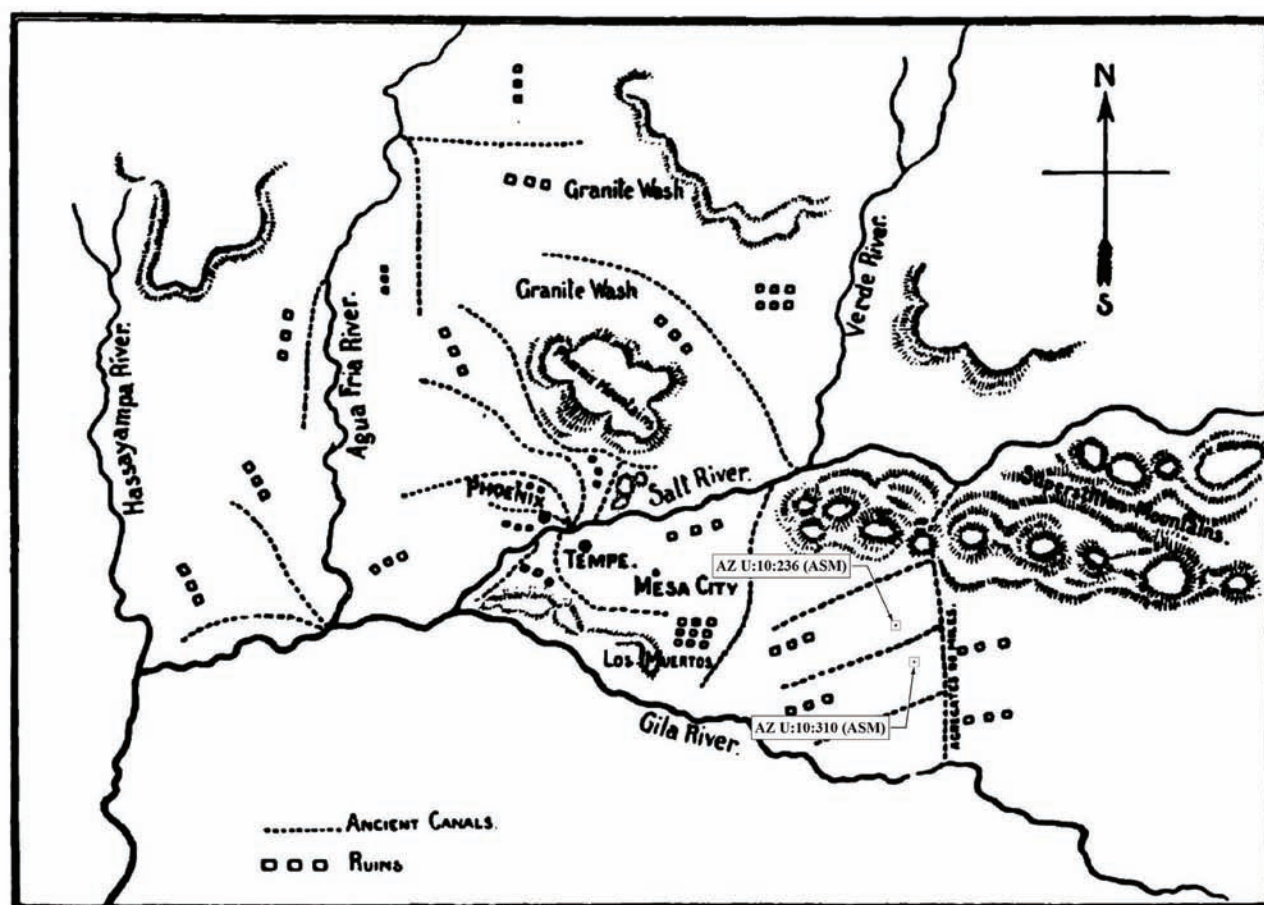
AZ U:10:236 (ASM) suggests the residents of this site might have engaged in a wider range of activities than did the residents of AZ U:10:310 (ASM), and could also indicate a greater length of site occupation over time, especially if we understand that AZ U:10:236 (ASM) is likely a continuation of earlier directly adjacent settlement at the Siphon Draw site. At both sites, jars and bowls would have provided the bulk of domestic containers; large, narrow-necked jars, which could have been easily sealed to protect their contents, would have made ideal storage vessels, while smaller jars with wider orifices would have been used for cooking, carrying, and other domestic functions. Similarly, bowls in a range of sizes would have been used for food preparation and serving, while large, shallow bowls might have been used in grain processing activities such as drying and threshing. The wear pattern found on many Hohokam scoops suggest they were used as their name implies, but others might have served as cooking implements or drinking vessels. Unfortunately, residue analyses have not been consistently carried out on miniature vessels, a process that would help identify or at least narrow down their potential categories of practical use. For now, we can only speculate based on their domestic contexts, that these miniature vessels might have been used as containers for spices such as salt, minerals such as ochre, or medicine; some might have been made to be used as toys or as novelty items.

Other than the observed disparity in vessel forms and the differences in ware distribution, the ceramic materials associated with domestic features suggest that both AZ U:10:236 (ASM) and AZ U:10:310 (ASM) shared broadly similar economic and social organization. Both sites had defined burial spaces containing secondary cremations, multiple types of structures including pithouses, houses-in-pits, and undefined forms, as well as a range of extramural activity areas including thermal features, undefined pits, and trash deposits. At each site, the proportion of wares and types recovered from these features was comparable to that recovered

from the site as a whole. The size of the ceramic collections, the multiple burials, the number and types of features, and the relatively modest number of structures at the sites suggest they might have served as farmsteads, perhaps used as part of a broader land-use and subsistence strategy, over a long period of time. In spite of the apparent differences between the two sites, their ceramic inventories and their implied range of activities are consistent with those of other small long-term habitation sites practicing non-irrigated agriculture above the floodplains and in the bajadas peripheral to the Hohokam core areas from the Pioneer through early Classic Periods (Gregory 1991; Stone 1993).

### Ceramic Production

Beyond agricultural pursuits, which represent the primary identified activity of the two farmstead sites, there is some evidence for ceramic production in the project area. Although no features specific to ceramic production such as firing pits, puddling pits, or potential mixing wells were identified at either site, other findings may be interpreted as evidence of ceramic production in the project area. These include several pieces of unfired clay recovered from AZ U:10:236 (ASM) and AZ U:10:310 (ASM), limonite, polishing stones, and schist. Small shaping tools often are used in handmade pottery and we may have recovered some possible instances at these sites. Shaping tools are sometimes identifiable by wear patterns, although their function as ceramic shaping tools is difficult to demonstrate when not supported by their recovery contexts (Rice 1987). Two possible shaping tools consisting of small, fired clay cylindrical objects with ends that appear almost like the exaggerated ends of dog bones, were recovered from trench (disturbed) contexts at AZ U:10:310 (ASM). Hau-ry (1976:Figure 13.26) identified several similar cylindrical clay objects with variously shaped ends at Snake-town, noting that they were typically worn and not fired hard; he did not speculate on their use. Although their presence at the site is intriguing, unfortunately their re-



MAP OF THE GILA AND SALT RIVER VALLEYS, SHOWING SITE OF ANCIENT CANALS AND RUINS.

Figure 5. An historical (Robinson 1893:696) map showing the location of “ancient canals” that could represent trails, and the approximate locations of the farmstead sites.

covery contexts and relatively poor condition precluded a definite association of these items with ceramic production.

Another indirect line of evidence—temper source identification—remains the most useful technique to characterize prehistoric ceramic production and exchange across the Hohokam interaction sphere. Although compositional analysis can provide specific mineralogical provenience for clays as well as tempering materials in pottery, microscopic examination of a clean sherd break (non-mortuary assemblages only) allows identification of the lithic inclusions in the temper, which can be matched with known petrofacies in the area of study to provide a specific location for the source of the temper and a general location of the locus of manufacture (following Arnold 1985). For the current study, binocular microscopy at 10X magnification was used to identify temper categories. The current study used the model for temper identification originally developed by Schaller (1994), built upon by Miksa (1995), and utilized extensively by Abbott (1999, 2000, 1994) and others (Burton et al. 2003; Montague-Judd et al. 2003). The temper categories and their breakdown by wares (buff, plain, and red) were very similar overall. These findings

suggest a remarkable consistency in exchange and pottery acquisition through the late Sedentary to early Classic Period transition. The majority of the ceramics were tempered with middle Gila micaceous schist, consistent with their acquisition from the middle Gila production communities. Additionally, where more specific identifications could be made on the basis of sand inclusions, temper identifications could be sorted into individual petrofacies categories that all fit within the larger Gila Petrofacies Group (Miksa 2001). Limonite and hematite ochre were present at the sites, and could have been used for ceramic decoration/production and/or personal decoration.

For AZ U:10:236 (ASM) and AZ U:10:310 (ASM), the majority of the ceramics did not have enough sand included with schist temper to allow for petrofacies identification. In those cases where it was possible, however, the most common category was Queen Creek-Petrofacies D, a distinctive rhyolitic-heavy schist temper, described as having rhyolitic inclusions that are maroon in color (see Ownby 2014a, 2014b). These findings suggest a consistency in ceramic exchange and acquisition in the project area through the Sedentary–Classic Period shift. The identification of Queen Creek–Petrofacies D temper



in ceramics dating to that period at the two sites is consistent with Abbott's general production and exchange model (2009), with the apparent increase in use of local petrofacies for ceramic manufacture during the sites' period of occupation, supporting an increase in localized production zones into the early Classic Period. Furthermore, the identification of Queen Creek as a locus of specialized red-on-buff production, with a significant increase during the late Sacaton and Soho phases of the late Sedentary Period and early Classic Period, fits with the potential supply of Queen Creek red-on-buff ceramics to the site's occupants (Lack et al. 2012: 37). Lack and others (2012) findings came after an earlier identification by Crown (1984b) of a distinctive schist source in the Queen Creek drainage based on X-ray fluorescence analysis of the pottery from the SGA project.

The ceramic analysis results at both AZ U:10:236 (ASM) and AZ U:10:310 (ASM) indicate that local producers utilized this tempering material for the manufacture of red, plain, and buff wares close to the source. The high incidence of Queen Creek temper in the plain ware assemblage in particular suggests that this source was used by producers supplying the sites with much of their utilitarian vessels during both the Sedentary and Classic Periods. The rhyolitic schist characteristic of Queen Creek–Petrofacies D also was noted crushed into the thick red slip of Sacaton Red sherds recovered from the two sites, suggesting that this ceramic type also might have been manufactured in the vicinity.

One important ceramic-based future research opportunity identified in the current analysis arose in the potential for using a distinctive red ware, Sacaton Red, for describing local production as it fit into the transitional late Sedentary to early Classic Period. During the course of analysis, Sacaton Red was identified in larger relative frequencies than have been found elsewhere in the Hohokam core area (Gladwin 1937). The Sacaton Red sherds from the current study, upon examination with binocular microscopy, were often tempered with Queen Creek–Petrofacies D sands and the thick distinctive raspberry slip had inclusions of the rhyolite found within the project area and its environs. Based on these observations, a surface spectroscopic analysis that is non-destructive (such as PIXE) could be used to compare the slip from the Sacaton Red sherds from the current sites to those recovered from other areas, such as Snaketown, to see if they were being manufactured from the same (likely local to Queen Creek) source. If future research indicates that Sacaton Red was locally produced, it would be consistent with the accepted model for the Sedentary to Classic transition, in which communities shifted to local production for local consumption.

### Exchange Networks

Although both sites show occupation from the Colonial through early Classic Periods (and earlier for AZ U:10:310 [ASM]), the two sites show evidence of par-

ticipating in different exchange networks for both ceramics and obsidian. As first suggested by David Gregory (1984:168) in his analysis from the SGA project excavations at AZ U:10:6 (ASM) (Siphon Draw site), in the late 1800s Robinson (1893:696) may have mapped some trail corridors between the Goldfield and Superstition mountains and erroneously labeled them as "canals" (Figure 5). The middle branch of the southeastern group of "canals" was projected to be located approximately 1 km from AZ U:10:6 (ASM), and by extension AZ U:10:236 (ASM) (Gregory 1984:168). Although some Hohokam canal segments that have been identified along Queen Creek (Dart 1983, 1986) are approximately at the same orientation as the southwestward-trending "canals" depicted on the 1893 Robinson map located south of AZ U:10:310 (ASM), no canals have been found in the area immediately south of the Superstition Mountains (Woodson 2010), and this environment would not have been conducive to canal irrigation. Traditional songs associated with both the Tohono O'odham and the Akimel O'odham describe traditional trails associated with the salt pilgrimages, but also likely associated with the procurement of ceramic tempering materials, obsidian, turquoise, and shell (Darling and Lewis 2007:135; Underhill 1993:111) (see Figure 6). Based on the potential of these trail corridors, it is possible that these otherwise marginal communities to the canal irrigation zones may have played roles in both local and extra-local (beyond central Arizona) exchange.

For the ceramic evidence, AZ U:10:236 (ASM) had a small amount of Tusayan white wares from northern communities, including Black Mesa Black-on-white, Sosi Black-on-white, and Dogoszhi Black-on-white recovered from disturbed (trench contexts) and also primary feature contexts (undefined-type structure, pithouse, and midden contexts). The chronological range of Black Mesa Black-on-white falls within the Sedentary Period, while the range for both Dogoszhi Black-on-white and Sosi Black-on-white falls within the Sedentary–early Classic Period (Hays-Gilpin and van Hartesveldt 1998). As noted previously, these wares accord with the primary occupation of the site. Cibola white wares (dating slightly earlier), and also from northern communities, also were found at adjacent AZ U:10:6 (ASM), offering support for exchange between northern communities and the current settlement spanning several generations. The ceramic complex found at both sites is consistent with a primary occupation during the Sedentary to early Classic Periods. Overall, AZ U:10:236 (ASM) shows some affiliation and connection with northern communities, and both sites had the expected local Hohokam connections indicated by buff ware and Sacaton Red.

Obsidian is another material, like ceramics, that can be evaluated to map exchange networks for the two sites (Loendorf 2010). Based on Shackley's (2005) study of obsidian sourcing, procurement, and exchange (often

as finished points) across the Southwest, the acquisition of obsidian does not always match a simple distance-decay model. Instead, more complex means of procurement and exchange often meant that obsidian was acquired in different ways as a raw material, but also often as a finished product from much farther locations. At AZ U:10:310 (ASM), obsidian was apparently acquired from the closest source while at AZ U:10:236 (ASM), consistent with ceramics, it was acquired from far and near sources. At AZ U:10:236 (ASM), obsidian was procured from a variety of sources both nearby and distant, respectively—including Superior, the Saucedo Mountains, and Government Mountain in the San Francisco Peaks area—while at AZ U:10:310 (ASM), all obsidian originated from the closest source (Superior) (Loendorf and Fertelmes 2016) (Table 8). We cannot tell whether the sole Government Mountain serrated projectile point was imported as a finished product by the inhabitants of site AZ U:10:236 (ASM), although the serration of the point is consistent with Sedentary Period Hohokam production. Additionally, the flaked artifacts recovered from AZ U:10:236 (ASM), which originated from the Saucedo Mountains, are difficult to assess as part of an identified production sequence (see Table 8). The different sources used at this site, however, can be assessed on the basis of temporal variation identified by Loendorf (2010) for the Gila River settlements. Loendorf (2010) found that the Superior source was associated with the Preclassic Period, with the Saucedo source becoming more prominent during the Classic Period. For AZ U:10:236 (ASM), radiocarbon and dated ceramic types are consistent with primary occupation during the late Sedentary and early Classic Periods, a pattern apparently matched by the obsidian sourcing study. And the predominant period of occupation at AZ U:10:310 (ASM) during the Colonial and early Sedentary Periods is consistent with the exclusive use of obsidian at that site from the Superior source.

Finally, the sourcing of basalt used to create ground stone artifacts, also has become a valuable way of examining exchange systems within the greater Phoenix Basin. Vesicular basalt sourcing efforts for the current study indicated that all samples from both sites belonged to the same geochemical group, although the results could not be assigned to a particular source. Vesicular basalt was likely from a source local to the project area, such as the Goldfield and/or Superstition mountains (Fertelmes 2016).

Based on the potential for connecting trails and exchange systems, the sites within the Queen Creek delta may have been situated along or in proximity to these routes, providing site occupants with access to traveling groups, their ideas, and items for exchange (Bahr et al. 1997; Darling and Lewis 2007) (Figure 5). While this likely would not have been the primary method of contact or exchange available to the site occupants, it is possible that sites like AZ U:10:236 (ASM) and AZ

U:10:310 (ASM)—with significant agricultural resources and water catchment basins—provided locations of respite, with opportunities to exchange ideas and materials. Trail corridors extending north from the middle Gila River to the lower Salt River show decreased significance of use during the Classic Period, possibly associated with the collapse of red-on-buff pottery distribution and the ball court system (Woodson 2016:138), and concurrent with the abandonment of AZ U:10:236 (ASM) and AZ U:10:310 (ASM). Following this period of stability along the Salt River during the early Classic Period, stream flow patterns show a shift again during the late Classic, indicating worsening Salt River conditions compared with improving Gila River environments. This shift in environmental conditions potentially resulted in a new adaptive cycle with reversed populations shifts—from the lower Salt River to the Gila River—and a reorganized society (i.e., historical Akimel O’Odham) beginning in the late 1380s (Loendorf and Lewis 2017:131, 133), likely further decreasing the use of these trails. While in use, however, the trails would have provided a connection to nearby ball court and platform mound sites near the Santan Mountains along the middle Gila River such as the Upper and Lower Santan Sites.

## CONCLUSIONS

Of the two Queen Creek farmstead sites described here, similar ceramic inventories were identified, consisting of some locally produced pottery including red-on-buff wares largely dating to the middle Sedentary. Red wares also were identified from the sites, including some plain red ware variants that may have been locally produced based on temper inclusions and slip composition. Finally, the residents had consistent access to farther-flung exchange networks for ceramics outside the Phoenix Basin, including the northern Arizona communities that produced the Tusayan white wares recovered from AZ U:10:236 (ASM), a pattern also reflected in the sole serrated obsidian projectile point made of Government Mountain obsidian recovered from the same site.

In summary, the evidence for subsistence, ceramic production, and exchange networks suggests that the two sites were relatively small farming communities occupied primarily during the Colonial, Sedentary and early Classic Periods, although the sites show a long history of periodic reoccupation. These two farmstead sites, although modest, apparently maintained strong ties to larger communities within the Queen Creek delta floodplain and middle Gila River, from whom they procured the majority of their ceramic vessels, but there is evidence that they also manufactured some of their own pottery using locally available raw materials. Questions remain about the degree of local ceramic production, although current evidence supports the localized sourcing of both plain and potentially red wares. Also, despite

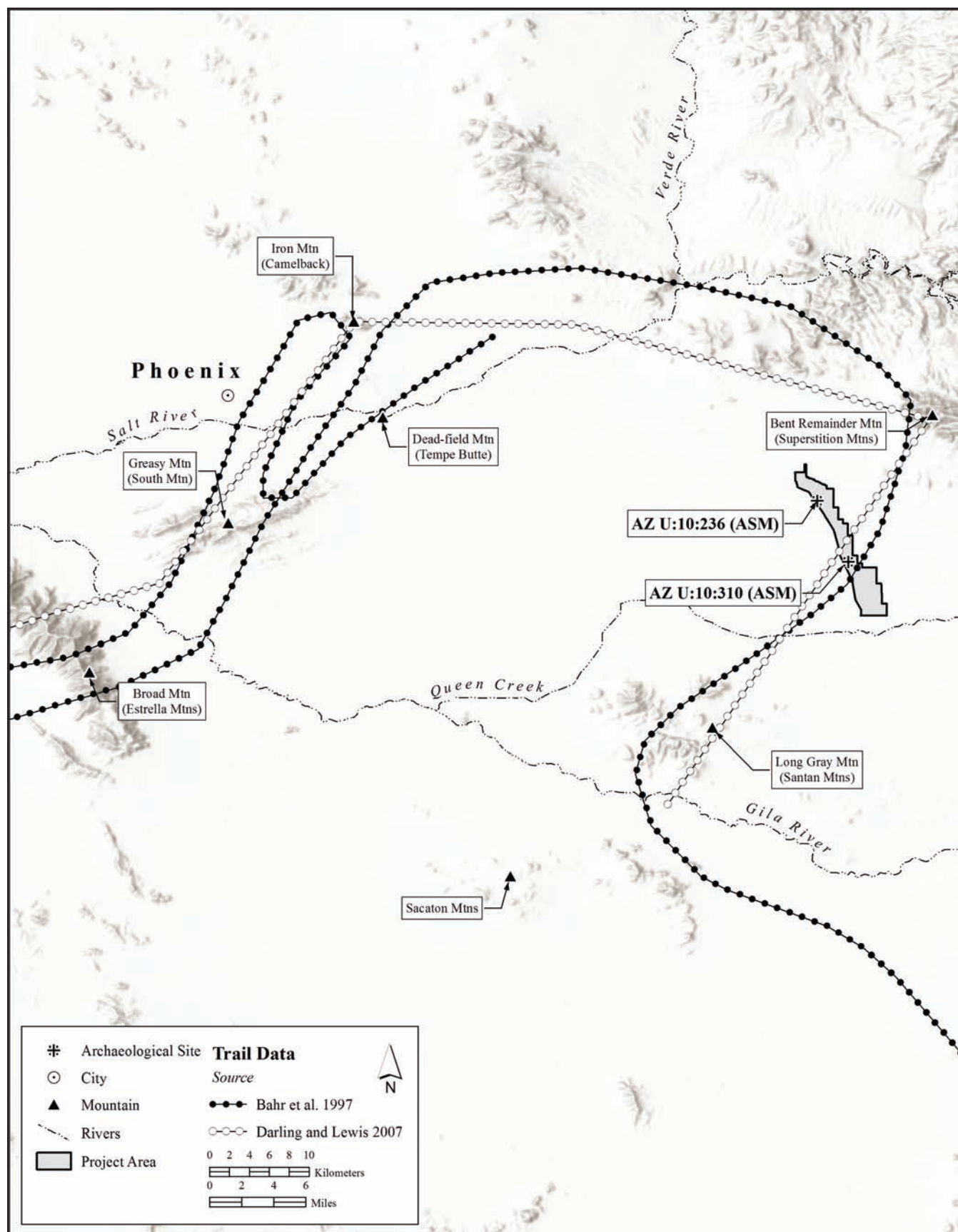


Figure 6. The traditional Akimel O'odham Oriole song routes and the two farmstead sites.



their dependence on relatively locally produced vessels, residents of at least one site, AZ U:10:236 (ASM), acquired modest amounts of obsidian and some decorated pottery from communities and sources that were farther removed. The ceramic data support some degree of contact with communities both north and south of the Salt River for both sites; however, whether this contact was through direct trade or indirect via intermediary groups is unknown. Ultimately, although both sites illustrate heavy reliance on local acquisition and production—a strategy that appears to have increased later in their occupations—they also show that larger network exchange was still taking place, even for small-scale communities outside of major riverine canal systems.

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# THE ARCHAEOLOGY OF LONE BUTTE WASH AND GILA CROSSING OF THE MIDDLE GILA RIVER VALLEY

Teresa Rodrigues  
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## ABSTRACT

*The authors examine social interaction and integration among communities of the Lone Butte Wash and the Gila Crossing Ballcourt Village near its confluence with the Gila River. The Lone Butte Wash is the terminal segment of the Queen Creek and is situated in the Gila River Indian Community in central Arizona. This paper describes what is known of the occupational history of Lone Butte Wash and the Gila Crossing Ballcourt Village, the largest prehistoric and historic settlement along this segment of Queen Creek. Though the site has been the subject of archaeological investigations and oral historians for more than two decades, archaeological fieldwork and archival documents have only recently been synthesized. This work has substantially improved our understanding of the prehistoric and historic use and occupation of Lone Butte Wash and its relationship with other sites along the Gila River and Queen Creek.*

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## INTRODUCTION

This paper integrates survey and limited excavation data from along Lone Butte Wash with excavation data from the Gila Crossing Ballcourt Village at the confluence of Lone Butte Wash with the Gila River to summarize settlement and land-use patterns. Lone Butte Wash is the little known, western terminal segment of Queen Creek, and the current archaeology of the area is based primarily on 100-percent coverage surveys (32,377 acres) and archaeological reconnaissance surveys (2,830 acres), which have covered 93 percent of the 38,570 acre Lone Butte Wash study area. We also draw on the results of several archaeological excavation projects, and information obtained from historical documents, some of which include oral histories from members of the Gila River Indian Community (GRIC). Research discussed in this paper compiles work conducted over more than two decades, the majority of it by the Cultural Resource Management Program (CRMP) of the GRIC.

People used the Lone Butte Wash area from at least the Middle Archaic through the Hohokam Classic period, and again during the historical period through the present day (Plumlee 2013; Plumlee and Loendorf 2013; Rice 2003; Rice et al. 1983; Rodrigues and Landreth 2015). We review land use and resource acquisition along Lone Butte Wash and at the Gila Crossing Ballcourt Village, the largest, most extensively occupied and thoroughly excavated site in the study area.

Research within the Phoenix Basin has provided evidence that prehistoric people interacted closely with neighbors along shared waterways (e.g., Abbott 2000; Loendorf 2010; Woodson 2016a). Though much effort has been directed toward settlements and social structure along the large Salt and Gila Rivers, social networks and integration along smaller waterways are less well understood. With this in mind, we focus on two primary questions. First, what resources were available and utilized within the study area through time? Second, how did the Gila River and Queen Creek water ways affect the interactions of people living at Gila Crossing?

This research contributes towards an understanding of the relationship between smaller sites along Lone Butte Wash, which are primarily resource collection sites, and surrounding large habitation sites. Given the rich resource base found along the wash, it is a likely subsistence locus for people from the surrounding settlements. We look particularly at the Gila Crossing site (GR-1112), located at the confluence of Lone Butte Wash and the Gila River. We also examine historical period uses and settlement of Lone Butte Wash.

## ENVIRONMENT

Lone Butte Wash is situated in the Basin and Range physiographic province. Environmentally it is character-

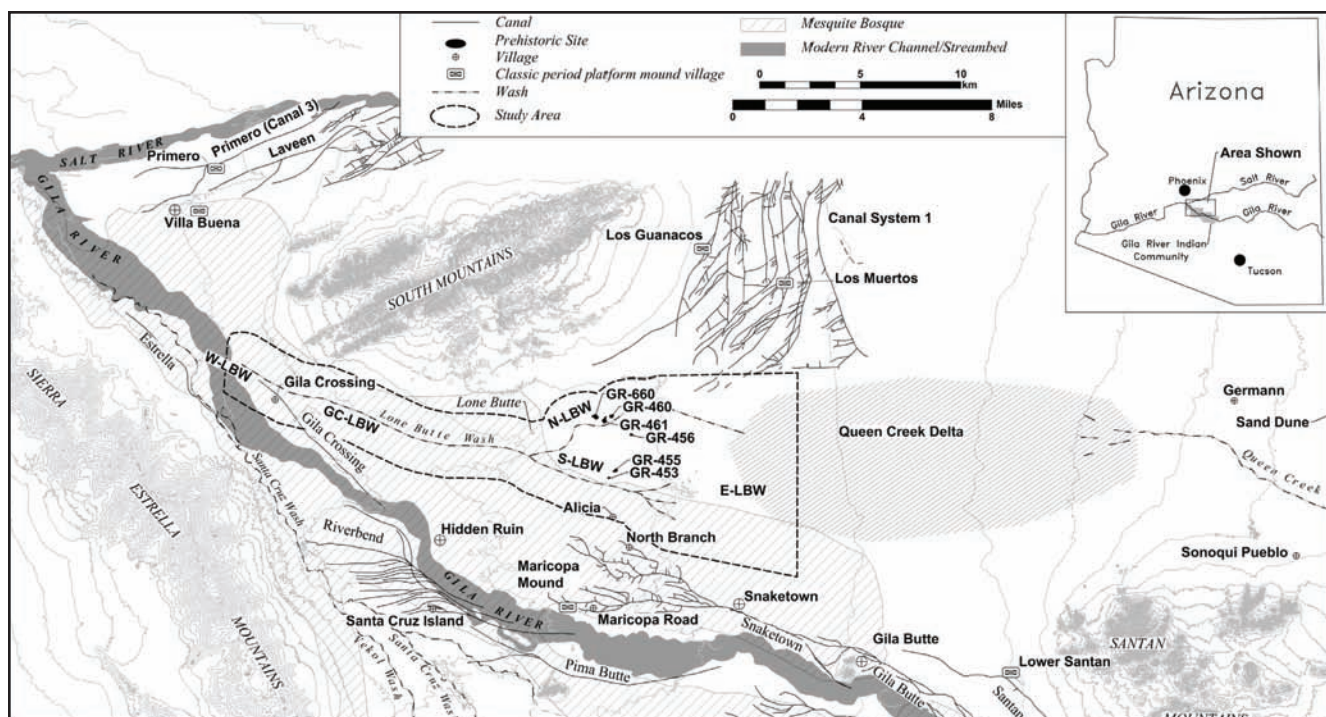
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ized by high temperatures and aridity (Waters 1998). Vegetation is typical of the Lower Colorado River Valley subdivision of the Sonoran Desert scrub biotic community (Brown and Lowe 1980, 1994). The local resource base is richly diverse, and the Wash is bordered by bosques and grasslands. During the historical period the landscape of Lone Butte Wash was modified with a loss of grassland and mesquite bosque in response to increasing habitation and new land use practices, such as ranching and harvesting mesquite wood during the early 1900s (Rice et al. 1983).

Lone Butte Wash is situated solely on the GRIC and is the western end of the Queen Creek drainage. The northern and eastern edges of the study area roughly follow the GRIC boundary; the remainder of the study area is delimited by the Lone Butte watershed. Due to the loss of surface flow within the Queen Creek delta (Babcock and Cushing 1952; Lee 1905:103), Lone Butte Wash is not contiguous with the main body of Queen Creek, but instead extends approximately 28.2 kilometers, from the point where the surface flow reemerges at the west end of the delta (for a discussion, see Schaafsma and Countryman, this issue), to its confluence with the Gila River (Figure 1). Over this distance, the 1.6-kilometer wide valley formed by Lone Butte Wash drops in elevation from 362 to 340 meters. This valley is bounded on the north by the base of South Mountain and on the south by a low ridge capped by aeolian dunes that roughly parallels Beltline Road (Figure 1).

The eastern portion of Lone Butte Wash has a dendritic pattern of small washes feeding two primary branches. Prior to modern flood control, the northern branch was the path followed by flood waters from Weekes Wash, Siphon Draw and Queen Creek, as they flowed to the Gila River. These waters periodically soaked the northern part of the delta area, resulting in wide grasslands. The southern branch is the result of the Queen Creek underflow, re-emerging from the western edge of the delta and forming wetlands. The water from these coalesced, forming the south branch and flowed west. These branches merge at Lone Butte (hence the modern name of this reach) into a single channel, which follows a relatively straight west-northwest course to the confluence with Gila River. Prehistorically, most of this section was likely an episodic stream. Historically subsurface water was shallow and, in several locations, reached the surface, forming springs, including a spring 2.4 kilometers east of Gila Crossing. Pee Posh oral tradition describes this spring as Coyote's swimming pool (Lee 1904; Spier 1933:350-351). As late as 1919, the general vicinity along the river, known as the Mass Acumult District (Committee on Indian Affairs House of Representatives United States Congress 1919:139) also contained sloughs, springs, and, approximately 3 miles south of Lone Butte Wash, a 4,000-foot long, 6-foot deep lake (Lee 1904:10, 25). Studies concluded that the source of this water was a combined underflow from the Gila and Salt Rivers, as well as Queen Creek (Lee 1904:26). Lee also pointed out that in the lowlands of the western third



**Figure 1. Lone Butte Wash and Surrounding Area.**

W-LBW: West end of Lone Butte Wash;  
N-LBW: North channel of Lone Butte Wash  
E-LBW: East end of Lone Butte Wash.

GC-LBW: Main channel of Lone Butte Wash  
S-LBW: South branch of Lone Butte Wash;

**Table 1. Cultural Components within the 184 Sites Associated with the Lone Butte Wash**

	Archaic	Early Ceramic	Pioneer	Colonial	Sedentary	Classic	Undefined Prehistoric	Historic	Total
Agricultural							1	1	2
Artifact Scatter	30	19	10	37	27	14	36	44	217
Habitation	1	1		1	1	1	1	31	37
Historic Linear Feature								5	5
Lone Butte: Ground-stone Quarry, Petroglyph site, and Shrine	1						1	1	3
Ballcourt Village: GR-1112					1	1		1	3
<b>Total</b>	<b>32</b>	<b>20</b>	<b>10</b>	<b>38</b>	<b>29</b>	<b>16</b>	<b>39</b>	<b>84</b>	<b>268</b>

of the GRIC, the great abundance of surface water resulted in numerous bogs and sloughs. Lee (1904:25) notes that "At the edge of one of these sloughs, near the village of Gila Crossing, large springs were noted boiling up from the sands below. One spring had a discharge of about 25 gallons per minute. These springs, together with the large quantities of water always present in the sloughs and the lake, show how readily the water moves in underflow."

The Gila Crossing site is situated near the confluences of the Lone Butte Wash, Santa Cruz Wash, and the Salt River with the Gila River. Shallow sub-surface bedrock between South Mountain and the Sierra Estrella Mountains forces groundwater to the surface, providing reliable domestic and agricultural water. Resulting riparian areas contained many resources and would have attracted larger game from the nearby mountains providing hunters access to upland game much closer to their homes—particularly during the driest months. Additionally, in the area around the confluences of these waterways, the land rises relatively quickly away from the channels. This rapid elevational change, combined with frequent area-wide flooding of arable lands (Hackenberg 1974:49, 141), made canals largely impractical although floodwater farming was viable. Indeed, between Hidden Ruin and Gila Crossing, a distance of 10 km, only one possible prehistoric canal alignment has been suggested (Woodson 2010: Figure 1) as passing to the east side of Gila Crossing. Two historic canals, the Hoover Ditch and the Co-operative canal, were excavated in the 19th century after the cessation of flooding on the Gila River due to the upstream diversion of water by Euroamerican farmers (Southworth 1919; Wilson 2014).

Besides environmental resources, the adjacent mountains also contain significant cultural resources including shrines, prehistoric and historic rock art sites, and trails (Bostwick 2002; Bostwick and Howard 1992; Darling 2004, 2009; Darling and Eiselt 2003; Darling and

Lewis 2007; Medchill and Darling 2017a, 2017b; Medchill and Tiedens 2016; Russell 1975; Woodson 2016b, 2017). The Komatke trail, an important route for the trade of salt, shell, and obsidian (Darling and Lewis 2007), runs west from Gila Crossing and through a pass in the northern part of the Sierra Estrella (Winters 2012:466). This trail was used by Kino and Manje in early March 1699 (Burrus 1971:425-426).

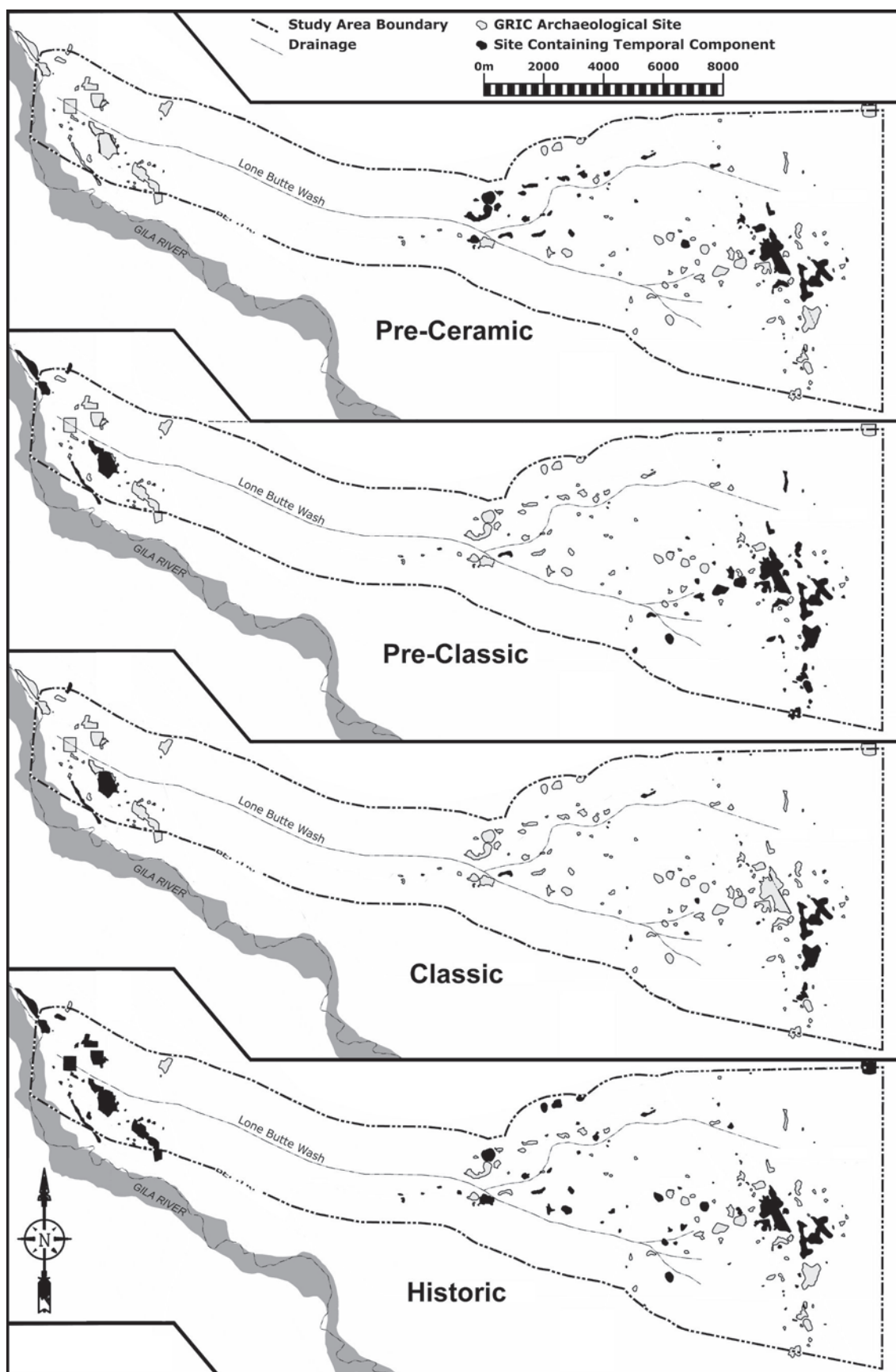
## ARCHAEOLOGY ALONG LONE BUTTE WASH

The Cultural Resource Management Program at GRIC has identified 184 sites within the Lone Butte Wash study area (Figure 2) and 846 isolated occurrences (IOs). Many of the sites consist of multi-component artifact scatters, as enumerated in Table 1. Site components represent different temporal occupations of the same space and were identified using diagnostic artifacts or absolute dates; temporal components (n=267) outnumber the total number of sites (n=184). Temporal components identified include the Archaic, Early Ceramic, Pioneer, Colonial, Sedentary, Classic, and Historic periods (for a chronology see Schaafsma and Countryman: Figure 3, this issue).

### The Middle Archaic through Early Ceramic Periods

Middle and Late Archaic (ca. 5000 to 1500 BC and 1500 BC to AD 1 respectively) settlements in the Phoenix Basin are typically split between resource collection areas in the uplands and habitations close to riverine resources (Hackbarth 1998:134; Huckell 1984). The Middle Archaic life way likely consisted of small, extended family groups following a mobile lifestyle (Bayham et al. 1986; Loendorf 2012; Rice 2003). Beginning around 1500 BC the first agricultural villages were established in the Sonoran Desert, and the term Early Agricultural Period frequently replaces the use of the Late Archaic Period (Diehl 2005; Huckell 1995; Mabry 1998a; 1998b; Matson 1991; Sliva 2003). Late Archaic/Early Agricultural groups settled along smaller drainages, such as the Santa Cruz River and Lone Butte Wash, where water control for incipient agriculture would have been less challenging than it would have been on the Gila River (Ciolek-Torello 1998). Early Ceramic Period sites have a similar surface expression to Archaic sites; the major diagnostic difference being the additional presence of plain ware ceramics (Mabry 1997).





**Figure 2. Temporal Site Distribution Along Lone Butte Wash.** When whole sites are highlighted by time period for clarity; this does not indicate the size of the temporal component within a given site.

There are 32 Archaic Period and 20 Early Ceramic Period sites along Lone Butte Wash, including a ground-stone quarry at Lone Butte, numerous artifact scatters, and one possible Early Ceramic Period habitation. Of the Archaic sites, fifteen were assigned simply to the Archaic Period. Five components dated to the Middle Archaic, two to the Middle and Late Archaic, one to the Late Archaic, and nine to the Middle Archaic and Early Ceramic Period components. The eastern portion of Lone Butte Wash has the highest density of Archaic Period points in the GRIC (Loendorf 2012).

Excavations of an Archaic Period component at GR-660, situated on the north side of the northern branch of Lone Butte Wash, documented a Middle Archaic thermal pit with a 2-sigma calibrated radiocarbon date of 2570 BC to 2460 BC (Plumlee and Loendorf 2012), one of the earliest radiocarbon dates from the Community. Middle and Late Archaic style projectile points were also recovered from the site. Early Ceramic Period components were found during excavations at both GR-460 and GR-660. Radiocarbon samples obtained from two GR-660 roasting pits produced 2-sigma calibrated dates of AD 240–390 and AD 130–260/AD 300–320 (Plumlee and Loendorf 2013).

Food remains recovered in macrobotanical and flotation samples include mesquite pods, saltbush fruit and grass seeds. Mesquite wood, saltbush, grasses and reeds were used as fuel. Maize was a minor resource in the Late Archaic along Lone Butte Wash (Adams 2013; Jones 2013). While no Late Archaic farming sites have yet been discovered along Lone Butte Wash, there may have been heavier cultivation of maize near the springs at the west end, or along the Gila River during this time. The reliance on mesquite pods and seeds is also supported by the consistent recovery of basin metates, cobble manos and pestles from both excavation and survey contexts (Plumlee 2016; Plumlee and Loendorf 2013). Basin metates and one-hand cobble manos are generally associated with processing smaller seeds, such as grasses and, while not limited to the Archaic time periods, are common on Archaic period sites (Adams 2014). Pestles, though used to process a number of resources (e.g. meat and tobacco), were primarily used for mesquite bean processing (Castetter 1935; Castetter and Bell 1942; Schroth 1996). No trough metates or rectangular manos were recovered (Plumlee and Loendorf 2013). Trough metates became more common following AD 500, accompanying the intensification of the use of maize (Adams 2014). Only small game animals, such as Desert Cottontails, Antelope Jackrabbits, rodents and gophers were recovered from the Lone Butte Wash sites (Gregory 2015a).

### **The Hohokam Pioneer through Classic Periods**

Sites on Lone Butte Wash that can be attributed to the Hohokam sequence are predominantly artifact scatters with associated thermal pits, which we attribute to

food processing activities. Material culture attributable to the Pioneer period (ca. AD 550/650) is nearly absent, and no pattern is apparent in the spatial distribution of possible Pioneer period components. Whether this is due to a low intensity human presence during this time, or to cultural and taphonomic processes that result in a reduced expression of that presence, is unclear. However, during the Colonial period (AD 650–950), the number of cultural components within the study area increased. This increase occurred primarily on the eastern end of the study area, suggesting an emphasis on utilization of mesic resources near the springs and seeps formed by the reemergence of Queen Creek waters. A similar trend is noted for the Sedentary period (AD 950–1150), with an increased focus on the southern branch of Lone Butte Wash. This resource rich area is located in proximity to a number of large villages: 1) Los Muertos and its neighbors, located to the north on Canal System 1, which is headed on the Salt River; 2) the large villages of the Queen Creek delta, to the east; 3) Gila Crossing, to the west and 4) Snaketown and villages on the Snaketown canal system headed on the Gila River, to the south. Snaketown, being the closest large site likely contributed extensively to the increased use of this area. The Classic period saw a decrease in the utilization of the study area. This may be related to a general population decrease along the Middle Gila River at that time, including the depopulation of nearby Snaketown (Woodson 2016a).

### **The Historical Period**

In the latter half of the 19th century the Akimel O'odham, Tohono O'odham, and Pee Posh used the Lone Butte Wash area for cutting fire wood, ranching, and farming (Darling 2011; Eiselt 2003; Loendorf and Burden 2003; Raveslout et al. 1992; Rice et al. 1983; Spier 1933). This was part of a major economic shift from an agrarian subsistence economy to participation in the Euro-American cash economy that occurred in the late historical period within the Gila River Community.

Local oral history and genealogies suggest that in the late 1800s and early 1900s a group of Tohono O'odham settled in the Lone Butte Wash area, having originally migrated from Sonora to communities on the western end of the GRIC such as Komatke, St. Johns, and Santa Cruz (Darling 2011; also Plumlee 2013). They established wood cutting camps and ran cattle within the S-cuk Kavick district (Darling 2011:74), selling the wood and cattle to Anglo Americans settling in Phoenix and other towns on the lower Salt. A small railroad, the Phoenix and Maricopa Railroad, facilitated the transport of the wood and cattle to market (Rice et al. 1983). The O'odham ranchers and wood cutters who utilized the rail for transportation of their goods to Phoenix markets in turn bought much of their food and clothing from Phoenix. The existence of mesquite stumps in the area mark the shift of mesquite from a food source (mesquite pods) to an exportable economic resource

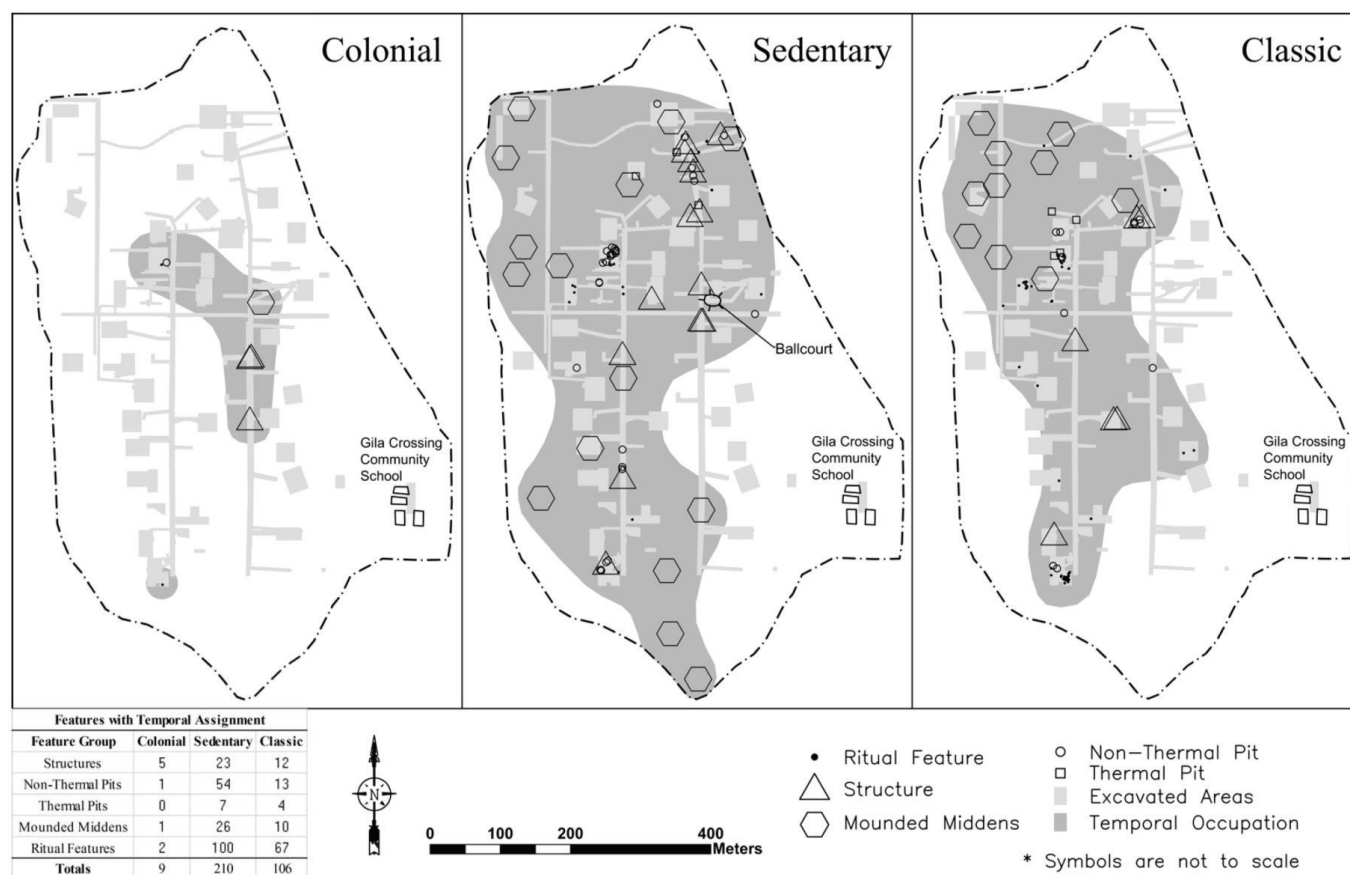


Figure 3. Gila Crossing Ballcourt Site.

(i.e. firewood). However, despite the general increasing reliance on the encroaching Euro-American economic sphere, sites further from the rail lines documented the continued importance of traditional practices, including use of stone tools, ceramic production, and gathered subsistence resources.

### ARCHAEOLOGY OF THE GILA CROSSING BALLCOURT VILLAGE (GR-1112, AZ T:12:84[ASM])

The current settlement at Gila Crossing was named after a river crossing located about a mile to the south of the current village, on the Gila River (Grossman 1869; Rea 2015; Wilson 2014:155). The Gila Crossing site is situated on a raised alluvial terrace, within an eolian sand sheet, just southeast of Lone Butte Wash's confluence with the Gila River. Despite being severely impacted by its long occupational history, including the presence of a modern housing subdivision that directly overlies the site, and periodic flooding, more than 1,260 archaeological features have been documented. Of these, 991 have been profiled, sampled, or completely excavated, including: 76 habitation structures, 227 mortuary features, 639 pits, 42 artifact mounds and middens, six historical canals, and one ballcourt (Figure 3).

### The Pioneer through Classic Periods at Gila Crossing

Though the earliest artifacts from Gila Crossing include a Chiricahua point (3500-2100 BC) and a few Early Ceramic period projectile points (Ensor and Doyel 1997:84; Loendorf and Rice 2004; Rodriguez and Landreth 2015), some or all of these may have been curated by later inhabitants. Indeed, despite the presence of a minimal Pioneer phase component (approximately six ceramic sherds), the oldest documented habitation structure at Gila Crossing dates to the Colonial period (Rodriguez and Landreth 2015). Settlement increased through the Preclassic (roughly AD 650–1150), reaching its greatest extent during the Sedentary period. In the Classic period the population declined but persisted. By the end of the Late Classic Gila Crossing was no longer inhabited and the village appears to have remained unoccupied until the 1800s.

### The Gila Crossing Ballcourt

First noted as a large depression (Ensor and Doyel 1997), the Gila Crossing ballcourt has internal dimensions of 25 m north-south by 13.5 m east-west. The ballcourt is of average size for Hohokam ballcourts in general (27.2 m by 12.6 m, see Wallace 2014a) but is relatively small among the ballcourts documented along the Mid-



dle Gila River (Wallace 2014a). In particular the nearby sites of Snaketown and Villa Buena, which bracket Gila Crossing, both have multiple ballcourts, and each contains one at, or more than, 50 m in length (Wallace 2014a). The Gila Crossing ballcourt has a well-plastered floor, with multiple replastering episodes, and dates from the late Colonial into the Sedentary period based on an optically-stimulated luminescence (OSL) date of AD 830  $\pm$ 110 obtained from fill sealed above the first floor. A sparse artifact assemblage on the uppermost floor included a matched pair of *Anodonta californiensis* shell pendants/earrings (Figure 4) and Sacaton Red-on-buff ceramics. The OSL date originating from sands sandwiched between the two lowest layers of floor plaster, and the presence of Sacaton ceramics on the last, highest floor suggest this feature

was constructed in the Colonial period and continued in use during much of the Sedentary period.

Evidence indicates that Hohokam ballcourts acted as centers of ritual, economic, and other social activities integrating regional communities and facilitating trade during the late Colonial and Sedentary periods (Abbott et al. 2007), with some ballcourts in use as late as the early Classic period (Wallace 2014b). Following Abbott (2000), the presence of a ballcourt indicates that Gila Crossing was integrated into an extended local and regional system of settlements (Abbott 2000; Wilcox and Sternberg 1983).

### **Pee Posh Migration and Assimilation at Gila Crossing**

The exact sequence of events that lead to the settling of Gila Crossing in the historical period is somewhat unclear. However, Pee Posh peoples were living in the area between Pima Butte and the confluence of the Salt and Gila for some time, and near Gila Crossing since at least 1800 (Spier 1933:18). In a discussion of relations between Pee Posh and O'odham interactions in this area, Harwell and Kelly (1983:74) state "When Americans finally crossed the desert in force during the mid-nineteenth century, Pima and Yumans had already consolidated on the plain above Gila Crossing." Gila Crossing ethnohistorical records indicate that many of the current O'odham inhabitants are the descendants of people who previously lived on the west side of the Gila River, at the base of the Estrella mountains (Komadk') in the O'odham village of Komadkwecho ('below

Komadk'), at the time of Father Kino's arrival in AD 1694 (Winters 2012:309-310).

In the late 1860s, the surface flow in the middle Gila River began to decline seriously due to its diversion by Anglo and Mexican farmers living near Florence (Hackenberg 1974) and was dry through much of the Community until just upstream from the Gila Crossing site, at an area called Mass-Acumult (Hackenberg 1974). Here, a shallow bedrock formation forced the subsurface-flow to emerge as a series of clear ponds (Southworth 1919:138). The availability of this water led to the construction of the Hoover Ditch in 1873, which brought a surge in settlement (Southworth 1919:124; Spier 1933).

The Pee Posh share land and resources with the Akimel O'odham, a process facilitated by intermarriage, political alliance, and mutual cooperation (Harwell and Kelly 1983). The Pee Posh story of Frog woman (Spier 1933:349-352) illustrates the degree to which Pee Posh peoples have become integrated with the cultural landscape of the area. Frog Woman fled Yuman enemies on the lower Colorado River area and emerged from a spring a mile and a half east of Gila Crossing. She later settled in Blackwater village, on the eastern end of the GRIC, where there is a small mountain named for her. This may represent the Pee Posh's own flight from the Colorado River due to persecution. Despite their close spatial, social, and political ties, the Pee Posh and O'odham have maintained their own leaders and distinct social and political identities (Rea 2015). The Pee Posh at Gila Crossing retain many of their traditional practices, such as interring publicly cremated remains



**Figure 4. Shell pendants/earrings recovered from Ballcourt Floor.**

within family lands (a current practice), and including Lower Colorado Buff ware ceramics and Euroamerican artifacts as grave goods. In contrast, Historical period O'odham practiced inhumation within Christian cemeteries.

### Historic Vernacular Structures

Numerous Historic period vernacular structures, called sandwich houses (Eiselt 2002) have been recorded across the GRIC, and many are still in use at Gila Crossing. Sandwich houses are a form of framed adobe architecture that is unique to the O'odham in the Phoenix Basin (Figure 5). The construction of sandwich houses began in the 1920s and continued through at least the early 1970s. This building style represents a melding of traditional jacal construction technology with the modern building materials that had become readily available by the 1920s (Eiselt 2002). Typically the frame is built using whatever supplies are at hand, including (but not limited to): railroad ties, mesquite timbers and 4-by-4-inch lumber for uprights; mesquite timbers and 2-by-4-inch (and similar) lumber, for roof beams; saguaro ribs and 1-inch thick lumber for horizontal wall "cribbing"; and arrowweed, plywood, saguaro ribs, and other timbers and lumber for roofing. Older houses are more likely to be constructed with a majority of gathered timbers, while more modern residences typically utilized finished lumber. The "cribbing" consists of horizontal planks or saguaro ribs, with gaps between each horizontal member. The cribbing is filled with adobe mud; formal bricks are not used. Older structures are often roofed using a saguaro rib base, supporting a mat of arrowweed, capped by a layer of earthen fill. More modern versions are constructed of manufactured materials such as plywood, plastic panels, corrugated metal, and tar paper.

## RESOURCE ACQUISITION TRENDS FOR GILA CROSSING

For a site located at the confluence of several drainages, situated on a major route (the Komatke Trail) linking the Lower Salt and Middle Gila Rivers to the Patayan territories and the Sea of Cortez (Darling and Lewis 2007) and having participated in the ballcourt system, Gila Crossing lacks the wide variety of imported goods that might be expected. Although the clear majority of sourced local and regional trade items at Gila Crossing do match those anticipated for similar sites in the Middle Gila (Fertelmes 2014; Loendorf 2012; Plumlee and Rodrigues 2017), investigations have noted fewer traded items at Gila Crossing than other similar sites in the area (Rodrigues and Landreth 2015). The limited numbers of regional trade items at Gila Crossing suggests that these items may have instead been traded into Snaketown, the clear major consumer of such goods during much of the Preclassic period.

In this discussion we define local resources as those accessible within one or two days walk (no more than 35-50 kilometers; Abbott et al. 2007; Drennan 1984; Malville 2001), and regional resources as those that would require several days travel to obtain. Local and regional interactions can, in part, be tracked by the presence and quantities of non-local items at a given site.

### Chronology

Features were assigned to phases and periods using temporally diagnostic sherd types and projectile point types as well as optically stimulated luminescence, archaeomagnetic dating and radiocarbon dating (Tables 2 and 3). Ceramic analyses have been conducted by numerous projects (Hoffman 2018; Laine 2017; Landreth



Figure 5. Occupied Sandwich House.

et al. 2014; Plumlee et al. 2014; Plumlee and Tiedens 2017; Rodrigues and Landreth 2015) and a collection of nearly 40,000 sherds from a subset of 31 features and five non-feature contexts is summarized by types in Table 2. The ceramic assemblage at Gila Crossing is like those from other large sites on the Middle Gila, with about 88 percent undecorated wares and about 12 percent decorated (Doyel 1975; Gladwin et al. 1965; Hoffman 2018; Laine 2017; Landreth et al. 2014; Plumlee et al. 2014; Plumlee and Tiedens 2017; Rodrigues and Landreth 2015). Table 3 lists some of the chronometric results from Gila Crossing.

## Ceramics

The majority of temporally diagnostic Preclassic decorated sherds from Gila Crossing include Gila Butte Red-on-buff (~11%), Santa Cruz Red-on-buff (~13%), and Sacaton Red-on-buff (~59%). Preclassic non-local ceramics are rare at Gila Crossing, making up less than 1 percent of the entire collection. These types include Tucson area Red-on-brown, Trincheras Purple-on-red, and northern White ware. The Classic period decorated sherds are Roosevelt Red (~2%) and Casa Grande Red-on-buff (~1.5%) wares. Non-local Classic period ceramics are rare, with Tanque Verde Red-on-brown, Jeddito Black-on-yellow, and Lower Colorado Buff ware making up less than 1 percent of the collection. Smudged wares are relatively common and make up about six percent of the full Gila Crossing collection. Historical indigenous sherds are found in low numbers; 124 have been identified, 57 of which are decorated. The small percentage of intrusive ceramics at Gila Crossing is like what is found at other sites along the Middle Gila (Eiselt et al. 2007). The site's use grew quickly during the early Colonial, was highest in the Sedentary period, and dropped slightly in the Classic period.

The presence of Lower Colorado Buff ware from early Classic period mortuary contexts at Gila Crossing (Figure 6) suggests Patayan in-migration as a precursor of the ethnohistorically documented and current local Pee Posh population. While the Patayan ceramics may have been traded in, the fact that the Patayan ceramics were recovered from mortuary features and domestic spaces (Rodrigues and Landreth 2015) argues more strongly for the presence of Pee Posh peoples living in the area. This is supported by the tendency for people to bury their dead with culturally appropriate grave goods (Mitchell and Brunson-Hadley 2001). Lower Colorado Buff ware has been recovered at sites further downstream near Gila Bend from as early as the Colonial period (Wasley and Johnson 1965) and continuing into the Classic period. Lower Colorado Buff wares have also been recovered from Preclassic and Classic period contexts at the Cashion Site, Las Colinas, Las Fosas, GR-893,

and GR-895 (Beck and Neff 2007; Doyel 2008; Eiselt et al. 2007; McGuire and Schiffer 1982; Rice et al. 2009; Wasley and Johnson 1965; Waters 1982). In some instances, the presence of Lower Colorado Buff ware is inferred to indicate Patayan cohabitation within Hohokam villages, such as at Gila Crossing (Rodrigues and Landreth 2015) and Las Colinas (Beckwith 1988). It is probable that these close associations represent integrated kinship lines between the Hohokam and Patayan peoples, leading to stronger and persistent exchange networks (Beck and Neff 2007).

At the Gillespie Dam site near Gila Bend, Rice and Watkins (2009) demonstrate the presence of two separate cemeteries, dating to the Sedentary period, for the internment of Hohokam and Patayan peoples. Evidence for Patayan peoples was also found in burial contexts at Gila Crossing within an irregularly shaped, plastered mortuary surface plaza. This plaza area is like other mortuary or offertory surfaces such as those reported on the Middle Gila at Casa Grande (Woodward 1931), Escalante Ruin Group (Rodrigues et al. 2018), Snake-town (Haury 1976:166-171), the Lower Salt at La Ciudad (McGuire 1987) and the Red-tail site in the northern Tucson Basin (Bernard-Shaw 1989:53-54). Forty-eight cremation features were within the mortuary plaza at Gila Crossing; these were set into the floor in two separated clusters. Patayan ceramics were recovered from both clusters. Based on the recovered ceramics, this 'cemetery-plaza' was utilized and maintained from the Sedentary (only one feature) through the Classic periods and again during the Historical period. This last use was noted by the presence of some Padre beads, a bead type used throughout the Historical period, thus dating this feature to the Historical period. Unfortunately, we were unable to confidently assign dates to the features with Patayan ceramics. However, because most of the Hohokam features date to the Classic, it seems reasonable to suggest that the Patayan features also date to the Classic. If this is accurate, it represents the first documentation on the Middle Gila River for the cohabitation of a probable Yuman speaking population in a Classic period Hohokam village.

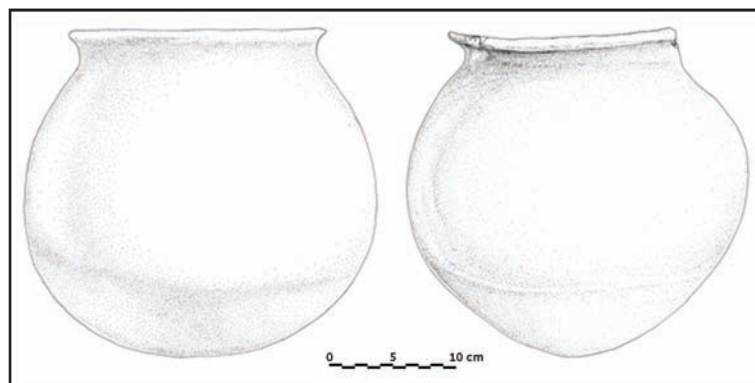


Figure 6. Lower Colorado Buff Ware Recovered from GR-1112.



**Table 2. Count of Sherd Types by Phase or Period in a Sample of 31 Features and Five Non-feature Excavation Contexts.**

Ceramic Ware Type	Phase/Period Assignment	Total
Black-on-Red, Historic	Historic	2
Brown, Indeterminate	No Date	1
Buff, Historic	Historic	4
Buff, Indeterminate	No Date	174
Buff, Prehistoric	No Date	3,965
Plain, Historic	Historic	37
Plain, Indeterminate	No Date	1,884
Plain, Prehistoric	No Date	23,689
Roosevelt Red, Gila Polychrome	Late Classic	27
Roosevelt Red, Tonto Polychrome	Late Classic	1
Red, Sacaton	Sacaton	9
Red, Historic	Historic	26
Red, Indeterminate*	Classic	670
Red, Prehistoric*	Classic	517
Red-on-Brown, Canada del Oro	Gila Butte	2
Red-on-Brown, Tanque Verde	Classic	2
Red-on-Brown, Historic	Historic	8
Red-on-Brown, Prehistoric	No Date	4
Red-on-Buff, Snaketown/Gila Butte	Snaketown/Gila Butte	2
Red-on-Buff, Gila Butte	Gila Butte	142
Red-on-Buff, Gila Butte/Santa Cruz	Gila Butte/Santa Cruz	40
Red-on-Buff, Santa Cruz	Santa Cruz	88
Red-on-Buff, Santa Cruz/Sacaton	Santa Cruz/Sacaton	33
Red-on-Buff, Sacaton	Sacaton	1,054
Red-on-Buff, Sacaton/Casa Grande	Sacaton/Classic	4
Red-on-Buff, Casa Grande	Classic	41
Red-on-Buff, Historic	Historic	47
Red-on-Buff, Indeterminate	No Date	38
Red-on-Buff, Prehistoric	No Date	2,975
Smudged, Plain	Late Sedentary/Classic	1,112
Smudged, Red	Late Sedentary/Classic	132
Unidentifiable	No Date	2,682
<b>Total</b>		<b>39,412</b>

\* The analysts have been unable to assign these to a time period. However, when large numbers of Red wares are present, everything else being equal, we viewed this as support for a Classic period assignment

### Ceramic Production

To date, evidence for local ceramic production at Gila Crossing is limited to a grouping of plaster-lined pits, a small number of pottery production tools, and a few formed clay balls and billets. Though limited, this assemblage contains characteristics that are like the much more extensive evidence for ceramic production recovered from the nearby, contemporaneous site

of Snaketown (Haury 1976) and also to Queen Creek delta sites (Lack et al. 2012).

Raw material for ceramic production is readily available and local clay sources have been associated with prehistoric and historical ceramic production (Abbott et al. 2011). Also, raw schist samples (which might have been ground into temper for use in pottery production) found at Gila Crossing were chemically characterized using Laser Ablation Inductively Coupled Plasma-Mass Spectroscopy (LA ICP-MS) and compared to established profiles from known mica schist temper. The results of the analysis indicate that the samples were derived from local schist outcrops in the Estrella Mountains (2 to 20 kilometers) to the west and remote sources in the Pinal Mountains (80+ kilometers) to the east, directly along Queen Creek (Eiselt et al. 2015:60). Eiselt notes that use of remote sources are outliers to the general pattern of closer material sources being accessed by peoples on the Middle Gila. It is interesting to note that, to date, the only sites on the Middle Gila River with material from these remote sources are GR-1112, GR-522 and GR-893/895, suggesting these sites may have had stronger trade ties to the east along Queen Creek, based on their presence on a shared drainage.

### Lithic Materials

The flaked stone collection from GR-1112 is composed primarily of locally available raw materials; eighty-eight percent is basalt, rhyolite, and quartzite, derived from nearby river cobbles. Obsidian comprises 3.5 percent (n=91) of the lithic collection. All obsidian in the collection was compositionally examined using a Bruker Tracer III-V portable energy-dispersive X-ray fluorescence (EDXRF) spectrometer and the results were compared to established obsidian sources (Loendorf 2018:5, Table 1; Loendorf and Fertelmes 2012). The Gila Crossing obsidian specimens were procured from eight geologic sources (Figure 7). Researchers have noted that the

majority of the obsidian recovered from sites in the Phoenix Basin is derived from three sources, Sauceda, Superior, and Vulture (Shackley 2005); as these three are the closest obsidian sources to the Basin, this is an expected result. However, obsidian acquisition patterns vary significantly over time and by location and proximity is not always the determining factor (Loendorf et al. 2013; Shackley 1995:547). The majority of Gila Crossing

**Table 3. Chronometric Dates from Features, GR-1112.**

Feature No./ Type	Unit/ Level	Sample Number	Archaeo-mag- netic Date	OSL Date	Radiocarbon Calibrated (1 Sigma)	Radiocarbon Calibrated (2 Sigma)	Period
110/ Ballcourt	4/1	3862		AD 830 ±110			CO-S
83.01/ Floor Remnant (Hearth)	1/1	6679			AD 880-950	AD 780-980	CO
509/ Pithouse	7/1	3989			AD 780-790	AD 780-900	CO-S
					AD 810-850	AD 920-970	
					AD 850-890		
509/ Pithouse	7/1	6824			AD 890-970	AD 880-990	CO-S
373.01/ Pithouse (Hearth)	1/1	4085	AD 910-1015				S
			AD 1310-1625				
			AD 1600-1690				
474.04/ Pithouse (Hearth)		4086	AD 910-1015				S
			AD 1310-1590				
			AD 1635-1690				
474.04/ Pithouse (Hearth)		6825			AD 990-1020	AD 980-1030	S
384/ Midden	1/5	6822			AD 1020-1030	AD 990-1040	S
						AD 1100-1120	
						AD 1140-1150	
24/ Pithouse	2/1	6676			AD 970-1010	AD 900-1020	S
24/ Pithouse	7/1	6677			AD 1160-1210	AD 1050-1230	S-C
24.02/ Pithouse (Intramural Pit)	BT-2	6675			AD 1160-1210	AD 1050-1230	S-C
630/ Pithouse	7/1	6819			AD 1040-1110	AD 1030-1190	S-C
					AD 1120-1160	AD 1200-1210	
718/ Non-thermal pit	1/1	6820			AD 1050-1090	AD 1030-1220	S-C
					AD 1120-1140		
					AD 1150-1170		
446/ Pithouse	1/1	6823			AD 1160-1210	AD 1040-1100	S-C
						AD 1120-1140	
						AD 1150-1220	
201/ Floor Remnant	BT-22	1104			AD 1280-1300	AD 1280-1320	C
					AD 1360-1380	AD 1350-1390	
201/ Floor Remnant	BT-22	6818			AD 1300-1320	AD 1290-1400	C
					AD 1340-1370		
					AD 1380-1390		
428/ Thermal Pit	3/1	6821			AD 1300-1360	AD 1290-1410	C
					AD 1380-1400		
850/ Thermal Pit	BT-184	5853			AD 1320-1340	AD 1310-1360	C
					AD 1390-1410	AD 1390-1430	
587/ Thermal Pit	3/1	7249			AD 1695-1725	AD 1685-1730	H
					AD 1815-1835	AD 1810-1925	
					AD 1880-1915	Post AD 1950	
					Post AD 1950		

CO – Colonial Period

S – Sedentary Period

C – Classic Period

H – Historical Period

obsidian was from the Saucedo (50.5%; 96 km distant) and Superior sources (~23.1%; 100 km distant), minor sources include Vulture Peak (~6.6%; 97 km distant) and the San Francisco Volcanic region (13.3% total; 7.7% RS Hill/Sitgreaves and 5.6% Government Mountain; 250 km distant; Loendorf 2018:5).

Obsidian acquired from the Saucedo source may have arrived along with items such as salt and shell, which were acquired using trails that passed this source (Loendorf 2018). The Superior source, which is located to the east on Queen Creek, suggests trade or acquisition of obsidian along the Queen Creek drainage. Alternatively, it may have arrived through trade with Gila River villages noted for large collections of Superior sourced obsidian, such as Snaketown, Grewe, and Casa Grande (Shackley 1995).

Loendorf (2018:10, see Figure 6) observed the following temporal trends in the Gila Crossing obsidian analysis. Through time Saucedo was the largest source of obsidian in the Gila Crossing sample, followed by Superior as the secondary source; all other sources were below 8 percent (Loendorf 2018:10, Figure 6). During the Classic period, obsidian from the Saucedo source provided over half of the specimens. Superior sourced

obsidian at Gila Crossing was recovered from across the site and in various contexts that included the modern ground surface, pithouses, storage pits, and middens. Almost fifteen percent was recovered from midden Feature 384, a feature with a mix of Preclassic and Classic period deposits and for that reason not used in the temporal analysis. The remaining eighty-five percent of the Superior sourced obsidian was recovered from fourteen features across the site.

While we consider Gila Crossing to be primarily a Middle Gila River settlement, its position at the crossroad of numerous trails and near the confluence of Gila River with three drainages (Lone Butte Wash, Santa Cruz and the Salt) put its inhabitants in contact with groups in all directions that had access to obsidian (Figure 7). Pertinent to the theme of the current paper, the presence of obsidian from Superior and schist from Pinal Mountain provide an indication of Gila Crossing's trade east along Queen Creek.

### Basalt

Ground-stone artifacts recovered from contexts within Gila Crossing (n=42) were chemically characterized using a Bruker Tracer III-V portable energy-dis-

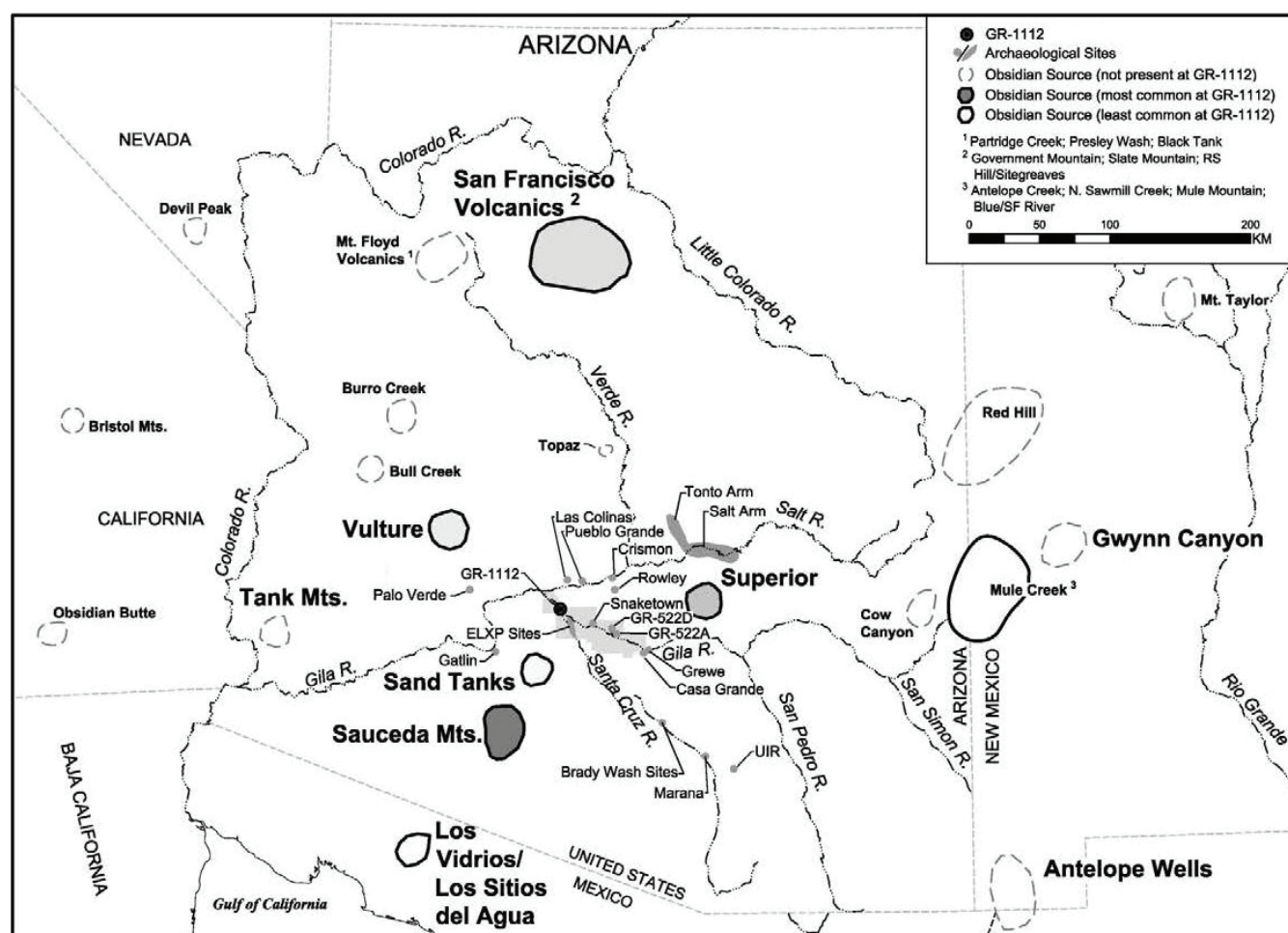


Figure 7. Obsidian Source Locations for Obsidian Types Identified at Gila Crossing (from Loendorf 2018: Figure 7)



pulsive X-ray fluorescence (EDXRF) spectrometer and compared to established profiles from known basalt quarries (Fertelmes 2014). Although Gila Crossing is close to the ground-stone quarry at Lone Butte (~12 kilometers to the east; Neily et al. 1999) no basalt originating from Lone Butte has been recovered at the site (Fertelmes 2014). The majority of the sourced artifacts (52.2%) originated from the Santan Mountains (~45 kilometers to the east), the edge of the “local” resource procurement area, as we have defined it. The question of why the further source was utilized is intriguing. One possible answer has to do with available motive power. Though Lone Butte is geographically closer, transported stones had to be moved back to Gila Crossing entirely by human power. Whereas, from the Santan source stones could be floated on rafts to Gila Crossing, thus making this trip ‘shorter’ in terms of miles moved under human power. Though Hohokam rafts are rarely mentioned, there is some evidence for their use based on possible remains of reed raft, or balsa, and possible canal-side accommodations for rafts (Schaafsma et al. 2015; Hackbarth 1997; Hodge 1893:325-327). The possibility that the Hohokam used balsas to move large stones was suggested by Hodge (1893:326-327). The ease with which large stones can be moved using rafts has been experimentally confirmed:

In an effort to test a hypothesis that water transport could have been used to transport quarry products in the American Southwest, where beasts of burden were not available a replication experiment was recently carried out. The experiment showed that 113 to 181 kilograms (250 to 400 pounds) of stone milling implements and human cargo could easily be transported on a small (just over three meters long) tule raft at the rate of about 1.6 kilometers per hour (1 mile per hour) in water of less than 50 centimeters depth [Schneider and LaPorta 2008:31].

There may also have been strong social connections between Gila Crossing and villages near the Santan material source a matter explored below.

Another ground-stone source for Gila Crossing artifacts (30.4% of the sourced sample) was the McDowell Mountains to the northeast (50-60 kilometers). This distant source indicates exchange between Gila Crossing and communities on the Lower Salt. Other sources identified include Moon Hill/Ludden Mountain, Robbins Butte and West Wing Mountain.

It is not unusual for sites in the Phoenix Basin to make use of non-local stone. Other examples of this include Casa Grande, Los Hornos, Las Colinas, and Pueblo Grande. None of these sites relied on the closest basaltic outcrop (Fertelmes 2014). Fertelmes (2014) suggests that among the Hohokam, if one lived within 10 km of a vesicular basalt source, it was worth the local cost of procur-

ing the material directly. However, when the source was over 10 km, the cost of direct procurement was prohibitive in the face of trade. Trade reduced transport costs, but it also saved time and effort in not having to perform the initial quarry and tool shaping. This study provides tentative support for the direct exchange model. Various exchange relations likely account for the importation of groundstone material from the vicinity of GR-522 on the western slopes of the Santan Mountains.

### Macrobotanical Resources

Research suggests that the particular palettes of botanicals used at Lower Santan Village (GR-522) and Gila Crossing (GR-1112) were strikingly similar and yet distinct from other sites along the Middle Gila (Adams 2015). Both communities exploited the Lower Sonoran bajada, and utilized multiple locally domesticated species, including amaranth, little barley, maize and agave. Gathered, wild resources were a part of the Gila Crossing subsistence strategy, including: goosefoot/pigweed, grass seeds, hedgehog cactus fruit, horse purslane seeds, mesquite pods, and saguaro fruit.

The GR-1112 record is quite similar to that of Lower San Tan Village (GR-522). At that village, during the Sedentary period groups burned saltbush and mesquite wood (Adams 2008). They prepared agave and domesticated little barley grains as food. The Late Sedentary occupants of the mound also carried in ironwood wood, and prepared grains from a wild grass, along with goosefoot/pigweed and horse purslane seeds. The Sedentary through Early Classic occupants utilized these same resources, plus a number of additional ones, including maize, saguaro fruit and ribs, hedgehog cactus fruit, ironwood and cottonwood/willow wood, reedgrass stems, and mesquite pods. These records are remarkably similar (Adams 2015:209).

### Faunal Resources

Gregory (2015a) has indicated that cottontails and jackrabbits (lagomorphs), and small mammals make up the largest portion of the Gila Crossing faunal collection, with smaller contributions from artiodactyls, rodents, birds, carnivores, reptiles, and amphibians (in order of ubiquity). Ubiquity values were highest for lagomorphs and other small mammals, confirming their role as a primary animal protein resource for occupants of the site. Artiodactyl and large game indices were low, indicating that they played a small role in diet at Gila Crossing.

### Shell

Given that Gila Crossing is situated in close proximity to documented trade routes, including the Komatke trail, which leads from the Gila Crossing area through the Sierra Estrella Mountains to the Sierra Pinacate, it was anticipated that the shell assemblage would be large and would include evidence of shell jewelry manufacturing (Darling and Lewis 2007; Mitchell and Foster 2011; Underhill 1946). Contrary

to our expectations, Gila Crossing has a lower shell count than at most other Middle Gila large village sites. Of the shell that is present, forty-five percent consists of locally available *Anodonta californiensis*. The majority of the marine shell artifacts are bracelets (11.6%) and beads (7.5%) with few other forms. Analyses indicate that a minor amount of household-based shell artifact production occurred at Gila Crossing (Gregory 2015b). Mortuary features contain 60 percent of all unmodified marine shell on the site. Overall, while the shell assemblage from Gila Crossing was like that of other larger sites on the Middle Gila there are notably fewer shell artifacts at Gila Crossing (Gregory 2015b).

### Turquoise

Only three turquoise artifacts have been recovered from the Gila Crossing site, a bead, a pendant, and a mosaic tessera. Two of the three artifacts were from Preclassic mortuary contexts. Because no local sources of turquoise exist, any items recovered from Gila Crossing arrived via trade from remote sources, probably through networks at the regional-scale or greater.

## DISCUSSION

### Lone Butte Wash

Despite the long use of Lone Butte Wash the only evidence of a permanent prehistoric residential location is the Gila Crossing village at the end of the wash. The majority of the sites along Lone Butte Wash represent special/limited use areas where subsistence (e.g., mesquite pods, wild buckwheat, sunflowers, grass seeds), architectural (e.g., mesquite timbers), fuel (e.g., mesquite wood) and other (e.g. ground stone, basket making material) resources were procured (Plumlee and Loendorf 2013). It appears that the Lone Butte Wash sites served the same functions and provided the same resources from the Middle Archaic until the removal of the mesquite bosques in the historical period (Darling 2011; Rice et al. 1983).

The continuity of site function is supported by the consistency of the flaked- and ground-stone collections: basin metates with one-hand manos for the ground stone (suggesting processing small seeds e.g. grasses) and pestles for processing mesquite pods and other resources. The flaked tool assemblage reflects the general expedient lithic technology found throughout southern Arizona (Andrefsky 1998:211-229).

One notable trend is the continuous use of the area east of the wash, in the resource-rich mesic area created by re-emerging waters. This area would have been an attractive location as attested to by its use from the Archaic through the Classic periods. Most extensively used during the Colonial period, sites of this time cluster east of the south branch and extend south toward Snaketown. This north to south line of sites follows a known north-south travel corridor from Snaketown to lower the Salt River Valley through the area around the south end of Canal System 1 (Wilcox et al 1981; Wood-

son 2010). This pattern continued into the Sedentary period, with usage increasing along the southern branch of the Wash. There was a general reduction in the usage of the eastern portion of the study area during the Classic period. However, the continued low level of utilization, even after the abandonment of Snaketown, suggests that other surrounding residential sites were continuing to take advantage of these resources.

A second trend is the differential use of the grasslands along the north branch of Lone Butte Wash where over half of all the Archaic site components were located. Archaic peoples may have found the grass lands ideal for harvesting grass seeds, while this resource may have been of less interest to later, more agricultural peoples. In historical documents, this area was noted as a fine grassland—grass watered by the periodic flooding that covered this area with significant, but slow-moving flood waters—ideal for grazing livestock (DeJong 2001). Surprisingly, there is little to no use of the area during the Sedentary period when tail waters from Canal System 1 off the Salt River may have enhanced the water of the area.

### Gila Crossing

While data from Gila Crossing suggests minor use of the area during the Archaic and Pioneer periods, the picture of Gila Crossing that emerges from the current data is of a rapidly growing village, established during the Colonial period (Rodrigues and Landreth 2015). This settlement expanded and became a ballcourt village by the Late Colonial or early Sedentary period. The Gila Crossing population appears to shrink somewhat during the Classic period. No Protohistoric use of Gila Crossing has been documented, and it was likely abandoned during this time. Pee Posh utilized the Gila Crossing area by the early 1800s. O'odham and Pee Posh people co-inhabited the Gila Crossing area by the mid-nineteenth century (Harwell and Kelly 1983; Spier 1933:252). The site of Gila Crossing was likely reoccupied by the Pee Posh and O'odham roughly in the 1870s.

The site is located near the confluence of the Gila with three drainages providing a rich resource base and the potential for multidirectional interactions. Despite the presence of a ballcourt, the proximity to the Komatke Trail, and the three confluences, archaeological investigations at Gila Crossing have found relatively few trade goods or signs of local manufacture for export (e.g. no large-scale shell ornament or ceramic manufacturing).

Resources noted at Gila Crossing are almost entirely locally available, with comparatively few regional goods present. Subsistence practices, utilitarian tool production, and ceramic production appear to have focused on locally available resources, including lagomorphs, artiodactyl, gathered and cultivated floral resources, and the use of local clay. Interestingly, while local schist was utilized, it was also procured at the regional level. Specialized tools, such as projectile points (obsidian and chert) and grinding tools (basalt), tended to be crafted out of materials from

regional sources, or more distant local sources. Distant regional, or trans-regional, sources were accessed for more exotic materials, such as marine shell and turquoise. Of interest, Gila Crossing occupants selectively chose to exploit ground-stone quarries in the Santan Mountains over nearby Lone Butte. The absence of any whole *Glycymeris* valves within the Gila Crossing assemblage suggests that finished jewelry, rather than unworked shell, may have been imported into the site (Gregory 2015b).

### The Queen Creek Context

Gila Crossing presents an interesting study site due to its position at the confluence of numerous drainages and of particular interest here, at the end of Queen Creek. The well-watered setting of Gila Crossing, and its placement along numerous important travel corridors, provides potential social and trade connections for Gila Crossing. But did these connections extend to the east, up Lone Butte Wash and Queen Creek?

Certainly, the length of Queen Creek/Lone Butte Wash was used or occupied at similar points in history. People in the Archaic period used both Queen Creek and Lone Butte Wash (Plumlee and Loendorf 2013; Wegener and Ciolek-Torello 2011). Very little Pioneer period cultural material has been identified along Lone Butte Wash, though there is some usage of the eastern end of Lone Butte Wash. Further east at Pozos de Sonoy, the late Pioneer occupation of Queen Creek is well established (Chenault 2015; Wegener and Ciolek-Torello 2011). Both Gila Crossing and the Queen Creek Delta were heavily occupied during the Colonial through Sedentary periods. The occupation at Gila Crossing persisted into the Late Classic, like sites in the eastern Queen Creek Delta such as at El Polvorón (Sires 1984) and the Southwest Germann Site (Leonard 2007).

Both the Gila Crossing site and the Queen Creek delta communities had ready access to Santan Mountain area resources in their provisioning schemes. However, the resources chosen by each differed, with Santan clay utilized in Queen Creek and Santan basalt tools present at Gila Crossing. Preclassic inhabitants of Gila Crossing emphasized the use of Saucedo and Superior sourced obsidian. An increased reliance on obsidian from the Saucedo source and a decreased reliance on the Superior source was noted during the Classic period, a trend common across the Phoenix Basin (Loendorf 2010; Loendorf et al. 2013; Shackley 2005). In general the occupants of Gila Crossing maintained relationships with groups that had access to obsidian in all directions during the Preclassic, with the western source (Vulture) dropping out during the Classic period.

### CONCLUSIONS

The results of this study indicate that Lone Butte Wash was an important resource base for local prehistoric populations during the Archaic, Preclassic and

Classic period Hohokam, and later O'odham and Pee Posh populations. The environment would have been a rich resource base for any people living in the surrounding area, and the mesic resources at the east end of the south channel were utilized throughout all of prehistory. Despite the rich resource base, only one large prehistoric settlement, Gila Crossing, was built on Lone Butte Wash. While the village of Gila Crossing was primarily linked with sites along the Middle Gila, such as GR-522, non-local items recovered from the Gila Crossing site suggest a connection along the length of Queen Creek that includes Superior sourced obsidian and Pinal Mountain schist. The Kumatke trail would have provided access to southern resources, such as Saucedo obsidian as well as salt and shell from the Gulf of California. It is not surprising that Gila Crossing would have ties along multiple travel corridors as it is situated near the confluence of numerous water ways and trails, all of which would have facilitated trade from multiple directions to concentrate at Gila Crossing.

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