

PREHISTORIC WATER UTILIZATION AND TECHNOLOGY IN ARIZONA

BACKGROUND FOR HISTORIC CONTEXTS
A COMPONENT OF THE ARIZONA HISTORIC PRESERVATION PLAN

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A number of Middle Archaic period sites have been identified in and around the Tucson Basin (e.g., Dart 1986a; Douglas and Craig 1986; Huckell 1984b; Stevens 1999). In the Phoenix Basin, Middle Archaic period sites appear to represent short-term seasonal field camps or long-term base camps (Bayham, Morris, and Shackley 1986; Fish 1968; Halbirt and Henderson 1993; Neily 1991). Recent work on the Gila River Indian Community has documented a number of previously unknown Middle Archaic sites along Lone Butte Wash and McClellan Wash (Bubemyre, Broadbeck, and Neily 1998; Neily, Broadbeck, and Peterson 1999; Woodson and Davis 2001). Although the period is not as well understood in the Phoenix Basin, surface finds of temporally diagnostic projectile points, as well as points recovered from later Hohokam sites, attest to the widespread use of the area during the Archaic period.

The Southwestern Archaic Tradition of hunting and foraging appears to have persisted throughout southern Arizona between 2000/1500 B.C. and around A.D. 1/150). This time also constitutes a transition characterized by early agricultural efforts and increased sedentism. Because of differences between sites representing these two subsistence-settlement patterns, it has been suggested that sites of the hunting/foraging type be designated "Late Archaic" and more sedentary settlements be designated "Early Agricultural" (Huckell 1995; Mabry 1998a). The Early Agricultural period (ca. 2000 B.C.–A.D. 1/150) is divided into three phases: an early unnamed phase (2000–1200 B.C.; Jonathan Mabry, personal communication 2000, 2000; the San Pedro phase (1200–800 B.C.); and the Cienega phase (800 B.C.–A.D. 1/150).

At many Late Archaic period sites in southern Arizona, especially those in more xeric areas, the tradition of hunting and foraging appears to have persisted with no reliance on agriculture, although accompanied by increasing sedentism (Bayham, Morris, and Shackley 1986; Halbirt and Henderson 1993; Huckell 1984a, 1984b). The Late Archaic is represented by a number of sites throughout most of southeastern Arizona. Recent work has also demonstrated a significant Late Archaic exploitation of secondary wash environments in the middle Gila Valley (Bubemyre, Broadbeck, and Neily 1998; Neily, Broadbeck, and Peterson 1999; Woodson and Davis 2001). As in the Middle Archaic period, these Late Archaic period sites generally are manifested as small, seasonally occupied, limited-activity locales in diverse microenvironments. At issue is whether sites manifesting a "Late Archaic" foraging pattern with no evidence of agriculture served as seasonally occupied camps within a settlement system focused on the floodplain agricultural villages (e.g., Huckell 1995; Roth 1992, 1995) or represented a distinct but contemporaneous subsistence-settlement system.

Beginning around 2000 B.C., groups occupying upland and primary or secondary stream course locations in southern Arizona adopted maize horticulture and developed a semi-sedentary subsistence-settlement pattern (Huckell 1995; Mabry 1998a; Matson 1991). Large, seasonally occupied villages, some with communal structures, were common in some areas by 800 B.C. (Mabry 1998a; Roth 1993). Pit houses were generally oval or round, and the first house clusters and house groups appeared (e.g., Huckell 1995; Mabry 1998a). The earliest ceramic containers in the American Southwest have been recovered from sites of this period (Heidke 1999). The subsistence base for these villages centered on floodplain maize agriculture, to a limited extent riparian resources, and continued exploitation of upland resources (as evidenced by seasonally occupied camps; Dart 1986a; Douglas and Craig 1986; Huckell 1995; Roth 1995). In addition, the earliest canals known in the Southwest have been discovered near these floodplain villages (Mabry 2000). The most important Early Agricultural period discoveries involve sites along Cienega Creek (Huckell 1995) and along the Santa Cruz River (Mabry 1998a), where early maize has now been dated between 2000 and 1200 B.C.

Preceramic, semi-sedentary horticultural settlements have not been identified in the middle Gila Valley. It is likely that if Early Agricultural period settlements were present in the area, they might have been situated along Holocene terraces that had potential for floodwater agriculture and, consequently, might be deeply buried in alluvium. Other settlements are expected in high-water-table areas along

Bordered or Waffle Gardens

Bordered or waffle gardens are rectangular plots that are bordered on all sides by rocks or mounded soil. Vivian (1974) notes that these agricultural features are also referred to as terrace plots, grid gardens, garden plots, stone-outlined gardens, and grid borders. Grid border is the term Woodbury (1961b) applies to these features in the Point of Pines area. These borders serve to retain moisture and soil for crops within them (Masse 1979; Vivian 1974). The gardens vary in size and form, ranging from an individual single plot to a series of contiguous grids that are also referred to as "waffle gardens" (Masse 1991a; Woosley 1980:321 [Hopi area]). This type of garden plot is found in other portions of the Southwest as well (e.g., Kintigh 1985; Lightfoot and Eddy 1995).

Dove (1970) reported an extensive bordered garden in the Calderwood Butte area on the lower Agua Fria River. Small gardens were located on the smaller, lower river terraces while the large gardens were located on the higher, flatter terraces. Dove notes that the size of the grids varies from about 1 m to 20 to 30 m on a side. It appeared that the rock borders had been "raked" into place, and there were also many small piles of rock. As a result, many areas were clear of field rock, but others were not completely cleared. Dove suggests that the smaller rock left on the fields may have acted to conserve moisture in the manner of the so-called gravel-mulched gardens (discussed below).

P. Fish and S. Fish (1984) describe an extensive series of bordered gardens on Beaver Creek in the Sacred Mountain basin of central Arizona. This system was originally recorded by Schroeder (1940). The fields cover an area of about 83,000 m² and consist of a combination of bordered gardens, terracing, and canals. Approximately 1.4 km of primary, secondary, and tertiary canals that transported water to these fields were identified. Many of the canals were excavated in fairly rocky areas, and some were apparently converted to bordered gardens (P. Fish and S. Fish 1984:Figure 4). Although no dimensions for the individual plots are provided, based on the illustrations of portions of the fields, individual grids appear to measure roughly 1.5 by 2 m in size (Figure 3.12). Crown (1984b) notes the presence of bordered gardens in the vicinity of Florence.

Neely (1995; Neely and Rinker 1997) reports a series of bordered gardens in the Safford Valley in southeastern Arizona, where bordered gardens have long been reported and are known to cover large areas (Figure 3.13). Associated with several of the garden systems are features that Neely calls "splash-pads." These are semi-circular features made from several horizontal courses of stone attached to terrace walls. Neely suggests they were put in place to prevent or reduce erosion produced by water flowing over the terrace wall.

Gravel-mulched Gardens

Gravel-mulched gardens are much like bordered gardens, but the soil in the plots is covered with small gravels to inhibit evaporation of soil moisture and perhaps, like rock piles, to help protect the roots of plants growing within them (Vivian 1974). Interestingly, in the Santa Cruz River valley, Doelle, Dart, and Wallace (1985) report numerous agricultural features in areas of moderate to heavy gravel cover. Perhaps the prevalence of non-irrigation water-management features in this area is a reflection of the fact that the gravels served as mulch that helped retain soil moisture and maximize the use of runoff. These features have also been identified in the Safford Valley.



Figure 3.12. Excavated segment of a border garden at Beaver Creek (photograph courtesy of Paul and Suzanne Fish).

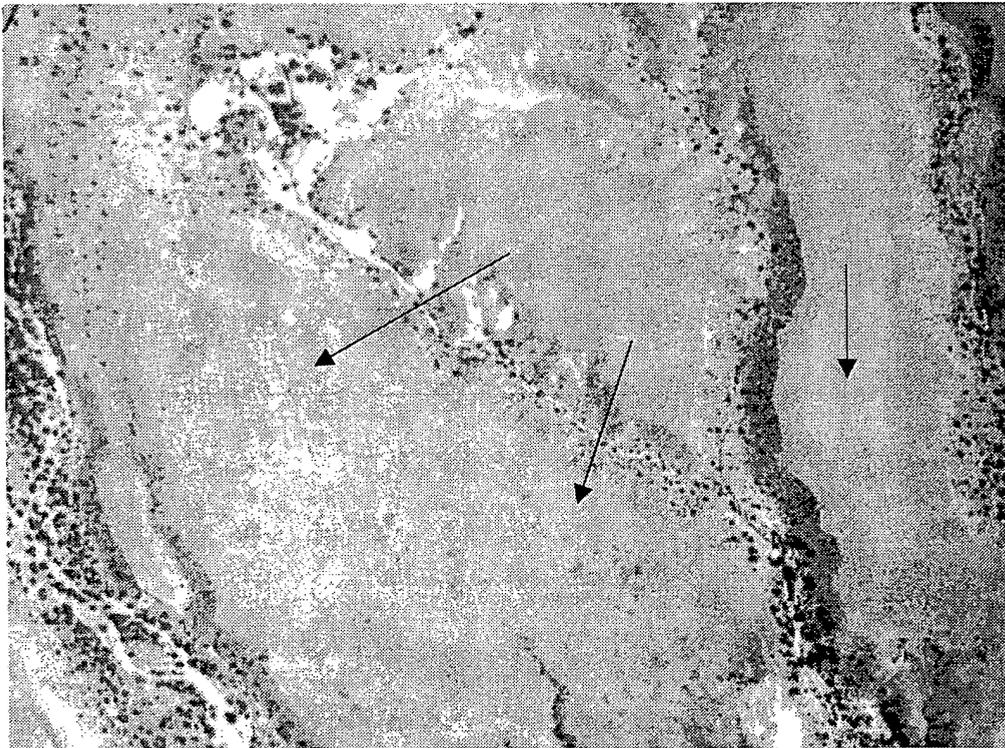


Figure 3.13. Aerial photograph of border gardens in the Safford Valley (Arizona Department of Transportation photograph from the files of Paul and Suzanne Fish).

Cultural and Spatial Distribution

Bordered gardens are found in a variety of cultural settings, including the Western Prehistoric Pueblo area of northeastern Arizona, the Mogollon area of the eastern Arizona mountains, and the Hohokam area of central and southern Arizona (e.g., P. Fish and S. Fish 1984; Neely 1995; Neely and Rinker 1997; Woodbury 1961a; Woosley 1980). They were and are used by the Hopi of northern Arizona as well (Hack 1942). The walls of Hopi gardens can be quite massive and the field systems quite extensive (Figure 3.14).

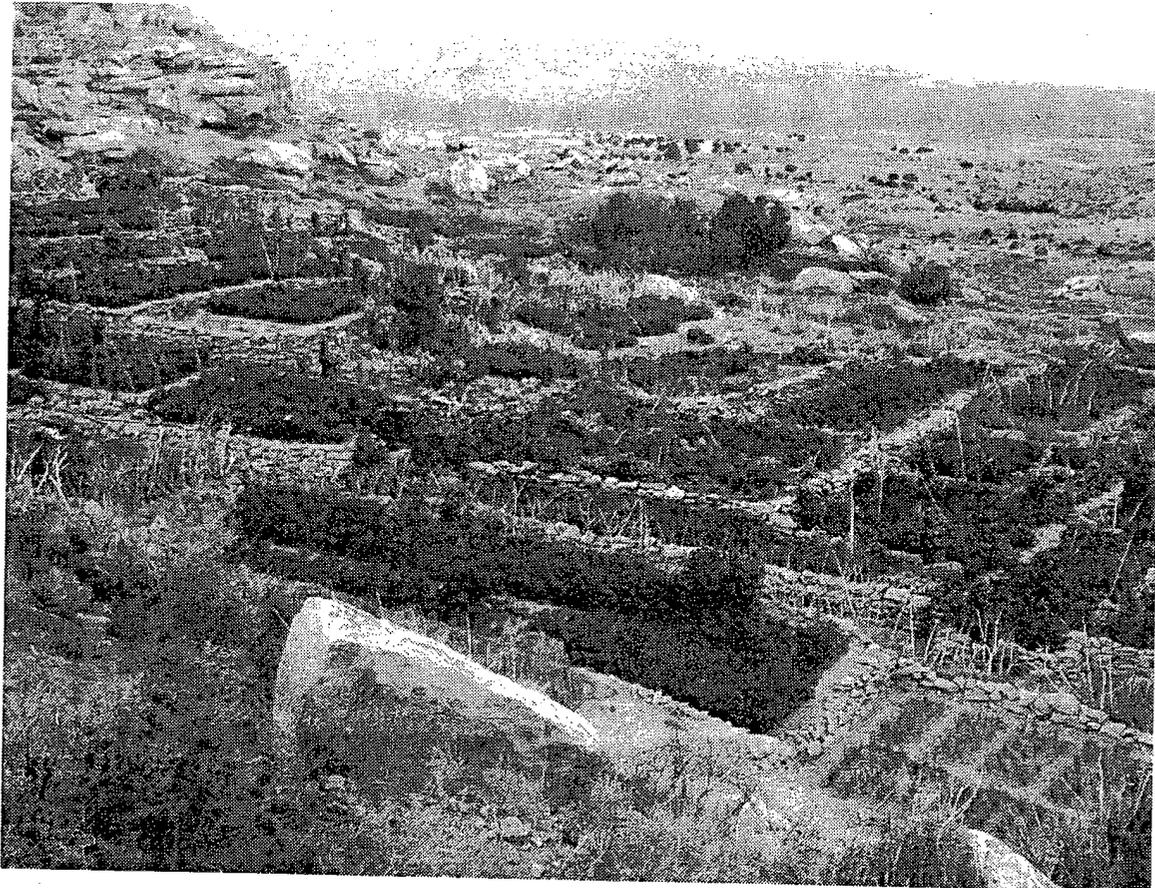


Figure 3.14. Hopi border gardens near Moenkopi (photograph from the files of Richard Woodbury, courtesy of Paul Fish).

Temporal Distribution

Dove (1970) assigns the Calderwood Butte fields to the Hohokam late pre-Classic through Classic period (A.D. 950–1400). P. Fish and S. Fish (1984) indicate that the Beaver Creek systems date between A.D. 1200 and 1350. In the Safford Valley the garden systems appear to date between the mid to late A.D. 1200s and the early A.D. 1300s.