

ZOOARCHAEOLOGY AND CHRONOLOGY OF HOMOL' OVI I AND OTHER
PUEBLO IV PERIOD SITES IN THE CENTRAL LITTLE COLORADO RIVER
VALLEY, NORTHERN ARIZONA

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Vincent Michael LaMotta

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As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Vincent Michael LaMotta entitled Zooarchaeology and Chronology of Homol'ovi I and Other Pueblo IV Period Sites in the Central Little Colorado River Valley, Northern Arizona and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy

E. Charles Adams Date: 14 April 2006

Michael B. Schiffer Date: 14 April 2006

Barbara J. Mills Date: 14 April 2006

Mary C. Stiner Date: 14 April 2006

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Co-Director: E. Charles Adams Date: 14 April 2006

Dissertation Co-Director: Michael B. Schiffer Date: 14 April 2006

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SIGNED: Vincent Michael LaMotta

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ABSTRACT

This study explores aspects of the development and organization of a mid-thirteenth through fourteenth-century, ancestral Hopi settlement cluster at Homol'ovi, located in the central Little Colorado River valley in north-central Arizona. The Homol'ovi cluster has been the subject of an intensive, 20-plus year program of excavation and survey by the Arizona State Museum's Homol'ovi Research Program. Homol'ovi I, an 1100-room pueblo occupied from approximately A.D. 1290 to 1400, was excavated between 1994 and 1999 and yielded deeply stratified, intact cultural deposits. The present study develops an internal, ceramic-based chronology of deposits at Homol'ovi I; establishes temporal relationships between occupational components at Homol'ovi I and other Pueblo IV period sites in the Homol'ovi cluster; and explores spatial and temporal variation in ritual activities within the Homol'ovi cluster through the lens of zooarchaeology.

The Homol'ovi I chronology developed in this study is based on frequency seriation of imported Jeddito Yellow Ware pottery; stylistic, formal, and technological analysis of Jeddito Yellow Ware; ceramic cross-dating; and high-precision AMS radiocarbon dating. These dating techniques make it possible to seriate cultural deposits at Homol'ovi I, and to tie deposits from other local sites into the Homol'ovi I sequence. Additionally, some of the techniques potentially can be applied to date sites in other regions where Jeddito Yellow Ware pottery is found. This chronological research establishes a framework for tracking behavioral and organizational changes within the

village of Homol'ovi I, and for situating events and processes in the life history of this community within a broader, regional context.

One potential application of this chronological framework is explored through a zooarchaeological study that addresses temporal and site-to-site variation in the use and deposition of ritually sensitive categories of fauna at Homol'ovi I and other nearby villages, including Homol'ovi II, III, and IV. The fauna of interest include birds, carnivores, artiodactyls, and certain reptiles and amphibians. This study identifies a number of temporal trends that may be related to a major, late-fourteenth century reorganization of the Homol'ovi cluster and its external relations. In doing so, it lays a foundation for further research into the ritual organization of the Homol'ovi cluster.

CHAPTER 1:
RITUAL ORGANIZATION AND CHANGE AT HOMOL'OVI:
INTRODUCTION TO A WORK IN PROGRESS

Introduction

This dissertation represents some initial steps toward a comprehensive archaeological study of ritual organization and change in the thirteenth- and fourteenth-century Homol'ovi pueblos, located in the central Little Colorado River valley in northern Arizona. Over the past decade, researchers pursuing deposit-based approaches have made great progress toward identifying material traces of ritual activities in the archaeological record of Homol'ovi and other ancestral Pueblo sites (Adams and LaMotta 2006; Karunaratne 1997; LaMotta 1996; Strand 1998; Walker 1995a, 1995b, 1996, 1998; Walker et al. 2000). This research has illuminated previously unrecognized sources of archaeological variability, and has made tangible contributions to the study of archaeological formation processes (LaMotta and Schiffer 1999, 2001, 2005; Schiffer 1987). The next major challenge along these lines will be to address more complex issues, such as ritual organization and ritual process, from a material-culture perspective. Applied to Homol'ovi, this means determining how ritual was organized within and between different villages in the cluster, and exploring how those relationships changed as the settlement cluster evolved. In taking up this challenge, archaeologists stand to gain not only major insights into the workings of Pueblo IV period villages and settlement clusters, but also into the development of Western Pueblo society itself.

Homol'ovi I (AZ J:14:3 [ASM]) is a large, complex, long-lived ancestral Pueblo site that will certainly play a key role in future discussions of ritual organization and

change in the Homol'ovi region. The Arizona State Museum's Homol'ovi Research Program (HRP) conducted extensive excavations at this site from 1994 to 1999 (Adams 2002:34-36). HRP excavations at Homol'ovi I yielded hundreds of thousands of artifacts, faunal remains, and botanical specimens, plus voluminous information on architecture, features, and deposits. Eventually, through analysis of this material, archaeologists hope to understand how ritual activities were organized within Homol'ovi I; how those activities changed as the village grew in size and complexity; and how Homol'ovi I was articulated ceremonially with other nearby villages. This dissertation lays some of the necessary chronological groundwork for answering these questions, and presents some preliminary conclusions on ritual organization and change from a zooarchaeological perspective.

Goals of this Study

The first goal of this study was to develop a chronological framework for Homol'ovi I that could be used to accurately date individual deposits. This framework ideally would be applicable to other Homol'ovi sites to make it possible to cross-correlate depositional events in the life histories of different villages. Obviously, precise chronological control is necessary for distinguishing synchronic from diachronic variation in cultural deposits and their contents. The dating technique developed in this study is based on frequency seriation of Jeddito Yellow Ware pottery. A detailed analysis of decorated ware ceramics from Homol'ovi I demonstrates the chronological sensitivity of the technique at this site, while data from Homol'ovi II and III show that the technique is generally, if not universally, applicable to deposits from other sites in the

region. Ceramic cross-dating and high-precision AMS radiocarbon dating supply absolute dates for key points in the Jeddito Yellow Ware seriation for Homol'ovi I.

A second goal was to expand the Homol'ovi I faunal dataset, focusing on the identification and analysis of faunal taxa that are typically associated with ritual activities in Western Pueblo ethnographic literature (more below). These include birds, carnivores, artiodactyls, and certain reptiles and amphibians. In the Pueblo Southwest, where there is a rich ethnographic record, faunal remains provide an ideal medium for identifying traces of ritual activities in the archaeological record (e.g., Clark 1998; Creel and McKusick 1994; Dean 2001, 2005; Hill 2000; McKusick 1982, 2001; Olsen 1990:160-166; Potter 1997; Shelley 1993; Strand 1998; Strand and McKim 1996; Zack Horner 1999). Among the Hopi, Zuni, and other Puebloan groups, for example, certain animals are often associated with particular ceremonies, religious organizations, lineage groups (e.g., clans), forces of nature (e.g., rain), or types of power (e.g., curing, witchcraft) (Bahti 1990; Bradfield 1974:1, 1995:Parts 2-3; Cushing 1883; Fewkes 1899; Ladd 1963; Roediger 1941:70-78; Smith 1952:173-189, 202-223; Tyler 1975, 1979; references are also found throughout lengthier descriptive ethnographies such as Bunzel 1932a, 1932b; Parsons 1939; Stephen 1936; and Stevenson 1904). If nothing else, the ethnographic data provide highly specific clues for interpreting prehistoric ritual deposits that include animal remains.

Finally, a third goal was to demonstrate the value of the ceramic chronology to be developed in this study for partitioning both spatial and temporal sources of variation in faunal datasets from Homol'ovi I, II, III, and IV, focusing again on ritually sensitive

categories of fauna. One purpose of this analysis was to isolate cluster-wide temporal trends in the relative frequency of different ritually sensitive taxa—trends that might reflect broad-scale changes in ritual among the Homol’ovi villages generally. Patterns of ritual-fauna usage among contemporaneous Homol’ovi sites were also explored, principally to identify any evidence for shared ritual traditions among different, roughly coeval villages. While admittedly preliminary, this analysis demonstrates the value of specific kinds of faunal data for identifying patterns of ritual organization and change at Homol’ovi, while also underscoring the need for precise chronological control in any such research.

The remainder of this introductory chapter provides background information on the Pueblo IV period occupation of the Homol’ovi region, including descriptions of the four sites that feature prominently in the rest of this study; a brief description of the environmental setting of the sites; modern and historical data on biotic communities in surrounding areas; and a brief introduction to ritually sensitive fauna in the Homol’ovi zooarchaeological collection. The environmental and biogeographic data presented below serve as a backdrop for the zooarchaeological analyses that appear in Chapters 3 and 4.

The Pueblo IV Period Occupation of the Homol’ovi Region

There are seven major Pueblo IV period sites in the central Little Colorado River valley, comprising what Adams (2002) has called the Homol’ovi cluster (listed here in order from upstream/east to downstream/west) (Figure 1.1): Jackrabbit Ruin, Chevelon Ruin, Cottonwood Creek Ruin, Homol’ovi I, Homol’ovi II, Homol’ovi III, and

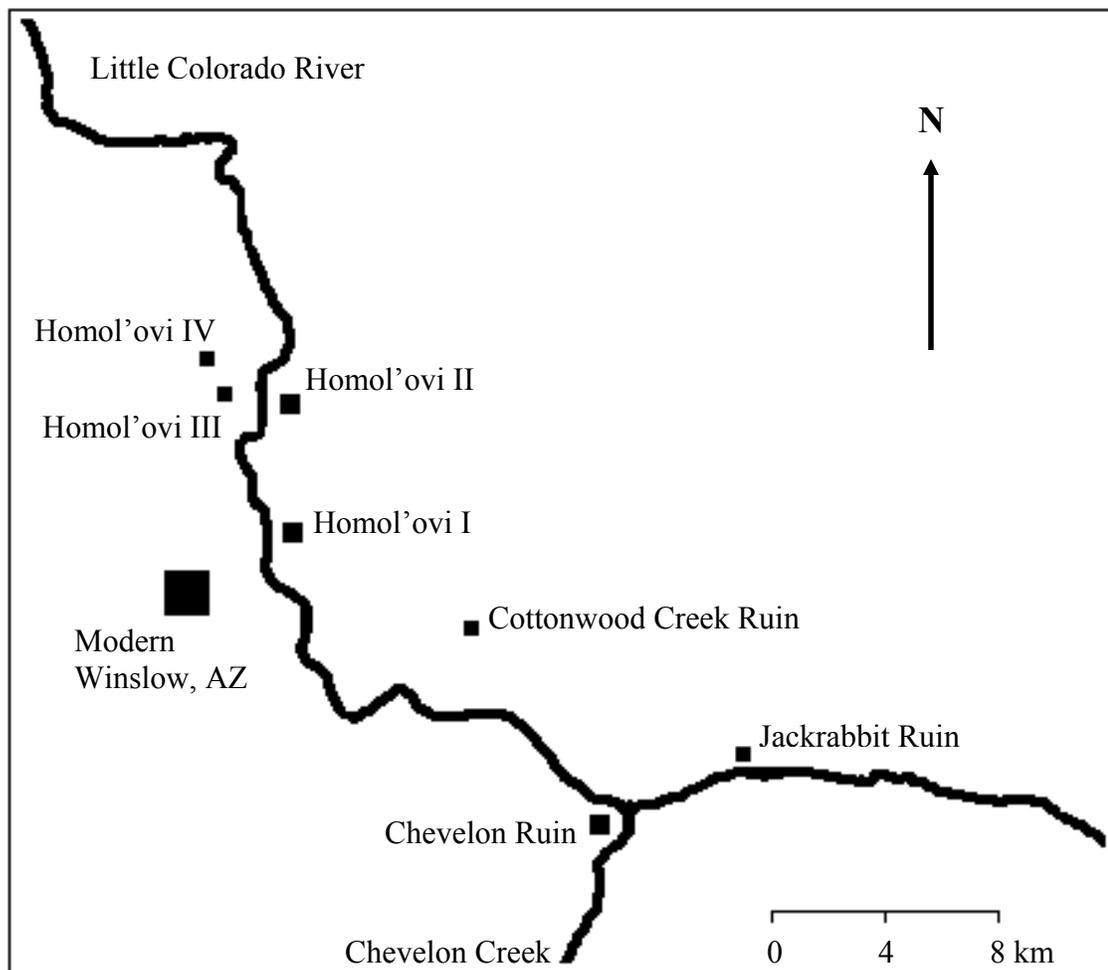


Figure 1.1 Map of the Homol'ovi settlement cluster in north-central Arizona. Based on Adams (2002:Figures 1.2 and 3.2).

Homol'ovi IV. Collectively, the occupation of these pueblo villages spans the period from the mid A.D. 1200s to about 1400, at which point the region was apparently depopulated. Based on current research, it appears that no more than five of the Homol'ovi-cluster sites were occupied simultaneously (Adams 2004a:119).

To date, the bulk of HRP research efforts have been focused on Homol'ovi I, II, III, and IV, which are situated along an approximately 8 km stretch of the Little Colorado River just north of (downstream from) modern-day Winslow, Arizona. In subsequent chapters, this group of four sites is sometimes referred to as the western Homol'ovi cluster, to distinguish it from the eastern Homol'ovi cluster, consisting of Jackrabbit, Chevelon, and Cottonwood Creek ruins. These labels are purely descriptive. While the eastern sites are currently less well known, Chevelon and Jackrabbit ruins have been investigated in recent years by HRP and affiliated projects. The research reported in this thesis, however, draws exclusively on data from Homol'ovi I, II, III, and IV.

Background Information on the Homol'ovi Pueblos

This section introduces and briefly describes the four major Homol'ovi sites that are the focus of this study, in order from earliest to latest. The Adobe Pueblo (AZ J:14:316 [ASM]), an outlying roomblock associated with Homol'ovi I, is also described. Basic site data, including dates of occupation; number of rooms, kivas, and plazas; and estimated population size are presented in Table 1.1.

Homol'ovi IV (AZ J:14:13 [ASM]). The earliest of the Homol'ovi pueblos, Homol'ovi IV was founded in the mid-thirteenth century and abandoned before the beginning of the fourteenth century, with the main occupation probably falling between

Table 1.1
 Dating, Size, and Architectural Features of Homol'ovi Sites Discussed in this Study¹

Site (ASM No.)	Dates of Occupation	Rooms	Plaza Kivas	Plazas	Estimated Maximum Population
Homol'ovi I (AZ J:14:3)	1290–1400	1100	5–10	3 small, enclosed + 1 large, enclosed	600
Adobe Pueblo (AZ J:14:316)	mid-late 1300s	15	2	1 unbounded	25
Homol'ovi II (AZ J:14:15)	1350–1400	1200	40+	3 large, enclosed	1000
Homol'ovi III (AZ J:14:14)	1280–1300/ 1330–1375	45	5+	1 unbounded	75
Homol'ovi IV (AZ J:14:13)	1260–1285	150– 200	2+	1 unbounded	200

Note:

¹Some data from Adams 2002:Table 1.1.

about A.D. 1260 and 1285 (Adams 2004b) (Figure 1.2). The site consists of approximately 150-200 stone masonry rooms built on the sides and top of a butte on the west side of the Little Colorado River. The site grew by accretion, with no obvious pre-conceived design. There is a single unbounded plaza with at least two kivas. HRP spent one season (1989) working at this heavily vandalized site, excavating eight rooms, two kivas, and a portion of the plaza. The decorated ware ceramic assemblage from Homol'ovi IV is dominated by locally made Winslow Orange Ware, with lesser amounts of Tsegi Orange Ware and Tusayan, Cibola, and Hopi White wares (Bubemyre 2004:Table 8.1). Yellow-firing Jeddito Yellow Ware types, which are typical of later, fourteenth-century assemblages, are all but absent (Bubemyre 2004:Table 8.7).

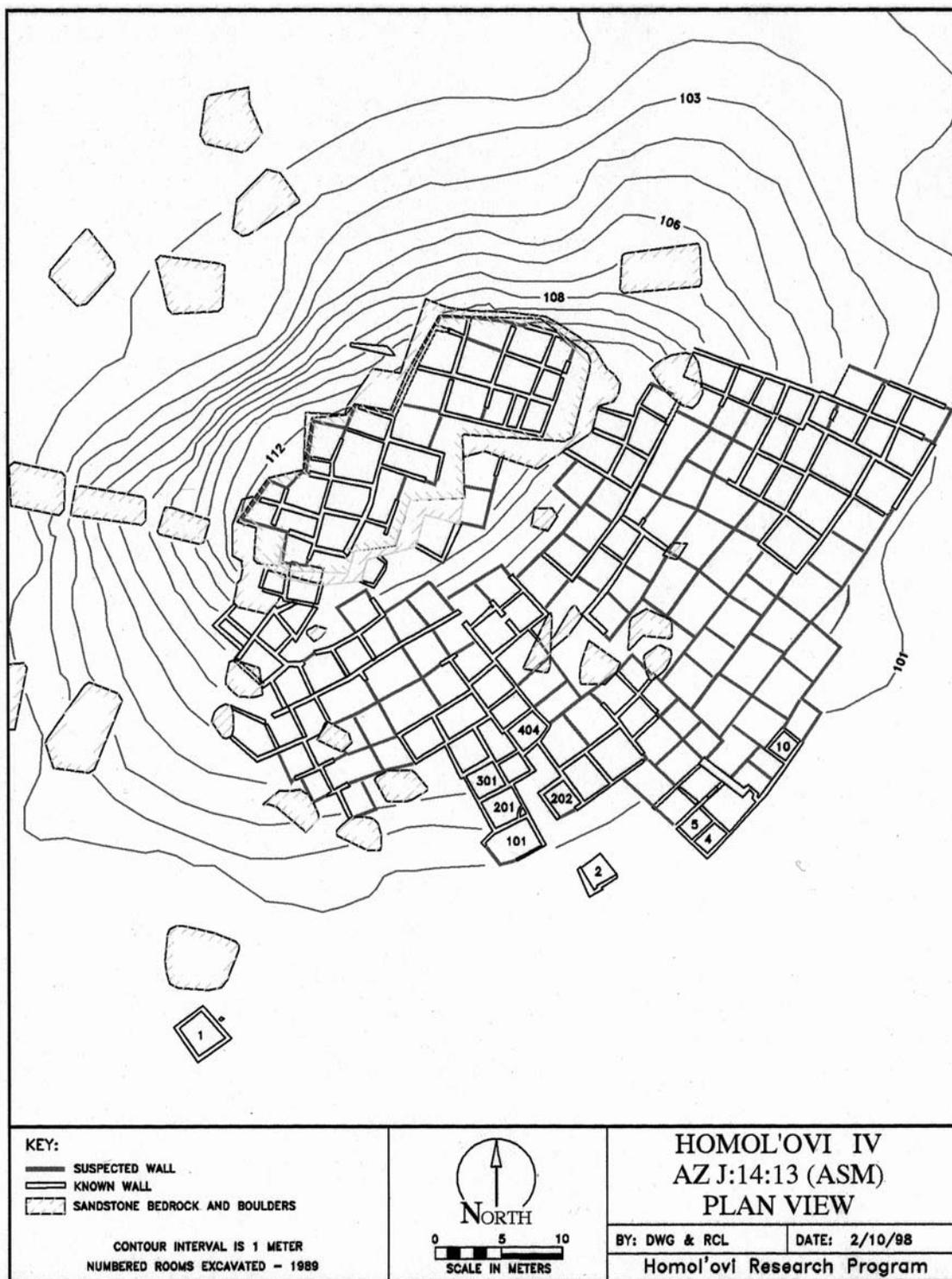


Figure 1.2 Map of Homol'ovi IV (AZ J:14:13 [ASM]). CAD drawing by Douglas W. Gann.

Homol'ovi III (AZ J:14:14 [ASM]). Homol'ovi III was occupied from about A.D. 1280 until 1375, with a possible occupational hiatus between 1300 and 1330 (Adams 2001a:Table 7.9) (Figure 1.3). Adams (1989, 2002:31-32) believes flooding caused the village to be abandoned as a permanent residence at the beginning of the fourteenth century, after which it was used periodically as a field house. The site is located on the west side of the Little Colorado River and consists of a single linear roomblock of about 45 rooms, with a mix of stone and adobe architecture. There is an unbounded plaza area to the southeast of the roomblock, with at least five kivas. HRP worked at Homol'ovi III from 1985 to 1989, excavating and testing seventeen rooms, five kivas, and a portion of the plaza. The decorated ware ceramic assemblage from Homol'ovi III is dominated by Winslow Orange Ware, with lesser amounts of Jeddito Yellow Ware, White Mountain Red Ware, Tsegi Orange Ware, and a variety of white wares (Lyons et al. 2001:Table 8.1). Yellow-firing Jeddito Yellow Ware types are rare to absent in the earliest deposits at the site, and account for no more than about 20 percent of decorated ceramics in the later deposits (see Lyons et al. 2001:Tables 8.2 and 8.6).

Homol'ovi I (AZ J:14:3 [ASM]). Homol'ovi I is the longest-lived of the four sites under examination, with a continuous occupation spanning the period from about A.D. 1290 to 1400 (see Chapter 2) (Figure 1.4). This large pueblo has an estimated 1,100 rooms and perhaps as many as 10 plaza kivas. The northern and southern portions of Homol'ovi I differ dramatically in layout and growth history. The northern part consists of a number of massed roomblocks that collectively enclose three relatively small plaza areas. In general terms, this is the older portion of the site, although it remained in use

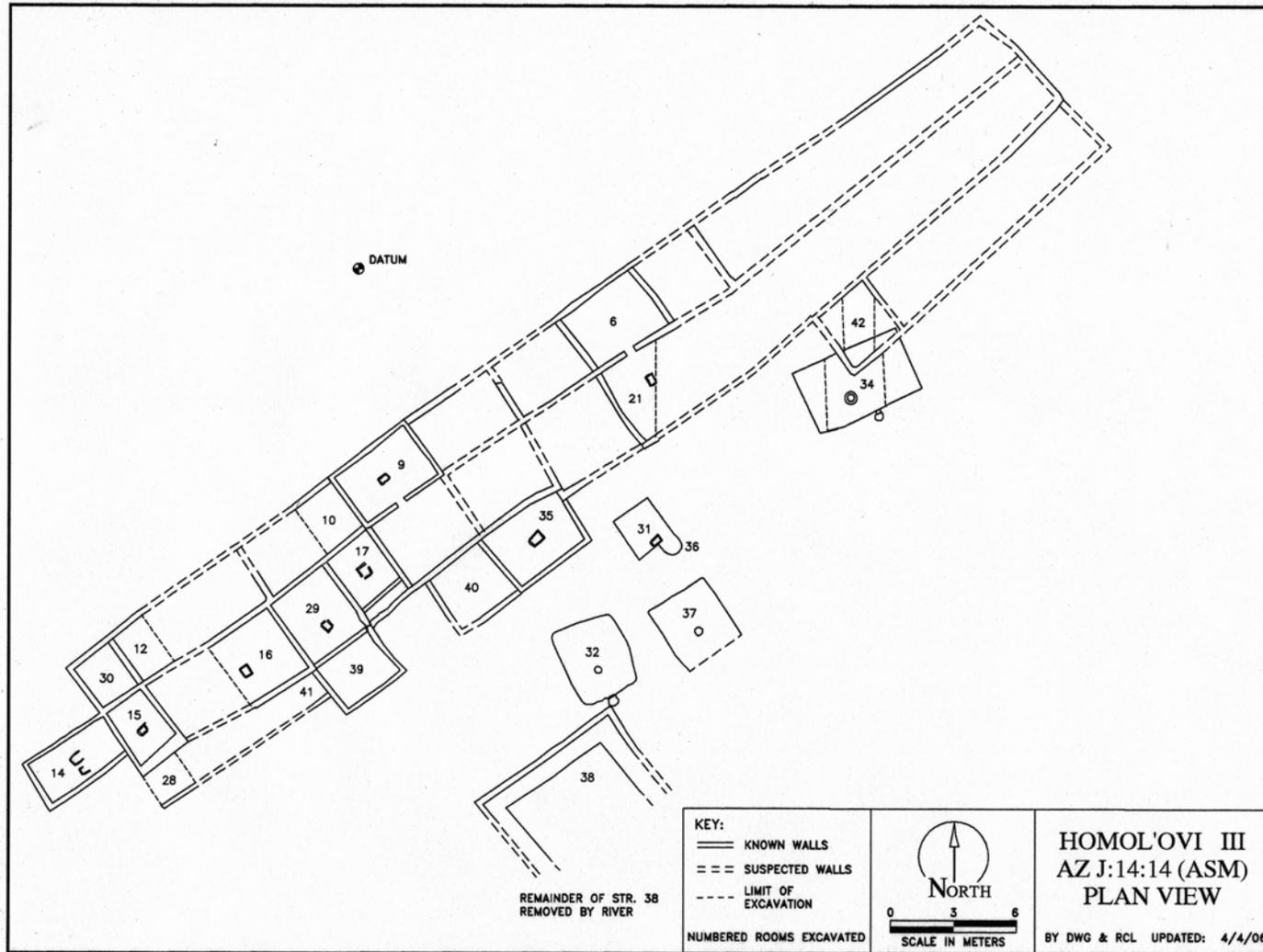


Figure 1.3 Map of Homol'ovi III (AZ J:14:14 [ASM]). CAD drawing by Douglas W. Gann.

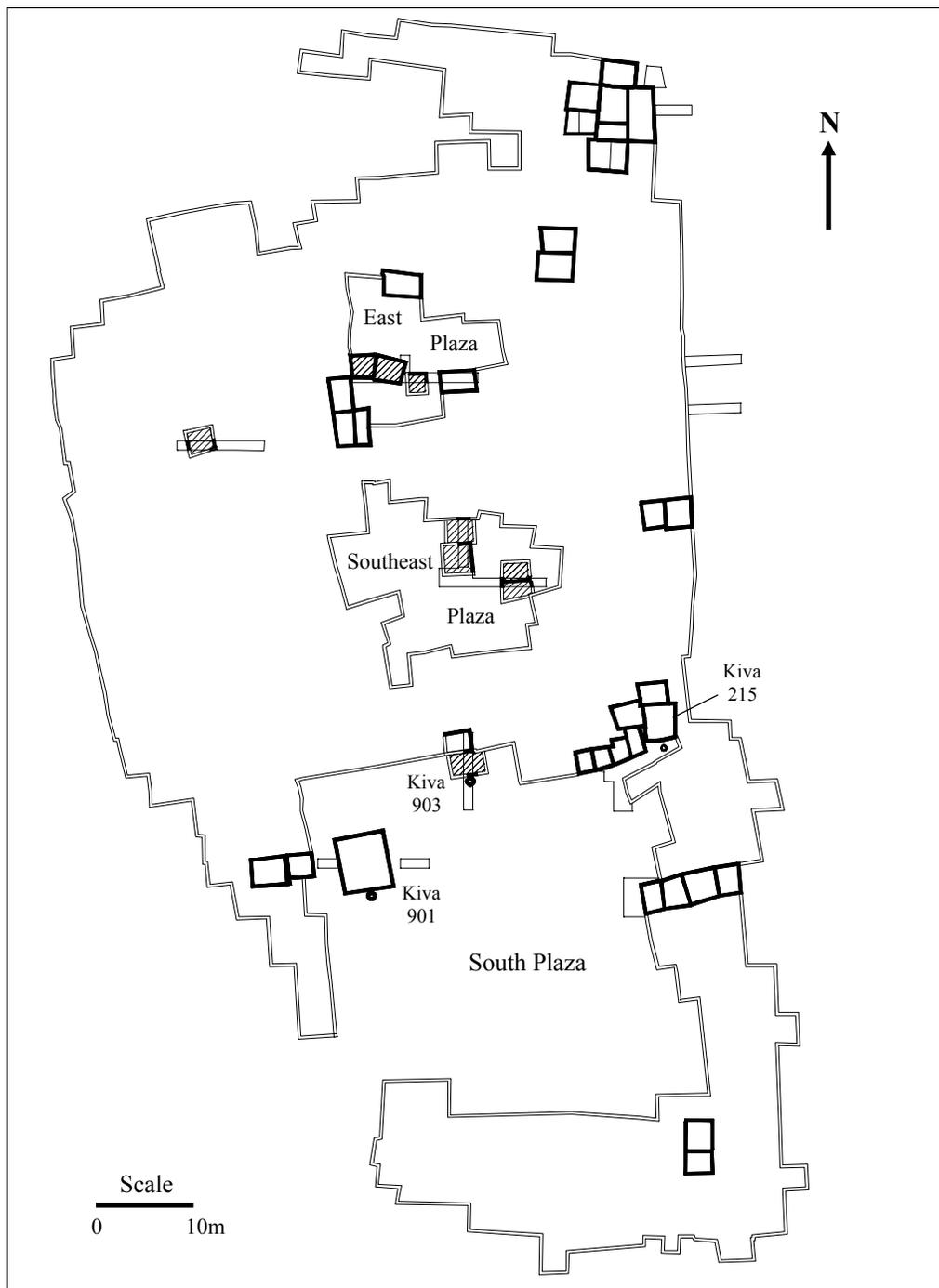


Figure 1.4 Map of Homol'ovi I (AZ J:14:3 [ASM]) showing excavated rooms and trenches. CAD drawing by Vincent M. LaMotta and Douglas W. Gann.

throughout the site's occupation. Growth of the northern part of Homol'ovi I was largely organic and accretional, with little evidence for a preconceived village layout.

Boundaries of the small plaza areas were fluid, and changed as surrounding roomblocks grew or fell into disuse. The layout of the southern portion of the site, in contrast, appears more formal and planned. Additionally, the southern roomblocks are generally constructed of adobe, whereas the northern roomblocks tend to be constructed of stone masonry. The southern part of Homol'ovi I is dominated by a single, large, enclosed plaza, which was defined through the construction of pueblo roomblocks on its south, east, and west sides, and which contains several large kivas. Construction and use of the South Plaza apparently began shortly after the initial appearance of yellow-firing Jeddito Yellow Ware pottery at Homol'ovi I, i.e., sometime after A.D. 1325 (LaMotta 2002a; LaMotta et al. 2002).

HRP worked at Homol'ovi I from 1994 to 1999, excavating and testing an estimated 70 rooms; three plaza kivas; and portions of the South Plaza, three smaller plazas, and several different extramural areas on the east and west sides of the pueblo. Decorated ware ceramic assemblages from this site are discussed extensively in Chapter 2. Yellow-firing Jeddito Yellow Ware types are absent from the earliest deposits at the site, but account for 60 to 100 percent of decorated ware sherds in the latest deposits.

Adobe Pueblo (AZ J:14:316 [ASM]). Located 125 m south of Homol'ovi I proper, AZ J:14:316 (ASM) consists of a single adobe-walled roomblock with an estimated 15 rooms and two kivas (Adams 2002:36; Gann 1995). This outlying roomblock was investigated by HRP in 1992 and 1994. Both kivas and the remains of

the road grader-damaged surface roomblock were excavated. The architectural style and presence of yellow-firing Jeddito Yellow Ware types clearly associate this roomblock with the fourteenth-century occupation at Homol'ovi I.

Homol'ovi II (AZ J:14:15 [ASM]). Homol'ovi II is the largest site in the Homol'ovi cluster, with an estimated 1,200 rooms and 40 plaza kivas (Figure 1.5). The site is constructed entirely of stone masonry, and is situated on top of a low mesa on the east side of the Little Colorado River. Homol'ovi II was established relatively late, probably not before A.D. 1350, and was occupied until about 1400 (see discussion in Chapter 2). The site is formally organized around three large plazas, two of which are fully enclosed, and all of which contain kivas. HRP conducted preliminary work at Homol'ovi II in 1984, and then returned for more extensive excavations in 1991-1995. Altogether, HRP excavated or tested 27 rooms, 7 kivas, portions of the plazas, and portions of extramural areas to the north and south of the pueblo. The decorated ware ceramic assemblage from Homol'ovi II is dominated by yellow-firing Jeddito Yellow Ware pottery, which accounts for 80-90+ percent of decorated sherds in most analyzed contexts (Hays 1991; see also Chapter 2). Homol'ovi II is practically surrounded by petroglyph panels depicting katsinas and katsina-like anthropomorphic figures, which, along with iconography found on ceramics and in kiva murals at Homol'ovi II, strongly suggests that katsina ceremonialism flourished at this late-fourteenth century village (Adams 1991:54-63, 1996; Cole 1992; Pond 1966; Walker 1996; Walker et al. 2000).

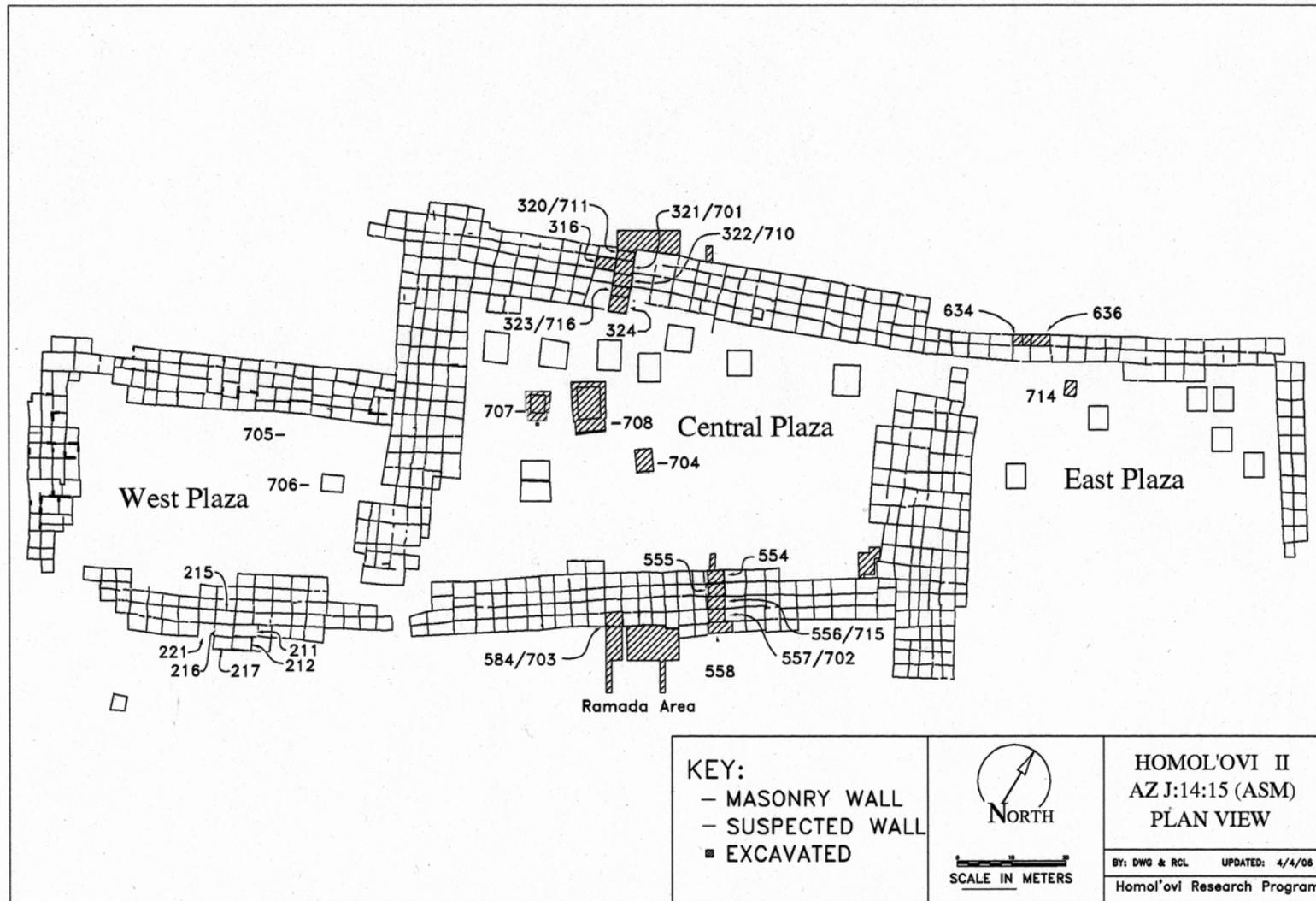


Figure 1.5 Map of Homol'ovi II (AZ J:14:15 [ASM]). CAD drawing by Douglas W. Gann.

Population Sources for the Homol'ovi Pueblos

Survey data (Lange 1998) and pithouse excavation data (Young 1996) indicate that the Homol'ovi region was inhabited primarily on a part-time, seasonal basis in the centuries leading up to the initial settlement of large, year-round pueblo villages such as Homol'ovi IV in the mid-to-late 1200s (Adams 2002:222-224). Beginning in the 1280s, settlers founded at least five new permanent villages, including Homol'ovi I and III in the western portion of the settlement cluster; and by the late 1300s, settlement at Homol'ovi was characterized by a few large, aggregated, and perhaps multi-ethnic villages. The wide array of non-local decorated ware ceramics found in mid-thirteenth through mid-fourteenth century deposits at the Homol'ovi sites reflects a diversity of extra-regional ties with Puebloan population centers throughout the Little Colorado River basin and northeastern Arizona generally (see Adams 2002:Table 7.1). Understanding the origins and extra-regional ties of populations living at Homol'ovi is an important and on-going area of research (e.g., Lyons 2001, 2003:39-61). While these issues are not central to the present study, information on population origins is of interest to the extent that it might help explain observed variation in faunal assemblages—e.g., taxonomic variation that could reflect culturally encoded species preferences or ritual traditions (see Chapter 4).

So far, study of ceramics, architecture, and village layout has provided some information on the ethnic makeup of the Homol'ovi villages (see especially Lyons 2003:39-61). The settlers at Homol'ovi IV clearly came from the Tusayan (Hopi Mesas) area (Adams 2004c:2; Bubemyre 2004). Homol'ovi III, on the other hand, exhibits some traits suggesting origins in, or ties to, the upper Little Colorado/Silver Creek region,

although a northern (Tusayan/Kayenta) origin for the founders has not been ruled out (Adams 2001b:121, 2002:174-175; Lyons 2001, 2003:39-61; Lyons et al. 2001).

Homol'ovi I was probably founded by a population with roots in the Tusayan/Kayenta region (Lyons 2003:39-61), although it may have become more heterogeneous through subsequent waves of immigration and aggregation. Adams (2002:175), for instance, suggests that populations from Homol'ovi III and IV may have resettled at Homol'ovi I after abandoning their own villages as full-time residences in the late thirteenth/early fourteenth century. Finally, Homol'ovi II was almost certainly founded by a population from the Hopi Mesas. Specifically, the extremely high frequencies of Jeddito Yellow Ware pottery at this site, in combination with sourcing data, suggest strong ties with Yellow Ware-producing villages of Antelope Mesa (Bishop et al. 1988; Hays 1991). Homol'ovi II was established relatively late and appears to have been built rapidly (Adams 2002:143), suggesting a mid-to-late fourteenth century influx from Hopi.

Environmental Setting

The Homol'ovi sites are located in and adjacent to a riparian corridor along the Little Colorado River. The floodplain of the Little Colorado River is particularly broad in the Homol'ovi area, up to 4 km across, with a relatively high water table (Lange 1998:4). Since rainfall is sparse, and springs virtually nonexistent, the river is the main permanent water source for the region. In the past, the general availability of water would have attracted both human settlers and a variety of animal life to the region—much as it has done in recent times. As Lange (1998:1) notes, aside from the recent effects of livestock grazing and cyclical changes in the river and floodplain (Van West 1996), the

environment of the Homol'ovi region has remained fairly unchanged over the past few millennia (Martin 1963:70). Judging from recent ecological data, the prehistoric residents of Homol'ovi would have had a diversity of floral and faunal communities within a short distance from their home villages.

Surveying just the area north of the Mogollon Rim, one finds four different biotic communities within a 55 km radius of the Homol'ovi sites, aside from the wetlands associated with the river itself (Table 1.2) (Brown 1994; Brown and Lowe 1994). These are the Great Basin Desertscrub community, which covers much of the valley floor immediately around the Homol'ovi sites; and at greater distances, the Plains and Great Basin Grassland, Great Basin Conifer Woodland, and Petran Montane Conifer Forest communities. At even greater distances, ranging from 90 to 160 km from Homol'ovi, one encounters areas of Petran Subalpine Conifer Forest, Alpine Tundras (e.g., the San Francisco Mountains), Subalpine Grassland (e.g., the White Mountains), and Mohave Desertscrub (e.g., the Grand Canyon). Each biotic community supports a unique mix of plant and animal resources. While many desirable animal resources would have been available locally to the populations at Homol'ovi, others may have been procured over relatively great distances. In theory, residents of Homol'ovi could have made a round trip on foot to any of the biotic communities listed in Table 1.2 in ten days or less (based on the travel formula suggested by Wilcox 1996:243-245; after Drennan 1984).

Information on the flora and fauna associated with the biotic communities surrounding the Homol'ovi sites has been summarized by Brown (1994), Hoffmeister

Table 1.2

Biotic Communities North of the Mogollon Rim within a 160 Kilometer Radius of Winslow, Arizona¹

Biotic Community	Distance from Winslow (km)²	Elevation (m)	Characteristic Vegetation	Characteristic Artiodactyl Species
Great Basin Desertscrub	0	1,200-2,200	sagebrush, saltbush, rabbitbrush, greasewood	pronghorn
Plains and Great Basin Grassland	5	1,200-2,300	grasses, sagebrush, saltbush, rabbitbrush	pronghorn
Great Basin Conifer Woodland	25	1,500-2,300	pinyon, juniper	mule deer
Petran Montane Conifer Forest	55	2,200-2,650	ponderosa pine, Douglas-fir, white fir, limber pine, aspen	mule deer, white-tailed deer
Petran Subalpine Conifer Forest	90	2,450-3,800	Engelmann spruce, subalpine fir, aspen, bristlecone pine	mule deer
Alpine Tundras (San Francisco Mts.)	95	3,500-3,850	lichens, mosses, vascular plants (above treeline)	bighorn
Subalpine Grassland (White Mts.)	140	2,500-3,500	grasses and forbs (wild-daisy, vetch, clover, etc.)	bighorn, mule deer
Mohave Desertscrub (Grand Canyon)	160	< 1,220	creosote bush, saltbush	bighorn, mule deer

Notes:

¹Based on Brown (1994) and Brown and Lowe (1994).

²Minimum linear distance (km) from Winslow, Arizona.

(1986), Lange (1998), and Strand (1998). In short, it is likely that many species found in the Homol'ovi faunal assemblages were procured locally or at short distances from the villages (one important exception, bighorn sheep, is discussed below). In addition to supporting a native wetlands fauna, the Little Colorado River would have attracted a variety of mammals and local and migratory birds to the area (Strand 1998:88-89).

Introduction to Ritually Sensitive Fauna in the Homol'ovi Zooarchaeological Collections

This section provides a brief description of ritually sensitive faunal taxa encountered in the zooarchaeological collections from Homol'ovi I, II, III, and IV. The present study employs the term “ritually sensitive fauna” to designate certain broad taxonomic categories which, based on Puebloan ethnography, are likely to include species that would have had ritual significance in ancestral Hopi villages like those at Homol'ovi. Ritual, in this context, is defined in strictly empirical terms, as the sets of activities that Puebloan ethnographers identified as such based on first-hand observations and informant testimony. This use of the direct historical approach simply provides a way to narrow the focus of research to portions of the faunal collection that are most likely to contain traces of prehistoric ritual activities. This does not mean that the taxa chosen for study—birds, carnivores, artiodactyls, and certain reptiles and amphibians—are the only groups of animals that would have experienced ritualized life histories; nor is it meant to imply that all specimens falling within the purview of this analysis were necessarily used or deposited in connection with ritual or ceremonial activities. This is simply a place to begin looking for the zooarchaeological traces of ritual prehistory. The

taxa omitted from consideration in the present study include lagomorphs, rodents, fish, and some miscellaneous forms (see Chapter 3).

The following sections discuss the taxa of interest, as they are represented in the Homol'ovi zooarchaeological collections, and provide some brief comments on the ritual uses or ceremonial significance of these taxa as documented in ethnographic sources. The ethnographic data presented herein are intentionally general, and are heavily weighted toward Hopi and Zuni sources. This discussion is meant to be suggestive rather than exhaustive; a more complete discussion of the ritual ethnozoology of the northern Southwest (and beyond) can be found in Strand (1998:Chapter 2). This discussion also provides some brief comments on the biogeography of artiodactyl taxa found at Homol'ovi, principally to document the fact that the assemblages contain at least one important, non-local species—bighorn sheep (*Ovis canadensis*).

Birds

The aggregate bird assemblage from Homol'ovi I, II, III, and IV includes representatives of at least 24 different families (see Chapter 3). As an estimate, there are at least 45 different species of birds represented in this collection, including examples of hawks, golden eagle, falcons, typical owls, nighthawks, common raven, turkey, sandhill crane, a variety of water birds (grebes, herons, rails and coots, shorebirds, geese and ducks), quails, doves, woodpeckers, cuckoos or roadrunners, and numerous types of small perching birds. There are also rare examples of exotic macaws in the collection from Homol'ovi III. This taxonomic variety reflects not only local environmental

diversity, it underscores the importance of birds generally—and of many different kinds of birds—in village life at Homol’ovi.

Historically, among the Western Pueblos, birds were highly valued for their feathers, skins, and talons—items that figured prominently in ceremonial paraphernalia and costume (e.g., Roediger 1941:70-78). Edmund Ladd (cited in McKusick 2001:11-13), for instance, estimated that a Zuni tribal member might consume between 80 and 400 bird feathers of various kinds annually just in making prayer sticks; to make or refurbish a single Zuni ceremonial mask might require feathers from more than 20 individual birds, including ravens, crows, owls, and hawks. Eagles and large hawks also figure prominently as sacrificial victims in the Hopi Niman ceremony (McKusick 2001:52-58; Parsons 1939:187; Stephen 1936:568-569; Titiev 1944:235; Voth 1912).

Carnivores

The carnivore assemblages from the Homol’ovi sites include only a few major taxa, principally coyote or domestic dog, red or gray fox, bobcat, and badger. There are also unique specimens of possible mountain lion and possible skunk in the Homol’ovi I collection. Historically, carnivores were valued for their skins, which were used in various aspects of ceremonial costume, as well as for their heads and paws, which were often used as fetishes. Fox pelts, for instance, are ubiquitous elements of katsina-dancer attire among the Zuni and the Hopi (Bunzel 1932b:870; Roediger 1941:136-139; Smith 1952:210; see also entries under *foxskin* in Stephen 1936:1355). The felids tend to have martial or hunting associations in Hopi and Zuni ritual (e.g., Stephen 1936:98, 307 n.1, 643-644, 699-700, also Fig. 64a.-64b.; Stevenson 1904:438-439); badger has curing

associations (Eggan 1950:84; Parsons 1939:190); and coyotes and other canids are sometimes associated with witchcraft (Bradfield 1995:266; Hill 2000; Stephen 1936:1281; Titiev 1942:549).

Artiodactyls

There are three principal artiodactyls in the Homol'ovi faunal collection: pronghorn, deer, and bighorn sheep. Historically, the procurement, consumption, and disposal of these large mammals was surrounded by ritual (Beaglehole 1936; Stevenson 1904:438-431). The Hopi sometimes used heads of artiodactyls such as pronghorn and bighorn as ritual paraphernalia, or as models for ceremonial headdresses (Fewkes 1897a:Plate CX; Stephen 1936:41, 970; Wright 1979:38). Horns, antlers, scapulae, hooves, and skins were also used for a variety of functions in Western Pueblo ritual (Bunzel 1932b:872; Fewkes 1903:64; Roediger 1941:145-147; Wright 1979:27, 30-33, 38, 83-84; see also numerous references in Stephen 1936). Pronghorn and deer would have been available fairly close to the Homol'ovi villages, while bighorn must have been procured over relatively longer distances (see Table 1.2).

The issue of bighorn sheep procurement—where and how far residents of Homol'ovi would have had to go to obtain these animals (presuming they were not acquired through trade)—is especially important in the context of the present study, given that bighorn occurs at unusually high frequency in certain artiodactyl assemblages from Homol'ovi I (see Chapters 3-4). This pattern seems anomalous both in terms of the regional zooarchaeological record and in light of recent and historical biogeographic data.

Bighorn tend to prefer rocky desert habitats, especially broken and dissected mountainous country (Hansen 1980:64; Hoffmeister 1986:556). In northern Arizona, bighorn are found principally in and around the Grand Canyon, although there are recent and nineteenth-century reports of this species in the White Mountains and in and around the San Francisco Mountains (Hoffmeister 1986:554-558; Merriam 1890). Bighorn were reportedly once abundant in the canyons of Black Mesa, where they were pursued by Hopi hunters prior to the twentieth century (Bourke 1984:134-135; Bradfield 1995:291). North of Black Mesa, in the rugged Kayenta region, bighorn were demonstrably important throughout the prehistoric period (Schaafsma 1980:148-153) and continued to be hunted by Paiutes as late as the 1890s (Grant 1980:9; Wetherill 1954). Bighorn are also found in parts of southern Utah that border northern Arizona, principally in the canyons of the Colorado and San Juan rivers and their tributaries (Bolton 1950; Monson 1980:42, 48).

While isolated populations of bighorn theoretically could be found in enclaves where local terrain and environment are conducive to their survival, none of the modern or historical sources consulted for this study identified any such populations near the Homol'ovi sites. If these accounts accurately represent the regional distribution of bighorn in the thirteenth and fourteenth centuries, then hunters from Homol'ovi I may have faced a journey of at least 95 km (one way) to acquire one directly (see Table 1.2). Pronghorn and deer, in contrast, would have been available in areas around Homol'ovi

(Beaglehole 1936:4; Hoffmeister 1986:551), and it is therefore not surprising that one or the other of these local species is usually dominant in the artiodactyl assemblages from Homol'ovi I, II, III, and IV (see Chapter 4).

Reptiles and Amphibians

Reptiles of interest for this study include turtles and pit vipers (rattlesnakes). The only amphibians to be considered are frogs and toads. Three kinds of turtle are found in the Homol'ovi assemblages: western box turtle, painted turtle, and (possibly) Sonoran mud turtle. A very limited number of crotalid (pit viper) remains have been found at the Homol'ovi sites; however the temporal and contextual distribution of these remains may be patterned (see discussion in Chapters 3 and 4). None of the frogs or toads in the Homol'ovi collection have been identified to species, but the family of true toads (Bufonidae) is represented.

Turtle shell rattles are a typical component of ceremonial costume for Hopi katsinas and other ceremonial practitioners (Bradfield 1995:244; Bunzel 1932b:872; Roediger 1941:145-146; Stephen 1936:38, 49, 120, 194, 335). According to Beaglehole (1936:22-23), the Hopi collected turtles in the historical period from a tributary of the Little Colorado River, possibly Chevelon Creek.

The use of rattlesnakes in the Hopi Snake-Antelope ceremony is well documented in the ethnographic literature (e.g., Bourke 1984; Fewkes 1897b, 1900; Stephen 1936:577-767). This kind of ceremony may have once been more widespread among the Pueblos. Espejo (cited in Parsons 1939:976), for example, described a public snake dance at Acoma in 1582.

Finally, frogs and tadpoles are considered “Cloud’s pets” or “kachina pets” by the Hopi (Stephens 1936:307 n.1), and like all things associated with water they are sacred (Smith 1952:217). This symbolism was obviously not foreign to the prehistoric inhabitants of Homol’ovi: From a cache of probable ritual items in a surface room at Homol’ovi I, for instance, HRP recovered a turquoise-mosaic encrusted, carved shell frog that is similar in design to the carved shell and turquoise frogs that Fewkes (1904:Figure 50, Plate XLIV) found at Chevelon Ruin and Chavez Pass. Presumably, this item had some ritual as well as iconic significance.

Organization of the Dissertation

The rest of this dissertation is organized as follows: Chapter 2 presents the results of the Homol’ovi I ceramic chronology study. The occupation of Homol’ovi I is divided into four ceramic phases, and these phases are cross-correlated with ceramic sequences from other Homol’ovi sites. Chapter 3 applies the chronology developed in Chapter 2 to temporally partition zooarchaeological datasets from Homol’ovi I, II, III, and IV. This chapter provides data on the taxonomic composition of ritually sensitive faunal assemblages from the Homol’ovi sites, focusing on the birds, carnivores, artiodactyls, reptiles, and amphibians, broken down by ceramic phases. Chapter 4 presents a spatial and temporal analysis of taxonomic variation in ritually sensitive fauna from Homol’ovi I, II, III, and IV. This analysis reveals a number of site-specific patterns and diachronic trends in assemblage composition. Some preliminary explanations for these patterns are offered, focusing on (a) the idea that different villages or subpopulations within villages may have had their own, relatively unique patterns of ritual behavior (particularly among

earlier temporal components), possibly as a result of cultural or ethnic differences; and (b) the notion that diachronic changes in ritually sensitive faunal assemblages are related in some fashion to an internal reorganization of the Homol'ovi cluster after the mid-fourteenth century founding of Homol'ovi II. Finally, Chapter 5 summarizes the findings of this study and points out directions for future research. This dissertation potentially will be of interest not only to Southwestern archaeologists, but also to scholars studying ritual and its role in middle-range and emerging complex societies worldwide, particularly to those studying ritual through the medium of the zooarchaeological record.

CHAPTER 2: CHRONOLOGY OF HOMOL' OVI I DEPOSITS

Introduction

This chapter develops a chronological foundation for current and future research into the ceremonial organization of Homol'ovi I and other Pueblo IV period sites in the western portion of the Homol'ovi settlement cluster. The ability to order archaeological phenomena in time—and thus the ability to distinguish synchronic variation from diachronic change—is prerequisite for understanding how ritual was organized within and between these sites, and how ceremonial organization may have changed over the life history of the community. The ceramic chronology developed in this chapter provides a framework for dating and seriating a large portion of the cultural deposits and architectural spaces that were excavated by the Homol'ovi Research Program at Homol'ovi I between 1994 and 1999. Additionally, within this framework it is possible to correlate archaeological manifestations at Homol'ovi I with remains at other nearby villages, permitting a broader, regional perspective on organization and change. While its main application in the present study involves discerning temporal and spatial variation in ritually sensitive faunal assemblages (Chapter 4), the chronological framework developed in this chapter can certainly be applied in other research pertaining to the Homol'ovi region and beyond.

The research presented in this chapter dates the Pueblo IV occupation at Homol'ovi I to the period from approximately A.D. 1290 to 1400, and shows that the occupation is divisible into four ceramic phases, as listed in Table 2.1 (note that the absolute dates shown in Table 2.1 are established through analyses presented later in this

Table 2.1
Ceramic Phases at Homol'ovi I

Ceramic Phase		Approximate Calendar Dates (A.D.)	Percent Jeddito Yellow Ware (%JYW) ¹
Homol'ovi Phase	Late	1385-1400	60.0–100
	Middle	1365-1385	40.0–59.9
	Early	1330-1365	1.0–39.9
Tuwiuca Phase		1290-1330	0

Note:

¹Percentage out of all decorated ware pottery.

chapter). These phases are defined mainly in terms of the proportion of yellow-hued Jeddito Yellow Ware (JYW) pottery out of the total decorated (painted) ware assemblage, a statistic referred to hereafter as the Jeddito Yellow Ware index or %JYW. Stratigraphic evidence clearly demonstrates that the JYW index is strongly correlated with the passage of time at Homol'ovi I, with the proportion of JYW pottery increasing through time. Analyses presented herein also demonstrate that the JYW index can be used to date contexts from Homol'ovi II relative to the Homol'ovi I sequence. Homol'ovi II was probably founded during the Middle Homol'ovi Phase, but most deposits at this site date to the end of the Late Homol'ovi Phase; the site was occupied no later than about 1400. On the other hand, a pilot study on ceramics from Homol'ovi III indicates that it may not be possible to correlate deposits at this small site with sequences at Homol'ovi I and II by means of the JYW index alone, but this is not to say the sequences cannot be correlated

through use of other dating techniques (see below). Details of the Homol'ovi III chronology have been published elsewhere (see Adams 2001a; Lyons et al. 2001): This village was probably founded in the 1280s and abandoned by about 1375, with a brief occupational hiatus in the early 1300s (Adams 2001a: Table 7.9; Lyons et al. 2001: Table 8.6).

This chapter is divided into three sections: The first section demonstrates, through stratigraphic analysis of decorated ware ceramic assemblages, that the JYW index is sensitive to the passage of time at Homol'ovi I. The second section evaluates how well the ceramic periods listed in Table 2.1 represent discrete slices of time at Homol'ovi I. This analysis draws on several known temporal trends in JYW pottery—stylistic, formal, and technological. This analysis also demonstrates that it is possible to date deposits at Homol'ovi II relative to the Homol'ovi I sequence. Finally, the third section concerns the absolute dating of contexts at Homol'ovi I and II. Absolute dates are determined through ceramic cross-dating and AMS radiocarbon dating.

Temporal Sensitivity of the Jeddito Yellow Ware Index at Homol'ovi I

The JYW index is the single most important relative measure of time used in this study. Previous research at Homol'ovi III demonstrated, through stratigraphic analysis, that the proportion of JYW pottery increased through time, providing a powerful tool for seriating deposits within this site (Adams 2001a; Lyons et al. 2001). Smith (1971:18-54) identified a comparable pattern in his stratigraphic analysis of decorated ware ceramics from the Western Mound at Awatovi. Since Homol'ovi I is coeval with Homol'ovi III,

and at least partly coeval with the Western Mound, it stands to reason that the proportion of Jeddito Yellow Ware pottery would be temporally sensitive at Homol'ovi I as well.

The first goal of this chapter is to demonstrate that the JYW index does, in fact, track the passage of time at Homol'ovi I. This index was calculated for 125 different ceramic assemblages from this site: The JYW index was found to increase from the bottom to the top of every stratigraphic sequence examined, demonstrating that the proportion of JYW pottery is positively correlated with the passage of time at Homol'ovi I.

Sample Selection, Analytical Methods and Units of Analysis

The ceramic assemblages that form the basis for this stratigraphic analysis were recovered from 44 pueblo rooms and 11 extramural trenches at Homol'ovi I (Figure 2.1). A cross-section of proveniences was selected for analysis to ensure that all periods of occupation were adequately represented. Some of the deepest, most heavily stratified deposits encountered at Homol'ovi I were included in the sample.

All ceramics were analyzed by trained ceramic analysts working with the Arizona State Museum's (ASM) Homol'ovi Research Program (HRP), and using comparative typological specimens housed at ASM and in the HRP laboratory. In addition to the typological analyses described below, analysts subjected a sample of Jeddito Yellow Ware bowl rims (including sherds and reconstructed vessels) from key contexts to detailed formal, technological, and stylistic analysis, as described in a later section.

All ceramic material in the study was subjected minimally to a ware sort analysis, in which analysts examined and divided all decorated ware sherds larger than 2 cm in any

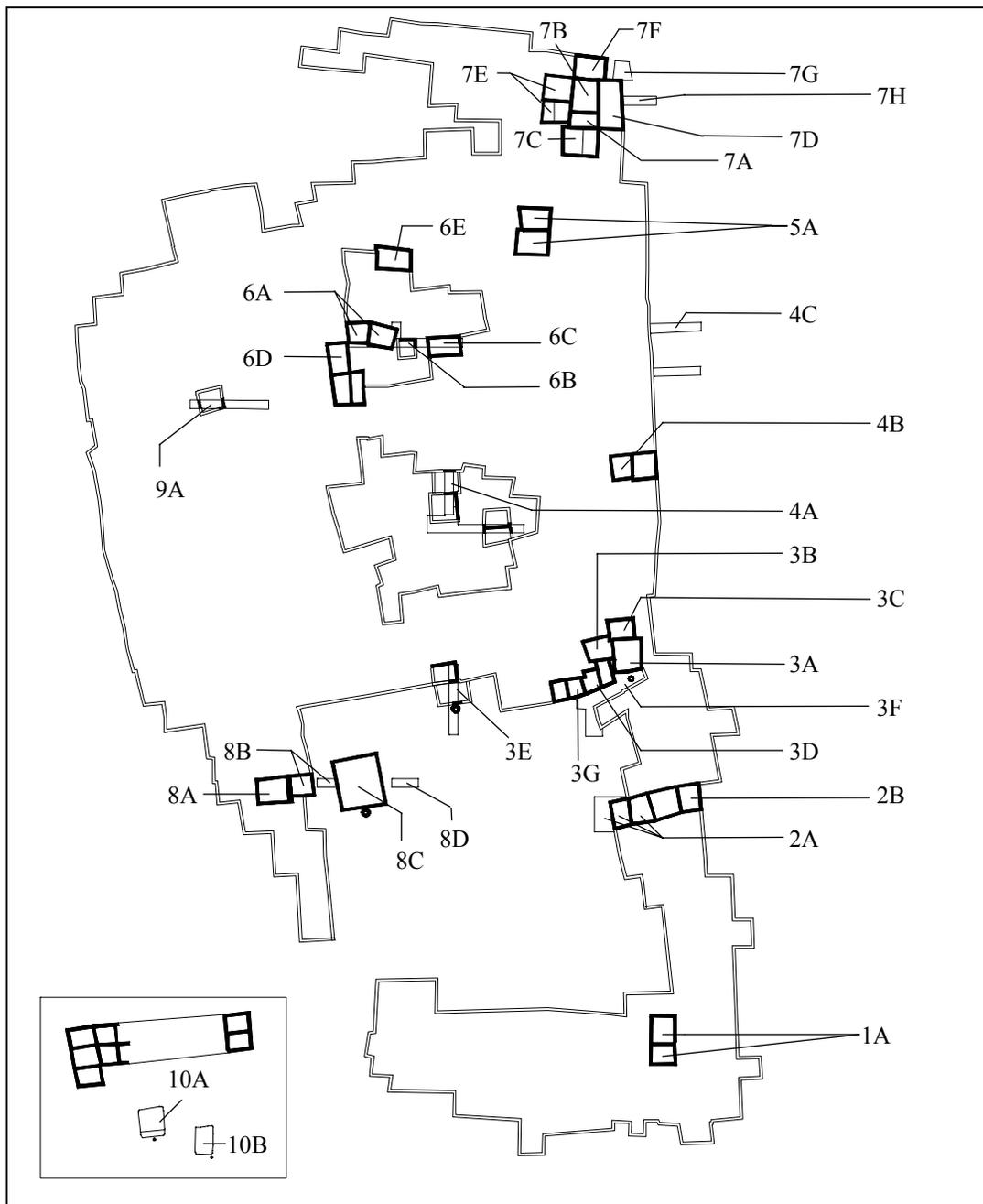


Figure 2.1 Locations of stratigraphic sequences sampled for the Homol'ovi I ceramic chronology study. Inset box shows the Adobe Pueblo (AZ J:14:316 [ASM]) outlier, located approximately 125 m south of Homol'ovi I (not to scale). The sequences shown in this figure are keyed to Harris-matrix like diagrams in Appendix A. CAD drawing by Vincent M. LaMotta and Douglas W. Gann.

dimension into one of four major ware categories: Jeddito Yellow Ware (yellow-hued), White Mountain Red Ware, Zuni Glaze Ware, all other decorated ware. By working primarily at the ware sort level, and by focusing on Jeddito Yellow Ware and a few other distinctive wares, analysts were able in a reasonable amount of time to generate data necessary for seriating a wide range of contexts at Homol'ovi I. Additionally, analysts identified and recorded temporally diagnostic types such as Sikyatki Polychrome, Fourmile Polychrome, and Kechipawan Polychrome (among others; see below) when these types were present. Analysts also recorded temporally-diagnostic types in the Salado Polychrome series, but the fragmentary nature of this material often made it difficult to make definitive type identifications. Identifications at the ware sort level were generally made by simple visual inspection, using a fresh cross-sectional break and low-power magnification as necessary.

Some contexts were singled out for more detailed, in-depth typological analysis. These include some of the more important stratigraphic sequences at Homol'ovi I. For in-depth analysis, analysts examined all decorated ware sherds larger than 2 cm in any dimension and classified them to the most specific ware and type categories possible. Such identifications were typically made with the aid of a fresh cross-sectional break and low-power magnification.

The 2 cm rule, used in both the ware sort and in-depth analyses, was introduced primarily to minimize the impact of sherd-proliferating effects, such as progressive fragmentation and spalling, on quantitative analyses. Jeddito Yellow Ware, for instance, seems especially prone to in situ attrition, and would likely tend toward

overrepresentation if every recovered sherd under 2 cm were counted. This rule was applied consistently across all contexts analyzed for this study.

A total of 28,913 potsherds from Homol'ovi I were analyzed at either the ware sort or in-depth level. This ceramic material comes from over a thousand individual provenience designations (PDs), or recovery units, each PD representing a three-dimension block of archaeological deposits. Deposits were generally hand-excavated according to natural stratigraphic layers and screened with quarter- or eighth-inch mesh.

For purposes of quantitative analysis, ceramic data were aggregated into analytical units called "ceramic assemblages." A ceramic assemblage could represent material from a single PD, but more typically includes material from several contiguous and roughly contemporaneous PDs. Material from different PDs was aggregated in this way to maximize sherd counts for individual stratigraphic-analytical units (ceramic assemblages), and to simplify stratigraphic relationships among those units.

The process of aggregation was guided by patterns of ceramic refitting, by the typological makeup of the ceramic assemblages at hand, and by information pertaining to the sediment stratigraphy of the deposits in question. In general, the goal was to avoid combining proveniences separated by a perceptible temporal disjunction—as represented, for example, by a sudden change in ceramic types or by a stratigraphic break. Although this process was admittedly subjective, it was absolutely necessary to combine individual proveniences to obtain ceramic samples large enough for quantitative analysis (in some cases, small samples were unavoidable). All decisions about combining and splitting proveniences were made by the present author, drawing on his first-hand knowledge of

deposits at Homol'ovi I. While a different analyst might draw assemblage boundaries in slightly different places, the overarching ceramic trends within any particular stratigraphic sequence would almost certainly remain the same.

A total of 125 ceramic assemblages was defined in this way, with a mean sample size of 231.3 sherds per assemblage (range = 14 to 3166 sherds; $s = 379.7$ sherds; $s^2 = 144,194.0$) (Appendix A). In many cases, two or more assemblages can be related to each other stratigraphically, forming a stratigraphic sequence. The ceramic assemblages analyzed for this study are divided among 27 different stratigraphic sequences spread across Homol'ovi I (plus seven isolated assemblages that do not fit into a sequence) (see Figure 2.1). Appendix A provides Harris-matrix like diagrams for each of these stratigraphic sequences, showing the JYW index values for all constituent assemblages (see Figures A.1-A.17).

Definition of the Jeddito Yellow Ware Index

The Jeddito Yellow Ware index (%JYW) refers to the proportion of yellow-hued JYW sherds in any decorated ware ceramic assemblage. Jeddito Yellow ware includes a number of coal-fired pottery types that were produced on the Hopi Mesas beginning in the late thirteenth century A.D. and continuing well beyond 1400 (Bernardini 2002, 2005; Bishop et al. 1988; Colton 1956; Hays 1991; Smith 1971:474-527). While Colton's (1956) definition of Jeddito Yellow Ware (Ware 7B) includes a number of orange-hued types dating to the late thirteenth century (e.g., Huckovi Black-on-orange), in the present study these early types are excluded from the JYW index, with the latter being restricted to the yellow-hued, fourteenth-century JYW types listed in Table 2.2.

Table 2.2
 Characteristics of Fourteenth-century Jeddito Yellow Ware Pottery Types

Relative Dating	Type	Paint Colors (in addition to black-brown)	Other Paint Treatment
Earlier 14 th -c. Group	Awatovi Black-on-yellow	–	–
	Bidahochi Polychrome	white	–
Later 14 th -c. Group	Jeddito Black-on-yellow	–	–
	Paayu Polychrome	pale (watery) brown	–
	Jeddito Engraved	–	painted areas engraved to produce fine-line designs in negative
	Jeddito Stippled	–	paint splattered on to produce a stippled effect
	Sikyatki Polychrome	red	–

Fourteenth-century Jeddito Yellow Ware pottery is readily identified by its distinctive yellow color with brown-black (iron-manganese) paint, shattering fracture, well-polished surfaces, and fine (sometimes temperless) paste (Colton 1956; Colton and Hargrave 1937:150-155; Hargrave 1932:28-31; Hays 1991; Smith 1971:476-480). JYW was traded extensively throughout the northern Southwest (Adams et al. 1993; Benitez 1999; Schaefer 1969), and by the end of the fourteenth century it had become the most prevalent decorated pottery at Homol'ovi, displacing most other imported wares and even the locally-produced Winslow Orange Ware (Adams 2002:199; Adams and LaMotta 2006). The JYW index simply measures the overall proportion of yellow-hued Jeddito Yellow Ware types in any given assemblage of decorated pottery, expressed as a

percentage:

$$\%JYW = N_{JYW}/N_{\text{all decorated pottery}} \times 100$$

This index is highly variable among decorated ware assemblages from Homol'ovi I, ranging from 0 to 97.5 percent.

Evaluating the Temporal Sensitivity of the Jeddito Yellow Ware Index

Stratigraphic analysis demonstrates that there was directional change through time in the JYW index at Homol'ovi I. This trend is especially evident in stratigraphic columns from three different plaza trenches (Table 2.3a-c): In each sequence the JYW index rises steadily from bottom to top. In fact, the same trend can be seen with few significant deviations in *every one* of the 27 stratigraphic sequences from Homol'ovi I (see stratigraphic diagrams in Appendix A). The trend appears more gradual in some sequences and more abrupt or stepwise in others, but the overall direction is the same throughout. Only nine assemblages appear to be out of sequence, and each of these was demonstrably affected by some form of natural or cultural formation processes.¹ These few cases represent minor anomalies. The bulk of the evidence from Homol'ovi I demonstrates that the JYW index changed in only one direction through time—it went up. The JYW index is therefore strongly and positively correlated with the passage of time at this site. Accordingly, it should be possible to seriate assemblages accurately by using this index alone, provided the sherd counts are adequate. The validity of this last statement is born out by the analyses described in the next section.

Table 2.3
Typological Composition (%) of Decorated Ware Ceramic Assemblages from Three Plaza Trenches at Homol'ovi I

(a) East Plaza (500)/Structure 652 Sequence

Ware Categories	Ceramic Assemblages ¹ (Sequence 6A)							
	652-B	652-A	500-A6	500-A5	500-A4	500-A3	500-A2	500-A1
Jeddito Yellow Ware (y) ²	28.7	33.1	66.5	76.3	83.3	93.4	97.5	88.6
Jeddito Yellow Ware (o) ³	4.1	2.2	0.5	4.1	1.3	2.6	1.7	2.1
Tsegi Orange Ware	-	< 0.1	-	-	0.2	0.3	-	-
Tusayan White Ware	5.0	4.5	3.6	-	0.2	0.3	0.8	-
Salado Polychrome Types	-	0.2	-	3.1	1.5	0.8	-	0.5
White Mountain Red Ware	7.9	5.4	3.6	2.1	0.9	-	-	1.6
Cibola White Ware	0.3	0.3	1.0	-	0.6	-	-	-
Zuni Types	-	0.1	-	-	0.6	-	-	-
Alameda Brown Ware	0.9	-	0.5	-	0.6	0.3	-	-
Little Colorado White Ware	-	0.4	3.6	-	-	-	-	-
Winslow Orange Ware	52.5	51.7	19.6	14.4	9.9	2.1	-	6.7
Indeterminate Decorated	0.6	1.9	1.0	-	0.9	0.3	-	0.5
Total Decorated Sherds	341	1470	194	97	466	381	121	193

Notes (apply to Tables 2.3a-c):

¹Ceramic assemblages are listed in ascending stratigraphic order from left to right (see also Appendix A)

²Yellow-hued types.

³Orange-hued types.

(b) Southeast Plaza (400)/Structure 490 Sequence

Ware Categories	Ceramic Assemblages (Sequence 4A)				
	490-A	400-D	400-C	400-B	400-A
Jeddito Yellow Ware (y)	27.8	32.7	50.0	58.4	71.8
Jeddito Yellow Ware (o)	0.9	0.7	-	0.3	-
Tsegi Orange Ware	-	-	-	-	-
Tusayan White Ware	2.8	3.5	0.7	2.9	1.7
Salado Polychrome Types	0.5	0.1	-	-	-
White Mountain Red Ware	3.8	3.2	3.7	1.3	1.7
Cibola White Ware	0.5	0.7	1.5	0.8	2.6
Zuni Types	-	-	0.7	0.3	-
Alameda Brown Ware	-	0.3	-	-	-
Little Colorado White Ware	1.9	0.9	-	0.3	-
Winslow Orange Ware	59.4	56.1	40.4	34.8	20.5
Indeterminate Decorated	2.4	1.6	2.9	1.0	1.7
Total Decorated Sherds	212	679	136	382	117

Table 2.3, *continued*

(c) South Plaza (299) Sequence

Ware Categories	Ceramic Assemblages (Sequence 2A)					
	299- F	299- E	299- D	299- C	299- B	299- A
Jeddito Yellow Ware (y)	-	5.7	12.0	30.3	64.4	93.5
Jeddito Yellow Ware (o)	4.8	11.4	5.3	1.1	2.9	-
Tsegi Orange Ware	-	-	-	-	-	-
Tusayan White Ware	19.0	12.4	5.3	6.7	1.0	1.0
Salado Polychrome Types	-	1.9	0.9	-	-	-
White Mountain Red Ware	-	1.9	2.7	2.2	1.0	0.7
Cibola White Ware	-	2.9	-	-	1.9	0.3
Zuni Types	-	-	-	-	-	0.3
Alameda Brown Ware	-	1.0	-	-	1.0	0.7
Little Colorado White Ware	-	-	0.4	-	-	-
Winslow Orange Ware	61.9	54.3	68.4	58.4	27.9	2.4
Indeterminate Decorated	14.3	8.6	4.9	1.1	-	1.0
Total Decorated Sherds	21	105	225	89	104	292

Ceramic Phases at Homol'ovi I and II

This study utilizes the terms *Tuwiuca Phase* and *Early, Middle, and Late Homol'ovi Phase* to designate different ceramic-stratigraphic components of the Pueblo IV period sequence at Homol'ovi I and other nearby sites (see Table 2.1). This terminology is in effect a refinement of Colton's (1939) seminal work on the ceramic culture-history of the central Little Colorado region. Colton (1939:68-69) recognized two distinct ceramic complexes ("foci") during the late prehistoric period, a distinction that has been retained in regional syntheses to the present day (although modern authors generally call these "phases") (Gumerman and Skinner 1968; Lange 1998). The earlier complex, or Tuwiuca Phase, commenced with the thirteenth-century inception of the local Winslow Orange Ware tradition and lasted until the first imports of yellow-hued

Jeddito Yellow Ware appeared in the region in the early fourteenth century. The Homol'ovi ("Homolovi" in early publications) Phase, defined by the appearance of yellow-hued JYW, lasted until the abandonment of the region around A.D. 1400. This basic sequence has been validated stratigraphically in excavations at Homol'ovi I and III, where ceramic assemblages without JYW are consistently overlain by later deposits rich in JYW (Adams 2001a, 2002:31-36).

Tuwiuca Phase (TP) deposits are uncommon at Homol'ovi I. The limited ceramic material that represents this phase is not susceptible to further chronological breakdown, at least not with the data available for the present study. The mass of ceramic material representing the Homol'ovi Phase, in contrast, requires subdivision if one hopes to understand how this village changed through time. For this study, the Homol'ovi Phase is divided into three components—Early (EHP), Middle (MHP), and Late (LHP)—based on the JYW index (see Table 2.1).

The rest of this section is concerned with demonstrating that the Early, Middle, and Late components of the Homol'ovi Phase represent discrete, sequential slices of time at Homol'ovi I; it is also concerned with dating contexts at Homol'ovi II relative to the Homol'ovi I sequence. To do so, five time-sensitive attributes of Jeddito Yellow Ware pottery were examined in a sample of bowl rims from a cross-section of deposits from Homol'ovi I and II. These five attributes are:

- (1) rim-to-banding line distance
- (2) banding line width
- (3) rim form
- (4) paste color (hue)
- (5) temper density

Temporal trends in each of these attributes have already been established through research on Pueblo IV-period collections from Awatovi (Smith 1971) and through various pilot studies at Homol'ovi (more below). These known patterns provide the means for testing the supposition that the proposed ceramic phases at Homol'ovi I represent discrete slices of time: In comparing EHP to MHP to LHP samples in the Homol'ovi I collection, the five attributes *should* exhibit the same directional trends as, for example, Smith (1971) found in the Awatovi collections. Likewise, these patterns should provide a way to date contexts from Homol'ovi II relative to the Homol'ovi I sequence: Based on the JYW index, one of the Homol'ovi II contexts used in this section (Structure 714, with 58.3% JYW) should date to the end of the MHP or to the beginning of the LHP; the other context (Structure 708, with 88.1% JYW) should fall within the LHP. If the JYW index can in fact be used to date assemblages from these two sites relative to each other, then the two Homol'ovi II contexts should most closely resemble the MHP/LHP and LHP groups, respectively, as far as the five time-sensitive attributes are concerned.

Data on the five attributes listed above were collected from a cross-section of EHP, MHP, and LHP contexts from Homol'ovi I, plus the two contexts from Homol'ovi II (Structures 714 and 708). Rim-to-banding line distance, considered to be the most temporally-sensitive of these attributes based on prior research (LaMotta 2002b; Levin 1990; Levstik 1999), was the focus of data-collection. Consequently, only bowl sherds preserving at least a portion of the vessel rim and the top margin of the broad sub-rim banding line (Figure 2.2) were selected for analysis, a sample totaling just over 2,100

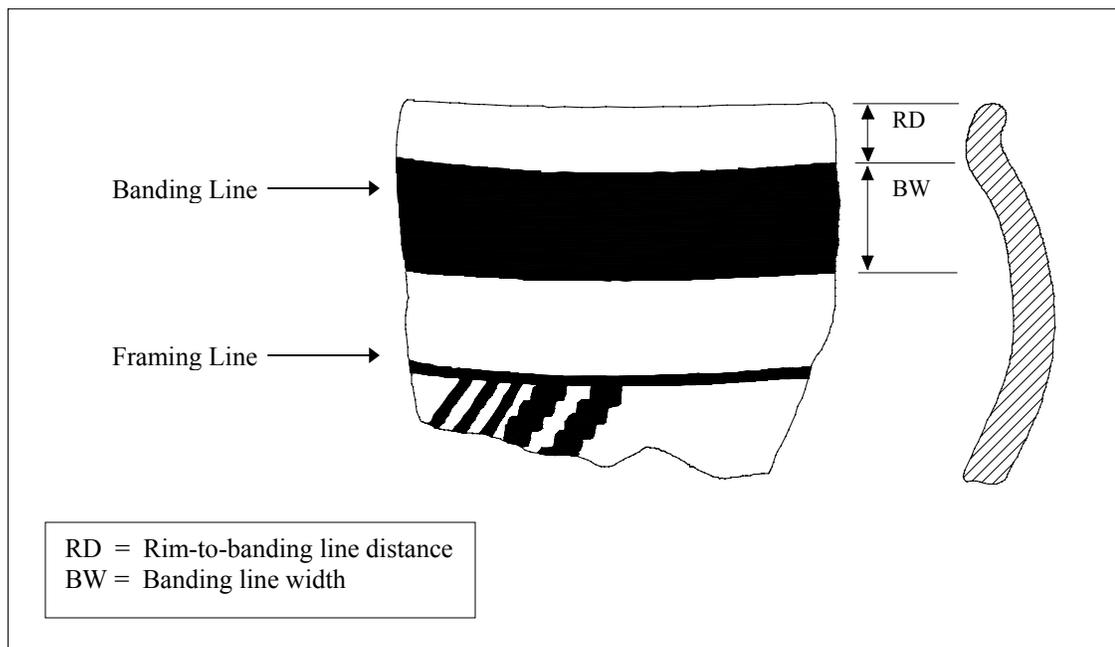


Figure 2.2 Banding line measurements for Jeddito Yellow Ware bowls. Adapted from Hays-Gilpin et al. (1996:Figure 4.3).

pieces. The other attributes were recorded, where possible, from this sample of bowl rims. Restricting the technological analyses to bowl rims may have biased these data in unknown ways, a possibility that should be evaluated in the future. To preserve the continuity of the text, many details of the statistical analyses that underlie the conclusions reached in the following sections are presented in Appendix B.

Rim-to-banding Line Distance (RD) and Banding Line Width (BW)

Most fourteenth-century Jeddito Yellow Ware bowls exhibit a broad sub-rim banding line that encircles the interior design field (Hays 1991; Levin 1990; Smith 1971). Two measurements involving the banding line are especially time-sensitive (see Figure 2.2): These are the rim-to-banding line distance (RD) and the banding line width (BW).

Through time, the banding line became wider, and it was placed lower and lower on the vessel wall. These changes can be related to a well-documented shift in the spatial organization of the interior design field (LaMotta 2002b).

Earlier fourteenth-century bowls are decorated with complex geometric designs that encompass much of the interior surface of the bowl and extend far up the vessel walls toward the rim. These designs are typically symmetrical and geometric in densely-packed zonal or radial layouts, and it is not uncommon to find the center of the vessel interior left open as unpainted space (Smith 1971:480-527). Later fourteenth-century designs tend to be more open and freely executed, sometimes incorporating stylized zoomorphic or anthropomorphic motifs, often in layouts employing asymmetry, mirror symmetry, or recursive patterns (Smith 1971:480-527). Among later vessels, the center of the interior was more commonly filled with painted designs than previously, and there was a tendency for the interior design field to be circumscribed within the interior basal portion of the vessel. This last trend is especially significant because as the design field moved down from the interior vessel walls and into the center of the vessel interior, the banding line followed. Through time, the size of the gap left between the upper border of the banding line and the vessel rim increased (Adams 2002:82-86; Adams and LaMotta 2006; Haynie 1994; Hays-Gilpin et al. 1996; LaMotta 2002b; Levin 1990; Levstik 1999; Lyons 2004; Lyons et al. 2001; Sigler 1998; Steffen 1991). Moreover, with the design field no longer pushed right up to the rim, a major constraint on the width of the banding line was eased and banding lines became somewhat wider (Lyons et al. 2001). Eventually, potters eliminated the banding line from the design canon altogether, and

bowls without a banding line appear occasionally in late-fourteenth century assemblages (see Levin 1990). These temporal trends in vessel layout and banding line dimensions are illustrated in the series of bowls from Homol'ovi I shown in Figure 2.3a-b.

Banding line measurements were collected for more than 2,100 Jeddito Yellow Ware bowl rim sherds from Homol'ovi I and II (Table 2.4a). Samples were drawn from a total of 103 different ceramic assemblages from Homol'ovi I, representing a cross-section of EHP, MHP, and LHP contexts. Two assemblages from Homol'ovi II were also analyzed: Structure 714, seemingly one of the earliest contexts encountered at the site (58.3% JYW), and Structure 708, one of the latest (88.1% JYW). At least two rim-to-banding line distance (RD) measurements were taken on each sherd or vessel, and the results were averaged to obtain a single RD value for that piece. Only a single banding line width (BW) measurement was taken on each piece. All measurements were taken to the nearest 0.1 mm using electronic calipers. Sherds from ladles and other small (≤ 10 cm in rim diameter) vessels were excluded to minimize the influence of vessel size on the banding line measurements. Among the pieces retained in the analysis, rim diameter (a proxy for vessel size) explains virtually none of the variation in RD ($r^2 = 0.00$, $p = 0.12$) or BW ($r^2 = 0.01$, $p = 0.01$) (see also Lyons et al. 2001).

Table 2.4a lists the mean RD and BW values for the EHP, MHP, and LHP groups from Homol'ovi I and for each of the two contexts from Homol'ovi II. Table 2.4b summarizes the results of pairwise statistical tests of difference among these five samples (see also Appendix B). Among the three Homol'ovi I groups the sample mean for RD and BW increases as predicted from EHP to MHP to LHP, and these three groups are

Figure 2.3 Variation in fourteenth-century Jeddito Yellow Ware bowl interiors, examples from Homol'ovi I: (a) Interior views; (b) Oblique views. Photos by Vincent M. LaMotta, except as noted.

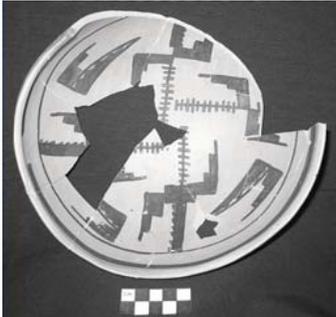
				
Early Homol'ovi Phase Assemblage 799-B (16.3% JYW) 799 trench, Vessel 1	Early Homol'ovi Phase Assemblage 652-A (33.1% JYW) Str. 652, Vessel 2	Late Homol'ovi Phase Assemblage 210-A (61.4% JYW) Str. 210, Vessel 10	Late Homol'ovi Phase Assemblage 556-A (83.2% JYW) Str. 556, Vessel 2	Late Homol'ovi Phase Assemblage 601-B (89.6% JYW) Str. 601, Vessel 21
<p><u>Design:</u> Dense, interlocking solids and hatched-and-corbeled areas. Layout unknown. Design field extends nearly to vessel rim.</p> <p>Photo by Richard W. Lord.</p>	<p><u>Design:</u> Negative offset quartered radial layout. Central area in base of vessel left free of design. Design field extends nearly to vessel rim.</p>	<p><u>Design:</u> Open, free-form offset quartered radial layout. Geometric designs intrude on central area in base of vessel, and design field does not extend very far up the vessel walls.</p>	<p><u>Design:</u> Asymmetrical layout, iconic design. Design field is circumscribed within interior base of vessel.</p>	<p><u>Design:</u> Asymmetrical radial layout, abstract design. Design field is limited to interior base of vessel, but lacks a defining framing line or banding line.</p>

Figure 2.3 (a) Interior views.

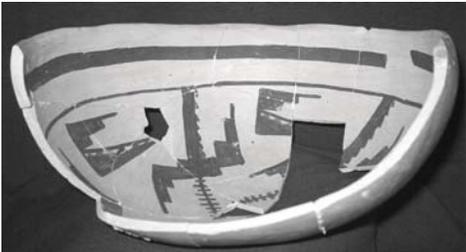
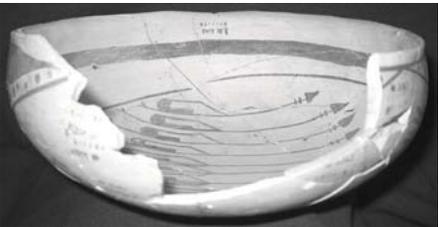
	<p>Early Homol'ovi Phase Assemblage 799-B (16.3% JYW)</p> <p>799 trench, Vessel 1</p> <p>RD = 5.3 mm BW = 8.1 mm</p> <p>Photo by Richard W. Lord</p>
	<p>Early Homol'ovi Phase Assemblage 652-A (33.1% JYW)</p> <p>Structure 652, Vessel 2</p> <p>RD = 8.8 mm BW = 9.3 mm</p>
	<p>Late Homol'ovi Phase Assemblage 210-A (61.4% JYW)</p> <p>Structure 210, Vessel 10</p> <p>RD = 14.1 mm BW = 9.9 mm</p>
	<p>Late Homol'ovi Phase Assemblage 556-A (83.2% JYW)</p> <p>Structure 556, Vessel 2</p> <p>RD = 18.6 mm BW = 12.2 mm</p>
	<p>Late Homol'ovi Phase Assemblage 601-B (89.6% JYW)</p> <p>Structure 601, Vessel 21</p> <p>No banding line or framing line present</p>

Figure 2.3 (b) Oblique views.

Table 2.4
Rim-to-banding Line Distance (RD) and Banding Line Width (BW) Statistics for
Samples of Jeddito Yellow Ware Bowl Rims from Homol'ovi I and II

(a) Summary Statistics

Site	Sample	RD (mm)			BW (mm)		
		mean	±	N	mean	±	N
H1	Early Homol'ovi Phase Group	7.3	4.2	226	11.4	2.3	186
	Middle Homol'ovi Phase Group	9.9	5.5	257	12.1	2.8	219
	Late Homol'ovi Phase Group	13.7	6.0	1326	13.2	3.1	911
H2	Structure 714	14.0	5.3	148	12.8	2.6	87
	Structure 708	13.7	5.4	145	13.5	3.1	93

(b) Results of Pairwise Statistical Comparisons of Samples¹

Variable	Site	Sample	H1			H2
			EHP	MHP	LHP	Str. 714
RD	H1	Early Homol'ovi Phase Group	-	-	-	-
		Middle Homol'ovi Phase Group	D	-	-	-
		Late Homol'ovi Phase Group	D	D	-	-
	H2	Structure 714	D	D	S	-
		Structure 708	D	D	S	S
BW	H1	Early Homol'ovi Phase Group	-	-	-	-
		Middle Homol'ovi Phase Group	D	-	-	-
		Late Homol'ovi Phase Group	D	D	-	-
	H2	Structure 714	D	S/D	S	-
		Structure 708	D	D	S	S

Note:

¹In each pairwise comparison, both the Student's *t* test (separate variance) and the nonparametric Mann-Whitney test were used to test the null hypothesis (H_0), which states that the two samples could have been drawn from a single original population, and that observed differences between them are attributable to the vagaries of sampling. See Appendix B for details.

D[ifferent] = The null hypothesis is rejected at the $p \leq 0.02$ level. It is highly unlikely that the two samples could have been drawn from a single original population.

S[ame] = The null hypothesis cannot be rejected at the $p \leq 0.02$ level. It is not unlikely that the two samples were drawn from a single original population; observed differences between them are attributable to the vagaries of sampling.

significantly different from each other in all pairwise tests involving either variable, RD or BW. The two samples from Homol'ovi II are statistically most similar to the LHP group from Homol'ovi I as far as both variables, RD and BW, are concerned; this is consistent with the predicted outcome (since Structure 714 yielded 58.3% JYW it is borderline MHP-LHP). These two Homol'ovi II samples cannot be distinguished from each other statistically, which suggests that there is not much time depth represented at this site.

Bowl Rim Form

Jeddito Yellow Ware bowl rims can be divided into two general forms (Figure 2.4), recurved and non-recurved. Non-recurved rims (including rounded, flat, and beveled profiles) are more common in earlier, fourteenth-century assemblages. Through time the proportion of recurved rims (including rounded-beveled and s-shaped profiles) increased, and in fifteenth-century assemblages recurved rims are found on a majority of JYW bowls. A comparison of published collections from fourteenth-century Awatovi (Smith 1971) or Homol'ovi II (Hays 1991) with a collection from fifteenth-century Sikyatki (Fewkes 1898) illustrates this trend. Data from an unpublished study by Levin (1990) also confirm this pattern: Recurved rims occur on a majority (40/68; 58.8 %) of the bowls in Levin's sample from fifteenth-century Sikyatki, but are significantly less common in her fourteenth-century assemblage from Homol'ovi II (25/116 bowls; 21.6 %) ($\chi^2 = 86.18$, $df = 1$, $p < 0.01$).

Table 2.5a tabulates the proportions of recurved and non-recurved bowl rims among the three groups from Homol'ovi I and the two contexts from Homol'ovi II. For

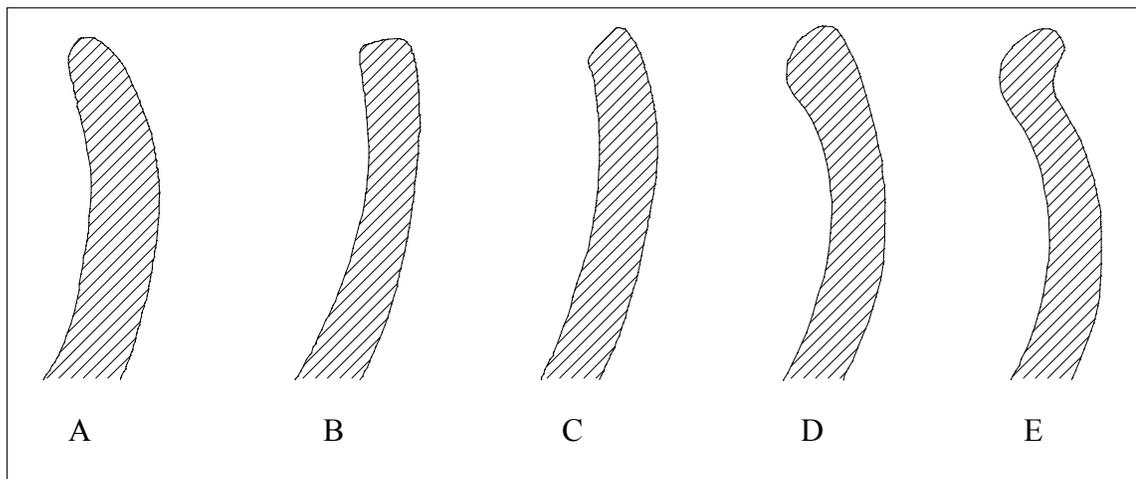


Figure 2.4 Jeddito Yellow Ware bowl rim profiles. Non-recurved forms: A. rounded; B. flat; C. beveled. Recurved forms: D. rounded-beveled; E. S-shaped. Adapted from Hays-Gilpin et al. (1996:Figure 4.1).

the Homol'ovi I samples, the proportion of recurved rims increases as predicted from EHP to MHP to LHP groups, and the differences among these groups are significant ($\chi^2 = 22.96$, $df = 2$, $p < 0.01$; see also Appendix B). Again, both samples from Homol'ovi II are best compared to the LHP group from Homol'ovi I, consistent with the predicted outcome. The Structure 714 assemblage does show a significantly lower proportion of recurved rims compared to the Structure 708 assemblage ($\chi^2 = 5.86$, $df = 1$, $p = 0.02$), which supports the inference that the former was deposited slightly earlier than the latter.

Paste Color

There is substantial color variation in JYW pottery, with paste colors spread across the yellow-red and yellow hues on the Munsell color chart. Through time, the proportion of yellow-red pottery declined and the proportion of yellow-hued pottery increased significantly. Watson Smith (1971:476-8) first quantified this transition using

Table 2.5

Rim Form, Paste Color, and Temper Density Statistics for Samples of Jeddito Yellow Ware Bowl Rims from Homol'ovi I and II

(a) Rim Form

Site	Sample	Rim Form			
		Non-recurved Rims		Recurved Rims	
		N	%	N	%
H1	Early Homol'ovi Phase Group	179	79.9	45	20.1
	Middle Homol'ovi Phase Group	199	78.4	55	21.7
	Late Homol'ovi Phase Group	878	67.4	424	32.6
H2	Structure 714	100	69.0	45	31.0
	Structure 708	80	55.2	65	44.8

(b) Paste Color

Site	Sample	Hue			
		Yellow-red (2.5YR, 5YR, 7.5YR)		Yellow (10YR, 2.5Y, 5Y, 10Y)	
		N	%	N	%
H1	Early Homol'ovi Phase Group	47	35.1	87	64.9
	Middle Homol'ovi Phase Group	36	17.5	170	82.5
	Late Homol'ovi Phase Group	139	14.4	827	85.6
H2	Structure 714	-	-	-	-
	Structure 708	12	8.3	133	91.7

(c) Temper Density

Site	Sample	Gross Temper Density Categories			
		Visible Temper Present		Essentially Temperless	
		N	%	N	%
H1	Early Homol'ovi Phase Group	121	88.3	16	11.7
	Middle Homol'ovi Phase Group	161	77.8	46	22.2
	Late Homol'ovi Phase Group	674	71.1	274	28.9
H2	Structure 714	110	75.9	35	24.1
	Structure 708	102	70.8	42	29.2

samples of JYW from the deeply-stratified Western Mound at Awatovi. His analysis contrasted Awatovi Black-on-yellow, an earlier type prevalent in the lower ceramic groups, with Jeddito Black-on-yellow, a later type that appears in the upper levels of the Western Mound (Smith 1971:516). Yellow-red (2.5 YR, 5YR, 7.5 YR) pieces dominated the Awatovi B/y sample (135/232 sherds; 58.2%), whereas yellower-hued (10 YR, 2.5 Y) pieces made up the bulk of the Jeddito B/y sample (185/228 sherds; 81.1%). These color differences between (earlier) Awatovi B/y and (later) Jeddito B/y in Smith's (1971:Figure 245) sample are in fact statistically significant ($\chi^2 = 74.89$, $df = 1$, $p < 0.01$).

For the Homol'ovi I and II samples, color readings were taken with a Munsell color chart under constant artificial lighting conditions (mixed incandescent and fluorescent light). Burned sherds were generally excluded from this analysis (and from the analysis of temper density, see below). Table 2.5b counts the number of pieces falling into the yellow-red and yellow paste color categories for the three groups from Homol'ovi I and for the Structure 708 sample from Homol'ovi II (paste color was not recorded for the Structure 714 assemblage). Among the Homol'ovi I samples, as predicted, there is a marked increase in the proportion of specimens that fall into the yellow hue category from EHP to MHP to LHP; these differences are statistically significant ($\chi^2 = 35.73$, $df = 2$, $p < 0.01$; see also Appendix B). Again, as predicted, the sample from Structure 708 at Homol'ovi II is most similar to the LHP group from Homol'ovi I, but exhibits an even higher proportion of yellow-hued pieces.

Temper Density

Temper density refers to the proportion of the total ceramic volume that is occupied by temper particles (defined for present purposes as natural or culturally-added nonplastic inclusions that are visible at the stated magnification). Earlier JYW types were tempered with quartz sand and/or crushed sherds—sometimes abundant and densely packed. In samples from the fourteenth-century Western Mound at Awatovi, Smith (1971:478-480) noted a substantial diminution through time in the size and density of temper particles. By the end of the sequence, temper was no longer being used in the production of JYW pottery (Smith 1971:588). Thus, heavily tempered pieces are common in the early-fourteenth century assemblages, whereas temperless JYW is typical of assemblages from the late-fourteenth century and after.

For the Homol'ovi I and II samples, the analysis of temper was performed on a fresh break with the aid of low-power optical (binocular) microscopy. A standard of 10× magnification was adopted to ensure that all assessments of temper density were comparable. For the purposes of this statistical analysis, sherds were divided into two temper density categories: (1) those with visible temper; and (2) those with essentially no visible temper (ignoring the occasional isolated piece of stone).²

Table 2.5c shows a significant ($\chi^2 = 20.29$, $df = 2$, $p < 0.01$) increase in the proportion of essentially temperless JYW at Homol'ovi I from EHP to MHP to LHP, as predicted. The proportion of temperless pieces in the Structure 714 assemblage from Homol'ovi II falls in between the figures for the MHP and LHP groups from Homol'ovi I, while the Structure 708 assemblage has a slightly higher proportion of temper-free

pieces than the LHP group; both of these results are consistent with the predicted outcomes.

Implications

These findings indicate that, by and large, *time* is the main source of variation in the JYW index within and between Homol'ovi I and II. At Homol'ovi I, the three subdivisions of the Homol'ovi phase behave as relatively discrete, sequential slices of time when several known temporal trends in JYW pottery were examined. Directional trends in these five attributes would have been obscured if other, confounding factors had a substantial impact on JYW index values—factors such as functional specialization of rooms, activity areas, or entire sites; differential circulation, use, or discard of JYW pottery; post-depositional disturbance; or sampling error. Likewise, the JYW index accurately predicted which group(s) from Homol'ovi I the two contexts from Homol'ovi II would most closely resemble when these five attributes were examined. This last observation is especially significant because it indicates that the JYW index can be used to seriate assemblages from Homol'ovi I and II relative to each other.

As a side note, the situation at Homol'ovi III appears to be somewhat more complex, at least based on a limited pilot study (see endnotes, below). Deposits at this small site can be divided into five sequential groups, which have been dated primarily by ceramic cross-dating (Adams 2001a; Lyons et al. 2001).³ The first four groups of deposits span the interval from A.D. 1280 to 1355. The JYW index rises steadily from one group to the next, reaching a maximum of 17.1% JYW in the fourth group.⁴ The proportion of JYW in these deposits seems commensurate with their age, at least in

comparison to similarly-dated (TP and EHP) deposits at Homol'ovi I. The fifth and latest group of deposits, dated between 1355 and 1375, yielded a mere 21.5% JYW. This last figure, in contrast, seems somewhat low for the assigned dates (which would be roughly coeval with the MHP at Homol'ovi I, give or take a few years). Independent ceramic evidence suggests that it is the proportion of JYW, and not the absolute dating, that is awry.⁵ For some contexts at Homol'ovi III, therefore, it may be the case that the JYW index is slightly depressed relative to contemporaneous deposits at other sites. If so, this may be partly a formation-process issue: Given the complex use and reuse history of Homol'ovi III (Adams 2001b), it would not be surprising if temporal mixing of ceramics from different periods were at least partly responsible. Additional research on JYW ceramics from Homol'ovi III will be needed to evaluate the findings of this limited pilot study.

Absolute Dating of Contexts at Homol'ovi I and II

While the major objective of this chapter is to construct a relative chronology of deposits at Homol'ovi I and other sites in the region, it is also useful to date these deposits in terms of approximate calendar years. For one thing, absolute dating provides a means for verifying seriation techniques. Absolute dates also provide a basis for estimating the timing and rate of behavioral (architectural, depositional, material-culture) change at the Homol'ovi sites, and for temporally correlating the changes of interest with regional demographic, organizational, and environmental processes (e.g., papers in Adams and Duff 2004 and in Adler 1996; Dean et al. 1994; Van West 1996). In the absence of a reliable tree-ring sequence for the Homol'ovi sites (see Adams 2002:Table

3.2), this study draws on ceramic cross-dating and AMS radiocarbon dating to establish an absolute chronology.

Ceramic Cross-dating of Contexts at Homol'ovi I and II

The most reliable absolute dating technique that currently can be applied to deposits at the Homol'ovi sites is ceramic cross-dating. Production dates have been established for many southwestern pottery types by virtue of their association with tree-ring dated wood beams (Benitez 1999; Breternitz 1963, 1966; Smiley et al. 1953). When one of these types is found in an undated deposit, the initial production date (start-date) associated with the type provides a *terminus post quem* date for the formation of the deposit. In using this dating technique, one must be aware that even minor post-depositional disturbance can move sherds around in deposits and create spurious associations. Hence, the internal consistency of dates obtained through ceramic cross-dating must be checked from multiple perspectives.

Tree-ring Dated Pottery Types Found at Homol'ovi

The cross-dating of contexts at Homol'ovi I and II is based on decorated pottery types from four different non-local wares: Jeddito Yellow Ware, White Mountain Red Ware, Zuni Glaze Ware, and Salado Polychromes. The dating of each type is discussed below, and the best start date for each type is listed in Table 2.6. Counts and percentages of certain temporally diagnostic types at Homol'ovi I are shown by ceramic phases in Table 2.7.

Jeddito Yellow Ware Types. Fourteenth-century pottery types in the JYW series are not especially well dated; however, there is general agreement that an earlier group of

Table 2.6
Earliest Occurrence of Certain Dated Pottery Types at Homol'ovi I

Ware	Type	Best Start Date ¹	Earliest Associated Phase at H1	Lowest Associated %JYW at H1
Jeddito Yellow Ware ²	Awatovi B/y	1330	EHP	1.8
	Bidahochi Poly	(1330)	EHP	3.9
	Paayu Poly	(1365-1385)	MHP	40.8
	Sikyatki Poly	1385	LHP	60.0
	Jeddito Stippled	(1385)	LHP	61.4
	Jeddito Engraved	(1385)	LHP	61.4
White Mountain Red Ware ³	Pinedale B/r + Poly	1280-1290	TP	0.0
	Cedar Creek Poly	1300	TP	0.0
	Fourmile Poly	1330	EHP	2.9
	Showlow Poly	1330	MHP	43.2
Zuni Glaze Ware ⁴	Pinnawa G/w	1325-1350	EHP	13.2
	Kechipawan Poly	1350	MHP	43.2
Salado ⁵	Gila or Tonto Poly	1350	EHP	33.1

Notes:

¹Start-dates listed in parentheses for several of the JYW types have not been established through tree-ring associations. These start-dates are implied by the type's association with other, tree ring-dated pottery types at Homol'ovi I. Dates in parentheses are considered provisional and were not used to cross-date contexts in this study.

²Main sources: Benitez (1999); Hays (1991); LaMotta (this study, Appendices C and D).

³Main source: Mills and Herr (1999).

⁴Main sources: Duff (1999, 2002); Kintigh (1996); also Andrew Duff, personal communication, 2006; Barbara Mills, personal communication, 2006.

⁵Main sources: Crown (1994); Mills and Herr (1999); Reid et al. (1992); Reid and Whittlesey (1992)

Table 2.7
 Counts and Percentages¹ by Phase of Certain Temporally Diagnostic Ceramic Wares and Types at Homol'ovi I

Ware/Type	Ceramic Phase							
	TP		EHP		MHP		LHP	
	N	%	N	%	N	%	N	%
Jeddito Yellow Ware	2	0.3	2399	21.1	2122	46.1	9759	80.2
- Bidahochi Poly	-	-	108	0.9	133	2.9	77	0.6
- Paayu Poly	-	-	-	-	2	< 0.1	14	0.1
- Sikyatki Poly	-	-	-	-	-	-	50	0.4
- Jeddito Stippled	-	-	-	-	-	-	6	< 0.1
- Jeddito Engraved	-	-	-	-	-	-	10	< 0.1
White Mountain Red Ware	6	0.8	469	4.1	308	6.7	143	1.2
- St. Johns Poly ²	-	-	-	-	-	-	-	-
- Pinedale B/r and Poly	2	0.3	8	< 0.1	3	< 0.1	12	< 0.1
- Cedar Creek Poly	1	0.1	9	< 0.1	6	0.1	2	< 0.1
- Fourmile Poly	-	-	105	0.9	51	1.1	19	0.2
- Showlow Poly	-	-	-	-	1	< 0.1	1	< 0.1
Zuni Glaze Ware	-	-	16	0.1	19	0.4	25	0.2
- Pinnawa G/w	-	-	14	0.1	16	0.3	13	0.1
- Kechipawan Poly	-	-	-	-	3	< 0.1	5	< 0.1
Total Decorated Ceramics	752		11,393		4606		12,162	

Notes:

¹Percentages are calculated out of all decorated ware ceramics for the phase.

²No examples of St. Johns Polychrome were identified in the sherd collections from Homol'ovi I. However, a single St. Johns Polychrome vessel from the Watron Collection, presumably from Homol'ovi I, is illustrated by Martin and Willis (1940).

types (Awatovi B/y, Bidahochi Polychrome) can be distinguished from a later group (Jeddito B/y, Paayu Polychrome, Sikyatki Polychrome, Jeddito Engraved, Jeddito Stippled) (see Table 2.2). JYW may have been produced as early as 1300, but there is currently little evidence that it was traded extensively outside of the Hopi Mesas region prior to about 1330 (see Benitez 1999). This last inference is based primarily on ceramic cross-dating: Fourmile Polychrome and other post-1330 pottery types are consistently found at sites where JYW appears as an import, even at low frequencies (Table 2.8; see also Appendix C). Sikyatki Polychrome is also fairly well dated by tree-ring associations: Based on the results of a literature search conducted for this study, Sikyatki Polychrome is best dated after about 1385 at Hopi and elsewhere (Table 2.9; see also Appendix D).⁶ At the time of this study there was insufficient evidence in the published record to date any of the other JYW types more precisely.

White Mountain Red Ware Types. The White Mountain Red Ware series includes some of the most precisely dated decorated ware pottery types in the Southwest. Tree ring-dated assemblages from sites in the Silver Creek drainage (Pinedale Ruin, Showlow Ruin), on the Grasshopper Plateau (Chodistaas Pueblo, Grasshopper Springs Pueblo, Grasshopper Pueblo), and just below the Mogollon Rim (Canyon Creek Ruin) supply precise start-dates for many of the types found at Homol'ovi (see Table 2.6) (Breternitz 1963, 1966; Carlson 1970; Haury 1934; Haury and Hargrave 1931; Mills and Herr 1999; Rice and Lindauer 1994). Fourmile Polychrome, which first appeared around 1330 based on associated tree-ring dates at Canyon Creek Ruin (Haury 1934) and several

Table 2.8
Tree-ring Dated Contexts from Outside Homol'ovi that are Relevant to Dating the Initial Production and Circulation of Jeddito Yellow Ware

Site ¹	Latest Tree-ring Date ²	% JYW (or N Pieces)	Post-1330 Types		
			Fourmile Poly	Pinnawa G/w + Kechipawan Poly	Gila/Tonto Poly
Fourmile Ruin	1214+	4 %	Present	Present	Present
Hooper Ranch Pueblo	1287+	< 0.5 %	Present	Present	Present
Nuvakwewtaqa North	1301+	< 0.5 %	-	-	Present
AZ W:10:51	1302+	N = 3	Present	-	Present
Pollock Site	1303+	N = 3 (?)	-	-	-
Kinnikinnick Pueblo	1313	34 %	Present	-	-
Bailey Ruin	-	N = 4	Present	-	Present
Canyon Creek Ruin	1348+	N = 1	Present	-	Present

Notes:

¹See Appendix C for sources consulted and discussion of contextual information.

²Non-cutting date +; cutting dates unmarked.

Table 2.9

Tree-ring Dated Contexts from Outside Homol'ovi that are Relevant to Dating the Initial Production and Circulation of Sikyatki Polychrome

Site	Context(s) ¹	Latest Tree-ring Date ²	%JYW	Sikyatki Polychrome (% of JYW) ³
Kinishba	General site	1366+	Rare	Absent/NR
Rattlesnake Point	General site	1370	0.4	Absent
Raven Ruin	General site	1370	Rare	Absent/NR
Grasshopper Pueblo	General site	1373+	Rare	Absent/NR
Kinnikinnick Pueblo	General site	1374+	34.4	Absent
Table Rock Pueblo	General site	1377+	19.1	1.0
Pinedale Ruin	General site	1378+	Rare	Absent/NR
Kookopngyamu*	Room 24	1380+	Present	Absent/NR
Nuvakwewtaqa South	General site	1381	19.0	0.4
Showlow Ruin	General site	1384+	Rare	Absent/NR
Tuzigoot*	General site	1386+	> 35.2	Absent
Tsa'akpahu	General site	1390+	Present	Present
Pink Arrow*	Room 24	1399+	93.0	Absent
Kookopngyamu*	Room 23	1400+	Present	Present
Kawàyka'a	Test 5, Room 2	1415	99.7	11.7 (+8.2)
Kawàyka'a	Test 4, Room 1	1423+	98.3	13.2 (+8.5)
Awat'ovi	Test 14, Room 2	1429+	98.4	17.1
Kawàyka'a	Test 4, Room 5	1433+	96.0	19.4 (+6.1)

Key:

- * strongest cases
- + non-cutting date (cutting dates are unmarked)
- Present type is present, but not quantified
- Rare type is present, considered rare but proportion not specified
- Absent type is reported as absent
- Absent/NR type is apparently absent but may simply be not reported or not recognized

Notes:

¹See Appendix D for sources consulted and discussions of contextual information.

²All contexts listed provide dates *post quem* for establishing the initial production of Sikyatki Polychrome, except for Kookopngyamu Room 23 which provides a date *ante quem*. See Appendix D for details on this context.

³Each of the three contexts from Kawàyka'a also includes some pottery tabulated as "post-Sikyatki," a nebulous category that Smith (1972:5) says may include "late" Sikyatki material as well as literally "post-Sikyatki" types. The proportion of "post-Sikyatki" material is listed in parentheses for each of these contexts.

other sites (Mills and Herr 1999), is the most important of these types for purposes of the present analysis.

Zuni Glaze Ware Types. Zuni ceramics are uncommon at Homol'ovi I, but two fourteenth-century types occur with sufficient frequency to warrant consideration: Pinnawa Glaze-on-white and Kechipawan Polychrome. Neither of these types is dated precisely, but there is general agreement among contemporary Zuni-region archaeologists that Pinnawa Glaze-on-white first appeared sometime between 1325 and 1350, and that Kechipawan Polychrome first appeared around 1350 (Duff 1999:Table 6.1, 2002:Table 5.1; Kintigh 1996:Table 9.1; also Andrew Duff, personal communication, 2006; Barbara Mills, personal communication, 2006). Based on the results of recent excavations at Zuni, Barbara Mills (personal communication, 2006) believes these types are basically contemporaneous, and that both date to the period after 1350 (and extending to 1450 or perhaps 1475).

Salado Polychrome Types. Salado Polychromes are also uncommon at Homol'ovi I, and most pieces recovered are too small to identify to type. Nonetheless, a few pieces of Gila and Tonto Polychromes have been positively identified, providing some useful chronological information. Both of these types are generally dated to the period after 1350, based largely on work in the Grasshopper region (Crown 1994:19-20; Mills and Herr 1999:Table 8.4; Reid et al. 1992; Reid and Whittlesey 1992). As Lyons (2004:366) points out, however, the problem of transitional (Pinto-Gila Polychrome) vessels and how they are classified by different analysts does complicate the regional dating of Gila Polychrome. Additionally, Homol'ovi ceramic analysts did not recognize

Cliff Polychrome (Lyons 2004) as a distinct type at the time of the Homol'ovi I ceramic analysis; although this elision probably does not significantly affect the conclusions presented in this study, future analysts should nonetheless re-examine the Salado Polychrome material from Homol'ovi I for evidence of this late-dated (post-1350/1375) type.

Cross-dating of Ceramic Phases at Homol'ovi I

With these dates in hand, it is possible to sketch an absolute chronology for the Homol'ovi I sequence. Table 2.6 lists each cross-dated type, its start date, and the earliest ceramic phase and lowest %JYW with which it is associated at Homol'ovi I. The proportional representation of each type is quantified by phase in Table 2.7. Notice that the types within each ware appear in the correct sequence—i.e., the earlier types appear first, then later types are added. This further validates the relative chronology and the seriation techniques on which it is based. The following dates are suggested:

Tuwiuca Phase. (0% JYW; best ceramic dating at Homol'ovi I: circa 1290 to 1330.) Well-dated types are rare in Tuwiuca Phase deposits at Homol'ovi I. However, a number of types generally dated to the late-thirteenth/early-fourteenth century (Chavez Pass and Homol'ovi Polychromes; Jeddito, Huckovi, and Kokop Black-on-oranges; Hoyapi, Bidahochi, and Pinedale Black-on-whites) are found in the Tuwiuca Phase assemblages at the base of the South Plaza (299-F) and East Extramural Area (499-D) sequences (LaMotta et al. 2002; Lyons 1998), suggesting that deposition at Homol'ovi I could have begun shortly before 1300. A start-date between 1290 and 1300 is also supported by the range of White Mountain Red Ware types represented at the site in

general (see Table 2.7): St. Johns Polychrome (1200-1300) is virtually absent, but Pinedale Black-on-red (1280-1330), Pinedale Polychrome (1290-1330), and Cedar Creek Polychrome (1300-1350) specimens have been recovered in low numbers. Fourmile Polychrome (1330-1390) does not occur in Tuwiuca Phase assemblages at Homol'ovi I, suggesting this phase had ended by 1330. JYW is also absent (by definition), with the exception of two small errant sherds at the base of the Tuwiuca Phase deposits in the East Extramural Area sequence (499-D), probably displaced from overlying Homol'ovi Phase deposits by rodent action.

Early Homol'ovi Phase. (1.0-39.9% JYW; best ceramic dating at Homol'ovi I: 1330 to post-1350.) The transition from Tuwiuca to Homol'ovi Phase is marked, stratigraphically, by the initial appearance (and sustained presence) of JYW pottery. The first occurrence of Fourmile Polychrome at Homol'ovi I also coincides, approximately, with the beginning of the Early Homol'ovi Phase: Fourmile Polychrome is found in assemblages with as little as 2.9% JYW (see Table 2.6), indicating that there was not a significant hiatus between the initial appearance of JYW and Fourmile Polychrome (start date 1330) at Homol'ovi I. The EHP probably extended somewhat beyond the mid-fourteenth century mark since a few pieces of Gila or Tonto Polychrome (1350-1400) have been found in assemblages with as little as 33.1% JYW (see Table 2.6). The presence of Pinnawa G/w in some EHP assemblages may also support the last inference, but not all scholars agree that this type first appeared as late as 1350. While the EHP probably extends beyond 1350, the absence of Sikyatki Polychrome (which makes its first appearance in LHP deposits, see below) means this phase must end well before

1385. The end of the EHP (hence, the EHP/MHP boundary) cannot be defined more precisely on the basis of ceramic associations since there is currently no type in the Homol'ovi I assemblages with a firmly established start date in the 1360s or 1370s (see Table 2.6).

Middle Homol'ovi Phase. (39.9-59.9% JYW; best ceramic dating at Homol'ovi I: post-1350 to 1385.) A few ceramic types appear for the first time in Middle Homol'ovi Phase assemblages, including Paayu, Showlow, and Kechipawan Polychromes. The first two are of little help in dating this period: Paayu Polychrome has not yet been dated precisely, and Showlow Polychrome is believed to have been introduced at the same time as Fourmile Polychrome (Carlson 1970; Mills and Herr 1999), i.e., around 1330. Kechipawan Polychrome is somewhat more useful, with a 1350-or-later start date (Duff 1999:Table 6.1, 2002:Table 5.1; Kintigh 1996:Table 9.1). Sikyatki Polychrome was not found in any assemblage dated to this period, so the MHP was probably over by 1385.

Late Homol'ovi Phase. (60.0-100% JYW; best ceramic dating at Homol'ovi I: 1385 to circa 1400.) The beginning of the Late Homol'ovi Phase coincides with the first appearance of Sikyatki Polychrome, dated to 1385. This new type occurs in assemblages with as little as 60.0% JYW. Two additional JYW types, Jeddito Engraved and Jeddito Stippled, are unique to LHP assemblages; although there are no precise independent dates for these types, they appear to have been introduced at about the same time as Sikyatki Polychrome based on associated %JYW values (see Table 2.6).

Dating the end of the LHP is a challenge since there are no well-dated pottery types that make their first appearance between A.D. 1385 and 1450. The site was

probably abandoned in the early 1400s, at the latest, since there are no examples of Awat'ovi or Kawàyka'a Polychrome, nor of Sikyatki Polychrome in the later "free-treatment" style—all of which are found in fifteenth-century JYW assemblages (Colton 1956; Hays 1991). A circa-1400 abandonment of Homol'ovi I is also suggested when ceramic assemblages from this site are compared with specific tree ring-dated assemblages from Hopi sites on Antelope Mesa. There are particularly striking differences in the proportional representation of Sikyatki Polychrome among these contexts. At Homol'ovi I, Sikyatki Polychrome accounts for at most 3.9 percent of the JYW pottery from any given ceramic assemblage; furthermore, this type comprises a mere 0.5 percent of all of the JYW pottery assigned to the Late Homol'ovi Phase. By way of comparison, published contexts from Kawàyka'a and Awat'ovi with tree-ring dates as late as 1415 to 1433+ have yielded JYW assemblages with 11.7 to 19.4 percent Sikyatki Polychrome (see Table 2.9). In comparison to these Hopi contexts, it seems unlikely that the latest Homol'ovi I assemblages were deposited much later than about 1400. Finally, no example of Matsaki Polychrome, a post-1400 Zuni type that emulates Sikyatki Polychrome (Duff 1999:Table 6.1; Hays 1991:Table 3.10), has ever been recorded from the site.

Ceramic Cross-dating of Contexts at Homol'ovi II

JYW pottery is abundant and ubiquitous at Homol'ovi II (Hays 1991), so the major occupation of this site certainly dates to the Homol'ovi Phase. Ceramic cross-dating helps to establish more specific beginning and end dates for the site. Ceramic data are available from several sources: In 1984, HRP conducted excavations in and around

the 200 roomblock, and made systematic surface collections in all three plazas and other outside areas (Adams and Hays 1991). Ceramic assemblages from these contexts (16,393 decorated pieces) were analyzed and published by Hays (1991). Unpublished ceramic data are also available for several contexts from the 1991-1995 HRP excavations, including assemblages from Structures 708 and 714, and from a trench through the South Ramada (8,671 decorated pieces). Many of the generalizations below can be traced to Hays' (1991) work, although they are equally applicable to the newer data. For present purposes, deposits at Homol'ovi II are divided into two groups, representing a slightly earlier and a slightly later component, respectively: (1) Structure 714; and (2) Structures 211, 212, 215, 216, 217, 221, 708, and the South Ramada (999), plus all surface-collected contexts. The following absolute dates are suggested based on ceramic cross-dating:

Structure 714. (Earlier component, 58.3% JYW; best ceramic dating: post-1350 to 1385/Middle Homol'ovi Phase.) Structure 714 is one of the only contexts from Homol'ovi II that has not yielded even a single sherd of Sikyatki Polychrome (Table 2.10). In fact, two other late JYW types—Jeddito Stippled and Jeddito Engraved—are also missing. Hence, three types associated with LHP contexts at Homol'ovi I are not represented in this assemblage. One example of Paayu Polychrome, a MHP/LHP type, was found in the post-abandonment fill of this structure along with several pieces of Gila/Tonto Polychrome, indicating that at least part of the assemblage formed after 1350. This assemblage is best compared to MHP contexts at Homol'ovi I.

All Other Homol'ovi II Contexts. (Later component, 83.9-93.3% JYW; best ceramic dating: 1385 to circa 1400/Late Homol'ovi Phase.) All of the assemblages from

Table 2.10
Proportional Representation of Sikyatki Polychrome in Samples from Homol'ovi I and II

Site	Sample ¹	% JYW	% Sikyatki Polychrome (of JYW) ²	Total Decorated Sherds
H1	Early Homol'ovi Phase Group	21.1	-	11,393
	Middle Homol'ovi Phase Group	46.1	-	4606
	Late Homol'ovi Phase Group	80.2	0.5	12,162
H2	Structure 714	58.3	-	1526
	East Plaza (surface collection)	84.3	0.8	2207
	Ramada (Area 221)	85.6	0.3	1862
	Structures 211, 212, 215, 216, 217	87.1	0.6	1399
	Structure 708	88.1	0.9	5103
	North/south exterior areas (surface coll.)	88.8	0.6	5320
	Central Plaza (surface collection)	89.6	0.8	2012
	West Plaza (surface collection)	93.3	0.6	3593

Notes:

¹All data from Homol'ovi II surface collections, Area 221, and rooms in the 200 roomblock are summarized from Hays (1991). The rooms in the 200 roomblock are combined for this analysis because of the extensive disturbance and mixing of deposits in this area (see Madsen and Hays 1991).

²This number represents the percentage of Sikyatki Polychrome sherds out of all yellow-hued Jeddito Yellow Ware pieces in the sample.

Homol'ovi II that fall under this heading are best compared the LHP group from Homol'ovi I. Sikyatki Polychrome, dated after 1385, is found in virtually every one of these assemblages (see Table 2.10), and Jeddito Stippled and Jeddito Engraved, while rare in absolute numbers, are widely distributed. Paayu Polychrome, associated with MHP and LHP contexts at Homol'ovi I, is also well represented. A few examples of fourteenth-century Zuni pottery types are found in these contexts, including Pinnawa G/w and Kechipawan Polychrome, but fifteenth-century Matsaki Polychrome is absent (Hays 1991).

Placing an end-date on this later Homol'ovi II group is, once again, a challenge. Several lines of ceramic evidence indicate that deposition at Homol'ovi II ceased by about 1400—roughly the same time as Homol'ovi I was abandoned. There are no definitive examples of fifteenth-century Jeddito Yellow Ware types (Awat'ovi or Kawàyka'a Polychrome), nor of Sikyatki Polychrome in the later “free-treatment” style (Hays 1991). Furthermore, Sikyatki Polychrome accounts for only 0.7 percent of all the JYW at the site when all contexts (exclusive of Structure 714) are combined, and between 0.3 and 0.9 percent when contexts are considered individually (see Table 2.10). These figures are comparable to LHP assemblages at Homol'ovi I (0.5% Sikyatki Polychrome overall; individual assemblages range from 0 to 3.9% Sikyatki Polychrome), and, therefore, probably also date no later than about 1400 (compare with fifteenth-century Hopi contexts listed in Table 2.9). It is worth noting, however, that Sikyatki Polychrome, Jeddito Engraved, and Jeddito Stippled are seemingly more ubiquitous at Homol'ovi II than they are among LHP contexts at Homol'ovi I. This could mean that the main period of deposition at Homol'ovi II occurred rather late in the LHP (assuming these types became more ubiquitous through time). It is worth noting that the high %JYW values associated with these contexts supports this last supposition; because the range of %JYW values is so narrow, it is also likely that most of these deposits were laid down around the same time, perhaps at site abandonment. Lastly, the absence of Matsaki Polychrome also supports a circa-1400 termination date for Homol'ovi II.

AMS Radiocarbon Dating of Contexts at Homol'ovi I and II

Radiocarbon dating provides an independent method for evaluating and even refining the absolute dates assigned to contexts at Homol'ovi I and II by ceramic cross-dating. The specific dating techniques and calibration methods used in this study have been summarized by Bowman (1990), Stuiver et al. (1998), and Bronk Ramsey (1995). All of the samples submitted for dating came from carbonized annuals (corn, beans, and squash) recovered from undisturbed archaeological contexts. There are 23 radiocarbon dates for Homol'ovi I, all of which were processed by the NSF-Arizona Accelerator Mass Spectrometry Facility at the University of Arizona (Tucson); two of these are from the Adobe Pueblo outlier roomblock (AZ J:14:316 [ASM]) and were run as part of an earlier study (Gann 1995). There are five radiocarbon dates for Homol'ovi II; two of these were processed by the NSF-Arizona Facility, the other three by Beta Analytic Inc. (Miami) for an earlier project (Madsen and Hays 1991). The two Adobe Pueblo samples from Homol'ovi I and the three Homol'ovi II samples run by Beta are low-precision dates, meaning a single target was run for each sample. All of the remaining samples were processed as high-precision dates, whereby three to five targets were run on each sample and the results combined to produce a single weighted average prior to calibration; the more runs, the smaller the error term associated with the uncalibrated date. All dates were calibrated by the probabilities method using OxCal version 3.5 (Bronk Ramsey 2000), with the INTCAL98 atmospheric decadal dataset (Stuiver et al. 1998).⁷ Tables 2.11 and 2.12 list each sample by number, the material type, specific provenience,

ceramic phase, and uncalibrated and calibrated dates, for the Homol'ovi I and II datasets, respectively.

Radiocarbon dating produces relatively imprecise results, and, consequently, this technique is rarely used by archaeologists working among the late prehistoric pueblos where tree ring-datable wood beams and tightly cross-dated ceramics are readily available. Some of the imprecision in radiocarbon dating is a function of secular fluctuations in the atmospheric concentration of carbon 14 (^{14}C). Because the atmospheric concentration of ^{14}C has not been constant through time, the radiocarbon age of a sample does not indicate the true calendrical age of the sample. Rather, the radiocarbon age must be calibrated against the appropriate empirically derived calibration curve to ascertain the true calendar age (Bowman 1990:16). The calibrated date ranges produced by radiocarbon dates from fourteenth-century contexts are especially broad and imprecise because of the shape of the calibration curve over this interval (see Stuiver and Becker 1986:Figure 1B): For every uncalibrated date there is not one but several possible intercepts on the calibration curve, and therefore several possible calibrated dates or actual calendar ages. When the error term associated with an uncalibrated date is large, the two or three possible calibrated dates cannot be distinguished statistically and must be combined into a single date range—often covering the entire fourteenth century and more. When the error term is small, it is sometimes possible to obtain two discrete (statistically distinct) ranges of calibrated dates for a single sample at the two-sigma level. If independent dating evidence (e.g., associated tree-ring dated pottery) can be drawn upon to eliminate one of these possible ranges, then in theory a relatively precise

Table 2.11
Radiocarbon Dates from Homol'ovi I

Sample #	Material Dated	Assemblage	Context	% JYW	Ceramic Phase	¹⁴ C Age	Cal A.D. (OxCal v.3.5, 2-sigma range)
AA51317	<i>Zea mays</i>	499-D	firepit in east extramural area surface (Feature 20, PD 528)	1.8	TP	639 ± 32	1290-1332 (.377) 1340-1399 (.577)
AA32688	<i>Zea mays</i>	499-B	firepit in east extramural area surface (Feature 3, PD 235)	2.0	EHP	628 ± 20	1298-1329 (.378) 1344-1395 (.576)
AA49396	<i>Zea mays</i>	299-D	South Plaza surface below Str. 250 (PD 1542)	12.0	EHP	580 ± 28	1303-1368 (.642) 1384-1415 (.312)
AA45148	<i>Zea mays</i>	651-C	near-floor fill in Str. 651 (PD 1500)	20.6	EHP	686 ± 23	1276-1307 (.622) 1352-1388 (.332)
AA45145	<i>Zea mays</i>	401-E	cultural fill in Str. 401 (PD 511)	25.5	EHP	899 ± 30	1037-1143 (.615) 1150-1214 (.339)
AA44534	<i>Zea mays</i>	503-A	firepit in floor of Str. 503 (Feature 1, PD 2605)	29.4	EHP	629 ± 22	1297-1330 (.376) 1343-1396 (.578)
AA49395	<i>Zea mays</i>	299-C	firepit in South Plaza surface (Feature 6, PD 1313)	30.3	EHP	670 ± 25	1282-1322 (.450) 1350-1390 (.504)
AA45147	<i>Zea mays</i>	652-A	post-abdn fill in Str. 652 (PD 1403)	33.1	EHP	648 ± 24	1291-1327 (.363) 1346-1394 (.591)
AA44536	unid. seed	558-B	hearth in floor of Str. 558 (Feature 7, PD 3321)	42.7	MHP	701 ± 22	1272-1303 (.824) 1368-1383 (.130)
AA32687	<i>Zea mays</i>	210-A	hearth in floor of Str. 210 (Feature 4, PD 896)	61.4	LHP	663 ± 28	1284-1326 (.420) 1348-1392 (.534)
AA49398	<i>Phaseolus</i>	504-B	hearth in floor of Str. 504 (Feature 2, PD 2764)	64.5	LHP	688 ± 28	1275-1319 (.609) 1351-1389 (.345)
AA44535	<i>Zea mays</i>	504-B	hearth in floor of Str. 504 (Feature 2, PD 2764)	64.5	LHP	817 ± 25	1187-1277 (.954)

Table 2.11, *continued*

Sample #	Material Dated	Assemblage	Context	% JYW	Ceramic Phase	¹⁴ C Age	Cal A.D. (OxCal v.3.5, 2-sigma range)
AA45146	<i>Zea mays</i>	500-A6	firepit in East Plaza surface (Feature 32, PD 715)	66.5	LHP	624 ± 21	1298-1330 (.382) 1342-1396 (.572)
AA20953	<i>Zea mays</i>	AP8-A	hearth in floor of Str. 8 (Feature 3, PD 115)	67.4	LHP	565 ± 50	1300-1372 (.536) 1379-1436 (.418)
AA49397	<i>Phaseolus</i>	400-A	firepit in Southeast Plaza surface (Feature 1, PD 2165)	71.8	LHP	595 ± 43	1298-1415 (.954)
AA51322	<i>Zea mays</i>	729-B	hearth in floor of Str. 729 (Feature 5, PD 2037)	71.9	LHP	615 ± 22	1299-1332 (.387) 1339-1400 (.567)
AA20952	<i>Zea mays</i>	AP10-A	near-floor fill in Str. 10 (PD 109)	74.7	LHP	695 ± 55	1222-1332 (.600) 1340-1399 (.354)
AA44532	<i>Zea mays</i>	209-A	hearth in floor of Str. 209 (Feature 2, PD 473)	75.3	LHP	631 ± 22	1297-1329 (.372) 1343-1396 (.582)
AA51323	<i>Zea mays</i>	709-A	hearth in floor of Str. 709 (Feature 1, PD 3231)	79.4	LHP	630 ± 52	1284-1408 (.954)
AA44533	<i>Zea mays</i>	556-A	firepit in post-abdn fill in Str. 556 (Feature 1, PD 2543)	83.2	LHP	556 ± 22	1320-1352 (.397) 1388-1430 (.557)
AA51319	<i>Zea mays</i>	215-A	hearth in floor of Str. 215 (Feature 2, PD 1719)	87.0	LHP	625 ± 62	1281-1420 (.954)
AA51318	<i>Cucurbita</i>	901-E	hearth in floor of Str. 901 (Feature 1, PD 1060)	88.6	LHP	598 ± 22	1302-1369 (.733) 1383-1404 (.221)
AA45149	<i>Zea mays</i>	601-B	hearth in floor of Str. 601 (Feature 2, PD 2302)	89.6	LHP	608 ± 23	1300-1372 (.748) 1380-1402 (.206)

Table 2.12
Radiocarbon Dates from Homol'ovi II

Sample #	Material Dated	Structure	Context	% JYW	Ceramic Phase	¹⁴ C Age	Cal A.D. (OxCal v.3.5, 2-sigma range)
AA51321	<i>Zea mays</i>	Str. 714	near-floor fill of Structure 714 (PD 1632)	58.3	M/LHP	647 ± 23	1292-1327 (.360) 1346-1394 (.594)
Beta-12915	<i>Zea mays</i> (?)	Str. 215	hearth in floor of Str. 215 (Feature 2)	83.8	LHP	600 ± 75	1281-1439 (.954)
AA51320	<i>Zea mays</i>	Str. 708	hearth in floor of Str. 708 (Feature 9, PD 1520)	88.1	LHP	567 ± 26	1306-1366 (.540) 1386-1423 (.414)
Beta-12913	<i>Zea mays</i> (?)	Str. 211	hearth in floor of Str. 211 (Feature 1)	89.0	LHP	610 ± 85	1255-1448 (.954)
Beta-12914	<i>Zea mays</i> (?)	Str. 211	hearth in floor of Str. 211 (Feature 2)	89.0	LHP	1160 ± 85	689-1018 (.954)

calibrated age for the specimen in question can be ascertained (at the two-sigma level, there is still a five percent chance that the true age of the sample falls outside of both ranges of dates). A simple way to narrow the error term is to radiocarbon-date the same sample multiple times, combining the results to produce a single weighted average prior to calibration. Even still, the resulting calibrated ages for fourteenth-century materials are typically fairly broad, as discussed below.

Radiocarbon Dating of Individual Contexts at Homol'ovi I and II

Every context that has been radiocarbon dated at Homol'ovi I and II can be associated with a specific ceramic assemblage. Each of these assemblages has been analyzed and assigned to one of the ceramic phases defined in Table 2.1 based on the %JYW. Since many of the Homol'ovi I and II radiocarbon samples come from hearths and other surface features, however, it is important to remember that these actually provide post-quem dates for the associated (directly overlying) ceramic assemblages.

The radiocarbon dates can be used, in theory, to test the absolute dates assigned to individual contexts at Homol'ovi I and II based on ceramic cross-dating. However, even some of the high-precision dates span much of the fourteenth century, providing a poor basis for testing the ceramic chronology on a context-by-context basis. Although it is possible to eliminate portions of some of these ranges by looking to associated ceramics, for present purposes this technique must be used cautiously to maintain analytical rigor and to avoid circular reasoning.

The two-sigma calibrated date ranges for the Homol'ovi I samples are, by and large, consistent with the ceramic dates proposed in the previous section: For nearly

every sample there is at least some overlap between the calibrated radiocarbon dates, on the one hand, and the ceramic cross-dates applied to the phase with which the sample is associated, on the other.⁸

Most of the radiocarbon dates from Homol'ovi II are consistent with the proposed ceramic dates for the associated contexts, although the radiocarbon date ranges are admittedly very broad.⁹ The calibrated date from Structure 714 is in agreement with the suggested MHP/LHP placement for this assemblage. Calibrated dates from structures 211 (Beta-12913), 215 (Beta-12915), and 708 (AA51320) are all capable of accommodating a LHP placement.

Radiocarbon Estimates of Occupation Span at Homol'ovi I and II

The body of radiocarbon dates from each site, when examined as a whole, supports (or is at least consistent with) the foundation and abandonment dates suggested by ceramic cross-dating. In Figure 2.5a, each radiocarbon date from Homol'ovi I is split into an earliest date and a latest date; these dates represent the upper and lower boundaries, respectively, of the calibrated two-sigma range. A rough date for the founding of the site can be estimated from the spread of earliest dates, shown on the left side of the graph. Most of these dates fall between 1272 and 1303, with a large cluster in the 1290s. Based on this spread of dates, it seems unlikely that Homol'ovi I was occupied prior to about the mid-1280s or early-1290s. It is worth noting, in this regard, that one of the deepest Tuwiuca Phase contexts at Homol'ovi I, a feature located at the base of the East Extramural Area (499 trench) sequence, has been radiocarbon-dated to 1290 or later (AA51317) at the two-sigma range (see Table 2.11). Turning to the spread

Earliest Dates		Latest Dates	
103	7		
118	7		
122	<u>2</u>	121	4
127	256	127	7
128	<u>1244</u>		
129	01778889		
130	<u>0023</u>		
132	0		
		138	389
		139	02456669 <u>9</u>
		140	024 <u>8</u>
		141	55
		142	<u>0</u>
		143	<u>06</u>

(a) Homol'ovi I

Earliest Dates		Latest Dates	
068	<u>9</u>	101	<u>8</u>
125	<u>5</u>		
128	<u>1</u>		
129	2		
130	6		
		139	4
		142	3
		143	<u>9</u>
		144	<u>8</u>

(b) Homol'ovi II

Figure 2.5 Stem-and-leaf plots of radiocarbon dates from Homol'ovi I and II, showing earliest and latest calendar years associated with each two-sigma range. Dates with an error term ≥ 50 years are underlined.

of latest dates, on the right side of the graph, it is possible to estimate an abandonment date for the site. Ignoring the low-precision outliers, most of these dates fall between 1383 and 1415, with the largest cluster between 1390 and 1400. This distribution supports the inference that the site was abandoned prior to the first decade of the fifteenth century.

Figure 2.5b shows the radiocarbon dates from Homol'ovi II arrayed in a similar fashion. This approach does not work as well for dating the occupation at Homol'ovi II because there are fewer dates, and most are low-precision dates. The dates on the left side of the graph only indicate that the site must have been founded sometime after the 1280s. On the right side, the group of latest dates suggests the site was abandoned before the 1420s, and certainly prior to 1450. This is consistent with the circa-1400 abandonment date proposed above based on the ceramic evidence.

Analysis of Uncalibrated Radiocarbon Dates from Homol'ovi I and II

It should be apparent by this point that the interpretation of calibrated radiocarbon dates from fourteenth-century contexts is greatly complicated by the shape of the calibration curve (Figure 2.6): No matter how precise the uncalibrated dates are, the shape of the curve itself inevitably adds to the imprecision and ambiguity of the calibrated dates. It is possible to circumvent this problem, to some extent, when dealing with high-precision dates that can be seriated by some independent measure. In such cases, approximate calendar ages can be assigned by use of a technique that is conceptually similar to the procedure known as “wiggles-matching.”

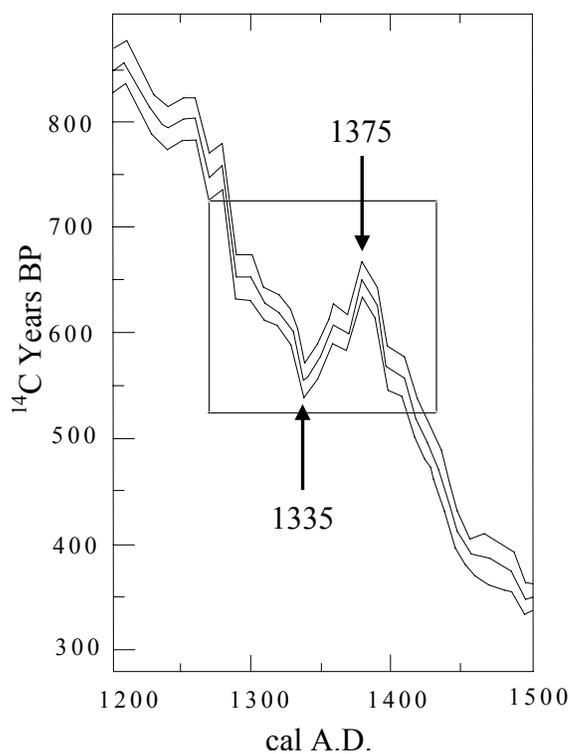
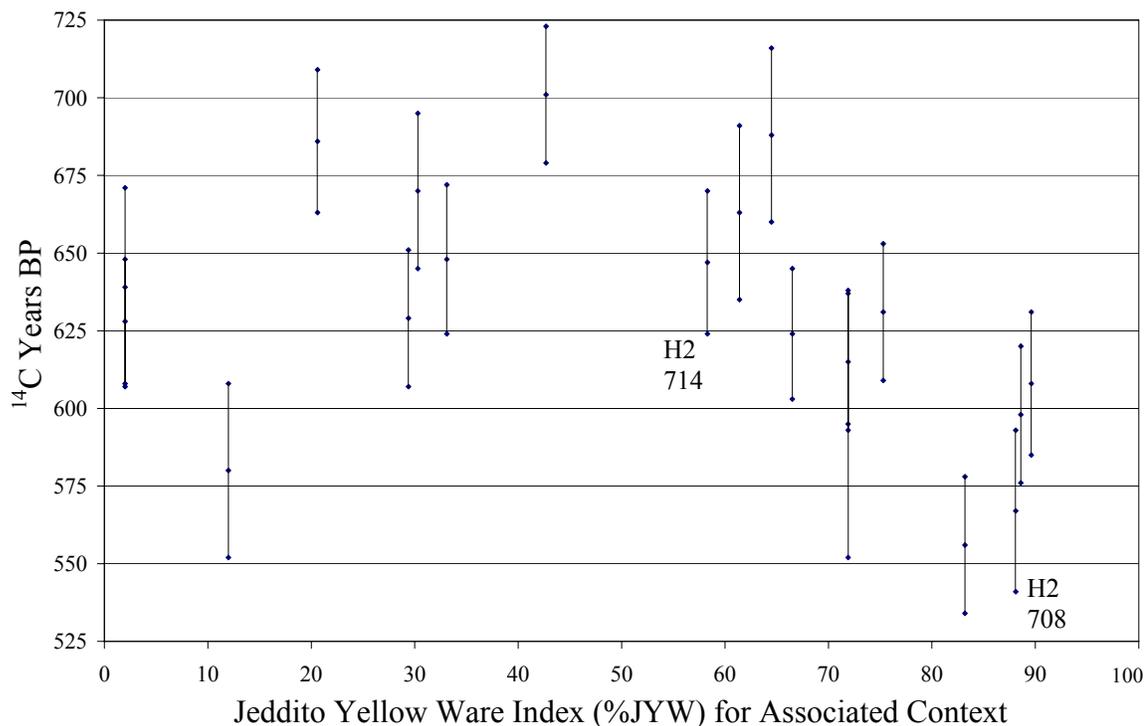


Figure 2.6 Uncalibrated radiocarbon age of samples from Homol'ovi I and II (one-sigma range) as a function of the Jeddito Yellow Ware index (%JYW). All dates in the graph at top are from Homol'ovi I except as noted. Dates with error term ≥ 35 years were omitted. A portion of the radiocarbon calibration curve for the time period of interest is shown at left for comparison (based on Stuiver and Becker 1986; Stuiver et al. 1998; Bronk Ramsey 2000).

Technically, wiggle-matching is a method used to radiocarbon-date wood. High-precision dates are obtained from several different annual rings from a single specimen. Since the number of years between dated rings is known, the uncalibrated dates can be strung together to produce “[a] floating piece of calibration curve... which can be fixed in calendar time by matching it to the master calibration curve” (Bowman 1990:48). From the standpoint of this technique, topographic variability in the calibration curve is not an impediment to dating; rather it is an asset.

In a similar fashion, the ups and downs of the calibration curve can be turned to advantage in fixing calendar ages for radiocarbon-dated contexts from Homol’ovi I and II. In this case, %JYW (rather than tree-rings) is used to arrange the samples in relative chronological order. Next, the uncalibrated radiocarbon age of each sample is plotted as a function of the associated %JYW value in a bivariate graph. The resulting spread of points should replicate the shape of the calibration curve over the period of time represented. By matching peaks and valleys in the bivariate plot with the corresponding points on the calibration curve, it should be possible to establish calendar dates for a few key points in the archaeological data set.

A few potential limitations to this technique must be made explicit at the outset. Most importantly, it is highly unlikely that the %JYW—as a proxy for time—increased at a constant rate. Consequently, there is no way to determine, a priori, exactly how much real time separates any two samples in the data set. This means it is not possible to pin down most samples to a specific location on the calibration curve; instead, it is necessary to work with the most diagnostic points—the peaks and valleys. Also, if the rate of

change in %JYW varied through time, this will have a distorting effect on the archaeological graph in comparison to the calibration curve. This effect is probably negligible, however, because only the steepness of the slope of the distribution, and not its overall shape, should be affected.

Figure 2.6 plots the one-sigma range for 19 high-precision radiocarbon dates from Homol'ovi I and II against the %JYW associated with each dated sample. Also shown in Figure 2.6 is the calibration curve for the period of interest. Notice that the slope of the calibration curve is negative throughout this period, except for the brief interval between about 1335 and 1375 where it rises. The distribution of the archaeological samples on the upper graph replicates a portion of this curve. The radiocarbon ages of the Homol'ovi I and II samples generally rise until about the middle of the graph; after the 50% JYW mark, the overall trend is downward. Therefore, the ascending portion of this distribution probably corresponds to the period between 1335 and 1375, where the calibration curve is rising. The descending portion of the distribution, on the other hand, probably matches the post-1375 segment of the calibration curve. These data permit the following provisional conclusions:

- (1) The EHP (1.0-39.9% JYW) probably lasted from the 1330s through the mid-fourteenth century.
- (2) The year 1375 likely falls somewhere within the MHP (40.0-59.9% JYW).
- (3) The LHP (60.0-100% JYW) probably began sometime after 1375.

These findings are fully consistent with the ceramic cross-dating of contexts at Homol'ovi I, as reported above. What is more, these results, in combination with the ceramic cross-dating, allow us to set the EHP-MHP boundary at roughly 1365 (give or take 5-10 years) (see Table 2.1). Additionally, the uncalibrated ages of the two samples

from Homol'ovi II fit well within the observed distribution of points, which tends to support the proposed dating of these contexts: Structure 714 seems appropriately placed at the boundary between the MHP and LHP, and probably dates after 1375; the Structure 708 sample fits best toward the end of the LHP. While this dating technique permits only broad calendar ages to be assigned to archaeological contexts, it can potentially supply important chronological benchmarks which, in the present study at least, could not be established solely by examining the calibrated ages of individual radiocarbon samples. Additional chronometric work at Homol'ovi I and II is necessary to thoroughly evaluate the foregoing conclusions, and to set this dating technique on a more solid empirical foundation.

Conclusions

This chapter has developed a chronological framework for the Pueblo IV-period occupations at Homol'ovi I and other contemporaneous sites in the Homol'ovi region. This chronology is based on multiple independent lines of evidence, including frequency seriation and formal, stylistic, and technological seriation of Jeddito Yellow Ware pottery; ceramic cross-dating; stratigraphy; and AMS radiocarbon dating. The Jeddito Yellow Ware index (%JYW) was shown to be a reliable tool for seriating deposits at Homol'ovi I, and for establishing temporal relationships between deposits at Homol'ovi I and II. However, it would appear that deposits from Homol'ovi III probably cannot be tied into the Homol'ovi I seriation by means of the JYW index alone; fortunately, deposits at this site can be integrated through other dating techniques (Adams 2001a; Lyons et al. 2001).

One of the more important findings to emerge from this chapter concerns the partial contemporaneity of the occupations at Homol'ovi I and II. It was demonstrated that Homol'ovi I was founded somewhat earlier than Homol'ovi II, the largest village in the cluster. Homol'ovi II may have been founded during the MHP, but most cultural deposition at this site seems to have occurred after 1385, during the LHP. This finding is especially significant because in the past researchers have suggested that the establishment of a Hopi community at Homol'ovi II may have served as a catalyst for ceremonial reorganization at Homol'ovi I and at villages throughout the cluster (Adams 1996, 2002:234-244; Walker et al. 2000). Homol'ovi II is believed to have introduced katsina ceremonialism, plaza rituals, and new religious sodalities to the region.

The chronology developed in this chapter figures prominently in subsequent chapters, where it provides a temporal framework for describing faunal assemblages from the Homol'ovi sites (Chapter 3), and (in slightly condensed format) for identifying temporal and intersite spatial patterns in the taxonomic composition of faunal assemblages from Homol'ovi I, II, III, and IV (Chapter 4).

Endnotes

1. An assemblage is considered to be out-of-sequence if it exhibits a significant ($\geq 5\%$) drop in %JYW compared to the immediately subjacent assemblage. Six of these assemblages (417-A, 500-A1, 601-A, 729-A, 901-A and 901-B) represent the deposits closest to the modern ground surface in their respective sequences—deposits that are especially prone to disturbance by people, animals, weathering, and water transport. Two assemblages (417-B and 730-A) represent deposits on the floor of a second-story room; in both cases, it is likely that the %JYW is out of sequence simply because the upper room was abandoned and filled with trash before the lower room was filled. Lastly, assemblage 901-D represents an obviously intrusive deposit of early trash that spilled into Structure 901, a large subterranean kiva, when one of the structure's retaining walls collapsed.

2. To quantify the dividing line between these temper density categories, a representative sample of sherds was examined at 40× magnification through a 4mm ocular grid. Temper density within the area covered by the grid was quantified by counting the number of grid intersections covered by temper particles and then dividing this number by 121 (the total number of intersections on the grid) to obtain a proportion. For the “essentially temperless” pieces, five percent or fewer of the total grid intersections were found to be covered by temper particles at this magnification.

3. Names and approximate dates for these groups of deposits are: Founder Phase (1280-1290); Early Phase (1290-1300); Middle Phase (1330-1345); Early-Late Phase (1345-1355); Late Phase (1355-1375) (Adams 2001a:Table 7.9).

4. JYW index values were calculated for each Homol’ovi III phase from Tables 8.2 and Table 8.6 in Lyons et al. (2001), as follows: Founder Phase (2.2%); Early Phase (3.2%); Middle Phase (5.7%); Early-Late Phase (17.1%); Late Phase (21.5%). These proportions were re-calculated from raw sherd counts listed in the publication in an effort to maintain strict comparability with JYW index values for Homol’ovi I and II. It should be noted, however, that because of the way the Homol’ovi III ceramic counts are reported these data may include a small but indeterminate number of early, orange-hued Jeddito Yellow Ware specimens. It is unlikely that this would cause the resulting %JYW figures to be inflated by more than about 1.0 to 2.5 percent, however (see Lyons et al. 2001:Table 8.6).

5. The proposed dating of the Late Phase at Homol’ovi III (1355-1375) seems correct based on the ceramic types represented at the site (see Adams 2001a; Lyons et al. 2001). The temporal placement of the Homol’ovi III Late Phase is also supported by an analysis of JYW bowl rims from Structure 32, which was conducted for the present study (but only summarized here). Analysts collected data on rim-to-banding line distance (RD), banding line width (BW), bowl rim form, paste color, and temper density from a sample of 103 JYW bowl rims from two distinct assemblages within Structure 32:

<u>Assemblage</u>	<u>Context</u>	<u>%JYW</u>	<u>Proposed Dating</u>
32-A	Upper post-abdn. fill/overburden	26.9	1355-1375 (Late Phase)
32-B	Lower post-abdn. fill (strata 3-6)	6.1	1330-1345 (Middle Phase)

The lower assemblage from Structure 32 (Assemblage 32-B; N = 34 JYW bowl rims) was most similar to the EHP group at Homol’ovi I for nearly every attribute examined, as expected based on the low %JYW. The upper assemblage (Assemblage 32-A; N = 69 JYW bowl rims) was comparable to the Homol’ovi I MHP group, or fell in between MHP and LHP groups, for nearly every attribute—consistent with the absolute dates assigned to this context but seemingly inconsistent with the relatively low %JYW for the assemblage. These data suggest that the absolute dates for the Late Phase at Homol’ovi III are correct, but, for whatever reason, the proportion of JYW pottery is slightly less than the standard 40-59.9% JYW for MHP deposits at Homol’ovi I. Since this pilot study was based on a relatively small sample of JYW bowl rims from a single structure,

additional research on JYW assemblages from Homol'ovi III (particularly rim-to-banding line distance analysis) is necessary to confirm these findings.

6. The 1385 start-date for Sikyatki Polychrome is based on a re-evaluation of the regional tree-ring record that was conducted for this study, results of which are presented in Table 2.9 and Appendix D. In compiling these data, an effort was made to distinguish among the different varieties of Sikyatki Polychrome. Hays (1991) and other Homol'ovi researchers recognize two varieties of early (fourteenth-century) Sikyatki Polychrome: An earlier geometric style in which the red paint is used to outline black solids; and a later style with areas of solid red outlined in black. Colton (1956) also distinguished an earlier "geometric" style from a later "free-treatment" style, although he did not specifically comment on the temporal priority of red outlining. Sherds with red outlining and sherds with massed red outlined in black have been recovered from the Homol'ovi sites, but most pieces are too small to categorize as one style or the other. This distinction is not generally made in the regional literature, either—at least not for the dated fourteenth- and fifteenth-century contexts that were examined for this study. It must be assumed, therefore, that any examples of the red-outline style encountered at these sites were reported generically as "Sikyatki Polychrome." Hence, there is currently no specific evidence to suggest that the red-outline style of Sikyatki Polychrome began any earlier than the 1385 start-date that has been applied to the type as a whole.

7. The weighted averages for high-precision samples analyzed for this study were calculated by G. S. Burr of the NSF-Arizona Facility. The calibrated dates listed in Tables 2.11 and 2.12 differ only slightly from results obtained using the intercepts method, or by using a different calibration program, CALIB 4.3 for Windows (Stuiver and Reimer 2000).

8. There are two problematical maize dates from Homol'ovi I (AA45145 [Structure 401 fill] and AA44535 [Structure 504 hearth]), both of which returned anomalously early dates in the eleventh through thirteenth centuries. Laboratory error is unlikely in either case. One possibility is that these samples were taken from redeposited organic debris that dates to an earlier, pre-Pueblo IV period occupation at the site of Homol'ovi I. There are well-documented Pueblo II/III sites in close proximity to Homol'ovi I that are dated to the Black Mesa Phase (1000-1050) and Walnut Phase (1120-1225) (Lange 1998:44-46, 153-157; Young 1996). Although no architectural evidence for a PII/III occupation has been found at Homol'ovi I, ceramics dated to this period are widely scattered throughout the Pueblo IV period deposits at the site. The sample from Structure 504 (AA44535) overlaps with dates for Homol'ovi IV (1260-1285) (Adams 2002:Table 1.1), so it is also possible that this material came from an early Tuwiuca Phase deposit. There are no obvious contextual indications that either of these samples should date as early as they do, and, in fact, a second date from the same feature in Structure 504 (AA49398) produced a date that is consistent with the associated LHP ceramic assemblage.

9. One of the samples from Structure 211 (Beta-12914) returned an anomalously early date of 689-1018 (two-sigma range). Pithouses probably dated to the Black Mesa Phase (1000-1050) have been found under later structures at Homol'ovi II (Lange 1998:154), and it is possible that the early date from Structure 211 represents redeposited material from some such early context.

CHAPTER 3:
TAXONOMIC COMPOSITION OF FAUNAL ASSEMBLAGES FROM
HOMOL' OVI I, II, III, AND IV

Introduction

This chapter introduces the faunal assemblages from Homol'ovi I, II, III, and IV. Specifically, it describes the taxonomic composition of the bird, carnivore, and artiodactyl assemblages from these sites, and briefly characterizes the amphibians and reptiles. These particular groups of animals were selected for in-depth analysis because of their close associations with religion, ritual, and ceremony in the Western Pueblos historically (see Chapter 1). While largely descriptive, the present chapter lays the groundwork for the subsequent analysis of temporal trends and intersite spatial patterning in the Homol'ovi faunal assemblages (Chapter 4). The assemblages described in the present chapter are part of an aggregate Homol'ovi faunal sample that currently numbers more than 47,000 analyzed specimens (Table 3.1).

Data Sources

The faunal data presented in this chapter were compiled from a number of different published and unpublished sources, and from new analyses performed specifically for this study. Table 3.1 lists background information on the collections. All of the zooarchaeological material included in this study was analyzed by trained faunal analysts working with the Arizona State Museum's (ASM) Homol'ovi Research Program (HRP). Analysts used specimens housed in ASM's Comparative Vertebrate Collections to identify zooarchaeological specimens to taxon and skeletal element. Complete analysis records from these studies are stored in the Homol'ovi Research Program

Table 3.1
Homol'ovi Faunal Datasets Included in this Study

Site	Recovery Dates	Recovery Contexts	Faunal Sample (NSP) ¹	Data Sources
Homol'ovi IV	1989	6 rooms, 2 kivas, 1 plaza	5,571	Strand (1998); Andronescu and Glinsky (1994)
Homol'ovi III	1986–87	5 rooms, 3 kivas, 1 plaza	7,443	Strand (1998); Pierce (1989); Senior and Pierce (1989)
Homol'ovi II	1991–93	5 rooms, 4 kivas, 1 plaza, 1 ramada	10,844	Strand (1998); Strand and McKim (1996)
Homol'ovi I	1994–99	27 rooms, 3 kivas, 1 plaza, 1 midden ²	23,334	Strand (1998); LaMotta (this study)

Notes:

¹Counts do not include bird or carnivore burials. See text for details.

²A full listing of contexts sampled at Homol'ovi I, including material from Strand's (1998) sample and material analyzed for this study, is found in Appendix E.

Laboratory (ASM). The zooarchaeological specimens reported in this study were recovered between 1985 and 1999 during controlled HRP excavations at Homol'ovi I, II, III, and IV. Deposits were typically excavated by hand using trowels and/or shovels, and all undisturbed deposits were generally screened with quarter- or eighth-inch mesh. Some assemblages include faunal specimens recovered from flotation samples taken from features, occupation surfaces, or cultural fill contexts.

The basic faunal data for Homol'ovi II, III, and IV come from Jennifer G. Strand's (1998) Ph.D. dissertation on the Homol'ovi fauna. For these three sites, Strand (1998) was largely summarizing faunal data collected by other HRP analysts, much of it not previously published. Strand (1998) also analyzed and reported on nearly 12,000

faunal specimens from Homol'ovi I, mostly from contexts excavated during the 1995 field season. About half of the current Homol'ovi I dataset comes from Strand's (1998) analysis, while the rest is supplied by the present author's more recent work with faunal collections spanning the entire period of HRP's excavations at Homol'ovi I (1994–1999). In a few specific instances, Strand's (1998) NISP counts for Homol'ovi I, II, III and IV were adjusted to bring them in line with standards adopted for the present study: Specifically, bird and carnivore burials were removed from NISP counts; and each individual element in an articulated bone cluster was counted as *one specimen*, regardless of the fact that it was found in articulation. Additionally, some of Strand's (1998:Tables 6.1–6.4) provenience assignments for Homol'ovi I specimens were changed to reflect the most current interpretations of stratigraphic and architectural sequences at this site.

The faunal samples from Homol'ovi II, III, and IV, as well as Strand's portion of the Homol'ovi I sample, were analyzed comprehensively—i.e., in each sample, every bone from every provenience designation (PD) selected for analysis was examined in detail and identified to the most specific taxonomic category possible. The rest of the Homol'ovi I sample was analyzed in a more selective fashion: All rabbit bones, rodent bones, and much of the unidentifiable material was sorted out at an early stage, allowing analysts to focus their efforts on the categories of fauna that are most central to the present investigation.

To put the faunal material described in this chapter into proper perspective, Table 3.2 shows the general taxonomic composition of Strand's (1998) Homol'ovi I sample. The vast majority (88.5%) of the analyzed sample is made up of rabbits, rodents,

Table 3.2
General Taxonomic Composition of Strand's (1998) Homol'ovi I Faunal Dataset

Taxon	N	%
Fish	107	0.9
Reptiles	22	0.2
Amphibians	0	0.0
Birds	385	3.2
Bats	2	> 0.1
Rabbits	6583	55.4
Rodents	856	7.2
Carnivores	252	2.1
Artiodactyls	172	1.4
Unid. Sm. Mammals	2128	17.9
Unid. Med. Mammals	216	1.8
Unid. Lg. Mammals	204	1.7
Unid. Mammals	4	> 0.1
Unclassifiable	953	8.0
Total Analyzed Specimens	11,884	100.0

unidentified small mammals, and unclassifiable specimens. In contrast, birds, carnivores, artiodactyls (including unidentified large mammals), reptiles, and amphibians together account for just 8.7 percent of the total sample. Extrapolating from these figures, it is clear that the faunal material covered in this and the subsequent chapter represents a relatively small portion of the total Homol'ovi fauna. Nonetheless, the animal taxa selected for analysis in this study were almost certainly accorded social and ritual significance by the residents of these ancient villages, much as they were historically (see Chapter 1).

Description and Dating of Faunal Assemblages

The assemblage descriptions that make up the bulk of this chapter follow a standard format. There is a separate section for each major category of fauna—first

birds, then carnivores, artiodactyls, and finally reptiles and amphibians. Within each section the discussion is organized by site and, for multicomponent sites, by ceramic phases (more below). The assemblage descriptions provide information on the taxonomic composition of each assemblage, including a listing of the taxa that are present, the number of identified specimens present (NISP) per taxon, and a general assessment of the proportional abundance of different taxa.

The faunal assemblages described in this chapter are generally assignable to one of the four ceramic phases defined in Chapter 2: Tuwiuca Phase (TP), Early Homol'ovi Phase (EHP), Middle Homol'ovi Phase (MHP), and Late Homol'ovi Phase (LHP). Assignments are based on a number of criteria, including the proportion of Jeddito Yellow Ware pottery, and the presence or absence of certain cross-datable pottery types (see Chapter 2). The Homol'ovi I faunal samples readily fit into this sequence since the decorated ware ceramics from all of the relevant proveniences were analyzed prior to completion of this study. The same dating scheme can be extended to the other sites in the present sample, using published descriptions and personal observations on the decorated ware ceramic assemblages from these sites (Table 3.3). For present purposes, Homol'ovi II and IV are considered single-phase sites, while Homol'ovi I and III have faunal assemblages dating to multiple ceramic phases. In subsequent chapters, some of the individual ceramic phases will be collapsed into larger groupings to increase faunal sample sizes for specific analyses.

Table 3.3
Chronology of Homol'ovi Faunal Assemblages Included in this Study

Site	Temporal Components ¹	Approximate Dates	Total Faunal Sample (NSP)
Homol'ovi IV	Tuwiuca Phase	1260–1290	5,571
Homol'ovi III	Tuwiuca Phase	1280–1300	1696
	Early Homol'ovi Phase	1330–1355	2017
	Middle Homol'ovi Phase	1355–1375	3730
Homol'ovi II	Late Homol'ovi Phase	1385–1400+	10,844
Homol'ovi I	Tuwiuca Phase	1290–1330	617
	Early Homol'ovi Phase	1330–1365	5047
	Middle Homol'ovi Phase	1365–1385	2348
	Late Homol'ovi Phase	1385–1400+	13,826
	Undated	–	1496

Notes:

¹Sources for dating information:

Homol'ovi IV: Adams 2004b:25; Bubemyre 2004.

Homol'ovi III: Adams 2001a:Table 7.9; Lyons et al. 2001. The temporal components listed here for Homol'ovi III correspond to the published (Adams 2001a:Table 7.9) occupational phases for this site as follows: Tuwiuca Phase (Homol'ovi III Founder and Early Phases); Early Homol'ovi Phase (Homol'ovi III Middle and Early Late Phases); Middle Homol'ovi Phase (Homol'ovi III Late Phase).

Homol'ovi II: Hays 1991; LaMotta (this study, Chapter 2). All of the Homol'ovi II faunal material included in this study comes from contexts that are believed to date to the Late Homol'ovi Phase, although there may well be earlier deposits at the site (see Chapter 2).

Homol'ovi I: LaMotta (this study, Chapter 2)

In addition to the dated material, there is a group of specimens in the Homol'ovi I sample that comes from mixed contexts which cannot be dated precisely. These specimens are listed under *Undated Material* in the assemblage descriptions that follow.

Assemblage Descriptions: Birds

This section describes the bird assemblages from Homol'ovi I, II, III, and IV. NISP counts for birds are shown in Table 3.4. The following general terms are used in this section to characterize the proportional abundance of different taxa in the bird assemblages: *abundant* (> 10% NISP), *common* (5-10% NISP), *uncommon* (1-5% NISP), *rare* (< 1% NISP), and *unique* (NISP=1). For birds, %NISP is calculated as the percentage out of all bird specimens identified to order or better. For sake of clarity, specimen counts for unidentified birds are presented in the format $N=\times$, rather than $NISP=\times$, since these specimens are not counted in %NISP calculations (the same notation is used in subsequent sections for unidentified carnivores and unidentified artiodactyls).

Homol'ovi I

The analyzed faunal collection from Homol'ovi I includes 2,222 bird bones. Approximately 60 percent of this material (1,333 specimens) has been identified taxonomically to the level of order or better. As an estimate, there are at least 44 different species from 23 families and 11 orders of birds represented. By all accounts, this is a large, diverse avian assemblage that is comparable to the largest archaeological collections from the Pueblo Southwest. The assemblage includes TP, EHP, MHP, and LHP components, as well as some undated material from mixed contexts. No bird burials

Table 3.4
 NISP Counts by Taxon for Bird Assemblages from Homol’ovi I, II, III, and IV¹

Taxon	Homol’ovi I						Homol’ovi IV	Homol’ovi III ²	Homol’ovi II
	TP	EHP	MHP	LHP	Und.	Total			
Podicipidae (grebes)									
Podicipidae		1	1	1		3		4	
<i>Podiceps nigricollis</i> (eared grebe)		3				3		1	
<i>Podilymbus podiceps</i> (pied-billed grebe)		7		1		8		2	
Ardeidae (herons and bitterns)									
Ardeidae		5		4		9		1	
<i>Butorides virescens</i> (green heron)		1	2			3			
<i>Ardea alba</i> (great egret)				1		1			
Accipitridae (hawks and eagles)									
Accipitridae		14		1		15			5
cf. Accipitridae		2	3		1	6			1
<i>Accipiter striatus</i> (sharp-shinned hawk)		1		1		2			
<i>Buteo jamaicensis</i> (red-tailed hawk)		80		5		85			16
<i>Buteo</i> spp. (buteonine hawk)		21	12	10	1	44	1	7	28
<i>Circus cyaneus</i> (marsh hawk)		1				1			
cf. <i>Circus cyaneus</i> (marsh hawk)		1	1			2			
<i>Aquila chrysaetos</i> (golden eagle)		3	1	27		31	1		6
cf. <i>Aquila chrysaetos</i> (golden eagle)		2	1	3		6	3	1	
Falconidae (falcons)									
<i>Falco mexicanus</i> (prairie falcon)								4	
cf. <i>Falco mexicanus</i> (prairie falcon)		21		4		25			
<i>Falco sparverius</i> (American kestrel)		11		1		12	4	11	
Phasianidae (quails, pheasants, et al.)									
Phasianidae	13	16	6	3	2	40		3	4
cf. <i>Callipepla</i> sp. (scaled or Gambel’s quail)		1		2		3			

Table 3.4, *continued*

Taxon	Homol'ovi I						Homol'ovi IV	Homol'ovi III	Homol'ovi II
	TP	EHP	MHP	LHP	Und.	Total			
Meleagrididae (turkeys)									
<i>Meleagris gallopavo</i> (turkey)	143	36				179	20	11	
cf. <i>Meleagris gallopavo</i> (turkey)		1				1			
Gruidae (cranes)									
<i>Grus canadensis</i> (sandhill crane)		40	3	64	7	114		2	40
cf. <i>Grus canadensis</i> (sandhill crane)		6		10	1	17			6
Rallidae (rails, gallinules, and coots)									
Rallidae		7	1	5	1	14			
<i>Fulica americana</i> (American coot)		22	4	20	1	47		11	
Charadriiformes (shorebirds)									
Charadriiformes		5	1			6			
Anatidae (swans, geese, and ducks)									
Anatidae				1	1	2		2	6
cf. Anatidae				2		2		1	1
cf. <i>Anas platyrhynchos</i> (mallard)				5	1	6			
cf. <i>Anas strepera</i> (gadwall)				1		1		1	
<i>Anas acuta</i> (pintail)		3		3		6			
<i>Anas cyanoptera</i> (cinnamon teal)		1		1		2			
cf. <i>Anas cyanoptera</i> (cinnamon teal)			1			1		4	
<i>Anas americana</i> (American wigeon)				1		1			
<i>Anas</i> sp. (duck/teal)	4	51	9	19		83		4	3
<i>Aythya valisineria</i> (canvasback)				1		1			
cf. <i>Bucephala</i> sp. (goldeneye or bufflehead)	1					1			
<i>Oxyura jamaicensis</i> (ruddy duck)	1	3		5		9			
<i>Branta canadensis</i> (Canada goose)		7		2		9			2
cf. <i>Anser albifrons</i> (white-fronted goose)		1				1			

Table 3.4, *continued*

Taxon	Homol'ovi I						Homol'ovi IV	Homol'ovi III	Homol'ovi II
	TP	EHP	MHP	LHP	Und.	Total			
Columbidae (pigeons and doves)									
Columbidae		2		6		8			
<i>Zenaida carolinensis</i> (mourning dove)		10	1	35		46		2	
Cuculidae (cuckoos and roadrunners)									
Cuculidae		1		1		2			
Strigidae (typical owls)									
Strigidae		11		12	2	25			31
<i>Bubo virginianus</i> (great horned owl)		10		14	1	25			4
cf. <i>Athene cunicularia</i> (burrowing owl)		1				1			2
<i>Asio otus</i> (long-eared owl)		1				1			
<i>Asio</i> sp. (long- or short-eared owl)				1		1			
Caprimulgidae (nighthawks)									
Caprimulgidae		1				1			
cf. <i>Chordeiles acutipennis</i> (lesser nighthawk)					1	1			
Picidae (woodpeckers)									
Picidae		3	1	6		10		1	1
<i>Colaptes</i> sp. (flicker)							3	1	
cf. <i>Colaptes</i> sp. (flicker)		11				11			

Table 3.4, *continued*

Taxon	Homol'ovi I						Homol'ovi IV	Homol'ovi III	Homol'ovi II
	TP	EHP	MHP	LHP	Und.	Total			
Passeriformes (perching birds)									
Unidentified Passeriformes		77	18	44	7	146		19	53
Tyrannidae (tyrant flycatchers)		6	5	2		13			
<i>Sayornis</i> sp. (phoebe)		4	4			8			
Unid. Corvidae (jays, ravens, crows, magpies)		5	1	1		7		1	4
Garrulinae (jays)		6				6			1
<i>Cyanocitta stelleri</i> (Steller's jay)									1
cf. <i>Cyanocitta stelleri</i> (Steller's jay)		1		5		6			
<i>Corvus corax</i> (common raven)		38	12	51	3	104	1	7	28
cf. <i>Corvus corax</i> (common raven)		4		6	1	11			
cf. <i>Pica pica</i> (common magpie)		1		1		2		2	
<i>Lanius ludovicianus</i> (loggerhead shrike)				8		8			
Mimidae (mockingbirds and thrashers)		28	1	5		34			
cf. Mimidae (mockingbirds and thrashers)		2				2		4	5
Turdidae (thrushes, bluebirds, and solitaires)		5	2	2		9			
cf. Turdidae (thrushes, bluebirds, and solitaires)		2				2			
cf. <i>Turdus migratorius</i> (American robin)		2			1	3			
<i>Catharus</i> sp./ <i>Sialia</i> sp. (thrush or bluebird)		1		5		6			
<i>Sialia</i> sp. (bluebird)				2		2			
<i>Piranga</i> sp. (tanager)		1				1			
Fringillidae (grosbeaks, finches, sparrows, etc.)	1	2	1	6		10			
<i>Passerina amoena</i> (lazuli bunting)				1		1			
Icteridae (meadowlarks, blackbirds, and orioles)		6	4	3		13			1
<i>Xanthocephalus xanthocephalus</i> (yellow-headed blackbird)		5				5			1

Table 3.4, *continued*

Taxon	Homol'ovi I						Homol'ovi IV	Homol'ovi III	Homol'ovi II
	TP	EHP	MHP	LHP	Und.	Total			
Unidentified Birds									
Unid. Small Birds	2	128	34	89	5	258		2	1
Unid. Medium Birds		139	7	114	5	265		20	1
Unid. Large Birds	82	98	13	134	4	331		58	2
Unid. Birds				34	1	35	12	43	112
Total Identified and Unidentified Birds	247	986	150	792	47	2222	45	230	366

Notes:

¹Data for Homol'ovi IV, III, and II are from Strand (1998:Tables 6.5–6.12), with some modifications (see text). Some Homol'ovi I data are also from Strand (1998).

²The Homol'ovi III sample (plaza context) included one adult turkey skeleton that was found in association with remains of at least 14 (MNI) juvenile turkeys (see Senior and Pierce 1989; Strand 1998:374). The adult skeleton and all associated juvenile material was excluded from the NISP count for *Meleagris gallopavo* in this table. The Homol'ovi III sample (Kiva 34) also included a juvenile cf. *Corvus corax* skeleton (see Strand 1998:384). The skeleton was excluded from the NISP count for cf. *Corvus corax* in this table.

per se were recovered from Homol'ovi I; however there are several fragmentary turkey skeletons (TP) and a fragmentary red-tailed hawk skeleton (EHP), described below.

Tuwiuca Phase (TP) Sample. The TP sample from Homol'ovi I is fairly large, with 163 identified birds and 84 unidentified birds. However, 143 of the identified specimens come from a large collection of turkey remains from one particular context in Structure 701. Besides turkey, quails, geese/ducks, and small Passeriformes are also represented in the TP sample.

Specifically, the following taxa were identified:

- Quails: Phasianidae (NISP=13);
- Turkey: *Meleagris gallopavo* (NISP=143);
- Geese/Ducks: *Anas* sp. (NISP=4), cf. *Bucephala* sp. (NISP=1), *Oxyura jamaicensis* (NISP=1);
- Small Passeriformes: Fringillidae (NISP=1)

The unidentified material includes small (N=2) and large birds (N=82).

The turkey remains consist of the scattered and mostly disarticulated skeletons of perhaps two individuals (MNI=2), both adults (Munro 2001). This material was encountered in a 15-cm thick ash layer between floor surfaces in Structure 701. Unlike the turkey-pen feature at Homol'ovi III (see below), this context did not yield remains of turkey poults or eggshells.

Early Homol'ovi Phase (EHP) Sample. The EHP sample from Homol'ovi I is the largest bird-bone assemblage in the present dataset (NISP=621 identified birds, N=365 unidentified birds). Small Passeriformes and hawks are abundant. Geese/ducks, sandhill

crane, common raven, turkey, and falcons are common. Rails/coots, typical owls, quails, woodpeckers, pigeons/doves, grebes, and herons are uncommon. Finally, golden eagle, shorebirds, cuckoos/roadrunners, and nighthawks are rare or unique.

The following taxa were identified:

- Grebes: Podicipidae (NISP=1), *Podiceps nigricollis* (NISP=3), *Podilymbus podiceps* (NISP=7);
- Hérons: Ardeidae (NISP=5), *Butorides virescens* (NISP=1);
- Hawks: Accipitridae (NISP=14), cf. Accipitridae (NISP=2), *Accipiter striatus* (NISP=1), *Buteo jamaicensis* (NISP=80), *Buteo* spp. (NISP=21), *Circus cyaneus* (NISP=1), cf. *Circus cyaneus* (NISP=1);
- Eagle: *Aquila chrysaetos* (NISP=3), cf. *Aquila chrysaetos* (NISP=2);
- Falcons: cf. *Falco mexicanus* (NISP=21), *Falco sparverius* (NISP=11);
- Quails: Phasianidae (NISP=16), cf. *Callipepla* sp. (NISP=1);
- Turkey: *Meleagris gallopavo* (NISP=36), cf. *Meleagris gallopavo* (NISP=1);
- Sandhill crane: *Grus canadensis* (NISP=40); cf. *Grus canadensis* (NISP=6);
- Rails/Coots: Rallidae (NISP=7), *Fulica americana* (NISP=22);
- Shorebirds: Charadriiformes (NISP=5);
- Geese/Ducks: *Anas acuta* (NISP=3), *Anas cyanoptera* (NISP=1), *Anas* sp. (NISP=51), *Oxyura jamaicensis* (NISP=3), *Branta canadensis* (NISP=7), cf. *Anser albifrons* (NISP=1);
- Pigeons/Doves: Columbidae (NISP=2), *Zenaida carolinensis* (NISP=10);
- Cuckoos/Roadrunners: Cuculidae (NISP=1);

- Typical Owls: Strigidae (NISP=11), *Bubo virginianus* (NISP=10), cf. *Athene cunicularia* (NISP=1), *Asio otus* (NISP=1);
- Nighthawks: Caprimulgidae (NISP=1);
- Woodpeckers: Picidae (NISP=3), cf. *Colaptes* sp. (NISP=11);
- Common Raven: *Corvus corax* (NISP=38), cf. *Corvus corax* (NISP=4);
- Small Passeriformes: unidentified Passeriformes (NISP=77), Tyrannidae (NISP=6), *Sayornis* sp. (NISP=4), Corvidae (NISP=5), Garrulinae (NISP=6), cf. *Cyanocitta stelleri* (NISP=1), cf. *Pica pica* (NISP=1), Mimidae (NISP=28), cf. Mimidae (NISP=2), Turdidae (NISP=5), cf. Turdidae (NISP=2), cf. *Turdus migratorius* (NISP=2), *Catharus* sp./*Sialia* sp. (NISP=1), *Piranga* sp. (NISP=1), Fringillidae (NISP=2), Icteridae (NISP=6), *Xanthocephalus xanthocephalus* (NISP=5)

In addition to this material, there were several hundred unidentified specimens, including small (N=128), medium (N=139), and large birds (N=98).

It is worth noting that nearly two-thirds of the hawk remains in the EHP assemblage (76 of 120 specimens) come from a single context—Structure 651. A fragmentary juvenile red-tailed hawk skeleton, including the axial skeleton plus upper hindlimbs (NISP=45), was found in the lower fill of this structure, near the floor; it does not appear to have been a formal burial. Another 31 isolated hawk elements (*Buteo jamaicensis*, *Buteo* spp., Accipitridae, cf. Accipitridae) were recovered in bulk from throughout the lower EHP fill of the structure. Minimally, two hawks are represented in the EHP assemblage from Structure 651 (MNI=2).

Besides the osteological material, a quantity of eggshell was encountered in EHP contexts. Approximately 219 fragments were recovered, weighing 4.7 grams. Presumably, these are the remains of bird eggs, but no attempt was made to identify the fragments to species. The eggshell comes from two particular rooms in the northern part of the site—Structures 651 and 704. Eggshell is virtually absent at Homol’ovi I outside of these two contexts. Turkey bones are found in both rooms, leading one to speculate that the eggshells might be from domestic turkeys. This is a reasonable hypothesis considering the evidence for turkey raising at Homol’ovi III, which includes eggshells in direct association with turkey remains (more below).

Middle Homol’ovi Phase (MHP) Sample. The MHP sample from Homol’ovi I includes just 96 identified birds and 54 unidentified birds. Small Passeriformes, hawks, and common raven are abundant. Geese/ducks, quails, and rails/coots are common, while sandhill crane, golden eagle, herons, shorebirds, pigeons/doves, woodpeckers, and grebes are uncommon. Notably, turkey is not represented in the sample.

The following taxa were identified:

- Grebes: Podicipidae (NISP=1);
- Hérons: *Butorides virescens* (NISP=2);
- Hawks: cf. Accipitridae (NISP=3), *Buteo* spp. (NISP=12), cf. *Circus cyaneus* (NISP=1);
- Eagle: *Aquila chrysaetos* (NISP=1), cf. *Aquila chrysaetos* (NISP=1);
- Quails: Phasianidae (NISP=6);
- Sandhill crane: *Grus canadensis* (NISP=3);

- Rails/Coots: Rallidae (NISP=1), *Fulica americana* (NISP=4);
- Shorebirds: Charadriiformes (NISP=1);
- Geese/Ducks: cf. *Anas cyanoptera* (NISP=1), *Anas*. sp. (NISP=9);
- Pigeons/Doves: *Zenaida carolinensis* (NISP=1);
- Woodpeckers: Picidae (NISP=1);
- Common Raven: *Corvus corax* (NISP=12);
- Small Passeriformes: unidentified Passeriformes (NISP=18), Tyrannidae (NISP=5), *Sayornis* sp. (NISP=4), Corvidae (NISP=1), Mimidae (NISP=1), Turdidae (NISP=2), Fringillidae (NISP=1), Icteridae (NISP=4)

Unidentified material in the MHP sample includes small (N=34), medium (N=7), and large birds (N=13). No eggshell was recovered.

Late Homol'ovi Phase (LHP) Sample. The LHP sample from Homol'ovi I is the second-largest bird-bone assemblage in the present dataset (NISP=421 identified birds, N=371 unidentified birds). Small Passeriformes, sandhill crane, and common raven are abundant. Geese/ducks, pigeons/doves, golden eagle, typical owls, and rails/coots are common. Hawks, woodpeckers, falcons, quails, and herons are uncommon. Finally, grebes and cuckoos/roadrunners are rare or unique. Turkey is not represented at all in this large sample.

Specifically, the following taxa were encountered:

- Grebes: Podicipidae (NISP=1), *Podilymbus podiceps* (NISP=1);
- Hérons: Ardeidae (NISP=4), *Ardea alba* (NISP=1);

- Hawks: Accipitridae (NISP=1), *Accipiter striatus* (NISP=1), *Buteo jamaicensis* (NISP=5), *Buteo* spp. (NISP=10);
- Eagle: *Aquila chrysaetos* (NISP=27), cf. *Aquila chrysaetos* (NISP=3);
- Falcons: cf. *Falco mexicanus* (NISP=4), *Falco sparverius* (NISP=1);
- Quails: Phasianidae (NISP=3), cf. *Callipepla* sp. (NISP=2);
- Sandhill crane: *Grus canadensis* (NISP=64); cf. *Grus canadensis* (NISP=10);
- Rails/Coots: Rallidae (NISP=5), *Fulica americana* (NISP=20);
- Geese/Ducks: Anatidae (NISP=1), cf. Anatidae (NISP=2), cf. *Anas platyrhynchos* (NISP=5), cf. *Anas strepera* (NISP=1), *Anas acuta* (NISP=3), *Anas cyanoptera* (NISP=1), *Anas americana* (NISP=1), *Anas*. sp. (NISP=19), *Aythya valisineria* (NISP=1), *Oxyura jamaicensis* (NISP=5), *Branta canadensis* (NISP=2);
- Pigeons/Doves: Columbidae (NISP=6), *Zenaida carolinensis* (NISP=35);
- Cuckoos/Roadrunners: Cuculidae (NISP=1);
- Typical Owls: Strigidae (NISP=12), *Bubo virginianus* (NISP=14), *Asio* sp. (NISP=1);
- Woodpeckers: Picidae (NISP=6);
- Common Raven: *Corvus corax* (NISP=51), cf. *Corvus corax* (NISP=6);
- Small Passeriformes: unidentified Passeriformes (NISP=44), Tyrannidae (NISP=2), Corvidae (NISP=1), cf. *Cyanocitta stelleri* (NISP=5), cf. *Pica pica* (NISP=1), *Lanius ludovicianus* (NISP=8), Mimidae (NISP=5), Turdidae (NISP=2), *Catharus* sp./*Sialia* sp. (NISP=5), *Sialia* sp. (NISP=2), Fringillidae (NISP=6), *Passerina amoena* (NISP=1), Icteridae (NISP=3)

The unidentified material from the LHP sample includes small (N=89), medium (N=114), and large (N=134) birds, as well as unidentified birds (no body size) (N=34).

It is important to point out that much of the golden eagle material from the LHP sample comes from two particular surface rooms, Structures 104 and 504. Structure 104 yielded a partly-articulated golden eagle foot, consisting of 14 pedal phalanges (NISP=14). The specimen was found in a deposit of roofing material and architectural debris approximately 40 cm above the floor of the structure (see Strand 1998:304–305, where this provenience was provisionally grouped with Structure 105, the second-story room above Structure 104). All five digits of the foot are represented, but there is no associated tarsometatarsus. Structure 504, on the other hand, yielded a complete golden eagle skull. The specimen includes the cranium, mandible, quadrates, nasals, and sclerotic (eye) rings (NISP=6; the non-diagnostic sclerotic rings were not counted). The skull was found on the floor of the structure.

Aside from the osteological material, there is only a trace amount of eggshell from the LHP sample (six fragments, < 0.1 g)—nothing compared to what was recovered with the EHP sample. This material comes from Structures 504 and 311.

Undated Material. There is a small collection of bird remains from undated contexts at Homol'ovi I (NISP=32 identified birds, N=15 unidentified birds). The material comes from mixed contexts in the East Plaza and Structures 651, 401, and 104.

The following taxa are present:

- Hawks: cf. Accipitridae (NISP=1), *Buteo* spp. (NISP=1);
- Quails: Phasianidae (NISP=2);

- Sandhill crane: *Grus canadensis* (NISP=7); cf. *Grus canadensis* (NISP=1);
- Rails/Coots: Rallidae (NISP=1), *Fulica americana* (NISP=1);
- Geese/Ducks: Anatidae (NISP=1), cf. *Anas platyrhynchos* (NISP=1);
- Typical Owls: Strigidae (NISP=2), *Bubo virginianus* (NISP=1);
- Nighthawks: cf. *Chordeiles acutipennis* (NISP=1);
- Common Raven: *Corvus corax* (NISP=3), cf. *Corvus corax* (NISP=1);
- Small Passeriformes: unidentified Passeriformes (NISP=7), cf. *Turdus migratorius* (NISP=1)

The unidentified material includes small (N=5), medium (N=5), and large (N=4) birds, as well as unidentified birds (no body size) (N=1).

Homol'ovi IV

The Homol'ovi IV assemblage falls entirely within the TP. This is the earliest bird assemblage in the present dataset, and unfortunately it is also among the smallest (NISP=33 identified birds, N=12 unidentified birds). There are just six species, representing five families and four orders of birds. Turkey is the most numerous taxon. Hawks, golden eagle, falcons, woodpeckers, and common raven are also present. Many of the identified birds (and all of the Falconiformes) come from a single disturbed context in Kiva 1. The bulk of the turkey remains are from a plaza context. No bird burials were encountered at the site.

The following taxa were identified (Strand 1998:Table 6.12):

- Hawks: *Buteo* spp. (NISP=1);
- Eagle: *Aquila chrysaetos* (NISP=1), cf. *Aquila chrysaetos* (NISP=3);

- Falcons: *Falco sparverius* (NISP=4);
- Turkey: *Meleagris gallopavo* (NISP=20);
- Woodpeckers: *Colaptes* sp. (NISP=3);
- Common Raven: *Corvus corax* (NISP=1);

In addition to the identified material, there is a small number of unidentified birds (no body size) (N=12) in the assemblage.

Homol'ovi III

The analyzed bird-bone assemblage from Homol'ovi III consists of 230 specimens. A little less than half of the collection (107 specimens) has been identified to order or better. As an estimate, there are at least 18 different species represented, and these come from 13 families and 9 orders of birds. The assemblage includes TP, EHP, and MHP components. A number of formal (in pit) and informal (no pit) bird burials have been recovered from Homol'ovi III, including several turkeys (TP, MHP), two macaws (MHP), and a probable common raven (TP) (Table 3.5).

Tuwiuca Phase (TP) Sample. The TP sample from Homol'ovi III is very small (NISP=26 identified birds, N=46 unidentified birds). Grebes, turkey, sandhill crane, rails/coots, geese/ducks, pigeons/doves, common raven, and small Passeriformes are all represented. In addition to this material, several informal bird burials were recovered from TP contexts, including turkeys and a probable common raven. None of the burials are counted toward NISP for the sample.

Table 3.5
Bird Burials from Homol'ovi III

Context	Taxon	Remains	References
Plaza Feature (TP)	turkey (<i>Meleagris gallopavo</i>)	1 adult female skeleton, complete, with remains of 14 (MNI) poults, 7 complete eggs, and numerous eggshell fragments, in trough-like plaza feature. (informal burials)	Adams (2001b:109-110); Senior and Pierce (1989); Strand (1998:374)
Kiva 34 lower fill (TP)	probable common raven (cf. <i>Corvus corax</i>)	1 immature skeleton. (informal burial?)	Strand (1998:384)
Structure 35 subfloor (MHP)	turkey (<i>Meleagris gallopavo</i>)	2 adult male skeletons, complete, in separate subfloor pits, both spatially associated with human neonatal burial. (formal burials)	Adams (2001b:73-76); Senior and Pierce (1989); Strand (1998:405)
Structure 40 subfloor (MHP)	macaw (<i>Ara</i> sp.)	2 skeletons, complete, in separate subfloor pits. (formal burials)	Adams (2001b:79-81); Strand (1998:190)

The following taxa were identified (Strand 1998:Table 6.7) (*does not include burials):

- Grebes: Podicipidae (NISP=2);
- Turkey: *Meleagris gallopavo* (NISP=1*);
- Sandhill crane: *Grus canadensis* (NISP=2);
- Rails/Coots: *Fulica americana* (NISP=7);
- Geese/Ducks: Anatidae (NISP=1), *Anas*. sp. (NISP=2);
- Pigeons/Doves: *Zenaida carolinensis* (NISP=2);

- Common Raven: *Corvus corax* (NISP=2*);
- Small Passeriformes: unidentified Passeriformes (NISP=6); cf. *Pica pica* (NISP=1)

The unidentified material includes medium (N=3) and large birds (N=10), as well as unidentified birds (no body size) (N=33).

The turkey remains from this sample are especially significant because they strongly suggest that turkeys were being raised domestically at Homol'ovi III at an early date. Most of the remains come from a single informal burial assemblage discovered in a pen-like feature in the plaza. This assemblage includes a single adult turkey skeleton, remains of numerous turkey poults (MNI=14), seven complete (unhatched) eggs, and a large number of eggshell fragments (Adams 2001b:109–110; Senior and Pierce 1989; Strand 1998:374). All but one of the poults was approximately four days old at death; the other was two to three months old. While the adult skeleton was discovered in a state of articulation, there was no evidence for a burial pit or any other indicators of formal ritual interment. Senior and Pierce (1989) interpret this as the remains of a domestic turkey that died accidentally, alongside the remains of her brood.

The probable common raven burial comes from the lower post-abandonment fill in Kiva 34. The skeleton is immature, and may or may not be complete (see Strand 1998:384). It is not clear if there was a formal burial pit.

Early Homol'ovi Phase (EHP) Sample. The EHP sample from Homol'ovi III is also very small, with only 27 identified bird specimens and 38 unidentified specimens. Small Passeriformes, falcons, turkey, rails/coots, and common raven are all represented.

The following taxa are present in the EHP sample (Strand 1998:Tables 6.8–6.9):

- Herons: Ardeidae (NISP=1);
- Falcons: *Falco sparverius* (NISP=3);
- Turkey: *Meleagris gallopavo* (NISP=3);
- Rails/Coots: *Fulica americana* (NISP=3);
- Geese/Ducks: cf. Anatidae (NISP=1), cf. *Anas strepera* (NISP=1);
- Common Raven: *Corvus corax* (NISP=3);
- Small Passeriformes: unidentified Passeriformes (NISP=8), cf. Mimidae (NISP=4)

Unidentified material includes small (N=1), medium (N=15), and large birds (N=14), as well as unidentified birds (no body size) (N=8).

Middle Homol'ovi Phase (MHP) Sample. The MHP sample from Homol'ovi III is fairly small, with just 54 identified birds and 39 unidentified birds. Falcons, hawks, turkey, geese/ducks, and small Passeriformes are well represented in the sample. Grebes, quails, woodpeckers, rails/coots, common raven, and (possible) golden eagle are also present. In addition to this material, two formal turkey burials and two formal macaw burials were recovered from MHP contexts (see Table 3.5). Neither the turkey nor the macaw burials are counted toward NISP for the sample.

The following taxa were identified (Strand 1998:Tables 6.10–6.11) (*does not include burials):

- Grebes: Podicipidae (NISP=2), *Podiceps nigricollis* (NISP=1), *Podilymbus podiceps* (NISP=2);

- Hawks: *Buteo* spp. (NISP=7);
- Eagle: cf. *Aquila chrysaetos* (NISP=1);
- Falcons: *Falco mexicanus* (NISP=4), *Falco sparverius* (NISP=8);
- Quails: Phasianidae (NISP=3);
- Turkey: *Meleagris gallopavo* (NISP=7*);
- Rails/Coots: *Fulica americana* (NISP=1);
- Geese/Ducks: Anatidae (NISP=1), cf. *Anas cyanoptera* (NISP=4), *Anas* sp. (NISP=2);
- Woodpeckers: Picidae (NISP=1), *Colaptes* sp. (NISP=1);
- Common Raven: *Corvus corax* (NISP=2);
- Small Passeriformes: unidentified Passeriformes (NISP=5), Corvidae (NISP=1), cf. *Pica pica* (NISP=1)

The unidentified material from the assemblage includes small (N=1), medium (N=2), and large birds (N=34), as well as unidentified birds (no body size) (N=2).

The two adult turkey burials were encountered in a sub-floor context in Structure 35 that dates to the MHP (Adams 2001b:73–76; Senior and Pierce 1989; Strand 1998:405). The turkey burials are spatially associated with a human neonatal burial near the east corner of Structure 35, and may have ritual (perhaps mortuary) significance. Each turkey skeleton was found in its own burial pit. Senior and Pierce (1989) note that the cranium, mandible, and several cervical vertebrae from one of the turkeys had been displaced from the rest of the postcranial skeleton, and were recovered slightly above the

burial. While they attribute the displacement to rodent disturbance, the possibility that the bird was purposefully decapitated just prior to burial must also be considered.

The two macaw (*Ara* sp.) burials were recovered from a subfloor context in Structure 40, a late-built surface room located directly adjacent to Structure 35 (Adams 2001b:79–81; Strand 1998:190). One was found toward the north corner of the room, the other toward the south corner; both were interred in pit features. These are the only macaw remains that have been recovered so far from any of the Homol'ovi sites. The macaws were recovered intact. While these specimens have not been aged by a trained faunal analyst, Creel and McKusick (1994) noted that 94 percent of all macaws recovered in the Southwest prior to their study were 10-13 months old (newfledged) at death (see also Hargrave 1970:Tables 9-10). They interpreted this as evidence for a widespread pattern of late winter/spring (February-May) sacrifice of newfledged macaws, after the tail feathers were completely formed. The Homol'ovi III macaws probably fall under this pattern as well.

Homol'ovi II

The Homol'ovi II assemblage is dated to the LHP. This is a fairly large assemblage, with 250 identified birds and 116 unidentified birds. Approximately twelve species from nine families and seven orders are represented. Small Passeriformes, hawks, sandhill crane, typical owls and common raven are all relatively abundant; geese/ducks, golden eagle, and quails are uncommon; and there is a single woodpecker specimen. Several taxa are conspicuous by their absence: turkey, falcons, and several major categories of water birds are among those missing from the assemblage (note that

Szuter's [1991:Table 9.1] data from the brief 1984 excavations at Homol'ovi II reflect this pattern as well). There are no bird burials per se from Homol'ovi II; however a fragmentary red-tailed hawk skeleton was recovered from the fill of Kiva 708.

The following taxa were identified in the Homol'ovi II assemblage (Strand 1998: Tables 6.5–6.6):

- Hawks: Accipitridae (NISP=5), cf. Accipitridae (NISP=1), *Buteo jamaicensis* (NISP=16), *Buteo* spp. (NISP=28);
- Eagle: *Aquila chrysaetos* (NISP=6);
- Quails: Phasianidae (NISP=4);
- Sandhill crane: *Grus canadensis* (NISP=40); cf. *Grus canadensis* (NISP=6);
- Geese/Ducks: Anatidae (NISP=6), cf. Anatidae (NISP=1), *Anas*. sp. (NISP=3), *Branta canadensis* (NISP=2);
- Typical Owls: Strigidae (NISP=31), *Bubo virginianus* (NISP=4), cf. *Athene cunicularia* (NISP=2);
- Woodpeckers: Picidae (NISP=1);
- Common Raven: *Corvus corax* (NISP=28);
- Small Passeriformes: unidentified Passeriformes (NISP=53), Corvidae (NISP=4), Garrulinae (NISP=1), *Cyanocitta stelleri* (NISP=1), cf. Mimidae (NISP=5), Icteridae (NISP=1), *Xanthocephalus xanthocephalus* (NISP=1)

Unidentified material includes small (N=1), medium (N=1), and large (N=2) birds, as well as unidentified birds (no body size) (N=112).

It is worth noting that more than half of the hawk remains in the Homol'ovi II sample (28 of 50 specimens) come from the large Kiva 708. The Kiva 708 assemblage includes a partial red-tailed hawk axial skeleton (NISP=16) (Strand 1998:357; Strand and McKim 1996:208, Table 10.2a, footnote 4), plus a dozen more hawk specimens that were recovered from various proveniences within the structure (Strand 1998:354–358). The red-tailed hawk partial skeleton was found in a sandy deposit just above the burned remains of the kiva roof (Strand 1998:357).

Also, it is worth noting that most of the typical owl specimens from Homol'ovi II (33 of 37 specimens) come from a single surface room, Structure 558. In this room, 28 pedal phalanges and 2 tarsometatarsi, identified only as Strigidae (typical owls), were found in a deposit near the floor (Strand 1998:332). Based on field notes, these owl feet were at least partially articulated when found. In addition to this material, several specimens of great horned owl (two pedal phalanges and a carpometacarpus) were recovered from deposits higher in the structure's fill (Strand 1998:333–334).

Assemblage Descriptions: Carnivores

This section describes the carnivore assemblages from Homol'ovi I, II, III, and IV. NISP counts for carnivores are presented in Table 3.6.

Homol'ovi I

The analyzed faunal collection from Homol'ovi I includes 542 carnivore bones. Almost 90 percent of this material (482 specimens) has been identified taxonomically to the level of family or better. There are at least seven different species of carnivores represented at the site, including coyote/dog, gray and red fox, bobcat, probable mountain

Table 3.6
NISP Counts by Taxon for Carnivore Assemblages from Homol'ovi I, II, III, and IV¹

Taxon	Homol'ovi I					Homol'ovi IV	Homol'ovi III	Homol'ovi II
	EHP	MHP	LHP ²	Und.	Total			
Canidae (coyotes, wolves, and foxes)								
<i>Canis</i> spp. (coyote/dog/wolf)			9	2	11	86	19	5
<i>C. latrans</i> (coyote)								14
<i>C. familiaris</i> (dog)								1
<i>C. latrans/C. familiaris</i> (coyote/dog)	28	16	167	30	241			106
<i>Urocyon cinereoargenteus</i> (gray fox)	22		1		23			1
<i>Vulpes vulpes</i> (red fox)			4		4			
<i>U. cinereoargenteus/V. vulpes</i> (gray/red fox)	11		1		12			
Canidae			5	10	15		1	3
cf. Canidae		1	2		3	2	7	1
Felidae (cats)								
<i>Felis rufus</i> (bobcat)	40	2	19	1	62			3
cf. <i>Felis rufus</i> (bobcat)	11		2		13		2	3
cf. <i>Felis concolor</i> (mountain lion)	1				1			
Mustelidae (weasels, skunks, and allies)								
<i>Taxidea taxus</i> (badger)	8	2	53	18	81		8	3
cf. <i>Taxidea taxus</i> (badger)	10		3	2	15		3	
cf. <i>Spilogale gracilis</i> (western spotted skunk)	1				1			
Unidentified Carnivores	21	3	32	4	60		9	13
Total Identified and Unidentified Carnivores	153	24	298	67	542	88	49	153

Notes:

¹Data for Homol'ovi IV, III, and II are from Strand (1998:Tables 6.5–6.12), with some modifications (see text). Some Homol'ovi I data are also from Strand (1998).

²Two juvenile coyote/dog skeletons (burials) were recovered from LHP contexts at Homol'ovi I; neither skeleton is counted in this table.

lion, badger, and probable western spotted skunk. Overall, this is the largest and most diverse carnivore assemblage in the present dataset. The assemblage includes EHP, MHP, and LHP components, as well as some undated material from mixed contexts. One of the undated contexts is the East Plaza overburden, which yielded a fairly large assemblage of carnivore remains (discussed below). So far, there are no carnivore remains from TP deposits.

Several canid burials have been encountered at Homol'ovi I (Table 3.7): Two juvenile coyote/dog burials were recovered from LHP contexts in Kivas 215 and 901. Both skeletons were decapitated, probably as sacrifices. Additionally, a partial adult coyote/dog skeleton was recovered from the fill of Kiva 8 at AZ J:14:316 (ASM), an outlier of Homol'ovi I (no other faunal remains from this outlier are included in the present study). The Kiva 8 burial probably dates to the LHP, based on associated ceramics. None of these canid burials are included in the NISP counts for the LHP.

Early Homol'ovi Phase (EHP) Sample. The EHP sample from Homol'ovi I includes 132 identified and 21 unidentified carnivores. The sample is dominated by canids and bobcat, but badger is also well represented. Fox accounts for slightly more than half of the canid remains, with coyote/dog making up the rest. The sample also contains isolated examples of probable mountain lion and probable western spotted skunk. The EHP sample from Homol'ovi I is taxonomically the most diverse carnivore assemblage in the present dataset.

Table 3.7
Canid Burials from Homol'ovi I

Context	Taxon	Remains	References
Kiva 215 post-abdn fill (LHP)	coyote or domestic dog (<i>Canis latrans/ C. familiaris</i>)	1 juvenile skeleton, aged 2-3 months ¹ , buried in a small pit in the upper post-abandonment fill, southeast corner. The articulated post-cranial skeleton was found in a large JYW sherd, capped with a piece of groundstone. The cranium, mandibles, atlas, axis, and another cervical vertebra (all articulated) were found directly on top of the capstone. (formal burial)	Strand (1998:262)
Kiva 901 floor/hearth (LHP)	coyote or domestic dog (<i>Canis latrans/ C. familiaris</i>)	1 juvenile skeleton, aged 1-2 months (see note 1). The cranium, mandibles, atlas, axis, and another cervical vertebra were buried in the upper fill of the hearth. The articulated but headless post-cranial skeleton was found on or near the floor, 60 cm east of the hearth. (informal burial)	Strand (1998:285) (the post-cranial skeleton was inadvertently omitted from Strand's analysis)
AZ J:14:316 Kiva 8 post-abdn fill (LHP)	coyote or domestic dog (<i>Canis latrans/ C. familiaris</i>)	1 adult partial skeleton, found in the post-abandonment fill (apparently, there was no pit). The remains consist of an articulated axial skeleton, including the cranium, mandible, vertebrae, pelvis, and fragments of sternum, ribs, and costal cartilage. (informal burial)	HRP field notes and data from an unpublished analysis by Regina Chapin-Pyritz

Note:

¹Age for both juvenile canids was ascertained using dental criteria in Hillson (1986:Table 3.21).

Specifically, the following taxa were identified:

- Canids: *Canis latrans/C. familiaris* (NISP=28), *Urocyon cinereoargenteus* (NISP=22), *Urocyon cinereoargenteus/Vulpes vulpes* (NISP=11);
- Felids: *Felis rufus* (NISP=40), cf. *Felis rufus* (NISP=11), cf. *Felis concolor* (NISP=1);
- Mustelids: *Taxidea taxus* (NISP=8), cf. *Taxidea taxus* (NISP=10), cf. *Spilogale gracilis* (NISP=1)

The EHP sample exhibits the highest percentage of fox remains of any assemblage in the present dataset. It is important to point out, however, that all of these specimens come from a single deposit in Structure 503, and probably represent the remains of a single gray fox (*Urocyon cinereoargenteus*). The assemblage includes 33 elements, all complete, consisting of paired forelimbs, a partial hindlimb, baculum (*os penis*), and numerous elements from the paws. Based on the elements represented, this collection could represent the remains of a gray fox pelt. At least some of the elements were found together, about 12 cm above the room floor, in the southeast corner of the structure. The material was found in a 30 to 80 cm thick deposit of cultural trash that filled the lower portion of the room.

Middle Homol'ovi Phase (MHP) Sample. The MHP sample from Homol'ovi I is very small, with just 21 identified and 3 unidentified carnivores. The sample is dominated by canids, most of which are classified as coyote/dog. Bobcat and badger are also represented.

The following taxa are present:

- Canids: *Canis latrans/C. familiaris* (NISP=16), cf. Canidae (NISP=1);
- Felids: *Felis rufus* (NISP=2);
- Mustelids: *Taxidea taxus* (NISP=2)

Late Homol'ovi Phase (LHP) Sample. The LHP sample from Homol'ovi I represents the largest assemblage of carnivore remains in the present dataset. There are 266 identified and 32 unidentified carnivores. The sample is dominated by canids. The canid material is mostly coyote/dog, along with a handful of red and gray fox specimens. Badger is fairly well represented in the assemblage; interestingly, most of the badger material consists of extremities (paws). Finally, bobcat is present but not in abundance. In addition to this material, there are two juvenile coyote/dog burials from LHP contexts; these are not included in the NISP counts below.

Specifically, the following taxa were identified (*does not include burials):

- Canids: *Canis latrans/C. familiaris* (NISP=167*), *Canis* spp. (NISP=9), *Urocyon cinereoargenteus* (NISP=1), *Vulpes vulpes* (NISP=4), *Urocyon cinereoargenteus/Vulpes vulpes* (NISP=1), Canidae (NISP=5), cf. Canidae (NISP=2);
- Felids: *Felis rufus* (NISP=19), cf. *Felis rufus* (NISP=2);
- Mustelids: *Taxidea taxus* (NISP=53), cf. *Taxidea taxus* (NISP=3)

The two juvenile coyote/dog burials come from Kivas 215 and 901 (see Table 3.7). These were very young individuals: The estimated age at death is no more than three months, based on dentition (Hillson 1986:Table 3.21). In both cases, the skull and upper cervical vertebrae were found apart from the post-cranial skeleton, suggesting the

individuals were decapitated. One skeleton was found in a burial pit in the upper post-abandonment fill of Kiva 215, while the other was found on the floor (post-cranial skeleton) and in the hearth (skull, cervical vertebrae) of Kiva 901.

In addition to the burials, several semi-articulated limbs and extremities were recovered from LHP contexts. These include a juvenile badger paw in Structure 210, a mature coyote/dog paw in Kiva 901, and a juvenile coyote/dog hindlimb in Kiva 215 (each individual element in these specimens was counted toward NISP for the corresponding taxon).

The partial, juvenile badger paw (right) was recovered from the trash fill of Structure 210 (Strand 1998:272). The specimen includes three metacarpals and five phalanges. Interestingly, the rest of the sizable badger assemblage from Structure 210 consists entirely of extremities (NISP=16) and hindlimb elements (NISP=2), both fused and unfused; this material is spread throughout the fill of the structure.

The partial, mature coyote/dog paw (right) was recovered from roof deposits in Kiva 901 (Strand 1998:290-291). The specimen includes 12 complete phalanges but no articulating wrist elements.

The partial, juvenile coyote/dog hindlimb (right) was recovered from the upper fill of Kiva 215 (see Strand 1998:261, where the specimen in question is misreported as “[a]n articulated cf. bobcat paw”). Stratigraphically, this specimen would have been deposited around the same time as the juvenile coyote/dog burial in Kiva 215, described above. The articulated hindlimb includes the femur, patella, tibia, fibula, astragalus, calcaneum, and four metatarsals (NISP=10), along with a number of unfused epiphyses

(not counted in NISP). Age at death is estimated at two months (based on metric analysis of the hindlimb elements, using bones from the dentally-aged coyote/dog skeletons from Kivas 215 and 901 as reference specimens).

Undated Material. There is a sizable collection of carnivore remains from undated contexts at Homol'ovi I (NISP=63 identified carnivores, N=4 unidentified carnivores). This material comes from three specific contexts—the East Plaza overburden, Structure 651, and Kiva 901.

The East Plaza overburden is worth discussing briefly because it yielded a fairly large assemblage of carnivore remains. This half-meter thick deposit of light cultural trash and natural sediments lies on top of stratified East Plaza deposits. Some or all of the fill may be redeposited slopewash. The fauna from the overburden are currently undated because the associated ceramics have not yet been analyzed, and because the complex formation history of the deposit precludes dating by stratigraphic inference.

The sample from the East Plaza overburden includes 55 identified and 2 unidentified carnivores. The assemblage is dominated by canids, mostly coyote/dog. Badger is also well represented (again, mostly as extremities). Bobcat, however, is categorically absent. Specifically, the following taxa were identified: *Canis latrans/C. familiaris* (NISP=28), *Canis* spp. (NISP=1), Canidae (NISP=10), and *Taxidea taxus* (NISP=16). In terms of overall taxonomic composition, the assemblage is very similar to the LHP sample described above. Stratigraphically, the material *could* date to the LHP.

The undated material from Structure 651 comes from a rain-collapsed profile. The small assemblage includes *Canis latrans/C. familiaris* (NISP=2), *Canis* spp.

(NISP=1), *Taxidea taxus* (NISP=2), and cf. *Taxidea taxus* (NISP=2). Additionally, there are two unidentified carnivore specimens.

Finally, from Kiva 901, there is a single bobcat (*Felis rufus*) maxilla (NISP=1) from an undated architectural context.

Related Context: Kiva 8 at AZ J:14:316 (ASM). AZ J:14:316 (ASM) is a small adobe roomblock with two kivas, located approximately 125 m south of Homol'ovi I proper; it is clearly associated with the latter site, spatially and temporally. The deposits in this outlying roomblock were not sampled for the present analysis; however one particular set of remains from one of the kivas warrants comment. Kiva 8 yielded a partial coyote/dog skeleton (see Table 3.7). In this case, the individual was mature, unlike the juvenile coyote/dog burials recovered from LHP contexts at Homol'ovi I proper. The specimen consists of an articulated axial skeleton that is missing all four limbs. The partial skeleton was found in the post-abandonment fill of the kiva, but no traces of a burial pit were identified. A cranium, partial mandible, 26 vertebrae, partial pelvis, and fragments of sternum, ribs, and costal cartilage were present. In this case, the head and neck were fully articulated. Ceramically, the context is best dated to the LHP.

Homol'ovi IV

The Homol'ovi IV carnivore assemblage includes 88 specimens, all of which are canids. Most of the material (81 specimens) comes from the heavily vandalized Kiva 1. Consequently, this assemblage probably does not accurately reflect carnivore usage patterns at Homol'ovi IV generally. The assemblage falls entirely within the TP.

The following taxa are present (Strand 1998:Table 6.12):

- Canids: *Canis* spp. (NISP=86), cf. Canidae (NISP=2)

The large assemblage of *Canis* spp. remains from Kiva 1 might represent portions of a disturbed skeleton. The elements are mostly from the axial skeleton, along with some extremities (paws) and a single tooth (Strand 1998:418). MNI has not yet been ascertained for this material, however.

Homol'ovi III

The analyzed faunal collection from Homol'ovi III includes just 49 carnivore specimens. More than 80 percent of this material (40 specimens) has been identified taxonomically to the level of family or better. Canids, probable bobcat, and badger are represented in the small collection. The assemblage includes TP, EHP, and MHP components.

Tuwiuca Phase (TP) Sample. The TP sample from Homol'ovi III includes just six identified carnivores. The sample is made up of canids and a single probable badger specimen.

The following taxa are present (Strand 1998:Table 6.7):

- Canids: *Canis* spp. (NISP=1), cf. Canidae (NISP=4);
- Mustelids: cf. *Taxidea taxus* (NISP=1)

Early Homol'ovi Phase (EHP) Sample. The EHP sample from Homol'ovi III consists of six identified carnivores and four unidentified carnivores. The assemblage includes canids and a possible bobcat.

The following taxa were identified (Strand 1998:Tables 6.8–6.9):

- Canids: *Canis* spp. (NISP=5);

- Felids: cf. *Felis rufus* (NISP=1)

Middle Homol'ovi Phase (MHP) Sample. The MHP sample is slightly larger than the other samples from Homol'ovi III. There are 28 identified carnivores and 5 unidentified carnivores. The identified material is mostly canids, with a fair number of badger specimens and a single possible bobcat.

The following taxa are found in the sample (Strand 1998:Tables 6.10–6.11):

- Canids: *Canis* spp. (NISP=13), Canidae (NISP=1), cf. Canidae (NISP=3);
- Felids: cf. *Felis rufus* (NISP=1);
- Mustelids: *Taxidea taxus* (NISP=8), cf. *Taxidea taxus* (NISP=2)

Homol'ovi II

The analyzed faunal collection from Homol'ovi II includes 153 specimens. More than 90 percent of this material (140 specimens) has been identified taxonomically to the level of family or better. The assemblage is clearly dominated by canids, most of which are coyote or dog. There is also a single gray fox specimen among the canids. Bobcat and badger are minimally represented. The Homol'ovi II assemblage falls entirely within the LHP.

Specifically, the following taxa are present (Strand 1998:Tables 6.5–6.6):

- Canids: *Canis latrans* (NISP=14), *Canis familiaris* (NISP=1), *Canis latrans/C. familiaris* (NISP=106), *Canis* spp. (NISP=5), *Urocyon cinereoargenteus* (NISP=1), Canidae (NISP=3), cf. Canidae (NISP=1);
- Felids: *Felis rufus* (NISP=3), cf. *Felis rufus* (NISP=3);
- Mustelids: *Taxidea taxus* (NISP=3)

Additionally, there are 13 unidentified carnivore specimens.

Interestingly, most of the canid material in the Homol'ovi II sample (104 of 131 specimens) comes from Kiva 708. Canid remains were found in various proveniences within this structure, including the floor, floor features, ventilator, roof deposits, and post-abandonment fill; none of the remains were articulated when found.

Assemblage Descriptions: Artiodactyls

This section describes artiodactyl assemblages from Homol'ovi I, II, III, and IV. NISP counts for artiodactyls are presented in Table 3.8. Specimens classified as unidentified medium/large or large mammals are also included under the heading of artiodactyls since, practically speaking, there is little else this *probable artiodactyl* material could represent.

Artiodactyl remains are fairly abundant at Homol'ovi I, II, III, and IV. However, relatively few of these specimens have been identified taxonomically to the level of family or better. Consequently, it is best to consider the following data as provisional, at least insofar as the numbers and proportions of different artiodactyl taxa are concerned.

Homol'ovi I

The analyzed faunal sample from Homol'ovi I yielded a total of 2198 artiodactyl and probable artiodactyl specimens. Approximately 14.6 percent of this material (322 specimens) has been identified taxonomically to the level of family or better. There are at least four different species represented in the assemblage, including pronghorn, bighorn sheep, probable bison, and mule deer. Bison is represented by a single cf. *Bison bison* specimen in the analyzed collection (a second probable bison specimen is known

Table 3.8
NISP Counts by Taxon for Artiodactyl Assemblages from Homol'ovi I, II, III, and IV¹

Taxon	Homol'ovi I						Homol'ovi IV	Homol'ovi III	Homol'ovi II
	TP	EHP	MHP	LHP	Und.	Total			
Antilocapridae (pronghorns)									
<i>Antilocapra americana</i> (pronghorn)	2	34	5	56	6	103	11	10	16
cf. <i>Antilocapra americana</i> (pronghorn)		9		8	3	20	6	5	7
Bovidae (wild cattle)									
<i>Ovis canadensis</i> (bighorn sheep)	2	82	6	16	4	110	9	2	9
cf. <i>Ovis canadensis</i> (bighorn sheep)		18	3	2	1	24			
cf. <i>Bison bison</i> (bison)				1		1			
Cervidae (deer)									
Cervidae		6	4	4		14			2
<i>Odocoileus hemionus</i> (mule deer)		8		7	1	16		8	1
cf. <i>Odocoileus hemionus</i> (mule deer)		2		4		6		1	
<i>Odocoileus</i> sp. (mule or white-tailed deer)		10	5	12	1	28	43		3
Unidentified Artiodactyls²	29	1095	131	522	99	1876	106	159	370
Total Identified and Unidentified Artiodactyls	33	1264	154	632	115	2198	175	185	408

Notes:

¹Data for Homol'ovi IV, III, and II are from Strand (1998:Tables 6.5–6.12), with some modifications (see text). Some Homol'ovi I data are also from Strand (1998).

²Category includes unidentified medium/large and large mammals (probable artiodactyls).

from a context that was not sampled for this analysis). The assemblage includes TP, EHP, MHP, and LHP components, as well as some undated material.

Interestingly, the Homol'ovi I artiodactyl assemblage includes a relatively large collection of fetal/neonatal skeletal remains. Altogether, there are 184 fetal/neonatal specimens in the present collection, representing 8.4 percent of all artiodactyl and probable artiodactyl remains from the site. At Homol'ovi I, the proportion of fetal/neonatal specimens remains fairly constant through time. Currently, systematic age information of this kind is available only for the Homol'ovi I assemblage. Only five fetal/neonatal specimens were identified to the level of family or better, but all three families of artiodactyls (Antilocapridae, Bovidae, Cervidae) are represented in the collection.

Tuwiuca Phase (TP) Sample. The small TP sample from Homol'ovi I yielded a few pronghorn (NISP=2) and bighorn (NISP=2) specimens, but no deer. The remainder of the sample is made up of unidentified artiodactyls (N=17), medium/large mammals (N=4), and large mammals (N=8). There are two fetal/neonatal specimens in the sample.

Early Homol'ovi Phase (EHP) Sample. The EHP sample from Homol'ovi I is the largest in the present dataset, with 169 identified artiodactyls, and 1095 unidentified artiodactyls and probable artiodactyls. The identified portion of the sample is dominated by bighorn sheep, which accounts for more than half (59.2%) of all identified specimens. This is the only artiodactyl assemblage in the present dataset where bighorn sheep is the dominant species (but see Diaz de Valdes and LaMotta 2006). Pronghorn and deer are also fairly well represented in the EHP sample.

Specifically, the following taxa were identified:

- Antilocaprids: *Antilocapra americana* (NISP=34), cf. *Antilocapra americana* (NISP=9);
- Bovids: *Ovis canadensis* (NISP=82), cf. *Ovis canadensis* (NISP=18);
- Cervids: *Odocoileus hemionus* (NISP=8), cf. *Odocoileus hemionus* (NISP=2), *Odocoileus* sp. (NISP=10), Cervidae (NISP=6)

Additionally, there is a large contingent of unidentified material, totaling 1095 specimens: unidentified artiodactyls (N=609), bighorn/pronghorn (N=11), bighorn/mule deer (N=2), medium/large mammals (N=98), and large mammals (N=375). There are 119 fetal/neonatal specimens in the EHP sample.

Middle Homol'ovi Phase (MHP) Sample. The small MHP sample from Homol'ovi I includes just 23 identified artiodactyls and 131 unidentified artiodactyls and probable artiodactyls. The identified material includes equal numbers of bighorn and deer, along with a few pronghorn specimens.

The following taxa were identified:

- Antilocapridae: *Antilocapra americana* (NISP=5);
- Bovidae: *Ovis canadensis* (NISP=6), cf. *Ovis canadensis* (NISP=3);
- Cervidae: *Odocoileus* sp. (NISP=5), Cervidae (NISP=4)

The unidentified material consists of unidentified artiodactyls (N=58), medium/large mammals (N=19), and large mammals (N=54). This sample includes 8 fetal/neonatal specimens.

Late Homol'ovi Phase (LHP) Sample. The LHP sample from Homol'ovi I yielded a sizable collection of artiodactyl remains, including 110 identified specimens and 522 unidentified artiodactyls and probable artiodactyls. The identified portion of the sample is dominated by pronghorn (58.2%). Deer accounts for about a quarter of the sample, and bighorn sheep makes up most of the remainder. Additionally, there is a single specimen identified as cf. *Bison bison*.

Taxa represented in the LHP sample include:

- Antilocapridae: *Antilocapra americana* (NISP=56), cf. *Antilocapra americana* (NISP=8);
- Bovidae: *Ovis canadensis* (NISP=16), cf. *Ovis canadensis* (NISP=2), cf. *Bison bison* (NISP=1);
- Cervidae: *Odocoileus hemionus* (NISP=7), cf. *Odocoileus hemionus* (NISP=4), *Odocoileus* sp. (NISP=12), Cervidae (NISP=4)

The unidentified material includes unidentified artiodactyls (N=196), *Antilocapra americana/Ovis canadensis* (N=2), *Odocoileus hemionus/Ovis canadensis* (N=2), medium/large mammals (N=183), and large mammals (N=139). There are 54 fetal/neonatal specimens in the LHP sample.

The cf. *Bison bison* specimen from the LHP sample was found in the fill of Structure 210. The specimen is a distal femur diaphysis fragment (unfused) from an immature individual; the surface of the shaft is polished with a deep brown patina, which probably indicates the bone served as a tool of some sort, perhaps as a flesher. This is the only bison specimen in the analyzed faunal collection from Homol'ovi I. However,

another cf. *Bison bison* specimen recently has come to light in the faunal assemblage from Kiva 903, in deposits dated ceramically to the Tuwiuca Phase (this kiva was not sampled for the present faunal analysis). Interestingly, the cf. *Bison bison* specimen from Kiva 903 is also a distal femur fragment, although it is mature (fused) and lacks the surface modification that characterizes the Structure 210 specimen.

Undated Material. There is a small collection of artiodactyl material from undated contexts at Homol'ovi I, including the East Plaza overburden, mixed deposits in Structure 651, and miscellaneous undated proveniences in Structure 401 and in the 199 trench. There are 16 identified artiodactyls and 99 unidentified artiodactyls and probable artiodactyls.

Specifically, the following taxa were identified:

- Antilocapridae: *Antilocapra americana* (NISP=6), cf. *Antilocapra americana* (NISP=3);
- Bovidae: *Ovis canadensis* (NISP=4), cf. *Ovis canadensis* (NISP=1);
- Cervidae: *Odocoileus hemionus* (NISP=1), *Odocoileus* sp. (NISP=1)

The unidentified material includes unidentified artiodactyls (N=36), medium/large mammals (N=8), and large mammals (N=55).

Homol'ovi IV

The Homol'ovi IV assemblage dates entirely to the TP. Nearly 40 percent of the collection has been identified taxonomically to the level of family or better: There are 69 identified specimens and 106 unidentified artiodactyls and probable artiodactyls. The

identified portion of the sample is made up mostly of deer (mule or white-tailed), with lesser contributions from pronghorn and bighorn sheep.

Specifically, the following taxa are reported (Strand 1998:Table 6.12):

- Antilocapridae: *Antilocapra americana* (NISP=11), cf. *Antilocapra americana* (NISP=6);
- Bovidae: *Ovis canadensis* (NISP=9);
- Cervidae: *Odocoileus* sp. (NISP=43)

Additionally, there is a substantial number of unidentified artiodactyls (N=73) and medium/large mammals (N=33).

Homol'ovi III

The small artiodactyl assemblage from Homol'ovi III yielded just 26 identified artiodactyls, plus 159 unidentified artiodactyls and probable artiodactyls. Only 14 percent of the total artiodactyl sample has been identified taxonomically to the level of family or better. Pronghorn, mule deer, and bighorn sheep are represented in this small assemblage. The Homol'ovi III artiodactyl assemblage includes TP, EHP, and MHP components.

Tuwiuca Phase (TP) Sample. The small TP sample from Homol'ovi III yielded specimens from each major family of artiodactyls (Strand 1998:Table 6.7):

- Antilocapridae: *Antilocapra americana* (NISP=1);
- Bovidae: *Ovis canadensis* (NISP=2);
- Cervidae: *Odocoileus hemionus* (NISP=2)

Additionally, there are some unidentified artiodactyls (N=7), medium/large mammals (N=11), and large mammals (N=1).

Early Homol'ovi Phase (EHP) Sample. The few identified artiodactyls from EHP contexts at Homol'ovi III are all pronghorn or mule deer (Strand 1998:Tables 6.8–6.9):

- Antilocapridae: *Antilocapra americana* (NISP=2), cf. *Antilocapra americana* (NISP=4);
- Cervidae: *Odocoileus hemionus* (NISP=3), cf. *Odocoileus hemionus* (NISP=1)

Additionally, there is a number of unidentified artiodactyls (N=15), medium/large mammals (N=15), and large mammals (N=16).

Middle Homol'ovi Phase (MHP) Sample. Again, all identified artiodactyl remains from MHP contexts at Homol'ovi III are pronghorn or mule deer (Strand 1998: Tables 6.10–6.11):

- Antilocapridae: *Antilocapra americana* (NISP=7), cf. *Antilocapra americana* (NISP=1);
- Cervidae: *Odocoileus hemionus* (NISP=3)

The unidentified material from the assemblage includes artiodactyls (N=24), medium/large mammals (N=46), and large mammals (N=24).

Homol'ovi II

The analyzed faunal collection from Homol'ovi II yielded just 38 identified artiodactyls, along with some 370 unidentified artiodactyls and probable artiodactyls. Less than ten percent of the total artiodactyl sample has been identified taxonomically to the level of family or better. This assemblage falls entirely within the LHP. The

identified component of the assemblage is dominated by pronghorn, much like the LHP assemblage from Homol'ovi I; the rest is made up of bighorn sheep and deer.

Specifically, the following taxa are reported (Strand 1998:Tables 6.5–6.6):

- Antilocapridae: *Antilocapra americana* (NISP=16), cf. *Antilocapra americana* (NISP=7);
- Bovidae: *Ovis canadensis* (NISP=9);
- Cervidae: *Odocoileus hemionus* (NISP=1), *Odocoileus* sp. (NISP=3), Cervidae (NISP=2)

Once again, there is a fairly large unidentified component, including unidentified artiodactyls (N=143), bighorn/mule deer (N=1), bighorn/pronghorn (N=1), medium/large mammals (N=211), and large mammals (N=14).

Assemblage Descriptions: Amphibians and Reptiles

This section describes amphibian and reptile assemblages from Homol'ovi I, II, III, and IV. NISP counts are presented in Table 3.9. The assemblages are described below in full, but in the next chapter only certain taxa of interest are singled out for further analysis.

Homol'ovi I

The analyzed fauna from Homol'ovi I yielded a total of 18 amphibians and 719 reptiles. There is only one major group of amphibians represented—frogs and toads (Anura). The reptiles include lizards (Sauria), common harmless snakes (Colubridae), pit vipers (Crotalidae), and at least three different species of turtles (Testudinata). The

Table 3.9
 NISP Counts by Taxon for Amphibian and Reptile Assemblages from Homol’ovi I, II, III, and IV¹

Taxon	Homol’ovi I					Homol’ovi III	Homol’ovi II
	EHP	MHP	LHP	Und.	Total		
Amphibians							
Unidentified amphibians	1		3		4	1	3
Anura (frogs and toads)			6		6		
Bufonidae (true toads)			8		8	1	12
Reptiles							
Unidentified reptiles	2		7		9		28
Sauria (lizards)			6		6		41
<i>Crotaphytus</i> sp. (collared or leopard lizard)			1		1		8
Colubridae (common harmless snakes)	7	483	105		595		
Crotalidae (pit vipers)			6		6		1
Testudinata (turtles)	17		4	2	23		
Testudinidae (freshwater and box turtles, etc.)	1		8	1	10	1	
<i>Terrapene ornata</i> (western box turtle)	6		47		53	1	
<i>Chrysemys picta</i> (painted turtle)	6	1	6	2	15		11
cf. <i>Kinosternon sonoriense</i> (Sonoran mud turtle)		1			1		
Total Identified and Unidentified Amphibians	1		17		18	2	15
Total Identified and Unidentified Reptiles	39	485	190	5	719	2	89

Notes:

¹Data for Homol’ovi IV, III, and II are from Strand (1998:Tables 6.5–6.12). Some Homol’ovi I data are also from Strand (1998).

Homol'ovi I assemblage includes EHP, MHP, and LHP components, as well as a few undated specimens (no reptiles or amphibians were found in TP contexts).

Early Homol'ovi Phase (EHP) Sample. There are no identified amphibians in the EHP sample from Homol'ovi I. The identified reptiles include common harmless snakes and turtles. There are at least two species of turtles in the assemblage—western box turtle (*Terrapene ornata*) and painted turtle (*Chrysemys picta*).

Specifically, the following taxa were identified:

- Snakes: Colubridae (NISP=7);
- Turtles: Testudinata (NISP=17), Testudinidae (NISP=1), *Terrapene ornata* (NISP=6), *Chrysemys picta* (NISP=6)

Additionally, there is one unidentified amphibian and two unidentified reptiles.

Most of the turtle remains in the EHP sample (27 of 30 specimens) are carapace or plastron fragments. Interestingly, all of the turtle material comes from contexts in the southern part of the site (Structures 003, 103, 310, 345, and the 199 trench) or from the 700 roomblock (Structures 704, 734, and the 799 trench).

Middle Homol'ovi Phase (MHP) Sample. There are no amphibians in the MHP sample from Homol'ovi I. The sample does include a large cluster of bones (NISP=483) from a common harmless snake (Colubridae), probably intrusive (the cluster was found in the fill of Structure 702). Also, there are single examples of painted turtle (*Chrysemys picta*) and probable Sonoran mud turtle (cf. *Kinosternon sonoriense*). The painted turtle specimen is a carapace fragment from Structure 651. This specimen comes from a provenience that is near the (subjective) boundary between Structure 651 and the

overlying East Plaza deposits, and could easily belong to either context. The probable Sonoran mud turtle specimen is a femur from Structure 704.

Late Homol'ovi Phase (LHP) Sample. The LHP sample from Homol'ovi I includes several groups of amphibians and reptiles that did not appear in earlier samples, including frogs/toads, lizards, and pit vipers (rattlesnakes). Again, there is a large number of common harmless snake remains (including a cluster in the lower fill of Kiva 215). Turtles are relatively abundant, and include western box turtle and painted turtle.

The following taxa were identified in the LHP sample:

- Frogs/toads: Anura (NISP=6), Bufonidae (NISP=8);
- Lizards: Sauria (NISP=6), *Crotaphytus* sp. (NISP=1);
- Snakes: Colubridae (NISP=105), Crotalidae (NISP=6);
- Turtles: Testudinata (NISP=4), Testudinidae (NISP=8), *Terrapene ornata* (NISP=47), *Chrysemys picta* (NISP=6)

Additionally, there are three unidentified amphibians and seven unidentified reptiles in the LHP sample.

Again, most of the turtle material in the LHP sample (63 of 65 specimens) comes from rooms and kivas in the southern part of Homol'ovi I (Structures 004, 104, 310 and Kivas 215 and 901); the remaining specimens come from East Plaza deposits. The majority of the turtle specimens are carapace or plastron pieces (62 of 65 specimens).

Undated Material. There are five undated turtle specimens in the Homol'ovi I assemblage, all of them carapace or plastron pieces. Three specimens come from mixed deposits in Structure 651 that may well include fill from overlying East Plaza surfaces

(Testudinata, NISP=1; Testudinidae, NISP=1; *Chrysemys picta*, NISP=1); these deposits became mixed when heavy rains caused a trench wall to collapse. Another specimen comes from the undated East Plaza overburden (*Chrysemys picta*, NISP=1). Finally, one additional specimen comes from an undated “wall cleanup” provenience in Structure 739.

Homol’ovi IV

No amphibians or reptiles were identified in the analyzed faunal collection from Homol’ovi IV (Strand 1998:Table 6.12).

Homol’ovi III

There are very few amphibian or reptile specimens in the analyzed faunal collection from Homol’ovi III (Strand 1998:Tables 6.7–6.11). There is a single unidentified amphibian (NISP=1) in Structure 17 (TP). The only other amphibian is a true toad (Bufonidae, NISP=1) specimen recovered from the upper fill of Kiva 32 (MHP). The only reptiles in the analyzed portion of the Homol’ovi III faunal collection are two turtle carapace fragments (Testudinidae, NISP=1; *Terrapene ornata*, NISP=1), both recovered from the upper fill of Kiva 32 (MHP).

Several additional turtle specimens are known from HRP field notes to have been recovered from contexts not included in Strand’s (1998) Homol’ovi III sample. The pieces in question come from unexamined (by Strand) contexts in Kivas 31, 32, 34, and 37, and in Structures 15 and 16, for a total of about seven additional specimens (see also LaMotta 1996:Table 9). One of these specimens is a pigment-stained Western box turtle (*Terrapene ornata*) carapace, refitting portions of which were found in Kivas 31 and 32 (Pierce 2001:274).

Homol'ovi II

There are several groups of amphibians and reptiles represented at Homol'ovi II, including true toads, lizards, pit vipers (rattlesnakes), and painted turtle.

Specifically, the following taxa are reported (Strand 1998:Tables 6.5–6.6):

- Frogs/toads: Bufonidae (NISP=12);
- Lizards: Sauria (NISP=41), *Crotaphytus* sp. (NISP=8);
- Snakes: Crotalidae (NISP=1);
- Turtles: *Chrysemys picta* (NISP=11)

Additionally, there are 3 unidentified amphibians and 28 unidentified reptiles in the collection.

All 11 painted turtle specimens from Homol'ovi II were recovered from lower deposits in Structure 702. The remains include vertebrae, sacrum, scapula, and pelvis—but no carapace or plastron pieces (Strand 1998:329). Looking beyond the analyzed sample reported here, there is no evidence from HRP field notes to suggest that turtle shell was recovered from any context that was excavated at Homol'ovi II during the main period of HRP fieldwork there (1991–1995) (LaMotta 1996:69). Additionally, Szuter (1991:Table 9.1) reports no turtle remains, shells or otherwise, in the faunal material collected during brief excavations at Homol'ovi II in 1984. In short, it would appear that turtle shell is simply absent from the faunal samples that have been recovered from Homol'ovi II.

Conclusions

This chapter has presented basic taxonomic descriptions of select faunal components from Homol'ovi I, II, III, and IV. The next chapter builds on these data to explore temporal and spatial patterns at various scales. The common goal of these analyses is to shed light on the nature and organization of the activities surrounding faunal use and deposition at Homol'ovi I, and in the villages of the Homol'ovi settlement cluster generally. Narrowing the focus to certain groups of animals, as in the present chapter, increases the probability that the observed zooarchaeological patterns represent traces of activities related specifically to religion, ritual, and ceremony (see Chapter 1). Ultimately, one hopes to gain a better picture of the social units responsible for these activities, and specifically to identify the zooarchaeological traces of any religious organizations that might have been active in the prehistoric Homol'ovi villages. Identifying temporal and spatial sources of taxonomic variability in the assemblages under examination (Chapter 4) is a necessary first step toward this goal.

CHAPTER 4:
EARLY AND LATE PERIOD PATTERNS OF FAUNAL EXPLOITATION AMONG
SITES OF THE WESTERN HOMOL' OVI CLUSTER

Introduction

The previous chapter examined the taxonomic composition of the birds, carnivores, artiodactyls, reptiles, and amphibians from Homol'ovi I, II, III, and IV from a diachronic perspective. Specifically, it described the faunal assemblage for each temporal component at these sites, following the ceramic phases defined in Chapter 2. Purposefully descriptive, that chapter did not specifically look for similarities or differences in the overall taxonomic composition of the faunal assemblages from the Homol'ovi sites. The present chapter takes up this challenge and presents an analysis of intersite variation in taxonomic composition, focusing again on the birds, carnivores, artiodactyls, and certain reptiles and amphibians. Several different aspects of taxonomic composition are considered, including which taxa are most abundant, how taxa are ranked relative to each other, and overall taxonomic richness. This analysis follows the ceramic phases defined in Chapter 2; however for sake of simplicity, material dated to the Tuwiuca, Early Homol'ovi, and Middle Homol'ovi Phases is combined into a single *Early Period*, while material dated to the Late Homol'ovi Phase is kept in a separate analytical category, herein called the *Late Period* to maintain terminological symmetry. Hence, there are three Early assemblages (one each from Homol'ovi I, III, and IV) and two Late assemblages (from Homol'ovi I and II, respectively) in the present analysis.

The goal of this analysis is to determine if there is evidence for a single, cluster-wide pattern of faunal exploitation for each time period, Early and Late, or if coeval

villages were targeting and acquiring species differentially. The answer to this question has potentially far-reaching implications, especially insofar as it provides a measure of the relative autonomy or integration of the villages—economically, politically, ethnically, or religiously; and of the extent to which each village maintained its own individual identity. If two or more villages shared a single set of traditions and practices with respect to a particular group of animals (including, among other things, procurement, use, and discard practices), then, all else being equal, one expects that the faunal assemblages generated by those villages would be fairly similar. Conversely, if the villages in question adhered to dissimilar traditions and practices regarding a particular group of animals, one expects that dissimilar faunal assemblages would result. Among the Homol’ovi sites, there appears to be more intersite variation among the Early assemblages than there is among the Late assemblages, suggesting that behavior patterns with respect to the fauna of interest generally became more uniform after the mid-to-late 1300s.

Sample Size and Identifiability Issues

Before considering intersite variation in the Homol’ovi faunal assemblages, it is necessary to acknowledge that there are nontrivial sample-size differences among the collections included in this analysis. This raises the issue of comparability. In general, the Homol’ovi I samples are larger than those from the other sites—sometimes much larger (Table 4.1). Such disparities should be taken into consideration when interpreting intersite patterns, especially where taxonomic richness is concerned, and in light of the well-known functional relationship between sample size (NISP) and taxonomic richness (N taxa) (see Grayson 1984:Chapter 5).

Table 4.1
NISP Counts for Early and Late Period Bird, Carnivore, and Artiodactyl Assemblages from Homol'ovi I, II, III, and IV

Taxon¹	Homol'ovi I Early	Homol'ovi III Early	Homol'ovi IV Early	Homol'ovi I Late	Homol'ovi II Late
Identified birds	880	107	33	421	250
Identified carnivores	153	40	88	266	140
Identified artiodactyls	196	26	69	110	38

¹Identified birds = order or better; identified carnivores = family or better; identified artiodactyls = family or better.

Comparability issues aside, the small samples are problematic in their own right. The nature of the analysis itself is a contributing factor here: Specimens that have not been identified to some minimally useful taxonomic category (order for birds; family for carnivores and artiodactyls) are in most cases excluded from the discussion. Consequently, some of the samples included in this analysis are very small—particularly the identified birds from Homol'ovi IV; the identified carnivores from Homol'ovi III and IV; and the identified artiodactyls from Homol'ovi II, III and IV (see Table 4.1). Obviously, the representativeness of these small samples is at issue. It is important to point out, however, that all samples used in this analysis come from large, systematically analyzed faunal collections that were recovered according to an explicit sampling design. For example, the 33 identified bird bones from Homol'ovi IV come from a much larger collection of over 5,500 analyzed faunal specimens recovered from nine distinct architectural units at the site (see Strand 1998:Table 6.12).

Given these sample-size limitations, the present discussion of intersite patterns is necessarily exploratory and suggestive, rather than definitive. For the sake of argument, it is generally assumed that sampling error is not the principal cause behind the observed patterns; in many cases, the validity of this assumption remains in question. A more definitive assessment of intersite variability will not be possible, however, until the faunal datasets from Homol'ovi II, III, and IV are significantly expanded.

Differential identifiability is another potential source of bias that must be acknowledged at the outset. For instance, due to fragmentation and loss of diagnostic bone morphology there are many unidentified bird (class *Aves*) specimens in the assemblages under examination—specimens that must be excluded when calculating proportions of different kinds (families, species) of birds in the assemblages. The same problem occurs for artiodactyls and, to a much lesser extent, for carnivores. In many cases, the unidentified specimens represent a nontrivial portion of the whole (see Table 3.4 for birds; Table 3.6 for carnivores; and Table 3.8 for artiodactyls). The full implications of this have yet to be worked out; offhand, one expects that the more highly-diagnostic taxa would tend toward overrepresentation in assemblages with a large unidentified component. This type of bias should not seriously compromise the present analysis, however, so long as the factors that govern identifiability (e.g., fragmentation, taphonomic processes) are fairly constant from one assemblage to the next.

Overview of Early and Late Period Taxonomic Patterns

The analyses presented below show that the Early faunal assemblages from Homol'ovi I, III, and IV are not especially similar to each other taxonomically. In short,

there are relatively few major taxonomic patterns that are shared by even two of the three Early sites. Local environmental differences may account for some of this variability, but certainly not all of it. Some of the only shared patterns are found in the bird assemblages, and these may reflect elements of an Early ritual complex (or complexes) that was practiced in all three villages. In the final analysis, however, the Early faunal assemblages exhibit significant variability in taxonomic composition, from site to site.

In contrast, the Late faunal assemblages from Homol'ovi I and II exhibit a number of convergent patterns. In fact, there are marked similarities in all major groups of fauna under examination—birds, carnivores, and artiodactyls. While the assemblages from the two sites are certainly not identical (for example, there are prominent differences in water birds and raptors), the similarities are too numerous to be merely coincidental. Presumably, these shared patterns represent elements of a behavioral complex or complexes that would have been active at both Homol'ovi I and II in the Late Period. The broader significance of this last inference is a matter for further investigation; however, there are at least preliminary indications from these data that the two Late sites were participating in aspects of a common ceremonial system.

Birds: Temporal and Intersite Patterns

For most analyses in this chapter, the birds are grouped into 27 general taxonomic categories, or *major types*; these are listed in Table 4.2. Grouping is necessary to reduce the number of analytical categories (e.g., see Table 3.4), and to ensure that analytical units are taxonomically discrete and numerically adequate (in terms of sample size) for statistical analysis. Most of the major types represent families of birds (suffix *-idae*), but

Table 4.2
Percent NISP Data for Major Types of Birds in Early and Late Period Bird Assemblages from Homol'ovi I, II, III, and IV¹

Major types of birds ²	Homol'ovi I Early	Homol'ovi III Early	Homol'ovi IV Early	Homol'ovi I Late	Homol'ovi II Late	
Podicipidae*	1.4	6.5	–	0.5	–	
Ardeidae*	0.9	0.9	–	1.2	–	
Accipitridae (Hawks)	15.5	6.5	3.0	4.0	20.0	
<i>Aquila chrysaetos</i>	0.8	0.9	12.1	7.1	2.4	
Falconidae	3.6	14.0	12.1	1.2	–	
Phasianidae	4.1	2.8	–	1.2	1.6	
<i>Meleagris gallopavo</i>	20.5	10.3	60.6	–	–	
<i>Grus canadensis</i>	5.6	1.9	–	17.6	18.4	
Rallidae*	3.9	10.3	–	5.9	–	
Charadriiformes*	0.7	–	–	–	–	
Anatidae*	9.3	11.2	–	9.7	4.8	
Columbidae	1.5	1.9	–	9.7	–	
Cuculidae	0.1	–	–	0.2	–	
Strigidae	2.6	–	–	6.4	14.8	
Caprimulgidae	0.1	–	–	–	–	
Picidae	1.7	1.9	9.1	1.4	0.4	
<i>Corvus corax</i>	6.1	6.5	3.0	13.5	11.2	
Small Passeriformes	Tyrannidae	2.2	–	0.5	–	
	Garrulinae	0.8	–	1.2	0.8	
	cf. <i>Pica pica</i>	0.1	1.9	–	0.2	–
	<i>Lanius ludovicianus</i>	–	–	–	1.9	–
	Mimidae	3.5	3.7	–	1.2	2.0
	Turdidae	1.4	–	–	2.1	–
	<i>Piranga</i> sp.	0.1	–	–	–	–
	Fringillidae	0.5	–	–	1.7	–
Icteridae	1.7	–	–	0.7	0.8	
Total NISP (ID birds)	880	107	33	421	250	
N taxa (major types)	25	15	6	22	11	

Notes:

¹Percent NISP is calculated as the percentage out of all identified birds (identified to order or better). Some taxonomic categories include “cf.” specimens.

²Taxa marked with an asterisk (*) are considered water birds.

a few orders (suffix *-formes*) and species are included as well. Some species are singled out for theoretical reasons, to highlight their particular contribution to the zooarchaeological record (*Aquila chrysaetos*, *Corvus corax*); in other cases, a species is simply the only representative of its particular family in the collection (*Lanius ludovicianus*). Decisions about how to group taxa were also conditioned by factors such as identifiability and rarity.

Taxonomic composition of the Homol'ovi bird assemblages can be examined in a number of different ways. Since many different major types of birds are represented, it is possible to compare the assemblages in terms of taxonomic richness (N taxa). The bird assemblages can also be compared in terms of the proportional abundance of the various major types, focusing specifically on the rank ordering of those taxa (using %NISP). This can be cumbersome when multiple assemblages with many different taxa are involved, so the present analysis focuses mainly on the major types that occupy the top ranks in each assemblage (i.e., focus is on the most abundant taxa). Finally, it is instructive to compare assemblages in terms of the relative contributions of different inclusive groupings of birds, defined for example on the basis of shared ecological, physical, or behavioral attributes (e.g., water birds, raptors), or defined in terms of how the birds were treated culturally. This last type of analysis may reveal general patterns that are not apparent when the assemblages are viewed solely in terms of narrowly-defined taxonomic categories.

Taxonomic Richness

Taxonomic richness, as the term is used here, refers to the number of different taxa that are represented in a given faunal assemblage (Grayson 1984:131; Reitz and Wing 1999:102). Grayson (1984:Chapter 5) presents an extended discussion of taxonomic richness and its relationship to sample size. In many archaeological faunal assemblages, one encounters the situation where a handful of taxa are very abundant in terms of specimen counts (NISP), while most taxa are comparatively uncommon or rare (Grayson 1984:134). As discussed below, this is certainly the case for the archaeological bird assemblages from the Homol'ovi sites. Under such conditions, richness (N taxa) is strongly correlated with sample size (NISP)—the larger the sample, the greater the probability that increasingly rare taxa will be encountered. In theory, N taxa should increase as a logarithmic function of NISP, leveling off when there are no more new taxa to be added (see Grayson 1984:Figure 5.3). If two or more assemblages differ in taxonomic richness, sample-size effects must first be ruled out before possible behavioral or environmental causes are considered. Below, the relationship between these two variables is examined for the Homol'ovi bird assemblages; in this analysis, N taxa refers to the number of major types of birds, while NISP is the total number of bird specimens identified to order or better.

The Homol'ovi bird assemblages do in fact vary greatly in taxonomic richness, but this is not entirely surprising given the differences in sample size. Figure 4.1 graphs the relationship between N taxa and NISP for three Early and two Late bird assemblages from Homol'ovi I, II, III, and IV. As expected, N taxa increases with NISP, and the

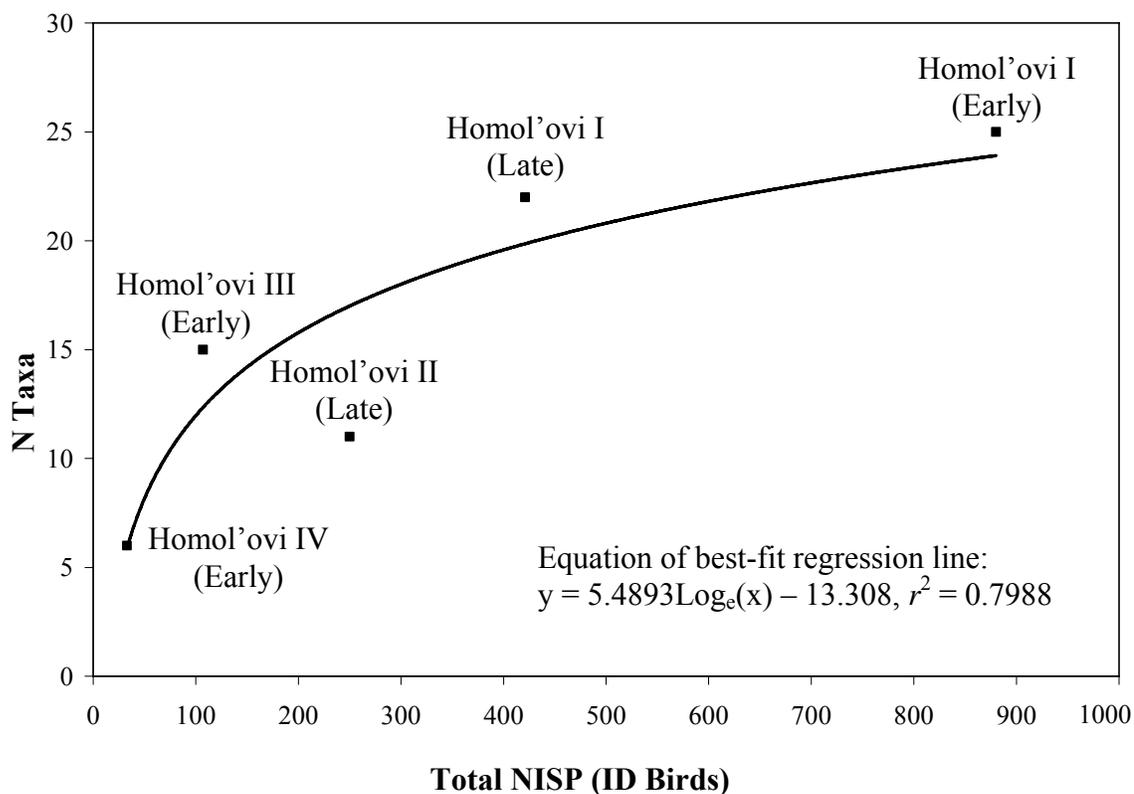


Figure 4.1 Taxonomic diversity (N Taxa) of Early and Late Period bird assemblages from Homol'ovi I, II, III, and IV as a function of sample size (NISP). N Taxa refers to the number of major types of birds (see text). When the Homol'ovi II assemblage is removed, the best-fit regression line through the remaining points is $y = 5.7467 \text{Log}_e(x) - 13.158$, with $r^2 = 0.9841$.

relationship between the two variables is aptly described by a logarithmic function (the formula for the best-fit regression line is: $N \text{ taxa} = 5.4893 \times \text{Log}_e[\text{NISP}] - 13.308$, with $r^2 = 0.7988$). In general, there is little reason to suspect that the observed variation in taxonomic richness is a product of anything other than sample-size differences among the assemblages. However, there is one exception: The Late assemblage from Homol'ovi II falls well below the regression line, indicating that the number of taxa represented in this assemblage is lower than expected for the sample size. In fact, the relationship between NISP and N taxa is much stronger when Homol'ovi II is removed from the pool of assemblages (the formula for the best-fit regression line *without* Homol'ovi II is: $N \text{ taxa} = 5.7467 \times \text{Log}_e[\text{NISP}] - 13.158$, with $r^2 = 0.9841$; compare above). Finally, using linear regression analysis (N taxa versus $\text{Log}_e[\text{NISP}]$), it is possible to show that the Homol'ovi II assemblage falls just outside the 95 percent confidence region surrounding the best-fit regression line drawn through the other assemblages, supporting its status as an outlier.

A comparison of the bird assemblages from Homol'ovi I, II, III, and IV reveals that certain major types of birds are missing from Homol'ovi II, which would account for the depressed taxonomic richness of the assemblage from this site. Table 4.2 shows %NISP for the major types of birds in each assemblage, the total number of identified birds (total NISP) for each assemblage, and the number of major types (N taxa). This layout highlights the relationship between sample size (NISP) and taxonomic richness (N taxa), providing an appropriate context for evaluating the gaps in the Homol'ovi II assemblage.

One of the most striking characteristics of the Homol'ovi II assemblage is the relative lack of water birds. For present purposes, the water birds include grebes (Podicipidae), herons (Ardeidae), rails and coots (Rallidae), shorebirds (Charadriiformes), and geese and ducks (Anatidae). Sandhill cranes are omitted from this grouping because they are less directly tied to watery habitats; in addition to marshes, these migratory birds can be found in open country, prairies, grainfields, and mountain meadows (Ransom 1981:75).

Geese/ducks (Anatidae) are the only water birds represented in the present sample from Homol'ovi II (cf. Szuter 1991:Table 9.1), accounting for just 4.8% NISP. In contrast, there are four major types of water birds represented at Homol'ovi III (total 28.9% NISP), four major types in the Late assemblage from Homol'ovi I (total 17.3% NISP), and five major types in the Early assemblage from Homol'ovi I (total 16.2% NISP). There are no water birds in the Homol'ovi IV assemblage; however, this is almost certainly due to the extremely small sample size. While the Homol'ovi I bird assemblages are very large in terms of total NISP, the Homol'ovi III assemblage is only half the size of the Homol'ovi II assemblage—leading to the conclusion that sample size alone is not responsible for the dearth of water-bird taxa at Homol'ovi II. The groups of water birds most conspicuous in their absence from Homol'ovi II are the grebes (Podicipidae) and rails/coots (Rallidae)—both of which are relatively common (>5% NISP) in one or more assemblages from the other sites. Herons/bitterns (Ardeidae) and shorebirds (Charadriiformes) are also missing from Homol'ovi II, but these taxa are uncommon (1-5% NISP) to rare (< 1% NISP) in the Homol'ovi assemblages generally.

Other major types of birds missing from Homol'ovi II include falcons (Falconidae), turkey (*Meleagris gallopavo*), pigeons/doves (Columbidae), cuckoos/roadrunners (Cuculidae), nighthawks (Caprimulgidae), and several types of small Passeriformes (see Table 4.2). The absence of falcons is interesting since these small raptors are at least present in all other assemblages, albeit at variable frequencies. As discussed previously in Chapter 3, turkey is absent from both Late assemblages in the present dataset, so this apparently is not a Homol'ovi II-specific pattern. It is unclear if the absence of pigeons/doves from Homol'ovi II is behaviorally meaningful since these birds appear sporadically and at generally low frequencies in the other assemblages. Nighthawks and cuckoos/roadrunners are rare in the present dataset, appearing only in the largest assemblages, so their absence from Homol'ovi II is quite possibly a matter of sampling. Likewise, sampling and analyst error probably account for the fact that only three major types of small passeriformes were identified in the Homol'ovi II collection.

In summary, aside from the relatively unique pattern expressed at Homol'ovi II, taxonomic richness (N taxa) in the Homol'ovi bird assemblages generally varies as expected with sample size (NISP). It is especially curious that falcons and several types of water birds are seemingly missing from the Homol'ovi II assemblage. One would have expected to find these taxa in an assemblage the size of the one from Homol'ovi II, based on the other assemblages from the region. All of the sites in the present dataset are in fairly close proximity to riparian habitats along the Little Colorado River, so a purely environmental explanation for the observed water-bird pattern at Homol'ovi II seems unlikely (cf. Strand 1998:167). However, if the settlers at Homol'ovi II were in fact

mostly late-coming immigrants from the Hopi Mesas (e.g., see Adams 2002:143), then it could be the case that this population had little prior exposure to many of the varieties of water birds available in the Homol'ovi region, and simply did not exploit these taxa as a matter of cultural preference. It is unclear why falcons might not be represented at Homol'ovi II; however, the data in Table 4.2 do emphasize the importance of larger raptors at this site—specifically golden eagle and buteonine hawks. Perhaps the smaller-bodied falcons, although technically raptors, were generally deemed unacceptable for ritual uses at Homol'ovi II.

Taxonomic Rankings

This analysis begins by ranking the major bird taxa within each assemblage according to their relative abundance (using %NISP, defined as the percentage out of all bird specimens identified to order or better). Any given taxon might be abundant in one assemblage, and therefore highly ranked in that assemblage, but poorly represented in another. Such variation might reflect differential patterns of acquisition, use, or disposal from one village to another, or, if the assemblages are from different time periods, change through time. To facilitate interassemblage comparisons, the scope of this analysis is generally restricted to the top seven ranks in each assemblage. This is largely a matter of convenience: The top seven ranks, as a unit, encompass a fairly large portion of each assemblage (roughly two-thirds to three-fourths, in terms of NISP), yet the number of taxa involved is still manageable (generally, N=7 major types). The Homol'ovi IV assemblage does not weigh heavily in this analysis since there are so few identified specimens (NISP=33), and just six major types of birds represented. In the discussion

that follows, a taxon is said to be *highly ranked* in a particular assemblage when it is found among the top seven ranks in that assemblage. Table 4.3 shows the rankings for the Early bird assemblages, while Table 4.4 shows the rankings for the Late bird assemblages.

Comparison of Early Period Bird Assemblages. This part of the analysis focuses on the large, Early bird-bone assemblages from Homol'ovi I (NISP=880) and Homol'ovi III (NISP=107). Much of the discussion that follows is centered around the five major categories of birds that are highly ranked in both of these assemblages: turkey, hawks, raven, geese/ducks, and rails/coots (see Table 4.3). The Homol'ovi IV assemblage is also discussed in this section, but for present purposes the current dataset is useful only insofar as it documents the presence of certain bird taxa at this Early site.

Turkey, hawks, and raven are among the birds that are highly ranked at both Homol'ovi I and III. Additionally, all three taxa are at least present in the small assemblage from Homol'ovi IV.

Turkey is the most abundant bird at Homol'ovi I in the Early Period (20.5% NISP), and thus it is ranked first in this assemblage. At Homol'ovi III, turkey is ranked third (10.3% NISP). Turkey is probably even more abundant at Homol'ovi III than this statistic indicates, however, since the current ranking does not take into account the multiple turkey burials that were found at this site (see Table 3.5). Finally, turkey is the most abundant type of bird (NISP=20) in the Homol'ovi IV assemblage. As discussed in Chapter 3, current evidence suggests that the residents of Homol'ovi I and III were trying

Table 4.3

Rankings by Percent NISP for Major Types of Birds in Early Period Bird Assemblages from Homol'ovi I, III, and IV

Homol'ovi I Early			Homol'ovi III Early ²			Homol'ovi IV Early		
Rank	Taxon	%NISP	Rank	Taxon	%NISP	Rank	Taxon	%NISP
1	<i>Meleagris gallopavo</i>	20.5	1	Falconidae	14.0	1	<i>Meleagris gallopavo</i>	60.6
2	Accipitridae (hawks)	15.5	2	Anatidae*	11.2	2	<i>Aquila chrysaetos</i>	12.1
3	Anatidae*	9.3	3	<i>Meleagris gallopavo</i>	10.3	↓	Falconidae	12.1
4	<i>Corvus corax</i>	6.1	↓	Rallidae*	10.3	4	Picidae	9.1
5	<i>Grus canadensis</i>	5.6	5	Accipitridae (hawks)	6.5	5	Accipitridae (hawks)	3.0
6	Phasianidae	4.1	↓	<i>Corvus corax</i>	6.5	↓	<i>Corvus corax</i>	3.0
7	Rallidae*	3.9		Podicepidae*	6.5	Not represented:		
8	Falconidae	3.6	8	Mimidae	3.7		Anatidae*	
9	Mimidae	3.5	9	Phasianidae	2.8		Columbidae	
10	Strigidae	2.6	10	Columbidae	1.9		<i>Grus canadensis</i>	
11	Tyrannidae	2.2	↓	<i>Grus canadensis</i>	1.9		Podicepidae*	
12	Icteridae	1.7		cf. <i>Pica pica</i>	1.9		Rallidae*	
↓	Picidae	1.7		Picidae	1.9		Strigidae	
14	Columbidae	1.5	14	<i>Aquila chrysaetos</i>	0.9			
15	Podicepidae*	1.4	↓	Ardeidae*	0.9			
↓	Turdidae	1.4	Not represented: ³					
17	Ardeidae*	0.9		Strigidae				
18	<i>Aquila chrysaetos</i>	0.8						
↓	Garrulinae	0.8						
20	Charadriiformes*	0.7						
21	Fringillidae	0.5						
22	Caprimulgidae	0.1						
↓	Cuculidae	0.1						
	<i>Piranga sp.</i>	0.1						
	cf. <i>Pica pica</i>	0.1						

Notes:¹Taxa marked with an asterisk (*) are considered water birds (applies to all sites).²The turkey and probable common raven burials from Homol'ovi III (see Table 3.5) are not included in these calculations.³Not all missing taxa are listed (applies to all sites). Only those that are common (> 5% NISP) in at least one of the five Early and Late Period assemblages under consideration are listed.

Table 4.4

Rankings by Percent NISP for Major Types of Birds in Late Period Bird Assemblages from Homol'ovi I and II

Homol'ovi I Late		
Rank	Taxon ¹	%NISP
1	<i>Grus canadensis</i>	17.6
2	<i>Corvus corax</i>	13.5
3	Anatidae*	9.7
↓	Columbidae	9.7
5	<i>Aquila chrysaetos</i>	7.1
6	Strigidae	6.4
7	Rallidae*	5.9
8	Accipitridae (hawks)	4.0
9	Turdidae	2.1
10	<i>Lanius ludovicianus</i>	1.9
11	Fringillidae	1.7
12	Picidae	1.4
13	Ardeidae*	1.2
↓	Falconidae	1.2
	Garrulinae	1.2
	Mimidae	1.2
	Phasianidae	1.2
18	Icteridae	0.7
19	Podicipidae*	0.5
↓	Tyrannidae	0.5
21	Cuculidae	0.2
↓	cf. <i>Pica pica</i>	0.2
Not represented: ²		
<i>Meleagris gallopavo</i>		

Homol'ovi II Late		
Rank	Taxon	%NISP
1	Accipitridae (hawks)	20.0
2	<i>Grus canadensis</i>	18.4
3	Strigidae	14.8
4	<i>Corvus corax</i>	11.2
5	Anatidae*	4.8
6	<i>Aquila chrysaetos</i>	2.4
7	Mimidae	2.0
8	Phasianidae	1.6
9	Garrulinae	0.8
↓	Icteridae	0.8
11	Picidae	0.4
Not represented:		
	Columbidae	
	Falconidae	
	<i>Meleagris gallopavo</i>	
	Podicipidae*	
	Rallidae*	

Notes:

¹Taxa marked with an asterisk (*) are considered water birds (applies to both sites).

²Not all missing taxa are listed (applies to both sites). Only those that are common (> 5% NISP) in at least one of the five Early and Late Period assemblages under consideration are listed.

to raise these non-local birds domestically in the Early Period (see also Senior and Pierce 1989).

Hawks are ranked second in the Early assemblage from Homol'ovi I (15.5% NISP). The species of hawks present in this assemblage include sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk (*Buteo jamaicensis*), and marsh hawk (*Circus cyaneus*). Hawks are ranked fifth (6.5% NISP) in the Homol'ovi III assemblage, and all specimens are identified as *Buteo* sp. The single specimen from Homol'ovi IV is also classified as *Buteo* sp.

Ravens are ranked fourth in the Homol'ovi I assemblage (6.1% NISP) and fifth in the Homol'ovi III assemblage (6.5% NISP). Additionally, there is a probable common raven (cf. *Corvus corax*) burial from Homol'ovi III that is not taken into account in the rankings (see Table 3.5). It is worth mentioning that there are other black corvids—crows and magpies—which tend to be viewed and treated much the same as ravens, ethnographically. Although these birds are rare in the Homol'ovi faunal assemblages, three of the four known specimens (all classified as probable common magpie, cf. *Pica pica*) come from Early contexts at Homol'ovi I and III. Finally, there is a single raven specimen from Homol'ovi IV.

All three of these highly-ranked birds—turkey, hawks, and raven—figure prominently in historical Western Pueblo religious practices and beliefs (e.g., Tyler 1979). They are important for their feathers, which are used in making prayer sticks, standards, masks and other elements of ceremonial costume; for their skins, wings, and claws, which are fashioned into a variety of ritual paraphernalia; and occasionally for use

as sacrifice victims (mainly the larger hawks) (see Strand 1998:Chapter 2). Given their strong ritual associations, it is tempting to identify these three high-ranking birds as elements of an Early ritual complex (or complexes) that was shared by Homol'ovi I and III. The fact that this aggregate of birds is also present in the small Homol'ovi IV assemblage may indicate that the proposed complex was of fairly widespread importance among Early villages.

The only other major types of birds that are highly ranked at both Homol'ovi I and III in the Early Period are water birds—geese/ducks and rails/coots. No aquatic taxa were found in the small Homol'ovi IV assemblage. Both Homol'ovi I and III would have had direct access to riparian habitats along the Little Colorado River, so it is not surprising that similar groups of water birds would have been emphasized in the two villages. However, there are also noticeable differences in the water-bird assemblages from the two sites. From the perspective of taxonomic rankings, the most prominent of these differences involves the grebes, which are highly ranked at Homol'ovi III but not at Homol'ovi I. Differences such as this might be pointing to localized variation in the microhabitats surrounding the two villages, in the seasons of their occupation, or in species preferences.

In light of the Late patterns to be discussed below, it is useful to point out two specific kinds of birds that are *not* highly ranked at either Homol'ovi I or III in the Early period—owls and golden eagle. Owls are uncommon at Homol'ovi I (2.6% NISP), and are not represented at all in the assemblages from Homol'ovi III and IV. Golden eagle is rare at both Homol'ovi I (0.8% NISP) and Homol'ovi III (0.9% NISP); it is at least

present at Homol'ovi IV, but not in abundance (in fact, many of the Early specimens from all three sites are only tentatively identified as golden eagle, cf. *Aquila chrysaetos*; see Table 3.4). These patterns are interesting because in the Late assemblages both owls and golden eagle are highly ranked (more below). Both birds have strong ritual associations, ethnographically. Therefore, it is possible that owls and golden eagle represent elements of a Late ritual complex (or complexes) that was either absent or not strongly emphasized among these Early sites.

Finally, it is worth mentioning that falcons, another group of raptors, are very prominent in the Early assemblage from Homol'ovi III; in fact, this is the highest-ranked taxon in the assemblage (14.0% NISP). At Homol'ovi I, in contrast, these birds are not quite as abundant (3.6% NISP). Like all raptors, falcons were undoubtedly taken for ritual or ceremonial purposes. The observed disparity between Homol'ovi I and III may indicate that falcons served a specific ritual function that was more strongly emphasized at the latter site. In this regard, it is worth noting that the proportion of hawks also differs markedly between these two Early sites, despite the fact that hawks are highly ranked in both assemblages. Hawks are very prominent at Homol'ovi I (15.5% NISP); less so at Homol'ovi III (6.5% NISP). Interestingly, this pattern and the falcon pattern are nearly complementary. A distribution such as this might result if hawks and falcons were differentially accessible for these two villages. Along these lines, the issue of intersite variability in raptors will be revisited in more detail in a subsequent section (see below, *General Patterns*).

Comparison of Late Period Bird Assemblages. This portion of the analysis focuses on the Late bird-bone assemblages from Homol'ovi I (NISP=421) and Homol'ovi II (NISP=250). Five major groups of birds are highly ranked in both Late assemblages—sandhill crane, golden eagle, owls, raven, and geese/ducks (see Table 4.4). Most of the discussion that follows concerns these five high-ranked taxa.

The appearance of sandhill crane, golden eagle, and owls among the high-ranked taxa may reflect the emergence of a new ritual complex (or complexes) among the Late villages (compare Strand 1998:466). None of these birds was highly ranked in any of the Early assemblages—the one exception being sandhill crane, which is ranked fifth in the Early Homol'ovi I assemblage (5.6% NISP). Golden eagle is an extremely important bird in Western Pueblo religion, and one that is closely associated with katsina rituals (Voth 1912). Owls, on the other hand, occupy a more ambiguous position because of their associations with the night and with witchcraft (Tyler 1979:181-198), but owl feathers and other body portions are nevertheless used in ceremonies, as ritual paraphernalia, and in costume (e.g., Roediger 1941:75; Stephen 1936:109, 529). Sandhill crane also has ritual functions, although they have not been documented extensively in the ethnographic literature; in one historical example, crane wing feathers were used on a standard of the Hopi Agave society (Stephen 1936:960).

Upon closer examination, it may be possible to discern something about the role(s) of sandhill crane in the Late villages simply from its position in the rankings. This bird is ranked first at Homol'ovi I (accounting for 17.6% NISP, it is the single most abundant bird in the assemblage), and second at Homol'ovi II (18.4% NISP). In fact,

sandhill crane occupies a position in the Late rankings that is very similar to the position of turkey in the Early rankings (compare Table 4.3). This is interesting because turkey is completely absent from the Late assemblages. Turkey and sandhill crane are generally similar in physical appearance—both are large, drab-colored terrestrial birds. It is therefore possible, as Strand (1998:209) has suggested, that sandhill crane was used as a substitute for turkey in the Late villages. Possible reasons why turkey might have disappeared from the Homol’ovi assemblages, including both cultural and ecological mechanisms, have already been discussed by Strand (1998:180, 209). If substitution did in fact occur, then one would expect that sandhill crane and turkey would exhibit similar patterns of processing, and similar modes of disposal—at least as far as sandhill crane remains from Late assemblages are concerned. On the other hand, sandhill crane and turkey may have always circulated in different, non-overlapping activity sets. Under this hypothesis, the rise of sandhill crane in the Late assemblages would not be directly related to disappearance of turkey. For example, sandhill crane may have been part of a distinctive ritual complex that emerged first at Homol’ovi I in the Early Period, and which developed into something of more widespread significance among the Late villages. If so, then sandhill crane and turkey would not necessarily have been treated alike in either time period, and might therefore exhibit different archaeological patterns. Further analysis of taphonomic and contextual data for sandhill crane and turkey remains from these assemblages should provide a firmer basis for evaluating the relative merits of these different scenarios.

While turkeys do drop out of the Late assemblages, ravens and hawks are still present to a greater or lesser extent. Ravens are the only members of the hypothetical Early ritual complex that are ranked highly in both Late assemblages. In fact, raven is more highly-ranked, and roughly twice as abundant, in the Late assemblages as it is in the Early assemblages, on average (compare Tables 4.3 and 4.4). Apparently, use of this bird continued unabated into the Late Period.

Regarding hawks, the picture is somewhat more complicated in the Late assemblages. Hawks are the highest-ranked group of birds in the Homol'ovi II assemblage, where they account for one-fifth of all identified bird bones (20.0% NISP). In the Late assemblage from Homol'ovi I, however, these birds are ranked eighth and account for just 4.0% NISP. This last figure seems low not only in comparison to Homol'ovi II, but also in comparison to the Early assemblage from Homol'ovi I itself, where hawks are highly ranked and relatively abundant (15.5% NISP). If the disparity between Homol'ovi I and II is not simply an artifact of sampling, it may be pointing toward some interesting distinction between these two Late sites—a difference in ritual activities, in depositional patterns, or perhaps in access to hawks (again, more below under *General Patterns*).

Finally, there is a single group of water birds—geese/ducks—that is highly ranked in both Late assemblages. This is not unexpected for Homol'ovi I, located as it is in close proximity to riparian habitats. In fact, there are two groups of water birds (the other is rails/coots) that occur among the high-ranking taxa at Homol'ovi I in both time periods. At Homol'ovi II, in contrast, water birds seem to be an anomaly rather than the

norm; no major types besides geese/ducks are present (see above, *Taxonomic Richness*). The latter may have been more readily accessible than other kinds of water birds, or they may have been sought after by the residents of Homol'ovi II for some specific purpose. In any event, the fact that geese/ducks are “highly ranked” at Homol'ovi II should not be overemphasized since these birds are actually much less abundant there (4.8% NISP) than they are at Homol'ovi I (9.3–9.7% NISP) or Homol'ovi III (11.2% NISP).

Discussion. The two major Early bird assemblages, from Homol'ovi I and III, share a total of five high-ranking taxa. Similarly, the two Late bird assemblages, from Homol'ovi I and II, also share five high-ranking taxa. When these assemblages are compared across time periods, however, of the various possible pairings there are no two assemblages that share as many as five taxa high-ranking taxa (Figure 4.2). Rather, assemblages from different time periods share, at most, three to four high-ranking taxa. These differences, while perhaps not overwhelming, are at least suggestive. For instance, according to this reckoning, the Early and Late assemblages from Homol'ovi I are more similar to other Early and Late assemblages, respectively, than they are *to each other*. Ultimately, these observations are simply another way of saying that, for each time period, there seem to be shared patterns of bird usage that transcend the idiosyncrasies of individual assemblages. So far, evidence has been presented for a shared, Early pattern that emphasized turkey, hawks, and raven; and for a shared, Late pattern that emphasized sandhill crane, golden eagle, and owls.

	Homol'ovi I Early	Homol'ovi III Early	Homol'ovi I Late
Homol'ovi III Early	5 taxa: turkey hawks common raven geese/ducks rails/coots	↓	↓
Homol'ovi I Late	4 taxa: sandhill crane common raven geese/ducks rails/coots	3 taxa: geese/ducks rails/coots common raven	
Homol'ovi II Late	4 taxa: hawks sandhill crane common raven geese/ducks	3 taxa: geese/ducks hawks common raven	5 taxa: sandhill crane golden eagle typical owls common raven geese/ducks

Figure 4.2 Taxonomic similarity of Early and Late Period bird assemblages from Homol'ovi I, II, and III. Each box counts and lists the high-ranking bird taxa held in common by a particular pair of assemblages (based on Tables 4.3 and 4.4).

General Patterns

In this section, the Homol'ovi bird assemblages are examined from a perspective that looks beyond the narrowly-defined taxonomic categories (species, families) that have served, to this point, as the primary units of analysis. The focus now shifts to more-inclusive categories of birds with inferred ritual significance. Specifically, this section revisits issues concerning the distribution of raptors and of the hypothetical Early and Late ritual bird complexes defined above. This analysis, however, uses the more general groupings (e.g., raptors), rather than the constituent taxa (e.g., hawks, eagles, or falcons),

as the primary units of analysis. The discussions that follow focus on variation in the relative abundance of the general groupings, as defined in terms of %NISP.

Intersite Variability in Raptors. So far, the various members of the order Falconiformes (raptors) have been divided into three major types for analysis: golden eagle, hawks, and falcons. Earlier in this chapter there was discussion of site-to-site differences in the relative abundance of these three kinds of raptors (see above, *Taxonomic Rankings*). To put these differences into perspective, the present section examines quantitative variation in raptors *as a group*.

It is likely that different species of raptors had specific ritual functions at Homol'ovi; however, it is also possible that substitutions were sometimes made, especially if a particular species was unavailable for one reason or another. Smith (1952:172), for instance, discusses substitution of one species of bird feather for another in Hopi ritual, and cites two particular cases from Stephen's (1936:531, 753) journal where hawk and eagle feathers were apparently used interchangeably. Additionally, there are indications in the ethnographic literature that buteonine hawks were sometimes sacrificed along with eagles at the Hopi Niman ceremony (Bradfield 1995:255; McKusick 2001:58; Voth 1912:107), with the implication that a hawk might be used if eagles were unavailable (McKusick 2001:97). In any event, given the conceptual linkages among the various birds of prey in Hopi thought (e.g., see Bradfield 1995:253-257), it seems at least plausible to investigate raptors in the aggregate. Practically speaking, it is useful to treat the Falconiformes as a group because analysts were not always able to identify zooarchaeological specimens to the level of species, or even

genus, owing to taphonomic effects (fragmentation, loss of diagnostic bone morphology) and to the general physical similarities among these birds (see Table 3.4).

In general, the overall percentage of raptors is remarkably consistent from one assemblage to the next. In fact, there is almost no difference between Homol'ovi II (22.4% NISP), Homol'ovi III (21.5% NISP), and the Early assemblage from Homol'ovi I (19.9% NISP). The Late assemblage from Homol'ovi I, however, presents an anomaly. Raptors are noticeably underrepresented in this assemblage (12.4% NISP), at least in comparison to the other samples. In fact, the disparity between this assemblage and the other Late assemblage, the one from Homol'ovi II, is especially pronounced. In this case, the difference is largely attributable to the hawks, which, as noted above, are significantly less abundant at Homol'ovi I in the Late Period than they are at Homol'ovi II (see Table 4.4). In general, it is difficult to see how this discrepancy between the Late assemblages could be attributed to sampling error alone: Both assemblages are large, and the percentage of bird bones from kiva fill, where raptors might tend toward overrepresentation, is very similar at Homol'ovi I (32.1%) and Homol'ovi II (34.8%). In any event, not only does the Late assemblage from Homol'ovi I have proportionately fewer hawks than Homol'ovi II, it has proportionately fewer *raptors* than Homol'ovi II *or any other assemblage in the current dataset*. Why this might be so is a matter for further consideration.

One can envision several different scenarios that might account for the observed variability in the distribution of raptors, but at this stage it is not possible to evaluate their relative merits:

(1) Early villages had relatively equal access to raptors, but by the Late Period the social or political landscape had changed in such a way that Homol'ovi I and II were afforded different levels of access to these birds. In other words, there was a differential in social power between the two Late villages.

(2) There was a decline in the use of raptors at Homol'ovi I in the Late Period, perhaps because some ritual activities involving raptors (specifically, hawks) were taken over by Homol'ovi II. This, again, might imply a social-power difference between the two Late villages, or at least a degree of ritual interdependency.

(3) The observed patterns reflect different modes of discard. Raptors appear to be underrepresented in Late deposits at Homol'ovi I because these birds were preferentially deposited in contexts that were not sampled, such as extramural cemeteries.

(4) Post-depositional processes are partly responsible: Some of the assemblages include articulated body segments and clusters of bones that might represent disarticulated skeletons or partial skeletons. Including these aggregates in the NISP counts (with each bone counted individually) may be biasing the data in ways that are not currently predictable.

Further analysis of taphonomic and contextual data for raptor remains from the Homol'ovi sites should provide a basis for evaluating some of these different scenarios.

Intersite Variability in Hypothetical Early and Late Period Ritual Bird

Complexes. Finally, it is useful to consider how the hypothetical Early and Late ritual

bird complexes defined above vary quantitatively from site to site—not in terms of their constituent taxa, but in the aggregate. The basic temporal pattern to these complexes has already been identified; however the spatial (intersite) component has not yet been fully addressed. While there is already evidence that the hypothetical complexes are not distributed evenly among sites of different time periods (see above, *Taxonomic Rankings*), this is only part of the picture; it would also be useful to know if there are differences between contemporaneous sites. Once again, the proposed Early complex consists of turkey, hawks, and raven; the proposed Late complex includes sandhill crane, golden eagle, and owls. For sake of terminological clarity, the Early complex is referred to as the *T-H-R complex* in this section (for turkey-hawk-raven), and the Late complex is referred to as the *C-E-O complex* (for crane-eagle-owl). Table 4.5 shows %NISP data for these two complexes, by assemblage. As before, the Homol'ovi IV assemblage is generally omitted from this discussion because of its small sample size.

As expected, the T-H-R complex accounts for a larger percentage of the Early assemblages than it does the Late assemblages (see Table 4.5); in fact, this pattern would be more pronounced if the turkey burials and probable common raven burial from Homol'ovi III were included in the calculations. However, there are some notable differences between contemporaneous assemblages. Among the Early assemblages, there is a marked difference in %NISP between Homol'ovi I and III (although here the difference would be *less* pronounced if the Homol'ovi III burials were counted). There is also a significant difference in %NISP between the two Late sites. In this case, the

Table 4.5
Percent NISP Data¹ for Hypothetical Ritual Bird Complexes in Early and Late Period
Bird Assemblages from Homol'ovi I, II, III, and IV

Hypothetical Complex	Homol'ovi I Early	Homol'ovi III Early ²	Homol'ovi IV Early	Homol'ovi I Late	Homol'ovi II Late
Turkey-Hawk-Raven complex	42.0	23.4	66.7	17.6	31.2
Crane-Eagle-Owl complex	9.0	2.8	12.1	31.1	35.6
Total NISP (ID birds)	880	107	33	421	250

Notes:

¹Percent NISP for a complex is calculated by summing the individual percent NISP values for the constituent taxa.

²Percent NISP for the THR complex at Homol'ovi III does not include the turkey or probable common raven burials from this site (see Table 3.5).

difference is attributable mainly to the hawks, which are significantly more abundant at Homol'ovi II than they are at Homol'ovi I—a pattern that was already discussed above.

The C-E-O complex also behaves as anticipated with respect to time: Total %NISP for the C-E-O complex is much higher in the Late assemblages than it is in the Early assemblages. In this case, differences between contemporaneous sites are relatively minor. There is a small difference in %NISP between the two Early assemblages, which is attributable to the fact that sandhill crane and owls are slightly more abundant at Homol'ovi I than they are at Homol'ovi III. The two Late assemblages are also remarkably similar, in terms of %NISP. In both assemblages, the C-E-O complex accounts for roughly one-third of all identified bird bones. The relatively small quantitative difference between these two assemblages is mainly attributable to the owls, which are proportionately more abundant at Homol'ovi II than they are at Homol'ovi I.

In summary, although the T-H-R and C-E-O complexes clearly vary with time, within each time period they also vary to a greater or lesser extent by site. In particular, there is significant variation in the T-H-R complex among contemporaneous sites in both time periods. This could mean that different villages had unequal access to some or all of the birds in question. Looking at the %NISP data for the individual taxa, hawks are the most likely of these birds to have been differentially accessible, in either time period (see Tables 4.3 and 4.4). Ravens and turkeys, in contrast, do not exhibit as much quantitative variation between contemporaneous sites, particularly if the burials from Homol'ovi III are taken into consideration. Consequently, one might infer that hawks are not necessarily part of the same ritual aggregate as ravens and turkeys. With regard to the C-E-O complex, there is not nearly as much variation between contemporaneous assemblages. Percent NISP for the Early assemblages is uniformly low; for the Late assemblages, uniformly high. This might be construed as evidence that the three birds grouped together here do in fact constitute a single ritual aggregate that was especially prominent in the Late villages (although there are interassemblage differences at the level of individual taxa). Obviously, to determine whether or not these two groupings of birds actually represent coherent ritual complexes will require a thorough spatial and contextual analysis of the remains in question.

Birds Summary

The analyses presented above have identified a number of patterns of intersite variability in the Homol'ovi bird assemblages. The most important patterns involve the water birds, raptors, owls, raven, turkey, and sandhill crane. Some of these patterns

encompass multiple sites, and may represent shared patterns of behavior with respect to the birds in question. Other patterns are distinctive of particular sites and assemblages. Such patterns might arise if the birds in question were differentially accessible, e.g., due to socio-political boundaries or because of local environmental differences. Alternately, villages may simply have differed in their activity patterns, reflecting perhaps ethnic or cultural differences, or because their roles within the larger settlement cluster differed. Some of the patterns are based on fairly small samples, and thus are tentative.

Since the bird remains from the Homol'ovi sites are so diverse taxonomically, it has been possible to examine variability in the assemblages from a number of different perspectives. Here, the Homol'ovi bird assemblages were examined in terms of taxonomic diversity, taxonomic richness, and relative abundance (%NISP). The other faunal components to be discussed in this chapter—carnivores, artiodactyls, reptiles and amphibians—are taxonomically much less diverse than the birds. Thus, the analysis of quantitative variation in these components is greatly simplified. In general, the sections that follow emphasize relative abundance (%NISP) as the principal analytical tool for identifying patterns of intersite variation.

Carnivores: Temporal and Intersite Patterns

The major carnivore taxa in the Homol'ovi assemblages are coyote or domestic dog (coyote/dog), fox (gray and red), bobcat, and badger (see Table 3.6). There is also an inconsequential amount of unidentified canid material, which does not play a major role in the present discussion. Finally, there are unique specimens tentatively identified as

mountain lion (juvenile) and western spotted skunk, both in the Early assemblage from Homol'ovi I.

The carnivore assemblages from Homol'ovi I, II, III, and IV differ primarily in the relative abundance of the four major taxa listed above. Table 4.6 shows %NISP data for the three Early carnivore assemblages and the two Late carnivore assemblages. Note that the assemblages from Homol'ovi III and IV are particularly small (< 100 identified specimens), which makes it difficult to compare them quantitatively to the larger assemblages from Homol'ovi I and II.

Comparison of Early Period Carnivore Assemblages

The three Early carnivore assemblages vary markedly in taxonomic composition. Bobcat is the most abundant taxon at Homol'ovi I (34.6% NISP), followed by coyote/dog (28.8% NISP), fox (21.6% NISP), and badger (13.1% NISP). All of the fox specimens from this assemblage come from a single room, and may well represent just one individual (possibly, the remains of a gray fox pelt). The Homol'ovi III assemblage, in contrast, is dominated by coyote/dog (47.5% NISP; or 67.5% NISP with the unidentified canid remains added in), followed by badger (27.5% NISP), and bobcat (5.0% NISP). The assemblage from Homol'ovi IV is made up almost entirely of coyote/dog remains (97.7% NISP; the rest are unidentified canids). The vast majority of the Homol'ovi IV carnivore assemblage comes from a single vandalized kiva, hence the current sample may not be representative of carnivore-use patterns for the site as a whole. In general, while the observed variation among the three Early sites may reflect real cultural patterns, there is a distinct possibility that sampling error is a factor as well.

Table 4.6
Percent NISP Data for Identified Carnivore Taxa in Early and Late Period Carnivore Assemblages from Homol’ovi I, II, III, and IV¹

Taxon	Homol’ovi I Early	Homol’ovi III Early	Homol’ovi IV Early	Homol’ovi I Late	Homol’ovi II Late
Coyote/dog	28.8	47.5	97.7	66.2	90.0
Fox	21.6	–	–	2.3	0.7
Canid, unid.	0.7	20.0	2.3	2.6	2.9
Bobcat	34.6	5.0	–	7.9	4.3
cf. Mountain lion	0.7	–	–	–	–
Badger	13.1	27.5	–	21.1	2.1
cf. Skunk	0.7	–	–	–	–
Total NISP (ID carnivores)	153	40	88	266	140

Note:

¹Percent NISP is calculated as the percentage out of all identified carnivores (identified to family or better). Some taxonomic categories include “cf.” specimens. Coyote/dog includes all specimens identified to genus *Canis*. Fox includes red and gray fox specimens.

Based on these data, there is currently no evidence that the three Early sites shared a common pattern of carnivore usage. Bobcat is the most prominent carnivore at Homol’ovi I, but this species is barely represented outside of this site. Interestingly, mountain lion, another type of felid, is also represented in this same Homol’ovi I assemblage—by a single, cut and painted metatarsal from an immature individual. Based on these observations, it seems likely that bobcat played an important role at Homol’ovi I in this period; in fact, felids in general may have held a special place in this community. Among the Hopi historically, felids often appeared in ceremonial contexts associated with warfare (e.g., see Stephen 1936:98, 307, 643, 700, and Figure 64a). Coyote/dog is the most dominant carnivore taxon at the other Early sites, at least in the current samples.

This pattern is interesting because it is similar to what one finds among the Late sites discussed below.

Comparison of Late Period Carnivore Assemblages

The Late carnivore assemblages from Homol'ovi I and II are fairly similar in taxonomic structure, at least insofar as they are both dominated by coyote/dog. Coyote/dog remains account for nearly two-thirds of the Homol'ovi I assemblage (66.2% NISP), and for the vast majority of the Homol'ovi II assemblage (90.0% NISP). Bobcat, badger, and fox are also represented in both assemblages, but these taxa generally account for only a small percentage of the identified carnivore remains. The single exception is found in the Homol'ovi I assemblage, where badger accounts for more than one-fifth of all identified carnivores (21.1% NISP). At Homol'ovi II, in contrast, badger is much less abundant (2.1% NISP). This disparity may be the result of preferential use and discard of badger paws at Homol'ovi I in the Late Period—a pattern that was noted earlier, in Chapter 3. Badger paws contain numerous individual bones, and the presence of even a few paws in an assemblage would tend to inflate NISP counts.

The prevalence of coyote/dog remains at both Homol'ovi I and II constitutes a shared pattern of carnivore usage between these two Late sites. It is currently unclear if this pattern first emerged during the Late Period, or if there were Early-period antecedents. While coyote/dog is in fact the dominant carnivore in the Early assemblages from Homol'ovi III and IV, this pattern may be unreliable because of the small sample sizes involved. Coyote/dog is also fairly well represented in the Early assemblage from Homol'ovi I, but it is not dominant. Whatever its origins, the coyote/dog pattern was

firmly entrenched in the Late villages. Furthermore, the pattern was seemingly elaborated at Homol'ovi I, where it may well have involved a sacrificial element. Here, several decapitated juvenile coyote/dog burials have been found in Late deposits (see discussion in Chapter 3 and data in Table 3.7). The partial, mature coyote/dog skeleton recovered from Kiva 8 at AZ J:14:316 (ASM) near Homol'ovi I is also dated to the Late Period. So far, no coyote/dog skeletons, sacrificial or otherwise, have been recovered from Homol'ovi II.

What the coyote/dog pattern might mean is currently a matter for speculation. The pattern could be quite ancient, as there is evidence for ritualized use of coyote/dog remains going quite far back in time in the northern Southwest (e.g., Hill 2000:Table 7). Historically, there are indications that coyotes were linked conceptually with witches and witchcraft power among the Hopi (Bradfield 1995:266; Hill 2000; Stephen 1936:1281; Titiev 1942:549). Stephen (1936:265), for instance, reports a case from First Mesa where a village dog was captured and killed by hanging—much as a human witch might be dispatched. In another journal entry, Stephen (1936:555) recounts an incident where a village dog was stoned to death and decapitated, apparently as a sacrifice to Masau'u. This and other conceptual linkages with Masau'u (e.g., Stephen 1936:995) suggest that coyotes and other, closely-related canids may have been associated with death, fire, warfare, or any of the other attributes of this Hopi deity (Bradfield 1995:268). As possible evidence that these canids were associated with death in the Pueblo IV Period, Fewkes (1904:27) recovered a dog skull from a human mortuary context at Chavez Pass. Among the Zuni, coyotes are associated with hunting and its attendant rituals—such as

those of the Sus'kikwe (Coyote) Fraternity, also known as the Hunters Fraternity (Stevenson 1904:438-443). Finally, use of these canids for food and skins cannot be ruled out, and it is possible that some of the coyote/dog material at Homol'ovi I entered the archaeological record through purely utilitarian activities.

The concentration of badger remains in the Late assemblage from Homol'ovi I is interesting, and may have a particular ritual significance. Badger is associated with medicine and curing among the Western Pueblos generally. In reference to Hopi, Eggan (1950:84) reports that badger is "the medicine animal *par excellence*, and through his digging ability controls all roots." At Zuni, badger is one of the "Beast Gods," which have medicinal powers (e.g., Bunzel 1932a:528). The abundant badger-paw elements in the Late Homol'ovi I assemblage may represent the remains of fetishes, particularly curing fetishes. Badger is fairly well represented in the Early assemblages from Homol'ovi I and III as well, but elements from the paws are not nearly as abundant in these assemblages as they are in the Late assemblage from Homol'ovi I (see Chapter 3). Thus, while there may be Early-period antecedents for use of badger in general, the Late Homol'ovi I pattern appears to be relatively distinctive.

Artiodactyls: Temporal and Intersite Patterns

The artiodactyl assemblages from the Homol'ovi sites are also fairly uncomplicated, taxonomically. The major taxa are bighorn sheep, pronghorn, and deer (see Table 3.8). Additionally, a single specimen in the Homol'ovi I Late assemblage has been identified provisionally as bison.

There is significant interassemblage variation in the relative proportions of the three major artiodactyl taxa. Table 4.7 shows %NISP data for the three Early assemblages and for the two Late assemblages. The assemblages from Homol'ovi II, III, and IV are fairly small (< 100 identified specimens), making it difficult to compare them to the larger assemblages from Homol'ovi I. Hence, any cluster-wide patterns that emerge from this limited dataset should be considered tentative.

It also should be mentioned that differential, off-site disposal of large animal remains could have impacted some of the patterns reported below. Beaglehole (1936:7-8, 11), for instance, reports that Second-Mesa Hopi hunters sometimes deposited the bones of pronghorn, deer, and bighorn sheep on shrines located close to, but outside of, the village proper. In such cases, the bones were not broken up for marrow; the skull and post-cranial elements were streaked with red ochre and sprinkled with corn meal prior to deposition. Similarly, Parsons (1939:308) reports on a Zuni cave shrine where members of the Hunters society deposited skulls of prey animals. If off-site disposal practices such as these were prevalent at Homol'ovi, the zooarchaeological record of large mammals at these sites could be biased in ways that are not entirely predictable. However, the documented presence of pigment-streaked large mammal bones, including crania, in room deposits at Homol'ovi I indicates that off-site disposal—if practiced at all—was not the exclusive mode of discard for ritually treated artiodactyl bones at these sites.

Comparison of Early Period Artiodactyl Assemblages

Bighorn sheep, pronghorn, and deer are present in each of the three Early assemblages; however the proportions vary markedly from one site to the next.

Table 4.7

Percent NISP Data for Identified Artiodactyl Taxa in Early and Late Period Artiodactyl Assemblages from Homol'ovi I, II, III, and IV¹

Taxon	Homol'ovi I Early	Homol'ovi III Early	Homol'ovi IV Early	Homol'ovi I Late	Homol'ovi II Late
Bighorn sheep	56.6	7.7	13.0	16.4	23.7
Pronghorn	25.5	57.7	24.6	58.2	60.5
Deer	17.9	34.6	62.3	24.5	15.8
cf. Bison	–	–	–	0.9	–
Total NISP (ID artiodactyls)	196	26	69	110	38

Note:

¹Percent NISP is calculated as the percentage out of all identified artiodactyls (identified to family or better). Some taxonomic categories include “cf.” specimens. Deer includes all specimens identified to genus *Odocoileus*.

Interestingly, the taxon of greatest abundance is different in each assemblage: Bighorn is dominant at Homol'ovi I (56.6% NISP); pronghorn at Homol'ovi III (57.7% NISP); and deer at Homol'ovi IV (62.3% NISP). Whereas a particular taxon may be dominant at one site, it generally occurs at much lower levels in the others. For instance, while bighorn is the dominant artiodactyl in the Early assemblage from Homol'ovi I (again, 56.6% NISP), it represents a much smaller proportion of the assemblages from Homol'ovi III (7.7% NISP) and Homol'ovi IV (13.0% NISP). This variation might reflect hunting preferences or territorial differences among the occupants of Homol'ovi I, III, and IV. On the other hand, sampling error may well be a factor, especially considering the small size of the assemblages from Homol'ovi III and IV. In any event, there is currently no evidence for a single, cluster-wide pattern of artiodactyl usage among the Early sites.

It is important to point out that the Early assemblage from Homol'ovi I seems anomalous in the sense that a non-local species, bighorn sheep, is the most abundant taxon in the assemblage. Logically, one would expect that locally-available pronghorn and deer would be the most prevalent taxa at Homol'ovi I, as they are at Homol'ovi III and IV (see discussion in Chapter 1). At this point, one can do little more than speculate as to why the Early occupants of Homol'ovi I might have preferentially targeted bighorn over local species. Given the probable northern (Tusayan/Kayenta) origins of the first-generation settlers of Homol'ovi I and other Homol'ovi sites (Lyons 2001, 2003:39-61), however, it is possible that this pattern may also be of northern derivation. This idea is explored in more detail below, including discussion of evidence provisionally linking the bighorn pattern at Homol'ovi I to archaeological manifestations in the Kayenta region. It is suggested that bighorn-hunting was part of a socio-ceremonial complex brought to Homol'ovi I by immigrants from the north.

Comparison of Late Period Artiodactyl Assemblages

The Late artiodactyl assemblages from Homol'ovi I and II are fairly similar, taxonomically. Both assemblages are dominated by pronghorn. In fact, this species represents well over half of the identified artiodactyl remains from Homol'ovi I (58.2% NISP), and nearly two-thirds of the identified remains from Homol'ovi II (60.5% NISP). Although there is some variation in the proportions of deer and bighorn, these taxa occur at fairly low levels (< 25% NISP) at both Late sites.

The fact that the two Late assemblages are taxonomically similar might indicate that Homol'ovi I and II were using similar or even overlapping hunting territories; that

both communities were preferentially targeting the same species; or that large animal products were shared extensively between the two Late villages, thereby leveling out any major differences in the faunal assemblages. Based on the %NISP data, it would seem that pronghorn became the artiodactyl species of choice for both Late villages, although it is currently unclear why this might have been the case. One possibility is that hunters from both Late villages were more closely tethered to the area around the settlement cluster. Under such conditions, one would expect to find more locally-available species, such as pronghorn, in the resulting faunal assemblages, and fewer long-distance species, such as bighorn. It is also possible that the long-distance hunting of bighorn was simply deemphasized or abandoned at Homol'ovi I in the Late Period.

Indeed, there is evidence that a change in hunting practices is at least partly responsible for the numerical decline of bighorn at Homol'ovi I in the Late period. The distribution of skeletal elements in the artiodactyl assemblages suggests that bighorn, pronghorn, and deer were all being hunted by the residents of Homol'ovi I in the Early period, but by the Late period only pronghorn and deer were being brought back to the site (Tables 4.8 and 4.9). In the Early artiodactyl assemblage from Homol'ovi I, all major body portions—skull, vertebrae, ribcage, pelvis, forelimb, hindlimb, and extremities—are at least present for bighorn and pronghorn, and deer is represented by all portions except the ribcage (see Table 4.8). This suggests that bighorn, pronghorn, and deer carcasses were being brought back to Homol'ovi I in the Early period. In the Late artiodactyl assemblage from Homol'ovi I, however, only pronghorn and deer are represented by the full suite of body portions, or something close to it (no deer vertebrae

Table 4.8
NISP Counts by Body Portion, Element, and Taxon in the Early Period Artiodactyl
Assemblage from Homol'ovi I

Body Portion/ Element	Taxon				Total Specimens
	Bighorn Sheep	Pronghorn	Deer	Unidentified Artiodactyls ¹	
Skull (total)	28	7	18	134	187
cranium	15	2	1	87	105
mandible	–	3	4	7	14
teeth	7	2	5	37	51
horn/antler	6	–	8	3	17
Vertebrae (total)	3	3	1	167	174
cervical	3	3	–	26	32
thoracic	–	–	1	72	73
lumbar	–	–	–	34	34
sacral	–	–	–	8	8
caudal	–	–	–	8	8
unknown	–	–	–	19	19
Ribcage (total)	2	1	–	254	257
rib	–	–	–	216	216
costal cartilage	–	–	–	30	30
sternum	2	1	–	8	11
Pelvis (total)	3	4	–	25	32
Forelimb (total)	11	5	6	67	89
humerus/radius/ulna	9	5	6	48	68
scapula	2	–	–	19	21
Hindlimb (total)	8	4	5	54	71
femur/tibia/fibula	8	4	5	53	70
patella	–	–	–	1	1
Extremities (total)	56	26	5	92	179
carpal/tarsal	18	5	2	12	37
metapodial	4	4	–	42	50
phalanx	34	17	3	38	92
Unidentified (total)	–	–	–	462	462
long bone	–	–	–	289	289
flat bone	–	–	–	55	55
spongy bone	–	–	–	95	95
other	–	–	–	23	23
Total Specimens	111	50	35	1255	1451

Note:

¹Category includes unidentified medium/large and large mammals (probable artiodactyls).

Table 4.9
NISP Counts by Body Portion, Element, and Taxon in the Late Period Artiodactyl
Assemblage from Homol'ovi I

Body Portion/ Element	Taxon				Total Specimens
	Bighorn Sheep	Pronghorn	Deer	Unidentified Artiodactyls ¹	
Skull (total)	14	9	17	83	123
cranium	2	1	–	39	42
mandible	1	4	2	16	23
teeth	1	4	4	27	36
horn/antler	10	–	11	1	22
Vertebrae (total)	–	1	–	56	57
cervical	–	–	–	8	8
thoracic	–	1	–	16	17
lumbar	–	–	–	11	11
sacral	–	–	–	1	1
caudal	–	–	–	1	1
unknown	–	–	–	19	19
Ribcage (total)	–	1	1	72	74
rib	–	1	1	63	65
costal cartilage	–	–	–	8	8
sternum	–	–	–	1	1
Pelvis (total)	–	–	1	5	6
Forelimb (total)	–	14	2	21	37
humerus/radius/ulna	–	10	2	15	27
scapula	–	4	–	6	10
Hindlimb (total)	–	2	1	7	10
femur/tibia/fibula	–	2	1	5	8
patella	–	–	–	2	2
Extremities (total)	4	33	5	33	75
carpal/tarsal	4	14	–	4	22
metapodial	–	4	1	19	24
phalanx	–	15	4	10	29
Unidentified (total)	–	4	–	245	249
long bone	–	–	–	136	136
flat bone	–	–	–	23	23
spongy bone	–	–	–	81	81
other	–	4	–	5	9
Total Specimens	18	64	27	522	631

Note:

¹Category includes unidentified medium/large and large mammals (probable artiodactyls).

were identified) (see Table 4.9). Bighorn, in contrast, is represented only by elements from the skull and extremities (in this case, carpals and tarsals). This pattern, combined with the numerical decline in bighorn specimens from the Early-period assemblage (NISP=111) to the Late-period assemblage (NISP=18), strongly suggests that bighorn carcasses were no longer being brought back to Homol'ovi I in the Late period—at least not in any great numbers. In fact, it is possible that all or most of the bighorn material in the Late-period assemblage represents curated items that had been acquired earlier. Furthermore, several of the Late-period specimens, such as painted and/or purposefully buried crania, strongly suggest ritual usage.

To put the Late-period pattern at Homol'ovi I into proper perspective, only nine (NISP) bighorn specimens were recovered from Homol'ovi II, yet this small, Late-period assemblage includes elements from the skull, vertebrae, forelimb, hindlimb, and extremities. Given how little bighorn material is present in the Late-period assemblages from Homol'ovi I and II, combined with the odd distribution of skeletal elements in the Late-period assemblage from Homol'ovi I, it is clear that there was a radical change of some sort in the procurement and use of this species by the late 1300s. Presumably, bighorn were not available in the local Homol'ovi region, but had to be procured from relatively distant areas. Perhaps hunting parties from Homol'ovi I were no longer willing or able to travel over long distances to procure bighorn in the Late period, but settled instead for locally available pronghorn and deer.

There also may be an ethnic dimension to the changing patterns of artiodactyl use at Homol'ovi I. Based on ceramic and architectural evidence, Lyons (2003:39-61) has

argued that the founding populations of Homol'ovi I and other Homol'ovi sites included migrants from the Tusayan/Kayenta region. The canyonlands north of Black Mesa, including the Kayenta heartland, contain numerous examples of bighorn imagery in rock art, and large-mammal assemblages from the region are typically dominated by bighorn remains (see Grant 1980; Kidder and Guernsey 1919:193-199; Schaafsma 1980:143-153). In this respect, the region is relatively unique among the various centers of Western Pueblo population. The treatment of bighorn in Kayenta rock art strongly suggests that this animal had ritual and/or mythological significance to the occupants of the region. The image of a flute-player, for instance, appears alongside bighorn glyphs in several of the rock-art panels documented by Kidder and Guernsey (1919), Schaafsma (1980), and Turner (1963) in the Kayenta-Glen Canyon area. Interestingly enough, this particular combination of motifs recurs in historical times in the Hopi Flute Ceremony, portions of which are presided over by Alosaka, a bighorn deity (e.g., see Stephen 1936:768-817).

If there were a Kayenta enclave among the early settlers of Homol'ovi I, it is possible that they brought some aspects of a northern, bighorn-oriented socio-religious complex with them. Logically, one might expect that communal hunting would have played a major role in such a complex. The evidence presented above suggests that the residents of Homol'ovi I did in fact hunt bighorn in the Early period, perhaps traveling great distances to do so; this behavior apparently ceased by the Late period, however. After several generations, the knowledge and social networks needed to acquire bighorn may have been lost. Alternately, this region-specific socio-ceremonial complex, along

with its attendant social roles and identities, may have been deemphasized in the wake of the mid-to-late 14th-century florescence of katsina ceremonialism in the Homol'ovi region.

Reptiles and Amphibians: Temporal and Intersite Patterns

As in previous chapters, the present discussion of reptiles and amphibians from Homol'ovi I, II, III, and IV is restricted to forms that are likely to have had ritual or ceremonial significance. These include anurans (frogs and toads), pit vipers (rattlesnakes), and turtles of various kinds. Lizards and common harmless snakes are omitted from the discussion, in part because the bulk of the remains are clearly intrusive (e.g., whole or partial skeletons found in natural, post-abandonment deposits). Since the taxa of interest are so rare, especially outside of Homol'ovi I, there is little point in pursuing the question of intersite patterns in terms of relative abundance; rather, this discussion generally focuses on the presence or absence of taxa at the sites under consideration. NISP data for the reptile and amphibian assemblages are found in Table 3.9.

Comparison of Early Period Reptile and Amphibian Assemblages

There is seemingly no consistent pattern in the reptile and amphibian assemblages from the three Early sites. The Homol'ovi I assemblage includes numerous turtle specimens (NISP=32), with examples of western box turtle, painted turtle, and Sonoran mud turtle. The Homol'ovi III assemblage yielded examples of true toads (NISP=1) and turtles (NISP=2), including western box turtle. Finally, the Homol'ovi IV faunal sample produced no reptile or amphibian remains of any kind. Once again, it is certainly

possible that sampling error is at least partly responsible for the observed distributions, especially considering how rare these taxa are in the present samples. In any event, it should be noted that pit vipers are completely absent from the Early assemblages.

Comparison of Late Period Reptile and Amphibian Assemblages

The Late reptile and amphibian assemblages from Homol'ovi I and II are broadly similar to each other, insofar as the same basic taxa are present in both. The Homol'ovi I assemblage includes true toads (NISP=14), pit vipers (NISP=6), and turtles (NISP=65), including western box turtle and painted turtle. The Homol'ovi II assemblage also includes examples of true toads (NISP=12), pit vipers (NISP=1), and painted turtle (NISP=11).

Aside from the general similarity of the Late assemblages, it is also interesting that pit vipers are represented in both Late assemblages, whereas they were not represented in any of the Early assemblages. There are so few specimens involved, however, that this point should not be over-emphasized. Nonetheless, given the importance of rattlesnakes in certain historical-period Hopi ceremonies, the appearance of this rare taxon in both Late assemblages is at least noteworthy.

Conclusions

The stated goal of this chapter was to identify patterns of taxonomic variation in the Homol'ovi faunal assemblages at a regional scale. The point of this analysis was to view Homol'ovi I, II, III, and IV not as isolated sites, but as parts of a larger whole. This perspective incorporates both temporal and spatial axes of variation, with groups of roughly contemporaneous sites serving as the major frames of reference: Homol'ovi I,

III, and IV in the Early Period; and Homol'ovi I and II in the Late Period. It is still not entirely clear how sites within this settlement cluster were related to each other, especially in terms of the social and ceremonial networks that may have linked them together (but see Adams 2002:Chapter 7). It was hoped that the present analysis might shed some light on these relationships, at least insofar as they are revealed through patterns of faunal exploitation.

Indeed, the analyses in this chapter found evidence for patterned variation among both Early and Late faunal assemblages. In general, there appears to be fewer shared patterns among the Early sites than among the Late sites. The most important similarities among the Early assemblages all revolve around birds. Three groups of birds—turkey, hawks, and raven—are generally well represented in these assemblages. Additionally, several groups of water birds are proportionately abundant at both Homol'ovi I and III. This is where the major similarities end, however: The carnivore and artiodactyl assemblages from the Early sites are all structured differently, with different taxa dominating the respective assemblages at each site. In contrast, the Late sites, Homol'ovi I and II, exhibit a greater number of shared patterns across a wider range of taxa. In the Late bird assemblages, five of the highest-ranked taxa (sandhill crane, golden eagle, owls, raven, geese/ducks) are the same at Homol'ovi I and II; the carnivore assemblages from both sites are dominated by coyote/dog; the artiodactyl assemblages are both dominated by pronghorn; and there are basic similarities in the amphibian and reptile assemblages, including the fact that pit vipers are represented at both sites. Overall, there appears to be

less intersite variability among the Late assemblages, in terms of taxonomic composition, than there is among the Early assemblages.

The broader significance of these patterns, and what they might signify about changing social and ceremonial relationships among the villages of the Homol'ovi settlement cluster, are matters for further investigation. At present, one can only speculate as to what the patterns might mean.

If sampling error is not the primary cause of the observed differences among the Early faunal assemblages from Homol'ovi I, III, and IV, then it would seem that these three villages were pursuing fairly distinct patterns of faunal acquisition, use, and discard. This may reflect ethnic, religious, territorial, or microenvironmental differences among the communities in question. It has been suggested that at least some of the distinctive aspects of the Early fauna from Homol'ovi I, particularly the prevalence of bighorn sheep in the artiodactyl assemblage, might signify the presence at this site of an enclave of immigrants from the Kayenta region, and the persistence of ancestral socio-ceremonial patterns at Homol'ovi I that are ultimately traceable to the canyonlands north of the Hopi Mesas. The Homol'ovi III fauna is distinctive in its own right; in addition to the patterns noted so far in this chapter, it is also important to mention that this is the only site in the Homol'ovi settlement cluster where macaw (*Ara* sp.) remains have been found. The presence of two macaw burials at Homol'ovi III (Pierce 2001) indicates that the people who used this site participated in certain long-distance exchange relationships which, judging from dearth of macaws from the other Homol'ovi sites, appear to have been relatively exclusive in character.

The general similarity of the Late faunal assemblage from Homol'ovi I and II is intriguing, especially considering the other material similarities between these Late sites. For instance, the decorated ware ceramic assemblages from both Late sites are dominated by Jeddito Yellow Ware pottery imported from the Hopi Mesas, whereas the Early ceramics from Homol'ovi I had been a more heterogeneous mix of local, northern, and eastern types (see Chapter 2). Large, open-air plazas were the focal points for both Late villages, and these public spaces seem to have been dedicated to ceremonial rather than domestic functions (e.g., see Adams 2002:144-154). Finally, the Late occupations at Homol'ovi I and II exhibit characteristic patterns of ceremonial-structure closure, which include structure-burning and manipulation of human remains (Walker 1995a; LaMotta 1996; Karunaratne 1997; Strand 1998).

In the past, researchers have attributed at least some of these patterns to the introduction and widespread adoption of katsina ceremonialism; specifically, an intensive and perhaps hierarchically-organized version of katsina ceremonies tracing its origins to the Hopi Mesas (Walker et al. 2000). Support for this model comes from katsina-like imagery in rock-art panels surrounding Homol'ovi II, and on decorated ware (including Jeddito Yellow Ware) ceramics found at both Homol'ovi I and II (Cole 1992; Hays 1989). While it would be satisfying to attribute the faunal similarities between Homol'ovi I and II to this same process of ritual transformation, it is not possible to tie all aspects of the Late faunal pattern directly to katsina ceremonialism, at least as it is represented in ethnographic accounts. The prevalence of golden eagle in both Late assemblages, and the differential distribution of hawk remains between the two Late sites,

could certainly be interpreted as evidence for an intensified, hierarchical katsina cult in these villages. Some of the other distinctive Late faunal patterns may reflect activities of non-katsina religious organizations that were introduced at about the same time as Hopi katsina ceremonialism, but which have not yet been recognized iconographically. Finally, some of the observed changes in the fauna may not be related directly to ritual at all. For instance, the fact that two important non-local species, turkey and bighorn sheep, disappeared or declined sharply by the Late Period may signify that Homol'ovi I's hunting territory had become constricted or that certain long-distance relationships had been severed or radically altered sometime in the mid-to-late 1300s.

The patterns and scenarios discussed in this chapter are meant to be provocative, not definitive. Obviously, the small sample sizes behind some of the patterns are matters for concern, and it is likely that at least some of these patterns ultimately will be attributable to sampling error. Nonetheless, it should be possible to evaluate at least some of these models through a more detailed analysis of the contextual associations of the remains in question. Future analyses should draw on the detailed contextual data available from HRP excavations at the Homol'ovi sites to do just this.

CHAPTER 5: CONCLUSIONS AND FUTURE RESEARCH

Recapitulation

This dissertation has presented two major bodies of research, both geared toward the ultimate development of a comprehensive, deposit-oriented research program on ritual organization and change at Homol'ovi. The first of these was a ceramic chronology study that focused on the Jeddito Yellow Ware sequence from Homol'ovi I, and on select JYW-bearing contexts from Homol'ovi II and III (Chapter 2). The second was a zooarchaeological study of ritually sensitive faunal remains from Homol'ovi I, II, III, and IV (Chapters 3 and 4). While the topic of ritual process at Homol'ovi was only discussed in a preliminary, exploratory fashion in this study (see Chapter 4), the chronological framework and fauna datasets developed herein are fundamental to all future research on the subject. As such, this dissertation offers a significant methodological contribution to the study of ritual and other aspects of ancient life at Homol'ovi. This final chapter summarizes the results of the ceramic chronology and zooarchaeology studies, points out areas where the work could be improved, and discusses ongoing and potential future applications of the findings.

The Jeddito Yellow Ware Chronology

The Homol'ovi I ceramic chronology study demonstrated that decorated ware ceramic assemblages (hence, deposits) from this site can be seriated accurately by means of the percentage of Jeddito Yellow Ware pottery—a statistic called the *Jeddito Yellow Ware index* (% JYW). This index was used to subdivide the Homol'ovi Phase, which corresponds to the period from the initial appearance of Jeddito Yellow Ware pottery

until the abandonment of the region (approximately A.D. 1325-1400), into Early, Middle, and Late components. The point of this exercise was to define a number of short, discrete (although not necessarily equal) units of time which would provide basic analytical units in future research on Homol'ovi I generally. Statistical analysis of known, time-transgressive, stylistic and technological attributes of JYW pottery confirmed that the proposed subdivisions do in fact represent relatively discrete, sequential slices of time. The most important of these attributes is the rim-to-banding line distance, which has been shown stratigraphically to covary in a direct, positive manner with the passage of time (LaMotta 2002b; Levstik 1999). The Early, Middle, and Late subdivisions of the Homol'ovi Phase were then dated by means of ceramic cross-dating and high-precision AMS radiocarbon dating.

Certain aspects of the Homol'ovi I Jeddito Yellow Ware chronology could certainly be improved with additional, focused research. In particular, the Middle Homol'ovi Phase is relatively under-represented in the present sample, in terms of both the number of assemblages and the total number of decorated ware sherds. Also, approximately one-third of MHP assemblages come from deposits with potential integrity problems resulting from natural and/or cultural disturbance processes. Additional ceramic data from undisturbed MHP contexts are therefore needed to improve the present sample, with the goal of further refining the beginning and end dates for this phase. The Tuwiuca Phase is also under-represented, and deposits of this age should be targeted for future analysis. It is important, for instance, to confirm the proposed end-date for the Tuwiuca

Phase at Homol'ovi I, which, by definition, corresponds to the start-date for JYW pottery at the site.

Additional high-precision AMS radiocarbon dates from key contexts might also help to refine the absolute dating of all ceramic phases at Homol'ovi I. The radiocarbon samples reported in the present study were chosen for analysis prior to completion of the JYW seriation for Homol'ovi I. While a fairly representative cross-section of contexts was dated, in hindsight there are some noticeable gaps (see Table 2.11). The most important gap is in the area of the EHP/MHP boundary; in fact, there is only one radiocarbon date for the portion of the sequence between 33.1 and 61.4 percent JYW. Additionally, the earliest and latest portions of the sequence at Homol'ovi I have not been well dated chronometrically: There is only a single radiocarbon date for the Tuwiuca Phase, and there are no dates for the very latest portion of the LHP (with % JYW \geq 90%). With the JYW seriation now in hand, it should be possible to hand-pick contexts for radiocarbon dating to fill these gaps.

While there is always a chance that individual calibrated radiocarbon results will be too imprecise for use in refining the Homol'ovi I chronology, this study has explored several analytical techniques that can potentially improve the value of radiocarbon data when used in combination with ceramic data. One of these techniques involves eliminating one or more portions of a split radiocarbon date on the basis of associated, temporally diagnostic ceramics. Another technique plotted uncalibrated radiocarbon dates against their associated JYW index values (as a proxy for time), and then compared the resulting graph to the calibration curve for the period (see Figure 2.6). The goal in

this case was to situate the uncalibrated dates relative to various prominent features (peaks, valleys) in the calibration curve, thus placing certain topographic limits on the true ages of the dated samples.

Another goal of the Homol'ovi I ceramic chronology study was to determine if contexts from other sites could be tied into the Homol'ovi I sequence by means of the Jeddito Yellow Ware index. Analysis showed that contexts from Homol'ovi II could in fact be correlated with the Homol'ovi I sequence. This conclusion is based largely on comparison of stylistic and technological attributes of JYW pottery from the two sites, particularly the rim-to-banding line distance (RD) on bowl rims. The rim-to-banding line distance measure will continue to serve as an important, independent means for dating JYW assemblages in future research at Homol'ovi and elsewhere, most notably to control for non-temporal factors which might affect site-to-site variation in the JYW index.

Several recent and on-going applications of the rim-to-banding line distance measure are worth mentioning, if only to hint at the future potential of the technique—not only as a tool for chronology-building, but also for investigating issues such as ceramic exchange and rates of cultural deposition. The Homol'ovi Research Program has already begun to implement banding line research in its efforts to construct a ceramic chronology for Chevelon Ruin (AZ P:2:11 [ASM]), located approximately 18 km southeast of Winslow at the confluence of the Little Colorado River and Chevelon Creek (E. Charles Adams, personal communication, 2006). Banding line data will be critical for calibrating the Chevelon chronology with sequences from other Homol'ovi sites, and for

determining if the JYW index can be used to tie deposits from Chevelon into the regional chronology developed in the present study.

The potential utility of the rim-to-banding line distance measure as a dating technique extends far beyond the Homol'ovi region, however. Researchers affiliated with the University of Redlands (California), for instance, have recently begun collecting banding line data from surface-collected JYW bowl rims from Awatovi and other Antelope Mesa sites within the JYW production zone (Wesley Bernardini, personal communication, 2006). Additionally, researchers at the Museum of Northern Arizona and Harvard Peabody Museum have been recording banding line data for JYW vessels from various Antelope Mesa sites as part of a Getty Foundation-funded research grant on fourteenth- and fifteenth-century Hopi mural and pottery painting (Kelley Hays-Gilpin, personal communication, 2006). The data generated by these projects, once they are tied into the Homol'ovi I chronology, will undoubtedly allow researchers to refine the internal chronologies of these important Hopi sites, and may ultimately provide a means for correlating changes at Homol'ovi with events and processes at JYW-producing villages on the Hopi Mesas.

Rim-to-banding line distance statistics may also prove useful for studying patterns of ceramic exchange among fourteenth-century Pueblo villages. Hopi-made JYW pottery was traded widely throughout the northern Southwest in the fourteenth century A.D. (Adams et al. 1993; Benitez 1999). Conceivably, researchers could utilize rim-to-banding line distance statistics, in combination with ceramic frequency data, to study the timing and rate of exchange of JYW to regions outside the production zone. It should be

possible to determine, for instance, when JYW first arrived in a region using banding line statistics, and how long it took JYW pottery to reach certain benchmark proportions (e.g., 25%, 50%, 75%) of the local decorated ware assemblages. Although it is now possible to make such assessments for the Homol'ovi sites, banding line data are needed for other regions outside of the Hopi-Mesas production zone. Ceramic collections from sites on Anderson Mesa, in the upper Little Colorado drainage, and in the Verde Valley are among the most obvious candidates for this kind of research. Such a study would be useful not only for documenting patterns of economic exchange, but also for tracking the fourteenth-century spread of Hopi influence and whatever social or religious institutions this might connote (e.g., the katsina complex).

Finally, future research should explore the use of JYW rim-to-banding line distance data as a tool for gauging relative differences in the rate of deposition among cultural deposits. Since the rim-to-banding line distance measure is sensitive to the passage of time, assemblages that formed relatively rapidly should exhibit less variance than assemblages that formed over a more extended period of time, all else being equal (e.g., no redeposition). Researchers have already begun to explore these ideas with ceramic assemblages from Homol'ovi I, and preliminary results are encouraging (Levstik 1999). However, it is not yet clear if the general (systemic-context) variance in rim-to-banding line distance was constant throughout the fourteenth century—a key assumption. Should this approach prove viable, it will certainly be an important contribution to the study of site formation processes (Schiffer 1987). At Homol'ovi, this use of banding line statistics is potentially applicable in key areas of research into ritual deposition, for

example to estimate how rapidly plazas were built and remodeled, or how quickly abandoned kivas were filled with trash and buried.

Ritually Sensitive Fauna

The zooarchaeological portion of this study significantly enlarged the sample of analyzed, ritually sensitive fauna from Homol'ovi I, building on an already-sizable dataset created by Jennifer G. Strand (1998) as part of her dissertation research on the Homol'ovi fauna. The present study focused on analyzing birds, carnivores, artiodactyls, and certain reptiles and amphibians, both as a matter of practicality and because Western Pueblo ethnography documents that the most important ritually utilized species are to be found within these categories. In addition to the Homol'ovi I faunal analysis, this study compiled information on ritually sensitive faunal taxa from previous analyses of material from Homol'ovi II, III, and IV, and then partitioned these assemblages according to the ceramic phases defined earlier in this study. Thus, Chapter 3 presents taxonomic profiles for ritually sensitive fauna from Homol'ovi I, II, III, and IV, divided into Tuwiuca Phase and Early, Middle, and Late Homol'ovi Phase components. The point of this exercise was to organize the assemblages under a single chronological framework, thereby facilitating the identification of both synchronic (spatial) patterns and diachronic (temporal) trends in the regional faunal dataset.

Finally, this study made some exploratory forays into the time-space matrix of faunal data presented in Chapter 3 to identify (a) temporal trends—cluster-wide changes through time in the relative frequencies of individual, ritually sensitive faunal taxa; and (b) intersite spatial patterns (synchronic)—similarities and differences in ritually sensitive

fauna from roughly contemporaneous sites or site components. For purposes of this analysis, faunal assemblages were grouped into an Early-period sample (TP, EHP, MHP) and a Late-period sample (LHP). This arrangement highlights the relative distinctiveness of the Late Period/LHP, which arguably represents the apogee of ritual elaboration at the Homol'ovi sites. Some of the major findings are summarized below.

At a general level, this study showed that there is a higher degree of intersite variation among Early-period faunal assemblages (Homol'ovi I, III, and IV) than there is among Late-period assemblages (Homol'ovi I and II), in terms of taxonomic composition. Whereas similarities among the Early-period sites are restricted mainly to the bird assemblages, the Late-period sites exhibit striking similarities in all major categories of ritually sensitive fauna—birds, carnivores, artiodactyls, reptiles, and amphibians. It is possible that the similarities among the Late-period villages reflect the adoption of a shared pattern of ritual in this period, perhaps as a result of increased Hopi influence over the region.

This study also identified a number of important spatial and temporal patterns in the bird assemblages. Turkey, hawks, and raven are especially prominent in Early-period assemblages, while sandhill crane, golden eagle, and owls are more prominent in Late-period assemblages. These two groups of birds may represent shared, Early and Late ritual complexes, although this idea has yet to be tested with contextual data from the various sites. Interestingly, turkey disappears completely from the Late-period assemblages, which may signal an end to local turkey-raising experiments or a severing of external trade relations which would have brought these non-local birds into the

Homol'ovi region. Finally, the Homol'ovi II bird assemblage is distinctive in a number of ways. For one thing, the proportion of raptors in this assemblage is significantly higher than in the other Late-period assemblage, from Homol'ovi I—a pattern that may reflect a difference in ritual power or function between the two sites. The Homol'ovi II assemblage is also notable for its relative lack of water-bird taxa, which simply may have been unfamiliar to the residents of this late-established site.

This study also identified important patterns in the carnivore and artiodactyl assemblages. The Early-period carnivore assemblages are highly variable, whereas coyote/dog is the dominant taxon in both Late-period assemblages. Similarly, the Early-period artiodactyl assemblages vary in taxonomic composition from site to site, while both Late-period assemblages are dominated by pronghorn. It is also important to emphasize that the Early-period carnivore and artiodactyl assemblages from Homol'ovi I are fairly distinctive: Bobcat occurs at unusually high frequency in the carnivore assemblage, while non-local bighorn sheep accounts for a majority of the identified artiodactyl specimens. The bighorn pattern, at least, may be ethnic in origin; while this pattern may be traceable ultimately to the Kayenta region in northern Arizona, other possibilities have not yet been ruled out (more below).

While the major findings of the zooarchaeological study are intriguing, and while they do offer a glimpse of how faunal remains might be utilized to reconstruct patterns of ritual organization and change at Homol'ovi, the small sample sizes are nonetheless troubling. Unfortunately, the taxa of interest are simply uncommon in Puebloan assemblages of this time period, and subdividing the data for analysis (e.g., by ceramic

phases) only exacerbates the problem. If fauna are to play a prominent role in discerning ritual processes in the Homol'ovi cluster, then researchers will need to augment sample sizes for all sites covered in the present study, but particularly for Homol'ovi II, III, and IV. While there is still an abundance of unanalyzed faunal material in the collections from Homol'ovi I, II, and III, additional recovery work may be needed in the case of Homol'ovi IV and to fill specific temporal and contextual gaps in the samples from the other sites.

Ongoing and future research on faunal remains from Chevelon Ruin may shed further light on the patterns described in this study, and may help to elucidate the nature of ethnic, cultural, and ceremonial relationships between the eastern and western portions of the Homol'ovi cluster. Preliminary data from the Chevelon faunal analysis, for instance, indicate that bighorn sheep is well represented at this site, accounting for more than half of all identified artiodactyl remains (NISP) in the currently analyzed sample of contexts (Diaz de Valdes and LaMotta 2006). If this pattern holds up to further analysis, it would certainly suggest a connection of some sort between populations at Homol'ovi I and Chevelon. The presence of bighorn at Chevelon clearly underscores the need for further research to determine where and how populations from the Homol'ovi region may have obtained these animals. The biogeographic data presented in Chapter 1 suggest several possibilities—the White Mountains, the San Francisco Mountains, Black Mesa, the Grand Canyon, the Kayenta region. Depending on the geology of these regions, it may be possible to narrow the possibilities through analysis of strontium isotope ratios in bighorn teeth or bones from archaeological contexts at Homol'ovi (see Beard and

Johnson 2000 and Bentley et al. 2002 for discussion of the geochemistry behind this technique and its application in the study of human remains). Research of this kind would be no less valuable than ceramic sourcing studies for reconstructing the extra-regional connections and ultimate origins of populations that settled in the Homol'ovi region in the fourteenth century.

APPENDIX A:
SELECT WARE AND TYPE DATA FOR DECORATED WARE CERAMIC
ASSEMBLAGES FROM HOMOL'OV I

Table A1. Select Ceramic Data¹ for Individual Homol'ovi I Ceramic Assemblages

STRAT SEQ	ASSEM	PHASE	% JYW	DEC Total	JYW Total	BHP	PAP	SKP	JEN	JES	WMRW Total	PBRP	CCP	FMP	SLP	ZGW Total	PGW	KEP
1A	103-A	MHP	53.9	89	48	0	0	0	0	0	4	0	0	0	0	0	0	0
1A	103-B	EHP	19.6	148	29	0	0	0	0	0	18	0	0	2	0	0	0	0
1A	104-A	LHP	70.0	260	182	0	1	0	0	0	7	0	0	0	0	0	0	0
1A	104-B	MHP	41.1	129	53	1	0	0	0	0	9	0	0	1	0	0	0	0
1A	104-C	EHP	26.4	148	39	1	0	0	0	0	13	0	0	0	0	0	0	0
1A	105-A	LHP	70.0	60	42	1	0	0	0	0	0	0	0	0	0	0	0	0
1A	199-A	EHP	21.3	277	59	2	0	0	0	0	19	0	0	2	0	1	1	0
1A	199-B	EHP	19.7	208	41	0	0	0	0	0	7	0	0	1	0	0	0	0
1A	199-C	EHP	12.4	226	28	0	0	0	0	0	5	0	1	1	0	0	0	0
1A	199-D	TP	0.0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2A	299-A	LHP	93.5	292	273	1	1	0	0	0	2	0	0	0	0	1	1	0
2A	299-B	LHP	64.4	104	67	3	0	0	0	0	1	0	0	0	0	0	0	0
2A	299-C	EHP	30.3	89	27	3	0	0	0	0	2	0	0	1	0	0	0	0
2A	299-D	EHP	12.0	225	27	0	0	0	0	0	6	0	0	0	0	0	0	0
2A	299-E	EHP	5.7	105	6	1	0	0	0	0	2	0	0	0	0	0	0	0
2A	299-F	TP	0.0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2B	228-A	EHP	16.0	156	25	0	0	0	0	0	1	0	0	1	0	0	0	0
3A	215-A	LHP	87.0	3166	2756	18	2	8	1	0	30	5	1	5	0	8	6	0
3A	215-B	EHP	21.4	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0
3B	209-A	LHP	75.3	263	198	1	0	1	0	0	2	1	0	0	0	1	1	0
3B	210-A	LHP	61.4	625	384	1	1	0	1	1	16	1	0	2	0	0	0	0
3B	210-B	TP	0.0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3C	310-A	LHP	71.8	156	112	2	0	4	1	1	1	0	0	0	0	0	0	0
3C	310-B	EHP	5.7	53	3	1	0	0	0	0	1	0	0	0	0	0	0	0
3D	311-A	LHP	88.1	84	74	1	0	0	0	0	1	0	0	0	0	0	0	0

Table A1, *continued*

STRAT SEQ	ASSEM	PHASE	% JYW	DEC Total	JYW Total	BHP	PAP	SKP	JEN	JES	WMRW Total	PBRP	CCP	FMP	SLP	ZGW Total	PGW	KEP
3D	311-B	LHP	75.2	105	79	0	0	0	0	0	0	0	0	0	0	0	0	0
3D	345-A	EHP	10.3	136	14	1	0	0	0	0	5	0	0	0	0	0	0	0
3E	375-A	LHP	61.0	59	36	0	0	1	0	0	2	0	0	0	0	1	0	0
3E	399-A	MHP	40.9	66	27	3	0	0	0	0	3	0	0	0	0	1	1	0
3E	399-B	EHP	1.8	56	1	0	0	0	0	0	2	1	0	0	0	0	0	0
3E	399-C	EHP	1.9	52	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3E	903-A	TP	0.0	225	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3F	300-A	LHP	72.4	388	281	6	0	0	1	0	7	0	0	1	0	1	0	0
3F	300-B	EHP	32.0	150	48	1	0	0	0	0	2	0	0	1	0	0	0	0
3F	300-C	EHP	3.2	158	5	0	0	0	0	0	3	0	0	0	0	1	0	0
3F	300-D	TP	0.0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3G	312-A	LHP	86.1	36	31	0	1	1	0	0	0	0	0	0	0	0	0	0
4A	400-A	LHP	71.8	117	84	2	0	0	0	1	2	0	0	0	0	0	0	0
4A	400-B	MHP	58.4	382	223	10	0	0	0	0	5	0	0	1	0	1	0	1
4A	400-C	MHP	50.0	136	68	3	0	0	0	0	5	1	0	0	0	1	1	0
4A	400-D	EHP	32.7	679	222	13	0	0	0	0	22	0	0	4	0	0	0	0
4A	490-A	EHP	27.8	212	59	6	0	0	0	0	8	0	0	3	0	0	0	0
4B	417-A	LHP	65.0	40	26	0	0	0	0	0	2	0	0	0	0	0	0	0
4B	417-B	LHP	77.2	162	125	0	0	0	0	0	1	0	0	0	0	0	0	0
4B	418-A	LHP	94.9	59	56	0	0	0	0	0	0	0	0	0	0	0	0	0
4B	418-B	LHP	69.5	82	57	2	0	0	0	0	0	0	0	0	0	0	0	0
4C	499-A	EHP	3.9	152	6	1	0	0	0	0	3	0	0	2	0	0	0	0
4C	499-B	EHP	2.0	102	2	0	0	0	0	0	2	0	0	0	0	0	0	0
4C	499-C	TP	0.0	100	0	0	0	0	0	0	2	0	1	0	0	0	0	0
4C	499-D	TP	1.8	112	2	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A1, *continued*

STRAT SEQ	ASSEM	PHASE	% JYW	DEC Total	JYW Total	BHP	PAP	SKP	JEN	JES	WMRW Total	PBRP	CCP	FMP	SLP	ZGW Total	PGW	KEP
5A	502-A	LHP	80.0	110	88	1	1	1	1	0	4	0	0	0	0	0	0	0
5A	503-A	EHP	29.4	534	157	3	0	0	0	0	42	0	0	2	0	0	0	0
5A	504-A	LHP	78.5	191	150	0	0	0	0	0	3	0	0	1	0	0	0	0
5A	504-B	LHP	64.5	172	111	6	0	0	0	0	4	0	0	1	0	0	0	0
5A	558-A	MHP	43.2	2017	872	87	0	0	0	0	215	1	5	30	1	9	8	1
5A	558-B	MHP	42.7	511	218	9	0	0	0	0	15	0	1	0	0	0	0	0
6A	500-A1	LHP	88.6	193	171	2	1	1	0	1	3	0	0	0	0	0	0	0
6A	500-A2	LHP	97.5	121	118	0	0	0	0	0	0	0	0	0	0	0	0	0
6A	500-A3	LHP	93.4	381	356	2	0	0	0	0	0	0	0	0	0	0	0	0
6A	500-A4	LHP	83.3	466	388	0	1	1	0	0	4	0	0	0	0	3	1	2
6A	500-A5	LHP	76.3	97	74	3	0	0	0	0	2	0	0	1	0	0	0	0
6A	500-A6	LHP	66.5	194	129	2	0	0	0	0	7	0	0	1	0	0	0	0
6A	651-A	MHP	45.6	298	136	11	0	0	0	0	19	1	0	6	0	4	4	0
6A	651-B	EHP	36.4	165	60	5	0	0	0	0	10	1	0	2	0	5	5	0
6A	651-C	EHP	20.6	364	75	2	0	0	0	0	11	0	1	1	0	0	0	0
6A	652-A	EHP	33.1	1470	487	28	0	0	0	0	80	1	3	31	0	2	2	0
6A	652-B	EHP	28.7	341	98	7	0	0	0	0	27	2	1	15	0	0	0	0
6B	500-B1	LHP	79.9	154	123	3	0	0	0	0	2	1	0	1	0	0	0	0
6B	500-B2	MHP	54.8	135	74	2	0	0	0	0	9	0	0	3	0	2	2	0
6B	653-A	EHP	34.6	81	28	0	0	0	0	0	3	0	0	1	0	0	0	0
6C	401-A	LHP	89.4	208	186	3	1	0	0	1	0	0	0	0	0	0	0	0
6C	401-B	LHP	82.8	279	231	6	0	1	0	0	3	0	0	1	0	2	1	1
6C	401-C	MHP	45.7	208	95	2	0	0	0	0	11	0	0	5	0	1	0	1
6C	401-D	EHP	29.7	91	27	2	0	0	0	0	4	0	0	2	0	2	2	0
6C	401-E	EHP	25.5	255	65	0	0	0	0	0	1	0	0	0	0	0	0	0

Table A1, *continued*

STRAT SEQ	ASSEM	PHASE	% JYW	DEC Total	JYW Total	BHP	PAP	SKP	JEN	JES	WMRW Total	PBRP	CCP	FMP	SLP	ZGW Total	PGW	KEP
6D	601-A	LHP	79.2	48	38	0	0	0	0	0	0	0	0	0	0	0	0	0
6D	601-B	LHP	89.6	67	60	0	0	0	0	0	0	0	0	0	0	0	0	0
6D	601-C	LHP	65.5	116	76	1	0	0	0	0	0	0	0	0	0	0	0	0
6D	601-D	MHP	40.8	76	31	0	0	0	0	0	3	0	0	1	0	0	0	0
6E	556-A	LHP	83.2	202	168	0	3	0	0	0	1	0	0	0	0	0	0	0
7A	701-A	LHP	60.0	50	30	0	0	1	0	0	0	0	0	0	0	1	0	0
7A	701-B	TP	0.0	145	0	0	0	0	0	0	3	2	0	0	0	0	0	0
7B	729-A	MHP	52.1	94	49	1	1	0	0	0	0	0	0	0	0	0	0	0
7B	729-B	LHP	71.9	121	87	1	0	0	0	0	3	0	0	0	0	1	1	0
7B	729-C	TP	0.0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7C	702-A	MHP	42.2	64	27	2	0	0	0	0	0	0	0	0	0	0	0	0
7C	734-A	EHP	14.9	114	17	1	0	0	0	0	12	0	0	6	0	0	0	0
7D	704-A	EHP	19.4	263	51	0	0	0	0	0	3	0	0	0	0	0	0	0
7D	704-B	EHP	13.2	1467	194	10	0	0	0	0	41	2	2	13	0	1	1	0
7E	709-A	LHP	79.4	63	50	0	0	1	0	0	1	0	0	0	0	0	0	0
7E	733-A	LHP	80.0	475	380	1	0	15	2	0	5	0	0	1	0	0	0	0
7E	733-B	LHP	64.0	89	57	2	0	2	0	0	3	0	1	1	0	0	0	0
7E	733-C	EHP	35.9	64	23	0	0	0	0	0	1	0	0	1	0	0	0	0
7E	733-D	EHP	9.5	105	10	0	0	0	0	0	0	0	0	0	0	0	0	0
7F	730-A	MHP	41.1	56	23	1	0	0	0	0	2	0	0	1	0	0	0	0
7F	739-A	LHP	80.4	189	152	0	0	1	0	1	3	0	0	1	0	0	0	0
7F	739-B	EHP	35.1	185	65	2	0	0	0	0	9	1	0	1	0	0	0	0
7G	799-B	EHP	16.3	772	126	5	0	0	0	0	44	0	1	5	0	0	0	0
7G	799-C	EHP	6.3	223	14	0	0	0	0	0	6	0	0	0	0	1	0	0
7H	799-A	EHP	12.5	120	15	0	0	0	0	0	9	0	0	2	0	0	0	0

Table A1, *continued*

STRAT SEQ	ASSEM	PHASE	% JYW	DEC Total	JYW Total	BHP	PAP	SKP	JEN	JES	WMRW Total	PBRP	CCP	FMP	SLP	ZGW Total	PGW	KEP
8A	001-A	LHP	66.7	21	14	0	0	0	0	0	0	0	0	0	0	0	0	0
8A	002-A	MHP	52.9	68	36	0	0	0	0	0	2	0	0	0	0	0	0	0
8A	003-A	EHP	24.8	210	52	1	0	0	0	0	7	0	0	2	0	2	2	0
8A	003-B	EHP	13.8	232	32	0	0	0	0	0	12	0	0	0	0	0	0	0
8A	003-C	EHP	2.9	138	4	0	0	0	0	0	6	0	0	1	0	0	0	0
8B	004-A	LHP	60.6	142	86	0	1	0	0	0	2	0	0	0	0	0	0	0
8B	008-A	EHP	29.7	37	11	0	0	0	0	0	1	0	0	1	0	0	0	0
8B	008-B	EHP	9.4	32	3	0	0	0	0	0	0	0	0	0	0	0	0	0
8B	099-A	EHP	9.5	95	9	0	0	0	0	0	6	0	0	1	0	0	0	0
8B	099-B	EHP	5.5	145	8	0	0	0	0	0	0	0	0	0	0	0	0	0
8C	901-A	MHP	48.3	87	42	1	0	0	0	0	1	0	0	0	0	0	0	0
8C	901-B	LHP	66.4	146	97	0	0	0	1	0	1	0	0	0	0	0	0	0
8C	901-C	LHP	84.5	367	310	2	0	0	0	0	2	0	0	1	0	1	0	1
8C	901-D	EHP	14.7	136	20	0	0	0	0	0	3	0	0	0	0	0	0	0
8C	901-E	LHP	88.6	796	705	0	0	9	2	0	3	0	0	0	0	1	0	1
8C	901-F	EHP	9.7	62	6	0	0	0	0	0	1	0	0	0	0	0	0	0
8D	00S-A	MHP	40.8	49	20	0	1	0	0	0	2	0	0	0	0	0	0	0
9A	661-A	LHP	66.1	115	76	0	0	0	0	0	2	0	0	1	0	0	0	0
9A	661-B	MHP	56.7	141	80	0	0	0	0	0	3	0	0	3	0	0	0	0
9A	661-C	EHP	36.1	144	52	5	0	0	0	0	4	0	0	0	0	1	1	0
9A	661-D	EHP	22.3	202	45	7	0	0	0	0	5	0	0	0	0	0	0	0
9A	800-A	LHP	66.9	142	95	0	0	0	0	0	1	0	0	0	0	2	2	0
9A	800-B	LHP	85.9	78	67	1	0	2	0	0	0	0	0	0	0	0	0	0
10A	AP8-A	LHP	67.4	129	87	3	0	0	0	0	6	2	0	0	1	1	0	0
10B	AP10-A	LHP	74.7	182	136	0	0	0	0	0	4	2	0	0	0	1	0	0

Table A1, *continued*

Note:

¹Explanation of column headings:

Information on Provenience and Dating:

STRAT SEQ	Stratigraphic sequence
ASSEM	Ceramic assemblage (structure or trench number followed by a letter designation)
PHASE	Ceramic phase assignment (TP – Tuwiuca Phase; EHP – Early Homol’ovi Phase; MHP – Middle Homol’ovi Phase; LHP – Late Homol’ovi Phase)
%JYW	Jeddito Yellow Ware index (percentage of yellow-hued Jeddito Yellow Ware out of the total decorated ware ceramic count)

Decorated Ware Sherd Counts (note that only certain wares and temporally diagnostic types are listed in this table):

DEC Total	Total decorated ware ceramic count
JYW Total	Total yellow-hued Jeddito Yellow Ware ceramic count
BHP	Bidahochi Polychrome count
PAP	Paayu Polychrome count
SKP	Sikyatki Polychrome count
JEN	Jeddito Engraved count
JES	Jeddito Stippled count
WMRW Total	Total White Mountain Red Ware ceramic count
PBRP	Pinedale Black-on-red and Polychrome count
CCP	Cedar Creek Polychrome count
FMP	Fourmile Polychrome count
SLP	Showlow Polychrome count
ZGW Total	Total Zuni Glaze Ware ceramic count
PGW	Pinnawa Glaze-on-white count
KEP	Kechipawan Polychrome count

General:

Ceramic data by individual provenience designations (PDs) are on file at the Homol’ovi Research Program Laboratory, Arizona State Museum.

Figure A.1 Stratigraphic Sequence 1A (Structures 103, 105/104, and sub-structure midden [199])

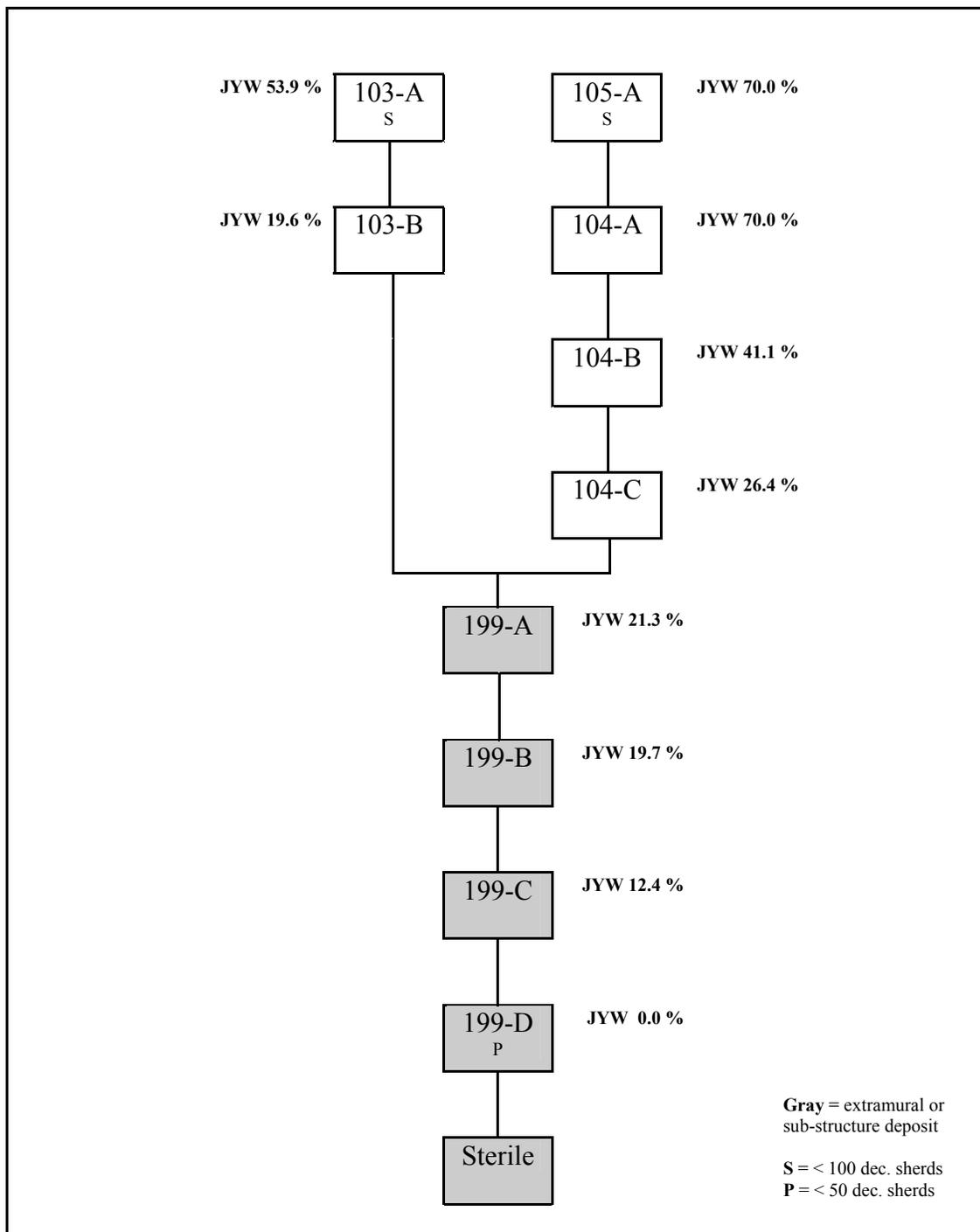


Figure A.2 Stratigraphic Sequences 2A (South Plaza [299-A through -D]/sub-plaza midden [299-E through -F]) and 2B (Structure 228)

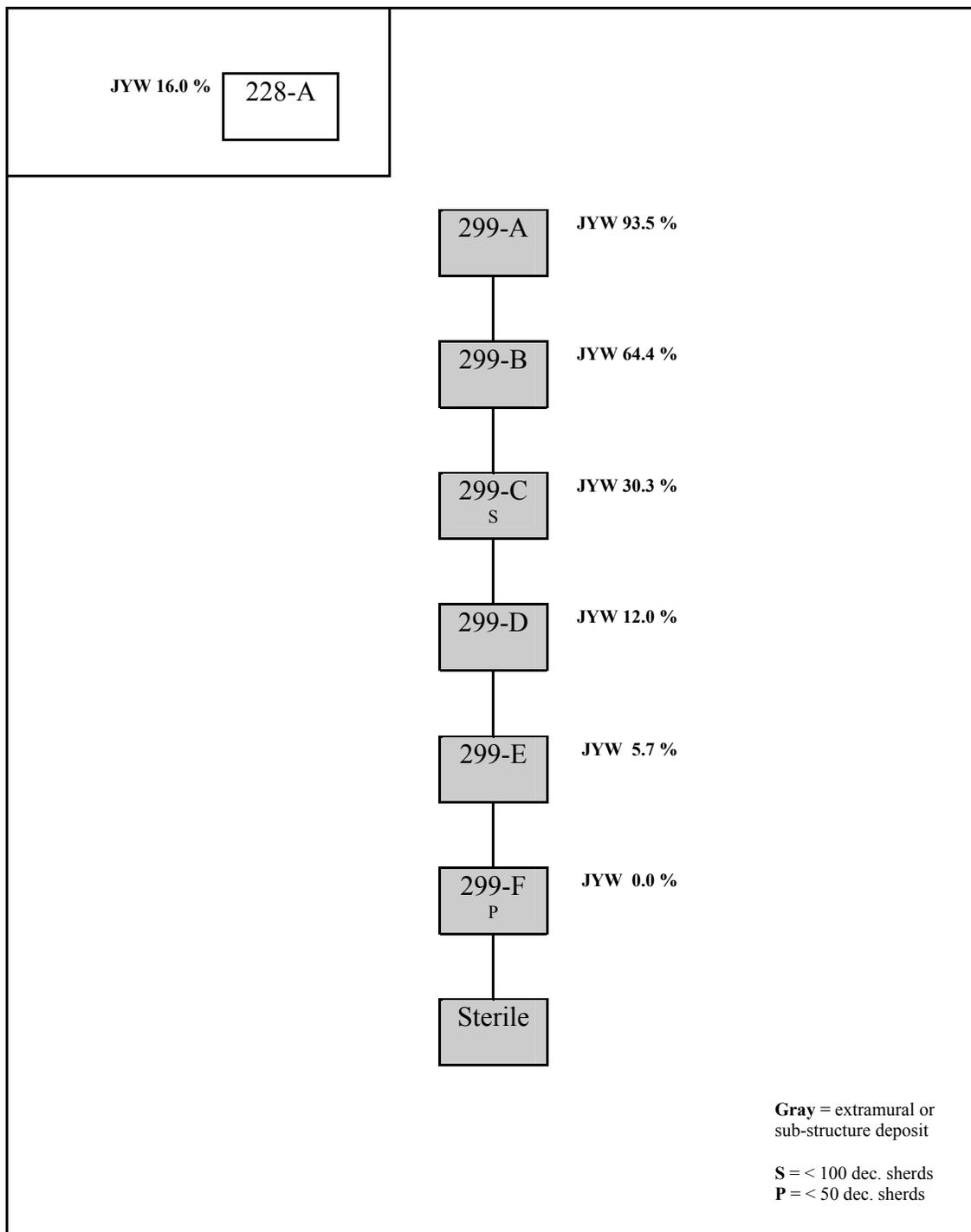


Figure A.3 Stratigraphic Sequences 3A (Structure 215), 3B (Structures 209/210), 3C (Structure 310), and 3D (Structures 311/345)

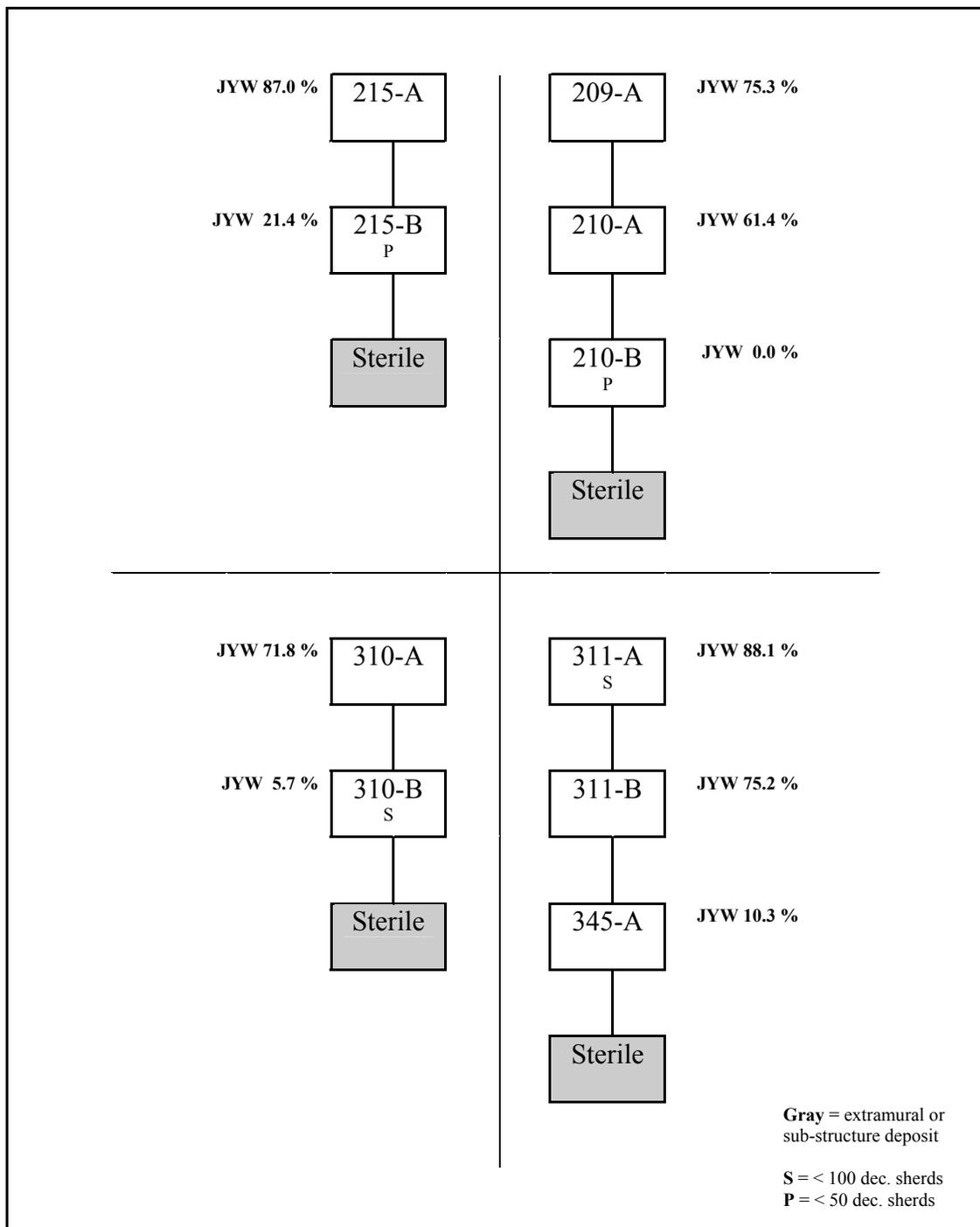


Figure A.4 Stratigraphic Sequences 3E (Structure 375/South Plaza [399]/Structure 903), 3F (South Plaza [300]), and 3G (Structure 312)

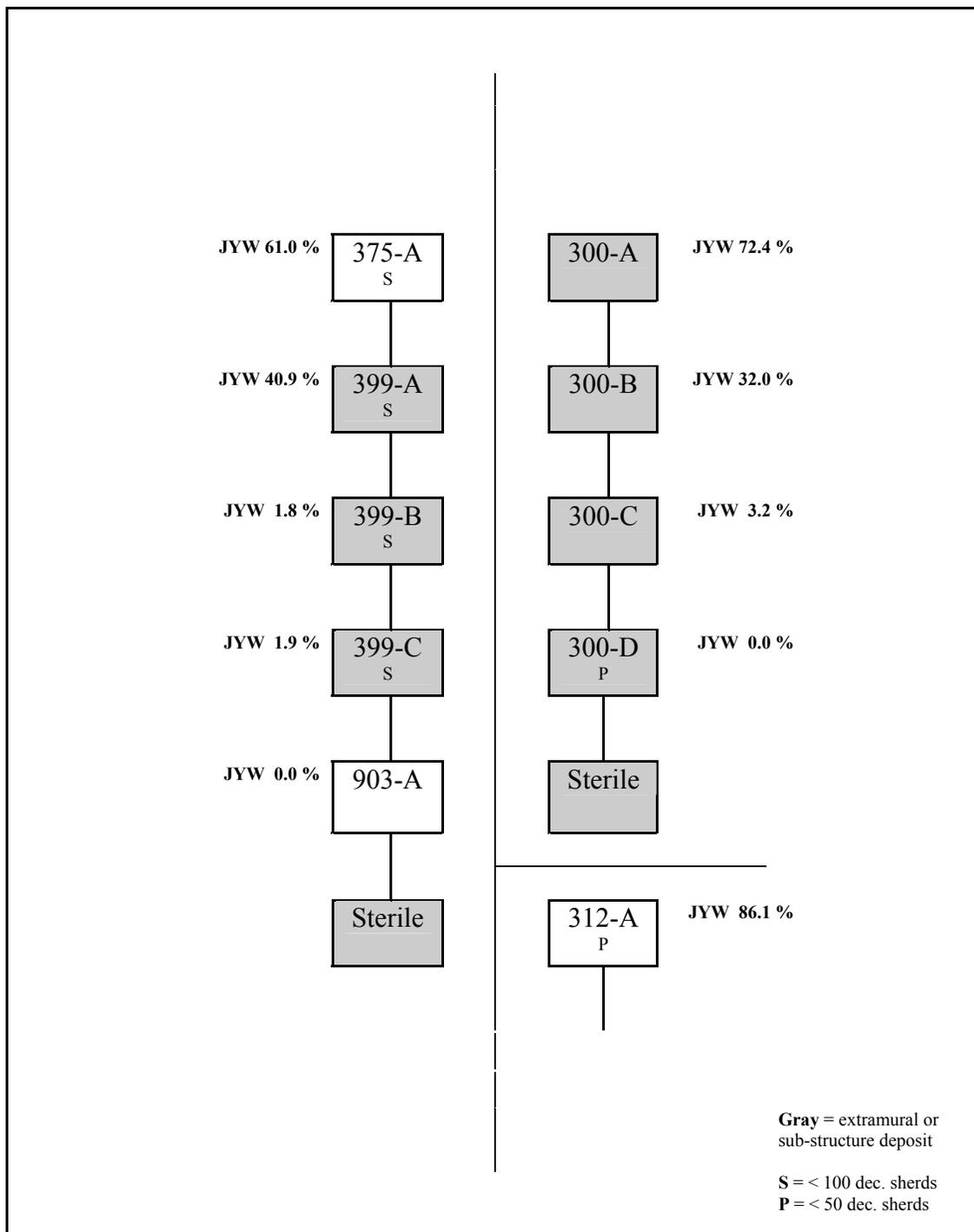


Figure A.5 Stratigraphic Sequence 4A (Southeast Plaza [400-A]/sub-plaza midden [400-B through -D]/Structure 490)

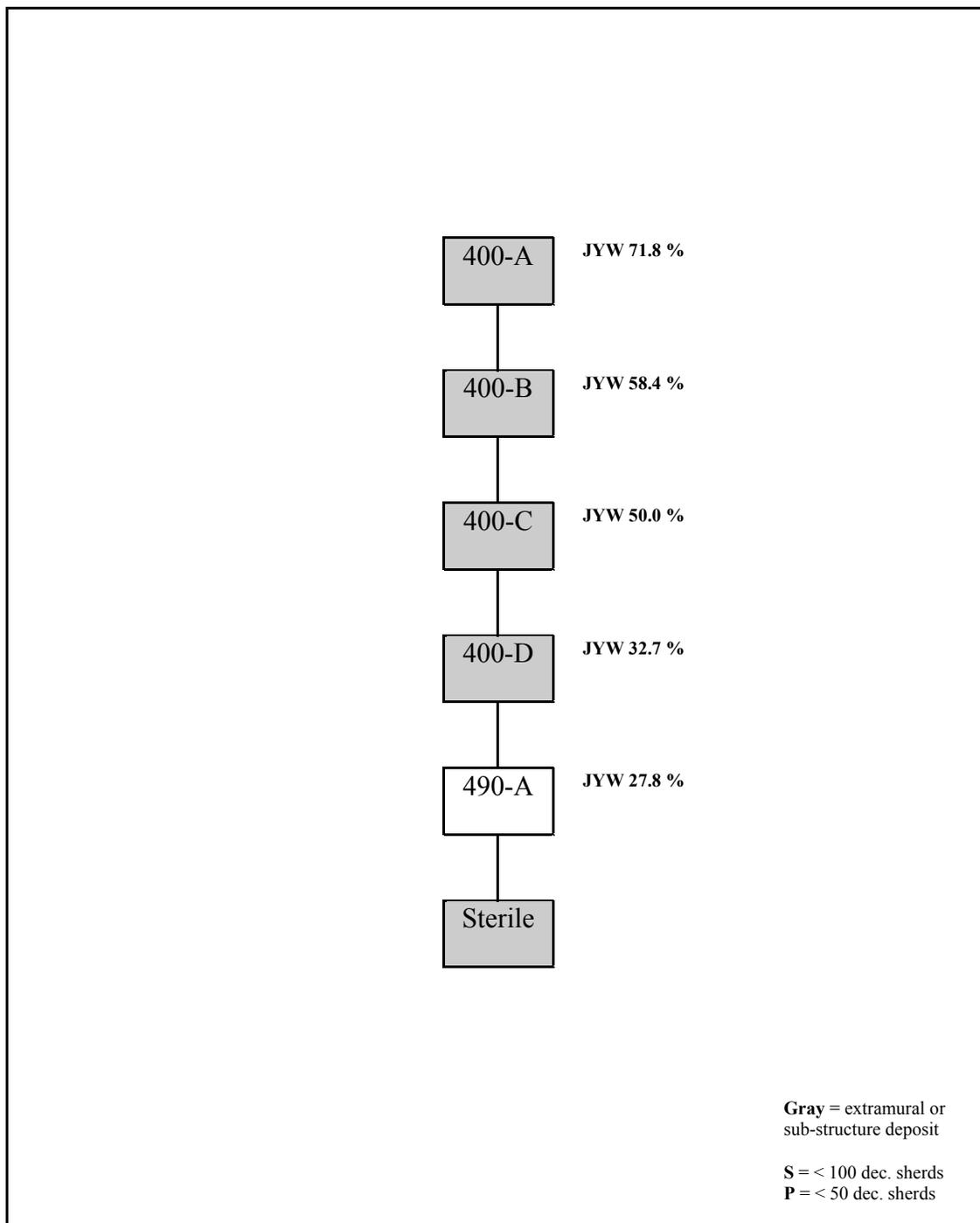


Figure A.6 Stratigraphic Sequences 4B (Structures 417/418) and 4C (East Extramural Area [499])

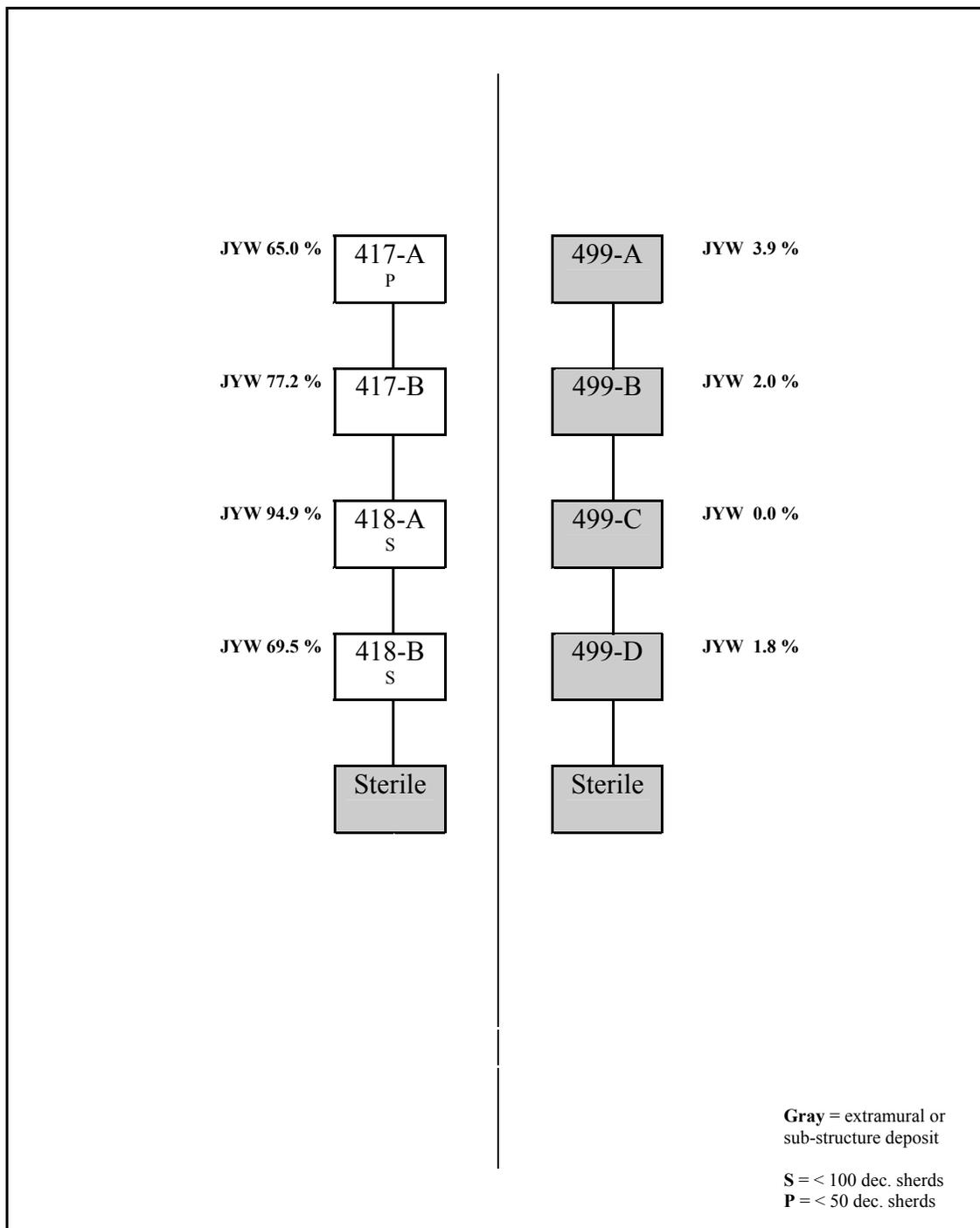


Figure A.7 Stratigraphic Sequence 5A (Structures 502/504/558 and Structure 503)

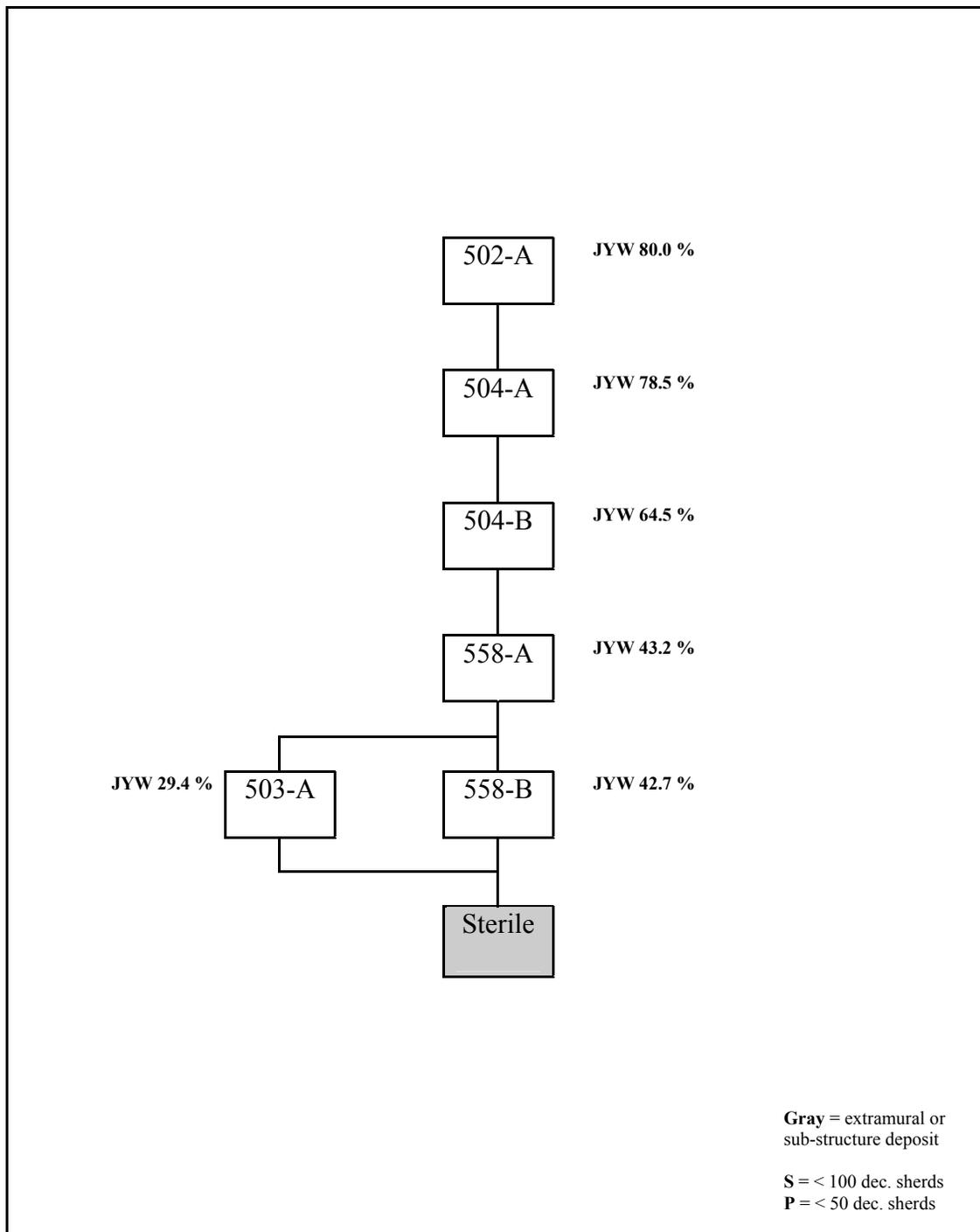


Figure A.8 Stratigraphic Sequence 6A (East Plaza [500]/Structures 651-652)

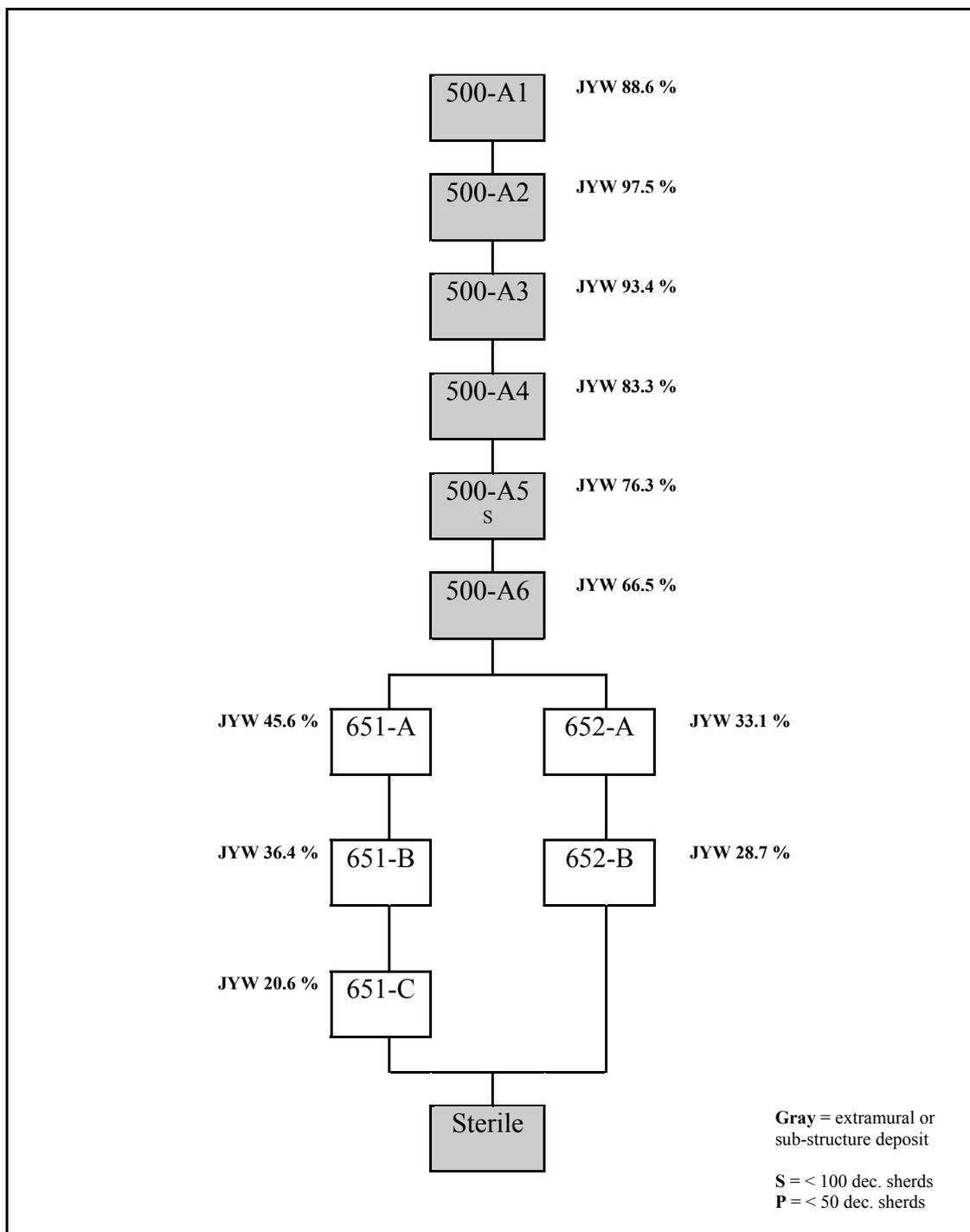


Figure A.9 Stratigraphic Sequences 6B (East Plaza [500]/Structure 653) and 6C (Structure 401)

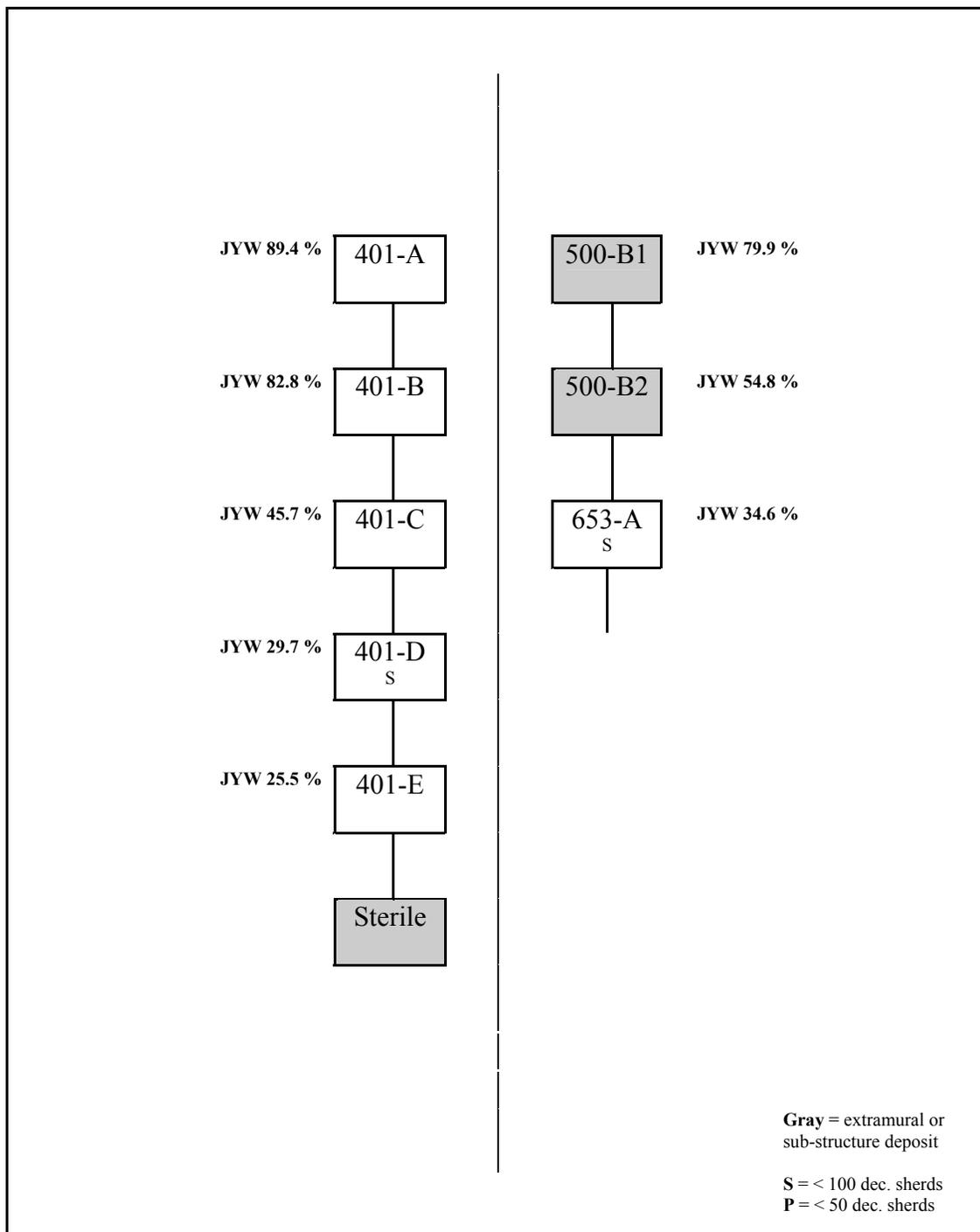


Figure A.10 Stratigraphic Sequences 6D (Structure 601) and 6E (Structure 556/East Plaza/Structure 566)

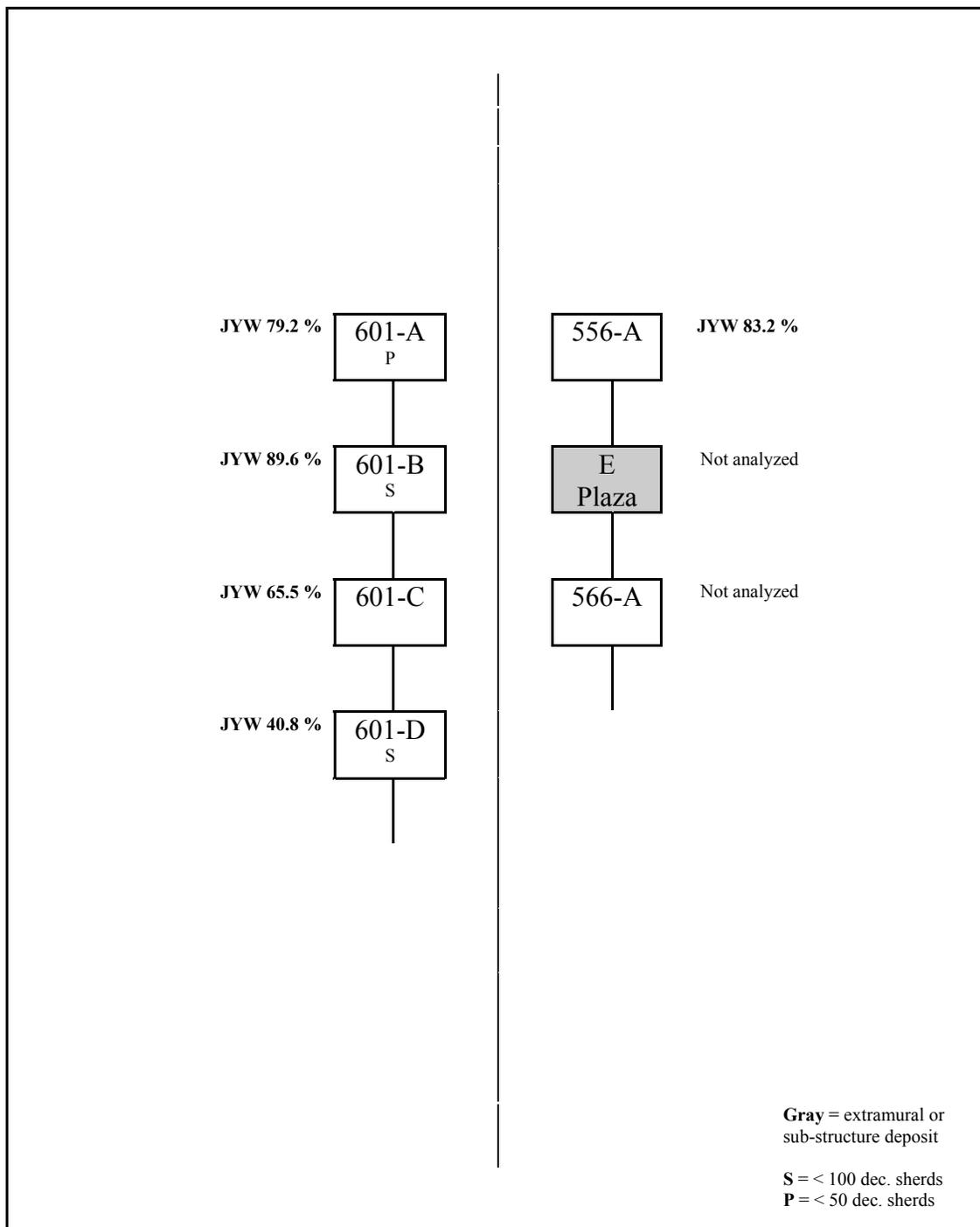


Figure A.11 Stratigraphic Sequences 7A (Structure 701), 7B (Structure 729), 7C (Structure 702/734), and 7D (Structure 704)

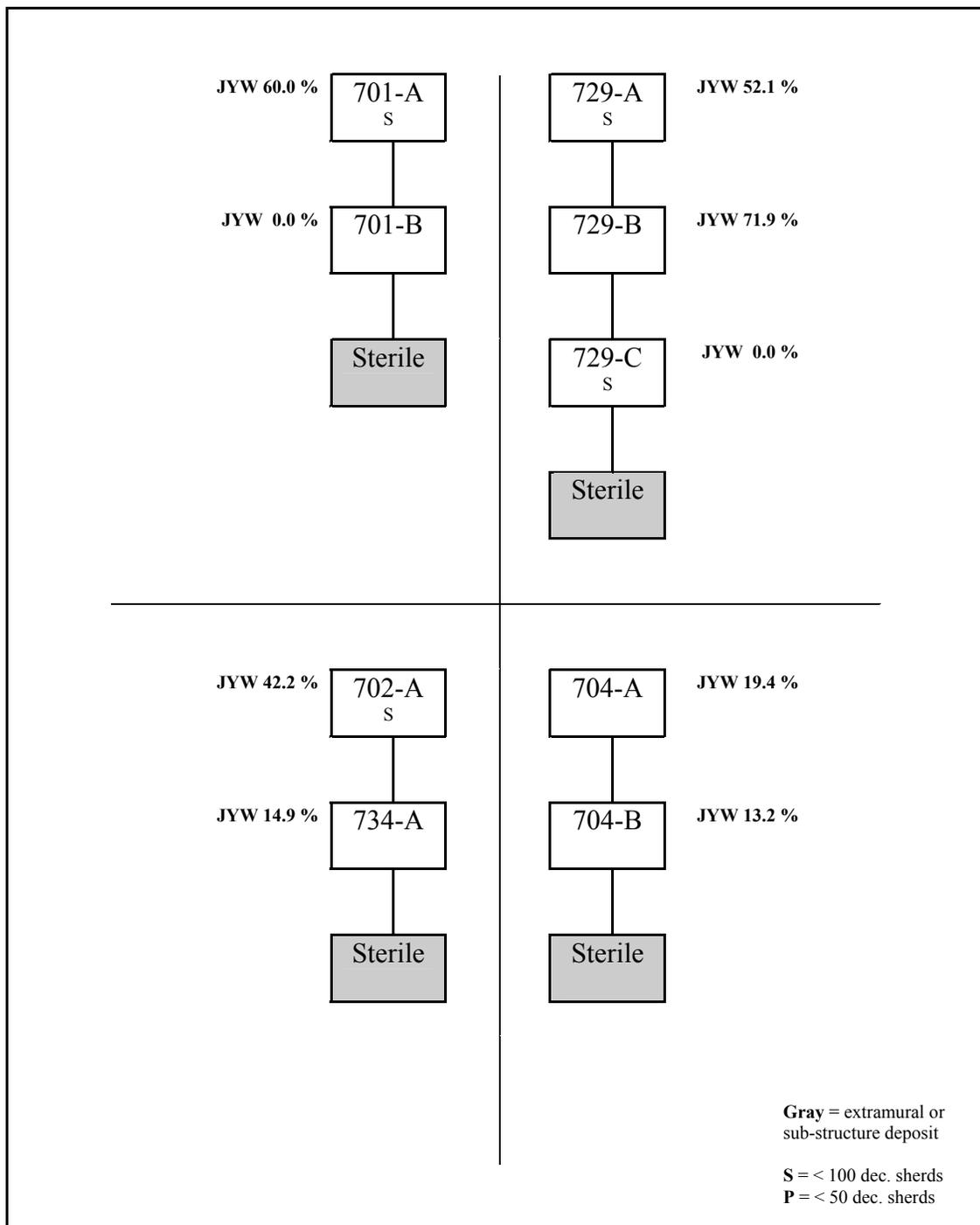


Figure A.12 Stratigraphic Sequence 7E (Structure 709 and Structure 733)

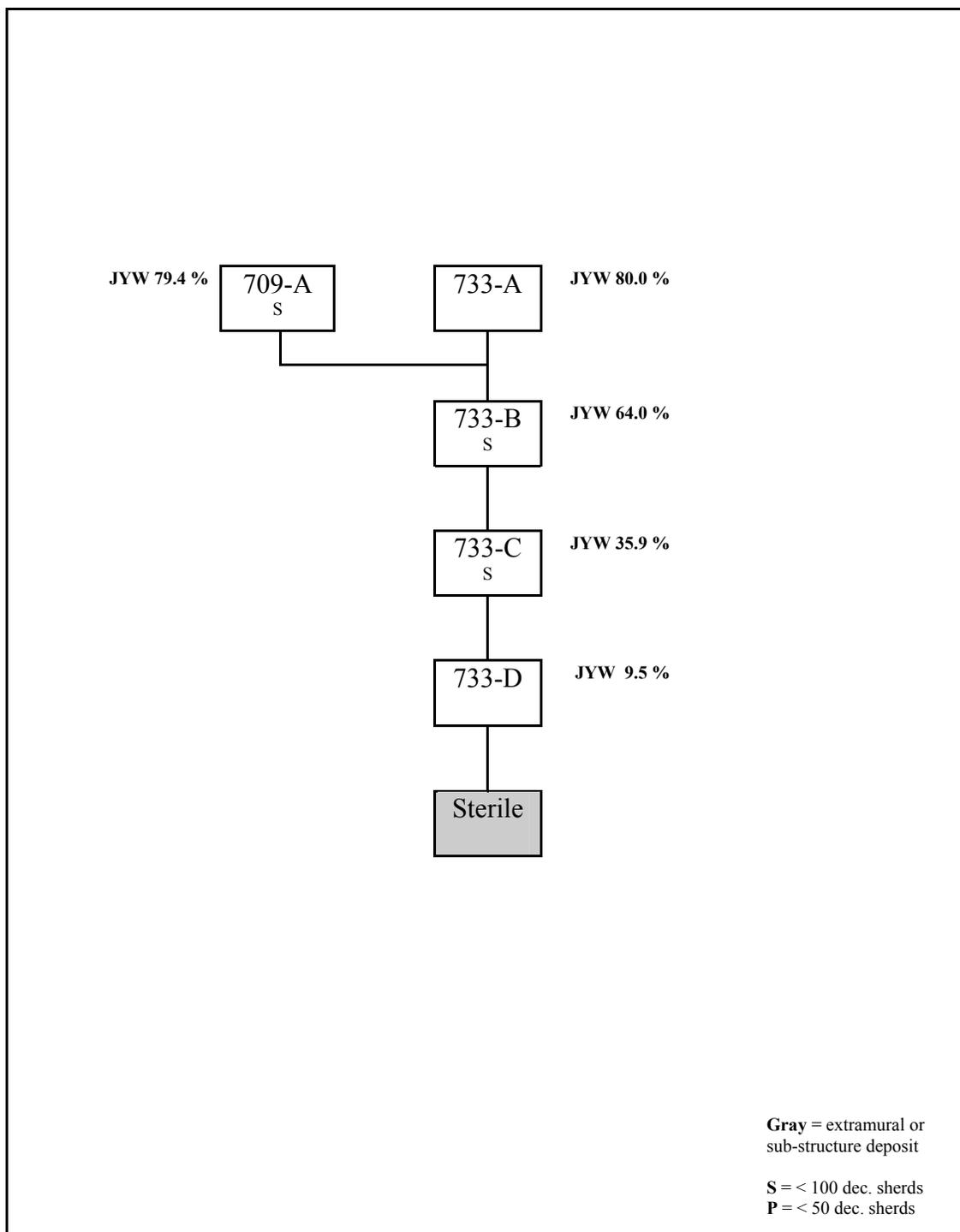


Figure A.13 Stratigraphic Sequences 7F (Structures 730/739), 7G (Northeast Midden [799-B and -C]), and 7H (Northeast Midden [799-A])

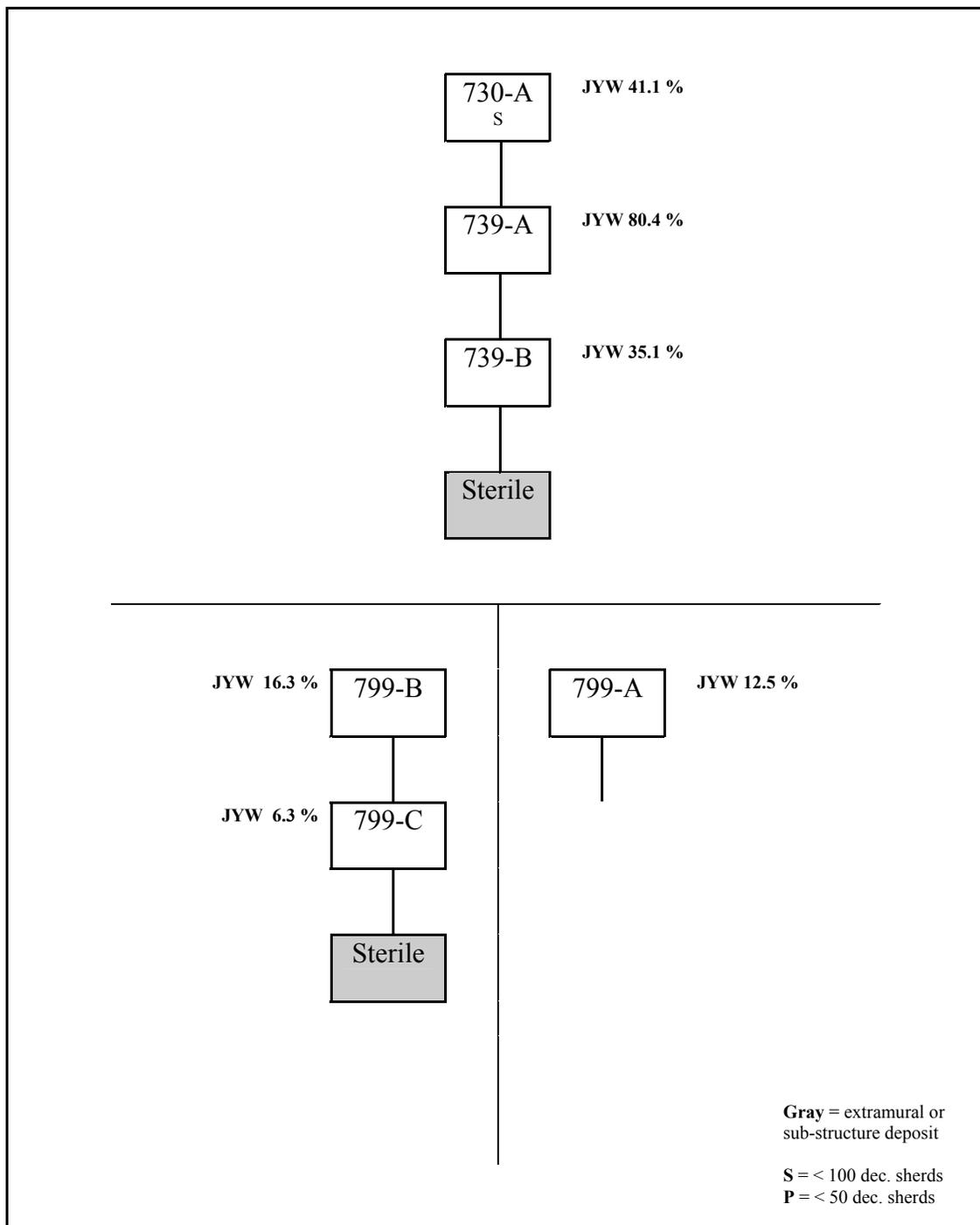


Figure A.14 Stratigraphic Sequence 8A (Structures 001-002/003)

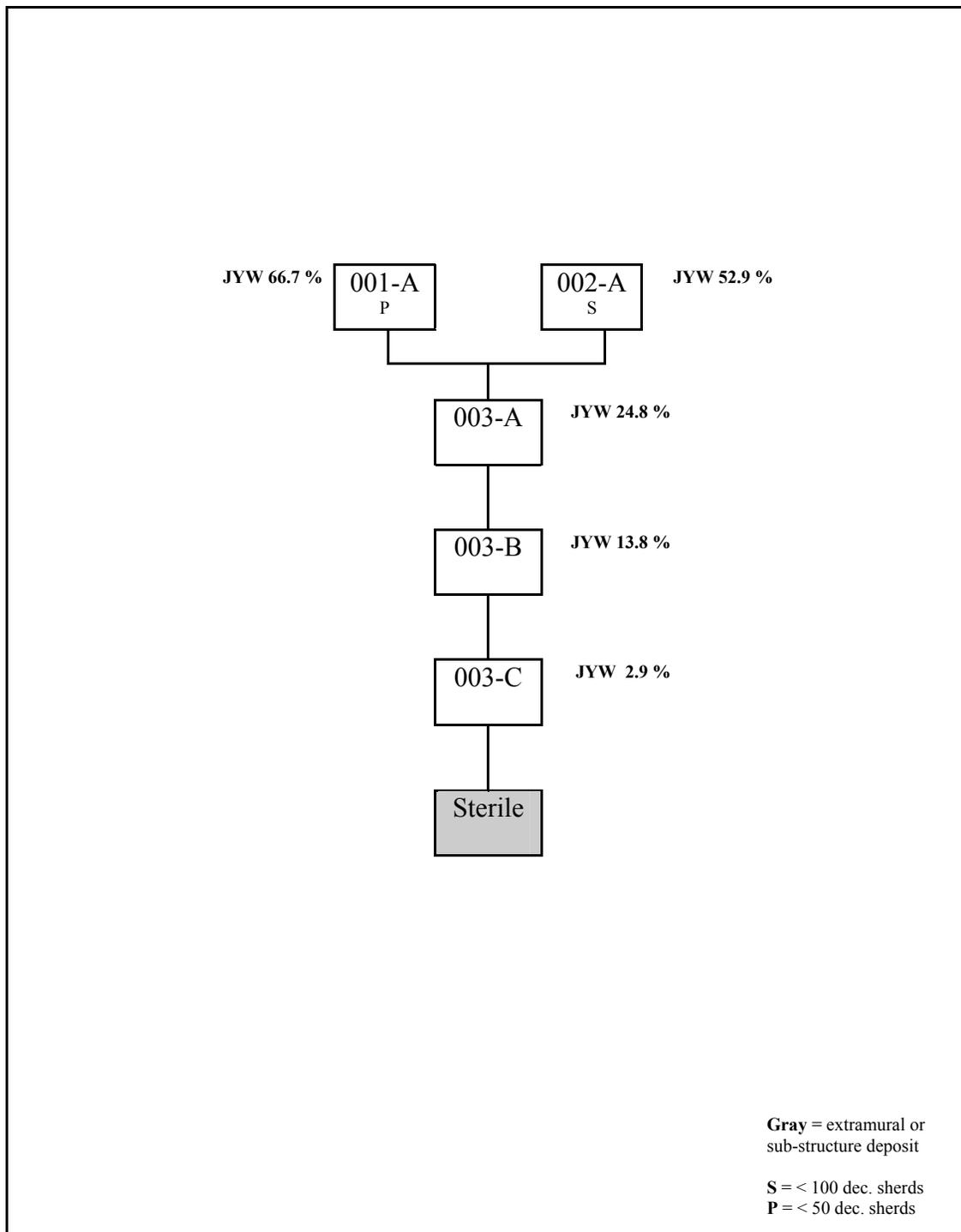


Figure A.15 Stratigraphic Sequences 8B (Structures 004/008 and South Plaza [099]), 8C (Structure 901), and 8D (South Plaza [00S])

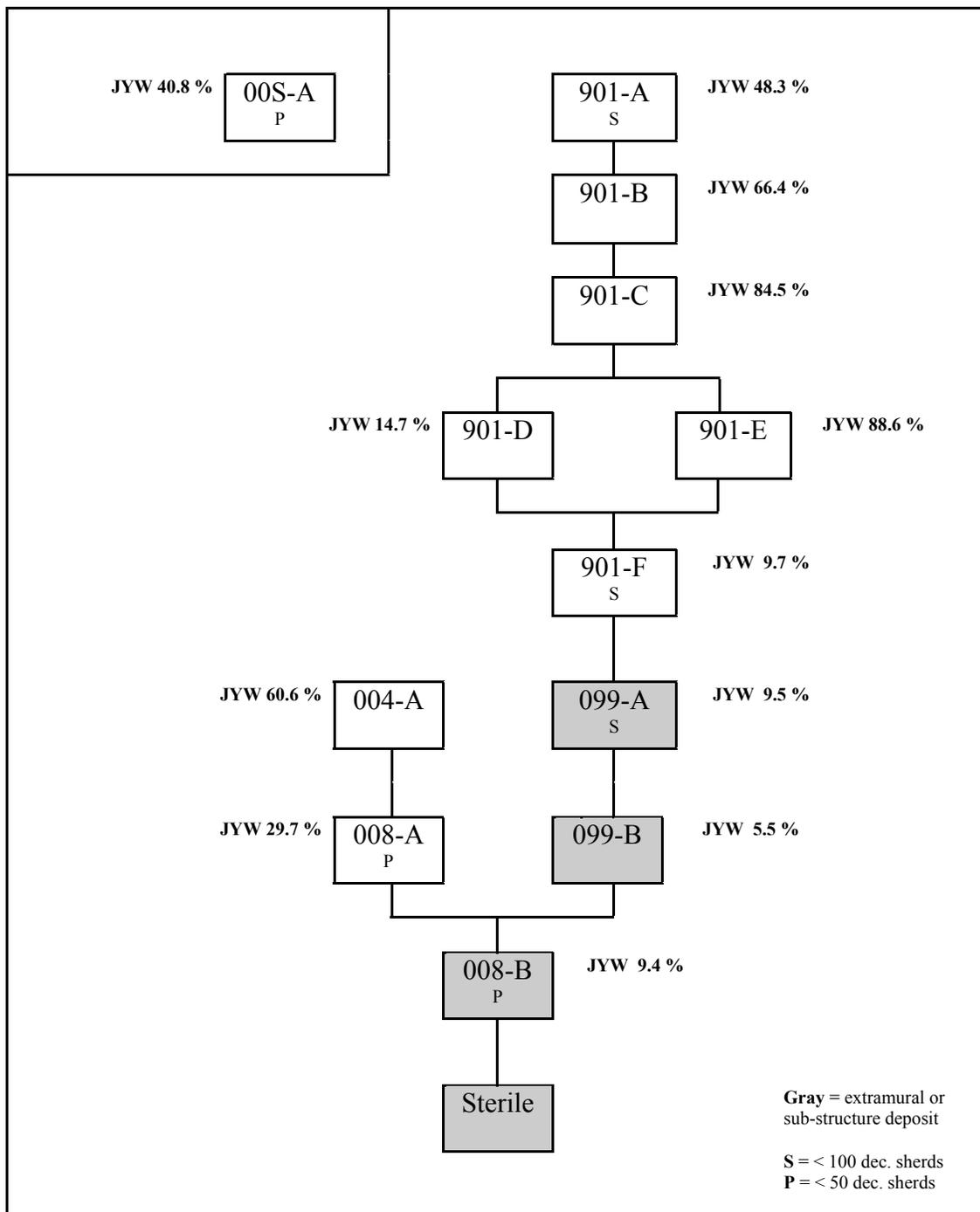


Figure A.16 Stratigraphic Sequence 9A (West Plaza/sub-plaza midden [800]/Structure 661)

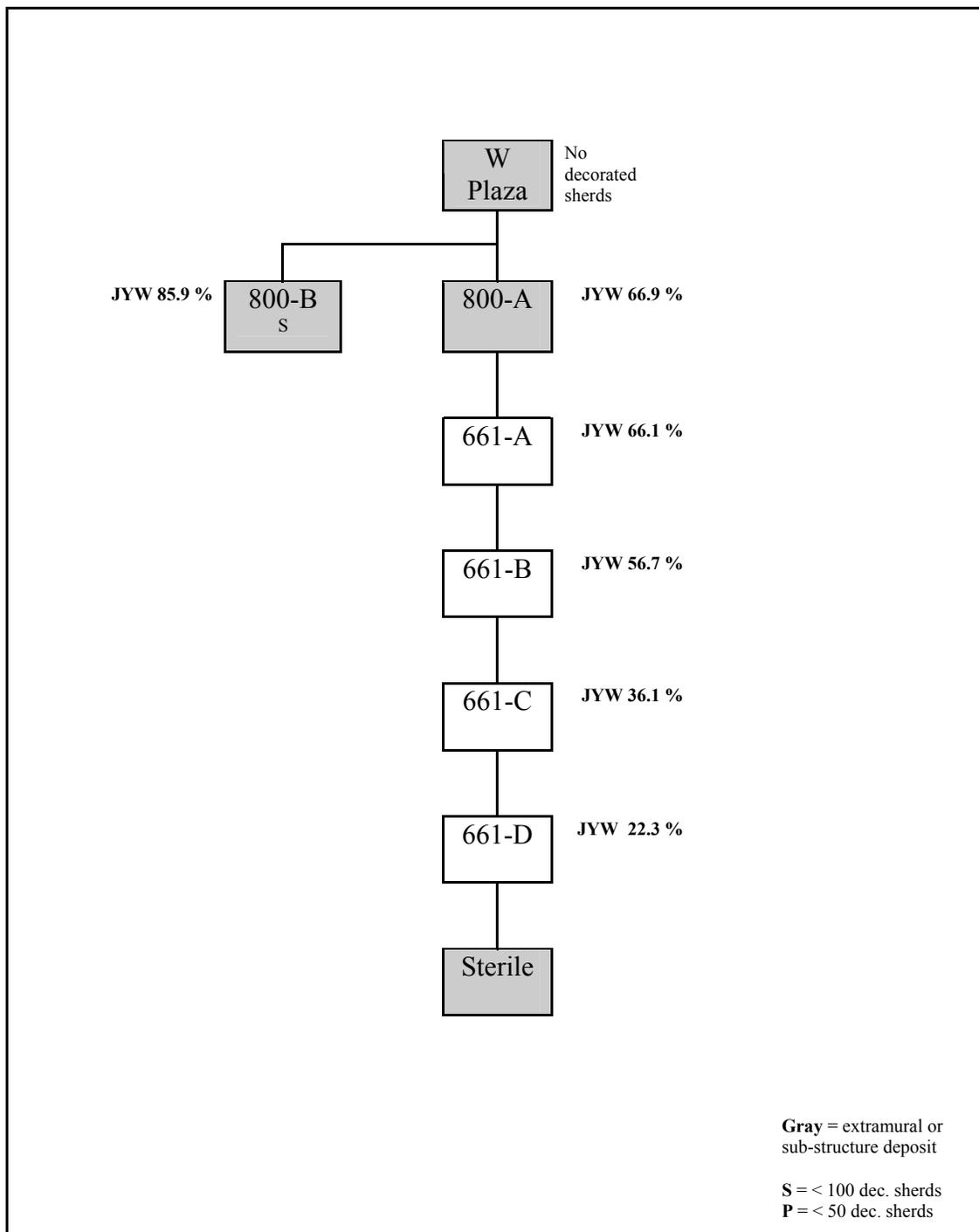
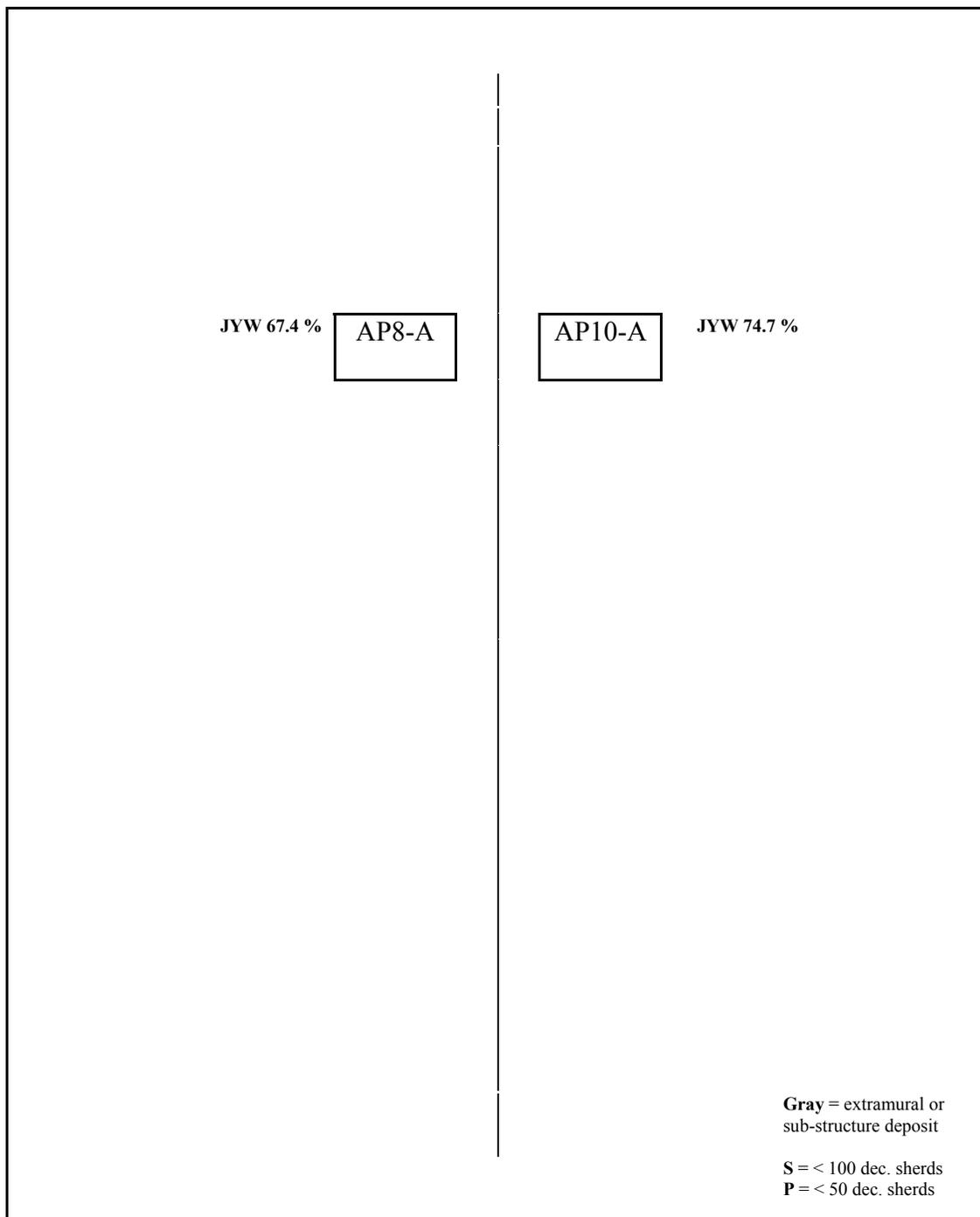


Figure A.17 Stratigraphic Sequences 10A (Structure 8) and 10B (Structure 10), Adobe Pueblo outlier roomblock (AZ J:14:316 [ASM])



APPENDIX B:
DETAILS OF STATISTICAL ANALYSES OF JEDDITO YELLOW WARE
POTTERY FROM HOMOL' OVI I AND II

Table B.1 Additional Banding Line Summary Statistics for Samples of Jeddito Yellow Ware Bowl Rims from Homol'ovi I and II (supplements Table 2.4a)

Var.	Site	Context(s)	mean (mm)	±	N	Variance	Skewness	Kurtosis	Kolmogorov-Smirnov one-sample test (for normal distribution)
RD	H1	Early Homol'ovi Phase Group	7.3	4.2	226	17.5	1.88	4.53	not normal
		Middle Homol'ovi Phase Group	9.9	5.5	257	30.2	1.26	2.08	not normal
		Late Homol'ovi Phase Group	13.7	6.0	1326	35.6	0.54	0.04	not normal
		H1 Total	12.4	6.2	1809	37.9	0.66	0.09	not normal
	H2	Structure 714	14.0	5.3	148	28.0	0.89	1.10	normal
		Structure 708	13.7	5.4	145	29.6	0.21	-0.21	normal
		H2 Total	13.8	5.4	293	28.7	0.53	0.42	normal
BW	H1	Early Homol'ovi Phase Group	11.4	2.3	186	5.2	0.41	0.31	normal
		Middle Homol'ovi Phase Group	12.1	2.8	219	8.0	0.68	0.89	normal
		Late Homol'ovi Phase Group	13.2	3.1	911	9.7	0.47	1.03	not normal
		H1 Total	12.8	3.0	1316	9.2	0.56	1.00	not normal
	H2	Structure 714	12.8	2.6	87	7.0	-0.63	0.40	normal
		Structure 708	13.5	3.1	93	9.7	0.18	0.05	normal
		H2 Total	13.2	2.9	180	8.5	-0.05	0.39	normal

Table B.2 Rim-to-Banding Line Distance (RD) and Banding Line Width (BW) Analysis: Details of Pairwise Statistical Comparisons of Samples from Homol’ovi I and II (supplements Table 2.4b)

Var.	Samples Compared (two samples were compared in each test)		Student’s <i>t</i> test (separate variance)				Kruskal-Wallis test (MWU = Mann-Whitney U test statistic)				
			<i>t</i>	df	<i>p</i>	H ₀	MWU	χ^2	df	<i>p</i>	H ₀
Homol’ovi I: Early, Middle, & Late Homol’ovi Phase Groups Compared to Each Other:											
RD	H1: Early HP	H1: Late HP	-19.74	400.0	< 0.01	rejected	51577.0	248.96	1	< 0.01	rejected
RD	H1: Early HP	H1: Middle HP	-5.99	471.6	< 0.01	rejected	19727.5	37.03	1	< 0.01	rejected
RD	H1: Middle HP	H1: Late HP	9.81	382.5	< 0.01	rejected	236431.5	96.96	1	< 0.01	rejected
BW	H1: Early HP	H1: Late HP	-9.11	341.1	< 0.01	rejected	54617.0	58.46	1	< 0.01	rejected
BW	H1: Early HP	H1: Middle HP	-2.82	402.0	< 0.01	rejected	17514.5	5.91	1	0.02	rejected
BW	H1: Middle HP	H1: Late HP	4.94	355.3	< 0.01	rejected	121310.5	24.71	1	< 0.01	rejected
Homol’ovi II: Str. 708 vs. Str. 714:											
RD	H2: Str. 714	H2: Str. 708	-0.48	290.3	0.63	not rejected	10630.5	0.02	1	0.89	not rejected
BW	H2: Str. 714	H2: Str. 708	1.81	176.4	0.07	not rejected	4509.50	1.77	1	0.18	not rejected
Homol’ovi I Early, Middle, & Late Homol’ovi Phase Groups vs. Homol’ovi II Str. 714 and Str. 708:											
RD	H1: Early HP	H2: Str. 714	-12.90	263.2	< 0.01	rejected	4266.5	148.50	1	< 0.01	rejected
RD	H1: Early HP	H2: Str. 708	-12.00	250.9	< 0.01	rejected	5280.0	121.40	1	< 0.01	rejected
RD	H1: Middle HP	H2: Str. 714	-7.25	316.3	< 0.01	rejected	10268.0	59.50	1	< 0.01	rejected
RD	H1: Middle HP	H2: Str. 708	-6.56	301.4	< 0.01	rejected	10969.0	46.93	1	< 0.01	rejected
RD	H1: Late HP	H2: Str. 714	-0.62	191.3	0.54	not rejected	94622.0	0.51	1	0.48	not rejected
RD	H1: Late HP	H2: Str. 708	0.02	184.1	0.98	not rejected	94026.0	0.19	1	0.66	not rejected
BW	H1: Early HP	H2: Str. 714	-4.13	148.3	< 0.01	rejected	5350.0	20.35	1	< 0.01	rejected
BW	H1: Early HP	H2: Str. 708	-5.87	143.3	< 0.01	rejected	5013.0	32.76	1	< 0.01	rejected
BW	H1: Middle HP	H2: Str. 714	-1.87	168.6	0.06	not rejected	7614.5	7.50	1	0.01	rejected
BW	H1: Middle HP	H2: Str. 708	-3.77	159.9	< 0.01	rejected	7262.5	16.06	1	< 0.01	rejected
BW	H1: Late HP	H2: Str. 714	1.44	110.0	0.15	not rejected	40899.5	0.24	1	0.62	not rejected
BW	H1: Late HP	H2: Str. 708	-1.01	111.6	0.32	not rejected	39231.0	1.38	1	0.24	not rejected

Note:

H₀ (null hypothesis for both tests): The two samples could have been drawn from a single original population; observed differences between them are attributable to the vagaries of sampling.

Table B.3 Rim Form, Paste Color, and Temper Density Statistics for Samples of Jeddito Yellow Ware Bowl Rims from Homol’ovi I and II: Results of Chi-square Tests (supplements Tables 2.5a-c)

Variable	Samples Compared (up to three samples were compared in each test)			χ^2	df	<i>p</i>	H ₀
Rim form	H1: Early HP	H1: Middle HP	H1: Late HP	22.96	2	< 0.01	rejected
Rim form	H2: Str. 714	H2: Str. 708		5.86	1	0.02	rejected
Rim form	H1: Middle HP	H2: Str. 714		4.33	1	0.04	rejected
Rim form	H1: Late HP	H2: Str. 714		0.14	1	0.71	not rejected
Rim form	H1: Late HP	H2: Str. 708		8.77	1	< 0.01	rejected
Paste color	H1: Early HP	H1: Middle HP	H1: Late HP	35.73	2	< 0.01	rejected
Paste color	H1: Late HP	H2: Str. 708		4.01	1	0.05	rejected
Temper density	H1: Early HP	H1: Middle HP	H1: Late HP	20.29	2	< 0.01	rejected
Temper density	H2: Str. 714	H2: Str. 708		0.93	1	0.33	not rejected
Temper density	H1: Early HP	H2: combined		12.20	1	< 0.01	rejected
Temper density	H1: Middle HP	H2: combined		1.26	1	0.26	not rejected
Temper density	H1: Late HP	H2: combined		0.56	1	0.46	not rejected

Notes:

H₀ (null hypothesis): The two samples could have been drawn from a single original population; observed differences between them are attributable to the vagaries of sampling.

Homol’ovi I Early, Middle, and Late Homol’ovi Phase Groups were also compared to each other individually for each variable. The null hypothesis was rejected in all cases at the $p \leq 0.05$ level except in the following, both of which involve the Middle Homol’ovi Phase Group: (1) Rim form, H1 EHP vs. H1 MHP; (2) Paste color, H1 MHP vs. H1 LHP.

APPENDIX C:
TREE-RING DATED CONTEXTS FROM OUTSIDE HOMOL'OVI THAT ARE
RELEVANT TO DATING THE INITIAL PRODUCTION AND CIRCULATION OF
JEDDITO YELLOW WARE POTTERY: DATA SOURCES FOR TABLE 2.8

GENERAL NOTE

Benitez (1999) recently summarized a great deal of published and unpublished material pertaining to dating the initial production and dissemination of Jeddito Yellow Ware pottery, including many of the contexts listed below. The interested reader should consult this source for further discussion of the early dating of Jeddito Yellow Ware. The information summarized below and in Table 2.8 builds upon this work. I have supplied additional, updated information where possible; and in a few cases, I have adopted a slightly different interpretation of the archaeological data.

FOURMILE RUIN (AZ P:12:4)

Sources

Adler and Johnson (1996); Bannister et al. (1966); Benitez (1999); Fewkes (1904); Haury and Hargrave (1931); Kaldahl et al. (2004)

Analysis

Ceramic data are based on comments made in passing in several sources.

Comments

Benitez (1999:52) notes that Jeddito Yellow Ware accounts for about four percent of decorated ware pottery at Fourmile. The occupation of the site extends to 1400, according to Adler and Johnson (1996:260).

HOOPER RANCH PUEBLO (AZ Q:15:6)

Sources

Duff (1999); Martin et al. (1961, 1962); Rinaldo et al. (1961)

Analysis

Ceramic data from Hooper Ranch are based on material collected during the Field Museum of Natural History excavations in 1959-1960, as summarized by Duff (1999:Table 5.2).

Comments

A total of just four pieces of Jeddito Yellow Ware (out of 4718 total decorated pieces) was recovered from Hooper Ranch Pueblo (Duff 1999:Table 5.2).

NUVAKWEWTAQA NORTH (AZ O:4:2)

Sources

Bannister et al. (1966); Benitez (1999); Bernardini (2002); Coinman (1984; 1990); Douglass (1935); Fewkes (1904)

Analysis

Ceramic data from Nuvakwewtaqa are from excavation contexts recently summarized by Bernardini (2002:Table 3.1), drawing on unpublished work by Steadman Upham and Nancy Coinman.

Comments

The North ruin at Chavez Pass yielded only four pieces of Jeddito Yellow Ware out of 758 total decorated pieces (Bernardini 2002:Table 3.1). The only other post-1325/30 type from the site is Gila Polychrome. Jeddito Yellow Ware is much more common at the nearby Southwest and Southeast ruins, so it is possible that these four sherds found at the North ruin are intrusive.

AZ W:10:51

Sources

Bannister and Robinson (1971); Benitez (1999); Breternitz (1963, 1966); Wendorf (1950)

Analysis

Ceramic data from AZ W:10:51 are from excavations, as summarized by Wendorf (1950) and by Breternitz (1963).

POLLOCK SITE (NA 4317 AND NA 5817)

Sources

Bannister et al. (1966); Benitez (1999); Bernardini (2002); Breternitz (1963, 1966); Brown (1982); McGregor (1956)

Analysis

Ceramic data from Pollock are from a surface collection made by Brown (1982) and reported by Bernardini (2002:Table 3.1), and from unpublished excavation data in the files of the Museum of Northern Arizona reported by Benitez (1999).

Comments

There are two loci at this site, NA 4317 and NA 5817, both of which are treated as a single context for this analysis. Room 11 at NA 4317 yielded tree-ring dates as late as 1292 (non-cutting). Benitez (1999) reports that three sherds of Jeddito Yellow Ware were found in the fill of this room, based on unpublished data from the Museum of Northern Arizona (Breternitz 1963 also reports Jeddito Yellow Ware from this room). McGregor (1956) believed this to be an early built room filled with later trash, an

interpretation also suggested by Breternitz (1963). Room 1 at NA 5817 yielded a non-cutting date of 1303 (the latest tree-ring date from the Pollock site), but no Jeddito Yellow Ware (Benitez 1999). Additionally, Bernardini's (2002:Table 3.1) surface collection data show no Jeddito Yellow Ware from the site in general. No other post-1325/30 types have been reported. This site is not considered to be a strong case for establishing a pre-1325/30 start date for Jeddito Yellow Ware because the latest date for the site is a non-cutting date and because so few Jeddito Yellow sherds have been reported.

KINNIKINNICK PUEBLO (NA 1629)

Sources

Bannister et al. (1966); Benitez (1999); Bernardini (2002); Brown (1982); Colton (1946); Conner (1943)

Analysis

Ceramic data from Kinnikinnick Pueblo are from a probabilistic surface collections made by Brown (1982) and by Colton (1946), both of which are summarized by Bernardini (2002:Table 3.1).

Comments

A total of 78 tree-ring dates have been reported for Kinnikinnick, 77 of which are dated to 1313 or earlier (Bannister et al. 1966:20-21; Bernardini 2002:67). However, a single specimen dated at 1374 (non-cutting) suggests the possibility of later deposition at the site.

BAILEY RUIN (AZ P:11:1)

Sources

Benitez (1999); Mills (1998, 1999); Mills and Herr (1999); Mills et al. (1999)

Analysis

Ceramic data from Bailey Ruin are derived from recent excavations by the University of Arizona Archaeological Field School.

Comments

No tree-ring dates are available for Bailey Ruin (Mills et al. 1999:240). Jeddito Yellow Ware, Fourmile Polychrome, and Gila and Tonto Polychromes are all rare at this site (see Mills 1999:Tables 7.8-7.10).

CANYON CREEK RUIN (AZ V:2:1)

Sources

Bannister and Robinson (1971); Benitez (1999); Breternitz (1963, 1966); Haury (1934)

Analysis

Ceramic data are from the 1932 Gila Pueblo excavations (Haury 1934), also summarized by Breternitz (1963).

Comments

A single possible specimen of Jeddito Yellow Ware was recovered from Room 22B, which yielded a late date of 1335 (cutting). Haury (1934:135) states, "A fragment of a shallow bowl with yellowish surface and black decoration was found on the altar of the ceremonial room [22B]. The same kind of pottery was meagerly represented in Showlow Ruin [Haury and Hargrave 1931], *and was there considered as a local copy of Jeddito Brown-on-yellow,*" (emphasis added). Until this specimen is located and positively identified, this cannot be considered a strong case for dating Jeddito Yellow Ware.

APPENDIX D:
TREE-RING DATED CONTEXTS FROM OUTSIDE HOMOL'OVI THAT ARE
RELEVANT TO DATING THE INITIAL PRODUCTION AND CIRCULATION OF
SIKYATKI POLYCHROME POTTERY: DATA SOURCES FOR TABLE 2.9

GENERAL NOTES

The information summarized below and in Table 2.9 pertains to dating the initial production and early dissemination of Sikyatki Polychrome pottery. The interested reader should also consult Benitez (1999) for additional comments on some of the sites and contexts listed here.

Sites with contexts considered strong cases (*) for dating Sikyatki Polychrome pottery are listed first, followed by supporting cases. The strong cases are annotated in more detail than the supporting cases. The following conventions are used in these summaries: Tree-ring dates that are also cutting dates are underlined (e.g., 1375), whereas non-cutting dates are not underlined. Additionally, when a range of tree-ring dates is given under Site Context, the early date is the earliest cutting date, and the late date is the latest date reported, whether cutting or non-cutting.

KOOKOPNGYAMU (AZ J:8:5)

Sources

Bannister et al. (1967); Benitez (1999); Haury and Hargrave (1931)

Site Context

Kookopngyamu is a 250-room pueblo on Antelope Mesa (Adams et al. 2004). Lyndon L. Hargrave excavated 20 rooms and 5 kivas in 1929 as part of the Third Beam Expedition (Haury and Hargrave 1931:95-120). Bannister et al. (1967:18-19) list 44 dates from the site ranging from 1272 to 1400 (note that Haury and Hargrave [1931:116-117] and Smiley [1951] published tree-ring dates as late as 1416 and 1430, respectively, but Bannister et al. [1967:19] reevaluated all of these specimens and found no dates later than 1400). The only published contextual or ceramic data from Kookopngyamu are found in Hargrave's brief description of the kivas (Haury and Hargrave 1931:103-116), which includes some general comments on the associated ceramic assemblages. Sikyatki Polychrome is present at Kookopngyamu, but apparently not in every structure excavated. Tree-ring dates and at least some specific ceramic information are available for two of the kivas, Rooms 23 and 24.

Room 23 (Kiva)*

Tree-ring Dates. 1400, 1400 (Bannister et al. 1967:18). Haury and Hargrave (1931:117) report only a single dated specimen from Room 23—a piece of charcoal from the hearth. One or both of the dates reported by Bannister et al. (1967:18) may be from the same specimen.

Interpretation of Dates. The dates are too few, and contextual information too sketchy, to determine when the kiva was built or repaired. Assuming at least one of the dated specimens is from the hearth, it would appear that the kiva was in use until at least 1400.

Ceramic Associations. Jeddito B/y and Sikyatki Polychrome sherds were found in a 6-inch thick sand deposit that apparently sealed over the ashes in one of the two hearths found in the room (Haury and Hargrave 1931:114). These two types were also found in association with the roof of the horizontal ventilator shaft that ran through the northeast wall (Haury and Hargrave 1931:114-115):

[The horizontal shaft] is 9 inches high, 5 inches deep, and is roofed with sticks covered with clay. The base of the entrance and passageway is level with the kiva floor, and is of clay....This short passageway...is built into the masonry wall of the kiva....In a small midden fill on top of the roof clay were sherds of Jeddito black-on-yellow and Sikyatki Polychrome.

From the description, it would seem that this ceramic material was sealed in place between that portion of the wall of the kiva that formed the top of the horizontal shaft and the clay-and-sticks roof of the shaft when the roof was constructed.

Room 24 (Kiva)*

Tree-ring dates. 1358, 1363, 1368, 1368, 1369, 1378 (× 2), 1380 (× 5), 1380 (× 11) (Bannister et al. 1967:18-19). All or most of these specimens are from roof beams; according to Haury and Hargrave (1931:117), Room 24 was the only kiva in which dated roof beams were found.

Interpretation of dates. The large cluster of dates between 1378 and 1380 indicates Room 24 was built or re-roofed in 1380 or soon thereafter (Bannister et al. 1967:19).

Ceramic Associations. Two sand-filled Jeddito B/y jars were found in a cache beneath the floor of the kiva. Haury and Hargrave (1931:112) also report fragments of Jeddito B/y and Jeddito corrugated ware “[b]eneath the fallen roof and scattered on the floor near the deflector and firepit.” Sikyatki Polychrome is apparently absent, although no detailed report of the ceramic material is provided. Hargrave gives fairly specific contextual and typological details in his comments on the ceramics found in the Kookopngyamu kivas, and he seems to note the presence of Sikyatki Polychrome when it occurs in other structures. Hence, his failure to mention Sikyatki Polychrome in the discussion of this structure likely means it was absent—at least from the floor assemblage that was sealed by the dated roof deposits.

Implications

The apparent absence of Sikyatki Polychrome from Room 24 suggests this type did not appear at Kookopngyamu until after 1380. The two dates from Room 23 suggest a final use of that structure around 1400 or not long thereafter. Since Sikyatki Polychrome sherds were sealed above the roof of the horizontal ventilation shaft when the roof was built, and since the construction of the ventilator must pre-date the final use of the kiva, it follows that Sikyatki Polychrome was in circulation at this site sometime prior to about

1400. This is the most parsimonious scenario given the currently available information for Room 23.

TUZIGOOT (AZ N:4:1)

Sources

Anderson (1992); Bannister et al. (1966); Benitez (1999); Caywood and Spicer (1935); Hartman (1976); Tagg (1986)

Site Context

Tuzigoot is a pueblo of over 100 rooms located in the Verde valley (Hartman 1976). It was thoroughly excavated in 1933-1934 when L. R. Caywood and E. H. Spicer cleared 86 of the approximately 110 structures at the site and dug several stratigraphic test trenches into the extramural midden areas, exposing 411 burials in the process (Caywood and Spicer 1935; Hartman 1976:41-44). Caywood and Spicer (1935:38-40) identified three discrete building phases at the site, the last of which is dated to the later fourteenth century (Bannister et al. 1966:14). Bannister et al. (1966:12-13) list 28 tree-ring dates for the site, ranging from 1137 to 1386. Fairly detailed, quantitative ceramic data for the entire site are provided by Caywood and Spicer (1935:48); although the original excavation and reporting are crude in terms of modern recovery techniques and standards of documentation (Hartman 1976), the ceramic data are considered to be reliable since “[e]very decorated sherd from every room was saved,” (Caywood and Spicer 1935:49). Unfortunately, the ceramic data are not broken down by individual rooms. Illustrations of designs on a few complete Jeddito Yellow Ware bowls are provided in the report, however. Caywood and Spicer’s analysis shows that the decorated ware assemblage at Tuzigoot was dominated by imported Jeddito Yellow Ware, but Sikyatki Polychrome is not represented at the site. A number of smaller excavation and survey projects have been conducted in and around Tuzigoot more recently; the few publications resulting from these recent projects have not reported Sikyatki Polychrome either (Hartman 1976; Tagg 1986; Anderson 1992). Since the bulk of the available ceramic data have not been reported for individual contexts at Tuzigoot, the site as a whole is treated as a single context in the present analysis.

General Site*

Tree-ring Dates. The following dates are reported for the fourteenth-century groups I, IV, and V (Bannister et al. 1966:12-13); no specific provenience is available in the published record for any of the samples:

Group I, Room 2 ?:	1386
Group I, Room 12:	1366
Group IV, Room 1:	1380, <u>1386</u> , 1386
Group IV, Room 4:	1347, 1351, 1355, 1371
Group V ?:	1242, 1314, 1316

Interpretation of Dates. With so few dates from any one room, and with so little contextual information, it is difficult to establish firm construction dates for any of these rooms. Group IV, Room 1 may have been built or repaired after 1386. In any event, it is clear from these dates that occupation of the site continued until at least 1386 and slightly beyond.

Ceramic Associations. Jeddito Yellow Ware accounts for over 35 percent of all decorated ware from Tuzigoot (N = 2,256 pieces) (Caywood and Spicer 1935:48); since this figure includes ceramics from twelfth-, thirteenth-, and fourteenth-century contexts, the proportion of Jeddito Yellow Ware in fourteenth-century assemblages must be even higher. Bidahochi Polychrome accounts for about six percent of the Jeddito Yellow Ware assemblage, the remainder being Jeddito B/y. Sikyatki Polychrome is apparently completely absent. Plate XII and Figure 7 in Caywood and Spicer's (1935) report show the interiors of a few complete Jeddito Yellow Ware bowls recovered from Tuzigoot. The interior layouts illustrated (asymmetrical [N = 2]; mirror symmetry [N = 1]; bottom-oriented bifold rotational symmetry [N = 2]; open, free-form quartered radial symmetry [N = 1]) resemble those typically found on Jeddito Yellow Ware bowls from Late Homol'ovi Phase contexts at Homol'ovi I (e.g., see Figure 2.3a, this study). Gila, Fourmile, Pinedale, and St. Johns Polychromes are also represented in the sherd assemblage in trace amounts.

Implications

The apparent absence of Sikyatki Polychrome from Tuzigoot suggests this type was not in circulation outside of the Jeddito Yellow Ware production zone until after 1386. It is possible that Sikyatki Polychrome was produced prior to this date but not traded to Tuzigoot, but this seems unlikely given the overall abundance of Jeddito Yellow Ware at the site and the relatively high proportion of another Jeddito Yellow Ware polychrome type (Bidahochi Polychrome) there. Possible trade restrictions notwithstanding, this date is considered a valid benchmark for dating the initial production of Sikyatki Polychrome.

PINK ARROW (AZ J:8:1)

Sources

Bannister et al. (1967); Brew (1941); Smith (1972)

Site Context

Pink Arrow is a 50-room pueblo on Antelope Mesa (Adams et al. 2004). The Awatovi Expedition excavated 32 rooms and a kiva in 1939 (Brew 1941). Bannister et al. (1967:26) report 12 tree-ring dates from the site ranging from 1370 to 1399. Most of the material and data collected from Pink Arrow remain unanalyzed and unpublished; however Smith (1972:135-138) includes a brief report on the kiva (Room 24) and its ceramic assemblage.

Room 24 (Kiva)*

Tree-ring Dates. 1376, 1378, 1382, 1394, 1399 (Bannister et al. 1967:26). Smith's (1972) discussion suggests that all of the dates were derived from a layer of burned roof debris that covered a 20-cm thick deposit of trash on the structure's floor. Above this burned layer the fill was mainly architectural debris.

Interpretation of Dates. The room may have been built shortly after 1382 with later repairs, or after 1399 with some reuse of earlier beams (Bannister et al. 1967:26). It is also possible that one or both of the specimens dated to the 1390s or later is intrusive; however the likelihood of this cannot be evaluated at present for lack of published contextual data.

Ceramic Associations. According to Watson Smith's (1972:137) data, Jeddito Yellow Ware makes up about 93 percent of the 887-piece decorated ware assemblage from this room. Slightly less than one percent of the Jeddito Yellow Ware is Bidahochi Polychrome. Sikyatki Polychrome is absent. The ceramic data are broadly consistent with the tree-ring dates in Smith's estimation.

It is worth noting that one partial bowl from Room 24 (Peabody Museum Cat. No. 21762) was at one point typed as Sikyatki Polychrome by Kelley Hays-Gilpin. The bowl in question is not a classic example of Sikyatki Polychrome, however, insofar as two shades of brown paint (rather than brown/black and red) were used in the interior design (Kelley Hays-Gilpin, personal communication, 2003); hence, the specimen is probably better classified as Paayu Polychrome (Hays 1991). In any event, this piece does not appear to be from the sealed floor assemblage below the dated roof samples which, by all accounts, is free of Sikyatki Polychrome.

Implications

The absence of Sikyatki Polychrome from the Room 24 assemblage is of great significance for dating the appearance of this type. This context currently provides the best evidence for placing a start-date on Sikyatki Polychrome since it is from a site within the Jeddito Yellow Ware production zone, and since specific ceramic data from strata above and below the dated roof elements have been published. Even if the two non-cutting dates from the 1390s are from intrusive elements, the remaining dates suggest that Sikyatki Polychrome did not appear until after 1382 at Pink Arrow. If the two late dates are not from intrusive elements, then Sikyatki Polychrome may not have appeared until after 1399. The possibility that the kiva was filled with redeposited earlier trash must also be considered, but there is nothing in the published information on the deposits or in the ceramic data to suggest that is was the case.

KINISHBA (AZ V:4:1)

Sources

Bannister and Robinson (1971); Benitez (1999); Breternitz (1963, 1966); Cummings (1940)

Analysis

Ceramic data from Kinishba are from non-quantified descriptive accounts based on excavation data.

Comments

According to Cummings (1940:89), Hopi pottery “from Sikyatki and Awatovi” was found at Kinishba. He states that “[t]he Sikyatki ware is a fine, even paste that burned a light buff. It is beautifully smoothed and polished and decorated in black or dark brown, the best finished and the best fired ever produced in the Southwest,” (Cummings 1940:89). His plates XXVIII and XXIX illustrate bichrome (black-on-yellow) bowls. It is assumed that “from Sikyatki” here simply refers to fine-pasted Jeddito Yellow Ware, and does not carry the connotation of “Sikyatki Polychrome.” Other authors note that Jeddito B/y is present at Kinishba, but do not specifically mention Sikyatki Polychrome.

RATTLESNAKE POINT PUEBLO (AZ Q:11:118)

Source

Benitez (1999); Duff (1999)

Analysis

Ceramic data from Rattlesnake Point Pueblo are from recent excavations and are summarized by Duff (1999:Tables 5.2 and 5.3).

RAVEN RUIN (AZ Q:11:48)

Sources

Beeson (1966); Benitez (1999); Duff (1999); Longacre (1961, 1962)

Analysis

Ceramic data from Raven Ruin are derived from survey work by Longacre (1961, 1962) and Beeson (1966), as summarized by Duff (1999:Table 5.3). Duff (1999:Appendix A.7) also provides additional comments on Jeddito Yellow Ware from the site based on his unsystematic examination of more recently excavated material in a private collection.

GRASSHOPPER PUEBLO (AZ P:14:1)

Source

Benitez (1999); Dean and Robinson (1982); Riggs (1999)

Analysis

Data on Jeddito Yellow Ware from Grasshopper are based on a personal communication from J. Jefferson Reid cited in Benitez (1999).

KINNIKINNICK PUEBLO (NA 1629)

Sources

Bannister et al. (1966); Benitez (1999); Bernardini (2002); Brown (1982); Colton (1946); Conner (1943)

Analysis

Ceramic data from Kinnikinnick Pueblo are from probabilistic surface collections made by Brown (1982) and by Colton (1946), both of which are summarized by Bernardini (2002:Table 3.1).

Comments

This site is not considered a strong case for dating Sikyatki Polychrome because the single 1374 non-cutting date is an extreme outlier compared to other tree-ring samples from the site, all 77 of which are dated to 1313 or earlier (Bannister et al. 1966:20-21; Bernardini 2002:67). This specimen may represent a later intrusion.

TABLE ROCK PUEBLO (AZ Q:7:5)

Sources

Benitez (1999); Duff (1999); Martin and Rinaldo (1960)

Analysis

Ceramic data from Table Rock Pueblo are from extensive excavations reported by Martin and Rinaldo (1960). Quantitative ceramic data from these excavations are summarized by Martin and Rinaldo (1960:Tables 1 and 2) and by Duff (1999:Tables 5.2 and 5.3).

PINEDALE RUIN (AZ P:12:2)

Sources

Bannister et al. (1966); Benitez (1999); Breternitz (1963, 1966); Haury and Hargrave (1931)

Analysis

Ceramic data from Pinedale Ruin are from non-quantified descriptive accounts based on excavation data.

Comments

Haury and Hargrave (1931:71) only report two partial vessels of Jeddito B/y.

NUVAKWEWTAQA SOUTH (AZ O:4:2)

Sources

Bannister et al. (1966); Benitez (1999); Bernardini (2002); Coinman (1984, 1990); Douglass (1935); Fewkes (1904)

Analysis

Ceramic data from Nuvakwewtaqa are from excavation contexts recently summarized by Bernardini (2002:Table 3.1), drawing on unpublished work by Steadman Upham and Nancy Coinman.

Comments

Both the Southwest and Southeast ruins at Chavez Pass are combined into a single context in Table 2.9 (this study) because it is unclear which ruin actually yielded the latest-dated tree-ring samples. The two 1381 cutting dates reported in Table 2.9 were published by Douglass (1935:52). Bannister et al. (1966:19) could not identify these specimens in their re-analysis, “possibly due to outer ring loss in storage.” Dates this late probably would have come from one of the two fourteenth-century South ruins, rather than the earlier North ruin (see Bernardini 2002:63-72). Bernardini (2002:Table 3.1) reports a single sherd of Sikyatki Polychrome from the Southeast ruin. Fewkes (1904:32-34, 56-61) neither mentions nor illustrates anything resembling Sikyatki Polychrome from his 1896 excavations at the site.

It is not clear if the 1381 dates should be considered valid. Bernardini (2002:Figure 3.6), for instance, lists 1367 as the latest tree-ring date for the South ruin (unknown cutting/non-cutting date).

SHOWLOW RUIN (AZ P:12:3)

Sources

Bannister et al. (1966); Benitez (1999); Breternitz (1963, 1966); Haury and Hargrave (1931)

Analysis

Ceramic data from Showlow Ruin are from non-quantified descriptive accounts based on excavation data.

Comments

Haury and Hargrave (1931:44) report one sherd of Jeddito Yellow Ware from this site with additional examples of what they characterize as local copies (see also Haury 1934:135).

TSA'AKPAHU (NA 1039)

Sources

Bannister et al. (1967); Breternitz (1963, 1966); Douglass (1935)

Analysis

Ceramic data from Tsa'akpahu are based on Breternitz (1963), who developed a list of types at the site from E. H. Morris' field notes on file at the University of Colorado and from a type list and survey collection housed at the Museum of Northern Arizona.

Comments

Bannister et al. (1967:14) discarded all of the tree-ring dates for Tsa'akpahu, stating that “[a]lthough it is possible to understand why Douglass dated the specimens as he did, the quality of the cross-dating with other sites and chronologies is not strong enough on present standards.” The dates are included in this table for the sake of completeness, but because of the quality of the dating this site cannot be considered a “strong case” for dating Sikyatki Polychrome.

KAWÀYKA'A (AZ J:7:2)

Sources

Bannister et al. (1967); Smith (1972)

Analysis

Ceramic data from the three listed contexts from this site are from Smith's (1972:78-79, 84-88, 93-96) report. The tree-ring dates come from Bannister et al. (1967:17).

AWAT'OVI (AZ J:7:1)

Sources

Smith (1972)

Analysis

Ceramic data and tree-ring dates for Test 14, Room 2 are from Smith's (1972:15-18) report. Bannister et al. (1967) do not list any tree-ring dates for this context.

APPENDIX E:
ANALYZED FAUNAL ASSEMBLAGES FROM HOMOL' OVI I REPRESENTED IN
THIS STUDY

Table E1. Analyzed Faunal Assemblages from Homol'ovi I Represented in this Study¹

Structure or Trench	Context Type	Portion of Context Excavated²	Portion of Excavated Context Selected for Faunal Analysis³
3	room	partial	partial (stratigraphic sample)
4	room	full	all proveniences
8	room	partial	all proveniences
103	room	full	all proveniences
104	room	full	all proveniences
105	room	full	all proveniences
199	South Plaza trench	tested	all proveniences
209	room	full	all proveniences
210	room	full	all proveniences
203/215	kiva	full	all proveniences
310	room	full	all proveniences
311	room	full	all proveniences
345	room	partial	all proveniences
401	room	partial	partial (stratigraphic sample)
418	room	full	partial (lower fill only)
500	East Plaza 1995 trench	tested	all proveniences
503	room	full	partial (lower fill only)
504	room	full	partial (lower fill only)
558	room	full	partial (lower fill only)
601	room	full	all proveniences
651	room	full	all proveniences
652	room	full	all proveniences
653	room	partial	all proveniences
701	room	full	all proveniences
702	room	full	all proveniences
704	room	full	all proveniences
709	room	full	all proveniences
729	room	full	all proveniences
730	room	full	all proveniences
734	room	partial	all proveniences
739	room	full	all proveniences
799	North Midden trench	tested	all proveniences
901	kiva	full	all proveniences

Table E1, *continued*Notes:

¹Table incorporates material from Strand's (1998) analysis and material analyzed specifically for the present study. Certain categories of fauna (e.g., lagomorphs, rodents) were not analyzed for all contexts (see text). Faunal data by individual provenience designations (PDs) are on file at the Homol'ovi Research Program Laboratory, Arizona State Museum.

²Portion of context excavated:

Full – The room was completely excavated, at least to the final occupation surface. In some ground-floor rooms, cultural deposits below the final occupation surface (including, in some cases, earlier superimposed occupation surfaces) were only partially excavated.

Partial – Half of the room or less was excavated.

Tested – A trench was excavated into a very large or unbounded context.

³Portion of excavated context selected for faunal analysis:

All proveniences – Fauna from all undisturbed cultural deposits were analyzed (material from disturbed or naturally deposited fill may have been omitted).

Partial (lower fill only) – Fauna from the floor and lower fill of the structure were analyzed only. Often used for rooms where the upper fill consisted of naturally deposited sediments and/or architectural decay products.

Partial (stratigraphic sample) – Fauna from individual proveniences representing upper, middle, and lower levels of the structure were analyzed (material from intervening proveniences was not analyzed). Only used for two contexts in Strand's (1998) analysis.

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