

Interpreting Late Prehistoric Use of a Desert Marsh: The Tule Springs Hearth Site, Alvord Basin, Southeastern Oregon

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ARCHAEOLOGISTS of the Steens Mountain Prehistory Project excavated the Tule Springs Hearth site in the early summer of 1980. This site, 35Ha406, is located just above 4,100 feet elevation in the eastern Alvord Basin of Pueblo Valley, on the eastern side of Steens Mountain (Fig. 1). It lies approximately 90 miles southeast of Burns, in Harney County, Oregon. C. Melvin Aikens directed the excavations, with the author as field supervisor. Field school students from the universities of Oregon and Washington, and from Washington State University, participated in the project.

The Hearth site was named for a large charcoal stain in a stabilized spring dune near the eastern edge of the Alvord Basin. Wheeled traffic on a narrow desert road had exposed the shallow hearth in a swale between higher dunes. The feature was associated with numerous lithic artifacts apparently eroding from either side of the linear dune. Deflated areas to the east and west of the hearth contained abundant artifacts, including fire-cracked rock, ground stone artifact fragments, flakes, and occasional manufactured tools. We were further drawn to the site by its proximity to several small springs and the Tule Springs marsh to the south. The site offered an opportunity to study the relationship of settlement location and water resources in the dry Alvord Basin during the later prehistoric past.

Interpretation of the site was not clear-cut, however, and one of the major research

goals was to try to determine the relationship of buried cultural deposits in the dune to the dense artifact scatters in deflated areas to either side. The deflation surface appeared to be a stable weathered soil that underlay the dune. We hoped to determine the number of components reflected in the deflated areas by discovering the number of components above the weathered soil in the dune. We further hoped that only one component, associated with the hearth feature, would be revealed by excavation. This turned out to be the case.

Understanding the Tule Springs Hearth site assisted in interpreting similar patterns on dune and other sites found during the Steens Mountain surface reconnaissance (Beck 1984; Jones 1984). More importantly, however, the interpretation of culture-historical aspects of occupation is crucial to understanding the place of the Hearth site in the late prehistoric settlement pattern proposed for the Steens Mountain region (Beck 1984). The site appears to fit well within the pattern of dispersion and increased mobility that began around 2,000 years ago.

The Hearth site, approximately 100 x 60 m. in size, is located in a low dune field formed of pluvial lake sediments on the valley floor about 500 m. north of Tule Springs. The marsh created by the springs is about 100 x 500 m. in size. It contains abundant ethnobotanically important sedges (*Juncus* spp.), bulrushes (*Scirpus* spp.), cattail (*Typha latifolia*), and other marsh species. *Wada* (*Suaeda* spp.) grows in a narrow band of

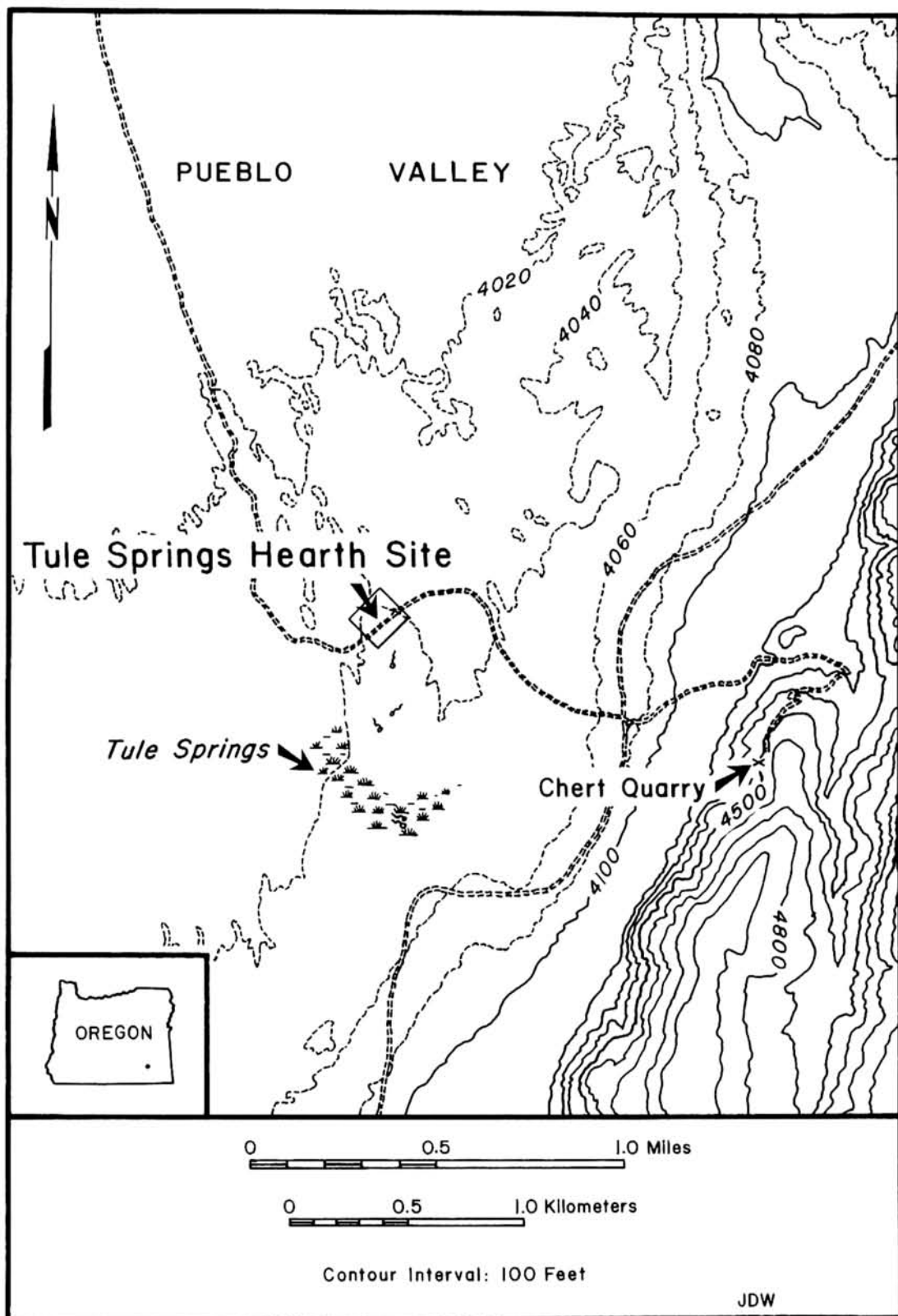


Fig. 1. Location of the Tule Springs Hearth site.

saline soil around the outer edge of the marsh.

Stabilized dunes form low ridges running northeasterly from the Tule Springs marsh. These contain small seep springs suggesting that minor faulting of the valley floor has allowed the emergence of ground water in the vicinity of Tule Springs Hearth site. Greasewood (*Sarcobatus vermiculatus*), saltgrass (*Distichlis stricta*), rabbitbrush (*Chrysothamnus viscidiflorus*), and some sagebrush (*Artemisia tridentata*) occupy and stabilize the dunes. Seeps contain abundant *Juncus* spp., *Scirpus* spp., and *Typha latifolia*, and are surrounded by dense tangles of wild rose (*Rosa* sp.). Stands of buckberry (*Shepherdia argentea*) grow in shallow channels just west of the springs, and Great Basin wild rye (*Elymus cinereus*) is found along the margins of the linear dunes. The latter also is found in isolated bunches in interdunal areas in association with Indian ricegrass (*Oryzopsis hymenoides*) and salt grass. Most of these species were important for food or textile manufacture to the historic indigenous peoples in the northern Great Basin.

Lithic resources also are available in the vicinity of Tule Springs. These include variegated cherts suitable for toolmaking that form old desert pavements in deflated areas throughout the eastern Pueblo Valley. Chert outcrops that may have been prehistorically mined occur in several places above the face of the escarpment east of the site.

Tule Springs Hearth site was subjected to intensive surface collection and excavation during the early summer of 1980. The excavation grid shown in Figure 2 formed the basis for the overall site grid. Surface collection of all artifacts encountered in each 2 x 2-m. unit over the site was completed by a mapping team under the direction of Charlotte Beck. Concurrent excavations and surface collection allowed an integrated

strategy for data recovery at the site.

The excavation grid was positioned to bisect a low swale between higher areas on the dune ridge, and to cross section the partly exposed hearth. It was laid out on a baseline running to the northwest, with the intersecting SW-NE baseline established perpendicular to the dune ridge. The excavation strategy was developed from artifact distribution maps generated during the surface collection. Initial excavations began in grid units with the lowest densities of surface artifacts with the expectation that intact cultural deposits would be found beneath the surfaces of these undeflated units.

EXCAVATION PROCEDURES

Nine 2 x 2-m. units were opened in controlled excavations (Fig. 2). Two units were first excavated in 10-cm. levels to determine the nature and extent of buried strata; these strata, once discovered, formed natural levels for subsequent excavations, especially those in units near the hearth. Natural levels thicker than 10 cm. were divided into arbitrary levels 5-10 cm. thick. Identifiable rodent burrows and disturbed surfaces associated with the desert road were isolated and collected separately from undisturbed sediments. Excavated material was screened through 3.18-mm. (1/8-in.) mesh to maximize possible recovery of small bones.

STRATIGRAPHY

Excavations at Tule Springs were carried out in conjunction with sedimentary and stratigraphic studies by Peter Mehringer and his assistants. A profile of wall 4-10 NW and 0 SW, passing through the hearth, is shown in Figure 3. Stratum C contained abundant artifacts associated with the hearth and is considered the primary occupation zone or component at the site. The whole stratigraphic column is described in Table 1.

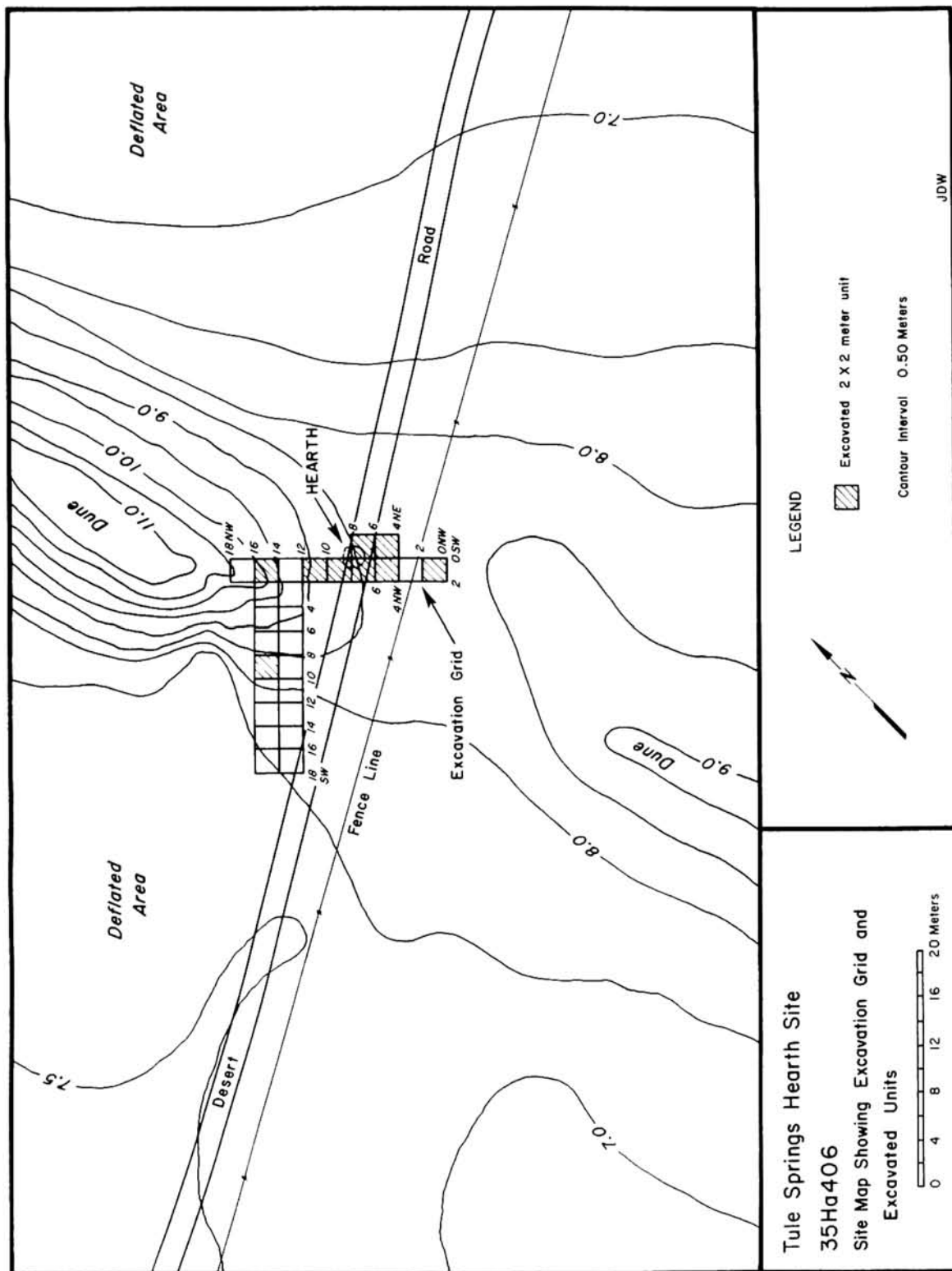


Fig. 2. Excavation grid, Tule Springs Hearth site.

Stratigraphic Profile, 4-10NW, OSW

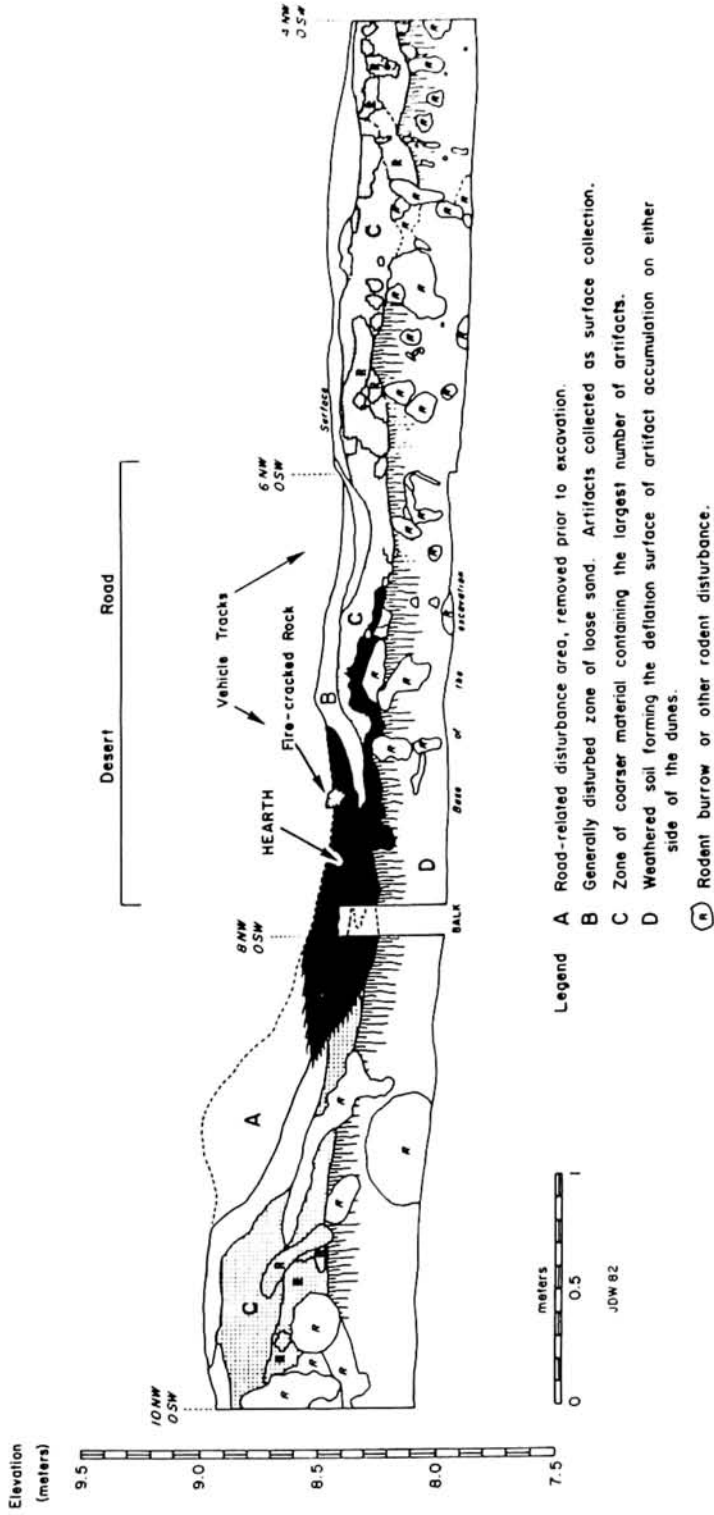


Fig. 3. Profile along 4-10NW, OSW, Tule Springs Hearth site.

Table 1
STRATIGRAPHIC DESCRIPTIONS, TULE SPRINGS HEARTH SITE

Stratum	Depth (cm.)	Description
A	—	Very fine sand, disturbed by road construction; removed prior to excavation.
B	0-6	Very fine sand, also disturbed.
C	6-15	Medium sand, lightly cemented, with abundant rodent burrows; primary occupation zone with numerous artifacts.
D	15-40	Fine sand, moderately cemented, with abundant rodent burrows; weathered soil forming resistant surface of artifact accumulation on either side of dune.
E	40-96	Very fine sand, weakly cemented, increasing toward lower levels, rootlets more abundant between 70-96 cm., abundant rodent burrows; no artifacts.
F	96-120	Silty fine sand, noncemented; no artifacts.
G	120-150	Clayey sandy silt, massive with salt concentrations throughout, black pebble lag on uneroded surface of stratum.
H	150-258	Silty clay; strong fine to coarse subangular blocky peds with carbonate skins between; volcanic ash at 241 cm.

The only feature encountered in the occupation zone (Stratum C) was the partially exposed hearth for which the site is named. This consisted of a roughly circular distribution of charcoal flecks and dark, greasy sand, between 30 and 40 cm. in thickness, covering an area of about four square meters. Its southern edges were dispersed by road-related disturbance and burrowing rodents, suggesting that originally it was only about 1.5-2 square meters in size.

Excavation showed that the hearth lay only a few centimeters above a resistant, weathered surface. This surface was followed into the dune, where the highest artifact densities were found immediately above it, in a rather narrow zone about 40 cm. in thickness (Stratum C). Sterile dune sediments (Strata A and B) overlay this zone, and the heavily rodent-worked deposits below it (Strata D - H) contained relatively few flakes, clearly carried downward by rodent activity. The same weathered surface (surface of Stratum D) was traced out from under the dune on both sides, where it became the modern ground surface. Wind deflation had concentrated abundant artifacts on this surface; these apparently originated in the single cultural component at the site, representing one or more occupations essentially

contemporaneous with that associated with the hearth.

MATERIAL CULTURE

A total of 13,244 artifacts was collected from the surface and excavations of Tule Springs Hearth site. All were lithic artifacts, except for one half of a ceramic spool or spindle whorl from an excavation unit. The excavations yielded 130 tools (defined as instances of macroscopically identifiable edge or surface use wear) on 99 objects (cores, flakes, cobbles, slabs, etc.), along with 3,037 unworn specimens (including five projectile points), for a total of 3,136 artifacts. The surface collection contained 576 tools on 450 objects, and 9,658 unworn specimens (including 12 projectile points and one crescent), for a total of 10,108 artifacts.

Lithic classifications developed by Robert Dunnell and his students at the University of Washington (e.g., Dancey 1973; Dunnell and Campbell 1977; Dunnell 1978; Dunnell and Beck 1979; Campbell 1981), provided the foundation for the Steens Mountain analysis (see Beck [1984], Jones [1984], or Wilde [1985] for a full discussion, and Beck and Jones [1989] for a summary and critique of the Steens classification). It is divided into hierarchical stylistic and functional compo-

nents, where shaping, retouch, or otherwise purposeful modifications are considered stylistic, and *all* instances of use wear are considered functional. This means that some traditionally named tools, such as projectile points, are subject to stylistic analysis, after which they, and all other modified (worked) and unmodified objects are subject to use-wear, or functional, analysis.

Functional Analysis

The functional analysis focuses on edge and surface use wear on flakes and other artifacts, defining particular instances of such wear in terms of five dimensions: kind of wear (chipped, abraded, crushed, etc.), location of wear (unifacial or bifacial edge, surface, etc.), shape of worn area (concave, convex, straight, etc.), edge angle (0-30°, 31-60°, 61-90°), and orientation of wear (perpendicular, oblique, parallel, diffuse). The analysis can generate 6,480 classes, of which only 33 were present at Tule Springs Hearth site (Wilde 1985:Table 31).

The edge-angle dimension describes the assemblage better than all others and is used below to characterize activity areas throughout the site. Table 2 shows a synopsis of artifact classes found at the site, segregated by the three edge-angle chipped use-wear classes, abraded and crushed use-wear classes, and all other categories of use wear combined. It should be noted that almost all (98%) macroscopically defined edge wear is on unmodified (i.e., not shaped, retouched, or otherwise purposefully modified) flakes.

Table 2 indicates the predominance of low angle edges (0-30°). This sharp-edged class comprises a total of 400 items (57% of the total tool assemblage from the site). Of this total, 394 (99%) are on flakes with unifacial chipping wear; the remainder are on flakes with bifacial chipping wear. Both kinds of use wear on sharp edges are associated with

cutting of relatively soft and flexible materials, such as meat and small animal hides. Medium edge-angle tools (31-60°) are the next most important, numbering 193 tools (27% of the assemblage). Of these, 181 (94%) are on flakes with unifacial chipping wear, and 12 (6%) are on flakes with bifacial wear. These kinds of use wear are associated with the cutting of moderately soft materials, such as wood and fiber, as well as with light scraping and shaving activities. Together, low and medium edge-angle cutting tools make up 84% of the total tool assemblage.

High edge-angle (61-90°) scraper-like tools number 59, (only 8% of the assemblage). Of these, 57 (97%) are on flakes with unifacial wear; the remainder are on flakes with bifacial wear. These kinds of use wear are associated with relatively heavy cutting, such as that required with large animal hides, hardwoods (e.g., greasewood, mountain mahogany), and bone, as well as with hide scraping, planing, and prying.

Grinding wear on cobbles or slabs occurs on 26 examples (4%), and examples of crushed wear on cobble edges or surfaces number 18 (3% of the assemblage). Grinding wear at the site probably is associated with seed and other plant resource processing, and crushed wear on cobbles represents heavy-duty breaking, crushing, and pounding, possibly related to various activities such as pigment production, bone crushing, fiber separation, and lithic core reduction. The remaining 1% of use-wear classes contain other categories, primarily made up of unifacial or bifacial chipping wear on pointed edges (traditionally called graters).

The proportions of functional classes in the excavated portion of the site should be similar to those from the total assemblage, including that from the surface, if the excavation is to be taken as representative of the site as a whole. This is generally the case,

Table 2
PROPORTIONS OF SELECTED TOOL CLASSES
TULE SPRINGS HEARTH SITE

Artifact Classes	Excavation		Surface		Assemblage	
	Total	Percent	Total	Percent	Total	Percent
Low (0-30°) edge angle	79	61	321	56	400	57
Medium (31-60°) edge angle	27	21	166	29	193	27
High (61-90°) edge angle	10	8	49	9	59	8
Ground surface wear	6	5	20	3	26	4
Crushed edge/surface wear	4	3	14	2	18	3
Other classes	4	3	6	1	10	1
Totals	130	101	576	100	706	100

as shown in Table 2. Many of the observed differences between proportions probably are due to the sampling effects of using 3.18-mm. mesh to recover buried artifacts, while the surface was collected without screening. This sampling difference allows smaller artifacts to be systematically collected from the excavated material, while their recovery was more haphazard in the surface collection.

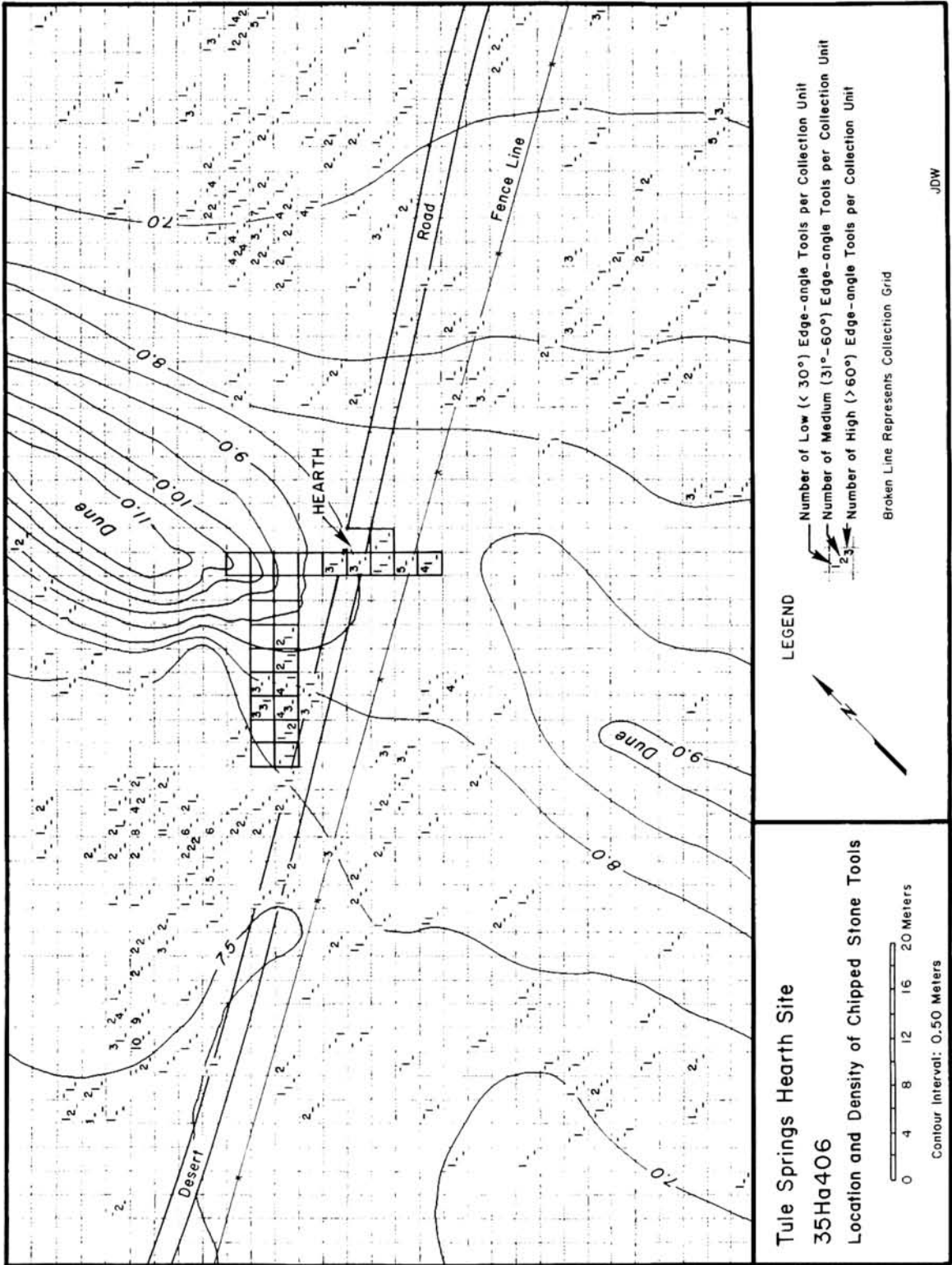
Table 2 shows that no significant difference exists between the proportions of tool types recovered during the excavation and those from the surface collection. This strongly suggests that the excavated portion of the site is representative of the whole, and that the two deflated areas on either side of the dune are related to the excavated site. This supports stratigraphic data previously discussed showing that the deflated scatters were originally part of, or related to, the main occupation zone in the dune.

A schematic profile of the units excavated along the NW-SE baseline at 0-2 SW is shown in Figure 4. This exaggerates the slope and even surfaces of the site, and standardizes all excavation levels to 10-cm. vertical units. The figure shows the number of specimens with no use wear compared with all classes of use wear found in each represented unit level. The gray zone indicates the correlated occupation zone, Stratum C, across the units, showing the abundance of artifacts recovered from this upper stratum that rests on the surface of an older, weathered soil horizon. The zone is more dispersed in the dune unit

on the left side of the figure. Nearly every excavation unit shows a steady decrease in artifact density with increased depth, further supporting the proposition that the site consists of a single component resting on a resistant soil horizon. Artifacts dispersed in the lower layers probably were displaced downward from the main occupation level by rodent activity.

Because the site appears to have only a single component, deflated surface scatters reflect something of its former structure, allowing tentative intra-site spatial analysis of possible activity or camp areas. Figure 5 shows the distribution of low, medium, and high edge-angle tools over the site, and portrays the areas of artifact density and dispersal. A light scatter characterizes most of the two deflated areas on either side of the dune, and the relatively small area excavated suggests it is continuous through the shallow swale of the dune ridge. In addition, several localized dense scatters suggest the presence of activity areas over the site.

A dense scatter of tools, also associated with grinding stones and fire-cracked rock, is shown on the western side of the dune. It is composed primarily of low- and medium-angle edged tools with few high-angle tools. A similar but less dense scatter also is shown in the northern portion of the site east of the dune ridge; this contained no grinding stones nor fire-cracked rock, and may represent a limited-use area within the site. Another activity area, with relatively high proportions



of sharp-edged tools, is located in the southeastern quadrant of the site, south of the desert road. This area also appears to have been a limited-activity area where fire-cracked rock and grinding stones were poorly represented. The remainder of the site contains a more random distribution of edge-worn artifacts suggesting generally dispersed multipurpose use throughout.

The site also contained a low number of objects exhibiting multiple instances of wear (Wilde 1985:221-223). This suggests that object re-use was not an important consideration, and that tool discard rates were considerably higher than at other sites in the Steens Mountain area (Beck 1984; Jones 1984). This may reflect the proximity of chert outcrops to the east and the relative abundance of chert raw material in this portion of Pueblo Valley. The vast majority of recovered debitage was of this material, while most of the modified objects were of obsidian. Modified tools, including bifaces, unifaces, and projectile points, made up less than five percent of the assemblage, however, and retouch or modification-related pressure or small percussion flakes of obsidian were not common.

More than 80% of the debitage consisted of secondary and tertiary chert flakes, with the latter contributing nearly 85% of the total. This shows that, although local raw material was heavily utilized, cores and primary flakes evidently were not strongly represented at the site. Auxiliary procurement sites, probably located near the rim to the east, were used for this activity, and only flakes and relatively refined lithic objects were returned to Tule Springs for further reduction. This, and the variety of functional classes distributed over the site, suggest that Tule Springs Hearth site was a primary base, utilized for camping and the processing of various resources, including lithic raw material.

Because of the lack of bone and macrobotanical data at the site, the specific kinds of targeted nonlithic resources cannot be determined. However, the variety of cutting, grinding, and pounding tools, as well as the few bifaces and projectile points, suggests that a broad range of local plant and animal species were exploited. The location of the site near Tule Springs and the small seeps strongly suggests that marsh resources were primary targets.

Stylistic Analysis and Dating

As at other Steens Mountain area sites, projectile points are the only artifacts recovered from the Hearth site to exhibit complex manufacturing techniques that result in stylistic differences between specimens (Beck 1984; Jones 1984; Wilde 1985; see also Dunnell [1978] for stylistic and functional distinctions). A total of 17 projectile points and one crescent were recovered from the site; all were broken to some degree, but 11 (Fig. 6) were sufficiently whole to be classified (Wilde 1985:101-154). Of the total assemblage, eight are Rosegate points (Thomas 1981), two are Elko Eared, and the last is a Cottonwood Triangular. Four of the Rosegates (Fig. 6: b, c, d, f) were found in excavated levels associated with the occupation zone; the remainder of the type were recovered from the surface. All of the surface Rosegates were associated with areas of high density and abundant artifacts. Four were recovered from the western scatter, associated with grinding stones and fire-cracked rock; the other was found in the southeastern scatter.

The Cottonwood type was recovered from the western edge of the site, near the margin of the large dense scatter on that side of the dune. The crescent, one Elko Eared point (Fig. 6: k), and two unidentifiable fragments of larger points were found near the north-eastern scatter. A portion of a possible

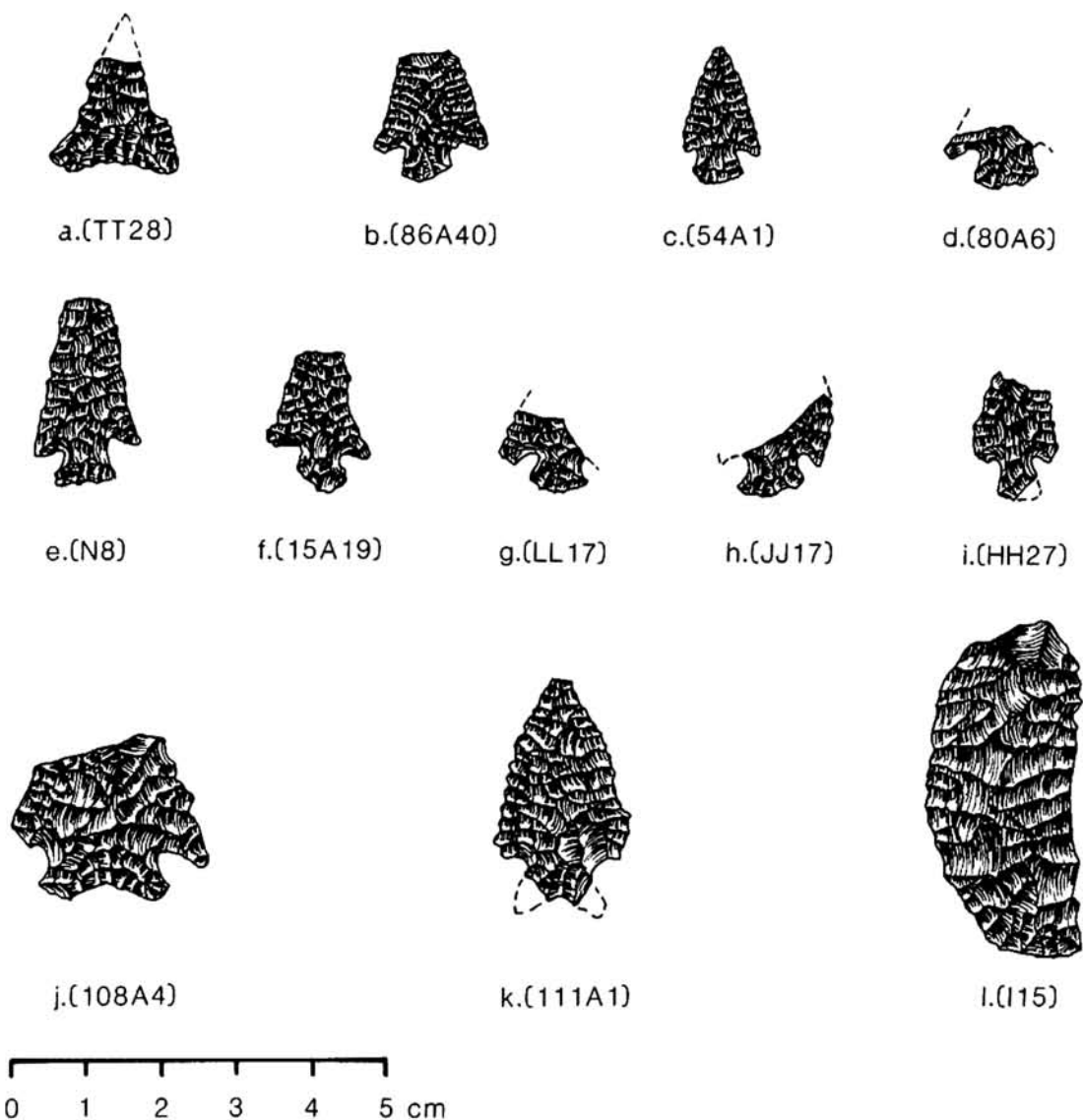


Fig. 6. Projectile points, Tule Springs Hearth site. *a*, Cottonwood Triangular; *b-i*, Rosegate; *j,k*, Elko Eared; *l*, crescent.

Gatecliff Split-stem was found on the southern edge of the site, away from the main artifact-rich areas. The other Elko Eared point was recovered from the 120-130-cm. level in the dune unit, 14-16 NW, 0-2 SW. This was 20 cm. below the occupation zone and resistant surface, suggesting the area had light Archaic usage prior to the well-represented later occupation.

A single radiocarbon date was run on or-

ganic material from the hearth; this produced a "modern" date (SI-4597), possibly related to road-use contamination of the hearth. No sizable pieces of charcoal were found in the hearth feature, so a half-liter of dark-stained, greasy, charcoal-flecked material was collected for radiocarbon analysis. The makeup of the greasy component of this material was not determined, and may have contained oil or other contaminants from passing vehicles.

The assemblage of Rosegate projectile points suggests an occupation dating between around 1,800 and 600 years ago, judging from the chronology discussed in Wilde (1985:145-155, Fig. 14). This suggests that the weathered soil forming the deflation surface cannot be much older. The single Cottonwood Triangular point may represent a later occupation, as these points date to the period beginning around 1,000 years ago (Wilde 1985:174). The crescent and a few specimens of later Archaic points were found on the surface, and may reflect any of several disturbing factors, including earlier occupations in the vicinity of the northeastern concentration, prehistoric curation and re-use of earlier types, prior deflation, or losses of these points in the area before the hearth site was occupied. The apparent young age of the deflation surface suggests that prehistoric curation and re-use may best account for the presence of these stylistic types in the Hearth site.

CONCLUSIONS

A late prehistoric single-stratigraphic component was excavated and analyzed at the Tule Springs Hearth site, adding an important dimension to the record from other Steens Mountain excavated early to late Archaic sites (Wilde 1985). Although no acceptable radiocarbon date was obtained, the small stylistic assemblage strongly suggests that its primary occupation occurred between 1,800 and 600 years ago. Because the surrounding surface scatter correlated with the buried component, deflated use areas containing fire-cracked rock, grinding stones, and abundant use-worn and unworn functional classes of artifacts were tied to the excavated assemblage. Several concentrations of artifacts within the general surface scatter further suggest that activity areas are discernible in the deflated site, and these are considered roughly contemporaneous with the excavated hearth area.

Only one projectile point, a Cottonwood Triangular, representing the latest prehistoric period (after ca. 800 B.P.), was found at the site. This exceedingly small sample of very late points is surprising because the Tule Springs area is known to have been the focus of Burns Northern Paiute gathering trips in the latter part of the nineteenth and early twentieth centuries (Couture et al. 1986). Paiute women reported traveling with their families over Steens Mountain to the Tule Springs area to collect buckberry (*Shepherdia argentea*), rye (*Elymus cinereus*), *Scirpus* spp. and other plant species. Procurement of lithic raw material, animals, chokecherry, and other resources presumably was embedded in this seasonal trek to and from the Alvord Basin.

Scant subsistence and environmental data were recovered from the site itself, although the stratigraphy indicates that a weathered soil of presumably young age underlies the occupation zone and forms the deflation surface around the site. A stratigraphically similar soil horizon was found at Skull Creek Dune Locality 1, in the Catlow Valley, west of Steens Mountain (Mehringer and Wigand 1985; Wilde 1985). Radiocarbon dates suggest that this soil is slightly older than 1,800 years, which is on the older end, but within the range of time proposed for the occupation at Tule Springs Hearth site.

The period of habitation, probably best thought of as a series of essentially contemporaneous short-term occupations, generally correlates with Period 6A in the portion of the Steens Mountain chronology shown in Figure 7, associated with late prehistoric episodes of decreasing effective moisture and increasing temperature in the Steens area (Aikens et al. 1982; Mehringer et al. 1982; Mehringer and Wigand 1985; Wigand 1985, 1987; Wilde 1985).

Perhaps the impetus for marsh- and spring-related occupation was associated with

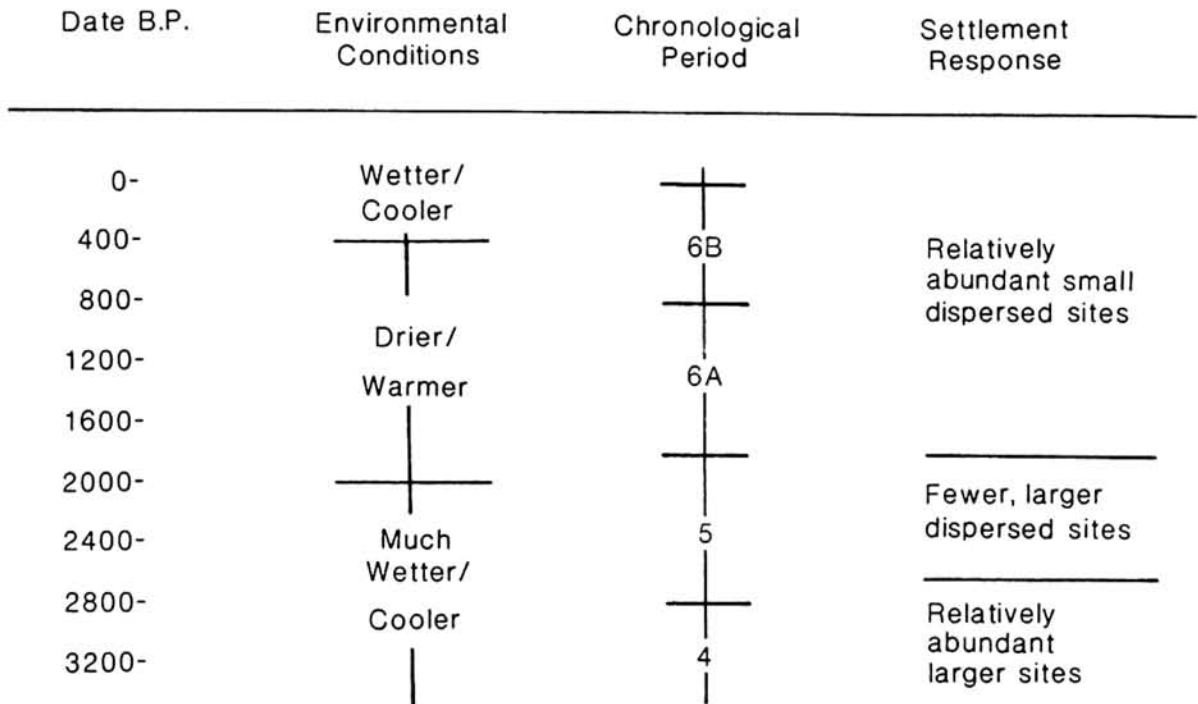


Fig. 7. Latter portion of the Steens Mountain regional chronology, showing climatic episodes and inferred settlement responses (Beck 1984:308-311; Wilde 1985:153, 380).

this climatic episode, as suggested by Beck (1984:313). She found that later-period settlements began to be more dispersed after around 2,000 years ago (roughly corresponding to her Period 1 and the latter part of her Period 2), with a trend toward more and smaller sites than in previous periods throughout most of the Steens Mountain area. Periods 6A and 6B, then, beginning around 1,800 years ago, correspond to an interval of climatic instability that induced atomistic settlement responses from the Steens Mountain area inhabitants.

Springs and the few desert marshes in the Alvord Basin became magnets for habitation for the first time during this latter portion of the Holocene. The Tule Springs Hearth site, at around 6,000 square meters, falls well above the average single-component site size for Periods 6A and 6B in the Steens Moun-

tain region (average: 1,826 square meters [Beck 1984:Table 58]), and in the Alvord Basin in particular (average: 1,667 square meters [Beck 1984:Table 58]). As such, it appears to contradict the general trend toward smaller sites after around 2,000 years ago. However, the Hearth site falls just below the average for the Alvord Basin (7,485 square meters [Beck 1984:Table 59]), when compared to sites with apparent re-use, as formally defined by the presence of mixed projectile point assemblages. As noted above, the projectile points from the surface of the Hearth site comprise Cottonwood, Rosegate, and Elko types, suggesting mixed components as defined by the Steens surface survey analysis (Beck 1984:145-153). In this regard, the site fits comfortably into the small site/dispersion pattern apparent during late prehistoric times in the Steens Mountain region.

A minor problem arises at this point, however, in interpreting the Hearth site. Inasmuch as the excavation suggested the presence of a single component related to a relatively short period of time between 1,800 and 600 years ago, an apparent contradiction occurs when interpreting the site as containing mixed components to allow it to fit into the postulated Steens settlement pattern. This is easily resolved, if, instead of thinking of the site as one large habitation site, it is seen as comprising three or four intensive short-term camps, all probably having occurred within a relatively narrow span of time during the Rosegate period, with the addition of some very limited later use, as evidenced by the single Cottonwood Triangular point. Thus, while the site consists primarily of a Rosegate "component," it probably represents several instances of similar use during a relatively short period of time.

Why were not other later components more fully represented at the site? It appears that although abundant resources associated with the marsh and springs attracted relatively intensive short-term occupations for what was probably a narrow period of time between around 1,800 and 600 years ago, the site was not intensively reoccupied at any later date. This suggests that prehistoric occupants of the Alvord Basin were using many different locales for resource gathering, but, although they may have been tethered to specific geographic features, such as springs and marshes, they were not tied to specific "places" (*sensu* Binford 1982). The record shows the result: a multitude of small short-term late prehistoric occupations, reflecting a highly mobile population, whose habitations were mostly associated with water resources.

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