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Paleoindian technological provisioning strategies in the northwestern Great Basin

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ABSTRACT

Great Basin populations during the Pleistocene–Holocene Transition (PHT) are often characterized as being mobile and focused on wetlands; however, the factors that influenced where Paleoindians selected residential campsites are poorly understood. Using predictions derived from optimal foraging-based patch choice models and GIS reconstructions of the PHT landscape, some researchers have argued that occupations in smaller wetlands should have been shorter than occupations in larger wetlands but such arguments have rarely been evaluated using empirical data. The PHT lithic record provides an opportunity to evaluate the relationship between wetland size and occupation span by applying Kuhn's (1995) concept of technological provisioning. Kuhn expects more mobile populations to provision individuals and more sedentary populations to provision places and suggests that: (1) a strategy of provisioning individuals should be reflected by a high proportion of more extensively used artifacts made on non-local raw materials; and (2) a strategy of provisioning places should be reflected by a high proportion of less extensively used artifacts made on local raw materials. We apply the technological provisioning concept to lithic assemblages from two of the Parman localities, extensive PHT sites in the northwestern Great Basin, and compare local and nonlocal artifacts to determine if Paleoindians shifted from provisioning individuals while moving to/from the sites to provisioning the place while occupying them. There is no relationship between artifact transport distance and artifact use intensity. We interpret these findings as evidence that Paleoindians did not alter their provisioning strategies while occupying the Parman localities, likely because occupations were brief within a small wetland poorly-suited to support groups for long periods.

1. Introduction

Technological and source provenance studies have shown that there is a predictable relationship between lithic artifact transport distance and use intensity. Generally, tools made on non-local toolstone are smaller, more intensively retouched, and exhibit higher breakage rates than tools made on local toolstone (Andrefsky, 2010; Bamforth, 1986; Beck et al., 2002; MacDonald, 2008; Morrow, 1997; Shott, 1986; but see Bamforth, 2009; Close, 1999; Eerkens et al., 2008). In the absence of clear differences in raw material availability that might influence the character of lithic assemblages (*sensu* Andrefsky, 1994), differences in the condition of local and non-local tools are often attributed to mobility and the constraints it imposes on toolkit design (e.g., Morrow, 1997; Shott, 1986).

Kuhn (1995:22) has linked variability in lithic assemblages to different provisioning strategies, or how groups ensured that toolstone was available when needed. He outlines two strategies: (1) provisioning individuals, where people kept a small number of tools in anticipation of use, maintained them, and transported them between locations; and (2) provisioning places, where people stockpiled toolstone at locations where it was expected to be used. Kuhn (1995:22) ties a strategy of provisioning individuals to mobile societies, who, at least among ethnographic groups, transport some personal gear (*sensu* Binford, 1979) when they travel. Because mobility constrains the amount of goods that pedestrian hunter–gatherers can carry, replacement gear should be uncommon and Kuhn (1995:23) expects implements in a mobile toolkit to suffer high rates of breakage and attrition – an argument also made by other researchers (Kelly, 1988; Kelly and Todd, 1988; Shott, 1986). As occupation span increases, travel-related technological constraints disappear and groups may instead provisioning the place if they know they will be there for an extended period or return in the future. Within such a strategy, especially if it was additionally

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supported by abundant high quality lithic resources, Kuhn (1995:24) expects efforts to extend the utility of tools beyond their optimal utility via resharpening/reworking to be uncommon. Surovell's (2009) study of Paleoindian assemblages in the Rocky Mountains and Northern Plains, which demonstrated that artifact use intensity is inversely correlated with occupation span, provides empirical support for Kuhn's (1995) predictions.

The provisioning strategy concept is ideally suited for application to Paleoindian assemblages in the northwestern Great Basin, where most early sites are open-air scatters comprised of obsidian and fine-grained volcanic (FGV) artifacts amenable to geochemical sourcing. By conducting detailed technological analyses of tools made on raw materials whose geologic origins are known, researchers can develop a good understanding of how individual artifacts were transported, used, and discarded. Furthermore, because obsidian and FGV are ubiquitous, we can discount raw material availability as a major influence on technological organization in that region. In this paper, we present the results of detailed technological comparisons of projectile points, bifaces, and unifaces made on local and non-local obsidian from Parman localities 1 and 3, two open-air lithic scatters containing stemmed projectile points and other artifacts indicative of Pleistocene–Holocene Transition (PHT) occupations in the Great Basin. Our results indicate that there are few significant differences in the condition of tools made on local and non-local toolstone, suggesting that early groups did not shift provisioning strategies as they traveled to/from and occupied marshside residential campsites. We interpret these results as evidence that the Parman localities were occupied for brief periods because they were adjacent to a small wetland that was poorly-suited to support groups for long periods.

2. Paleoindian mobility in the Great Basin

Current data from the northern Great Basin suggest that humans colonized the region ~12,000 radiocarbon (^{14}C B.P.) year ago (Jenkins et al., 2012, but see Fieldel and Morrow, 2012). Although variable, conditions at that time were generally cooler and moister (Grayson, 2011) and shallow lakes and marshes were common (Goebel et al., 2011; Madsen, 2007). Montane trees and shrubs grew at lower elevations and sagebrush-grass steppe covered mid-elevation zones (Wigand and Rhode, 2002). Lifeways during this early phase of human occupation in the Great Basin are widely regarded as having included frequent and sometimes distant residential moves and wetlands appear to have been hubs of Paleoindian activity (Elston and Zeanah, 2002; Goebel et al., 2011; Jones et al., 2003; Smith, 2010, 2011). This view is supported by various lines of evidence: (1) most early sites are located near PHT wetlands (Beck and Jones, 2009; Duke and Young, 2007; Elston and Zeanah, 2002; Jones et al., 2003; Smith, 2007); (2) early sites are often small and exhibit high tool-to-debitage ratios (Oviatt et al., 2003; Schmitt et al., 2007); (3) source provenance data indicate that tools were transported substantial distances (Jones et al., 2003, 2012; Smith, 2010); (4) architectural and storage features are virtually nonexistent (Elston and Zeanah, 2002; Jones and Beck, 1999); and (5) Paleoindian tools appear to have been multifunctional (Beck and Jones, 2009; Lafayette and Smith, 2012).

While most researchers acknowledge that Paleoindians were mobile, three models have been advanced to more fully account for the behaviors that produced the trends noted above. Jones et al. (2003) have posited that early groups practiced high levels of residential mobility (*sensu* Binford, 1980) as they moved between wetlands, and this model has found support from other technological and source provenance studies (Goebel, 2007; Goebel et al., 2011; Smith, 2011). More than 10 years ago, Elston and Zeanah (2002) proposed that while Paleoindians practiced high residential mobility between wetlands, a gender-based division of labor allowed male logistical parties to hunt in low- and mid-elevation zones from marshside camps positioned to maximize women's foraging opportunities. More recently, they have refined this model to suggest that if encounter rates with large game were sufficiently high, men and women may have worked together in such pursuits until encounter rates dropped and a gender-based division of labor became pronounced enough to prompt residential camp relocation to new resource patches (i.e., wetlands). The abundance of PHT wetlands and the large game contained therein would have supported frequent residential moves between basins as encounter rates dropped in each location (Bob Elston, personal communication, 2013). Finally, Madsen (2007:16) has suggested that trends in the PHT record primarily reflect long-distance logistical movements by males and not the residential movements that both Jones et al. (2003) and Elston and Zeanah (2002) have emphasized.

Although they differ in their treatments of PHT mobility regimes, each model emphasizes the importance of wetlands. Furthermore, each stresses that the size and productivity of particular wetlands as well as the distance between resource patches likely dictated how long groups remained residentially stable. Drawing from patch-choice models (e.g., MacArthur and Pianka, 1966), Madsen (2007:18) predicts that Paleoindian settlement strategies should have entailed shorter overall stays in individual basins and more distant residential moves in regions where wetlands were small and widely scattered. Conversely, he predicts that longer overall stays should occur in large wetlands, although declining resource return rates within an effective foraging radius of camp (*sensu* Kelly, 2007:135) would likely have promoted frequent, short-distant residential moves within larger patches.

While intuitively reasonable and in accordance with patch-choice models, the hypothesis that wetland patch size influenced Paleoindian occupation span in the Great Basin has rarely been tested using empirical data. Kuhn's (1995) concept of technological provisioning offers a framework within which to conduct such tests, but Duke and Young's (2007) effort to do so at early sites on the Old River Bed (ORB) delta in the Bonneville basin represents one of the only applications of the provisioning model thus far (also see Graf, 2001). At the ORB delta, likely the largest (~1000-km^2) PHT lacustrine patch in the Great Basin, Duke and Young (2007; also see Duke, 2011) concluded that the expansive wetlands fostered extended stays. Their study of lithic assemblages strongly suggests that groups provisioned that place with toolstone, gearing up with large FGV flake blanks and bifacial cores before traveling ~30–65 km into the toolstone-poor ORB delta for predictable, extended stays (Duke and Young, 2007). In this paper, we apply Kuhn's concept of technological provisioning to one of the smallest (~17-km^2) PHT wetlands – Lake Parman in northwest Nevada (Mifflin and Wheat, 1979). We do so by sampling two PHT Parman localities and geochemically sourcing their lithic assemblages to reconstruct degrees of tool modification, reuse, and repair relative to distance to quarries. We use these data to assess likely occupational durations at these sites and consequently the types and degrees of mobility employed by PHT hunter–gatherers. Our results suggest that a strategy of provisioning individuals was favored over a strategy of provisioning places in the northwestern Great Basin, likely due to the relatively small and low-return Lake Parman resource patch.

3. Characterizing Paleoindian provisioning strategies in the Great Basin

3.1. Materials

The Parman localities are four dense concentrations of Paleoindian artifacts located in northwest Nevada (Fig. 1). They were