Archaeological sites with standing log or brush structures, often called wickiups, are rare in the American Desert West relative to lithic scatters, pithouse villages, and even cliff dwellings. The rarity of wickiup sites arises from their fragility. The inevitability of erosion and wildfire ensures that wickiup sites will, in only a few centuries, become “just another lithic scatter”. At first glance this may provoke a call to arms for preservation of this fragile resource. All of the standing wickiup sites we see now will soon meet their inevitable end as lithic scatters. In another sense however, it is the life cycle of wickiup sites that makes them valuable. They present an opportunity to explore relationships between perishable housing and non-perishable debris.

Wickiup sites are one facet of the ethnoarchaeological study of site structure because they represent residential activity. When structures are not in direct association with surface lithics, their exclusion from the boundaries of the site area restrict the interpretation of the site to the lithics alone. Structures such as wickiups, and hence residential activities, gain relevance in the context of the ubiquitous lithic scatter of the American Desert West – by far the most common archaeological site recorded. Some lithic scatters do indeed yield surface evidence for structures, such as depressions or rock alignments. Others yield surface evidence of hearths, and structures may be nearby, albeit not necessarily close to the most dense areas of lithic debris. Further, structures can be difficult to detect even with excavation. The vast majority of lithic scatters however, yield no indication of residential structures at all, yet archaeologists are increasingly aware that structures once existed somewhere on or near the vast majority of lithic scatters. This realization enlivens the potential of the common lithic scatter so familiar to archaeologists working in the Desert West.

Here I enlist two examples of wickiup sites in Utah, one with standing structures and one where structures were not evident on the surface, but found through excavation. These examples are the basis of comparison to other wickiup sites, and to several large projects in Cultural Resource Management archaeology (Figure 1). In each example employed here, research design included a consideration of the ethnoarchaeological concept of site structure; the organization of site features and assemblages in space and their relationship to behaviors that created the site over time.

Over the past several decades, the study of standing wickiup sites and the method and theory of archaeological site structure help make the lithic scatter whole. The results of this effort include greater attention to wickiup sites and
increased efforts to locate residential structures. The effort is not without its caveats, and surely there has been a loss of innocence, but results of the application of site structure are most apparent in an increase in the size and extent of sampling at lithic scatters necessary to adequately evaluate the nature of site assemblage composition, as well as greater attention to the relationships between assemblages, features, and past human behaviour. The effort provokes suggestions for research design, field tactics, sampling, and scaling; all germane to an efficient extraction of knowledge in a CRM environment that is largely cost-driven.

The ethnoarchaeological analysis of standing wickiup sites and the application of site structure to lithic scatters makes a larger theoretical contribution as well. Site structure studies indicate that the archaeological attributes of forager residential behaviour is responsive to the tyranny of circumstance, and is thus potentially cross-cultural. Attention to this larger issue contributes to a general theory of behavior of foraging societies, behaviour that varies by circumstance and context (sensu O’Connell 1995).

Both the methodological and theoretical issues should be reflected in research design, and considered in management policy and regulations regarding lithic scatters. The approach advocated here, and the examples, potentially shape our ability to interpret the most common site type of all.

Site Structure, Wickiup Sites, and Lithic Scatter Archaeology

Ethnoarchaeological studies of site structure are well-known to archaeologists and inform our treatment of lithic scatters. Classic studies show, among other things, habitation structures may in or near other activity areas represented by discard such as lithics, or separated by significant distances (e.g. Binford 1987, 1991; Fisher and Strickland 1991; Gamble and Boismier 1991; Jones 1993; O’Connell 1987; O’Connell et al. 1991; Yellen 1977). James O’Connell (1993) detailed the implications of site structure for lithic scatter archaeology in the Great Basin of the western United States some years ago.

The inventory of standing wickiup sites continues to grow, yet with few exceptions (e.g., Greubel 2005) most reports of such sites focus on issues of local and recent culture history (e.g., Baker 2003, Martin 2016). In addition to these legitimate interests standing wickiup sites are also important because their study is ethnographic. This is not because of the involvement of informants, but because ethnography is the capture of a singular opportunity that is lost with the passage of time. Research design for wickiup sites should be framed in terms of archaeological method and theory that is cross-temporal and cross-cultural in addition to matters of recent culture history or the relevance of such sites to the narratives of living indigenous peoples. The management of such sites should take these larger values into account. In this way, wickiup sites can serve as ethnoarchaeological proxies to further inform all of us who investigate the ubiquitous lithic scatter, regardless of time period and local ethnic, cultural, and historic qualities.

Two contrasting wickiup sites in Utah that I excavated with students at Utah State University in 1999 and 2003 serve as examples of the incremental contributions arising from a search for houses on otherwise mundane lithic scatters. The sites represent two phases of the life cycle of wickiup sites. The Indian Corral site (42CB1916) has evidence of above-ground structures and the Orr Springs site (42TO384) does not. Subsurface structures were nevertheless found at Orr Springs, using methods given credence by studies at wickiup sites with standing structures. This exercise yields tangible and in some ways, mundane suggestions for finding wickiups at lithic scatters, but also provokes an argument that researchers and cultural resource managers should consider the method and theory potential of wickiup sites in addition to their parochial values.
Indian Corral and Orr Springs are hardly the only wickiup sites reported in the West. Substantial examples, such as the Colorado Wickiup Project (Martin 2016, Martin et al. 2005a, Martin et al. 2005b), and the documentation of archaeological signatures among the foragers of the Southwest hidden behind the strong archaeological patterns of Puebloan farmers (Seymour 2009; 2017) signal the value of these kinds of sites. The exercise of looking for houses may be less about finding houses as it is about directing attention to the larger problem of making lithic scatters at least more whole than they were before.

I illustrate progress in this effort with examples from large-scale CRM projects in the Great Basin and northern Colorado Plateau regions (Figure 1): the Kern River 2003 Expansion Project, a natural gas pipeline in southwest Utah (Reed et al. 2005; Stettler and Seddon 2005:107–111), the TransColorado Natural Gas Pipeline in southwest Colorado (Reed et al. 2001), and the Little Boulder Basin project in northeast Nevada (Cannon 2010). All of these projects were well-
funded and their research designs explicitly included site structure – the organization of site features and assemblages in space and their relationship to behaviors that created the site over time. Collectively the projects include sites with standing wickiups, evidence of collapsed wickiups, and structures found through excavation. Importantly, there are examples where concerted efforts to find structures were unsuccessful, but an interest in the organizational structure of assemblages and features improved the understanding of the archaeology.

The Indian Corral and Orr Springs Wickiup Sites

The Indian Corral wickiup site (42CB1916) is on Utah School and Institutional Trust lands on the West Tavaputs Plateau in central Utah (Figure 1). The site is a lithic scatter with two wickiups evident by remnant structural timbers. One structure features a single leaner pole against a juniper tree, anchored by sandstone slabs lodged in the crotch of the tree to hold the structure together. A second structure was recognized only by two “hanging leaners”, the upper remnants of structural poles entombed in a juniper limb crotch nearly three meters above the ground (Figure 2). The Indian Corral site exhibits attributes often found at standing wickiup sites elsewhere in the region that collectively contribute to identifying structures where no surface evidence of structures remains.

The Orr Springs wickiup site (42TO384) is on the U.S. Army Dugway Proving Ground located in the Great Salt Lake Desert in northwest Utah (Figure 1). The site is a lithic and ground stone scatter with no surface evidence of structures. Limited, but targeted excavation located two subsurface structures, one in a situation that may elude standard excavation methods (Figure 4). Orr Springs serves as an example where structures not evident on the site surface are found by employing knowledge learned at sites with standing structures and the study of site structure.

Excavation at both sites employed ¼ inch mesh screen, and artifacts were tabulated for each one meter square of excavation. The goal was to expose horizontal areas, identify features in relation to use-surfaces, and to produce artifact density distribution maps of a general scale. Excavations were a small fraction of each site and field methods were designed to develop site significance, not to mitigate proposed adverse effects.

Indian Corral

This site with two standing wickiups was found and excavated by students from Utah State University in 2003 (Figure 2). It was subject to limited excavation and study for a potential land sale. Surrounded by old growth pinyon-juniper woodland at 7,645 feet on the West Tavaputs Plateau, the site occupies a flat at the confluence of two small drainages with a spring nearby. Tree ring analysis indicates that the large pinyon and juniper trees germinated in the early 17th century, reaching maturity by the 19th century. No historic artifacts were found.

The site yielded 450 items of lithic debris, and 43 stone tools including two Desert Side-notched point bases, two Elko corner-notched bifaces, two hammerstones, an abrader, a graver, and cores. Thirteen whole and fragmentary ground stone artifacts were found. Debris occurred in two concentrations across a 3,885 m² site (.13 items/m²).

Low artifact density and high assemblage diversity is common to many, but not all standing wickiup sites (Simms 1989, Table 4). In some cases, the most dense lithics are tens of meters or more distant from the area of structures, and hence of unknown affiliation with the structures. However, large distances between lithic reduction activities behaviourally associated with habitations is documented in ethnographic cases (O’Connell 1987 and O’Connell et al 1991). Regardless of the variable association of lithic debris and structures, two classes of artifacts do commonly occur with structures: grinding stones and hammerstones. Significantly, hammerstones
are more difficult to recognize when they do not occur with more readily identifiable lithic debris, raising the potential for under-recording during surveys.

Structure 1 incorporates a 15 cm diameter juniper tree trunk, stripped of bark and bent over to wedge into a large living juniper to form a structural timber. Two sandstone slabs (20 x 30 cm each) hold the timber in place against the live juniper, and the limbs are in the early stages of entombing the timber. Lichen growth on the sandstone slabs post-dates their placement into the tree crotch, indicating some time depth to the structure. The absence of bark and considerable weathering precluded dating of the bent-over juniper used as a structural timber. Excavation revealed a saucer-shaped depression below the structural timber. The depression is 2.75 meters in diameter and a maximum of 10 cm deep. Four metate fragments, three chert cores and small lithic debris are scattered in an ashy area along the east to northwest rims of the depression. Sandstone slabs rest near the support tree along the south edge of the depression. These patterns, along with the discovery of a 40 cm diameter x 7 cm deep fire hearth located 1.5 meters west of the depression indicate that structure 1 opened to the west. A large ashy area extended downslope from the hearth, spread by sheet wash along a shallow micro-drainage running west of structures 1 and 2. Ethnographic cases such as the Great Basin Culture Element Distributions (Steward 1941, 1943, Stewart 1941) and measurements at other wickiup sites in the American West indicate that when houses do not contain interior hearths, a hearth is likely to be within 1–3 m from the entrance to the structure.
Structure 2 is only 3.5 m away from structure 1, and is identified by two “hanging leaners,” the upper remnants of structural poles nearly three meters above the ground and engulfed in a limb crotch of a 400+ year old juniper tree. A steeper slope and erosion around structure 2 may explain why there is no well-defined depression marking this structure. However, two hammerstones were within the inferred area of the structure interior and numerous lithics occur along the north edge; signatures of structures. No hearth is evident where it would be expected west of the structure, only scattered ashy sediments, but erosion from the same microdrainage that scattered the hearth outside of Structure 1 is more pronounced near Structure 2 suggesting the faint ash may be the remnants of a hearth west of the structure.

A 90 m$^2$ block of contiguous excavation was opened around the structures with cultural deposits ranging from 3–10 cm in depth. Forest duff with loose sand rests above a single cultural stratum of loose silts, sands, and gravels, with a culturally sterile substratum of decomposing bedrock below. The density distribution map of lithic debris found in subsurface contexts shows that in some areas, the density of lithics was substantial (Figure 3), significantly exceeding the density of 0.13 items/m$^2$ observed on the site surface, and much higher than the 0.4 items/m$^2$ surface density in the vicinity of the structures. The assemblage composition is consistent with residential occupation; point and biface bases inside the structures, late-stage lithic reduction, ground stone artifacts and spall, hammerstones, and finished tools such as scrapers. A leaf-shaped biface was made of obsidian sourced to Wild Horse Canyon, Mineral Mountains, western Utah - a distance of 250 km. A few burned bones of artiodactyls and lagomorphs were found.

**Orr Springs**

First recorded in 1984, this site was excavated by students from Utah State University in 1999 to help evaluate site significance. The site is a lithic and ground stone scatter on a flattened ridge at an elevation of 5,150 feet. The ridge fingers south from the Cedar Mountains affording a vantage of the expansive desert floor below. A spring is in a ravine flanking the site and the area is sparsely vegetated in juniper with little understory. The remnants of a brush corral and an early barbed wire corral suggest indigenous residents may have had an association with 19th century Euro-American ranches in the area, but no historic artifacts were found and it may be that the corrals are not associated with the Native American occupation (Figure 4).

The site encompasses 700 m$^2$, with an average artifact surface density of 0.13/m$^2$, identical to the density at the Indian Corral site and consistent with other wickiups reported in the West when artifact densities are recorded. A sample of 27 wickiup sites from Colorado, Nevada, and Utah revealed artifact densities 0.03–1 item/m$^2$ with most sites between 0.1–0.5 items/m$^2$ (Simms 1989: Table 4). Surface inspection of the Orr Springs site identified 62 lithic flakes, two informal projectile point fragments (arrow-sized), and a scraper. Twenty-three ground stone artifacts and fragments were found, as well as several suspected hammerstones.

There are no surface indications of structures at Orr Springs. Excavation began with a 1 m wide exploratory trench where lithic debris was evident on the surface. Stratigraphy consisted of 1–2 cm. of blow sand, and 2–8 cm. of loose sands, gravels and artifacts below that, underlain by a culturally sterile substratum of compact sands and silts that transitions to decomposing bedrock. Hearth 1 was encountered in the test trench and excavation was expanded to explore a clearing among the juniper trees for activity areas (Figure 4). The clearing yielded a relatively uniform scatter of lithic debris, mostly secondary flakes, and the remnants of charred juniper stumps. These can be significant because charred juniper stumps may result from cutting logs for structures and thus creating the clearing (Figure 5). Two live juniper trees adjacent to this clearing were selected for sampling to locate buried structures.
Figure 3. Indian Corral site map.
Structure 1 was found by expanding the block excavation in the clearing toward the nearest juniper. After removal of 10 cm of juniper duff, and the sediments below, excavation revealed a saucer-shaped depression up to 15 cm deep adjacent to the 4.5 m tall tree. The floor of the depression yielded a large rock, hammerstones, ground stone, a projectile point base, and two smooth river pebbles with parallel incisions. The structure would have opened toward the clearing that yielded the artifacts and the remnant burned juniper stumps. No hearth was found within Structure 1, but Hearth 1 was 4.5 m to the west.

Structure 2 was located on the opposite side of the clearing 6.25 meters away from Structure 1. Structure 2 was enveloped within a 3.5 m high juniper whose branches hugged the ground to form an impenetrable clump over 5 meters in diameter. The tree may be up to 500 years old. Ethnographic photos and experience at standing wickiup sites suggest that sometimes a young tree is employed to anchor a structure. The lower limbs on one side of a tree are removed to accommodate the structure, something observed at wickiup sites in Colorado (Greubel 2001, Martin et al. 2005). After abandonment and as the structure collapses, new limbs grow. To test for this possibility, the tree was denuded on the side facing the clearing that yields the charred juniper stumps, Hearth 1, and the artifact scatter. In the course of de-limbing the tree we found earlier branches that had been broken and chopped off leaving the scalloped marks made by stone tools. This suggests wickiups too old to expect remnant structural timbers may still be found by careful inspection of trees at sites even when the trunk is obscured by secondary branch growth.

After deliming the tree, a 1 m wide test trench placed adjacent to the tree trunk revealed the 30 cm diameter Hearth 2, situated within a saucer-
shaped depression 4 m in diameter and up to 11 cm deep (Figure 5). One edge of the depression was flanked by large rocks, likely supports for the wall of Structure 2. A concentration of 49 flakes of gray quartzite and two large leaf-shaped bifaces of the same material was found cached among these rocks along with a projectile point, scrapers, and a hammerstone. The key to locating this structure was the placement of the exploratory trench adjacent to the tree trunk - not adjacent to the exterior of the branches as they exist today. The 1 m x 5 m long trench was sufficient to clearly define the characteristics of the structure.

A total of 53 m$^2$ was excavated at Orr Springs (Figure 6). As at the Indian Corral site, most of the artifacts were outside of the structures. The subsurface density of lithic debris averages 4
items/m², and the range is mostly 1–9 items/m², the same as at Indian Corral. Both sites exhibited low surface densities of artifacts (.13/m²), and a relatively diverse assemblage indicating residential activities. Again, perhaps the most telling artifact association is the co-occurrence of grinding stone fragments, hammerstones, projectile point bases, and other tools/fragments. The cleared area at Orr Springs between the two structures contained only a light scatter of lithic debris. Significantly, Orr Springs yielded burned juniper stumps, perhaps from aboriginal logging activities to provide timbers for the wickiups. This parallels the findings at the Bustos site in eastern Nevada (Simms 1989).

**Comparisons and Implications**

For the past 35 years I have been on a quest to find light, perishable housing to complement the thousands of lithic scatters I have seen. The early studies of site structure discussed previously were the initial stimulation for the quest, but the subsequent accumulation of standing wickiup sites and attempts by archaeologists to apply site structure is what makes possible the notion of making the lithic scatter whole.

My journey began in 1982 with the unexpected discovery of what was in the A.D. 1000s a light brush structure, a wickiup, at a Fremont site in the Sevier Desert of Utah (Simms 1986). The journey continued at a site in northern Utah, where again, faint structures were found via large block excavations, a method that was relatively rare at that time on featureless open sites in the Desert West (Simms and Heath 1990)

The faint remnants of structures at these sites prompted four seasons of ethnoarchaeological field work at Bedouin tent encampments in Jordan to explore the relationship between portable (perishable) housing and archaeological signatures (Simms 1988; Simms and Russell 1996). The search simultaneously appealed to Great Basin lithic scatters with standing wickiups. These served as ethnoarchaeological proxies in the quest to find the structures that no longer exist. Many lithic scatters are almost certainly mislabelled “open sites” as if foragers
were just wilderness campers who used housing only sparingly (Baker 1993:47). The Great Basin quest led to the case of the Bustos wickiup site near Ely, Nevada, a spectacular pine nut camp of the late 18th to early 19th century and discovered in 1985 by Rab and Debbie Bustos, Ely-based horse packers who were also avocational archaeologists (Simms 1989).

Dramatic growth in the western United States and the consequent cultural resource management archaeology provides opportunities to apply the lessons of site structure, evidenced by papers such as “What Can Great Basin Archaeologists Learn from the Study of Site Structure? An Ethnoarchaeological Perspective” (O’Connell 1993) and the inclusion of explicit sections on site structure in more and more cultural resource management reports. This effort increased the number of standing wickiup sites (Indian Corral and Orr Springs were small CRM projects) and provided the opportunity to apply site structure theory on large, well-funded projects such as the Kern River 2003 Expansion Project (SWCA Environmental Consultants and Alpine Archaeological Consultants), the TransColorado Natural Gas Pipeline (Alpine Archaeological Consultants), and the Little Boulder Basin Project (SWCA Environmental Consultants). Comparisons among the sites referred to here and from these projects can speak to several issues relevant to improving the recognition of housing at lithic scatters where the structures have seemingly vanished as well as to the broader matter of accurate identification of assemblage composition.

Site Structure at Standing Wickiup Sites

The Bustos site featured five standing log structures in such pristine condition that it seemed only the people were absent. The structures contained over 100 juniper logs; a near match to a count of charred juniper stumps that created an aboriginal clear cut in the forest. A partially cut juniper tree with a hand-held stone ax lying at its base revealed that the trunk and exposed roots of each tree were set ablaze, likely repeatedly (Simms 1989:6, Figure 3). Trees were felled by chopping away the charred wood, leaving stone ax impressions on the logs and stumps.

The Bustos structures were 5–10 meters apart from each other. The distance between the structures at the Indian Corral site is 3.5 meters, 6.25 meters at the Orr Springs site, and 9 meters apart at the Simpson Wickiup site in Colorado (Greubel 2001). These sites are all short term camps, albeit used repeatedly. Ethnoarchaeology of Hadza and !Kung short term residential camps reports house spacing between 4–7 meters (Yellen 1977, O’Connell et al 1991). Considering that hunter-gatherer camps can be hundreds of thousands of square meters in size, the spacing among structures, or clusters of structures can be much larger than the above cases. The Colorado Wickiup Project (Martin 2017) documented late 19th century Ute refugia sites with excellent preservation. The Decker Big Tank Wickiup Village (Martin 2017:54) encompasses 50,000 m² with distances of 40, 70, 175 meters between wickiups and clusters of wickiups.

An intriguing characteristic of many, but not all wickiups is the low density of lithic debris in and immediately around the structures; about .1 item/m² at Bustos, Indian Corral and Orr Springs. While finished tools may be less common than one might expect, tool curation removes finished tools, while discard near the residence adds broken tools. This, along with the higher frequency of hammerstones and grinding stones, creates high assemblage diversity and low artifact density.

Our attention is naturally drawn to prominent lithic scatters with thousands of artifacts, some over 100 items/m². These may be well away from residential structures, and may or may not be in behavioural association. Such lithic scatters often exhibit low assemblage diversity resulting from final tool reduction and retooling.

The presence of stone features at sites can also draw attention away from the unspectacular and low density of artifacts suggesting structures. At Bustos there were eight stone rings used to cache pinyon pine nuts. At the Musick Lodge in
Colorado, there was the spectacular stone Eagle Trap only 100 meters from the wickiup, but 30 meters above on a rocky prominence (Martin 2017:133). Given these distractions, had the wickiup structures not been present, the portion of sites such as these that contained the wickiups may not have been recorded, let alone considered candidates for excavation.

Lithic debris is a standard alert to archaeological survey teams of an impending site, yet the discontinuity between the Bustos structures where the people lived and the majority of the surface debris was startling. The Bustos case recalls a story told by David Hurst Thomas about ethnoarchaeologist Richard Gould’s excavation at a Tolowa site in northwest California. “Gould once asked some Tolowa to look at his ongoing archaeological excavation . . . digging under the then-standard assumption that habitation areas are best located by looking for surface concentrations of artifacts and midden deposit. . . he was unable to locate any prehistoric house remains . . . the Tolowa informants were quite amused: Them old-timers never put their houses in the garbage dump. They don’t like to living in their garbage any more than you would” (Thomas 1999:166).

These experiences imply that thousands of lithic scatters in the western United States may contain evidence of houses and consequently, habitation, that go unnoticed because of our methods, and also because those methods tend to be institutionalized given the pressures to make cultural resource management standardized and efficient.

I do not chide. Archaeologists know the lesson of Gould’s Tolowa informants. We also have some lessons from additional wickiup sites, in some cases ones that contrast with the findings at the Bustos site and other such sites recorded prior to 1990. A stark example is the Simpson Wickiup Site (5SM2425) in southwest Colorado. The site features two standing wickiups and was studied as part of a large-scale energy project enabling a significant investment in field and lab analysis. As such it is an exemplary case of the application of site structure in addition to the traditional interests in culture history (Greubel 2001:125–133). In contrast to Bustos and some other wickiup sites, surface artifacts are common at Simpson with dozens of items per meter square in and around the structures. In fact, one of the structures was used as a lithic workshop. Artifact density distribution and microrefuse analysis show secondary refuse disposal, cleaning, and task segregation. Consistent with other wickiup sites, assemblage diversity was high. The Simpson Wickiup site reminds us that in some cases, structures will be in close association with artifacts.

Our concern here however is not with locating structures where they are obvious, either because there is evidence a structure is present, such as a depression, or because they are found through our habit of placing excavation in the areas of highest surface artifact density. It is cases where structures are segregated from debris that present challenges for finding the structures – cases of low artifact density and high assemblage diversity near the habitations, with the most obvious surface debris located elsewhere. In the absence of some guidelines to help find houses where there is discontinuity between surface remains and structures, archaeologists tend to remain stymied despite our loss of innocence about such relationships – we continue to dig where we find artifacts on the surface.

Indeed, since most archaeology occurs in the context of cultural resource management, proposals to random sample large areas, or expand excavations from features to areas with little or no surface evidence may create tension with clients, and even agency personnel. All parties are subject to economic justification and the spectre that excavation itself is an adverse effect. The result is that thousands, even tens of thousands of lithic scatters remain less than whole in the absence of attempts to devise our archaeological samples to increase the chances of finding the residential evidence to make such sites at least more whole than they are now. We have found however, there is a benefit to
this exercise beyond the mere identification of housing – the matter of assemblage composition.

### Applying Site Structure

Applications of site structure from three large cultural resource management projects expand our knowledge of wickiup sites, illustrate successful explorations for housing, and unsuccessful searches that nevertheless increase understanding of sites. Together these cases hold lessons for research design and field tactics.

Examples in southwest Colorado were studied by archaeologists during the Trans-Colorado Natural Gas Pipeline project in 1997–98 (Reed et al. 2001). The Simpson W Hickup site (5SM2425) features two standing wickiups and abundant artifacts. While the structures at the Simpson site were obvious, the studies of assemblage composition, size sorting, and microrefuse show the characteristics of the non-perishable evidence that can often be associated with perishable structures (Greubel 2001:125–133).

Excavations at the Schmidt site (5MN4253) exposed 642 m² and a suite of light habitation structures spanning two millennia. The earliest structures date to 400 B.C. – A.D. 420, and were found by excavating in areas of fire-cracked rock. Another occupation between A.D. 880–1160 yielded only hearth features; an example where structures were not found despite opening up a large excavation block of 375 m². The latest occupation at the site dating to A.D. 1300–1570 includes subtle surface evidence that structures were present, but they had to be defined through excavation.

Examples in southwest Utah were studied by various archaeologists and organizations over the course of nearly three decades because they lie within an energy corridor – the Intermountain Power Project and Kern River Natural Gas pipelines passing through western Utah.

Investigations at the Crucible site (42WS1579) track the history of site structure ethnoarchaeology and illustrate how field tactics and the understanding of the site changed, and did not change over the years. The initial recording of the site in 1983 described it as a “large campsite” covering 17,500 m². A single 50 x 50 cm test was excavated. The site was resurveyed in 1984 and the boundaries expanded to 64,000 m². A 17 m² block exposed subsurface features. The site was recorded again in 1989, but no changes in interpretation were made. A planned natural gas pipeline caused the site to be intensively studied in 1990. The site area was enlarged to 135,000 m² and 43 m² were excavated, along with two backhoe trenches. Subsurface hearths were found, and dated to A.D. 1300–1570. The site was interpreted similarly to the original recording in 1983, as “periodic campsites”. In 2001 another natural gas pipe was to be laid parallel to the first and this led to even larger excavations. The site boundary remained similar to that identified in 1990, but over 150 m² were exposed in four blocks. Hearths and thermal features were found, but no definitive evidence of structures.

As the site boundaries were enlarged over the years and the size of excavations increased, the subsurface sample nevertheless remained essentially nil because of the sheer size of the site. Even if the maximum excavated sample in 1990 had been applied to the original 17,500 m² site area as measured in 1983, the sample would have been a mere .01%. The investigations over the years located features and developed a degree of chronology, and the sample size enabled a greater understanding of assemblage composition, but the site interpretation remained “campsites”.

The nearby Monkey’s Paw site (42WS1460) also dates to the Late Prehistoric/Protohistoric period. Excavations there in 2001 exposed 113 m² in five areas of the site. Like the Crucible site, there were hearths, thermal features, and artifact assemblages indicative of residential camps. The extensive examination at the Monkey’s Paw site also produced a more comprehensive understanding of assemblage composition, one that included primary and secondary disposal. The sample suggested a broader array of activities than found at the Crucible site, the activities were spatially segregated, and the occupations may have been longer term.
Neither site yields clear evidence of structures, but the act of looking for houses and the consequent investigations at these sites shows that even when structures resist explicit identification, some lithic scatter sites can be made more “whole” (Schweitzer et al 2005: Chapters 15 and 17; Stettler and Seddon 2005:107–111).

A final example shows an unexpected consequence of the application of site structure, one that arises from a failure to find houses. The Little Boulder Basin in northeast Nevada is a 50 km² area subject to surface gold mining, and is another case where a well-funded cultural resource management environment enables an intensive evaluation of a sizable area. Site structure as developed in ethnoarchaeology as well as the findings at standing wickiup sites in the Great Basin shaped research design in this case from the beginnings of the project in the 1990s (Schroedl 1995 1996, 1997; Schroedl and Coulam 1996; Tipps 1996, 1997) and continued to do so over a decade later (Seddon and Clark 2010). The Little Boulder Basin is a case where, “Despite years of heroic effort, no structures have been identified on any sites of any time period” (Seddon and Clark 2010:240), yet the application of site structure and the exercise of making the lithic scatter whole leads to a fundamental message for archaeological method and theory in this case.

The application of site structure to the Little Boulder Basin sites revealed an extremely simple site structure and only three site types: 1) a generalized camp, 2) a site type with a greater emphasis on tool production and repair, and 3) a type with a greater emphasis on botanical and faunal processing. The findings stimulated a critical evaluation of the method and theory behind site typologies (Seddon and Clark 2010:209–241). The influential dichotomy of foragers and collectors of Binford (1980) and the distinctions between field camps, locations, and different kinds of base camps was challenged. A review of site typologies applied to forager societies in the American Desert West found that they were so particularistic and subject to an assumed need to split sites into ever finer units that they were empirically indefensible. Indeed, site classification had become an end rather than a means.

Researchers in the Little Boulder Basin initially attempted to apply these complex site typologies, but were unable to adhere to their own stated guidelines, resulting in inconsistent site classifications (Seddon and Clark 2010:219). The solution was found in a new approach to the evaluation of site variability, one with less emphasis on categorical assignments of whole sites based on the presence or absence of traits, and greater attention to frequency relationships among classes of archaeological remains such as feature diversity, debitage density, tool density, ground stone density, and faunal richness.

The search for houses in the Little Boulder Basin was stimulated by site structure studies, yet produced no evidence for houses. Yet the exercise exposed a flaw in the categorical, trait list conceptualization of site type. The presence or absence of structures is itself a trait often employed to assign site type. In terms of many traditional site typologies this practice risks the use of perishable, and hence difficult to detect housing as negative evidence to then cut to the chase and assign site function.

The findings at Little Boulder Basin contrast with Indian Corral, Orr Springs, and Bustos where despite the fact that houses were not closely associated with high densities of surface debris, they were detectable with excavation, and provided additional information about the sites. Perhaps the more significant contributions however, are the spatially extensive and larger samples stimulated by site structure studies. These improve the understanding of assemblage composition by increasing the chances of sampling primary as well as secondary disposal. Perhaps the most significant consequence is a fundamentally new approach to site type - one focused on variability rather than the presence of absence of traits. These studies made the lithic scatter more whole (Cannon 2010).
Recommendations

Looking for houses is only one element of site structure, but it symbolizes a lesson of ethnoarchaeology: discontinuity between the material remains typically recovered by archaeologists and material remains actually produced by the people living at sites promotes incomplete interpretations, if not incorrect interpretations. Archaeologists know this, but given that the lithic scatter is by far the most common form of site, the problem is by nature pervasive. The cases described here illustrate the problem and hold implications at two levels: specific, tangible recommendations to search for perishable housing at lithic scatters, and the broader issue of how the application of site structure increases our understanding of assemblage composition.

Archaeologists working in the Great Basin and other areas of the desert west became aware of ethnoarchaeology in the 1980s. In 1993 ethnoarchaeologist James O’Connell was invited by a regional journal to provide some direction to this effort and writes:

Prehistoric site structure is commonly seen as a promising source of information about past human behavior. Ethnoarchaeological studies indicate that research on site structure may require costly adjustments in conventional approaches to data recovery, with no commensurate increase in real knowledge except under narrowly defined circumstances, none of which are common in the Great Basin. Nevertheless, it should still be pursued whenever possible, partly to assess the validity of predictions based on ethnoarchaeological analogies, partly (and probably more importantly) as a means of controlling differences in assemblage composition related to the widespread practice of size sorting and secondary refuse disposal (O’Connell 1993:7).

What have we learned and where do we go from here? Here are some observations about field tactics to improve our search for housing, and through that search, our documentation of assemblage composition at lithic scatters.

Artifact Density, Assemblage Diversity, and Disposal Patterns

The density of non-perishable debris, especially lithics, may be low in structures and in household activity areas, either because some activities are segregated or because of secondary disposal. Archaeologists are more accomplished at finding structures when they are in proximity to high densities of debris on the site surface – we tend to excavate where artifacts occur on the surface. The cases where few objects are near habitations or activity areas are more likely to elude us given the field methods that continue to be typical.

Such failure is not inevitable because at some sites, especially in the presence of primary disposal, features will be associated with debris. Examples include the Simpson Wickiup site where abundant debris occurs in and around standing structures, and the Schmidt site where subsurface structures occur in proximity (but not necessarily in behavioral association) to surface debris.

At wickiup sites with variable artifact densities, low artifact density should not be used prematurely to conclude that no features are present. An evaluation of size sorting may be useful, with small items occurring in and around structures, even if only a few larger items are also present.

Burned tree roots and stumps, some with marks from stone axes, may indicate aboriginal logging. Forager structures often incorporate trees, and may require modification of trees to discover centuries later. For instance, Structure 2 at the Orr Springs site was not adjacent to the tree as it exists now, but was adjacent to a young tree that was delimbed to accommodate the structure. The detection of Structure 2 would not have been possible without exposing the tree trunk to investigate the trunk and to accommodate excavation. Of course, indicators such as aboriginal delimbing and burned stumps
apply only to lithic scatters up to a few centuries old.

Another recurrent theme at standing wickiup sites is the presence of ground stone and hammerstones – the latter often expedient and difficult to identify as artifacts, especially in isolation. The same may be said of manuports/camp rock, and in some cases fire-cracked rock. These types of artifacts do not always indicate structures, but in the cases we have, this is a common association.

**Field Practices to Find Houses and Evaluate Site Structure**

Ethnoarchaeology demonstrates that exposures must be large in order to identify patterns of site organization – on the order of 102–103 meters of contiguous excavation (O’Connell 1993). Where surface remains appear in clusters then more than one or two clusters must be sampled at these scales in order to identify patterns in the distribution, size, or internal organization of sites. Such large scales are daunting to those who devise research designs and scopes of work for compliance cultural resource management excavations on all but the largest and best funded projects. However, the findings at the sites discussed here stimulate some optimism. The Indian Corral site is 2,262 m$^2$ of which 90 m$^2$ were excavated to produce a clear picture of the area of structures. This is only 4% of the site, but approaches the recommendation of 102 meters of exposure. The Orr Springs site occupies 700 m$^2$ with a 53 m$^2$ block excavated. This is half the recommended size despite the increase in sample size to 8% of the site.

Ethnoarchaeological data that I collected at Bedouin tent camps in Jordan between 1986 and 1994 compared site structure at inhabited tent camps with abandoned Bedouin tent camps. When armed with the pattern recognition provided by the inhabited camps, an archaeological Bedouin tent camp could be identified with a 10% sample, or a 200 m$^2$ block excavation at a camp covering 2,000 m$^2$ (Simms and Russell 1996).

While every site will present different challenges, the application of site structure studies to wickiup sites should steadily improve the ability to recognize household areas and structures with samples under 10%. The large CRM projects described here generally sampled at far lower percentages, despite significant efforts to apply the lessons of site structure.

One tool important to an evaluation of site structure is a density distribution map of the site surface to inform testing or excavation strategies. Density distribution maps are best produced during survey and not later so they can influence the excavation research design and the scope of work specifications. Simple methods and even sketch maps are useful if they show the relationships among different kinds of debris so these can be compared to ethnographic and archaeological cases. My review of over 300 site forms on wickiup sites in the Great Basin and Rocky Mountain regions spanning the past 35 years finds only about three dozen site maps that yield information amenable to site structure analysis. We are likely doing better than before, but there remains room for improvement.

The construction of such maps does not mandate piece plotting and this was recognized early on (O’Connell 1993:21). Indeed, the goal should be to find the appropriate scale of mapping in relation to sample size. Highly precise techniques, such as total station points for every surface item seems to be an increasingly common form of recipe archaeology. For an initial analysis of site structure and assemblage composition, such automated field practices may sacrifice sample size, yet produce spurious results despite the illusion of meticulous precision. At early stages of investigation, seeing the big picture with coarser recording, such as counts and size frequencies per meter square, and larger sample sizes, would better serve the development of subsequent research design that may in turn prescribe increased precision and painstaking, expensive recording. This point gains relevance in light of the trend toward hyper-intensive recording on extremely small sample
sizes mandated by regulatory paralysis or sheer weight of habit in scopes of work and excavation plans written prior to fieldwork. These practices may lead to *spurious meticulous*.

The approach to excavation is also informed by site structure studies. The common practice of scattering samples of 1 m x 1 m or smaller sondages keyed to lithic scatters found on the surface will likely only sample more lithic debris. This technique will indeed determine the presence of subsurface artifacts, but contiguous context is better for recognizing larger, but subtle features such as structures, and post hole patterns, as well as primary and secondary disposal indicated by size sorting.

The cultural resource management examples described here show that progress is being made. However, some excavations continue to leave the impression that they are conducted with painstaking and hence expensive precision because of the understanding, or perhaps only the fear, that archaeology destroys as it proceeds. The preservation ethic that deems excavation an adverse effect is rooted in genuine threats to the archaeological record. But this ethic does not vitiate the fact that the archaeological record is valuable because of the knowledge it contains – and that knowledge can only be gained through an investigation of the record.

The trade-offs between sample size and precision in survey, mapping, and excavation are important both in terms of the time and cost of field archaeology and in terms of the quality of the interpretation. Perhaps counter-intuitively, greater precision, and painstaking excavation may actually not lead to the best science when it comes to gaining purchase on the overall assemblage composition at forager sites that can be extremely large and varied in the distribution of remains visible at the surface. Assessing assemblage composition in these cases demands that large samples outweigh precision. Site structure experience suggests that precision may often be rendered impotent when small sample sizes fail to evaluate the nature of primary and secondary forms of disposal at the site in the first place. Without this information there is no way to know if the sample reflects the assemblage composition resulting from past human behavior, or merely reflects the assemblage composition of the small sample the archaeologists so painstakingly excavate. One thing seems clear. Without a search for site structure, the excavator will have no means of knowing. The trade-off between sample size and precision is a practical, economic matter, but also a scientific matter of significant import.

**Conclusions**

The limited and dwindling resource of lithic scatters with standing structures in the Desert West presents two opportunities, one that flows from the other. First, attention to such sites enlists them in the service of archaeological method and theory for investigating lithic scatters where no structures are evident – the most common form of archaeological site. Second, this exercise holds important implications for matters of theory and paradigm.

Standing wickiup sites are valuable precisely because their life cycle of decomposition makes them ethnoarchaeological proxies. They should be studied as such in addition to the tendency to interpret such sites only in terms of recent culture historical issues. The more abstract and scientifically ambitious potential of these sites continues to be unrealized.

The act of looking for houses yields both success and failure, but the current inventory of such sites prompts recommendations that can increase success. The mere act of looking for houses is beneficial for other reasons, regardless of whether houses are found. The application of site structure directs attention to survey, mapping, and excavation techniques that improve the size and quality of samples that are crucial to a defensible and accurate assessment of assemblage composition at forager sites in the American Desert West that are often large and ephemeral. The cultural resource management projects exemplified here bear this out.
The ethnoarchaeological analysis of standing wickiup sites and the application of site structure to lithic scatters makes a larger theoretical contribution as well. Site structure studies indicate that significant archaeological characteristics of forager residential sites are shaped not by culture historical particulars; whether the group was Shoshone or Ute, or whether a site was used in the Archaic period or the Late Prehistoric period. Rather, patterns of site structure reflect behavioral context produced by the tyranny of circumstance, and is thus potentially cross-cultural. This fact makes such sites amenable to analysis without appeal to agency, intent, cultural badges, identity, or historical vicissitude. As such they serve as analogies of process and provide archaeologists the tools to model past cultures for which there is no historical analogy. Looking for houses and site structure further develop a general theory of behavior of foraging societies, behaviour that varies by circumstance and context (sensu O'Connell 1995). This prospect will hopefully continue to influence research design, but also needs to be absorbed into management policy to a greater degree. In this way, we meet the regulatory requirements to serve science by helping to make the most common form of archaeological site in the American Desert West at least more whole than it was before.

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