Oak Openings Archaeology: Spatial Statistical Discernment of Late Archaic Camps

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Introduction

Recent Phase II assessments for the U.S. 24 relocation project (Schwarz et al. 2005) have provided a window on the archaeology of one of Ohio's unique ecological zones. The project is sponsored by the Ohio Department of Transportation. Site 33LU759 is located in uplands near the Oak Openings region of Lucas County in northwest Ohio (Figure 1). Relict sand dunes formed by the glacial Lake Warren were colonized by widely dispersed oak trees and grassy and herbaceous ground cover. I hypothesize that hunting of deer attracted to the Oak Openings and acorn expoitation are among the reasons that prehistoric human settlements occurred there. Archaeological and spatial statistical analyses reveal what appear to be small Late Archaic camps on sandy dune-like terraces among a larger scatter of artifacts. These camps are placed within Stothers and Abel's (1993) model of Late Archaic settlement patterning in the Maumee Valley.

Background

Site 33LU759 sits at an ecotonal location (Figure 1), lying near the boundary between the Oak Openings, Mixed Oak forest, and Beech forest, as mapped by Gordon (1966) on the basis of witness tree locations in the Early Historic period. White oaks and black oaks predominated this area in broadly spaced stands (Gordon 1969). Soils are poor and acidic but the acorns produced in these oak stands also would have provided forage for deer. Both the deer and acorns may have been attractive resources for human exploitation. The sandy soils also supported grassy and herbaceous plants (Figure 2) in between the oak stands, some of which afforded subsistence opportunities. Moseley (1928:128) states that blueberries, red raspberries, and wild strawberries grew abundantly in the Oak Openings. He further notes that Native Americans living at Maumee, Ohio, prior to the founding of Toledo exploited cranberry bogs in the Oak Openings.

In characterizing Late Archaic settlement patterns in the Maumee Valley, Stothers and Abel (1993) describe the classic distinction made between foragers, who move from resource to resource, consuming as they go, and collectors who move resources back to a central settlement for consumption. They identify the base camps and local centers that were coalescence points for these peoples. These are well known sites clustered around the first, second, and third rapids of the Maumee River, such as the Riverside Site, Williams Site, and Missionary Island site. Such sites have produced evidence of large-scale, intensive occupations, structures and burials. But relatively little is known about smaller upland camps, which may be seasonal or extractive camps used during periods of population dispersal. Stothers conducted limited block excavations at the Oak Openings

#4 site (Stothers 1974), an Early Woodland upland camp, and at the Satchell site (Stothers 1983; Stothers et al. 2001:247), a Late Archaic camp near Grand Rapids, Ohio. Other intensive investigations of interfluvial Late Archaic sites have been limited as yet mostly to CRM investigations. It is important to investigate such sites because, among other reasons, upland camps can inform us about whether a forager or collector mode of hunting and gathering was pursued.

Methodology

As site 33LU759 was found within an agricultural field it could be surface collected using a controlled surface collection with 5-m collection blocks (Figure 3). Geophysical survey and limited test unit excavation followed.

Results

A very large (ca. 600-m long) lithic scatter at first appeared to be an unintelligible palimpsest but microtopographic and spatial statistical analyses reveal that individual camps can be discerned despite intensive plowing of the site. The statistical analysis utilized K Means clustering, Ripley's K analysis, and nearest neighbor hierarchical clustering.

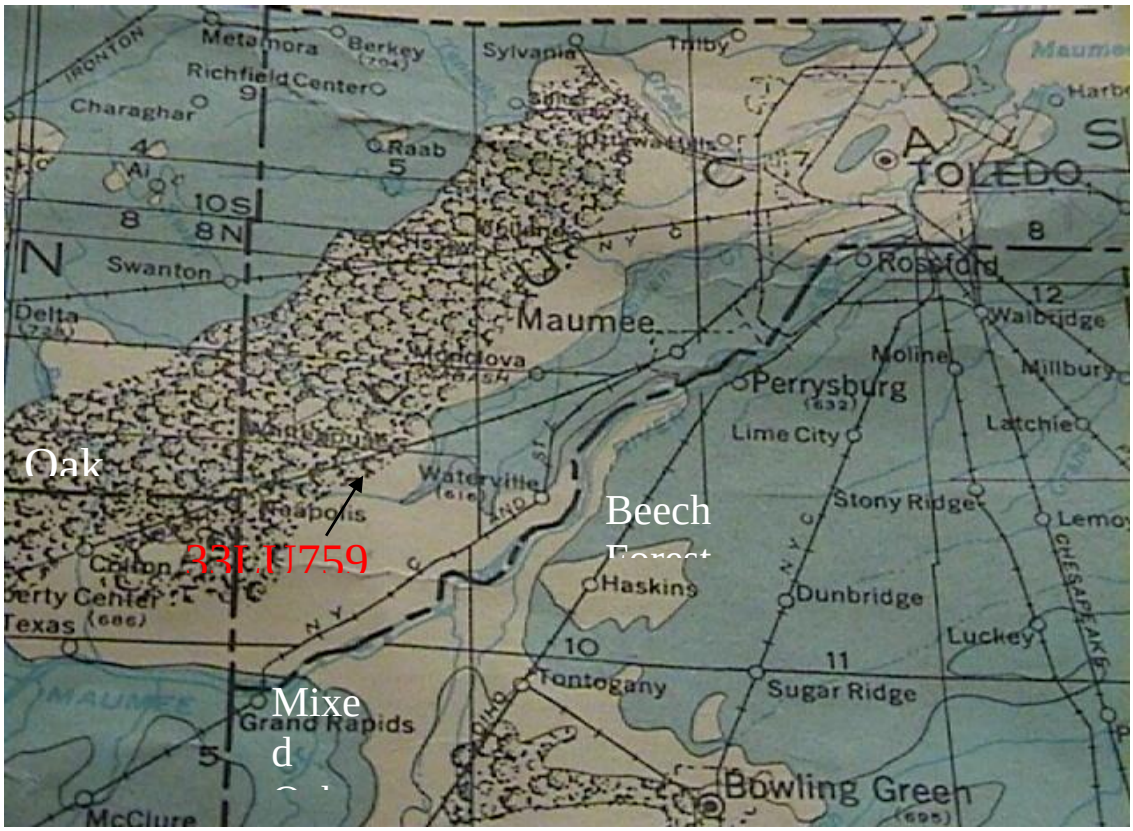
The statistical analysis helped with sorting of the data and identifying areas that may be associated with particular occupations, based on spatial clustering with diagnostic artifacts. Early Archaic and Late Woodland/Late Prehistoric components are also present at 33LU759, but the Late Archaic/Early Woodland component predominates (Figure 4).

Stothers and Abel (1993:39) document the association of Feeheley bifaces with a transitional "Feeheley" tool kit that has a distinctive reduction sequence. Also, these bifaces have been associated with deer and elk bone elements so it has been hypothesized that Feeheley tools (Figure 4E-F) were used for processing cervid carcasses.

Ripley's K analysis provides a scaled bivariate plot that measures global clustering at the site. A distance algorithm is introduced and the output is the K(t) statistic, which is the measures of spatial clustering. In practice, the use of L(t) as an estimator has replaced K(t). L(t) can be derived from K(t) via this formula: $L(t)=(K(t)/\pi)^{1/2}$. L(t) is then charted against distance and can be compared to a reference point, complete spatial randomness (L(csr)=0). For the L(t) statistic, positive values indicate clustering, values around 0 indicate complete spatial randomness, and negative values indicate dispersion (Ripley 1976). In this case, analysis of all artifacts at 33LU759 demonstrates clustering at distances below 60 m, with artifact clustering peaking between about 20 m and 35 m (the highest part of the curve). Beyond 60 m, dispersion of artifacts is evident (Figure 7).

K-means cluster analysis (Aldenderfer and Blashfield 1984) identified three major areas where chipped stone artifacts accumulated (Figure 5). Much more fire-cracked rock

(FCR) was present at 33LU759 than chipped stone lithics, so the K-means clusters are a better fit for FCR (Figure 6).



Northwest Ohio vegetation regions at the time of European contact (Gordon 1966)

Figure 2. Oak Openings were widely dispersed oak stands with a grassy/herbaceous ground cover.

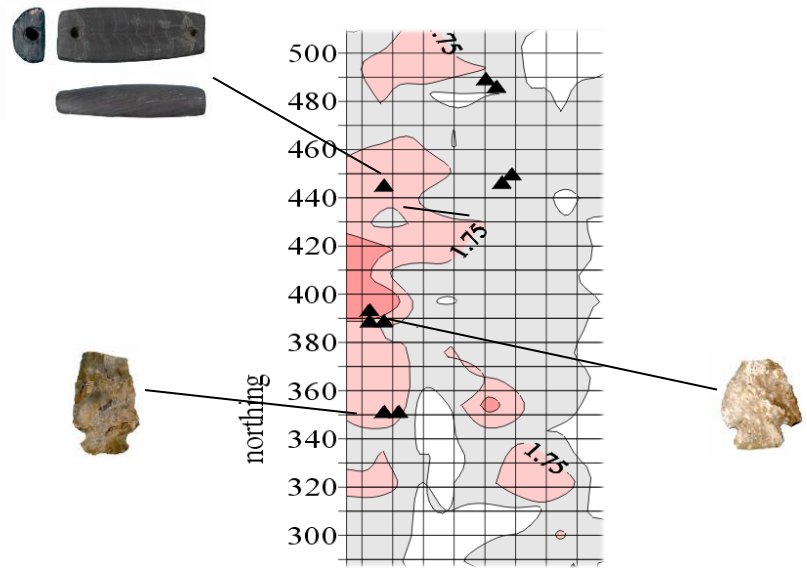


Figure 3. Controlled surface collection results.

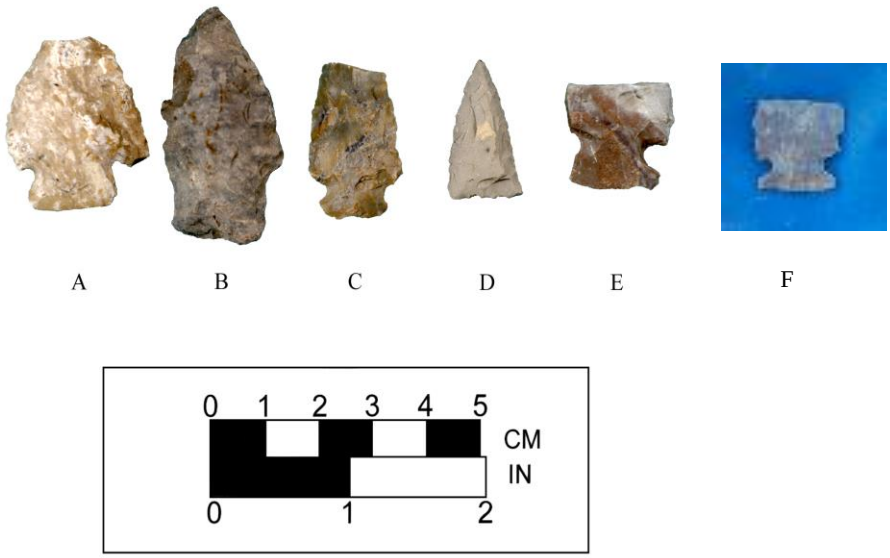


Figure 4. Projectile points recorded from Phase II Investigations at 33LU759: A) Brewerton Corner Notched point; B) Lamoka point; C) Trimble Side Notched point; D) Madison point; and E-F) Feeheley(?) biface bases.

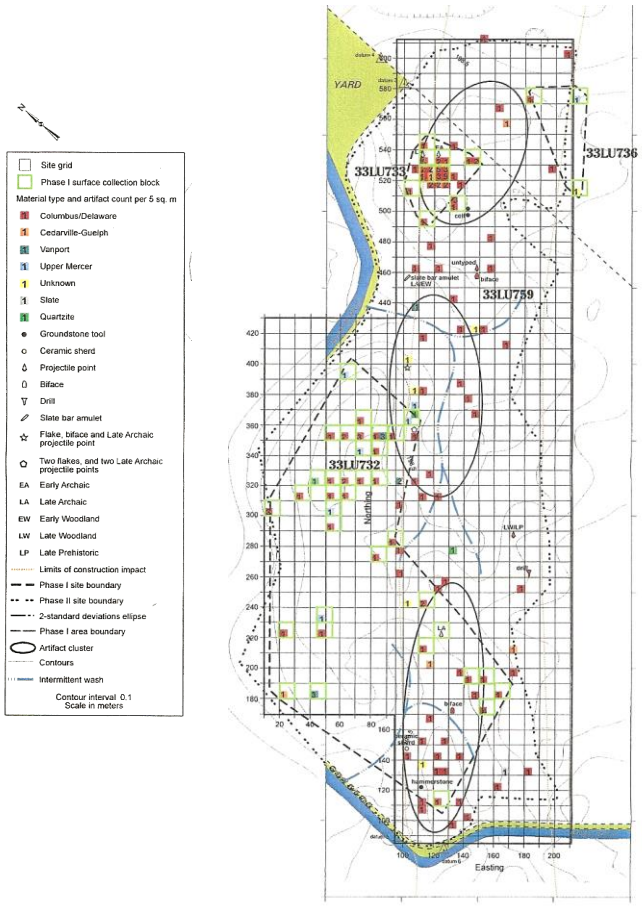


Figure 5. Chipped-stone artifacts from 33LU759 with K-means clustering results.

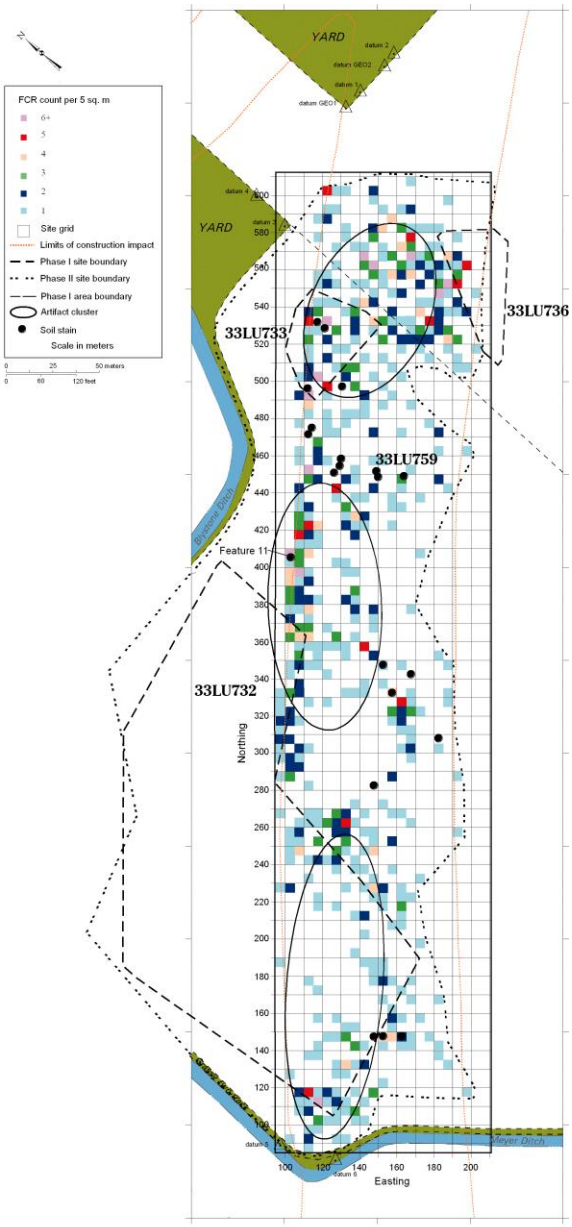


Figure 6. FCR Distribution at 33LU759 with K-means clustering results.

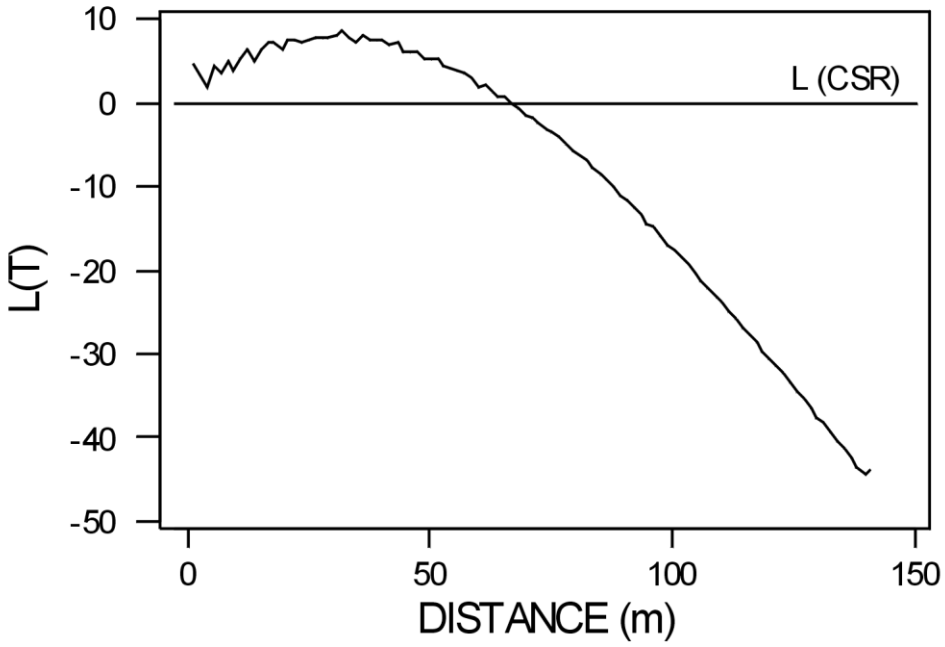


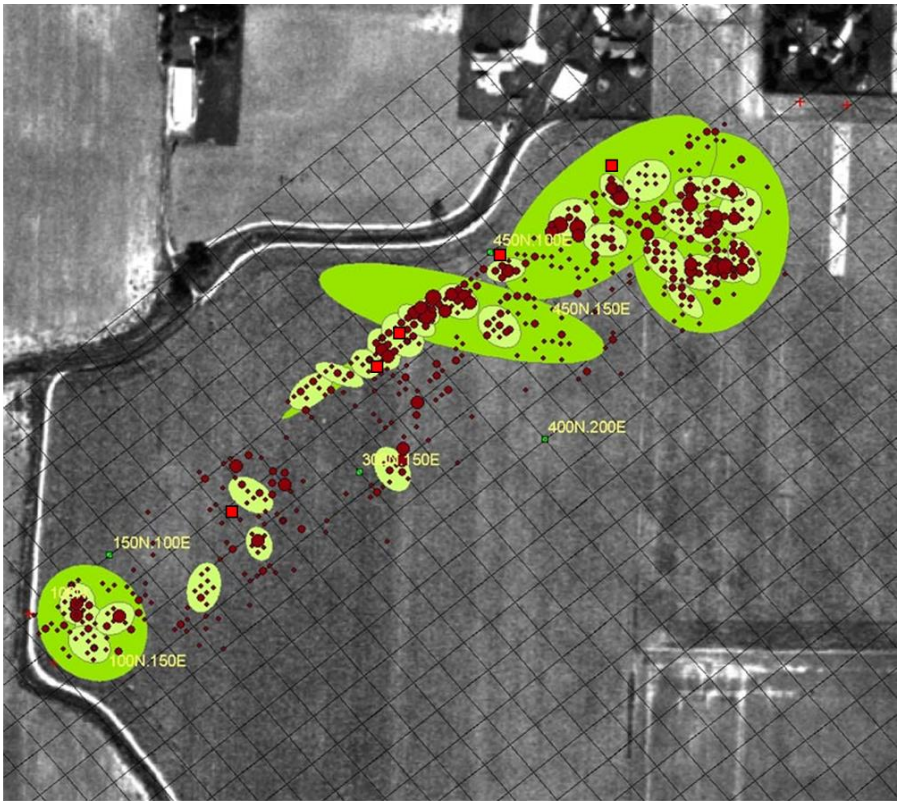
Figure 7. Ripley's K analysis of 33LU759 for all artifacts.

Next, a nearest neighbor hierarchical clustering algorithm was run. It was thought that individual hearths or even campsites might cluster, meaning that this hierarchical method would be needed to capture the clustering trends.

The clustering routine identifies groups that are in spatial proximity, based on the nearest neighbor method. Then observations are clustered into hierarchical groups, using three criteria: a threshold distance, minimum number of points per cluster, and the magnitude of the standard deviational ellipse.

There are 33 first order clusters, most of which are 20 m–30 m in size (yellowish-green). This size range is in good accordance with the Ripley's K analysis that showed maximal clustering at distance between 20 m–35 m (Figure 8).

The second order clusters (in a slightly darker green) do not correspond well to the Ripley's K analysis. The second order clusters approximate areas of sandy terrace soils where drainage was better and hence areas where more campsites were settled. Interestingly enough, all five Phase II Late Archaic/Early Woodland period diagnostic artifacts (red blocks) are near or within first order clusters, possibly indicating camp sites of those periods.



Late Archaic/Early Woodland diagnostics

Figure 8. Nearest neighbor hierarchical clustering results for 33LU759 artifacts.

Discussion and Conclusion

Some of the clusters at 33LU759 indicated by the nearest neighbor hierarchical clustering have enough debris at them to have been seasonal camps for small kin groups during stays in the hinterlands west of the Maumee Valley. The larger clusters are located on sandy terraces that would have been better drained and habitable in fall and early winter months, when acorn collection and deer hunting were optimal. The exploitation and processing of deer may be evidenced in the Feeheley biface assemblage. To date only one feature, a hearth, has been found at 33LU759. No paleobotanical evidence yet exists that indicates that the inhabitants of 33LU759 exploited the Oak Openings for acorns or berry-harvesting although large amounts of FCR indicate that fire-producing activities were common and acorn-processing could have been carried out on-site. Another Phase II site, 33LU698, is located in the dune field and produced a large FCR assemblage, although a single biface and a bi-pitted (nutting?) stone were the only tools found and very little debitage was present. This site may have been an extractive station where nuts were harvested and processed, although deep plowing means no features were found intact. Habitation at such a site would have been short, so it should not be surprising if little lithic reduction or tool maintenance took place. To date, use of hickory nuts at the Oak Openings #4 site (Stothers 1974) and recovery of

both acorn and hickory nuts at the Freeworth site are the only evidence of nut usage in these upland areas. A deep roasting pit with charred hickory and acorn nutshell at Freeworth (Stothers 1983; Stothers et al. 2001:247) provides a tantalizing glimpse of the subsistence practices of the Late Archaic period.

It seems that the great horizontal extent of 33LU759 is the combined signature of multiple overlapping camp sites that were settled independently over the course of time, which plowing has since intermixed. Some of the clusters identified above may have been seasonal Late Archaic camps along the lines suggested by Stothers and Abel (1993). If so, then it is likely that the Late Archaic/Early Woodland peoples practiced a foraging coalescence-dispersal seasonal round, because 33LU759 provides evidence of habitation that goes beyond short-term use, such as would be ascribable to mere hunting or resource exploitation stations. It is hoped that the Phase III mitigation excavation that is planned for 33LU759 would provide more complete picture of upland Late Archaic/Early Woodland upland settlement patterns.

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