An Analysis of Housefloor Dimensions in the Late Woodland Upper Yadkin River Valley

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Introduction

This research analyzes the spatial distribution of organic content in sediment samples, lithic weights and counts, and ceramic sherd sizes and counts to identify the dimensions of a potential housefloor at the Redtail site (31Yd173), a fourteenth-century Piedmont Village Tradition (PVT) settlement in the upper Yadkin River Valley (UYRV) (Figure 1). We work from the assumption that housefloors would have had increased deposition of organic material from plant materials used as flooring and decreased artifact counts and sizes due to maintenance activities.

We currently do not have a good model for intrasite arrangement of small, dispersed PVT settlements, which were the dominant form throughout this period in the UYRV and in other valleys before AD 1300. Sediment staining patterns and subsequent pilot research on ceramic distributions led us to form a hypothesis about the location of a housefloor. Our goal here is to test that hypothesis, and if it is supported, to determine the dimensions of this feature and activities associated with it. The identification of a housefloor and its spatial relationship to other features and activities has the potential to reveal invaluable details concerning household size, domestic activities, and social organization in this PVT locality.

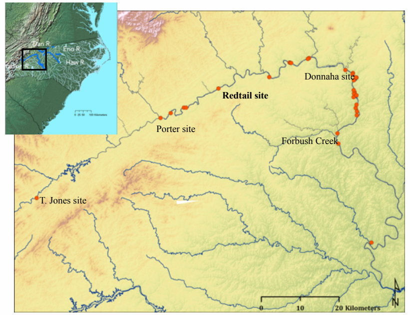

Figure 1: Redtail site location and other 800-1600 CE sites in the Upper Yadkin River Valley.

Background

The Piedmont Village Tradition (PVT) is an archaeological culture that existed throughout the northern Piedmont Southeast during the Woodland Period. Most PVT people lived in dispersed settlements of 2-5 households until 1300 CE, when they began to coalesce into planned villages (Ward & Davis 1993, 1999). However, in the UYRV, they remained dispersed into the 1500s.

PVT houses were generally constructed using wooden posts, rarely over 10cm in diameter. Sites in the Dan, Eno, and Haw valleys have revealed two basic house styles: a 7x4m rectangular form; and a larger round form approximately 10m in diameter (Ward and Davis 1993, 1999). Site formation processes in the UYRV have been less favorable. Sandy and acidic sediments in some locations and indeterminate postmold patterns make it difficult to identify dimensions.

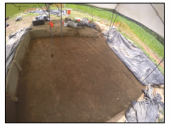

Figure 2: Staining observed in stratum 3 during 2015 excavations.

The Redtail site stratigraphy consists of two plowzones (stratum 1), a dark (10 YR 3/2) 5cm-thick lens (stratum 2) covering an oval-shaped area approximately 20x20m, and a yellow-brown (10 YR 3/4) stratum (stratum 3) with cultural material and pit features in the top 15-20cm. In 2015, the first radiometric dates were obtained from two undisturbed deposits. The calibrated ranges were 1300-1370 CE and 1285-1400 CE (Jones 2017).

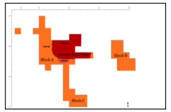

Figure 3: Site plan showing the surface of stratum 3 from 2015 excavations.

2015 excavations revealed staining in stratum 3 covering an area ~8m across (Figures 2 and 3). This led us to hypothesize that it was left by an organic matter leached from a housefloor directly above it in stratum 2. A pilot study found significant decreases in the size and quantity of ceramic artifacts in stratum 2 correlating with that location. Concurrent excavations also uncovered an area populated by various pit features 5m to the east. This led us to construct a hypothetical model for the intrasite arrangement that included three areas: housefloor (HF), general living surface (LS), and activity area (AA) (Figure 4). The research described here tests that model.

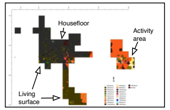

Figure 4: Site plan showing the surface of stratum 2 from 2015 excavations.

Methods

Excavation and Recovery

We excavated 1x1m units, screening plowzone through 1/4" mesh, undisturbed deposits and features through 1/16" mesh. All analyses here are based on remains recovered from 1/4". The 1/16" are still in the process of separation. Sediment samples were collected from stratum 3 in random locations, each unit within stratum 2, and from each level in pit features.

Figure 5: summer 2016 fieldwork, exposing pit features in the "activity area".

Sediment Analysis

We compared the percentage of organic content across 42 units using loss on ignition (LOI) analysis (Figure 6). We dried wet samples in an oven at 105° overnight. We weighed the dry samples and then heated them to 430° for two hours to combust organic matter. Higher temperatures can be used but run the risk of combusting calcium carbonate and other inorganic compounds. We then weighed the sample a final time. In addition, we analyzed the pH of the same samples to ensure that organic content levels were not a factor of acidity levels. We used a pH probe, calibrated using 4.0, 7.0, and 10.0 buffer solutions. Using a graduated cylinder, we measured out 20ml of water with a pH of 7.0 then combined the 20.0g of sediment and 20ml of water in a beaker using a metal stirring apparatus. We then used the probe to measure the sample's pH to the nearest thousandth.

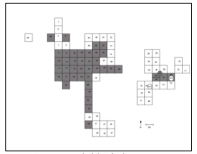

Figure 6: units sampled for the loss on ignition analysis.

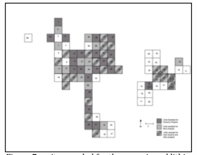

Figure 7: units sampled for the ceramic and lithic analysis.

This research began in 2015 with a 33% random and systematic sample of units (n=419). We continued this year using a non-probabilistic method to fill in unsampled areas, creating a 50% sample fraction across the entire site (n=693) (Figure 7). We identified ceramic pieces based on the presence of both temper and distinct interior and exterior surface treatment to distinguish them from indeterminate fired clay and daub. We measured the length, width, and thickness of each ceramic fragment using an electronic caliper (Figure 8). A t-test was used to compare the counts and measurements of these artifacts among the different areas of the site.

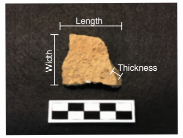

Figure 8: diagram of how we collected ceramic measurements.

Lithic Analysis

Our research took a systematic and random 42% sample of the 84 excavated units (Figure 7). We designated units as housefloor area (HF), activity area (AA), and living surface (LS) based on the aforementioned pilot research. We examined a total of 559 lithic artifacts, 154 from 14 units in the housefloor area, 277 from 15 units in the potential living surface, 128 from 5 pit features and 1 unit in the potential activity area. We categorized lithics by material and analyzed them for any features that indicated they had been worked, including eraillure scars, bulbs of percussion, and radiating fissures (Figure 9). If none could be identified, the artifact was classified as general debitage. After the lithics were separated based on material and type, each total assemblage per unit was weighed and a general sizing was taken. Artifacts were weighed in grams to the tenths on an electronic scale and sized using a general sizing chart ranging from 1-12cm (Figure 10).

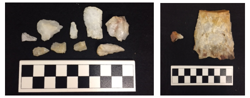

Figure 9: examples of quartz flakes from the Redtail site.

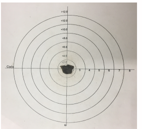

Figure 10: size chart used to categorize lithic artifacts.

Results

Sediment Analysis

Figures 11 and 12 and Table 1 show the results of the LOI and pH analyses and the results of the t-tests comparing the different areas. They show that the activity area had the highest percentages of organic matter, followed by the housefloor (demarcated by the black line), then the living surface. The lower pH of the housefloor area shows that the higher proportion of organic content there is not a factor of less acidic conditions.

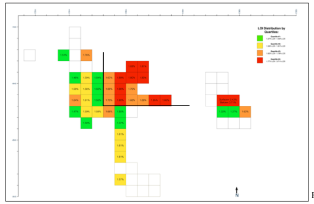

Figure 11: map of LOI results.

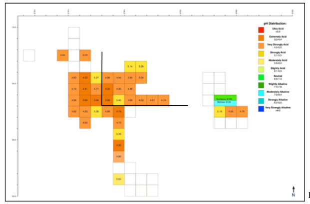

Figure 12: map of pH results.

	Loss on ignition (LOI)	pH
Housefloor vs. Activity Area:	M_{AA}=2.08% M_{HF}=1.74% $t(14)=1.112$, p=.285	M_{AA}=5.89 M_{HF}=4.91 $t(14)=2.039$, p=.061
Living Surface vs. Activity Area :	M_{AA}=2.08% M_{LS}=1.61% $t(29)=2.399$, p=.023	M_{AA}=5.89 M_{LS}=4.69 $t(29)=3.453$, p=.002
Housefloor vs. Living Surface :	M_{HF}=1.74% M_{LS}=1.61% $t(35)=2.983$, p=.005	M_{HF}=4.91 M_{LS}=4.69 $t(35)=1.525$, p=.136

Table 1: t-test results for LOI and pH data.

Ceramic Analysis

Tables 2 and 3 and Figure 13 show the results of the t-tests comparing ceramic dimensions and counts between the hypothesized areas. Overall, they show no significant difference between the living surface and housefloor, except thickness, but significant differences between the housefloor/living surface and the activity area. The difference in ceramic artifact counts between the housefloor and the living surface approaches signifcance, with the housefloor having a lower average number across those units.

	p for Length	*p* for Width	*p* for Thickness	*p* for Count
Housefloor vs. Living Surface	0.377	0.335	**0.050**	0.058
Housefloor vs. Activity Area	**1.115 E-04**	**1.138 E-03**	**7.145 E-06**	**0.002**
Housefloor vs. Features	**5.664 E-06**	**2.862 E-05**	0.122	0.083
Living Surface vs. Activity Area	**1.206 E-05**	**1.817 E-04**	**8.769 E-06**	**0.021**
Living Surface vs. Features	**4.990 E-06**	**2.738 E-05**	0.483	0.168
Activity Area vs. Features	**4.361 E-02**	**0.0377**	**5.619 E-04**	0.316

Table 2: t-test results for ceramic data.

	Avg. Length (cm)	Avg. Width (cm)	Avg. Thickness (cm)	Avg. Count
Housefloor	2.15	1.57	0.68	10.50
Living Surface	2.18	1.59	0.71	15.63
Activity Area	2.73	1.93	0.79	35.33
Features	3.15	2.25	0.71	24.75

Table 3: average ceramic dimensions and counts across the hypothesized areas.

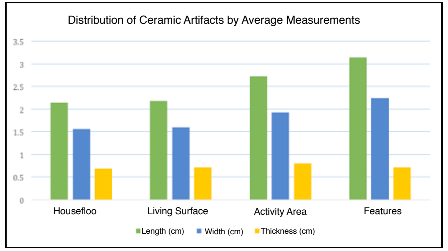

Figure 13: graph of ceramic dimensions across the hypothesized areas.

Lithic Analysis

Figure 14 and Table 4 display the results of sizing and two sample *t*-tests assuming equal variances that compared the three different areas of the site. These results demonstrate significant differences in lithic weight between the housefloor and the activity area (p=1.721E-05) and the activity area and the living surface (p < 0.001). There was not a significant difference in lithic weight between the housefloor and living surface. The *t*-tests for lithic count did demonstrate a significant difference between the housefloor and the living surface (p=0.038), indicating that there are noteworthy differences between the number of lithic artifacts found in the hypothesized housefloor area and the living surface. The living surface shows a comparatively large number of 1cm artifacts. The activity area, despite having the fewest units, shows the highest number of 4cm and greater artifacts.

	Lithic Analysis	
	Lithic Weight (g):	Lithic Count:
Housefloor vs. Activity Area	M_{HF} = 19.26 M_{AA} = 212.67 $t(18)$ = 1.734, p = 1.721E-05*	M_{HF} = 11.00 M_{AA} = 21.33 $t(18)$ = 1.734, p = 0.079
Activity Area vs. Living Surface	M_{AA} = 212.67 M_{LS} = 42.38 $t(20)$ = 1.725, p = 0.000*	M_{AA} = 21.33 M_{LS} = 18.44 $t(20)$ = 1.725, p = 0.643
Housefloor vs. Living Surface	M_{HF} = 19.26 M_{LS} = 42.38 $t(28)$ = 1.701, p = 0.065	M_{HF} = 11.00 M_{LS} = 18.44 $t(28)$ = 1.701, p = 0.038*

Table 4: t-test results for lithic data; *denotes significance

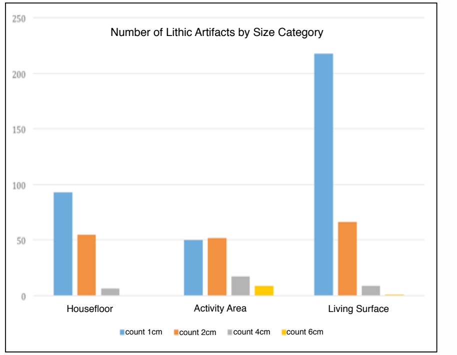

Figure 14: graph of lithic sizing across the hypothesized areas.

Discussion

These results show a mixture of similarities and differences between the housefloor and living surface, suggesting similar activities in these areas with differences in intensity in them across space. The results also show significant differences between this housefloor/living surface areas and the activity area. The higher counts of artifacts, larger pieces of artifacts, and high organic levels, along with the concentration of pit features, support our hypothesis that the activity area was a place of food preparation, cooking, and/or waste discard distinct from other areas of the site.

The high LOI levels in the housefloor area distinguish this location from other areas of the site. We see two possible explanations for this significant increase in organic content: 1) increased human activity from food processing; or 2) the area was covered with matting made of plant material that was placed on the floor of a structure and decomposed over time (Terrell 1998). The former would indicate the area was not a housefloor, while the latter would be more indicative of a housefloor. We will explore both possibilities using the ceramic and lithic evidence.

We are assuming that the ceramic and lithic distributions demonstrate both use and discard. For example, if pots are breaking where they are used, we expect larger pieces to be removed and discarded and smaller ones to remain where they broke. Also, when lithic tools are produced, used, and retouched, these activities produce a range of sizes in flakes and debitage. The larger pieces would have been removed and discarded and the smaller pieces would have been left *in situ*.

Given these assumptions, we can explore the first idea that our proposed housefloor is not a housefloor but a food processing area. This is supported by the organic levels and lack of distinction between the housefloor and living area with regard to ceramic counts and sizes. However, the lithic data does not support this hypothesis. There are fewer flakes in the housefloor area compared to the living surface, indicating that there was less lithic use, production, and repairing going in the former. We would expect more of these activities in an area where lithic tools were being used and fewer in a domestic structure that would have been used primarily for shelter. As such, the living surface looks like the location for the majority of lithic production and use activities, such as food processing. The housefloor looks like similar activities occurred but with much less intensity or frequency. The even distribution of smaller and larger lithic pieces in the activity area suggest that it was both a place of use–albeit less than the other areas–and discard of lithic material.

Thus, the three lines of evidence together seem to suggest the housefloor area was just that, an area with high organic content from plant-based flooring, an area of low to moderate activity levels, and an area that was cleaned off or preferentially maintained. Previous analyses of over 300 identified and excavated postmolds did not reveal any clear patterns. However, they do cluster in and around the housefloor area, which is approximately 6x4m. This could suggest a smaller household, like those rectangular forms found in other PVT areas, that shifted locations during rebuilding or repair.

Conclusions

While these results continue to support the hypothesis that there was a domestic structure at the Redtail site, we are finding it difficult to pin down the absolute dimensions. However, even without dimensions, we are gaining a picture of small, dispersed settlements in the UYRV. It appears that daily activities (e.g. food processeing, tool production and maintenance, etc.) were occurring adjacent to the dwelling structure/area. Pits for cooking, firing, and waste discard were located 5-10m from this area. This close proximity of activities in a large floodplain may indicate that there were other households nearby or a need to keep activities around the dwelling structure. Recent testing has found another potential living surface. It could be that multiple, independent households cohabitated in this floodplain.

Further analyses of sediment chemical composition and expanded excavations to the north and east of the housefloor area could help to refine the dimensions of the housefloor. Future work to identify other potential housefloors in the same floodplain could illuminate the social and economic relationships between households in the UYRV during this time period.

References

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