

Results from the Continued Lithic analysis of the Sunrise Ridge Borrow Pit site (45PI408)

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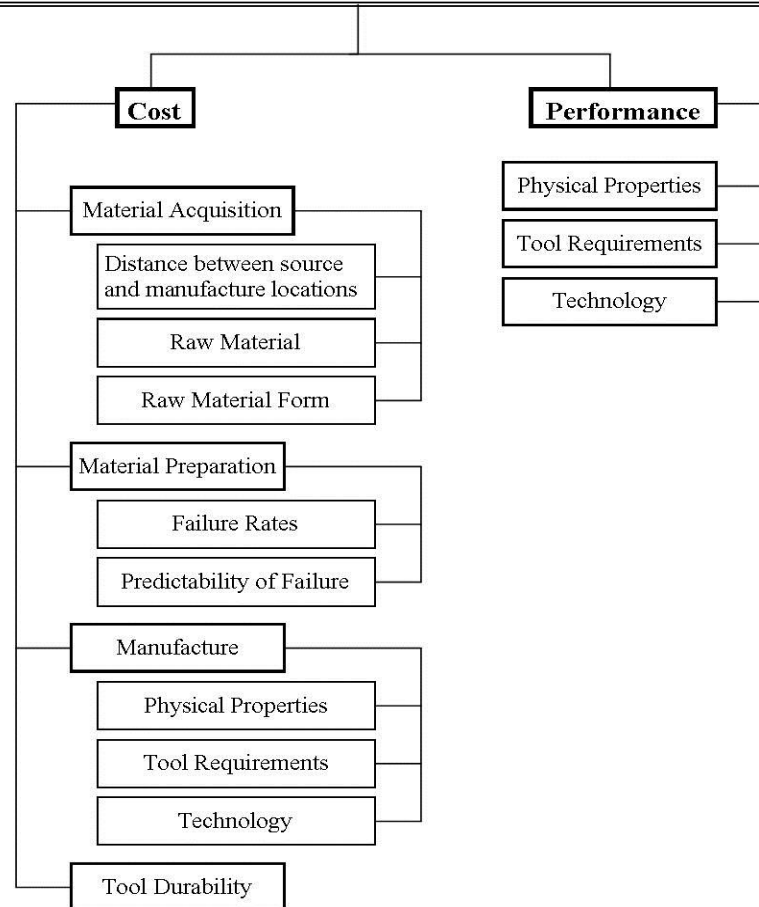


Cost and Performance

- “*What are the selective conditions under which a particular stone tool industry becomes fixed in mountain environments?*”
- *Cost* - refers to the amount of energy required to produce a given performance; including the construction of the original artifact.
- *Performance* - *Performance* refers to work done in the environment of interaction (McCutcheon 1997:184, Pfeffer 2001:76, Wilhelmsen 2001:119).

How Cost and Performance Variables Inter-relate

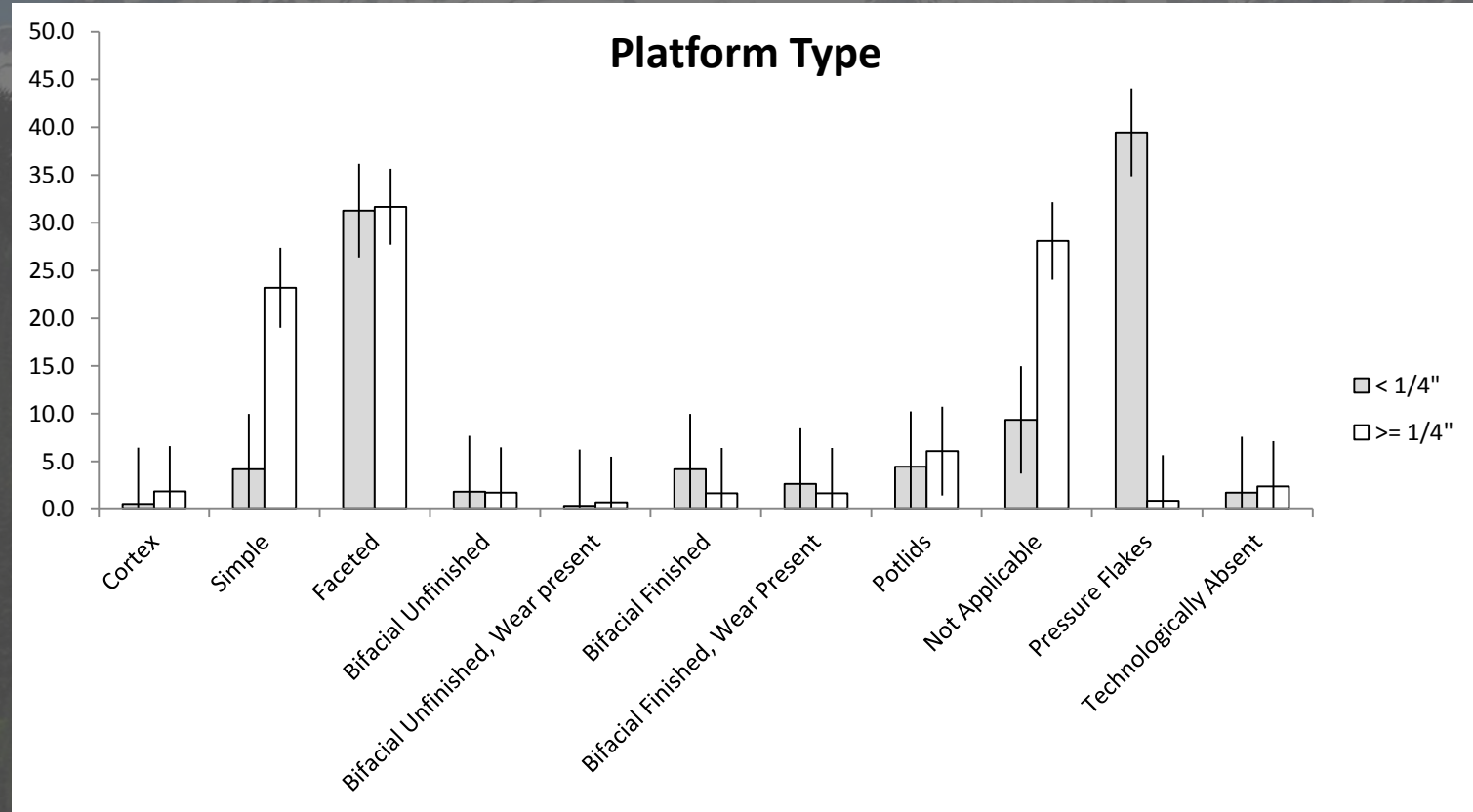
What are the selective conditions under which any particular stone tool industry becomes fixed in mountain environments?



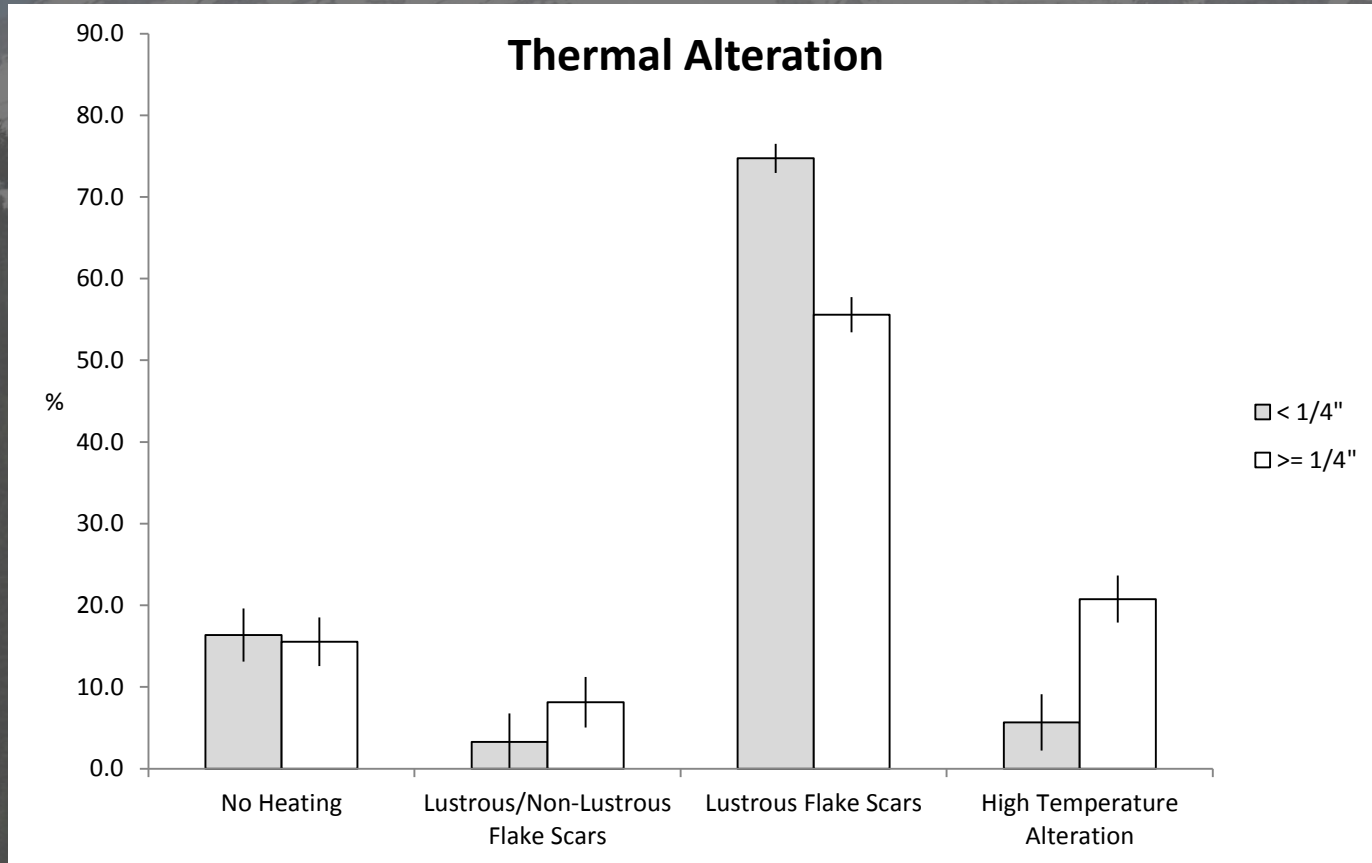
Sample Selection

- All lithics $\frac{1}{4}$ inch and larger
- Excavated from 12 1x1 meter units across 4 excavation blocks.
- A total of 2,321 artifacts that were $\frac{1}{4}$ inch or larger were excavated and analyzed from 2011-2013.
- This 2,321 were combined with all artifacts ≥ 0.07 g from earlier 45PI408 excavations/analyses , n=3,672 lithic sample size.

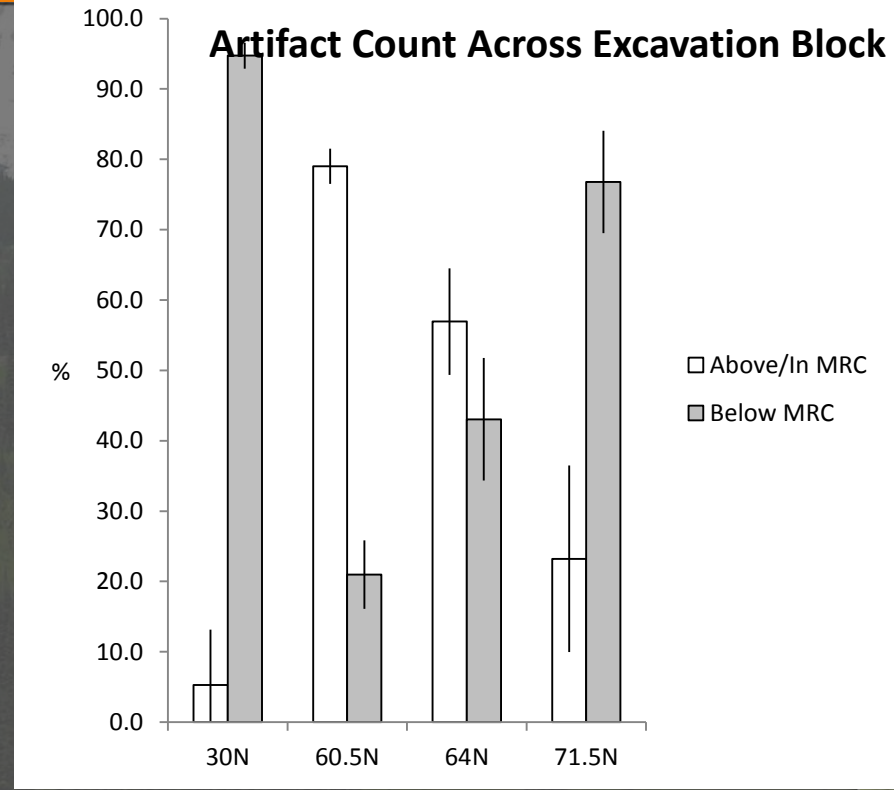
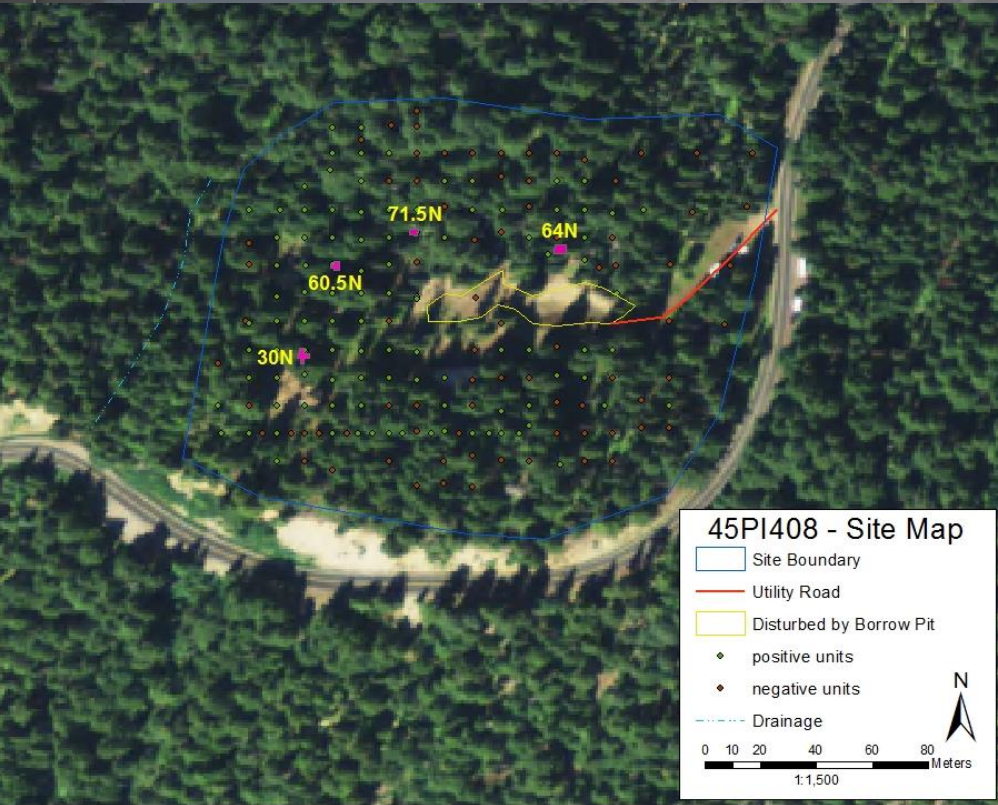
Size Class Comparison



Size Class Comparison

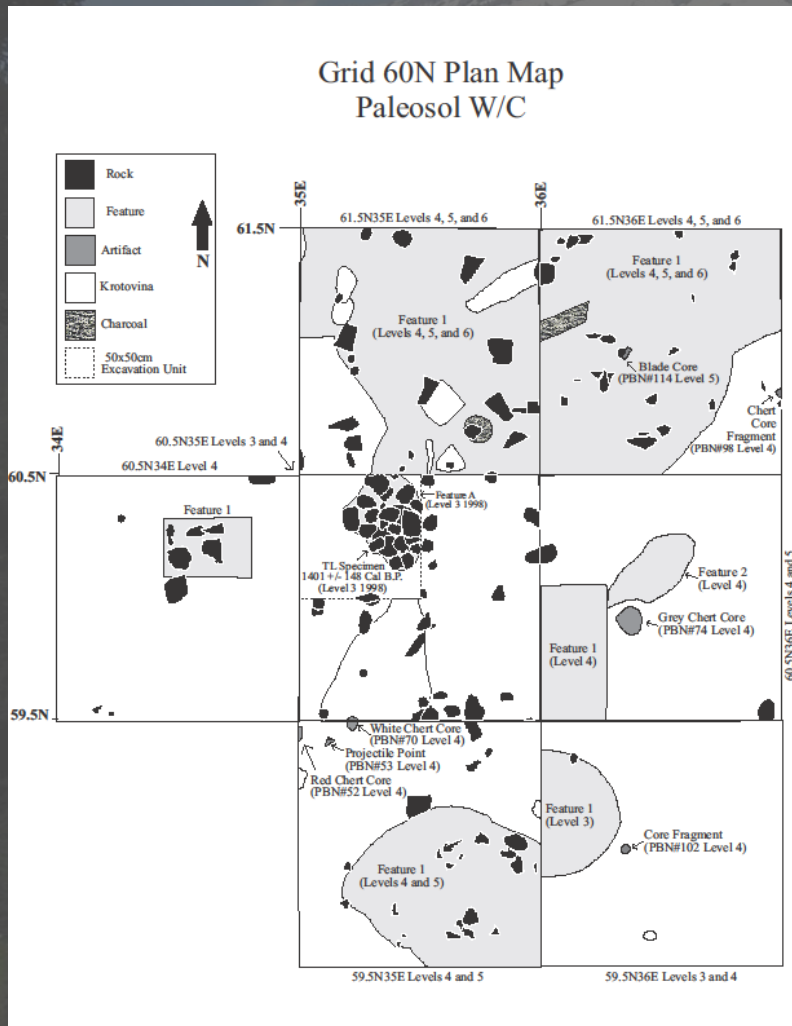


Variation Across Space



Feature Comparison → Excavation Block Comparison → Site Quadrant Analysis

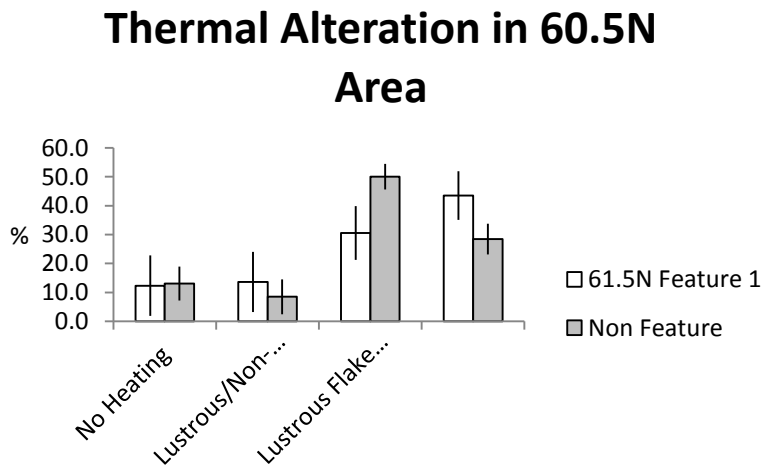
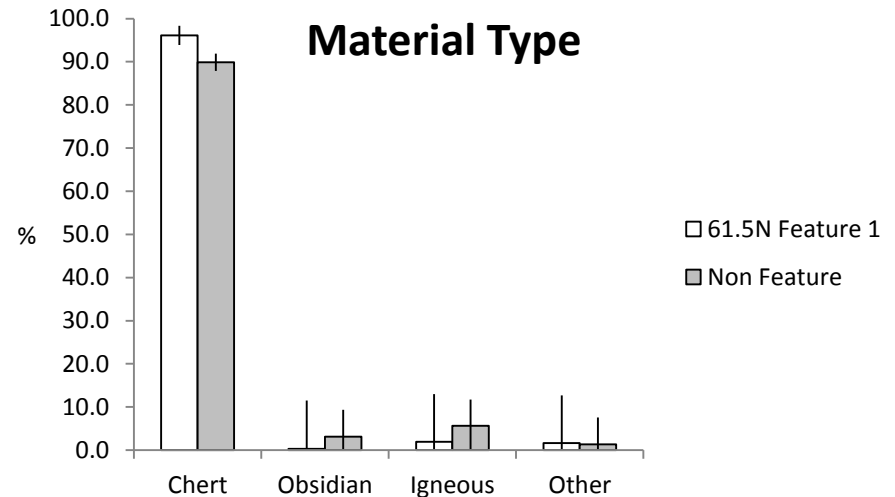
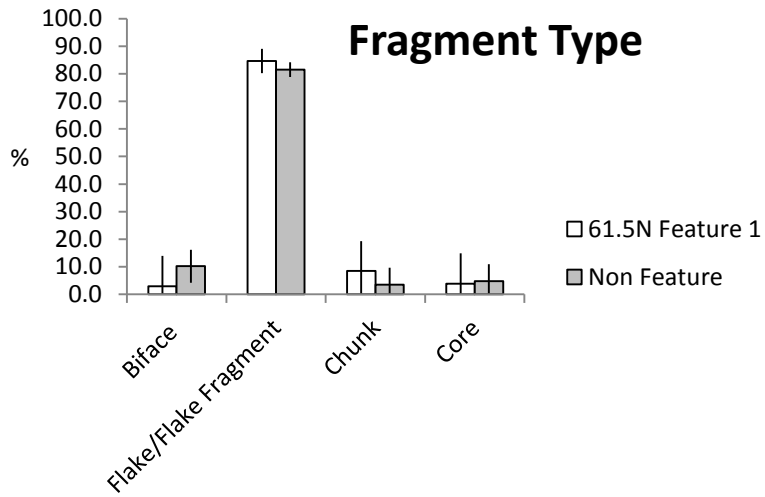
Feature Analysis



- The 60.5N excavation block had many features, including a large feature spanning the two northern most units.
- 305 artifacts were associated with this feature.



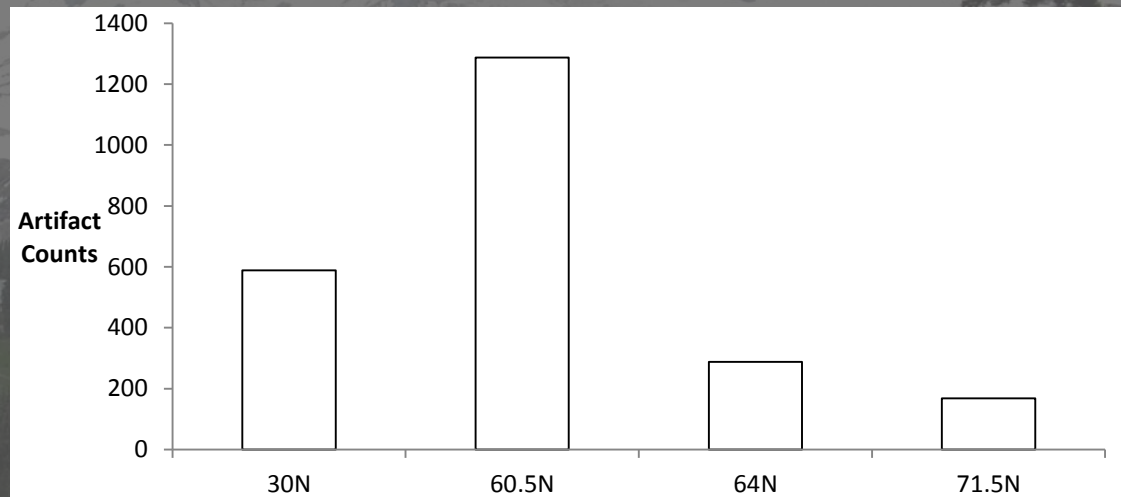
Feature Analysis



Excavation Block Comparison



30 North



60.5 North

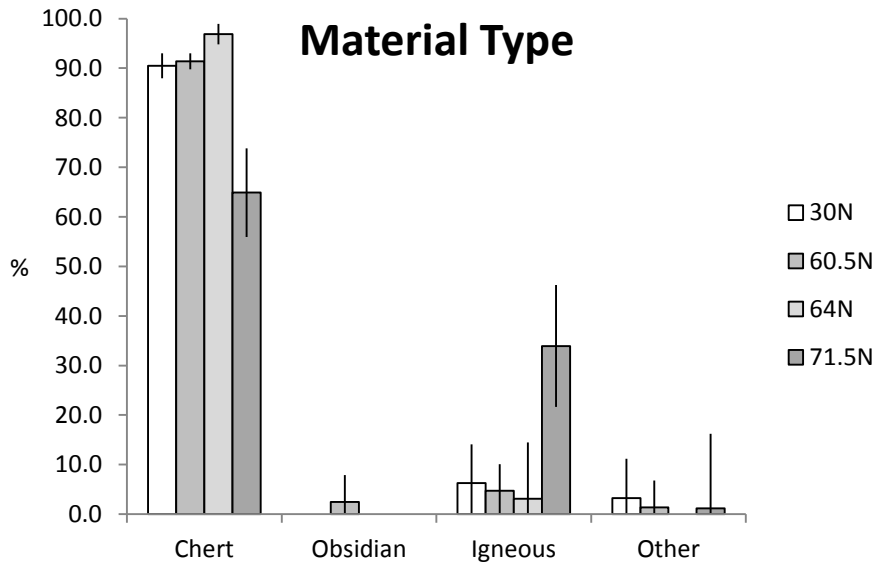
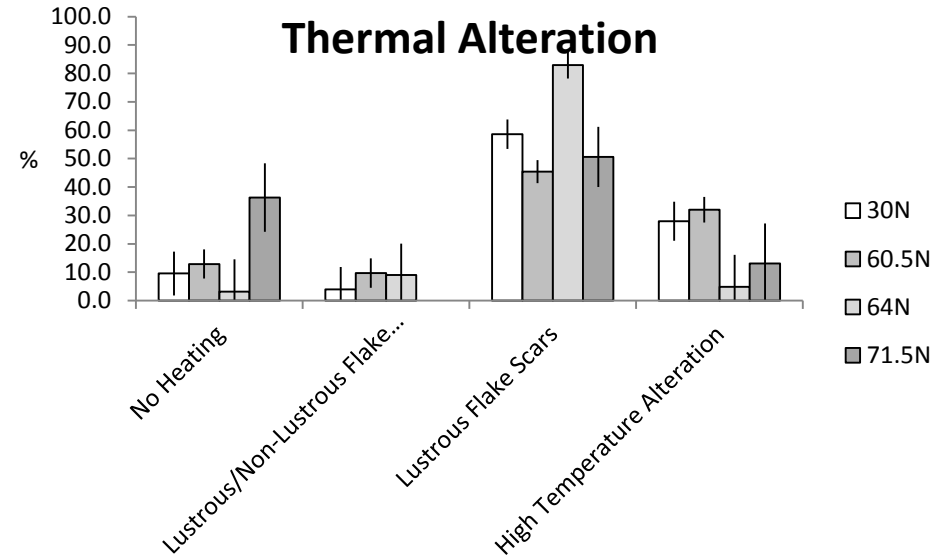
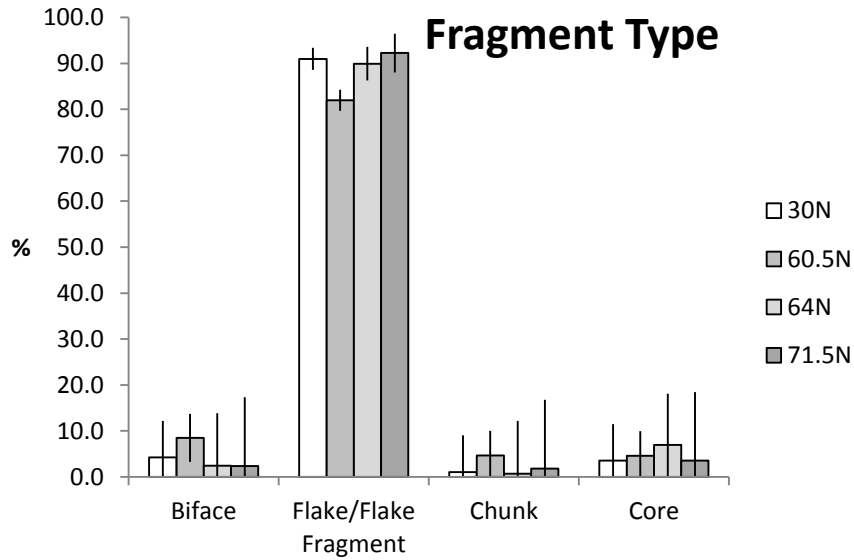


64 North



71.5 North

Excavation Block Comparison



OBSIDIAN SOURCE	
Obsidian Cliffs	16
Quartz Mountain	5
TOTAL	21



Change Through Time

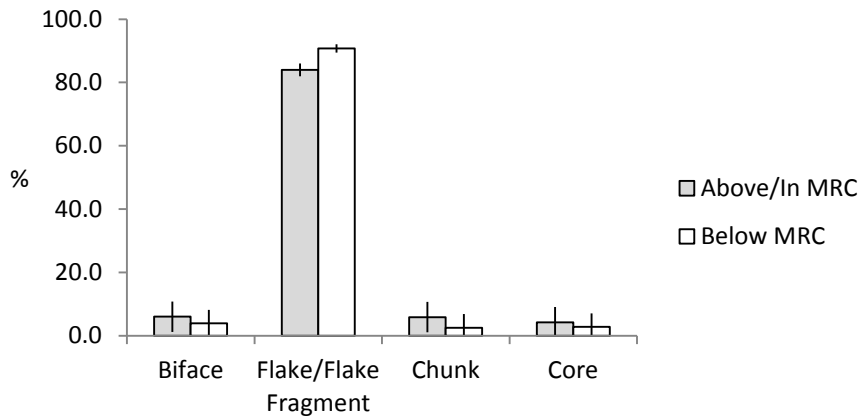


Tephra Layer	Approximate Age* (Years BP)	Grain Size (mm)	Characteristics
Mt. St. Helens W	470 BP	<1.0	White sand-sized pumice
Mt. Rainier C	2,200 BP	15	Brown pumice scoria and lithic lapilli
Mt. St. Helens P	3,000 BP	<1.0	White to light gray sand to silt sized ash
Mt. St. Helens Yn	3,500 BP	1.0	Yellow coarse sand-sized pumice and several fine-grained layers
Mt. Rainier F	4,800 BP	1.0	Light colored clayey ash and scattered lapilli
Mt. Mazama O	6,850 BP	<0.4	Orange to cream colored very fine sand to silt sized ash

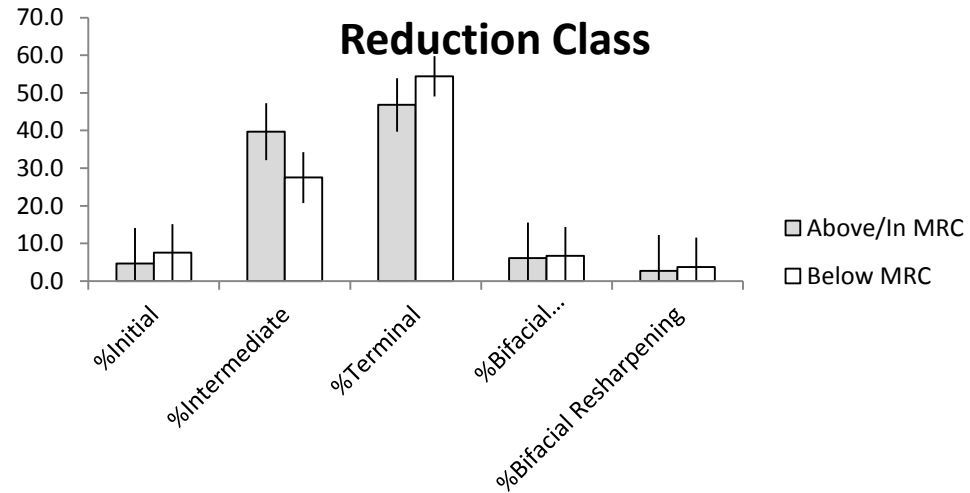
Tephra layers noted at 45PI408 during excavation. Dates and characteristics adapted from Mullineax (1974 and 1986) and Vallance and Scott (1997).

Change Through Time

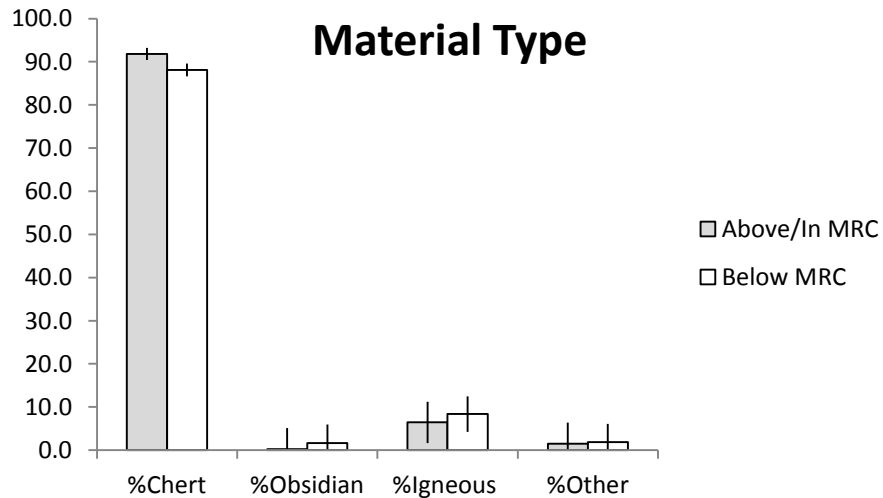
Fragment Type Above/Below MRC



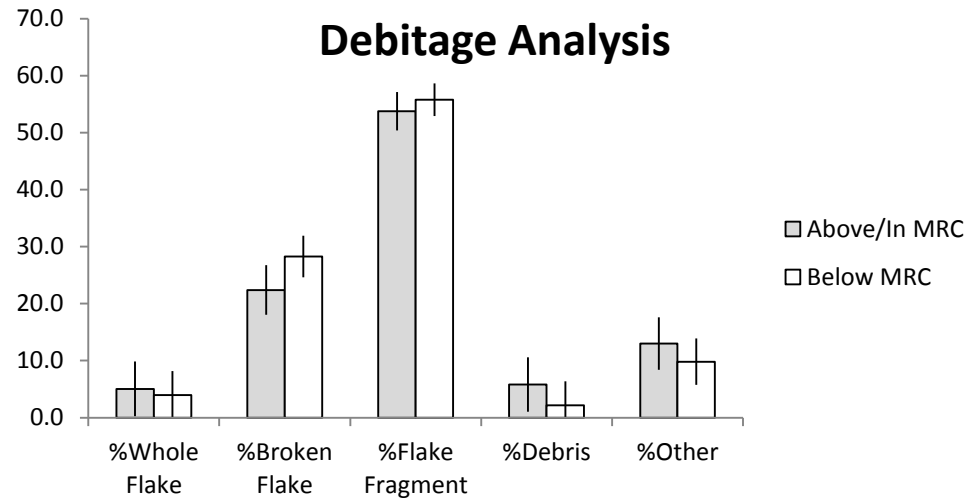
Reduction Class



Material Type



Debitage Analysis



Projectile Points

Rabbit Island Stemmed Points



Columbia Corner Notched



Wallula Rectangular Stemmed



Convergent Stem Points



Stemmed Point Collected from 1997-2001

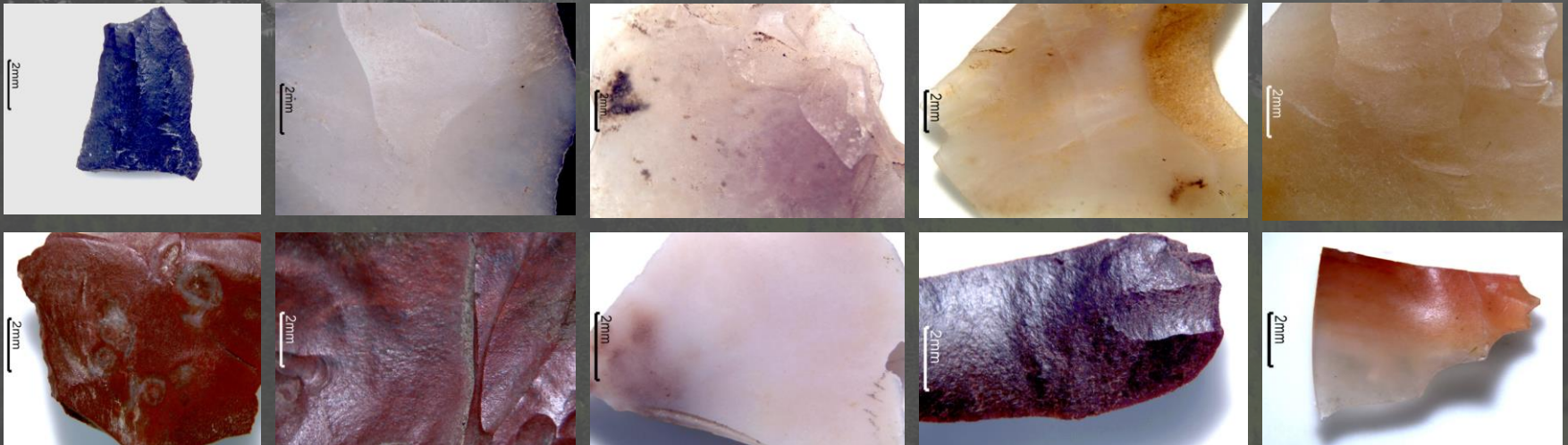


Point type	Complete	Fragment
Wallula Rectangular Stemmed	II	IIII
Columbia Corner Notched	I	IIII
Rabbit Island Stemmed	I	I

Additional Selective Conditions

- Further investigation into raw material types shows a wide variety of chert as different fine grained volcanic material.

Different varieties of chert:

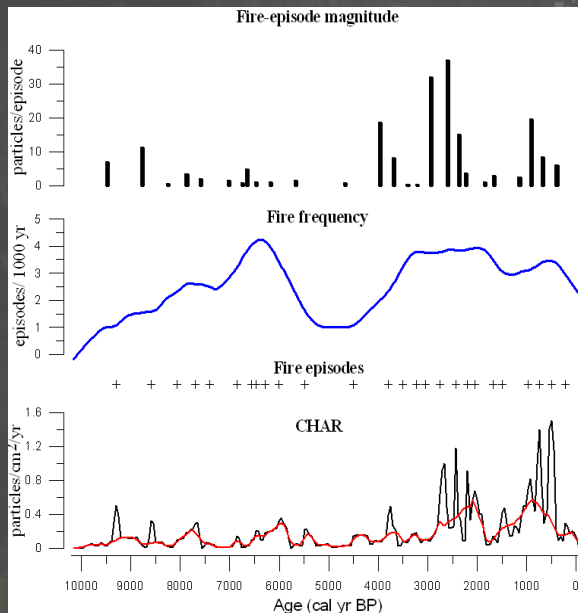


Igneous artifacts observed:

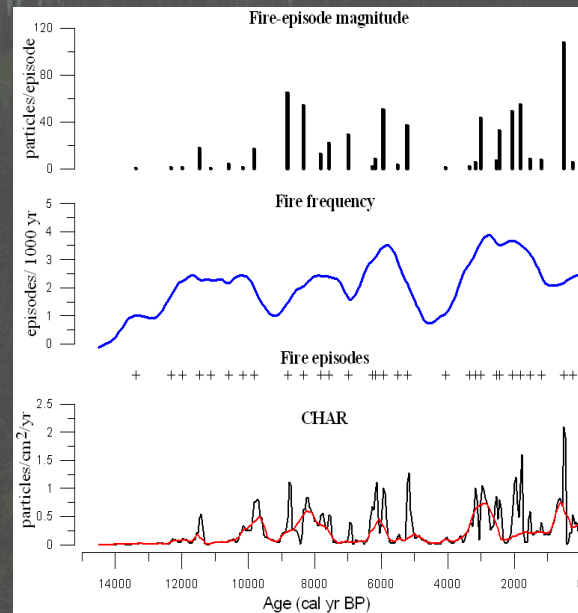


Additional Selective Conditions

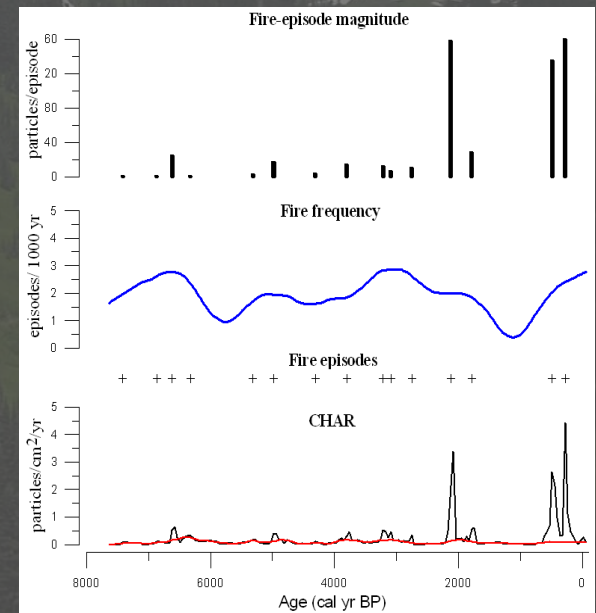
- Lake Sediment cores indicate increased fire frequency in late Holocene



Shadow Lake



Sunrise Lake



Little Sunrise Lake

Conclusions

- Lithic technological and functional variation across space and through time is subtle.
- The selective conditions at 45PI408 are more representative of the harsh environment, and changes in environmental zones, than any settlement and subsistence strategy taking place at lower elevations.
- The presence of large cores at the site suggests there are likely unknown raw material sources nearby.
- There is a mix of curated and expedient technologies present at the site, but formal technologies are dominant.

Further Research

- Analyze the remaining portions of the lithic assemblage ($\leq 1/4''$).
- Identifying the presence or absence of local raw material sources.
- Use all of the data from 45PI408 in combination with other sites to build a lithic lineage (e.g. Lyman and O'Brien 2000 and 2002) of the entire White River watershed.

Acknowledgements

- Special thanks to Greg Burtchard (MORA Park archaeologist).
- All of the CWU students, faculty, and volunteers who have contributed to the 45PI408 project.

