Spatial Patterning and Prehistoric Settlement Patterns

Cumberland County, North Carolina

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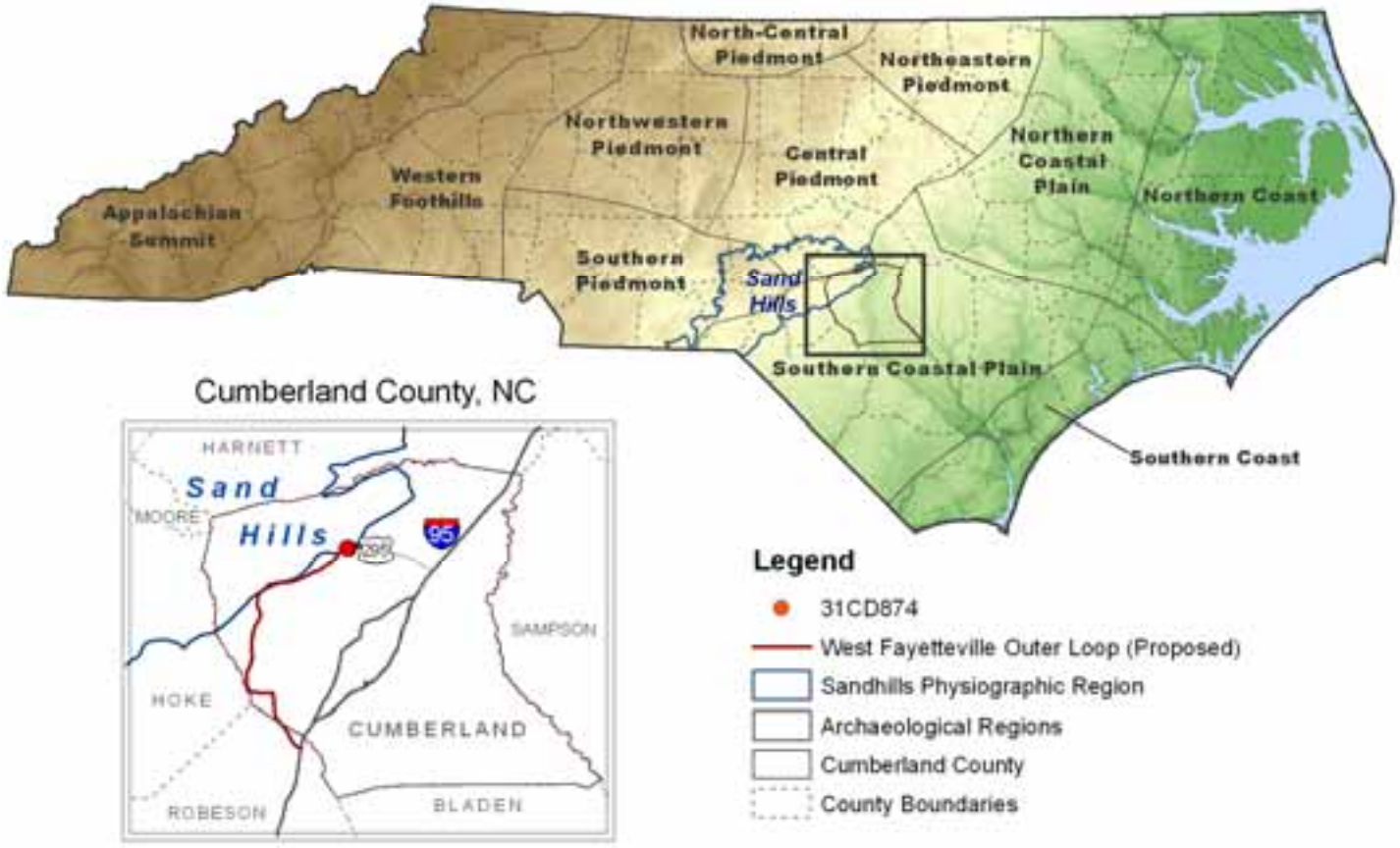
Project Overview

- National Historic Preservation Act of 1966
- North Carolina Department of Transportation (NCDOT)
- Fayetteville Outer Loop (FoL)
- Artifact patterns and densities used to:
  - Model settlement history
  - Interpret occupational patterns
  - Determine land use
  - Preserve archaeological record

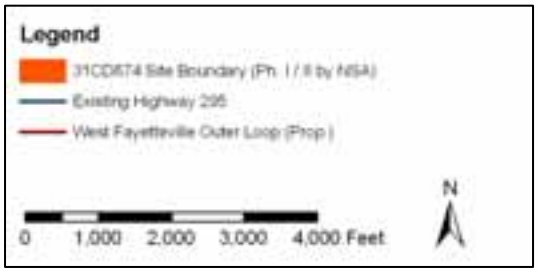
Cumberland County, NC

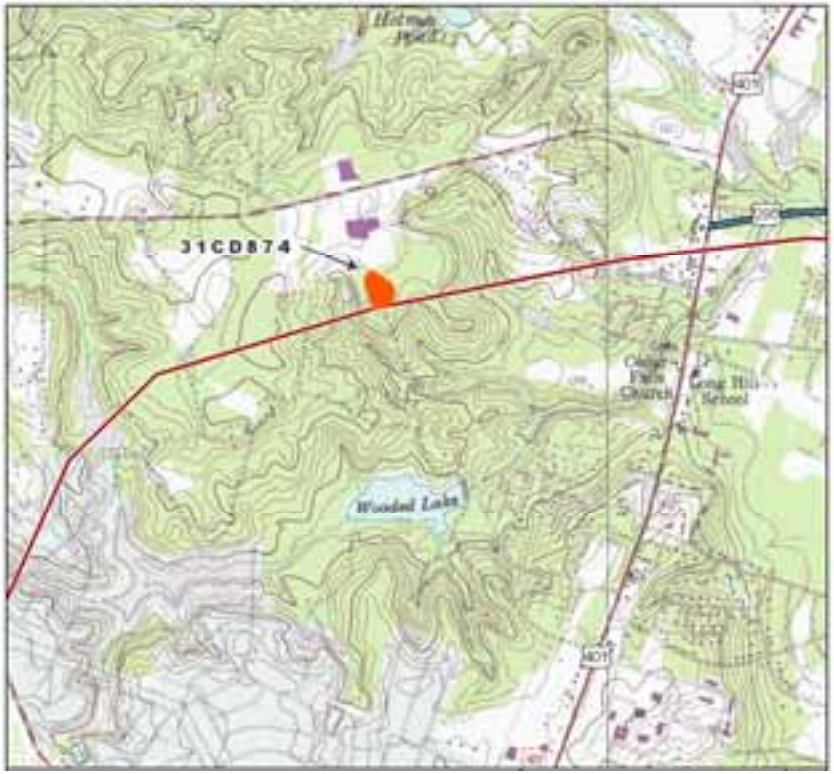
- Edge of Sandhills Eco-region



31 CD 874 Andrews Core Site

- Known archaeological site
- Within proposed highway corridor





Field Methods

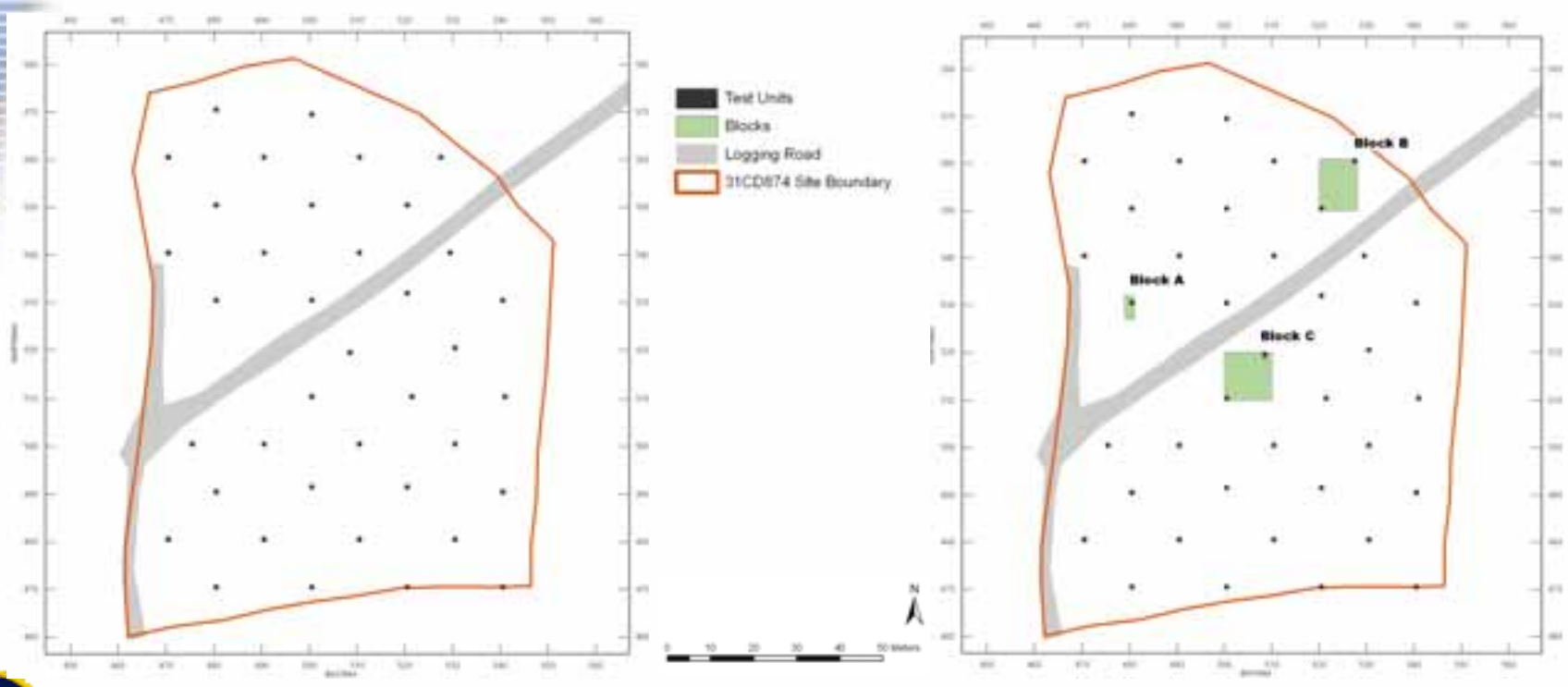
- Arbitrary Horizontal and Vertical datum established
- Trimble GeoXH used to record datum location

Field Methods

- Total station used to:
  - Establish grid north
  - Pinpoint specific locations on the grid
  - Survey the site
- Nikon DTM 352 Total Station

Field Methods

- Test units on the grid are chosen and excavated
- Test units with high artifact concentrations are expanded into larger excavation blocks



Field Methods

- Test units are 1 meter by 1 meter in size

Field Methods

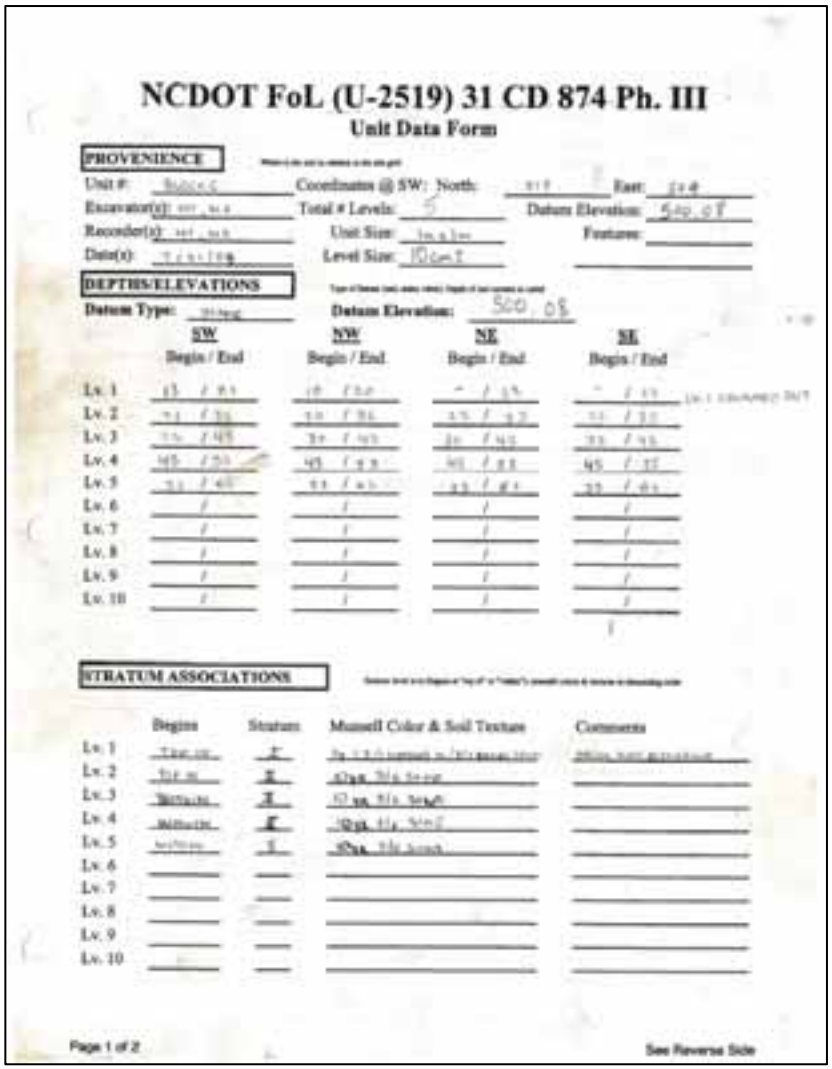
- Blocks are based on 1 m by 1 m grids
- Blocks are excavated in 10 cm vertical levels

Field Methods

- In most cases, it is safe to assume that older artifacts come from deeper levels

Field Methods

- Artifacts are recovered and placed into bags
- Bags are marked with:
  - Unique FS numbers
  - Northings and eastings of grid location
  - Depth below the vertical datum
- About 8,600 total artifacts recovered



NCDOT FoL (U-2519) 31 CD 874 Ph. III

Unit Data Form

PROVENIENCE

DEPTHS/ELEVATIONS

STRATUM ASSOCIATIONS

Page 1 of 2

See Reverse Side

What is an Artifact?

- Ceramics (pottery)
  - Bowls for cooking/eating
  - Jars for cooking/storage

What is an artifact?

- Lithics (stone)
  - Spear points, arrowheads, knives, etc.
  - Flakes (waste/debris)
  - Grinding stones for woodworking and food
- Other stones such as fire cracked rock (FCR) from camp fires/hearths

Artifact Catalog

- Each artifact is examined by archaeologists and recorded in the artifact catalog
- Two tables in the catalog:
  - Inventory table records characteristics for each artifact
    - Prehistoric, historic, natural
    - Artifact group, class, typology, material, shape, age, etc.
  - Provenience table records horizontal and vertical data for each excavation unit and level
    - Number of levels for each unit
    - Depth of levels
    - Soil characteristics
  - Two tables are linked by unique FS numbers from artifact bags

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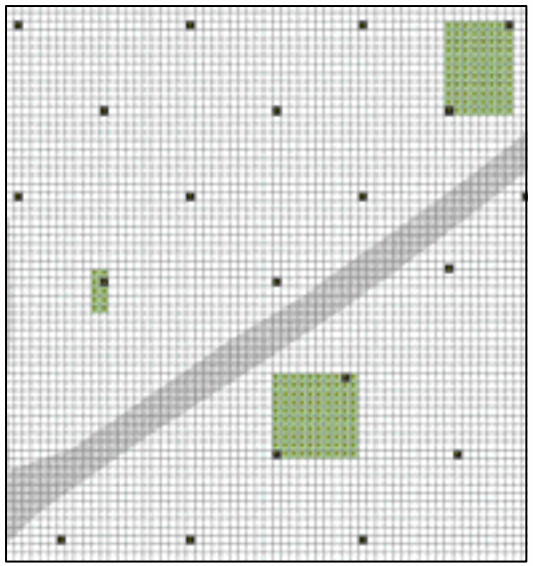
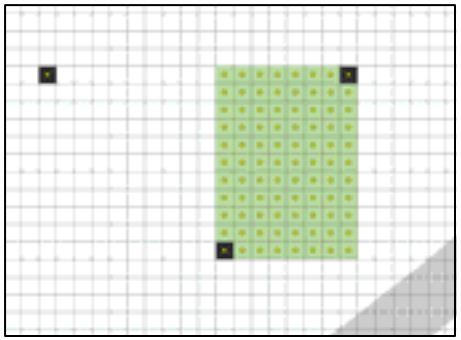
GIS Methods

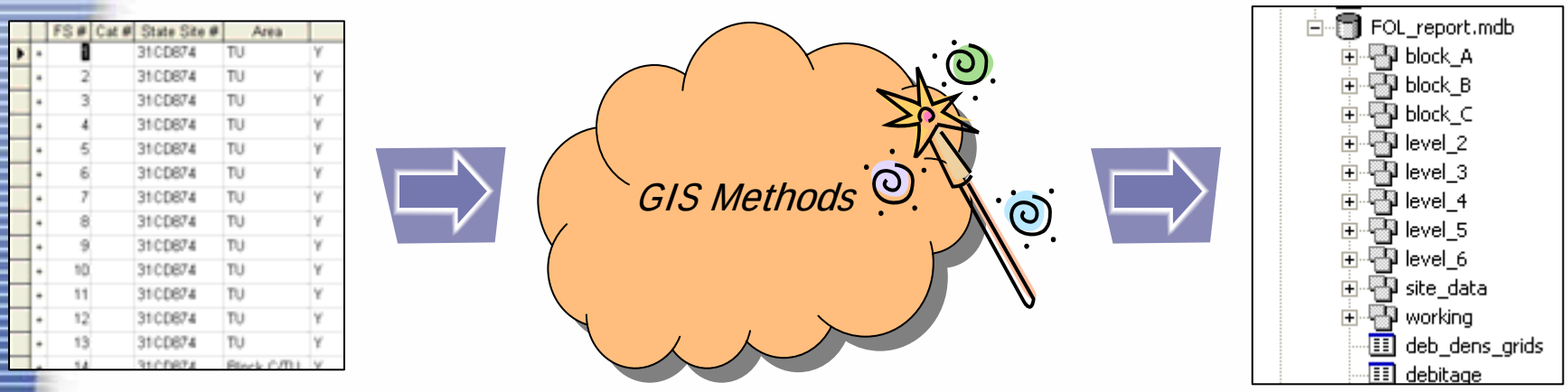
- Fishnet of grids representing each 1 meter by 1 meter square that could be excavated on the site
- Each grid was labeled with its X and Y coordinates
- Grids that were excavated are queried out
- Centroids are calculated for each square





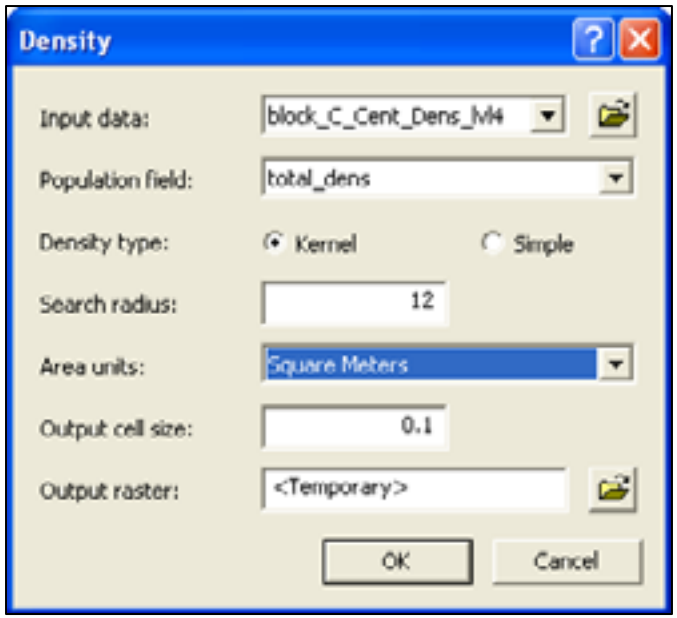
GIS Methods

- A series of joins and other table functions are performed on the artifact catalog
- Centroids are populated with artifact densities



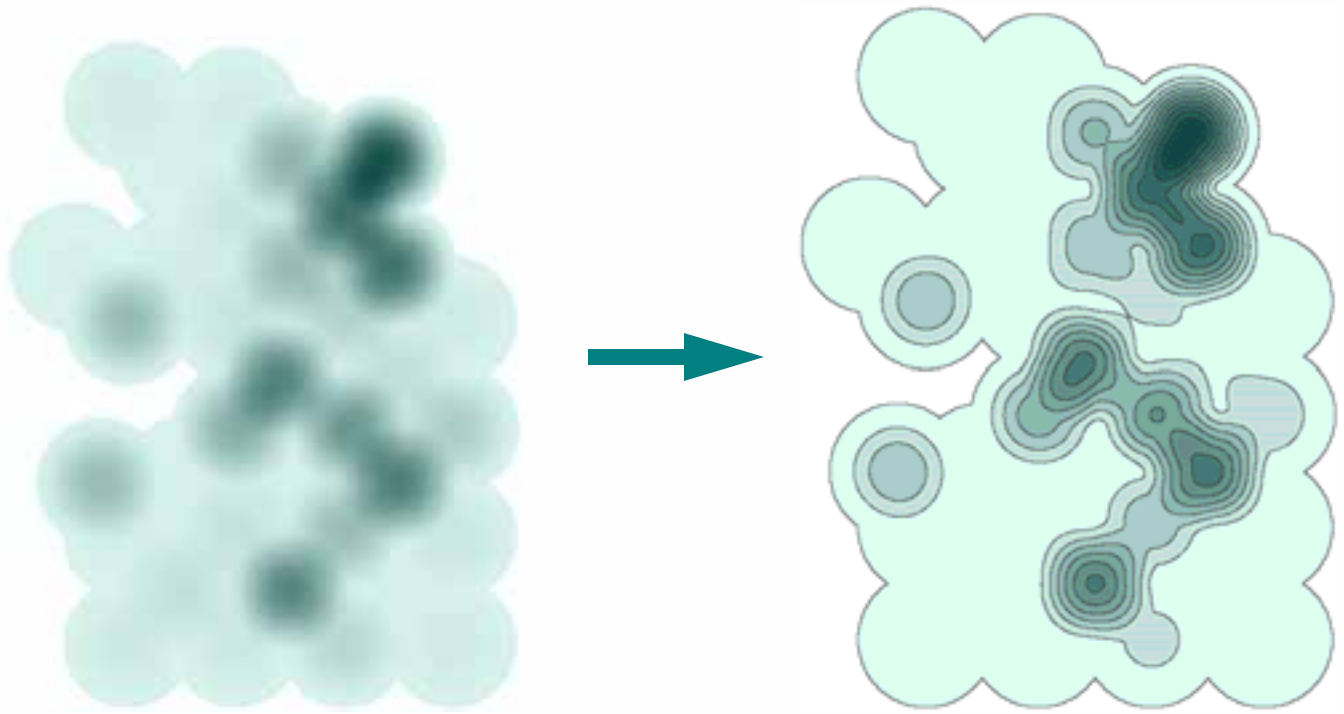
GIS Methods

- Density function of Spatial Analyst
- Experimented with a range of neighborhood sizes



GIS Methods

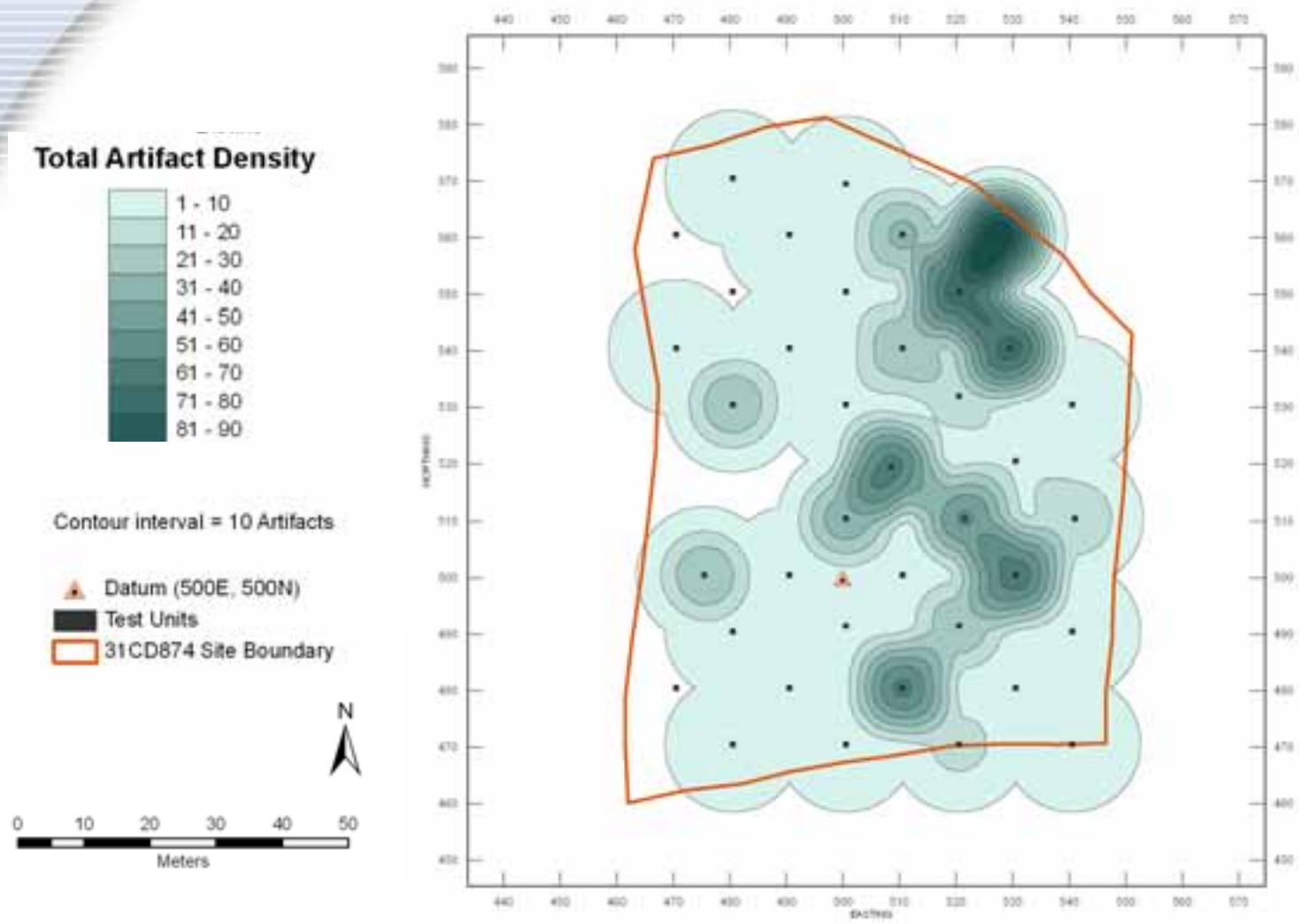
- Raster grid representing artifact densities
- Converted to polygon layers for visualization



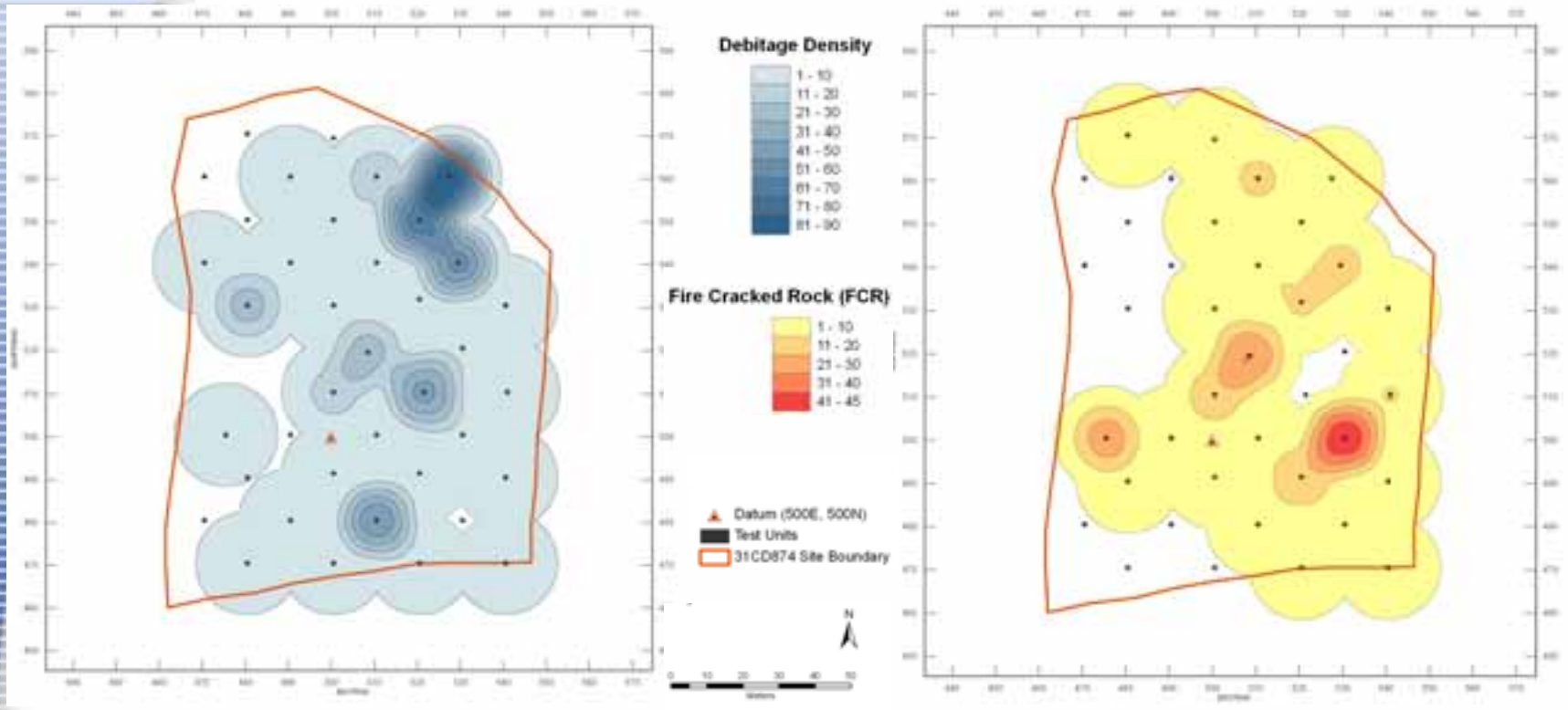
GIS Methods

- Two types of artifact densities were generated:
  - Site-wide density based on test units
  - Excavation block densities
- Individual artifact densities can be modeled using any of the characteristics recorded in the artifact catalog:
  - Lithic/ceramic density
  - Fire cracked rock
  - Type of soil or arbitrary vertical level where artifacts were recovered

Site-Wide Artifact Densities: Total Artifact

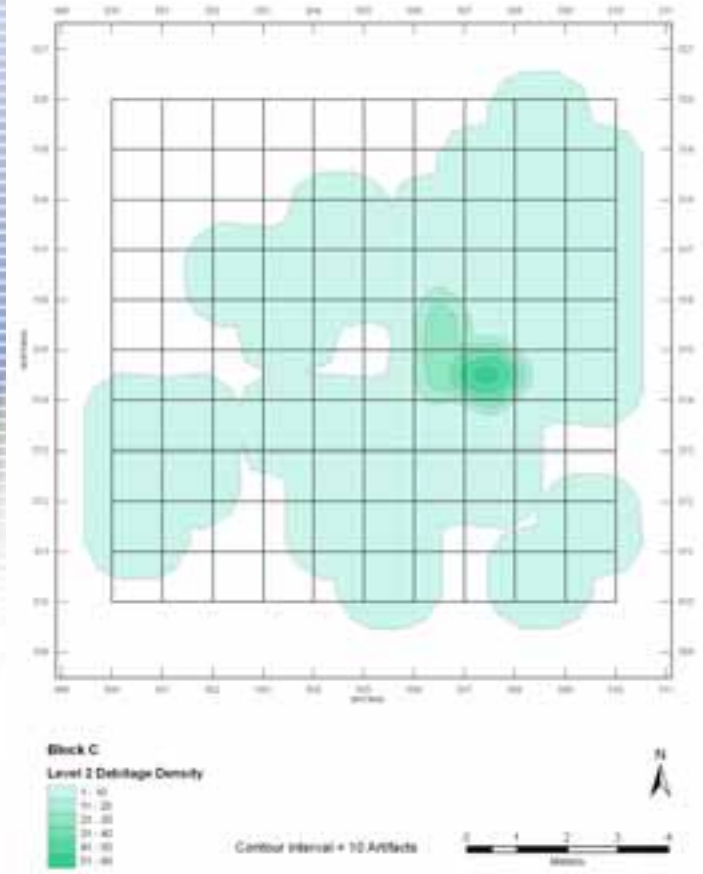


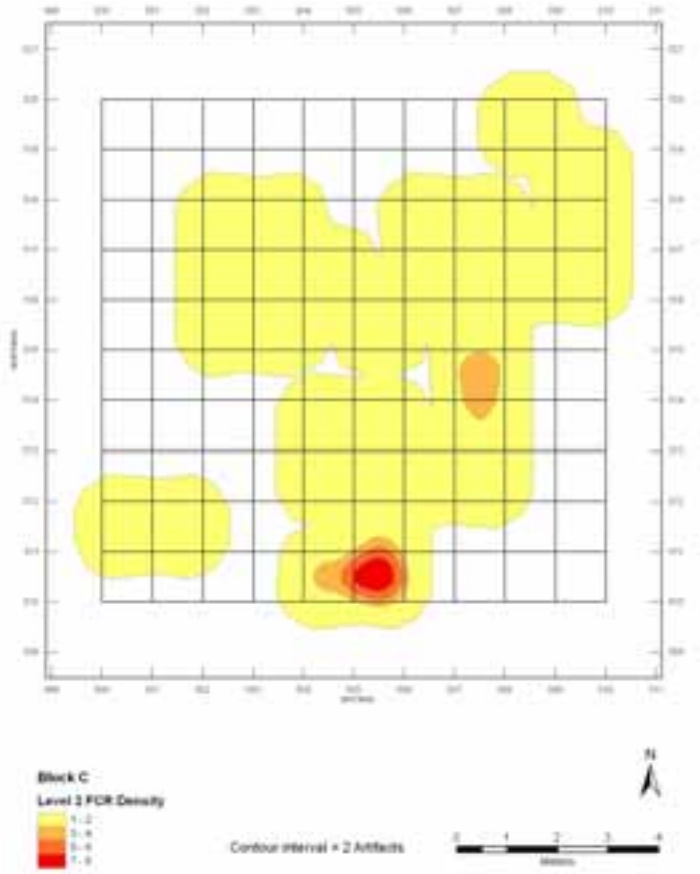
Site-Wide Artifact Densities: Debitage and Fire Cracked Rock



Excavation Block C: Level 2 (10-20 cm Depth)

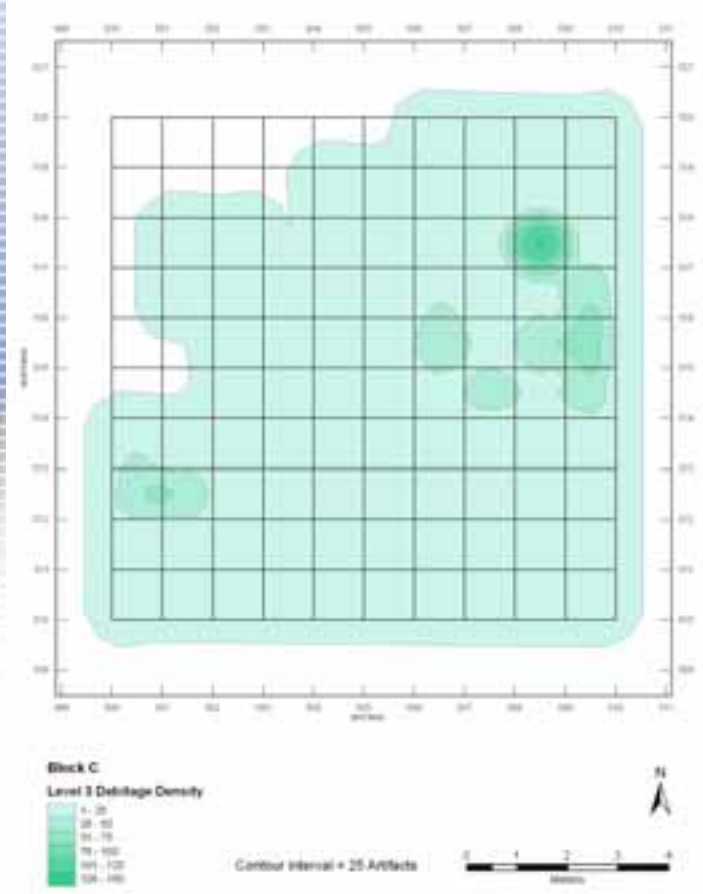
- Debitage vs. Fire Cracked Rock

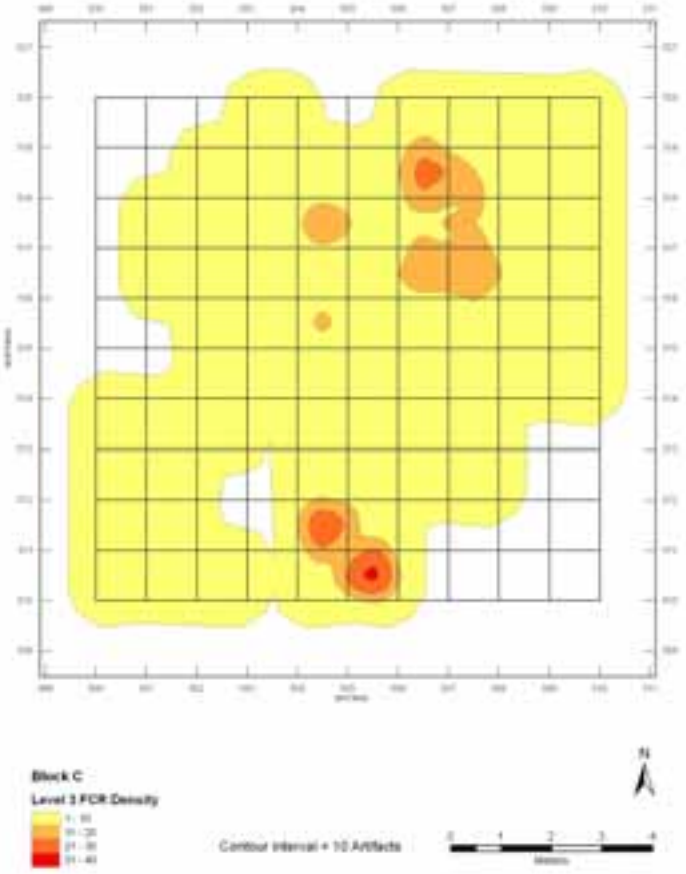




Excavation Block C: Level 3 (20-30 cm Depth)

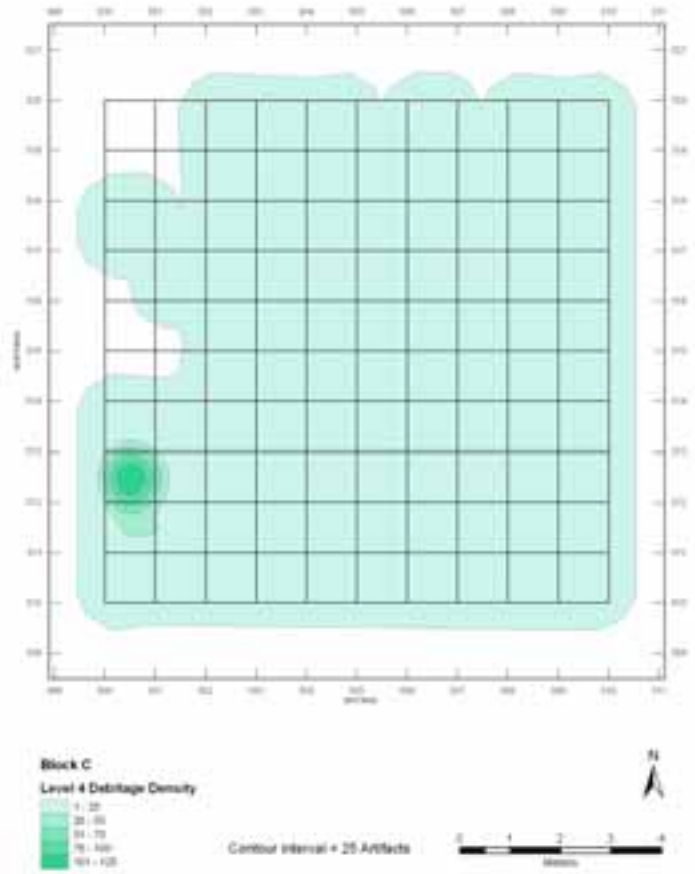
- Debitage vs. Fire Cracked Rock

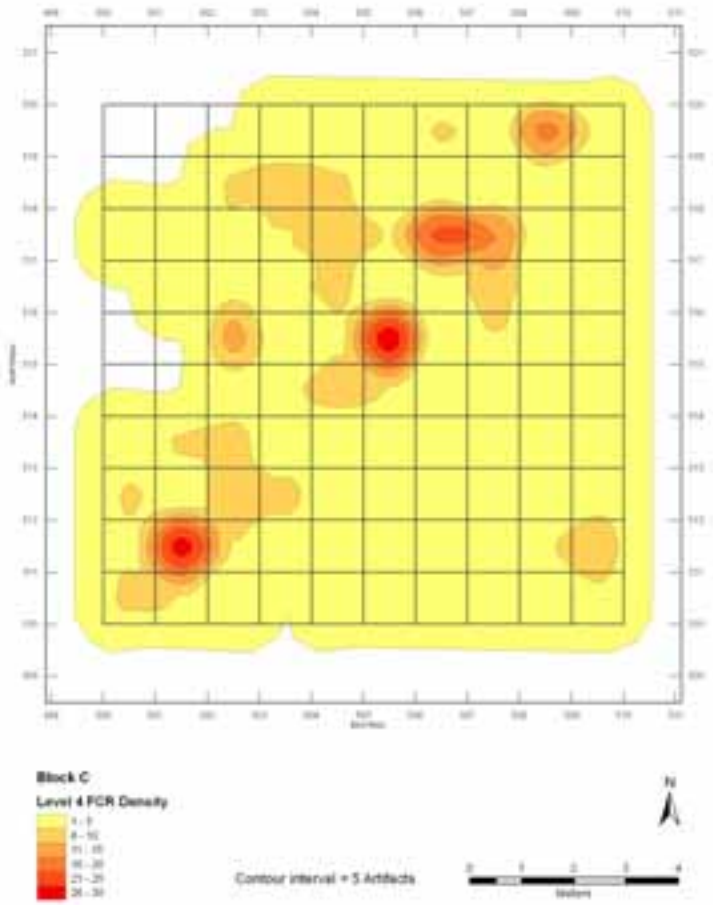




Excavation Block C: Level 4 (30-40 cm Depth)

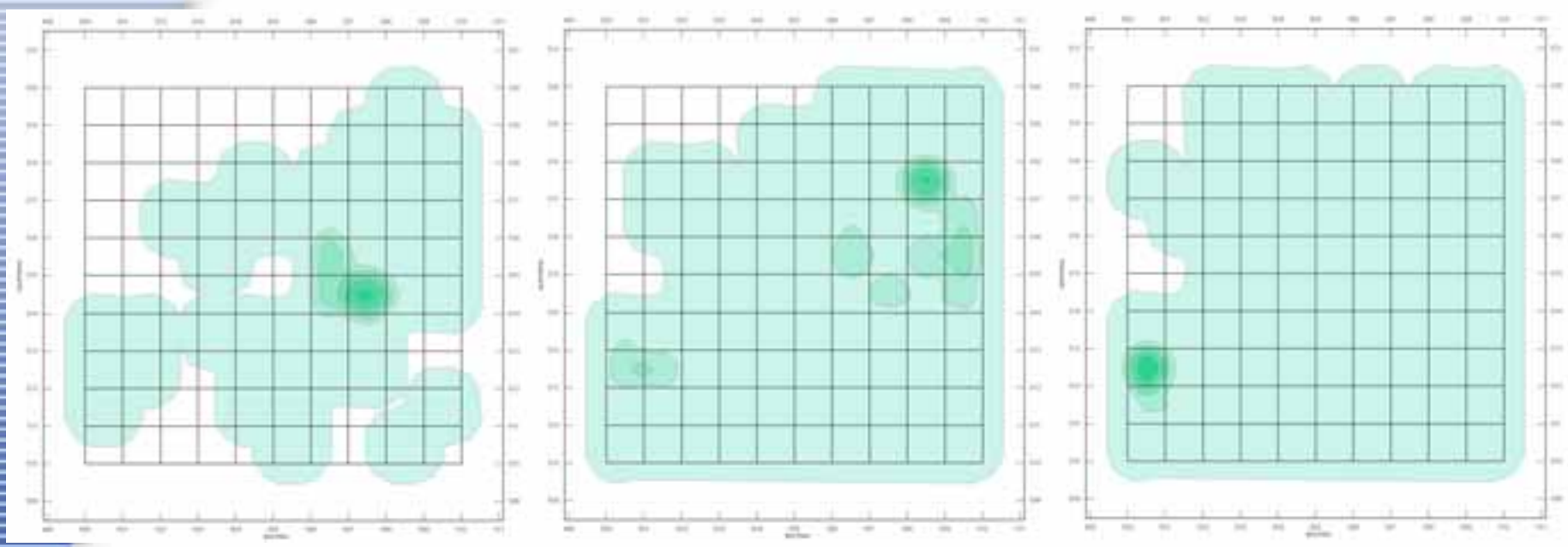
- Debitage vs. Fire Cracked Rock





Excavation Block C: Debitage Through Time

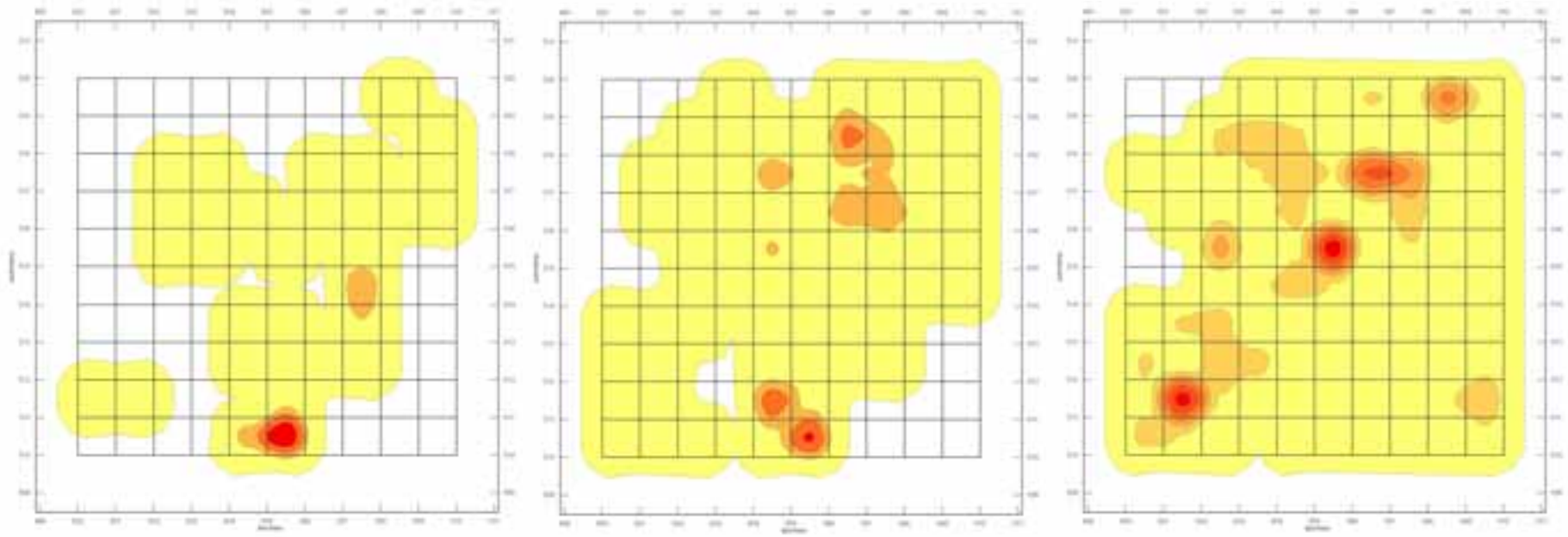
- Level 2
- Level 3
- Level 4



Newer → Older

Excavation Block C: Fire Cracked Rock Through Time

- Level 2
- Level 3
- Level 4



Newer → Older

Well, So What?

- Aids in the interpretation of tabular data
- Provides succinct visualization of otherwise complex tabular data
- Adds to body of knowledge of Native American Land Use Patterns
- Provides a permanent, written record of North Carolina Prehistory

Challenges

- Generating grid polygons in a relative coordinate system
- Relating relative coordinate system to real world coordinate system
- Search radius size for density calculations
- Zero vs. NULL
  - Zero indicates no artifacts found
  - NULL indicates area was not excavated
- Creating contours from raster data

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Questions?

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