



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



Cumberland County, NC



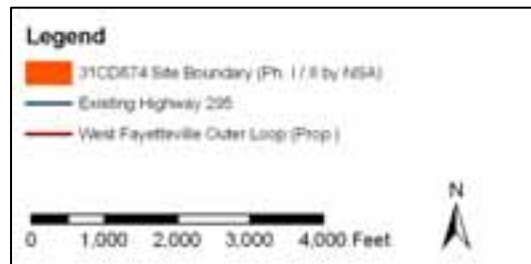
Legend

- 31CD874
- West Fayetteville Outer Loop (Proposed)
- ▭ Sandhills Physiographic Region
- ▭ Archaeological Regions
- ▭ Cumberland County
- ⋯ County Boundaries



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



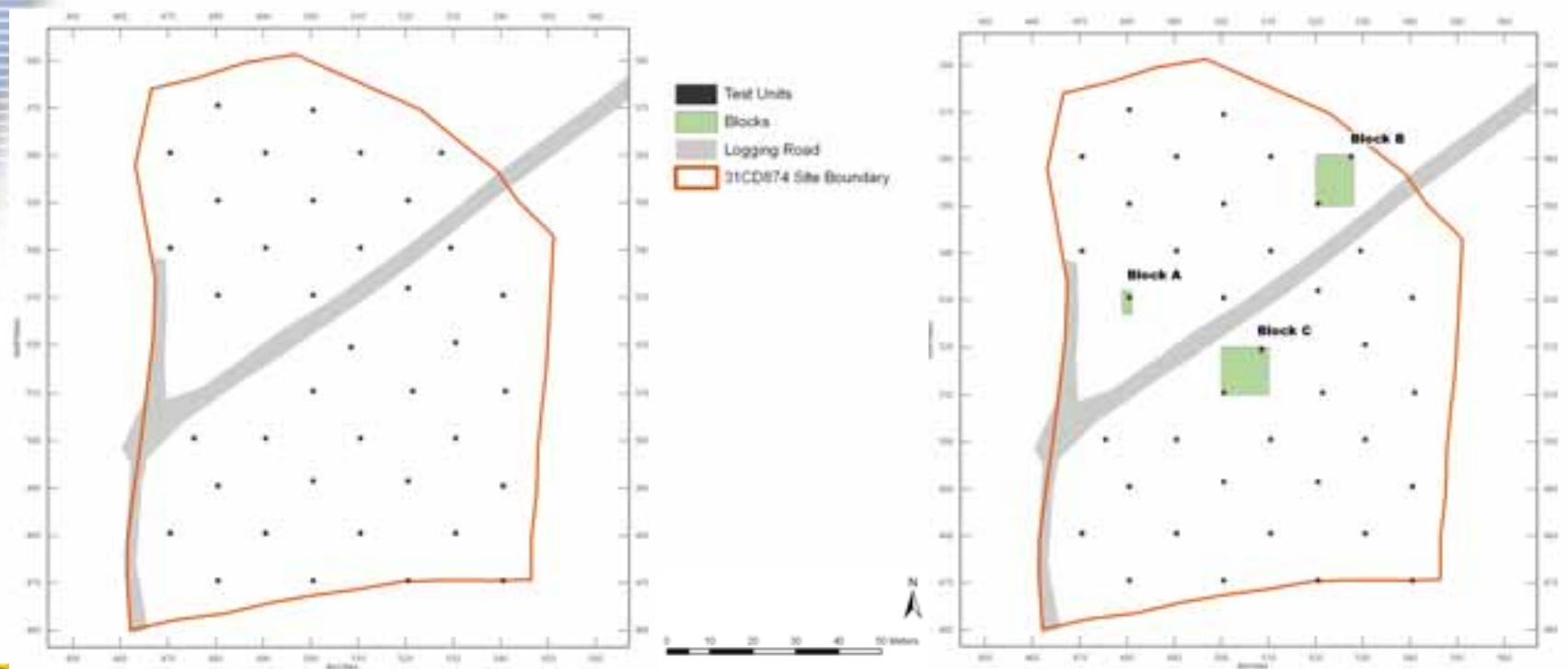
Field Methods

- 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

Unit #: 31000000 Coordinates @ SW: North: 818 East: 824
 Excavator(s): 001 000 Total # Levels: 5 Datum Elevation: 500.05
 Recorder(s): 001 000 Unit Size: 10 x 10 Feature: _____
 Date(s): 7/21/08 Level Size: 10 cm x 10 cm

DEPTH/ELEVATIONS

Datum Type: 01 (Spot) Datum Elevation: 500.05

	SW	NW	NE	SE
	Begin / End	Begin / End	Begin / End	Begin / End
Lv. 1	13 / 23	10 / 20	17 / 27	14 / 24
Lv. 2	14 / 24	11 / 21	18 / 28	15 / 25
Lv. 3	15 / 25	12 / 22	19 / 29	16 / 26
Lv. 4	16 / 26	13 / 23	20 / 30	17 / 27
Lv. 5	17 / 27	14 / 24	21 / 31	18 / 28
Lv. 6	18 / 28	15 / 25	22 / 32	19 / 29
Lv. 7	19 / 29	16 / 26	23 / 33	20 / 30
Lv. 8	20 / 30	17 / 27	24 / 34	21 / 31
Lv. 9	21 / 31	18 / 28	25 / 35	22 / 32
Lv. 10	22 / 32	19 / 29	26 / 36	23 / 33

STRATUM ASSOCIATIONS

	Begin	Status	Munsell Color & Soil Texture	Comments
Lv. 1	13-23	✓	10YR 5/1 brown ss, silty, sandy clay	shale, sand, gravel
Lv. 2	14-24	✓	10YR 5/1 brown ss, silty, sandy clay	
Lv. 3	15-25	✓	10YR 5/1 brown ss, silty, sandy clay	
Lv. 4	16-26	✓	10YR 5/1 brown ss, silty, sandy clay	
Lv. 5	17-27	✓	10YR 5/1 brown ss, silty, sandy clay	
Lv. 6				
Lv. 7				
Lv. 8				
Lv. 9				
Lv. 10				

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



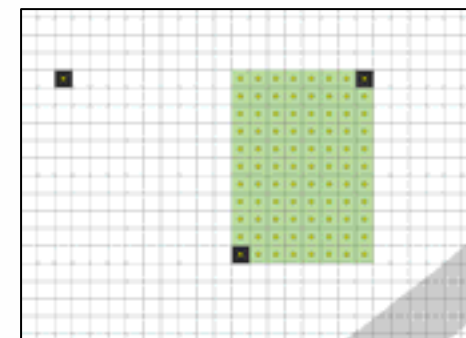
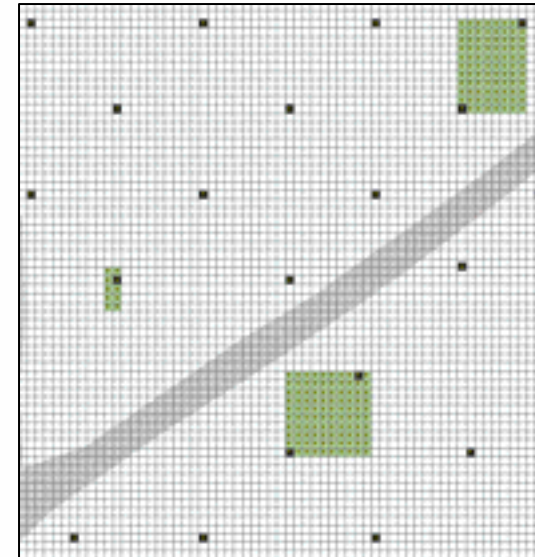
Artifact Catalog

- 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



GIS Methods

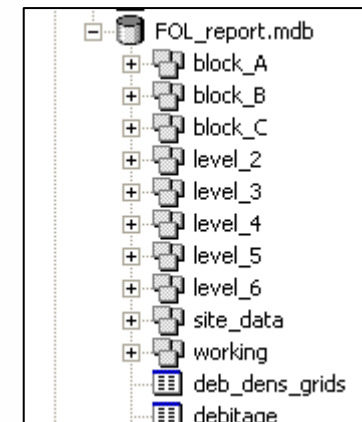
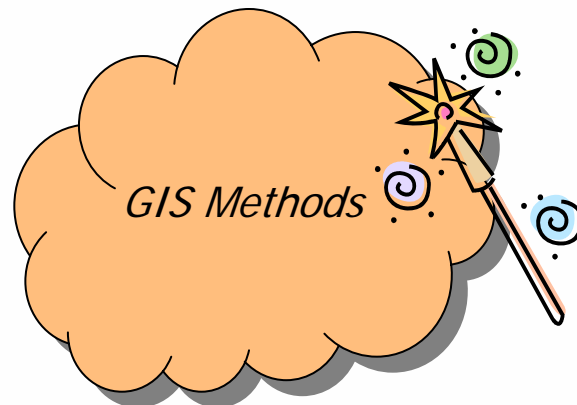
- Fishnet of grids representing each 1 meter by 1 meter square that could be excavated on the site
- Each grid was labeled with its X and Y coordinates
- Grids that were excavated are queried out
- Centroids are calculated for each square



GIS Methods

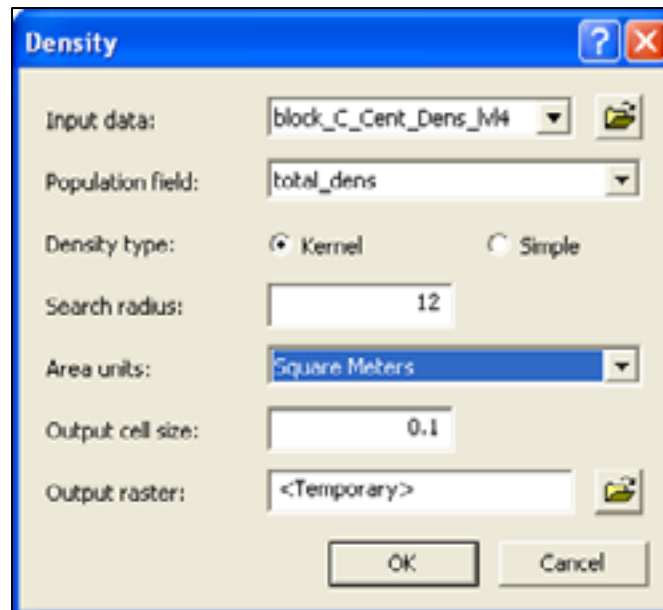
- A series of joins and other table functions are performed on the artifact catalog
- Centroids are populated with artifact densities

	FS #	Cat #	State	Site #	Area	
▶	*	1	31CD874	TU	Y	
	*	2	31CD874	TU	Y	
	*	3	31CD874	TU	Y	
	*	4	31CD874	TU	Y	
	*	5	31CD874	TU	Y	
	*	6	31CD874	TU	Y	
	*	7	31CD874	TU	Y	
	*	8	31CD874	TU	Y	
	*	9	31CD874	TU	Y	
	*	10	31CD874	TU	Y	
	*	11	31CD874	TU	Y	
	*	12	31CD874	TU	Y	
	*	13	31CD874	TU	Y	
	*	14	31CD874	Block CDTU	Y	



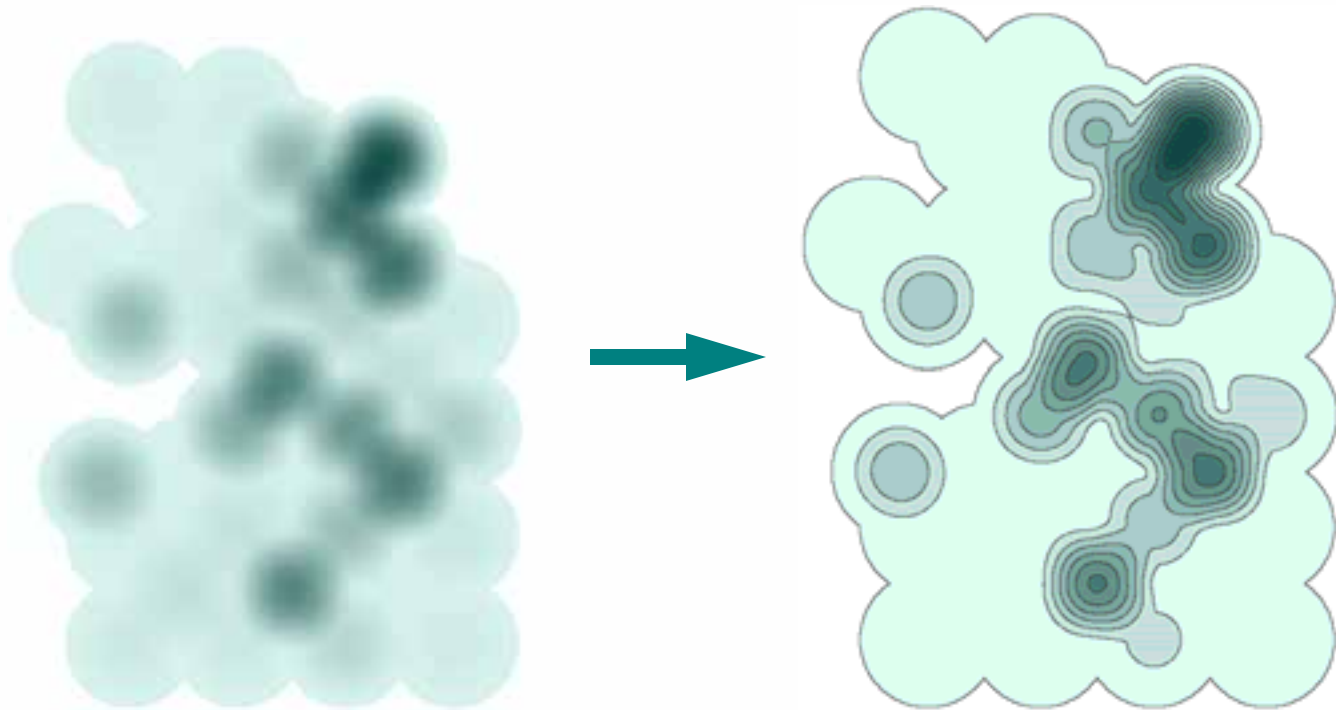
GIS Methods

- 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

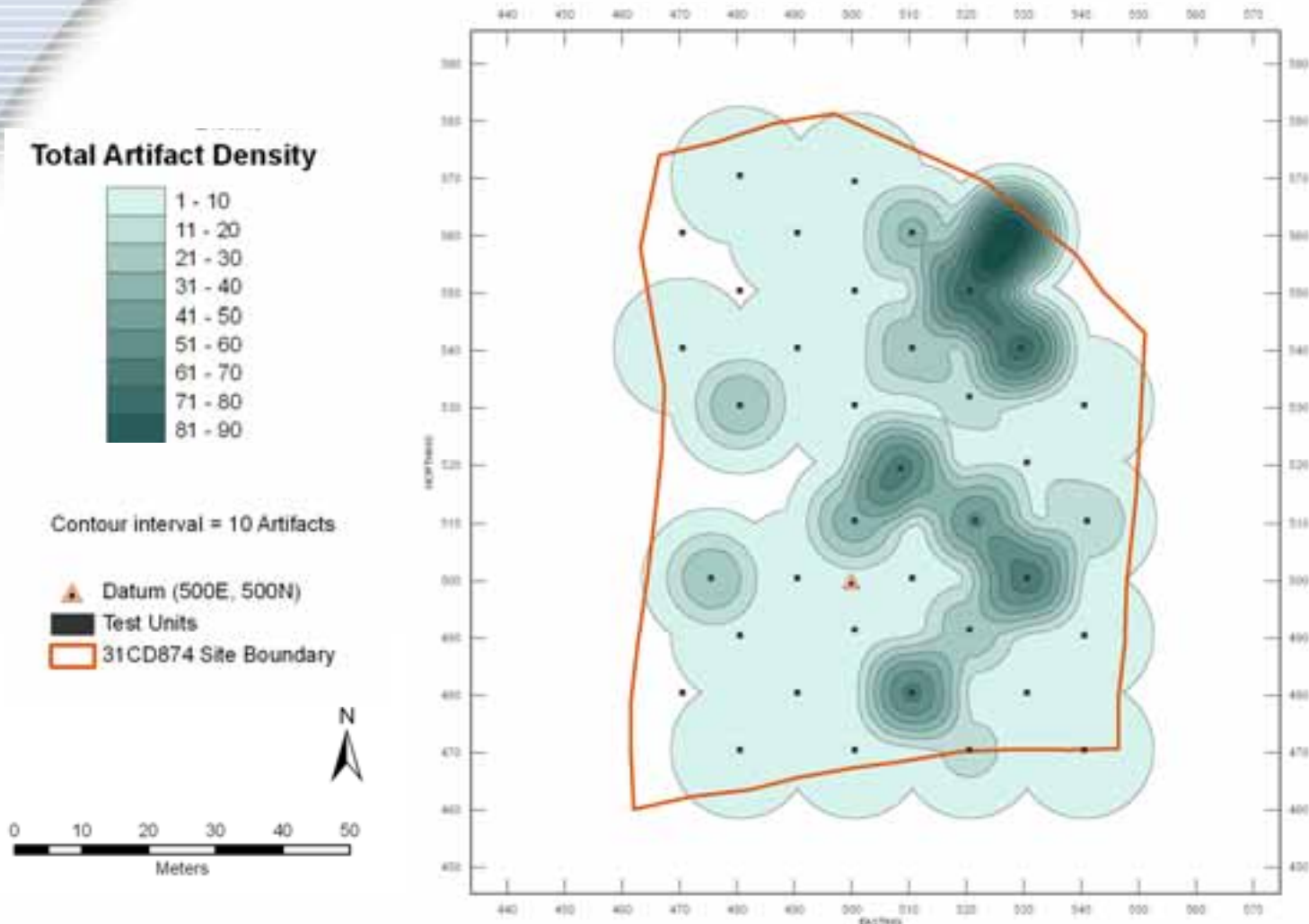


GIS Methods

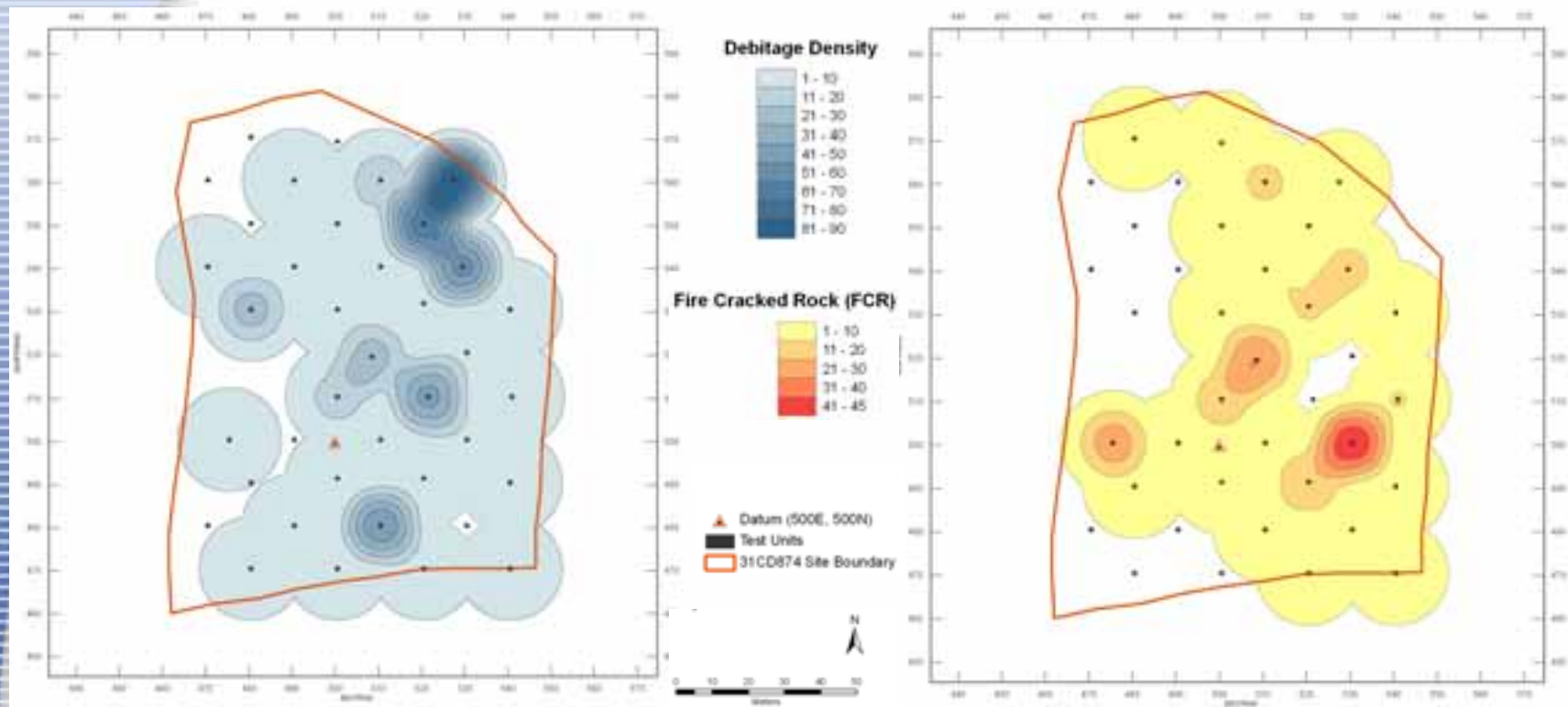
- Two types of artifact densities were generated:
 - Site-wide density based on test units
 - Excavation block densities
- Individual artifact densities can be modeled using any of the characteristics recorded in the artifact catalog:
 - Lithic/ceramic density
 - Fire cracked rock
 - Type of soil or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



Site-Wide Artifact Densities: Total Artifact

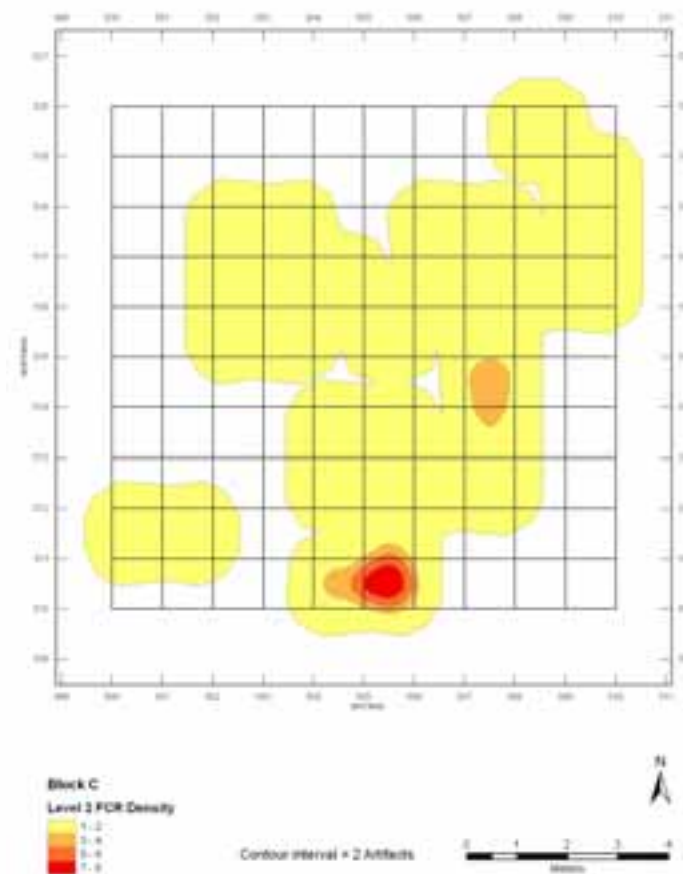
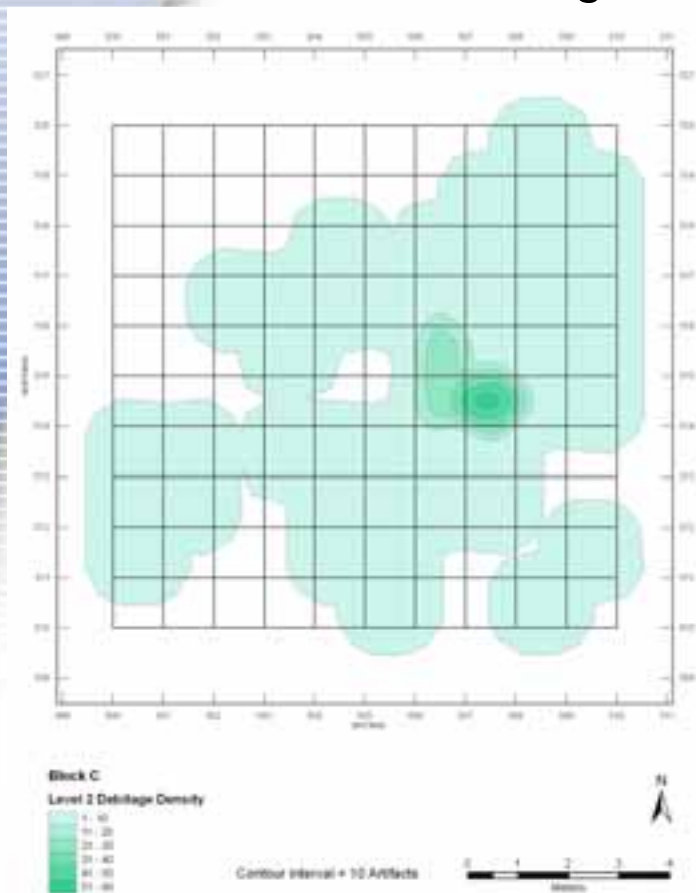


Site-Wide Artifact Densities: Debitage and Fire Cracked Rock



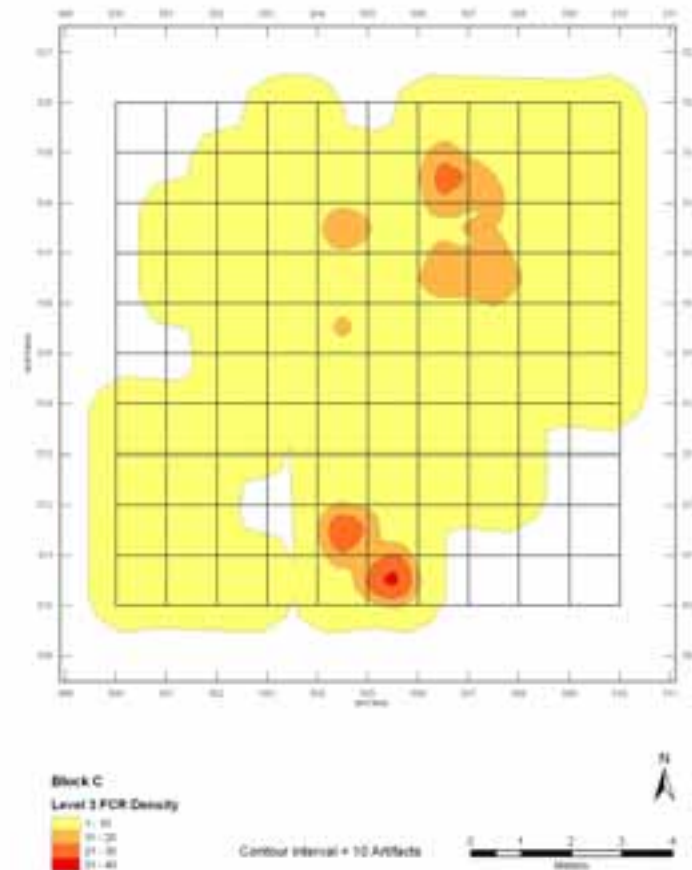
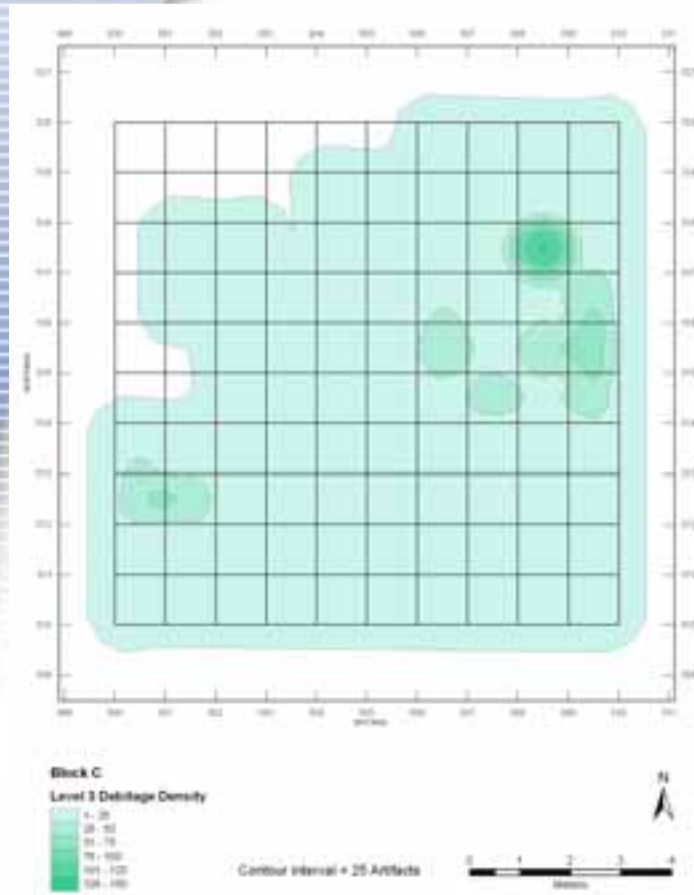
Excavation Block C: Level 2 (10-20 cm Depth)

- Debitage vs. Fire Cracked Rock



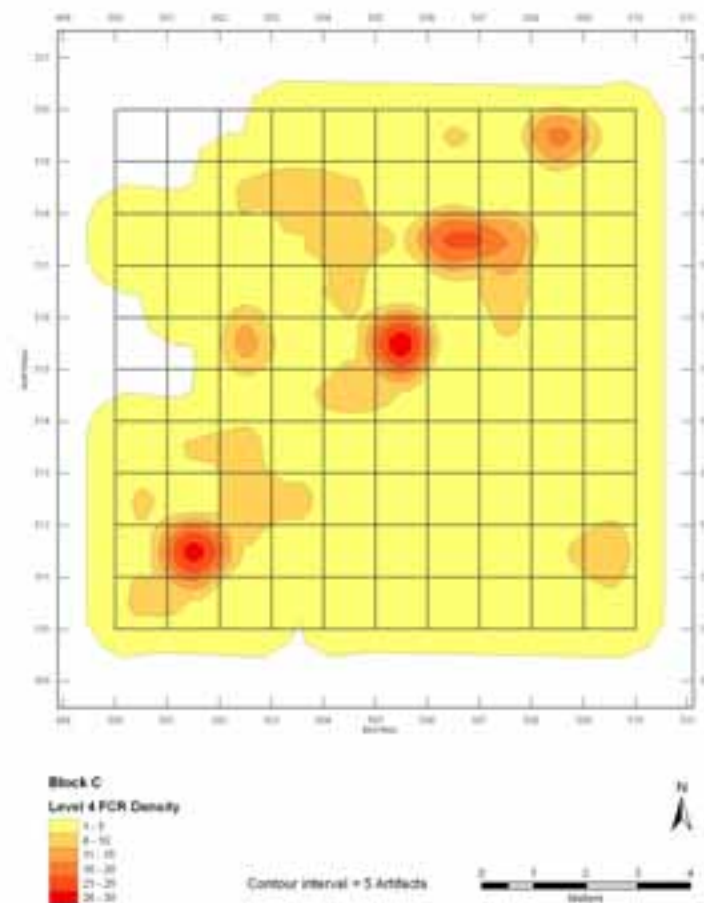
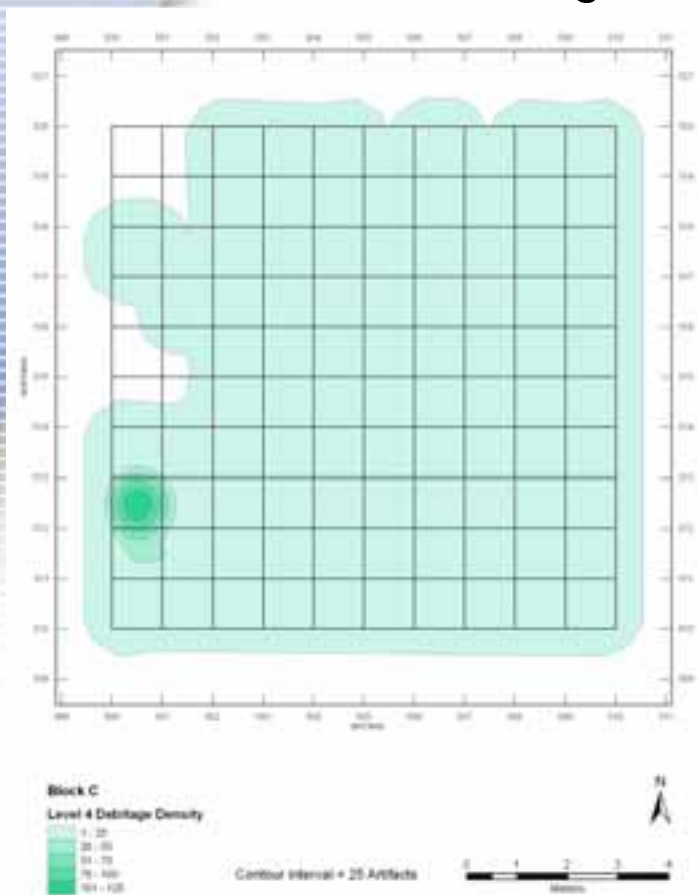
Excavation Block C: Level 3 (20-30 cm Depth)

- Debitage vs. Fire Cracked Rock



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

- Debitage vs. Fire Cracked Rock

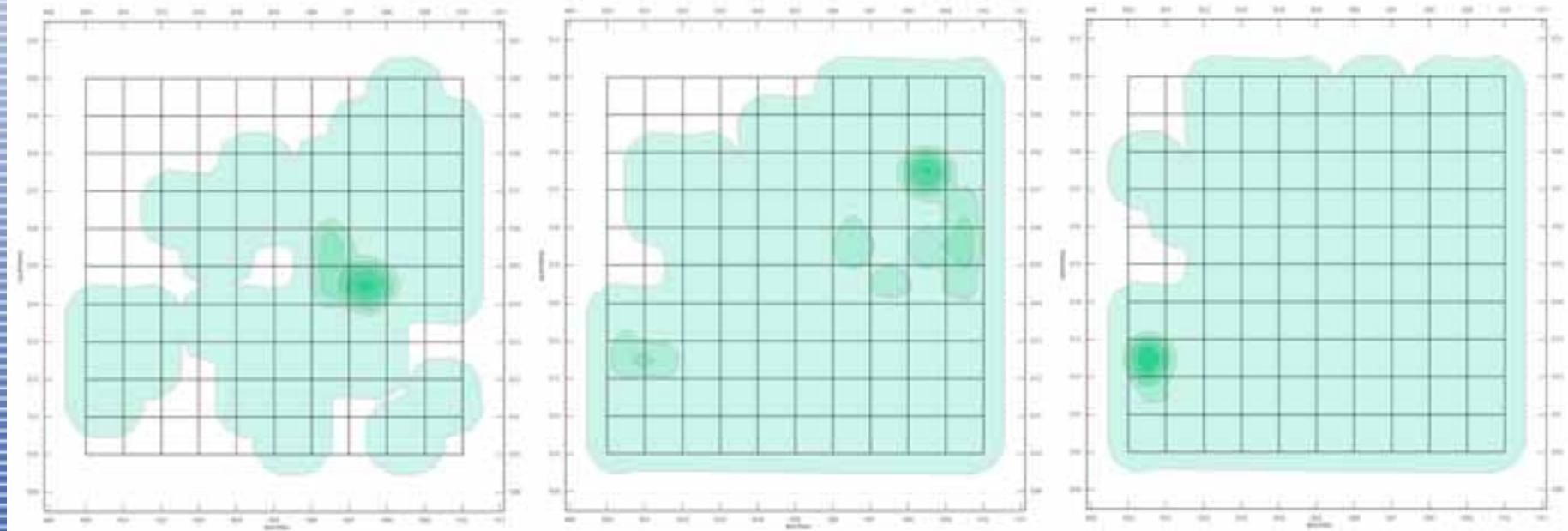


Excavation Block C: Debitage Through Time

- Level 2

- Level 3

- Level 4



Newer



Older

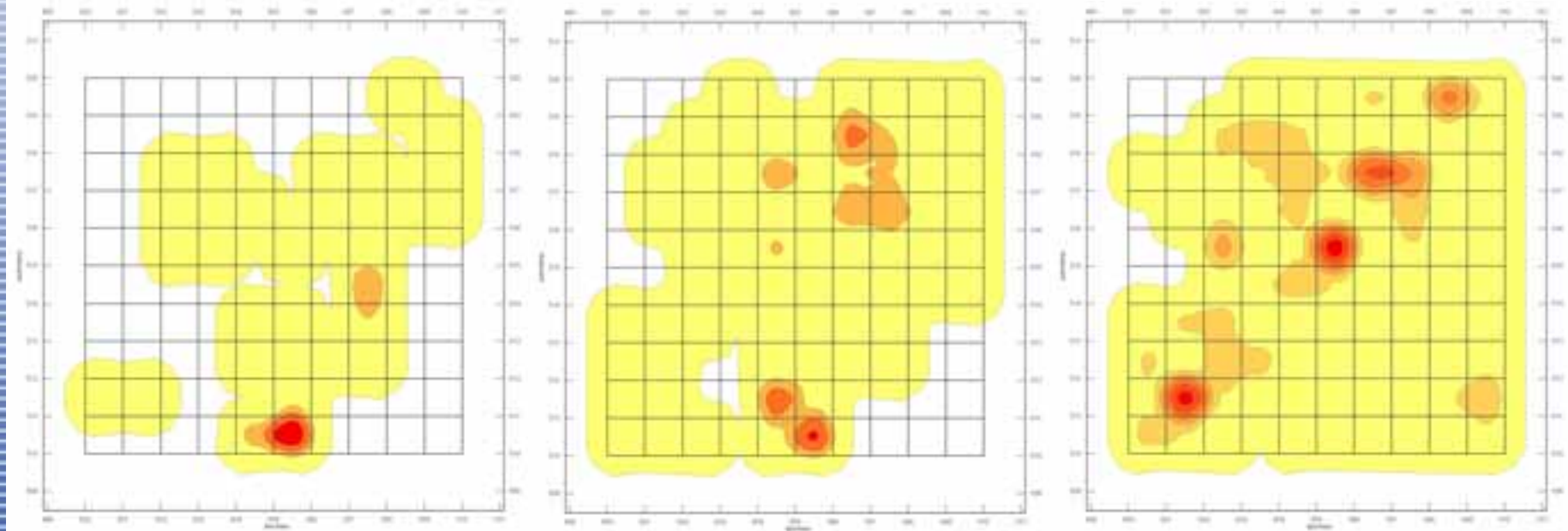


Excavation Block C: Fire Cracked Rock Through Time

- 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



Questions?



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