Archaeological Spatial Structure

- what we see in the archaeological record.

- horizontal spatial patterning in:
  - -Features (e.g. structures,, fences pits, etc): "***site structure***"
  - -Artifacts (e.g. secondary refuse)

- Culture historians : sites are "homogeneous artifact mines"

- Binford and the new archaeologists: within-site spatial variation is cool.

1. **Systemic context processes**

   1.1 Spatial organization of activities and the facilities with which they are associated

   1.2 Spatial organization of discard

2. **Post-abandonment processes**
   - plowing, etc.

Systemic context processes

1.1 Spatial organization of activities and the facilities with which they are associated: a simple model.

The extent to which one activity will be spatial segregated from others is a function of

- benefits of moving ~ scales inversely with interference potential:

  -activities take up lots of space
  -activities are dangerous
  -activities require uninterrupted time

- costs of moving the offending activity ~ scales with distance moved, access frequency

General vs. Special Activity Areas

General Activity Areas

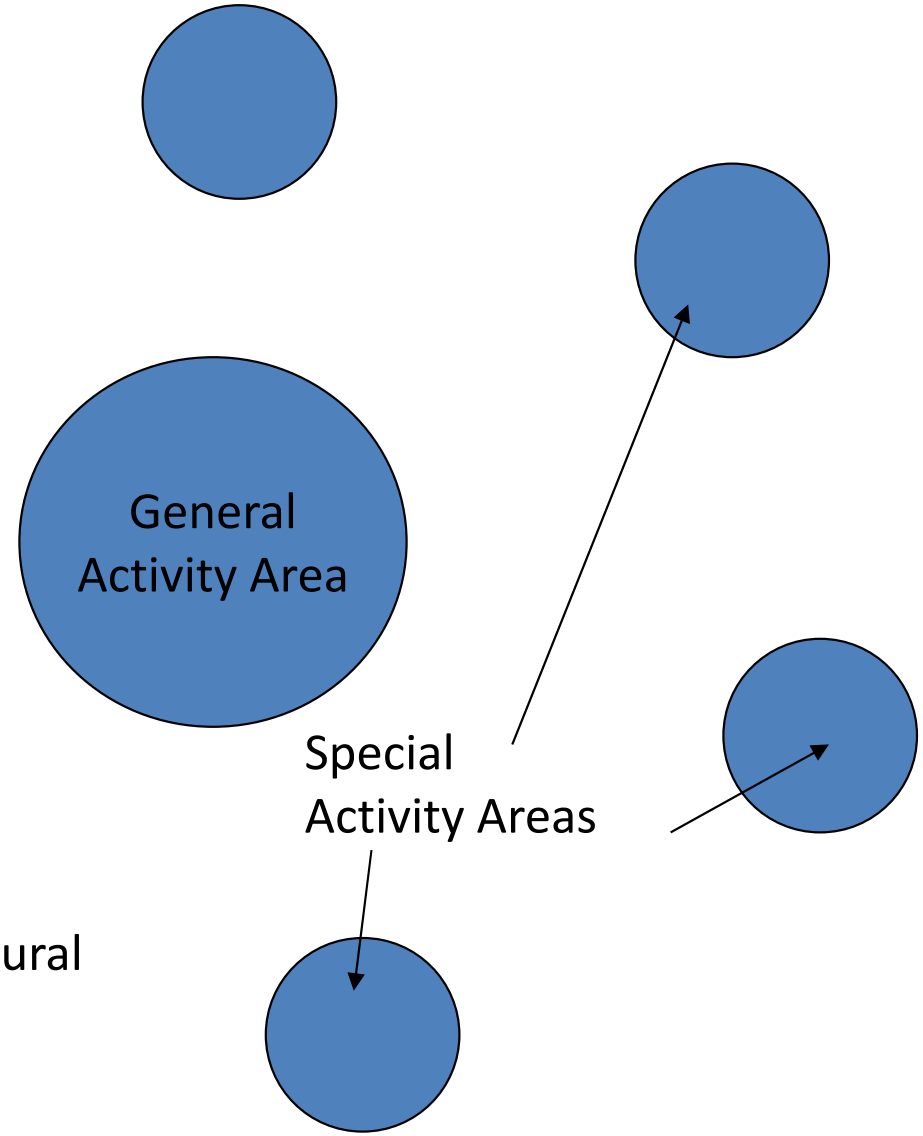
-sleeping, eating, socializing, cooking
-sleeping, cooking often separate within them

-Family (kin based)
-Communal (cross cut kin lines e.g. gender based)

a.k.a, "nuclear" (John Yellen)
"intensive" (Lewis Binford"
"household" (O'Connell)

Special Activity Areas

-ecologically variable
-e.g. kangaroo roasting, car repair
-cooking for large numbers (signals)
-bulk processing and storage of agricultural produce
-lots of refuse, space, time



Implications for Site Structure ….

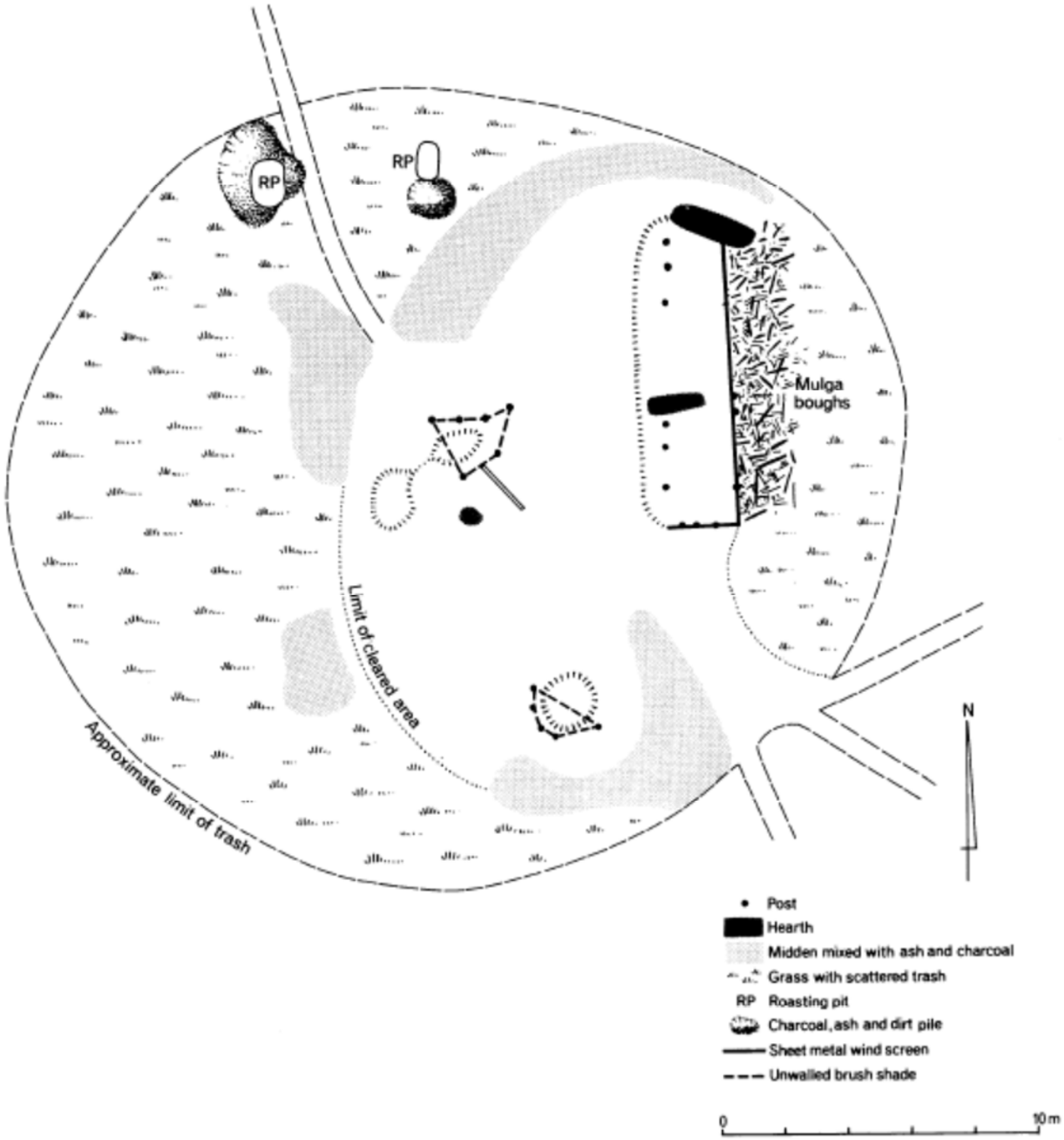
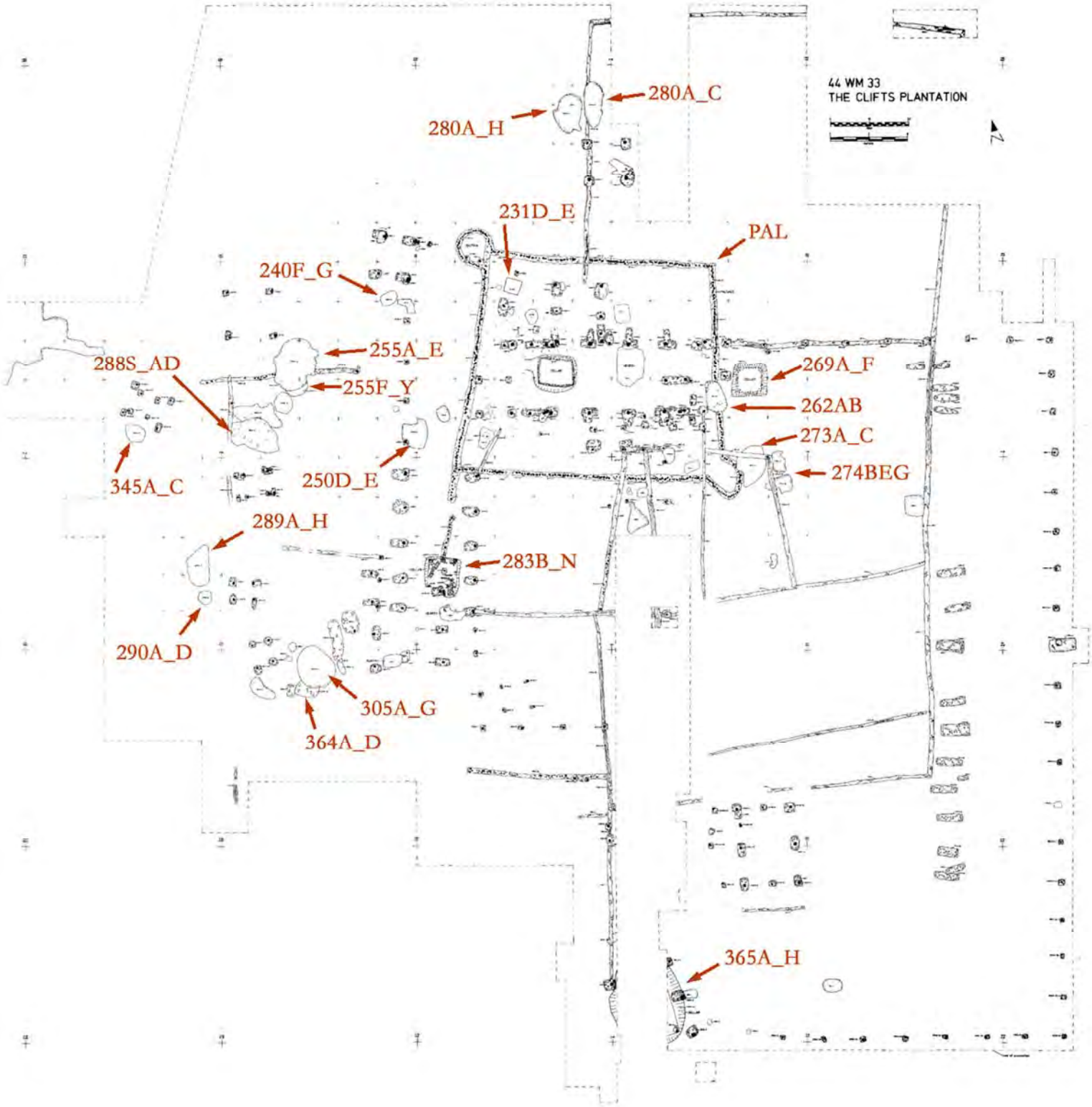
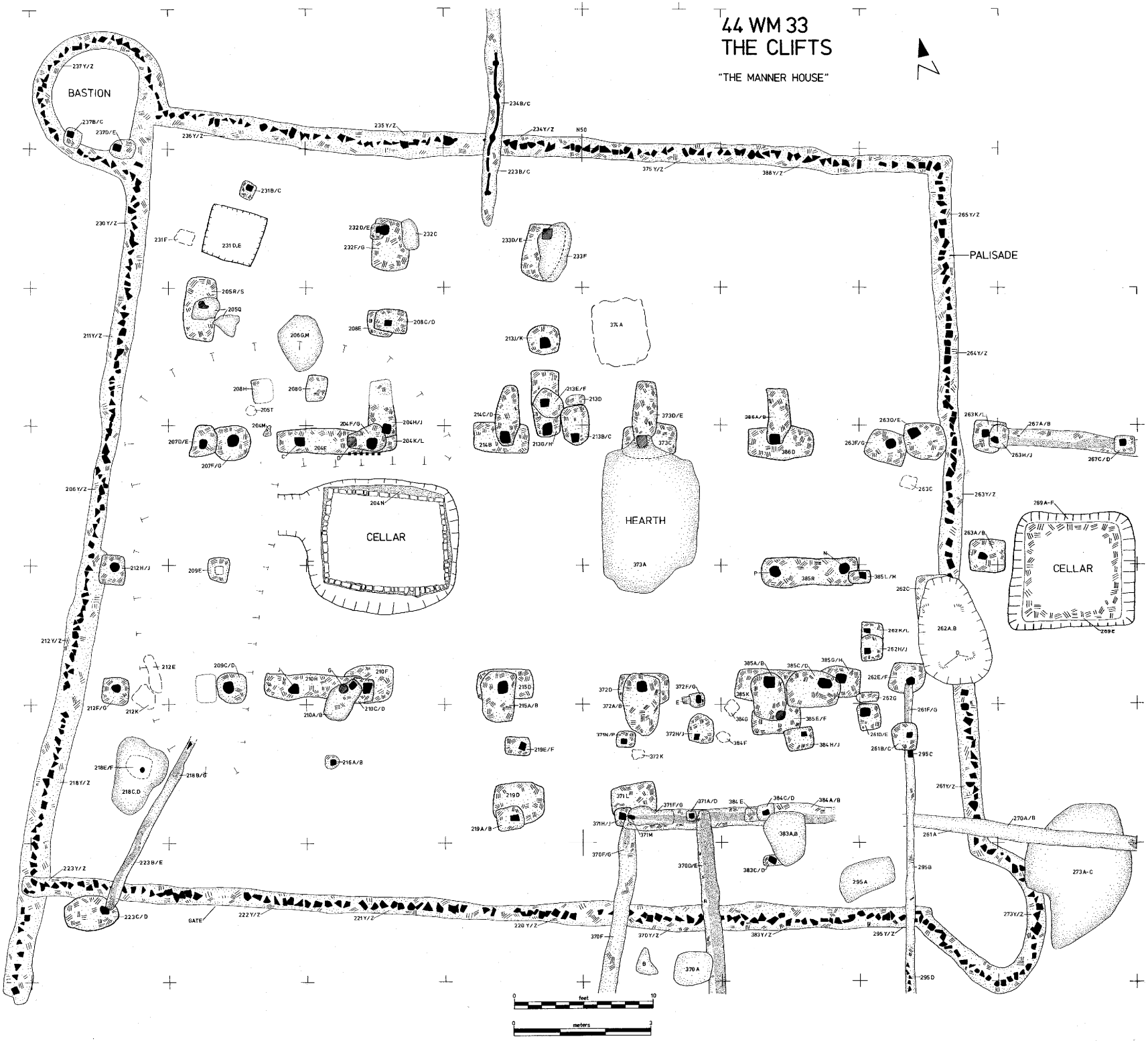
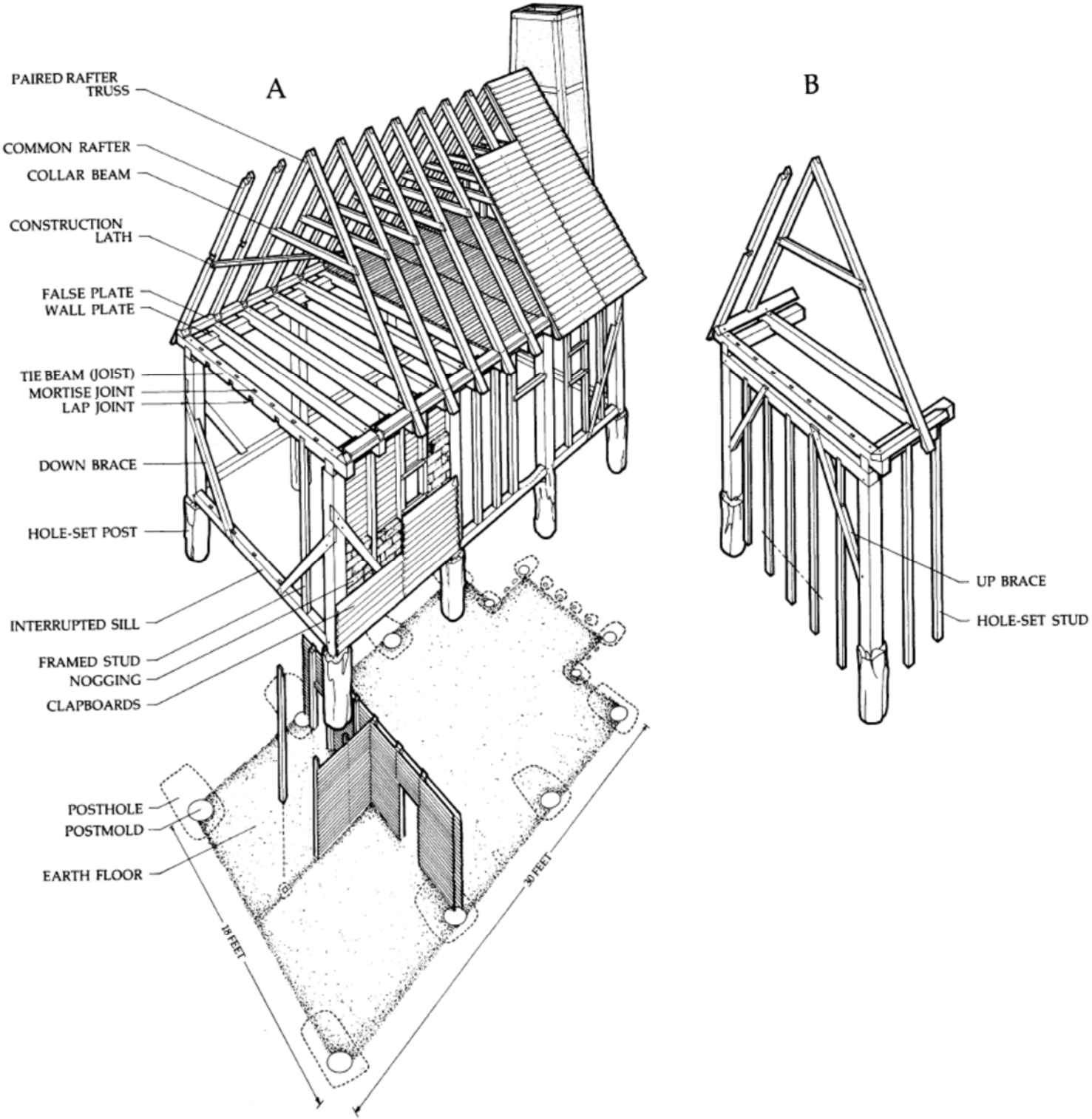
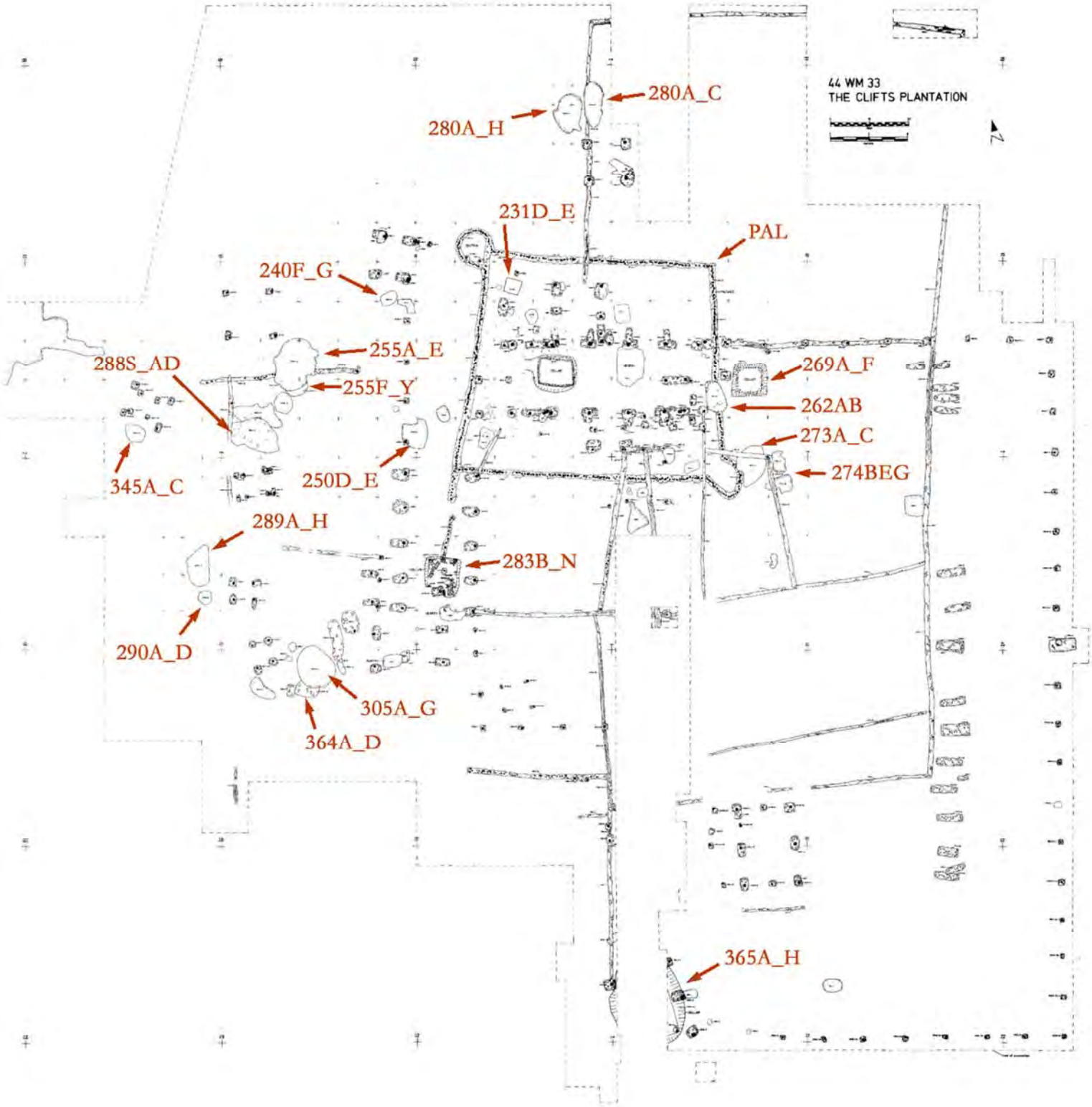


Figure 1. Plan of Alyawara household activity area, adjacent roasting pits, and refuse disposal zone.


44 WM 33
THE CLIFTS PLANTATION
280A_C
280A_H
231D_E
PAL
240F_G
255A_E
288S_AD
255F_Y
269A_F
262AB
273A_C
274BEG
345A_C
250D_E
289A_H
283B_N
290A_D
305A_G
364A_D
365A_H


44 WM 33
THE CLIFTS
"THE MANNER HOUSE"
N
BASTION
PALISADE
CELLAR
HEARTH
CELLAR
GATE
feet
meters


A
B
PAIRED RAFTER TRUSS
COMMON RAFTER
COLLAR BEAM
CONSTRUCTION LATH
FALSE PLATE
WALL PLATE
TIE BEAM (JOIST)
MORTISE JOINT
LAP JOINT
DOWN BRACE
HOLE-SET POST
INTERRUPTED SILL
FRAMED STUD
NOGGING
CLAPBOARDS
POSTHOLE
POSTMOLD
EARTH FLOOR
18 FEET
30 FEET
UP BRACE
HOLE-SET STUD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THE CLIFTS PLANTATION
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255A_E
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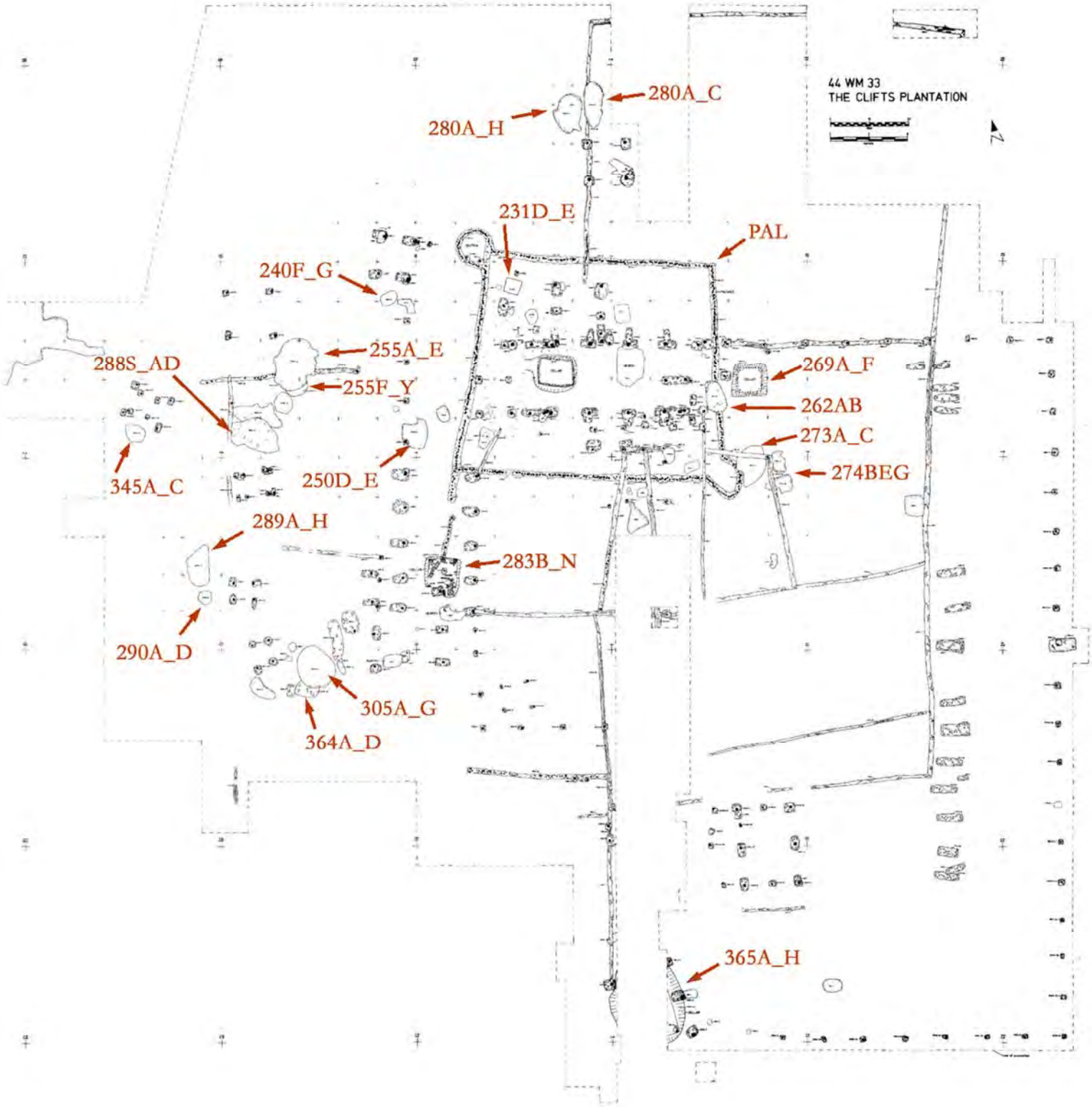
255F_Y
269A_F
262AB
273A_C
274BEG
345A_C
250D_E
289A_H
283B_N
290A_D
305A_G
364A_D
365A_H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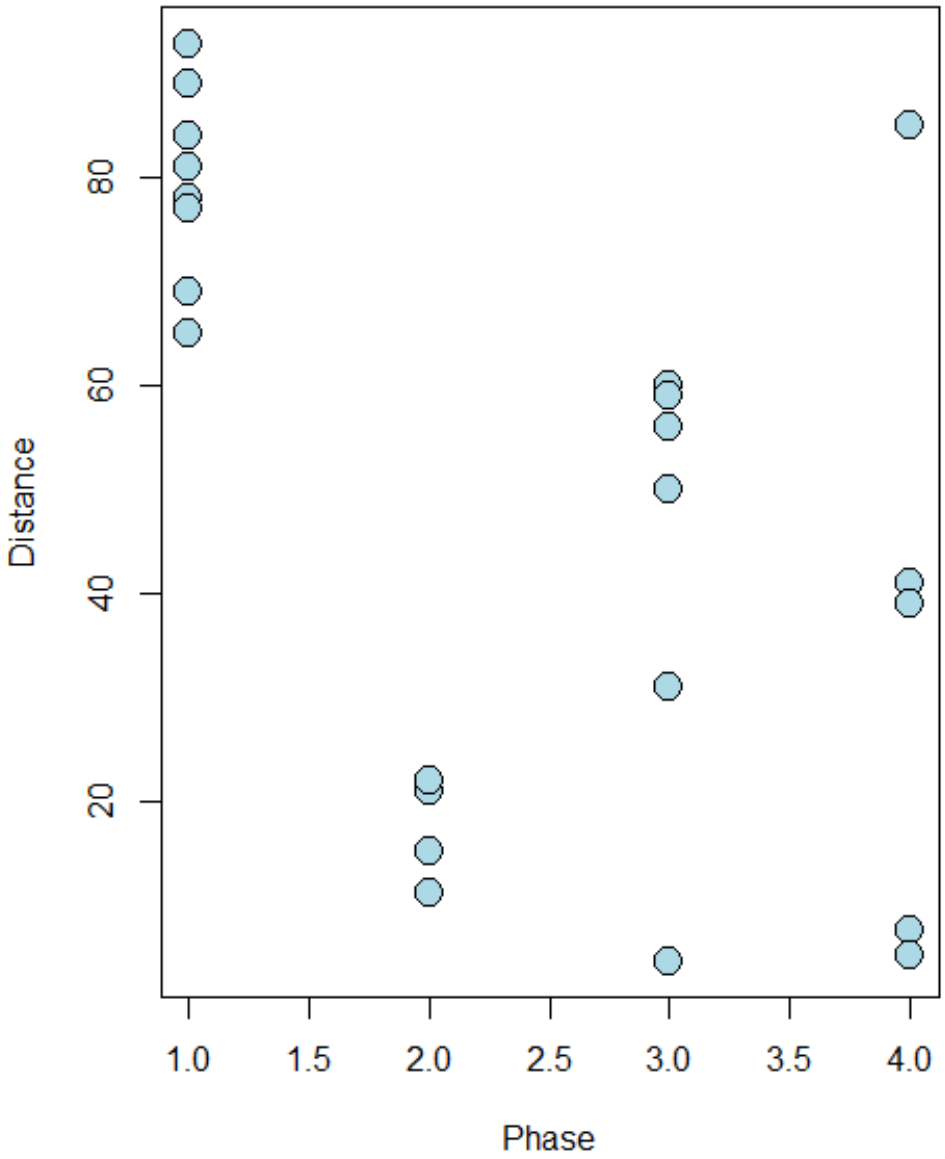
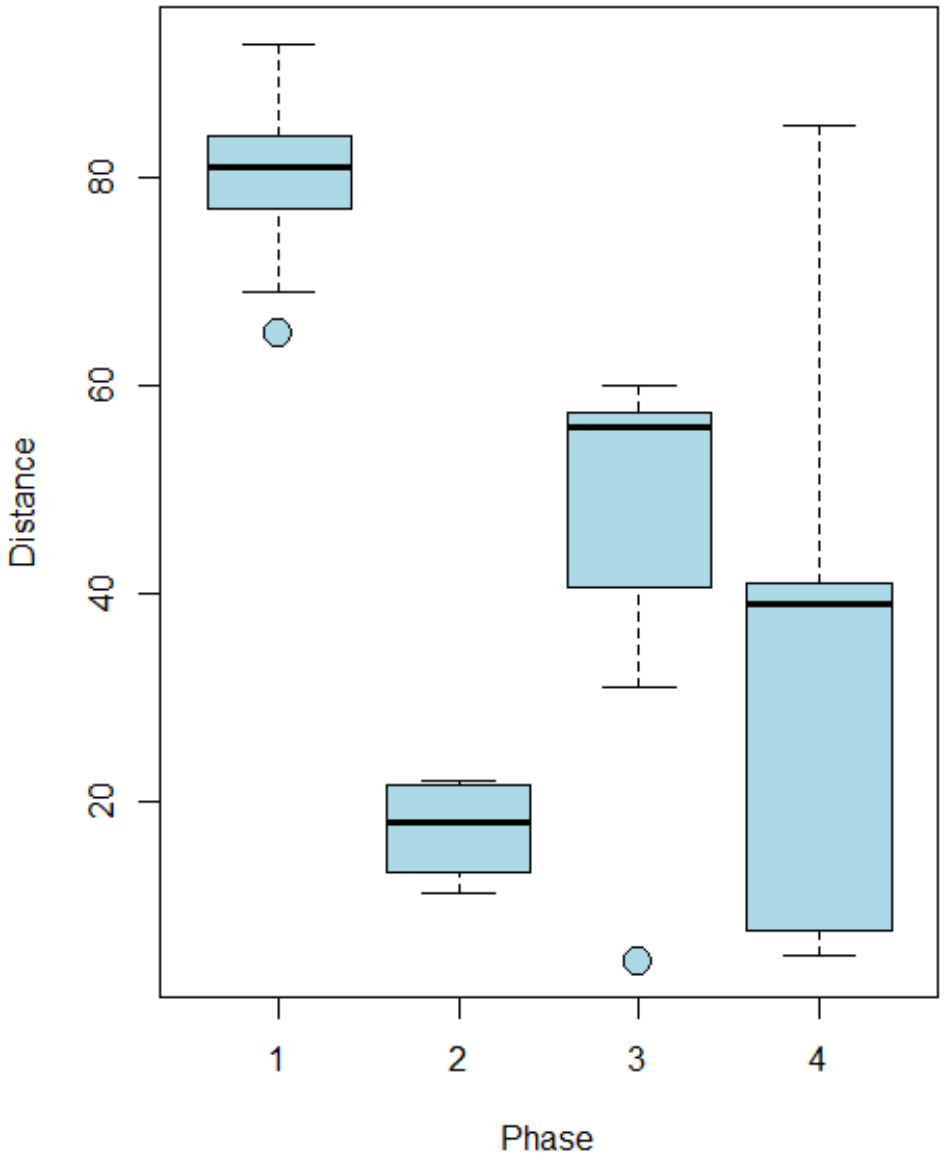
262AB
273A_C
274BEG
345A_C
250D_E
289A_H
283B_N
290A_D
305A_G
364A_D
365A_H

Context	Distance	Length	Width	Depth	Phase
305A_G	78	10.7	9.7	1.8	1
304A_C	93	7.3	3.5	1.1	1
346A_D_362A_C	84	8.2	5	0.9	1
351B_H	69	10.2	3	1.3	1
356A_C	77	3.7	1.5	0.3	1
390M_N	65	6.2	4.2	0.8	1
360A	81	2	2	0.3	1
290A_D	89	3.5	3	0.6	1
289A_H	84	10.5	5.5	1.7	1
250D_E	21	7.5	6.4	0.7	2
273A_C	15	10	8	1.2	2
274A_B_E_G	22	11	7	1.2	2
295A	11	4.1	2.3	1	2
205G_M	4.5	4	3.1	0.6	3
240F_G	31	4.5	3.1	0.6	3
259A_D	56	5.5	4.5	0.7	3
288C_R	60	12	8.5	1.3	3
288S_AD	59	13.5	4.4	1.2	3
255A_E_Z_AH	50	13.5	10.5	1.1	3
255F_Y	56	5.6	4.5	2	3
309A	56	5.5	5	0.6	3
226B	7.5	4	3	0.3	4
277A_C	41	11.5	4.7	0.5	4
280A_H	39	10	7.4	1.1	4
383A_B	5	3.9	3	0.5	4
345A_D	85	5.4	4.4	1.1	4

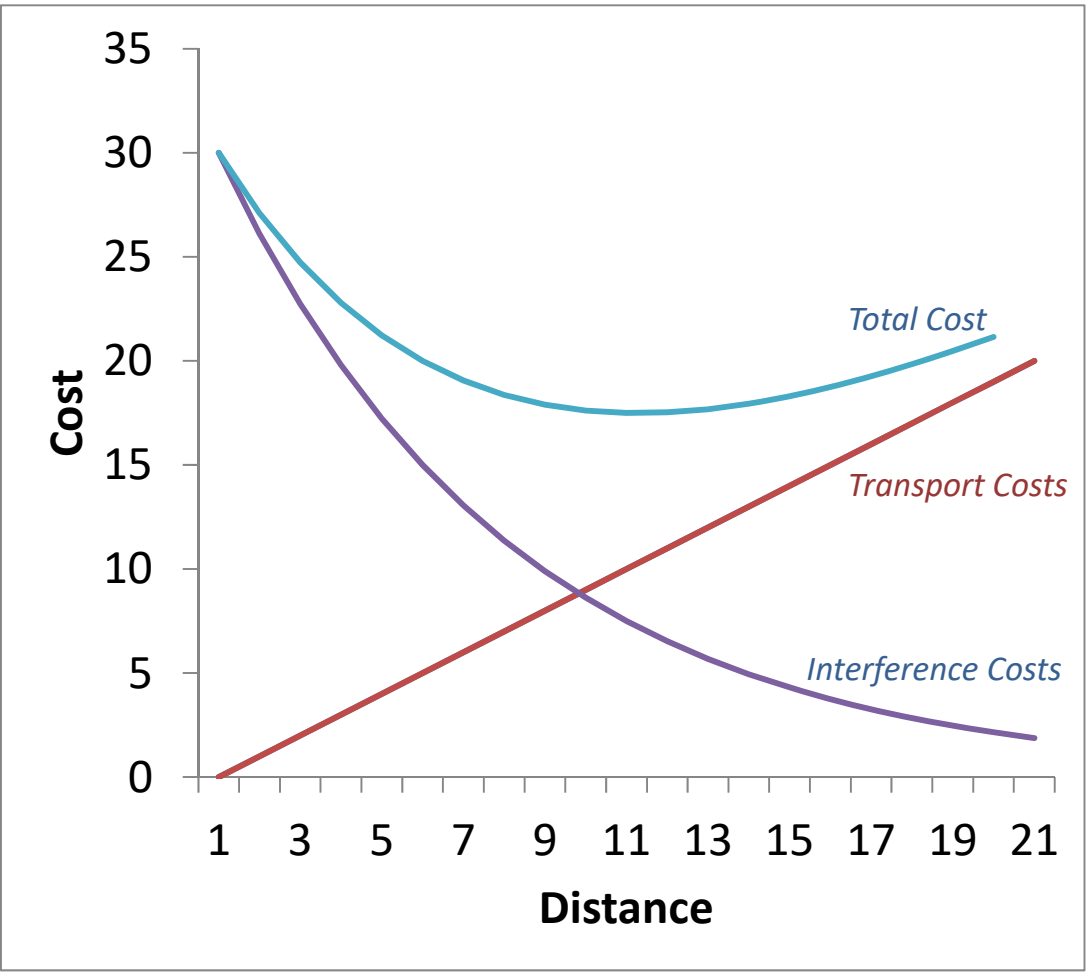
Clifts Plantation

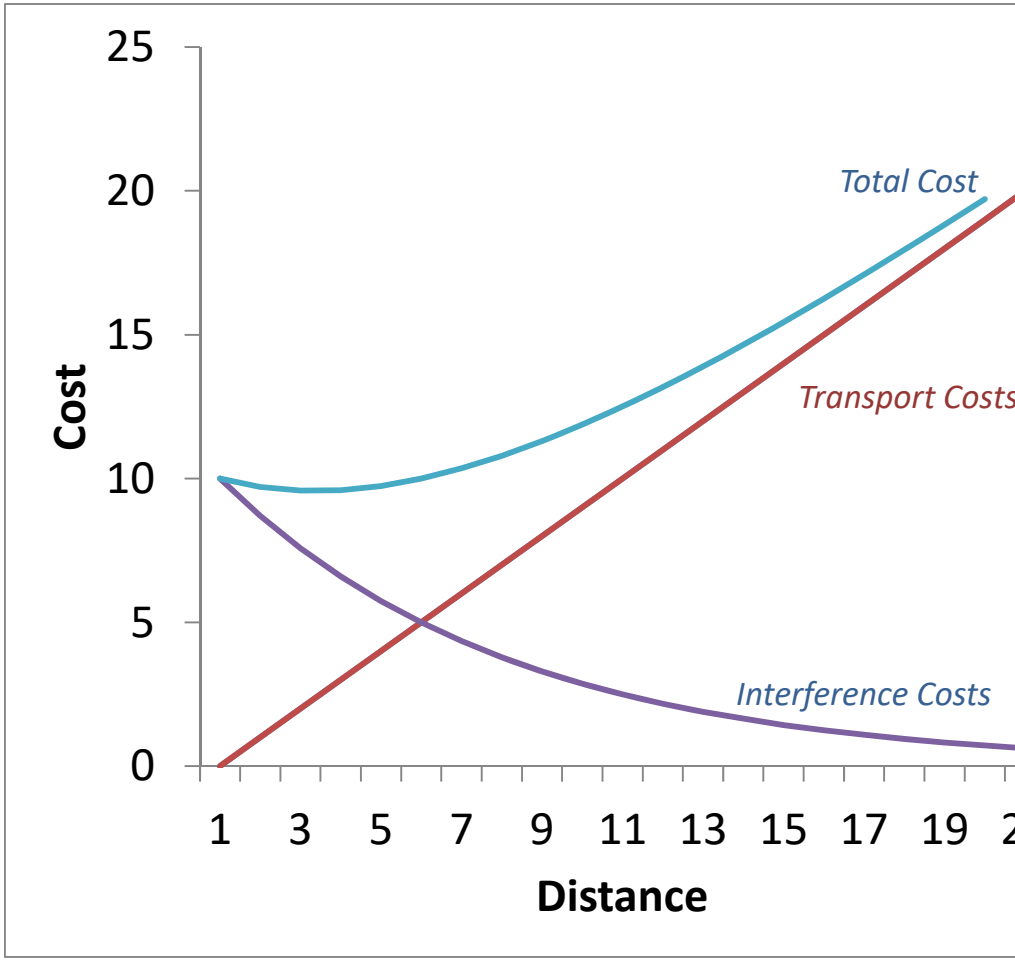
Distances of pits from the main house





Effect of variable pit size





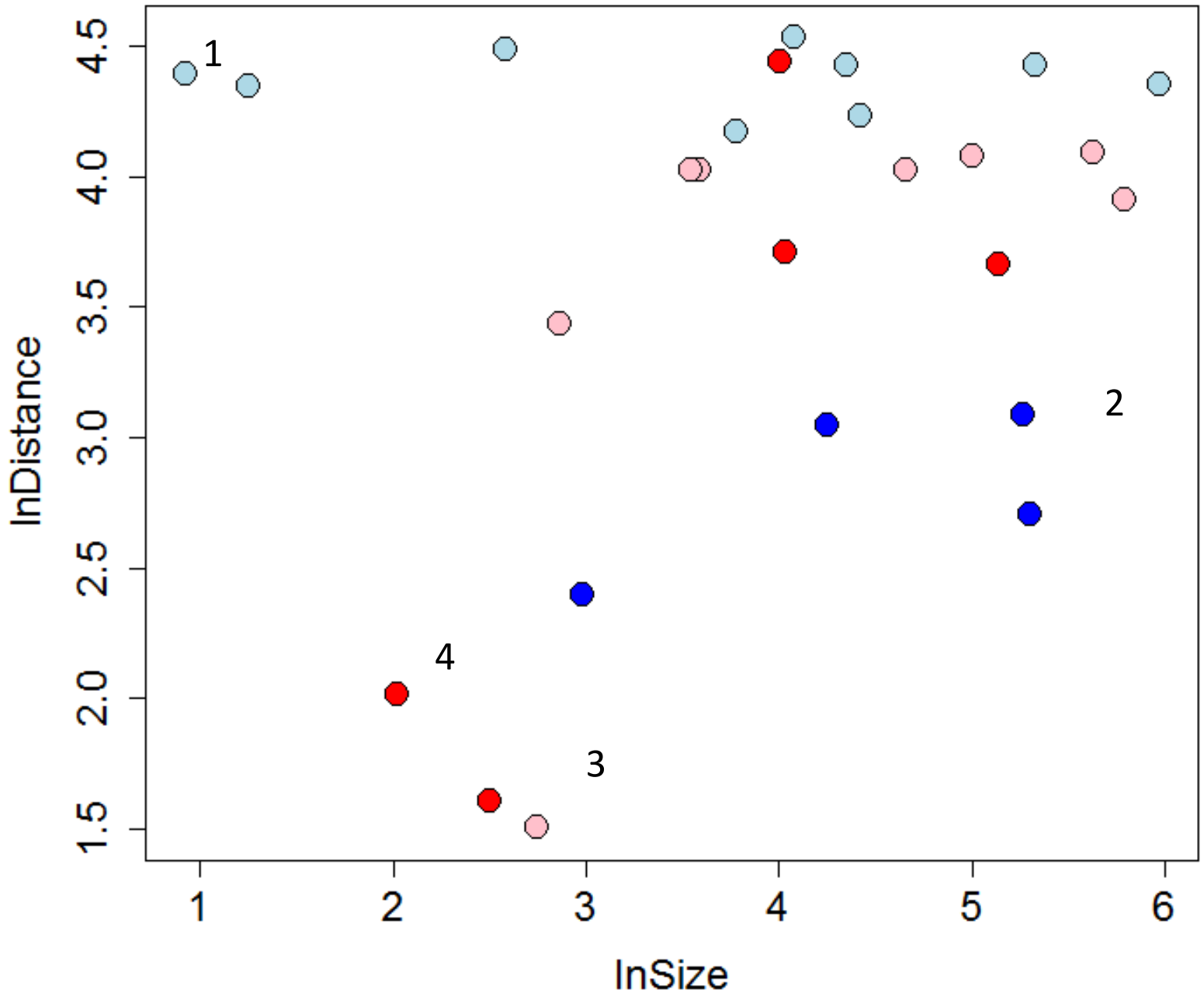
Big Hole – high interference costs.

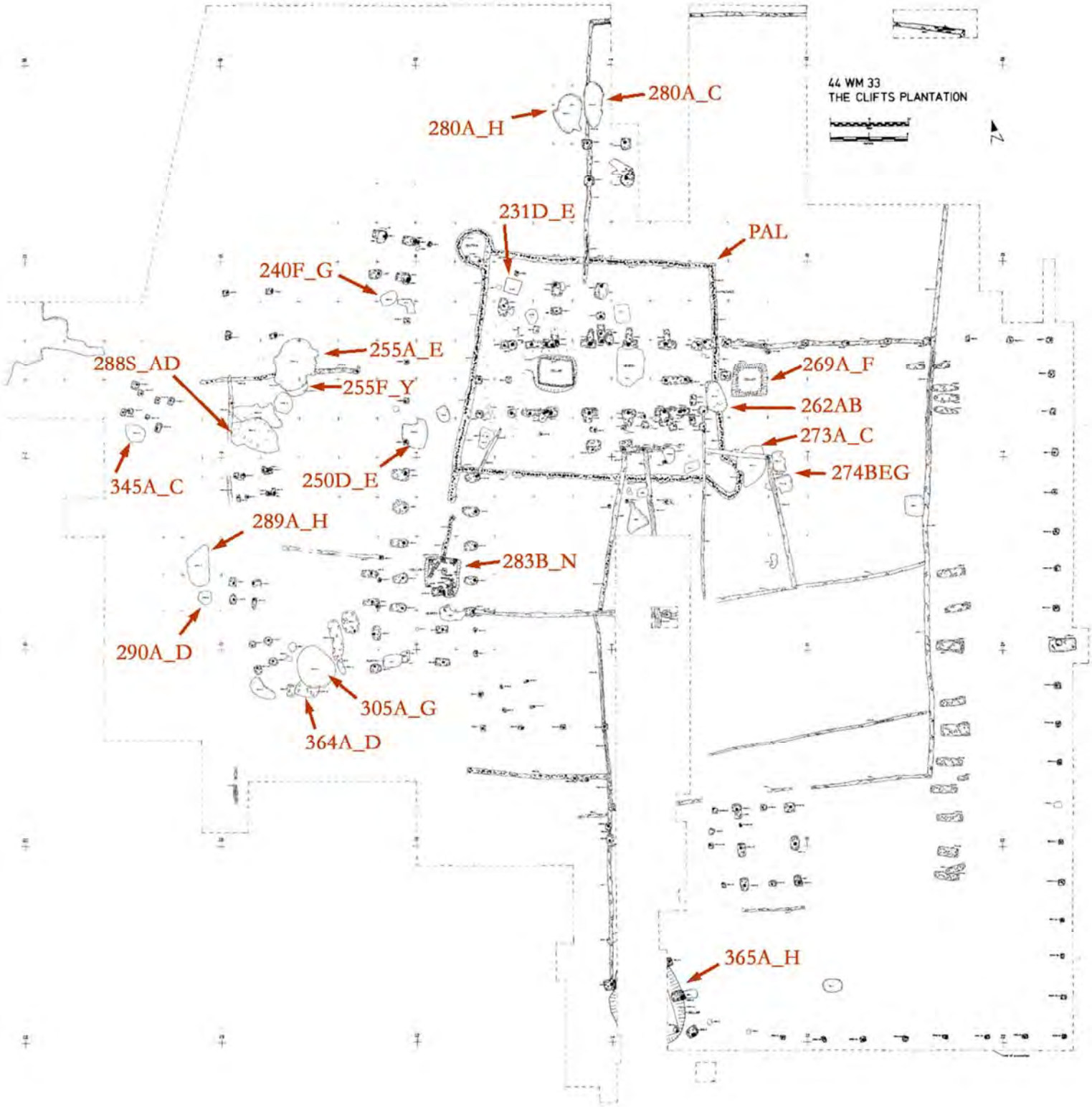
Small hole – lower interference costs.

On the basis of this model, what to we expect the size-distance relationship to look like?

Clifts Plantation

Pit Distances vs. Pit Size (log scale)

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345A_C
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Systemic context processes

1.1 Spatial organization of activities and the facilities with which they are associated: a simple model.

-Extent to which one activity will be spatial segregated from others is a function of

1. benefits of moving ~ scale inversely with interference potential:

    -activities take up lots of space
    -activities are dangerous
    -activities require uninterrupted time

2. costs of moving the offending activity ~ scales with distance moved, access frequency

Systemic context processes

1.2 Spatial organization discard.

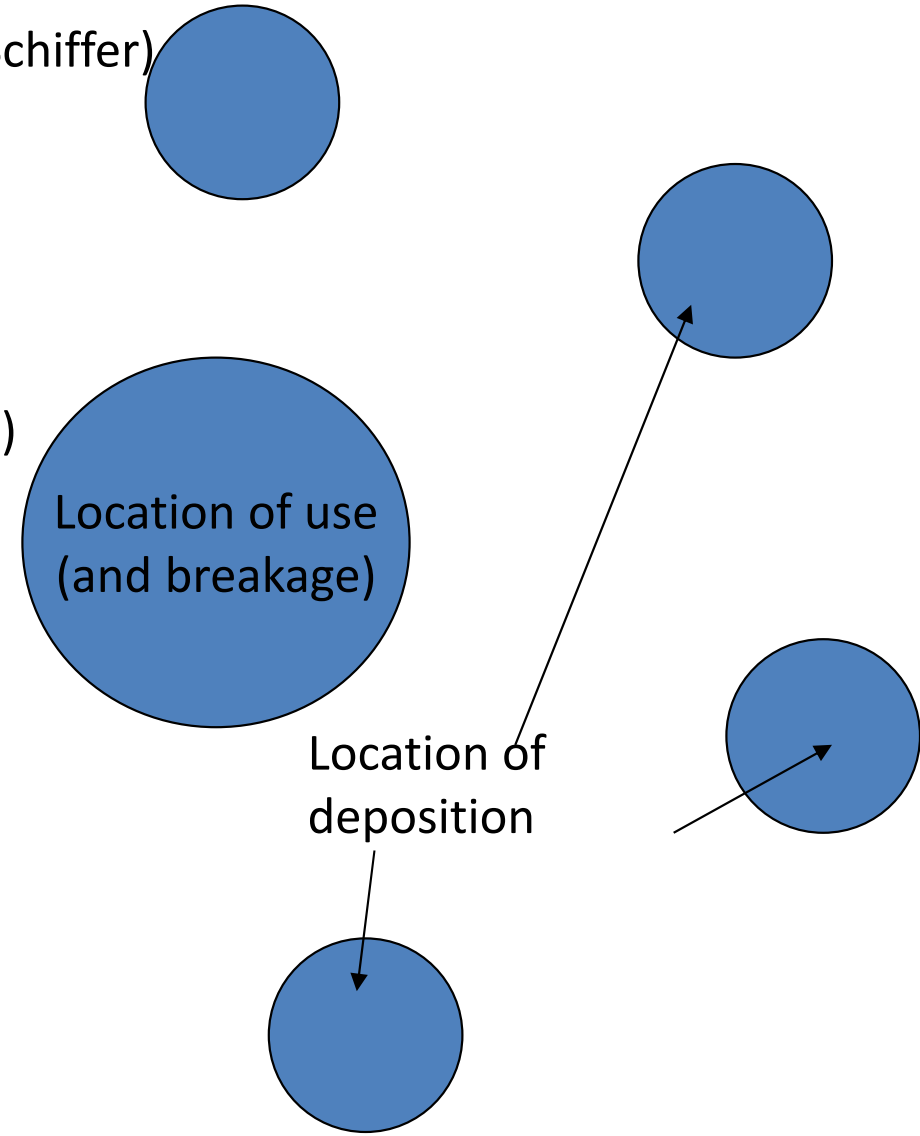
- ”The Pompeii Premise”
- primary refuse vs. secondary refuse (Mike Schiffer)

- ***cleaning up*** (creates some patterns, but destroys others)

- ***interference potential*** of primary refuse
  - amount (size, frequency, duration)
  - hazards (*e.g*. glass)

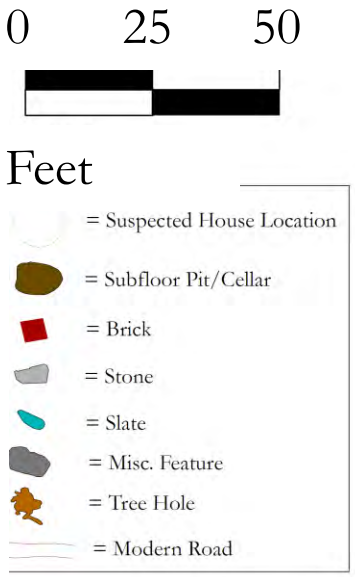
- how far stuff is transported effects spatial scale at which spatial pattern can be interpreted.

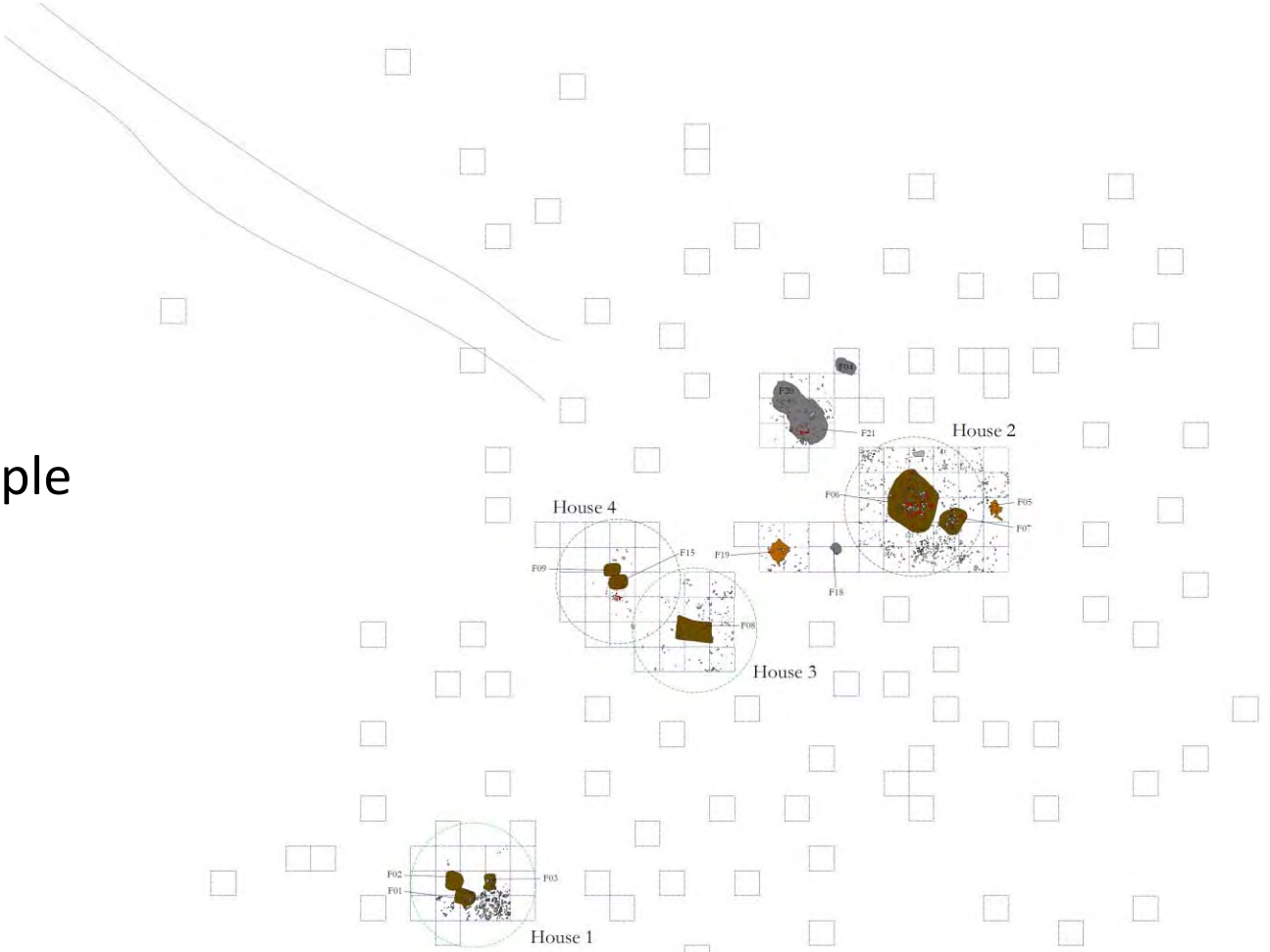
- secondary refuse nearly always has useful spatial pattern at some informative scale!!



Site 8 Example

-c. 1770-1800
-heavily plowed
-stratified random sample
-266 5-foot quadrats





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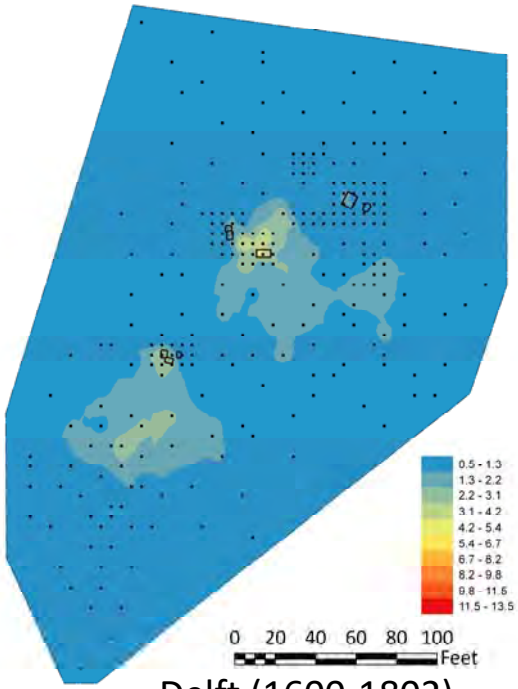
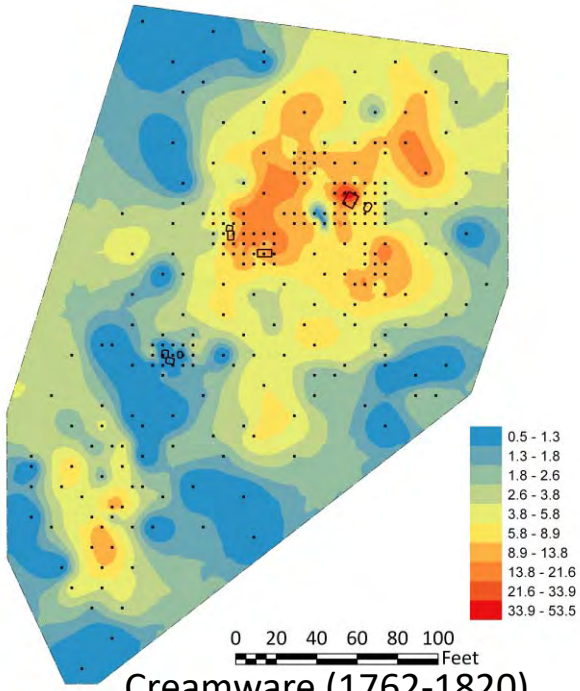
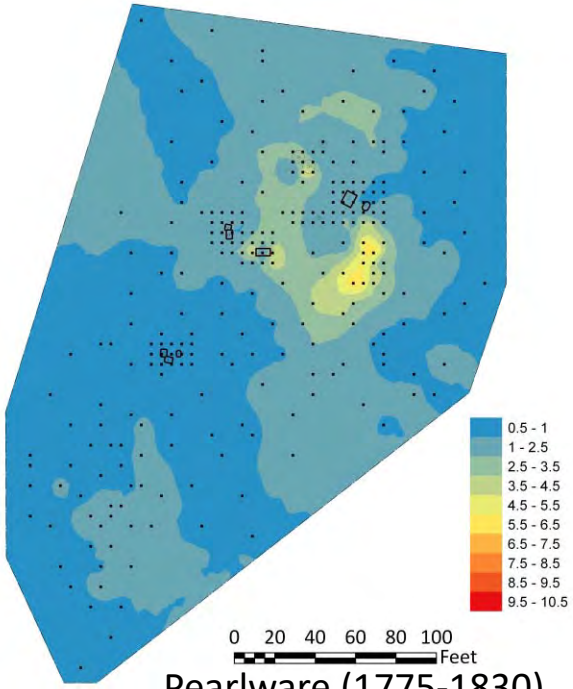
Date:	04 September 2008



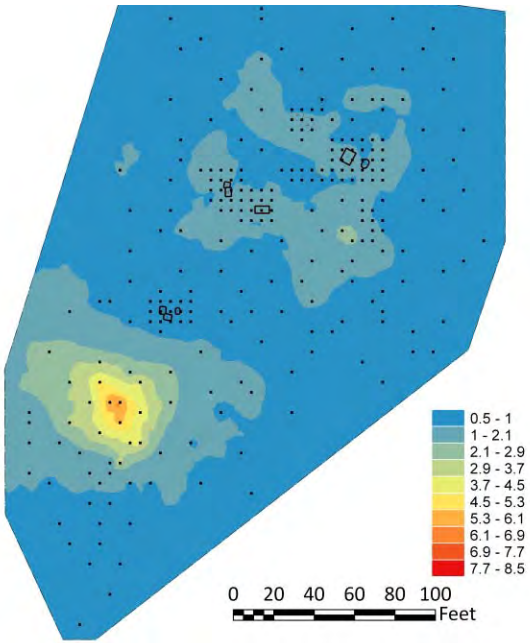
Delft (1600-1802)



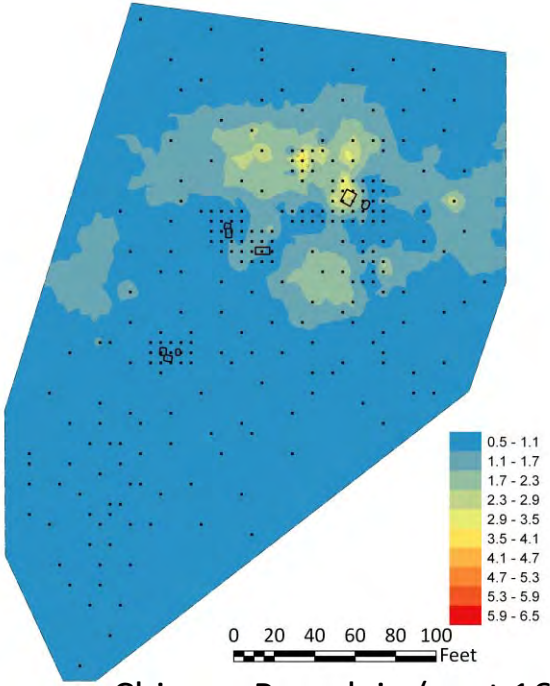
Creamware (1762-1820)



Pearlware (1775-1830)



Redware (post 1600)



Chinese Porcelain (post 1600)

Site 8 *(c. 1770-1800)*

Systemic context processes

1.2 Spatial organization discard.

- ”The Pompeii Premise”

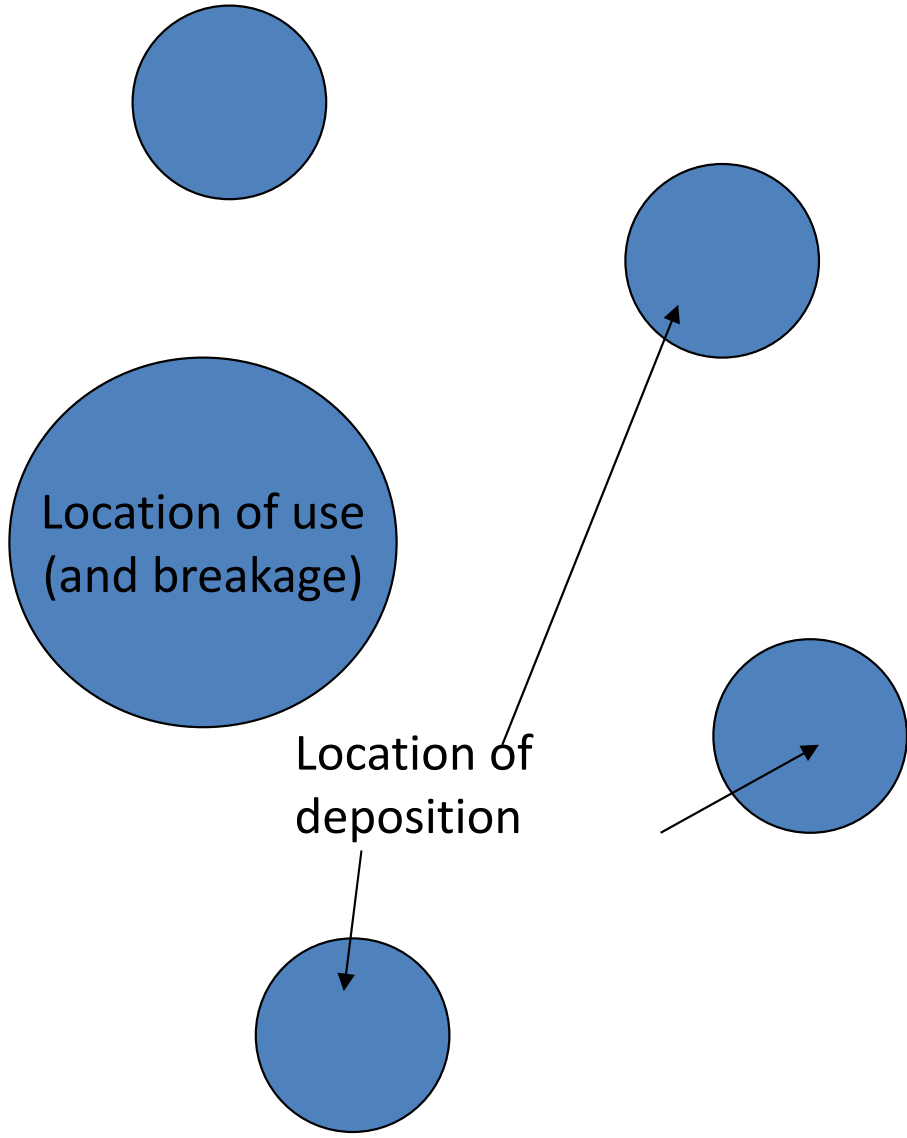
- primary refuse vs. secondary refuse (Mike Schiffer)

- ***cleaning up*** (creates some patterns, but destroys others)

- ***interference potential*** of primary refuse
  - -amount (size, frequency, duration)
  - -hazards (*e.g*. glass)

- how far stuff is transported effects spatial scale at which spatial pattern can be interpreted.

- secondary refuse nearly always has useful spatial pattern at some informative scale!!



Systemic context processes

1.2 Spatial organization discard.

- How to recognize cleaning up?

- Ethnoarchaeological evidence: Alyawara men's camp (O'Connell 1987)

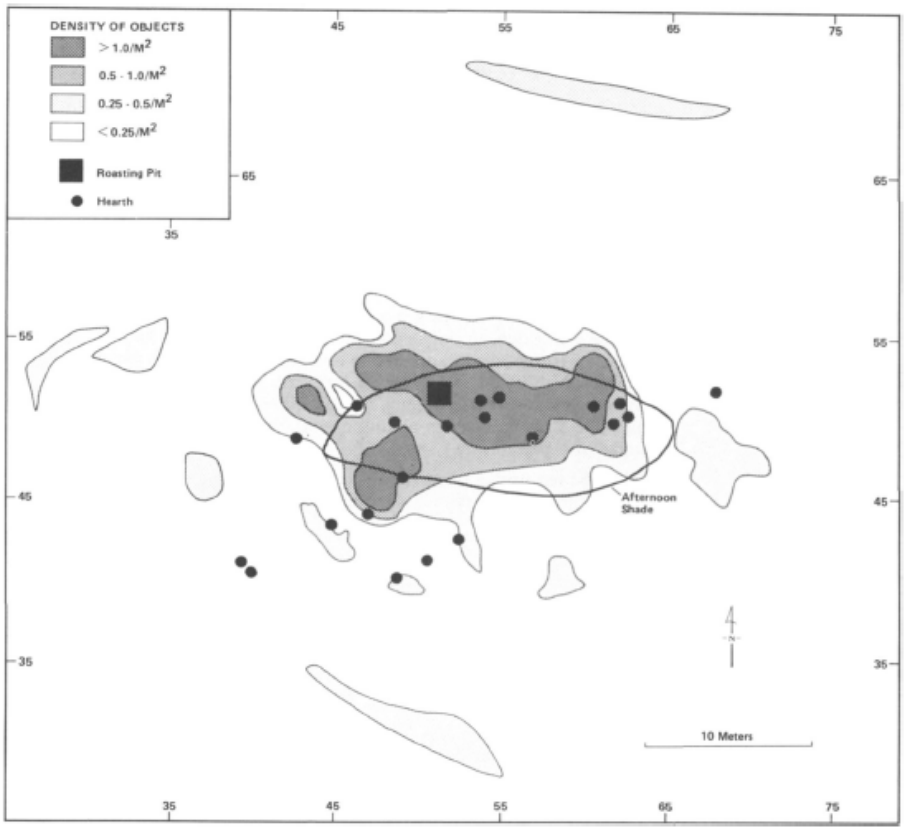


Figure 11. Contour map of refuse density at Bendaijerum *apulla* men's household activity area. Contours computed on refuse distribution data summarized by 2 m square. Total number of refuse items = 972. See Table 7 for description.

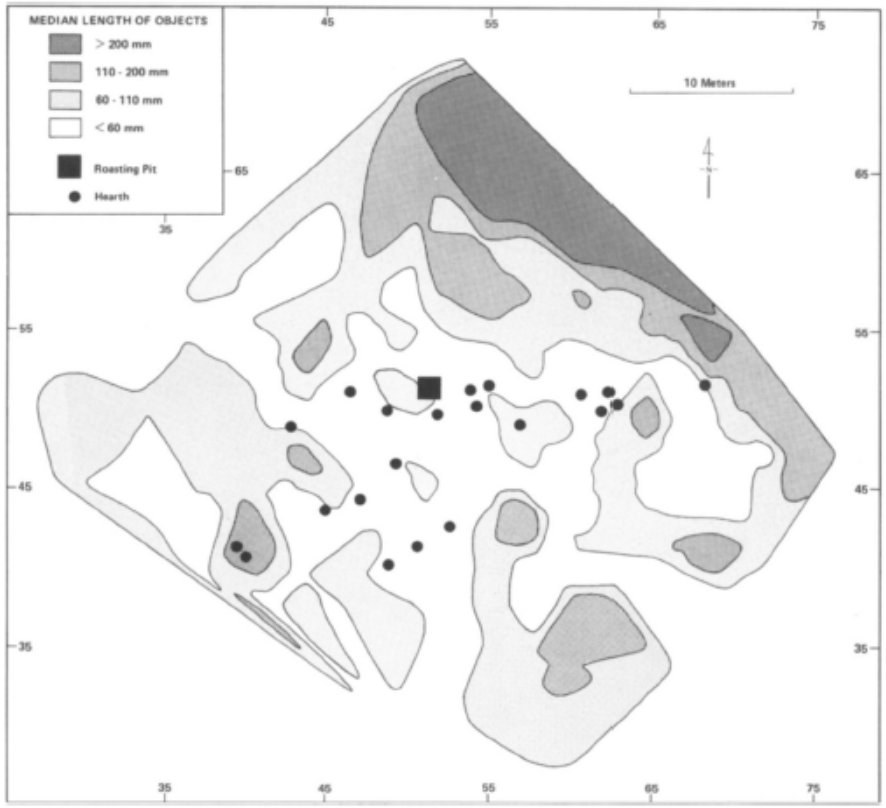


Figure 12. Contour map of median length of non-cloth objects at Bendaijerum *apulla* men's household activity area. Contours computed on data summarized by 2 m square.

The Artifact Size Index

A tool to recognize the size sorting that results from cleaning up.

$$ASI_i = \frac{(x_i - pN_i)}{\sqrt{p - (1-p)N_i}}$$

x_i = Number of large artifacts from the I'th quadrat

p = Site-wide proportion of large artifacts

N_i = Total artifacts from the *i'th* quadrat

So…

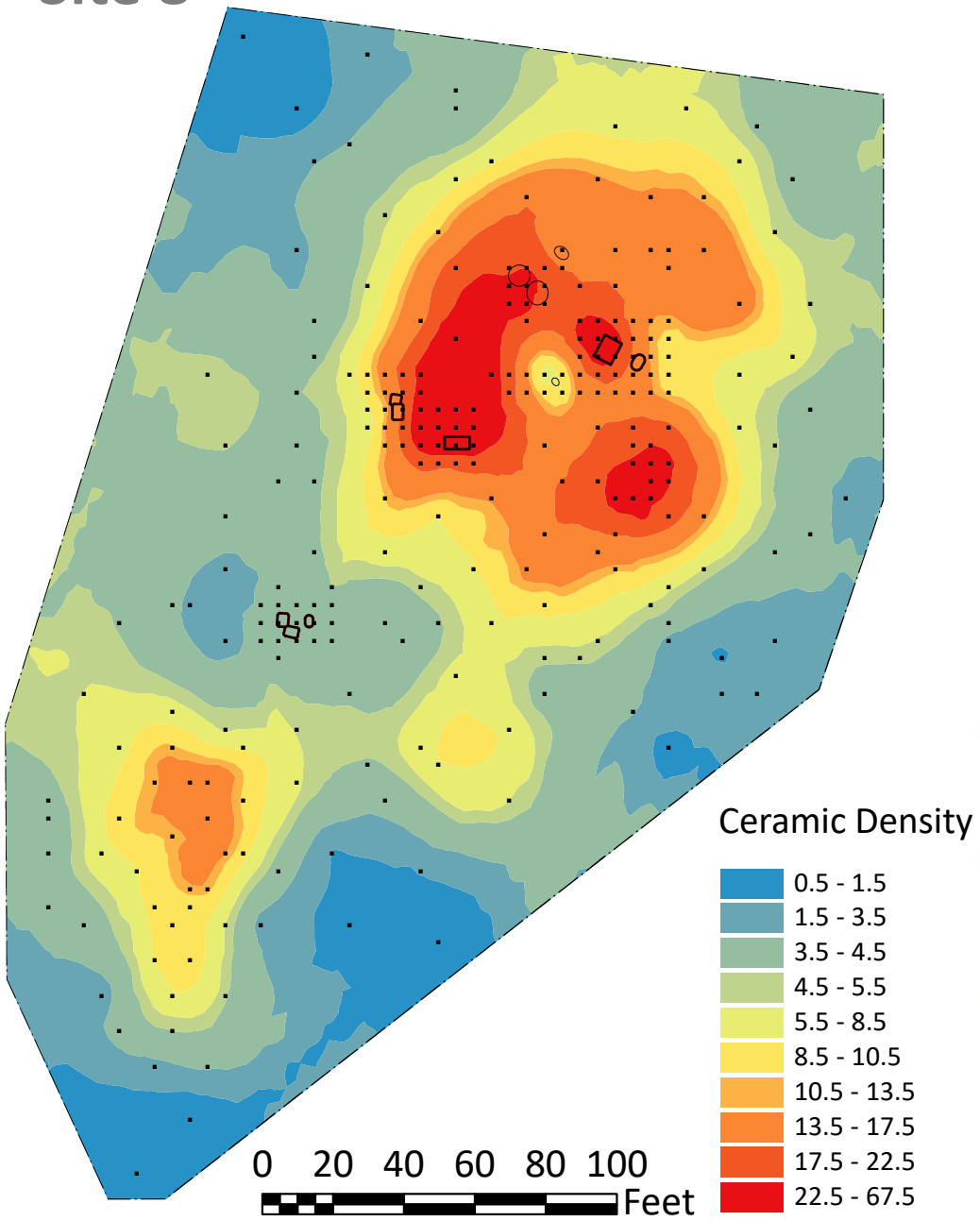
pN_i = Expected number of large artifacts in the *i'th* quadrat, if all quads had the site-wide proportion

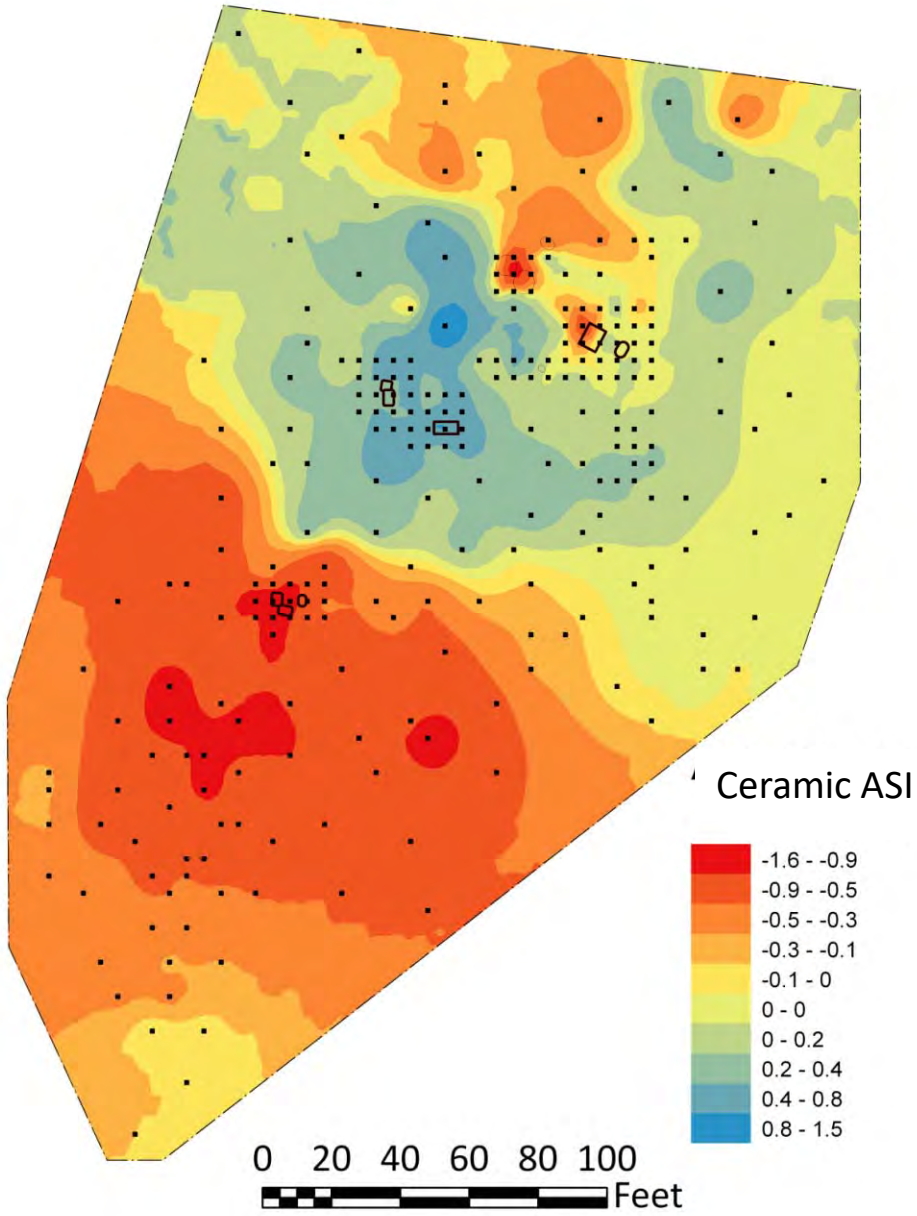
$\sqrt{p - (1-p)N_i}$ = Standard deviation of the *Gaussian approximation* to the *binomial distribution*, which is a simple statistical model of the chance of getting 0, 1, 2, 3 … larger artifacts in a sample of size N_i when the underlying probability of getting a large artifact is p.

More secret sauce:

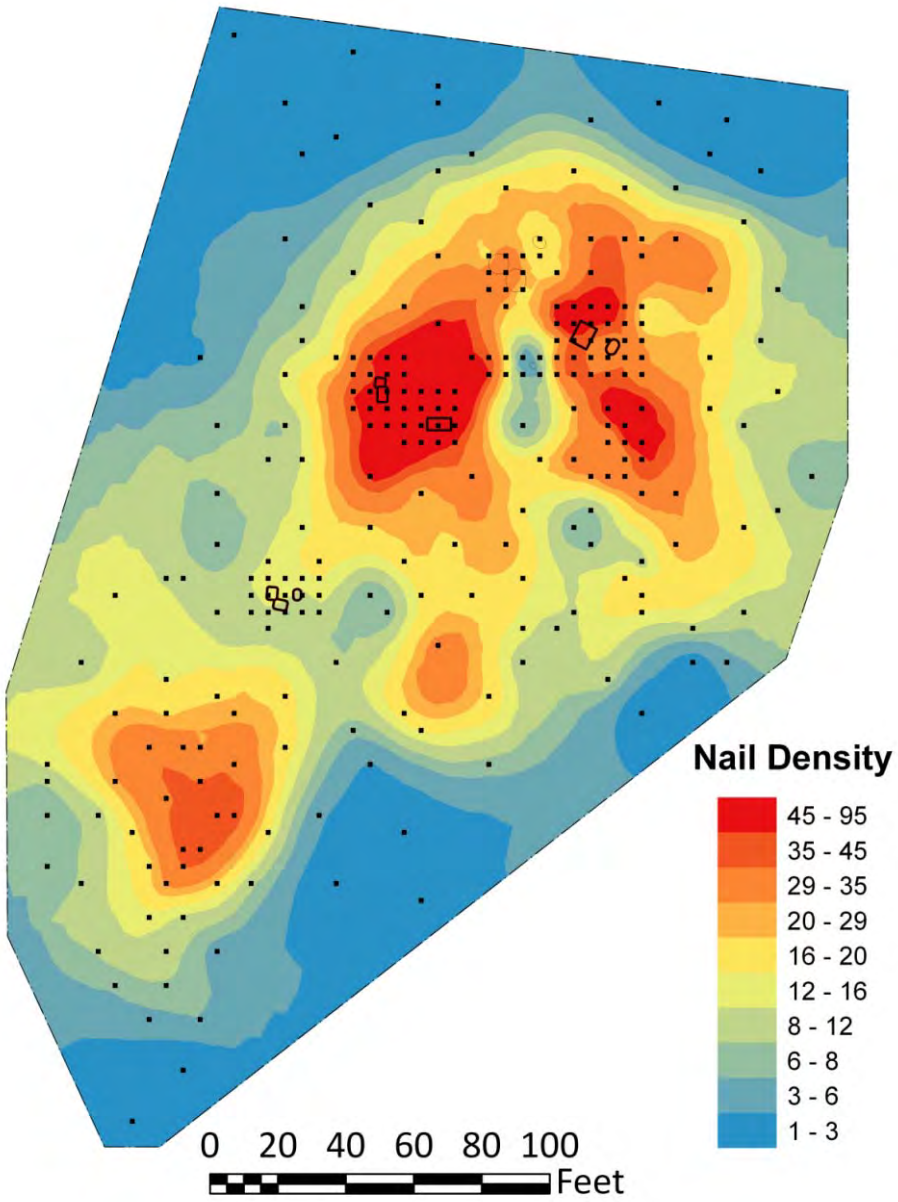
- Krige continuous surfaces

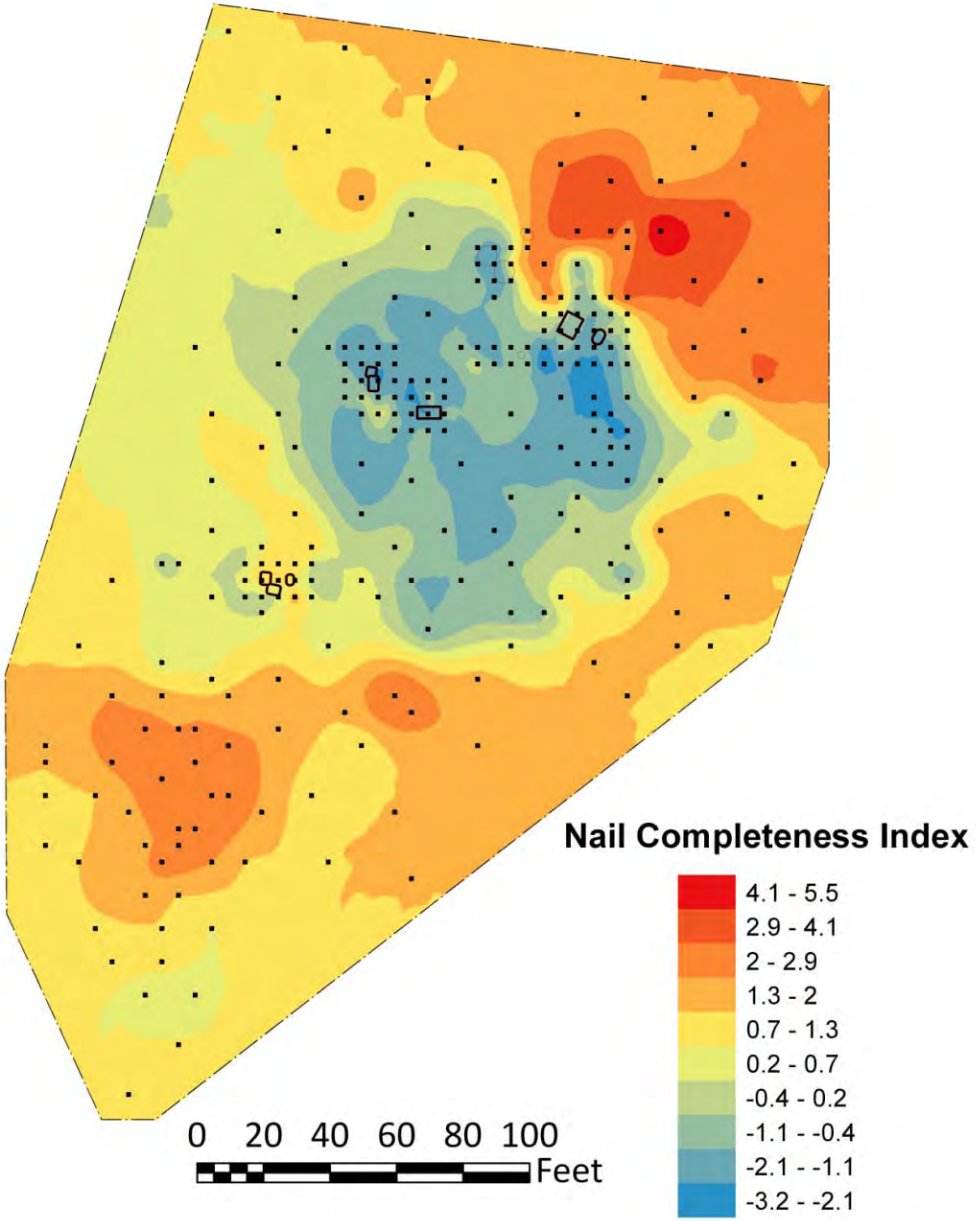
Site 8

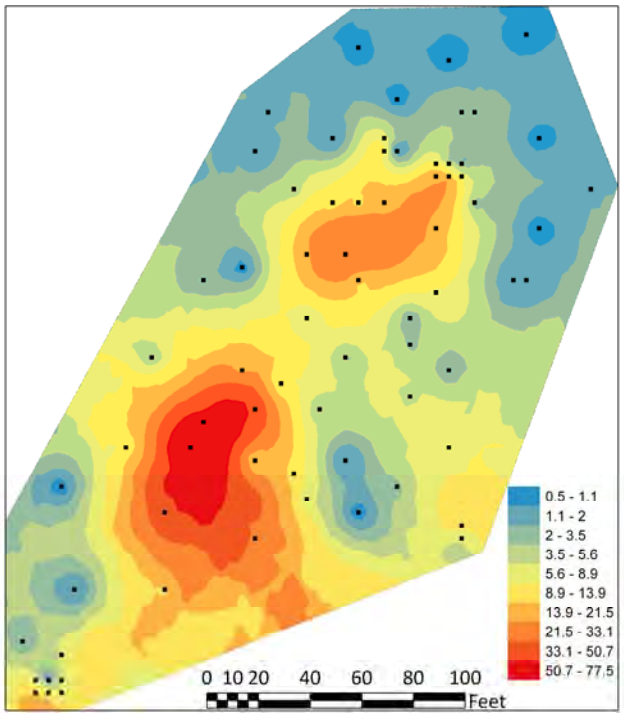

Ceramic Density
0.5 - 1.5
1.5 - 3.5
3.5 - 4.5
4.5 - 5.5
5.5 - 8.5
8.5 - 10.5
10.5 - 13.5
13.5 - 17.5
17.5 - 22.5
22.5 - 67.5
0 20 40 60 80 100
Feet


Ceramic ASI
-1.6 - -0.9
-0.9 - -0.5
-0.5 - -0.3
-0.3 - -0.1
-0.1 - 0
0 - 0
0 - 0.2
0.2 - 0.4
0.4 - 0.8
0.8 - 1.5
0 20 40 60 80 100
Feet

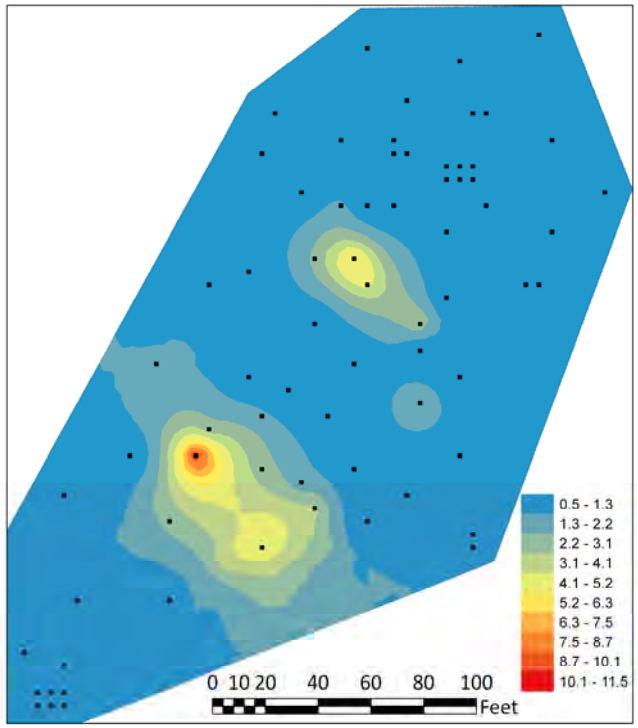
Site 8


Nail Density
45 - 95
35 - 45
29 - 35
20 - 29
16 - 20
12 - 16
8 - 12
6 - 8
3 - 6
1 - 3
0 20 40 60 80 100
Feet

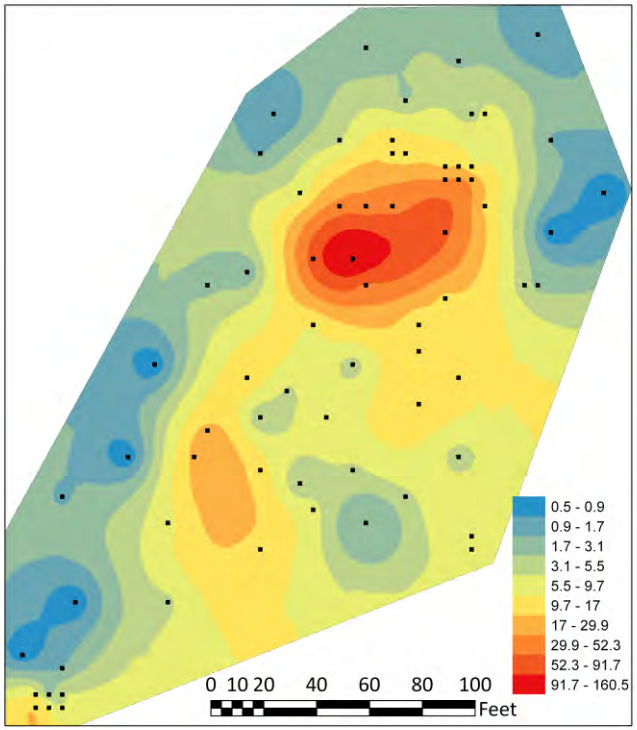

Nail Completeness Index
4.1 - 5.5
2.9 - 4.1
2 - 2.9
1.3 - 2
0.7 - 1.3
0.2 - 0.7
-0.4 - 0.2
-1.1 - -0.4
-2.1 - -1.1
-3.2 - -2.1
0 20 40 60 80 100
Feet



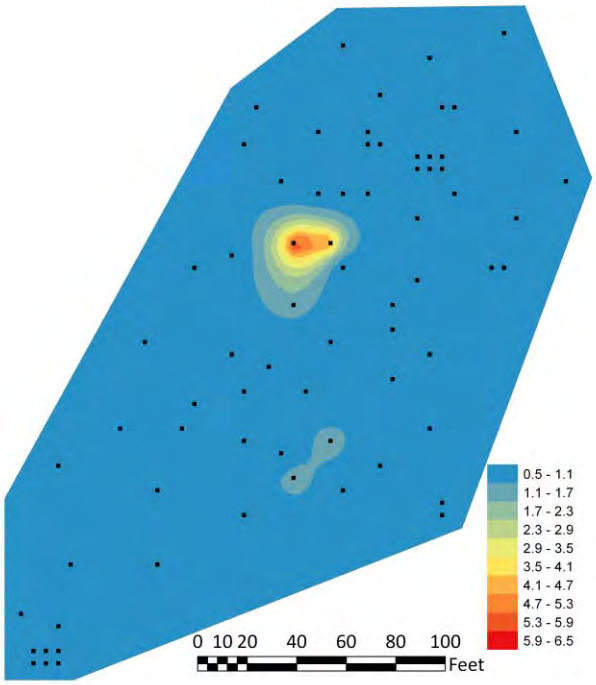
Creamware (1762-1820)



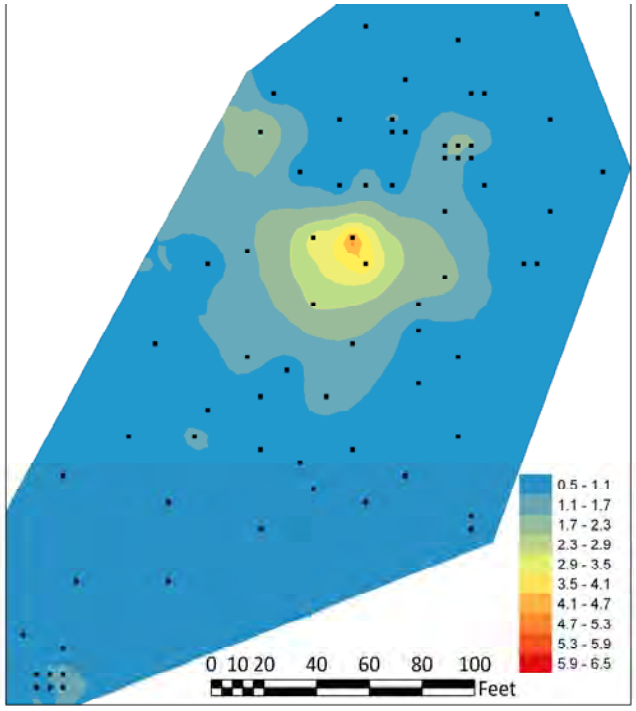
Chinese Porcelain (post 1600)



Pearlware (1775-1830)



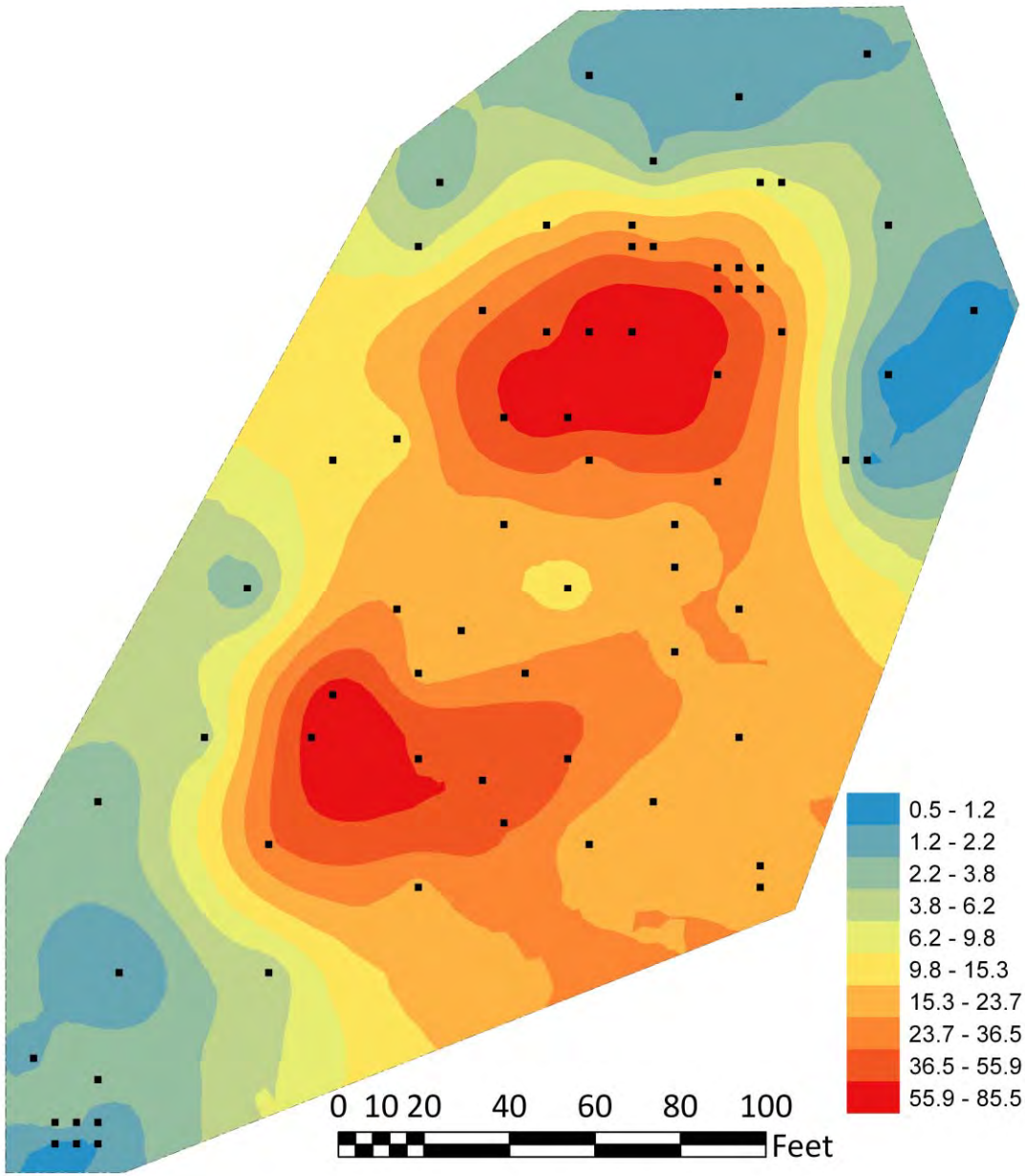
Whiteware



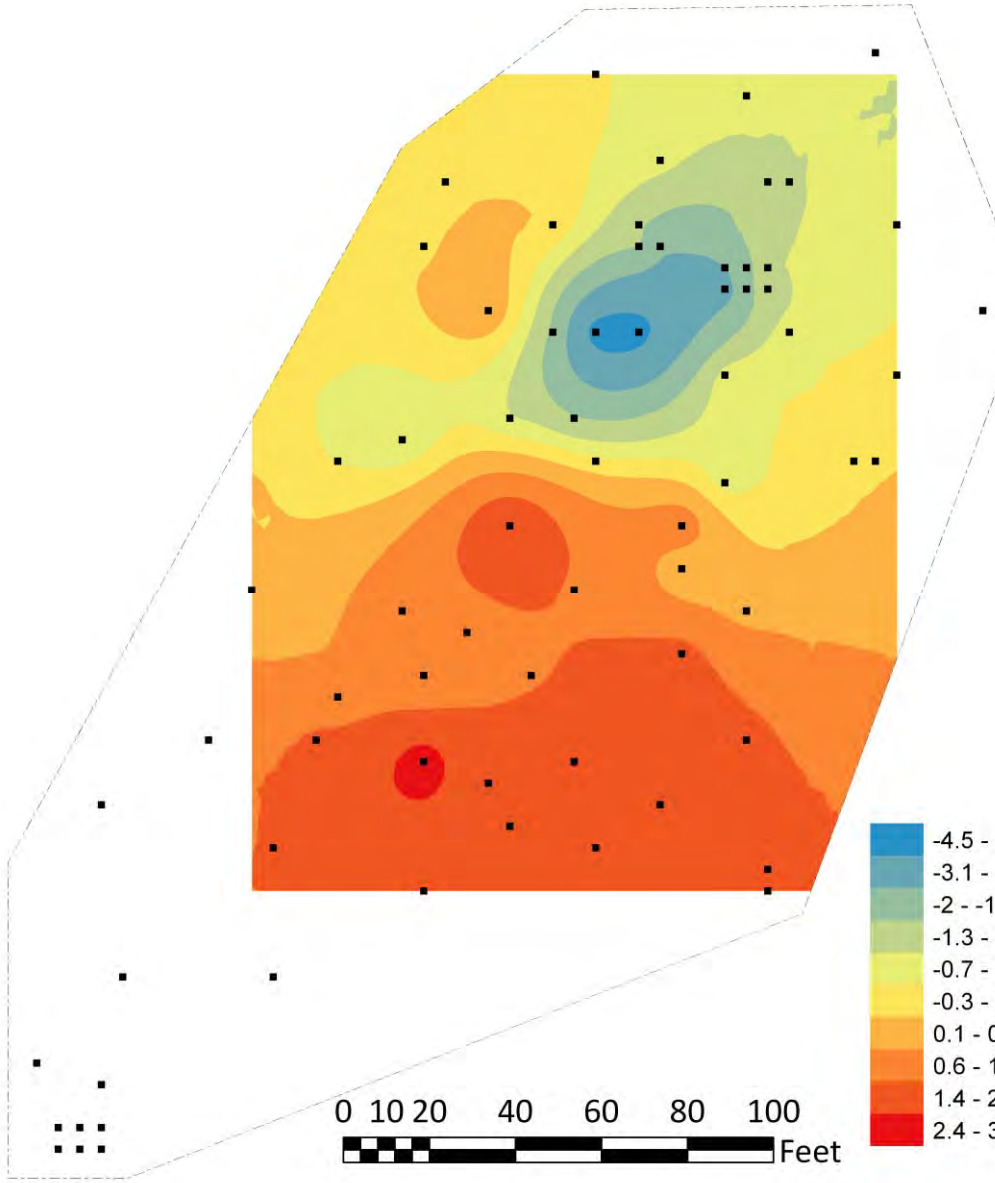
American Stoneware

Site 6

Site 6



Nail Density



Nail Completeness