IDENTIFYING ARCHAEOLOGICAL SETTLEMENT PATTERNS FOR ARCHAEOLOGICAL FEATURE IDENTIFICATION IN NORTHWEST ALASKA

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Introduction:

Prediction models of archaeological settlement patterns traditionally focus on regional data (i.e. geology, geomorphology, distance to available resources, elevation, slope, etc.) in order to locate and assess the potential location of unknown archaeological sites. While such models are invaluable for investigating large archaeological patterns, they do little to identify components of archaeological sites and features at smaller scales where resource distance or elevation is negligible or irrelevant. So how then do we investigate the complexity of archaeological sites that contain high numbers of components and features and use that information to identify specific feature types? GIS Is a powerful tool that can be used to investigate the spatial relationships between archaeological features and identify possible archaeological components at a smaller scale without full excavation and more survey work.

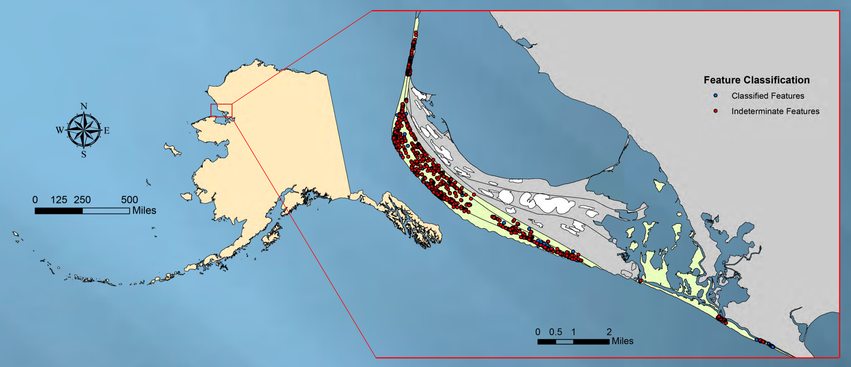

Figure 1. Study Area

Background:

The Cape Krusenstern National Monument in Northwest Alaska (Figure 1) contains a beach ridge complex that has developed over the last 5000 years, and has been occupied by humans since shortly after its development. Numerous Archaeological surveys have occurred at the archaeological site complex since the 1950's and have identified approximately 2,400 features, but a majority of features identified remain unclassified as houses or food storage features[1].

Research Question:

- Can the attributes of known feature types guide our interpretation of unknown features as houses or food storage features?

Data:

- CAKR "200 Generations on the beach Ridge of their Time" Cultural resource Survey data 2006-2010.
- NOAA Coastal Shoreline Data.

Methods:

- **Explored spatial relationships between known house and Food Storage Features (Table 1).**
- **Calculated feature attributes (Table 1).**
  - Area, Distance from nearest house, Orientation angle from nearest house (corrected to 360°).
- **Performed discriminate function analysis of feature attributes with IBM's SPSS statistical package to test.**
- **Created a site suitability models using distances, angles between house and food storage features reclassified and weighted reflecting spatial relations between features, in order to find possible locations of house and food storage features (Figure 2).**
- **Selected Veg. anomalies and indeterminate features that were within the possible locations.**

Table 2. Mean Feature Attribute Data

Feature Type:	Neighbor Distance (m)	Clustering (p-value)	Feature Area (m^2)	Nearest House (m)	Angle to Nearest House (degree)
House	60.71	Clustered (.000)	31.23	N/A	N/A
Food Storage	23.17	Clustered (.000)	4.72	67.74	179.99
Veg. Anomaly	70.29	Clustered (.000)	41.64	144.70	187.05
Indeterminate	31.75	Clustered (.000)	11.18	125.13	175.18

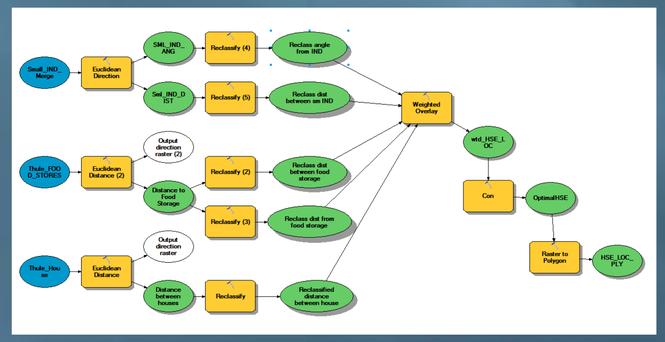

Figure 3. Site Suitability Workflow (repeated for food storage features

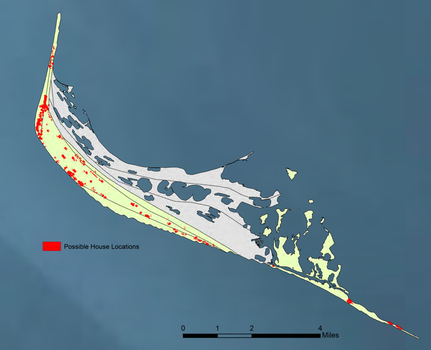

Figure 4. Possible House Locations

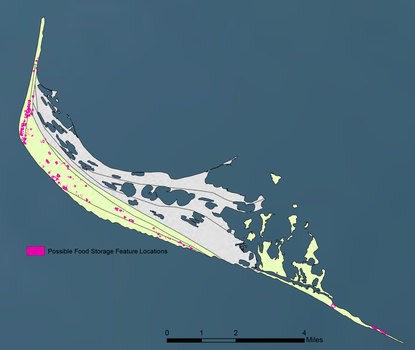

Figure 5. Possible Food Storage Feature locations

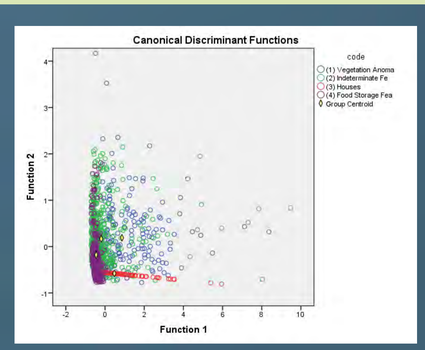

Figure 6. Grouping of Feature Types

Results:

- Site suitability identified potentially 71 house locations and 276 food storage feature locations, that is 37% of the unclassified feature categories.
- Discriminate function analysis showed; nearest angle, nearest house distance and shape area do exhibit distinctions in the dataset.
- Using all 4 feature categories only approximately 51% are group into their original categories.
- When reduced to 2 categories nearly 87% can be classified as house or food storage features.
- Mapping suitable sites showed the possible locations of house and food storage features.

Discussion and Conclusions:

Discriminate function analysis of known feature types showed good distinction between houses and food storage features. However, feature attributes did not exhibit significant ability to predict feature classification. This is likely due too non-normally distributed data and indicates that there is significant overlap in the feature size, orientation, and spatial relations. There is also the potential that interpretations of larger food storage features could be erroneous and that mapped features may not truly reflect their characteristics. More work is need to define these features.

Future work:

- Identifying errors in feature sizes and more effectively dealing with outliers.
- Refining comparable feature attributes, through additional research – such as Geochemical analysis.

References cited:

[1] Freeburg, A. and S. Anderson. 2012. *Human Environmental Dynamics at Cape Krusenstern 200 Generations on the Beachridge of their Time. Anchorage, AK.*