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Re-Examining Site Prediction Along the Middle Savannah River

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In 1989, the Savannah River Archaeological Research Program (SRARP) developed an archaeological predictive model of prehistoric site locations on the Savannah River Site facility (SRS) located along the Middle Savannah River. Since then, the model has been used to target prehistoric archaeological sites for cultural resource management and research projects on the SRS. In recent years, the staff of the SRARP conducted full coverage archaeological surveys for select timber compartments and set-aside areas to test the 1989 model. The following is an examination of the model using data from those full coverage surveys.

The sensitivity zones of the 1989 predictive model attempt to define those locations most likely to contain significant prehistoric archaeological sites (Figure 1). The first, Zone 1, is defined as all areas within 400-m of streams Rank 3 or greater (Strahler system), less than 83-m above mean sea level, and less than 31-m above the nearest stream Rank 3 or greater. Zone 1 represents only 17% of the total SRS land cover. This zone is the most likely to contain significant, multi-component prehistoric sites. Zone 2 is defined as all areas within 400-m of Rank 1 and 2 streams and within 401-m to 800-m of streams Rank 3 or greater. Zone 2 represents a full 44% of the SRS land cover, frequently containing small, multi-component sites and non-diagnostic sites. Zone 3 represents 26% of the SRS land cover, has the lowest probability of containing significant sites, and consists of areas outside of Zones 1 and 2. Finally, Zone 0 consists of wetland areas that do not receive regular archaeological reconnaissance due to their protected status from land use development. Zone 0 represents only 13% of the total SRS land cover.

On the sensitivity zones map (Figure 1), the dark gray areas represent Zone 1, the locations most likely to contain archaeologically significant sites or high probability areas; the medium gray areas represent Zone 2 and are locations likely to contain potentially less-significant archaeological sites or moderate probability areas; the light gray areas represent Zone 3 and are those locations least likely to contain significant, multi-component sites. The white or empty areas have an indeterminate probability corresponding to wetlands of the Savannah River, its tributaries, and upland Carolina Bays (as well as areas outside of the SRS boundaries).

The test sample represents the 47 prehistoric sites recorded during the full coverage surveys, including clear-cut surveys with 100% ground surface exposure and, in wooded areas, shovel testing using a 30-m grid for test unit placement (Figure 1).
This project is ongoing, but to date has covered over 1,100 hectares of the SRS representing a 1.4% sample of the total landscape. The percentage of land coverage by Zone for the sample has been controlled to closely parallel the percentage of land cover by Zone for the entire SRS. The distribution of survey areas has also been controlled to ensure sampling along all of the major tributaries that dissect the landscape.

Of the 47 prehistoric sites encountered during survey, significantly more (n=18) occurred in High Probability-Zone 1 areas than expected by chance alone (Table 1). Conversely, the observed frequency of sites for Zones 0, 2, and 3 were not significantly different than that expected by chance alone (n=0, 18, 11, respectively). While these results support Zone 1-High Probability areas as having the highest density of sites overall per unit area, this zone of the model accounts for only 38% of sites. While this suggests that many sites will be encountered in surveys based upon the model, others might be missed when they occur outside of the Zone 1 bounds. There seems to be considerable room for improvement in characterizing prehistoric site distributions on the SRS.

Despite these weaknesses, the 1989 predictive model of the SRARP has been invaluable as a tool for limiting the scale of survey projects and for communicating potentially sensitive areas to non-archaeologists involved with land use on the SRS. The model was developed before the availability of a Geographic Information System (GIS) at the SRARP and thus incorporated only three environmental variables and applied univariate statistics in the modeling process. Significant improvements to the model should be realized incorporating more numerous environmental data sets and multivariate statistical evaluations of the data.

The future goals for predictive modeling on the SRS include developing new, multivariate models for both prehistoric and historic site distributions. A wide variety of environmental data are currently available or are otherwise being developed for this project by the staff of the SRARP. In particular, historic roads should prove to be as significant to the historic data as streams are to the prehistoric site distributions. The new models will appear in a future issue of Legacy.

Table 1. Statistics comparing the sensitivity zones to prehistoric sites (n=47) recorded during the 1998-2001 full coverage surveys. (Tabulated by J. Christopher Gillam)

<table>
<thead>
<tr>
<th>ZONE</th>
<th>% Cover</th>
<th>Expected Sites</th>
<th>Observed Sites</th>
<th>Chi-Square ($X^2$)</th>
<th>% of Sites</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0.325</td>
<td>0</td>
<td>none</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>10</td>
<td>18</td>
<td>7.478</td>
<td>38</td>
<td>more</td>
</tr>
<tr>
<td>2</td>
<td>49</td>
<td>23</td>
<td>18</td>
<td>1.168</td>
<td>38</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>13</td>
<td>11</td>
<td>0.268</td>
<td>23</td>
<td>none</td>
</tr>
</tbody>
</table>

where $X^2 \geq 3.84$ at 0.05 probability and 1 degree of freedom.