Modeling Wild Turkey Habitat Using GAP Landcover Data

Introduction
Wild turkeys (Meleagris gallopavo) occurred historically throughout eastern Kansas and along many river drainages to the west (Mitchener 2001). Unregulated hunting and habitat modification or destruction had eliminated wild turkeys from most of their original range in the U.S. by the end of the 19th Century (Kennamer et al. 1992). In the late 1950’s wild turkeys began to appear along the Arkansas River near Arkansas City in Sumner County. Some trapping and transplanting began there, and throughout the 1960’s KDWP began a series of releases of wild turkeys obtained from other states into areas where surveys documented potential habitat. In the 1970’s releases of birds trapped in state increased (Mitchener 2001).

The wild turkey is now an important game bird in Kansas; with over 45,000 permits and game tags sold annually to spring hunters and over 11,000 permits and game tags sold to fall hunters (Applegate and Robertson 2001). Kansas has recently ranked among the ten best states to turkey hunt in several popular articles. In 2001 the Kansas Department of Wildlife and Parks (KDWP) and the National Wild Turkey Federation began work on the Kansas Wild Turkey Management Plan. As part of the plan a mapping effort began to document locations of wild turkey populations and habitat.

Methods
1. The Kansas Department of Wildlife and Parks (KDWP) and the National Wild Turkey Federation (NWTF) conducted a survey of each county in Kansas to identify the locations of known wild turkey habitat. The survey was conducted by mailing a county map to wildlife officials in each county, and having them indicate the legal description (Township, Range, Section) in which they knew wild turkeys to occur. Post processing of the data was conducted to transform the legal descriptions to geographic coordinates that could be mapped using GIS. The results yielded a map of 8736 known wild turkey locations in the state of Kansas.

2. The PLSS grid for Kansas was processed to fill in missing grid cells over the Kansas River and military areas in eastern Kansas. Known turkey locations and Omernik ecoregion information was then added to each grid cell.

3. The Kansas GAP vegetation map was generalized down to 9 cover classes, smoothed using a 3x3 moving window, converted to a vector format, and intersected with the PLSS grid.

4. The percent coverage per grid cell of each land cover class was calculated. Statistics were then generated by ecoregion to compare the land cover composition between turkey and non-turkey grid cells.

5. For each ecoregion, the land cover variables were entered into logistic regression models using a forward stepwise approach to predict wild turkey habitat suitability.

6. The models were evaluated by their errors of omission and commission, then the unique coefficients and variable combination that had the “best” results for each ecoregion were applied to the data set.

Results
A visual assessment of the data sets show many similarities between the areas of predicted and known wild turkey habitat, with locations tending to occur in woody areas and follow riparian corridors. There were consistent themes between ecoregion models (grassland and woodlands), though the variables used and the coefficients varied. Of the 8,736 known wild turkey locations, the ecoregion specific models correctly identified 5,631 (64.4%) as being suitable habitat. By comparison, the GAP species distribution map correctly identified 5,560 points (63.6%). The primary difference between these models is the range of accuracy, with the ecoregion specific models producing a more consistent level of accuracy across the state.

Variables used for each ecoregion model and resulting accuracies

<table>
<thead>
<tr>
<th>Ecoregion</th>
<th>Forest</th>
<th>Mixed Grass</th>
<th>Tall Grass</th>
<th>Shrubland</th>
<th>Mixed Grass</th>
<th>Water</th>
<th>Wetland</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>25</td>
<td>75</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mixed Grass</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Tall Grass</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Shrubland</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mixed Grass</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Water</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Wetland</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Urban</td>
<td>5</td>
<td>90</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>60</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Known Turkey Locations

Kansas Counties
Omernik Ecoregions
Turkeys reported throughout county

Generalized GAP Landcover Map

Predicted turkey habitat probability
50% - 60%  61% - 74%  75% - 100%

Kansas Counties
Omernik Ecoregions
Turkeys reported throughout county

Contact Information:
Mike Houts, KARS Program
785-844-1035, mhouts@ku.edu
Mike Mitchener, KDWP
620-672-0796, mikewm@wp.state.ks.us