Wildland Fire in Southern Oregon: 
*Risk to Established Settlement*

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Research Question

- Which established settlements in Southwestern Oregon face the greatest difficulty in suppressing wildland fire?
DATA

- 10 Meter DEM
  - Slope
- Fire Behavior fuel model
- CONUS/MODIS Fire Detection
- Land-use/Zoning Layer
- Roads
- Census Block data
  - Dasymetric Population Distribution
Approach

Recategorizing the Data

Southern Oregon

CIRCUMSTANCES
Exceeds distance from towns
Kilometers
5
10
30
90
300

Southern Oregon

Cities and towns
Distance from roads
Kilometers
5
10
30
90
300

3/11/2010
Reclassifying the Data

Fuel Model Values for Estimating Fire Behavior

- 13 Fuel Models 4 Classifications:
  - Grasslands
  - Shrublands
  - Timber
  - Slash

<table>
<thead>
<tr>
<th>Fuel model</th>
<th>Typical fuel complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Short grass (1 foot)</td>
</tr>
<tr>
<td>2</td>
<td>Timber (grass and under)</td>
</tr>
<tr>
<td>3</td>
<td>Tall grass (2 feet)</td>
</tr>
<tr>
<td>4</td>
<td>Chaparral (0 feet)</td>
</tr>
<tr>
<td>5</td>
<td>Bristle (2 feet)</td>
</tr>
<tr>
<td>6</td>
<td>Darnel brush, hardwood slash</td>
</tr>
<tr>
<td>7</td>
<td>Southern rough</td>
</tr>
<tr>
<td>8</td>
<td>Timber litter</td>
</tr>
<tr>
<td>9</td>
<td>Closed timber litter</td>
</tr>
<tr>
<td>10</td>
<td>Hardwood litter</td>
</tr>
<tr>
<td>11</td>
<td>Timber litter and under</td>
</tr>
<tr>
<td>12</td>
<td>Slash</td>
</tr>
<tr>
<td>13</td>
<td>Light logging slash</td>
</tr>
<tr>
<td>14</td>
<td>Medium logging slash</td>
</tr>
<tr>
<td>15</td>
<td>Heavy logging slash</td>
</tr>
</tbody>
</table>

Fire Behavior based on:
- Fuel Load
- Distribution
*among fuel particle size classes

Fuel Models Reclassed into 8 Classes:
Factors for Reclassification:
- Rate of spread
- Flame Length
*Conditions based on wind speed of 5 mph, fuel moisture content of 8%, and live fuel moisture content at 100%
Analytical Hierarchy Process

<table>
<thead>
<tr>
<th></th>
<th>Distance From Settlement</th>
<th>Slope</th>
<th>Distance to Roads</th>
<th>Fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from Settlement</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Slope</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Distance to Roads</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

*Based on literature review and adjusted for our purposes

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Geometric Mean</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from Settlement</td>
<td>(1<em>3</em>5*7)^1/4</td>
<td>0.5638</td>
</tr>
<tr>
<td>Slope</td>
<td>(1/3)<em>1</em>3*5</td>
<td>0.2634</td>
</tr>
<tr>
<td>Distance to Roads</td>
<td>(1/5)*(1/3)<em>1</em>3</td>
<td>0.1178</td>
</tr>
<tr>
<td>Fuels</td>
<td>(1/7)<em>(1/5)</em>(1/3)*1</td>
<td>0.0550</td>
</tr>
<tr>
<td>Sum</td>
<td>5.677569</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

![Southern Oregon Hazard Map Index of Risk to Fire](image)
Dasymetric Population Density

Results

Composite Map of Fire Risk Hazard vs. Population Density

Higher values indicate areas with greater population density or areas with higher difficulty in suppressing fires.
Limitations

- Complex nature of fire behavior
- Subjectivity of analysis parameters
  - (Expert knowledge and more data needed)

References

Questions?