**Overlay Analysis in GIS**

Gathering information from multiple data layers

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**Vector Data**

- Coordinate-based data structures commonly used to represent map objects. Each object is represented as a list of X,Y coordinates.
- Examples - trees, poles, roads, housing developments, zoning districts

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**Raster Data**

- Cell-based representation of map features. Each cell has a value. A group of cells with the same value represent a feature.
- Examples - satellite imagery, aerial photography and some come from software packages like GRID and ERDAS.

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**Point / Polygon overlay**

- Multiple layers of data are in relative position with one another - inserting a "digital pin" through the stack of overlaid data.
- This allows questions to be answered concerning everything occurring at a particular location.
- This view of the world limits focus to a particular point and precludes wide-area landscape analysis.

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GIS Overlay Analysis - Points

<table>
<thead>
<tr>
<th>Overlay type</th>
<th>ArcView 3x</th>
<th>ArcGIS 9x</th>
<th>ArcInfo Workstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point to Polygon</td>
<td>Geoprocessing Wizard – Spatial Join</td>
<td>Join and Related Join – Join data based on spatial location</td>
<td>Arc: identity</td>
</tr>
<tr>
<td>Point to Grid</td>
<td>Spatial Analyst: Analysis – Tabulate Areas</td>
<td>Spatial Analyst: Raster Calculator</td>
<td>GRID: sample</td>
</tr>
<tr>
<td></td>
<td>or Script: samplegridsave</td>
<td>[Toolbox – Spatial Analyst Tools: Extraction – Extract by Points or Polygon]</td>
<td></td>
</tr>
</tbody>
</table>

Region Wide: "Cookie Cutter Approach"

Vector data
- Clip
- Intersect – Union

Raster data
- GRID clip (masking)
- Zonal statistics (GRID)
- Combine

Fire Start Locations & Vegetation (GAP)

Idaho State 1986-1992, Fire and Vegetation

What covertypes burned in the Selway-Bitterroot Wilderness in year 2000?

Fire perimeters 2000
Zonal statistics

- Zones can be continuous or non-continuous
  - The zone layer can be raster or vector
  - The value layer must be a RASTER
  - Many statistics are computed: mean, median, standard deviation, min, max, variety, majority, range
  - Selected statistic can be charted
Output from Tabulate Area

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Forest</th>
<th>Grassland</th>
<th>Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200</td>
<td>543</td>
<td>893</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>123</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>100</td>
<td>920</td>
</tr>
<tr>
<td>4</td>
<td>45</td>
<td>0</td>
<td>1001</td>
</tr>
</tbody>
</table>

Map components

- Main map
- Legend
- Title
- Scale bar
- North Arrow
- Data source
- Locator map (if applicable)

GIS Analysis Tasks

1. Make a MAP Ex 1
2a. Create a GIS project for Craig Mountain
   - Add vector data: Roads, Streams, Land ownership, County boundaries
   - Add raster data: Elevation, Vegetation
2b. Apply overlay analysis tools and Xtools to the Craig Mountain datasets

GIS Tips!

- Avoid using folder and file names that includes a space. Rather than naming a folder 'GIS Data' name it 'GISData' or 'GIS_Data'
- Use ArcCatalog for management of GIS data (copying, moving, renaming etc.). If you use Windows Explorer for data management you may corrupt or loose GIS data.
- Manage your data well. Keep all data related to a project in the same main folder. This enables you to back up and transfer your entire project to a CD or DVD when finished.

Craig Mountain Wildlife Management Area

Elevation range: 230-1740 m
The flat top of Craig Mountain is forested

Craig Mountain mid elevations

North-facing forested slope

South-facing slope

Flat benches above the river

Yellow starthistle and other exotics

Photo: S. Bunting
Low elevation benches

Photo: S. Bunting

Landsat image July 2000

Landsat 7
Path 42 row 28
July 27, 2000

Landsat image August 2000

In mid August in year 2000 the southern half of Craig Mountain burned in the Maloney Creek wildfire

Craig Mountain before and after fire

July 27, 2000
August 28, 2000

Craig Mountain Cover Types

Disturbed Grassland
Exposed Grassland
Exposed Rock
discover
dryland
Mixed Mesic Forest
Montane Parkland and Meadow
Ponderosa Pine
Riparian or Floodplain Streamside Dominated Riparian
Riparian or Floodplain Streamside Dominated Riparian
Riparian or Floodplain Streamside Dominated Riparian
Shrub Dominated Riparian
Agriculture
Water

THE END