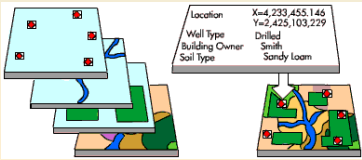


## Overlay Analysis in GIS

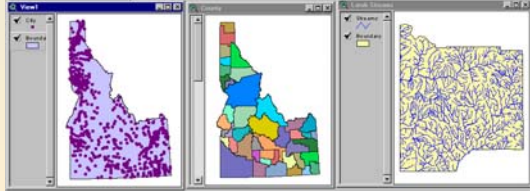
Gathering information from multiple data layers



## Vector Data

Coordinate-based data structures commonly used to represent map objects. Each object is represented as a list of X,Y coordinates

Examples - tree, poles, roads, housing developments, zoning districts

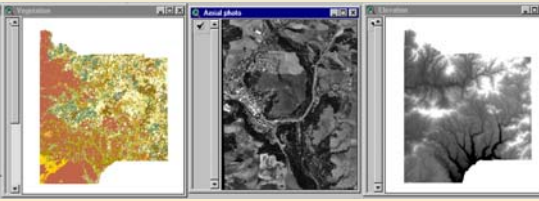


Points                  Polygons                  Lines

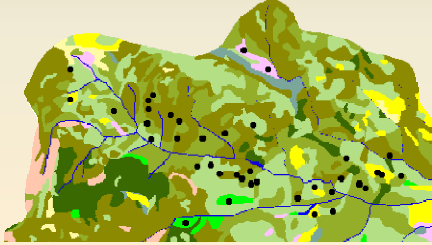
## Raster Data

Cell-based representation of map features. Each cell has a value. A group of cells with the same value represent a feature.

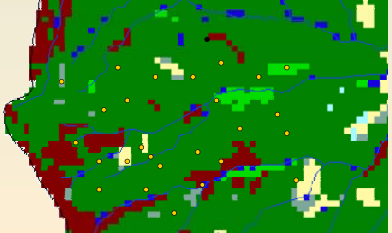
Examples - satellite imagery, aerial photography and some come from software packages like GRID and ERDAS.



## Point / Polygon overlay



## Point / GRID overlay

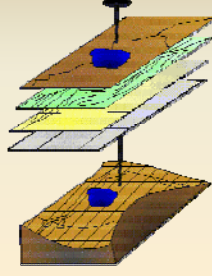


## "Piercing Needle" Approach

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.

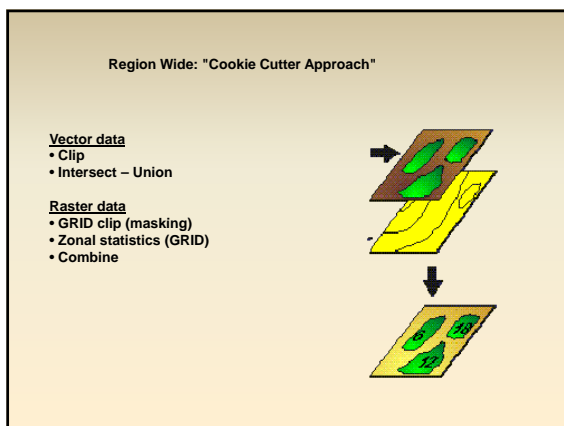
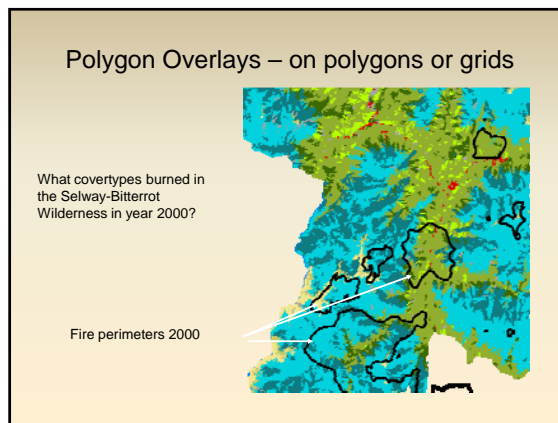
This view of the world limits focus to a particular point and precludes wide-area landscape analysis.



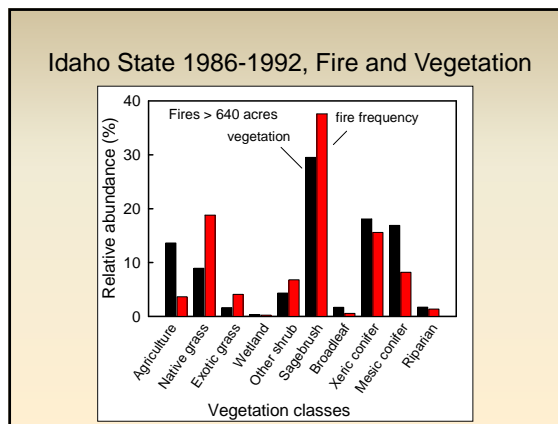
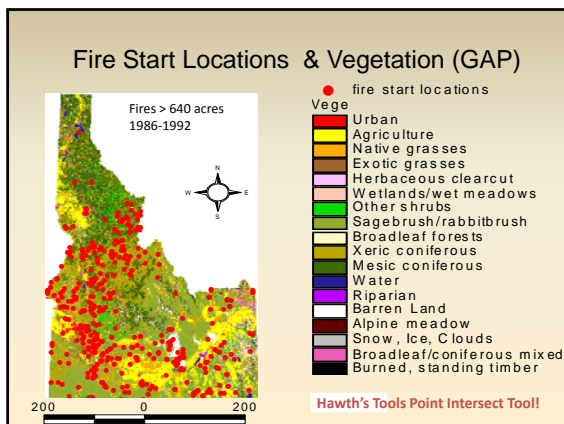
### GIS Overlay Analysis - Points

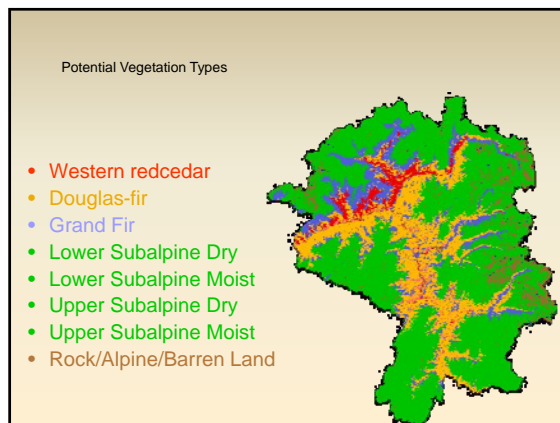
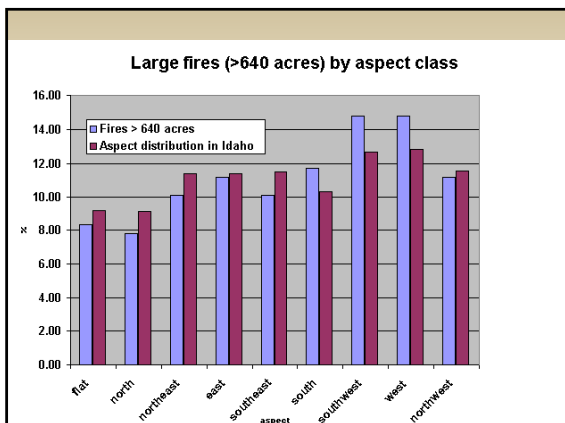
Overlay type	ArcView 3x	ArcGIS 9x	ArcInfo Workstation
Point to Polygon	Geoprocessing Wizard – Spatial Join	Join and Relates: Join – Join data based on spatial location	Arc: Identity
Point to Grid	Spatial Analyst: Analysis – Tabulate Areas or Script: samplegrids.ave	Spatial Analyst: Raster Calculator  Toolbox – Spatial Analyst Tools-Extraction-Extract by Points or Sample	GRID: sample

Hawth's Tools Point Intersect Tool!



Overlay type	ArcView 3x	ArcGIS 9x	ArcInfo
Poly to Poly	Geoprocessing Wizard – Intersect or Union	Toolbox – Analysis Tools – Overlay – Union or Intersect	Arc: Intersect Arc: union Arc: Identity
Poly to Grid	Spatial Analyst: Analysis – Tabulate Areas  Spatial Analyst – Zonal Statistics	Convert the polygon cover to a grid or the grid to a polygon  Spatial Analyst – Zonal Statistics	GRID: zonalstats
Grid to Grid	Spatial Analyst: Analysis – Tabulate Areas or Extension: Grid Transformation Tools – Transform Grids – <u>Combine</u>	Spatial Analyst: Raster Calculator Combine(grid1, grid2) Spatial Analyst: Analysis – Zonal-Tabulate Areas	GRID: combine



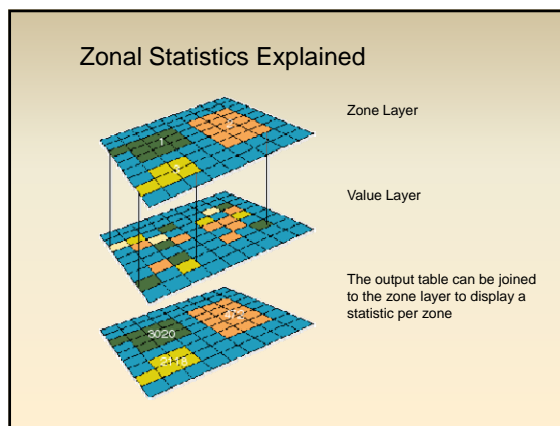


## Spatial Analyst in ArcGIS

### Zonal Statistics

Statistics are calculated for each zone in a zone dataset based on values from another dataset

Example: Calculate mean elevation within forest stands  
 Zone dataset: forest stands  
 Value dataset: elevation



- ### 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

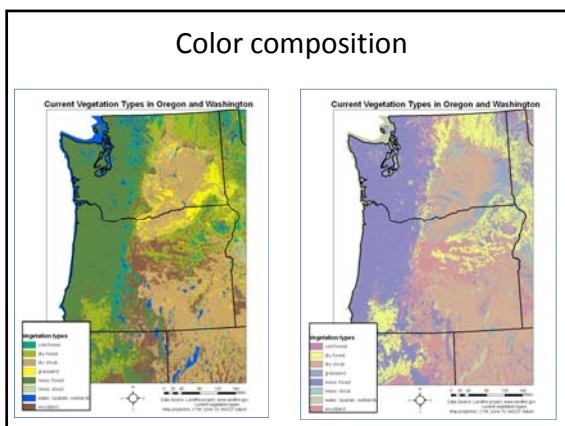
### Tabulate Areas analysis in Spatial Analyst

### Output from Tabulate Area

	Forest	Grassland	Agriculture
Watershed 1	200	543	893
Watershed 2	0	123	5
Watershed 3	300	100	920
Watershed 4	45	0	1001

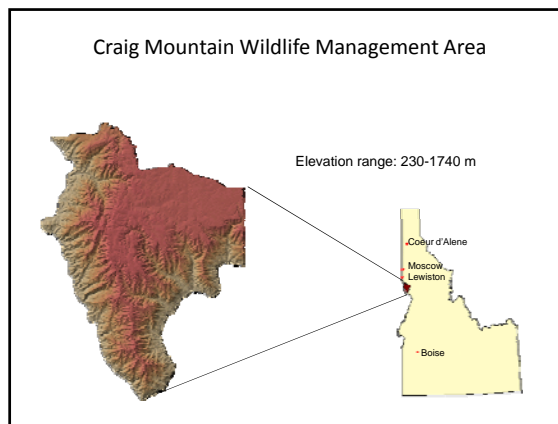
### Map components

- 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.



The flat top of Craig Mountain is forested



Craig Mountain mid elevations



Photo: S. Bunting

North-facing forested slope



South-facing slope



Flat benches above the river



Photo: S. Bunting

Yellow starthistle and other exotics



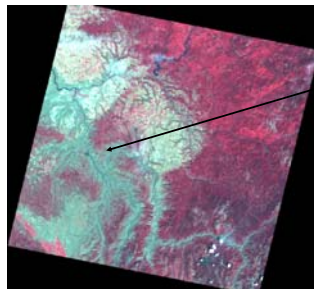
Photo: S. Bunting

Low elevation benches



Photo: S. Bunting

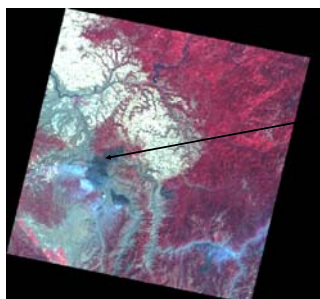
Landsat image July 2000



Craig Mountain Area

Landsat 7  
Path 42 row 28  
July 27, 2000

Landsat image August 2000



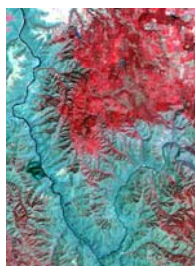
In mid August in year 2000 the southern half of Craig Mountain burned in the Maloney Creek wildfire

Landsat 7  
Path 42 row 28  
August 28, 2000

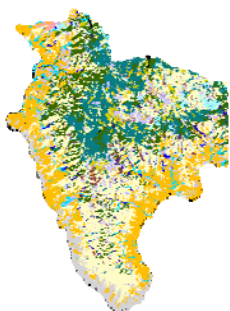
Craig Mountain before and after fire

July 27, 2000

August 28, 2000



Craig Mountain Cover Types



- Disturbed Grassland
- Foothills Grassland
- Exposed Rock
- Douglas-fir
- Mixed Mesic Forest
- Montane Parkland and Meadow
- Ponderosa Pine
- Mesic Upland Shrub
- Heabaceous Clearcuts
- Warm Mesic Shrub
- Broadleaf Dominated Riparian
- Needleleaf Dominated Riparian
- Graminoid or Forb Dominated Riparian
- Shrub Dominated Riparian
- Agriculture
- Water

THE END