Introduction to GIS

University of Maryland Libraries
GIS and Spatial Data Center

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GIS Services in the Libraries

- Workshops - 10 offerings available
  - Geospatial tools in R coming soon
- 1:1 consulting, collaboration
- Customized guest lectures/lab exercises
- Geospatial Researcher in Residence Program
- GIS lab in 4120 open for use during Library hours
- Access to free online tutorials and software trials
- See www.lib.umd.edu/gis for more information

Add'l Research Services

- Research Commons services:
- General research assistance
  - Proposals, ORAA requirements, presentations, etc.
- Data management
- Statistics consulting
- 3D scanning and printing; video editing
- Funding for open access publishing
- See www.lib.umd.edu/rc for more information

Workshop Outline

1. Introduction – What is GIS?
2. What does GIS do and who uses it?
3. ArcGIS exercises at your own pace.
4. Questions and concerns throughout – feel free to ask questions at any time!

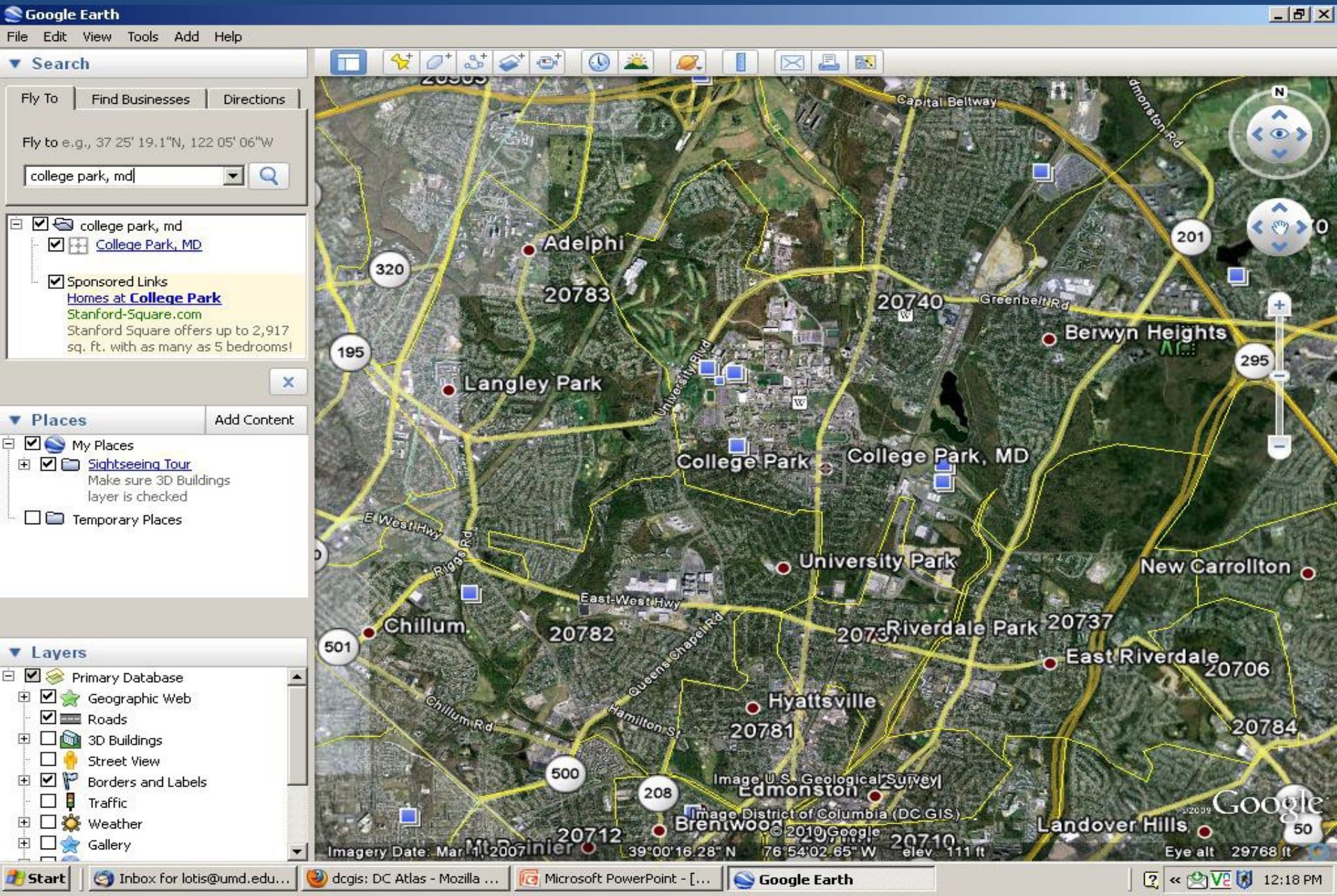
What is GIS?

- **G**eographic **I**nformation **S**ystem

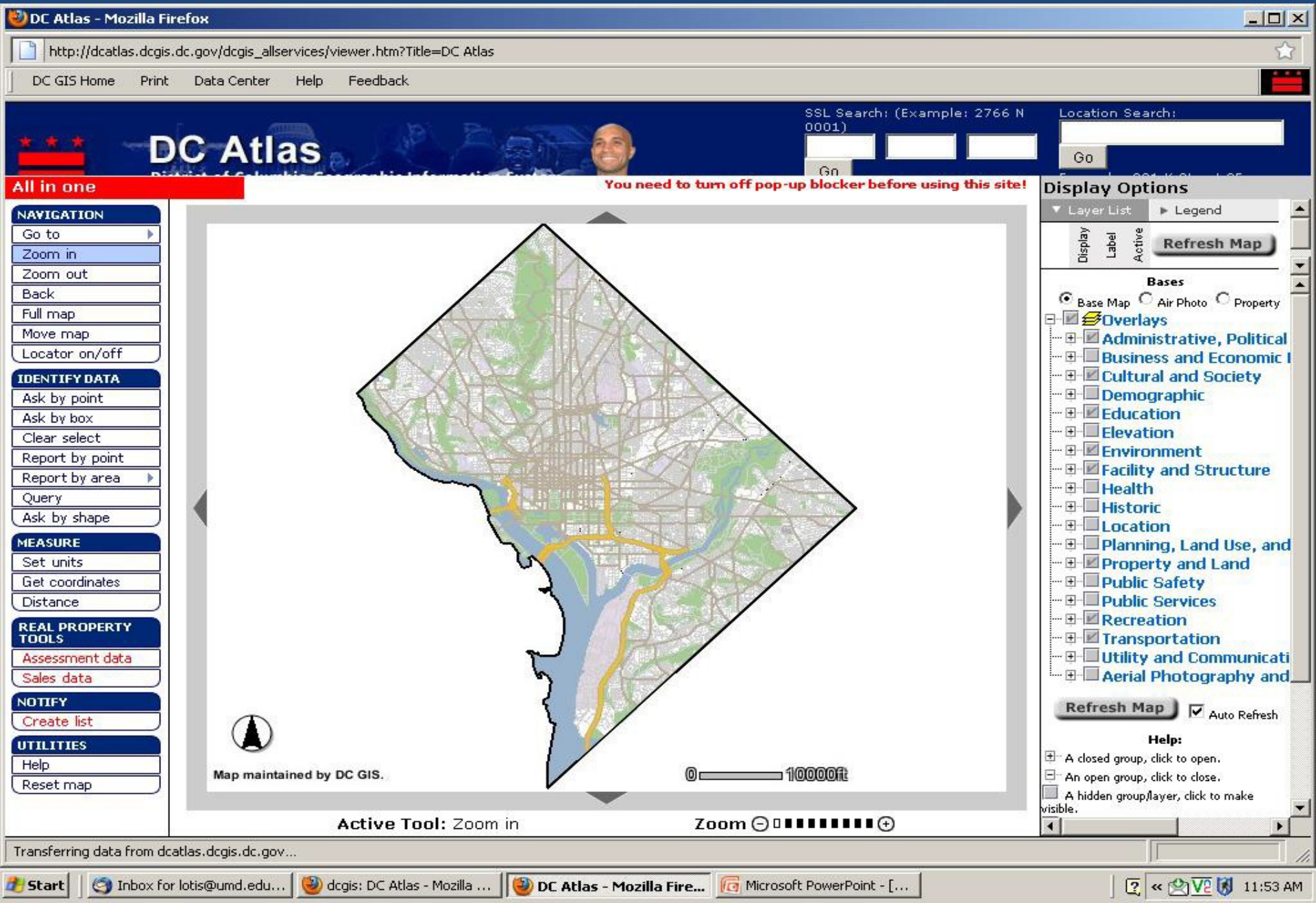
- "a system for the management, analysis, and display of geographic information" (*What is ArcGIS*, ESRI Press, 2004)

- Mapmaking software
- A way to visualize information

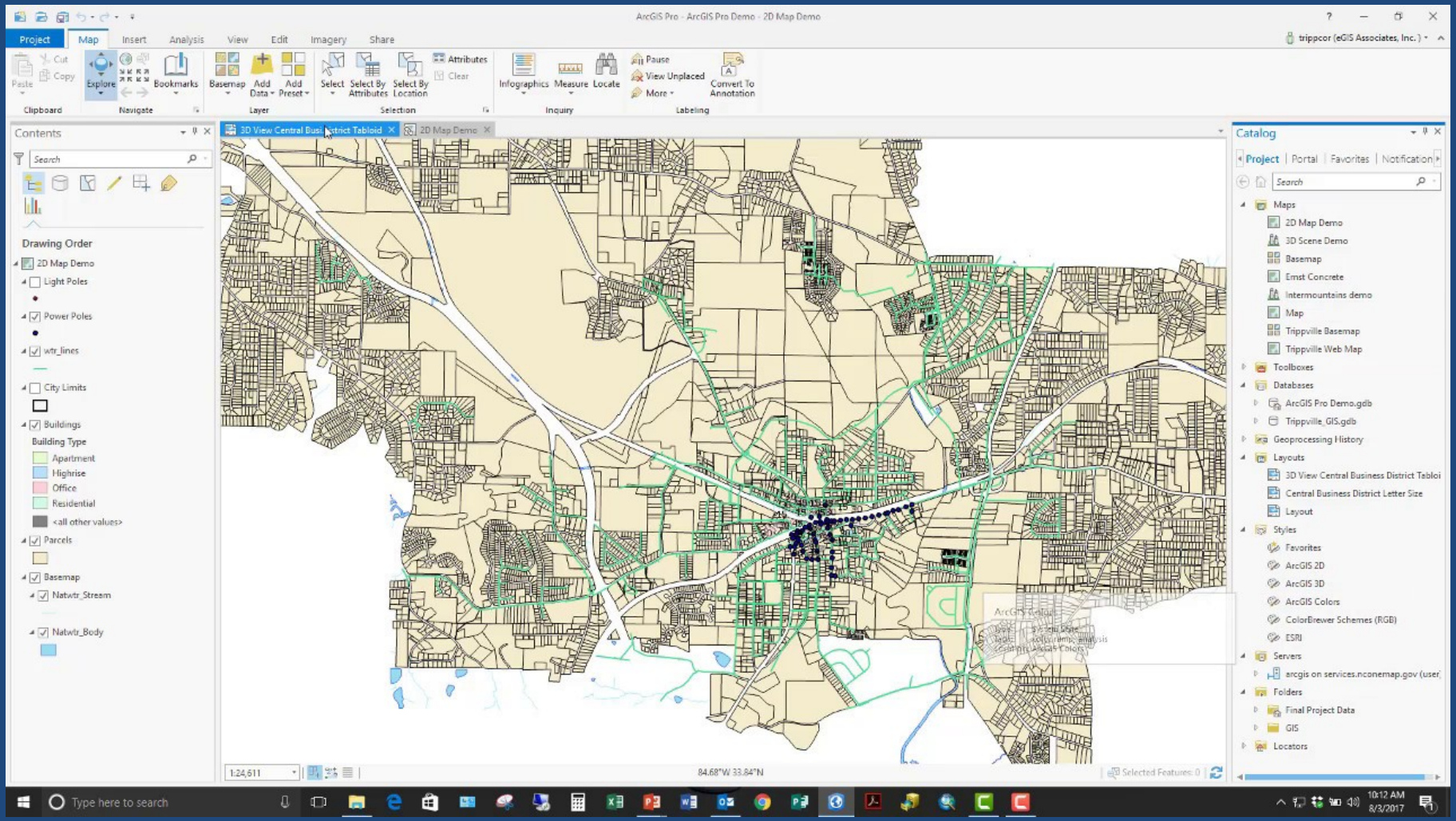
Google Earth – Sort of a GIS (Can add data; projection is imprecise)



DC Atlas – Almost a GIS. (Query, look at layers--but can't add)



ESRI's ArcGIS Pro– the most popular GIS software. (Expensive)



What makes a GIS?

- Add and edit data
- Make queries
- Use various map projections for accuracy
- Work with vector and raster data
- Make map layouts
- Read specific file types (shp, gdb, kml, etc.)
- Store data

Proprietary vs. Open Source

Proprietary

- ESRI ArcGIS

Open Source/Free

- GRASS
- Quantum GIS (QGIS)
- DIVA-GIS

GIS (ESRI) on UMD Campus

- In McKeldin Library
  - On all public computers
  - Contact Dr. Kelley O'Neal in the GIS and Spatial Data Services Center at kelleyo@umd.edu

- Other campus computer labs or terminals (access may be limited due to licensing)

GIS Courses at UMD

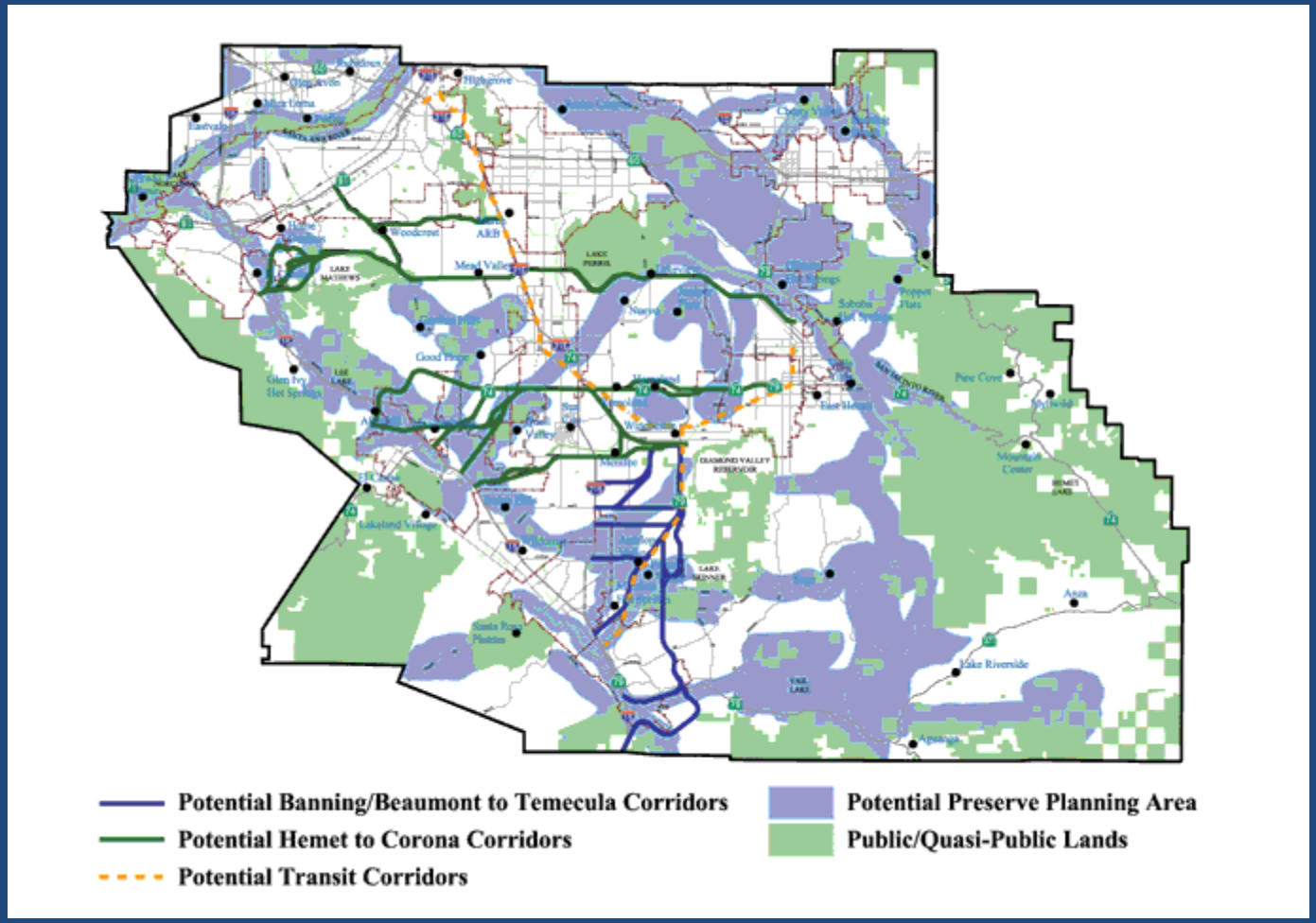
- Geography Department
  - GEOG 170, **306**, 372, **373**, 376, 472, **473**, 475, 476
- Urban Studies
  - URSP 612
- Government & Politics (may be cross-listed)
  - GVPT 729
- Computer Science
  - CMSC 725
- Civil & Environmental Engineering
  - ENCE 200
- Criminology / Criminal Justice
  - CCJS 699
- Landscape Architecture
  - LARC 221, 341

Who Uses GIS?

- Municipalities and urban planners
- Public health professionals
- Federal government
- First responders
- Video game designers
- Cartographers
- Military
- Etc., etc.

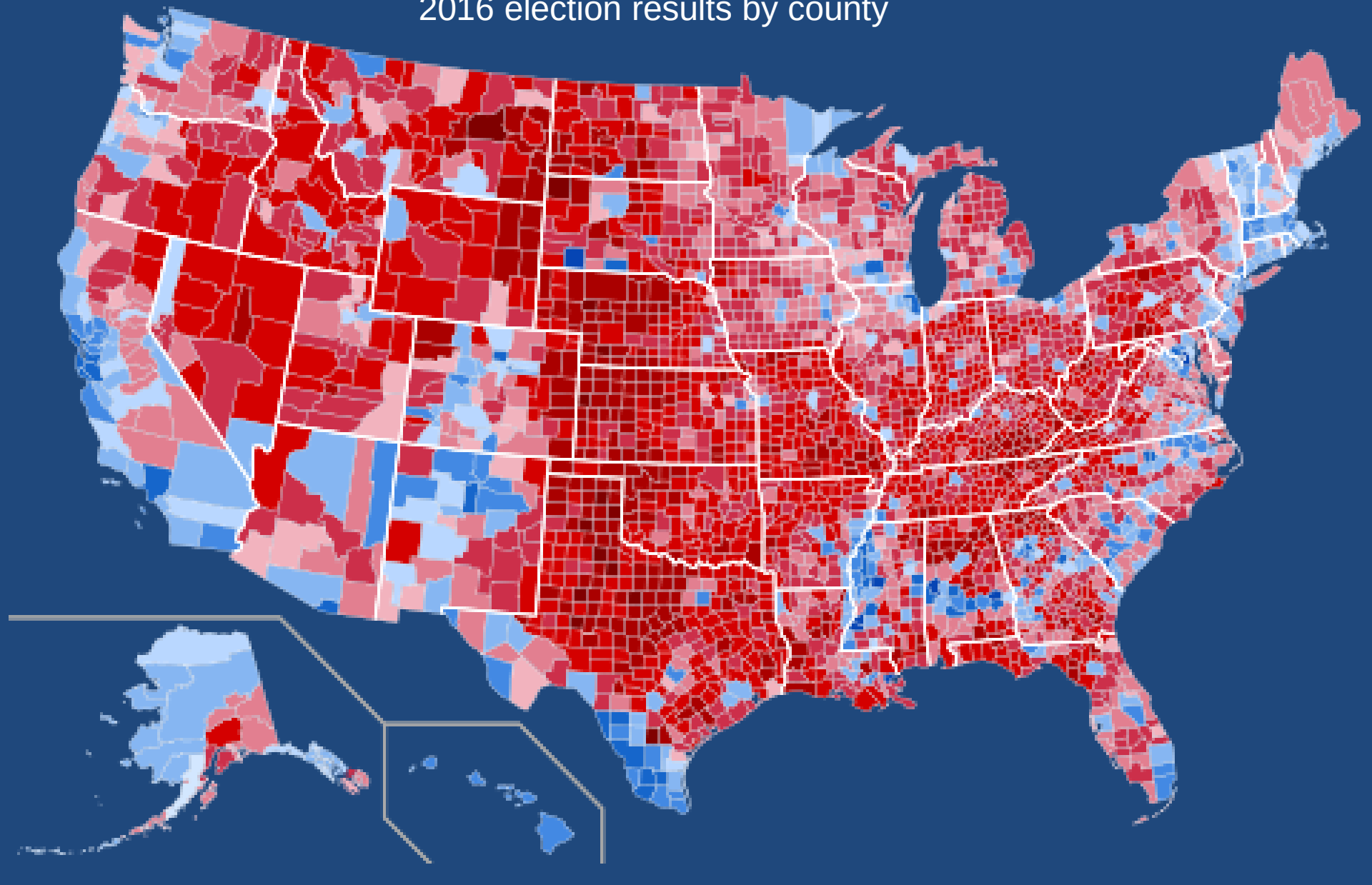
GIS for Urban Planning

Riverside County, CA (from http://www.fhwa.dot.gov/tcsp/case7.html)



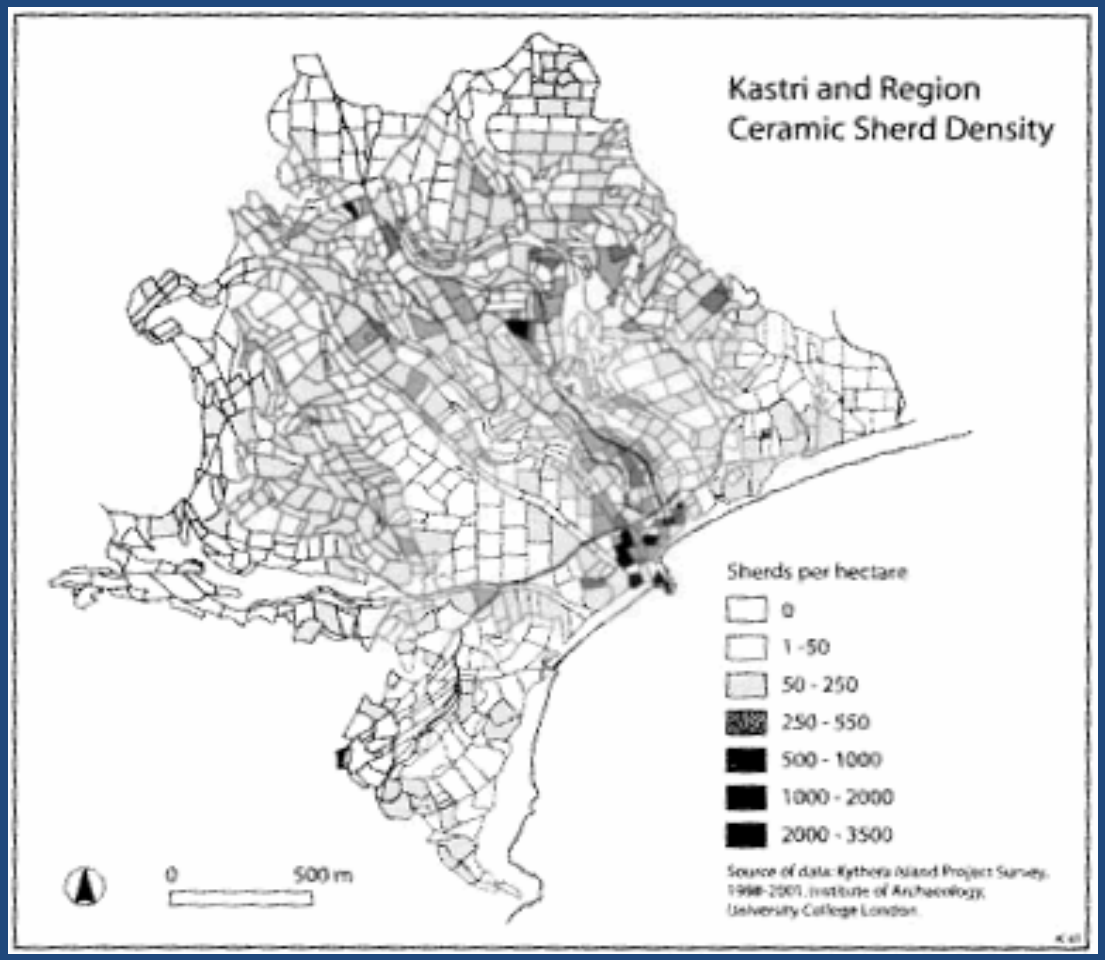
GIS for Politics

2016 election results by county

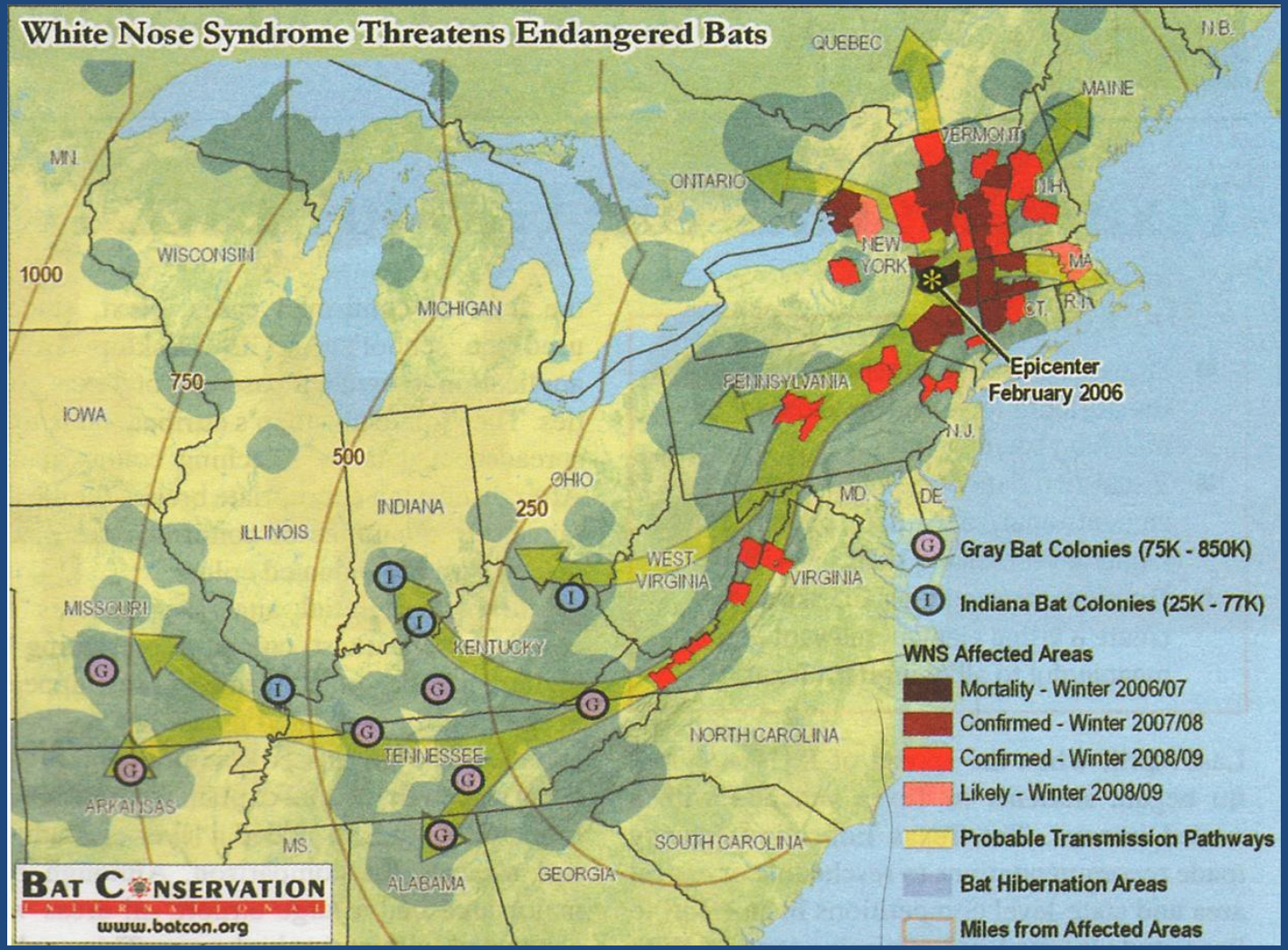


GIS for archaeology

(Image from *Geographical Information Systems in Archaeology* / Conolly and Lake)



GIS for environmental / natural resources / health



Why is GIS so great?

- Fast, powerful, interactive!
  - You can ask it questions—can't do that with paper maps.
  - Analysis and comparisons.
  - Easy layering.
  - Easy projection and changes of projection.
  - Land, water, space, time – works for all of them.

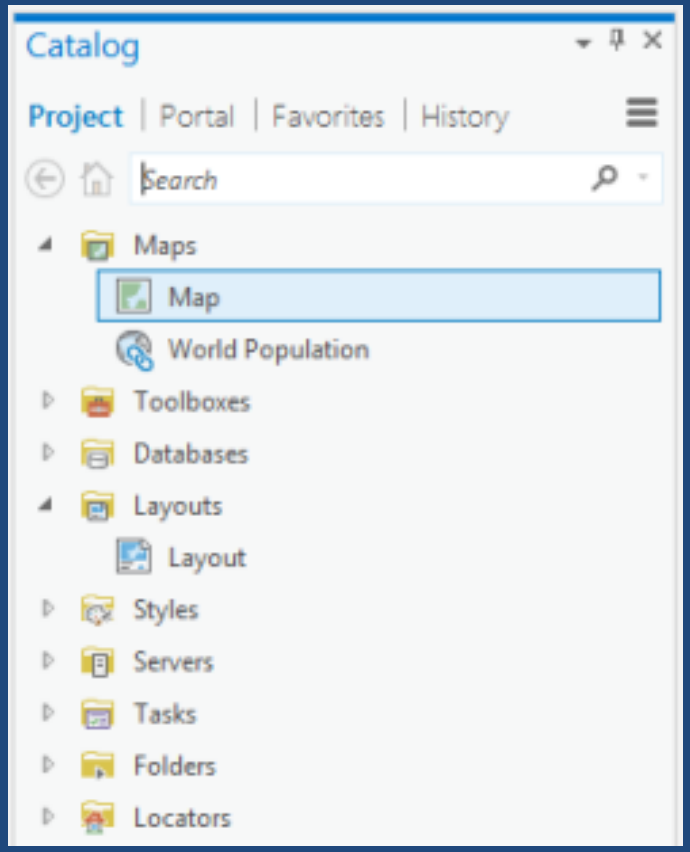
GIS Hazards

- Ugly or misleading maps
- Bad data
  - No metadata
  - No projection information
  - Incomplete fields
- Difficulty finding data

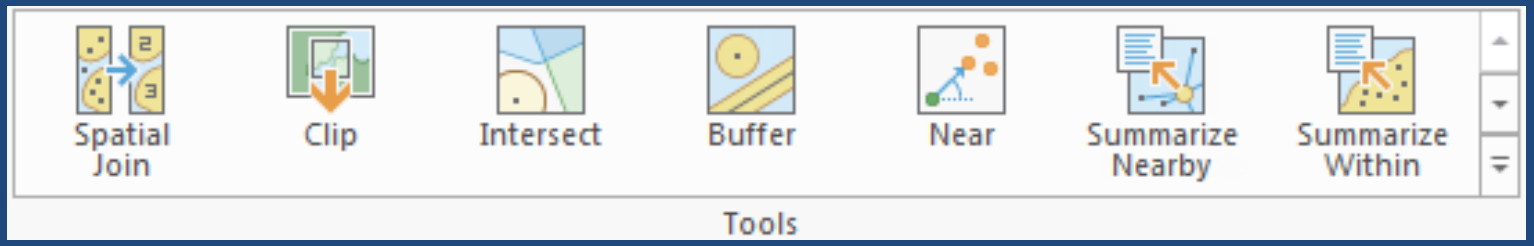
Working with a GIS

- Finding your data.
- Cleaning up and assessing your data.
- Querying and analyzing your data.
- Making your data into useful maps.

ArcCatalog


Catalog
Project
Portal
Favorites
History
Search
Maps
Map
World Population
Toolboxes
Databases
Layouts
Layout
Styles
Servers
Tasks
Folders
Locators

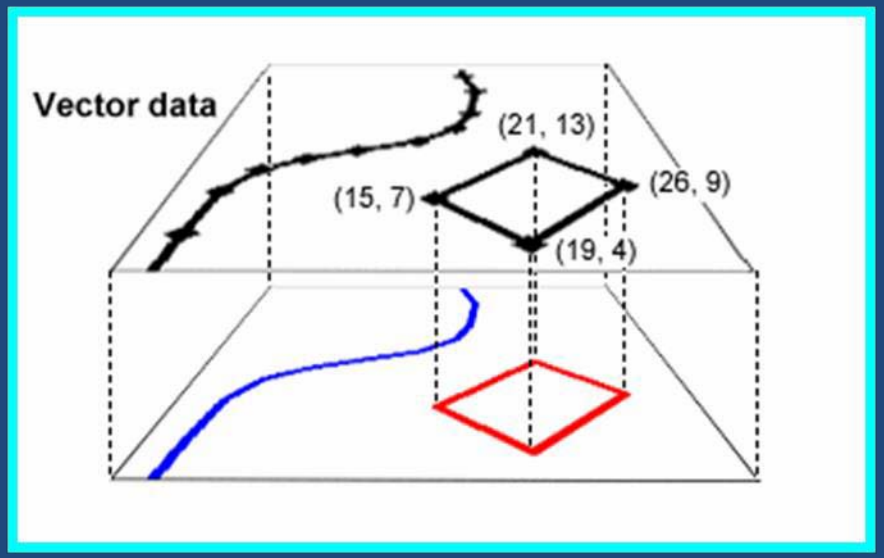
ArcGIS Pro Toolboxes

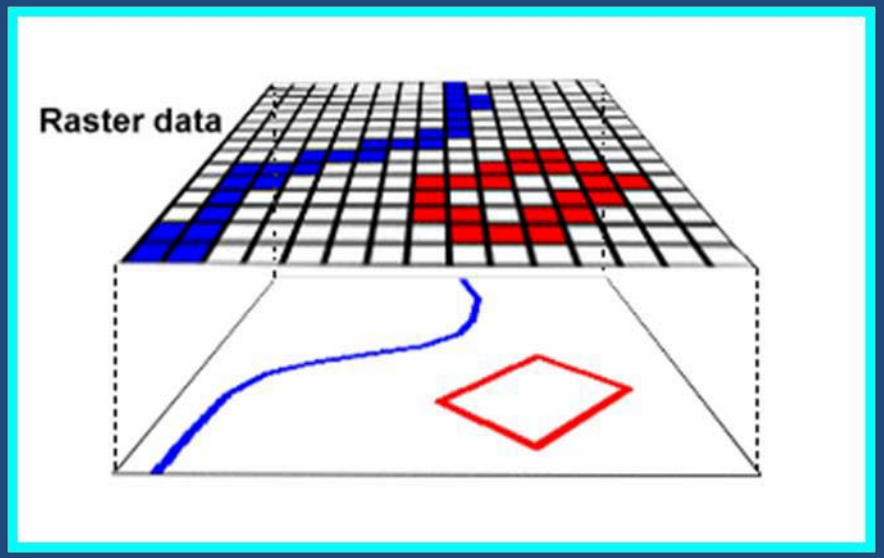


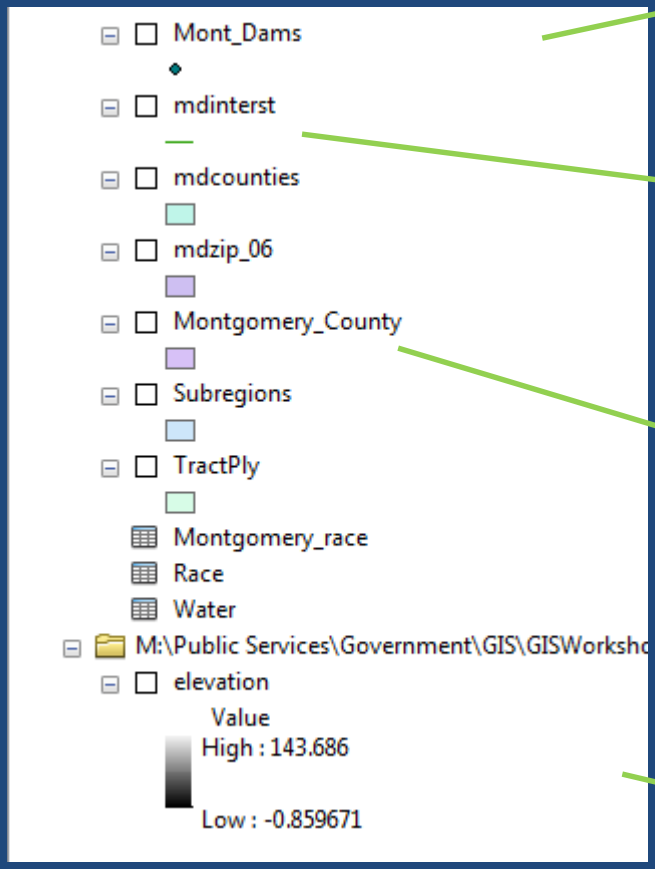
GIS Data

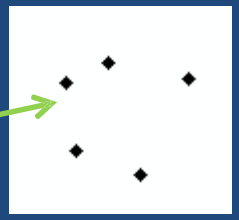
Vector - uses geometric objects (points, lines and polygons) to represent real features on the earth's surface such as light poles, roads and buildings. Ideal for discrete themes with definite boundaries.

Raster - is composed of a continuous grid of cells that represent a portion of the earth's surface. Ideal for continuous themes where there is lots of change.

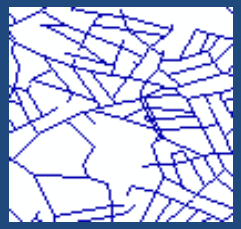




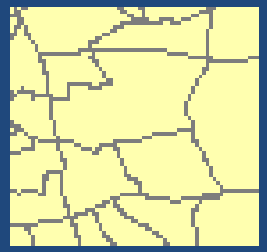




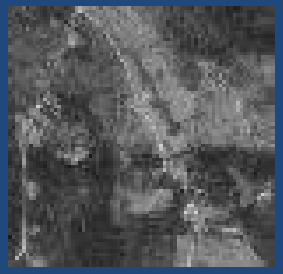
Point



Line

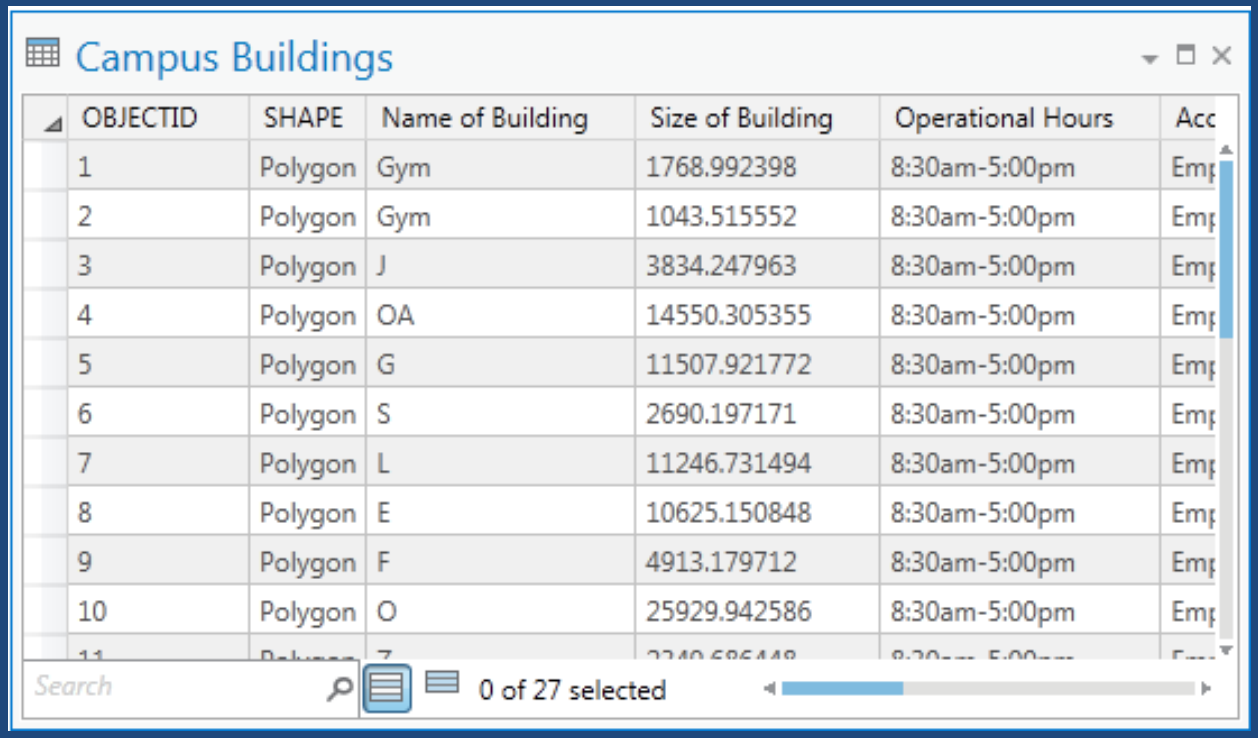


Polygon



Raster

GIS Data - Attribute Table



Let’s Go!

ArcGIS Exercises

lib.umd.edu/gis/workshops