Introduction to ArcGIS

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CFDR Workshop Series
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Thank you to Michael Castro for creating the step-by-step handout.
What is GIS?

• A geographic information system (GIS) lets us visualize, question, analyze, interpret, and understand data to reveal relationships, patterns, and trends.

• A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared.

• Typically present data in thematic maps.

(http://www.esri.com/what-is-gis)
Example of a Thematic Map

2012 Election Results

(http://elections.huffingtonpost.com/2012/results)
What Can You Do with GIS?

- Map Where Things Are  
  Where TARS respondents live now
- Map Quantities  
  Percent of Hispanics in population
- Map Densities  
  Population per square mile
- Map Change  
  Change in poverty: 2000 to 2010
- Find What’s Inside  
  Location of drug-related arrests
- Find What’s Nearby  
  Nearest family planning center

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### What Can You Do with GIS?

- **Map Where Things Are**
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New to ArcGIS?

Start by replicating an existing map

• **Census Briefs - The Hispanic Population: 2010**
  – Figure 5. Hispanic or Latino Population as a Percent of Total Population by County: 2010
Mapping Percent Hispanic

What You Will Need

Software:
- ArcGIS version 10

Data:
- Demographic Data by County (Shapefile)
- State Boundaries (Shapefile)
- U.S. Boundary (Cartographic File)
Where To Download Data

• Demographic Data by County (Shapefile)
  – http://www.census.gov/geo/maps-data/data/tiger-data.html

• State Boundaries (Shapefile)
  – http://www.census.gov/cgi-bin/geo/shapefiles2010/layers.cgi

• U.S. Boundary (Cartographic File)
  – http://www.census.gov/geo/www/cob/cbf_state.html

• Extract all files to the same folder
WARNING!!!

• Do not rename files
• Do not delete files that you do not think you are using
Using ArcMap

• Make new map
• Add data – connect to folder if necessary
  – County_2010Census_DP1.shp
  – tl_2010_us_state10.shp
  – gz_2010_us_040_00_20m.shp
• Clip map to reflect coastline boundaries
Clipping County Shapefile

• Geoprocessing → Clip
  – Input Features:
    County_2010Census_DP1
  – Clip Features:
    gz_2010_us_040_00_20m
  – Output Feature Class:
    C:\Documents and Settings\sburgoy\Desktop\ArcGIS Workshop\New Counties.shp
Clipping State Shapefile

• Geoprocessing → Clip
  – Input Features:
    tl_2010_us_state10
  – Clip Features:
    gz_2010_us_040_00_20m
  – Output Feature Class:
    C:\Documents and Settings\sburgoy\Desktop\ArcGIS Workshop\New States.shp
Using ArcMap (continued)

- Remove old data
  - County_2010Census_DP1
  - tl_2010_us_state10
  - gz_2010_us_040_00_20m

- Make New States outline only
  - Hollow, Width = 1.15, Outline Color = Black

- Change map projection
Problem: The Earth is Round & Maps are Flat

Solution:

• Change map projection to fix distortion
  – New Projection: USA Contiguous Albers Equal Area Conic

• Equal area projections preserve area, so many thematic maps use an equal area projection

• Maps of the United States commonly use the Albers Equal Area Conic projection
Creating Percent Hispanic Field

• Open attribute table for New Counties

• Add Field…
  – Name: PerHisp
  – Type: Double

• Use Excel file (DP_TableDescriptions.xls) to identify field names for Hispanic population (DP0100002) and total population (DP0100001)

• Field calculator
  – ([DP0100002] / [DP0100001]) * 100
Visualizing Percent Hispanic

• Open layer properties for New Counties

• Symbology Tab ➔ Quantities ➔ Graduated Colors
  – Value: PerHisp
  – Color Ramp: Yellow to Red
  – Classes: 5

• Classify…
  – Method: Manual
  – Break Values: 5.0, 16.3, 25.0, 50.0, 100.0

• Label: Less than 5.0, 5.0 to 16.2, 16.3 to 24.9, 25.0 to 50.0, More than 50.0
Creating a Printable Map

• View → Layout View
• File → Page and Print Setup → Landscape
• Right-click → Distribute → Fit to Margins
• Zoom to Contiguous U.S.
• Remove border
• Copy map, paste, resize, reposition, repeat
  – Zoom to Alaska
  – Zoom to Hawaii
Problem: Alaska and Hawaii Look Funny

• USA Contiguous Albers Equal Area Conic projection is for contiguous states only

Solution:

• Change map projection for Alaska
  – New Projection: NAD 1983 StatePlane Alaska 1 FIPS 5001 Feet

• Change map projection for Hawaii
  – New Projection: NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet
Looks Like a Map to Me
But Not as Good as This One
Making an Aesthetically Pleasing Map

• Change background color for AK & HI
• Add:
  – Legend
    • Flip symbols and reverse sorting (all 3 layers)
  – Scale bars
  – Border
  – Map Information Box
    • Title
    • Name and affiliation
    • Source
Export the finished product: .gif, .jpeg, .pdf, .png, etc

Save the map:
ArcMap Document (.mxd)
Hispanic or Latino Population as a Percent of Total Population by County: 2010

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Source: U.S. Census Bureau Cartographic Boundary Files, TIGER/Line® Shapefiles and TIGER/Line® Files, and TIGER/Line® Shapefiles Pre-joined with Demographic Data.
Conclusion

• You’re not a Map Master quite yet

• Practice replicating existing maps
  – Practice makes perfect
  – ArcGIS requires a lot of trial and error
  – Incorporate your own creative style

• Create new maps to supplement your research
Conclusion

• Look for additional ArcGIS documents on the CFDR website (coming soon)

• Take the Geographic Information Systems course (SEES 5100) in Fall 2013

• Contact the CFDR for assistance with future maps at cfdr@bgsu.edu