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.

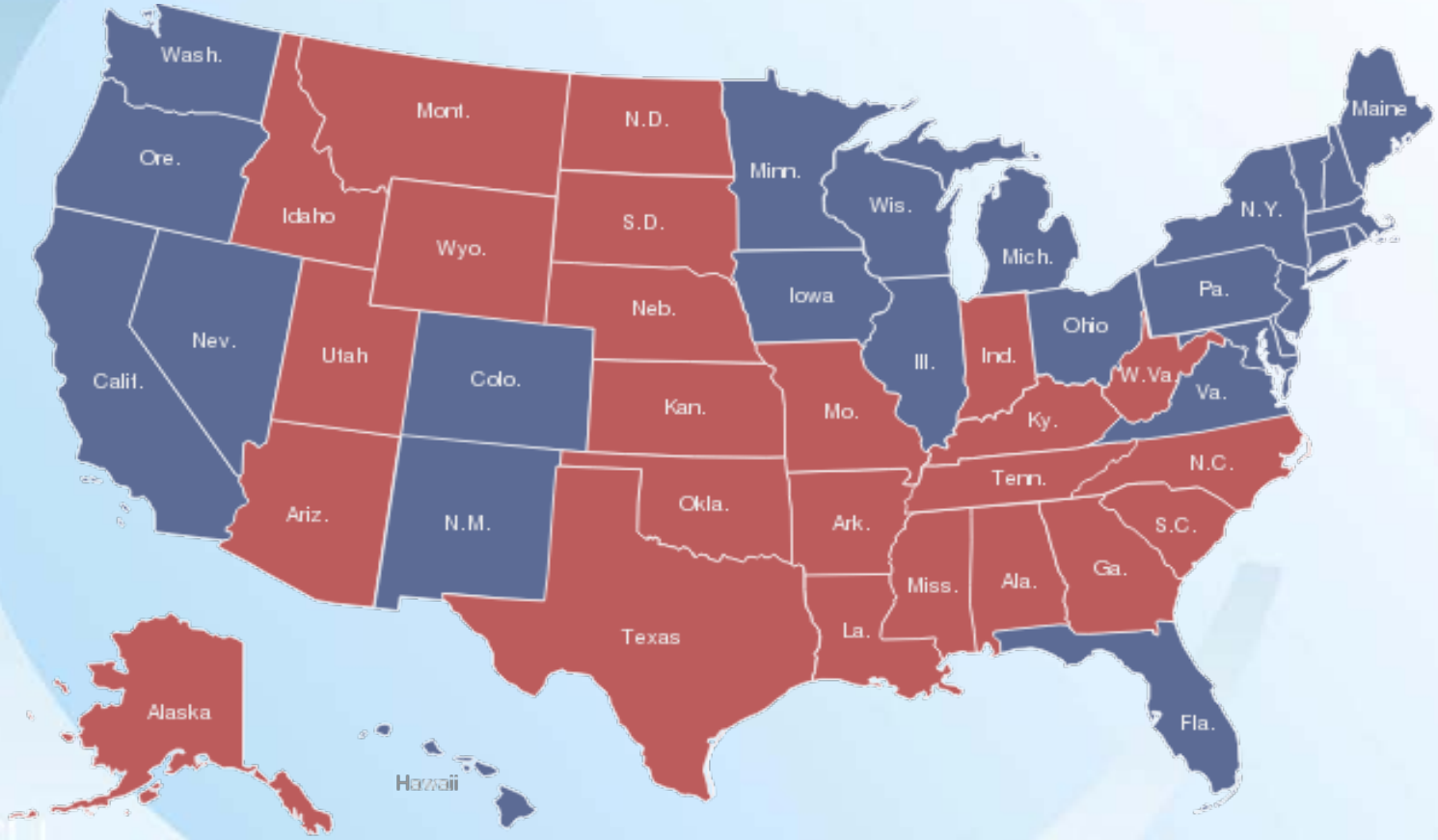
What is GIS?

- 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)

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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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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

clip…clip…clip…clip…clip…clip…clip…clip…clip…clip…clip…clip…clip

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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

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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

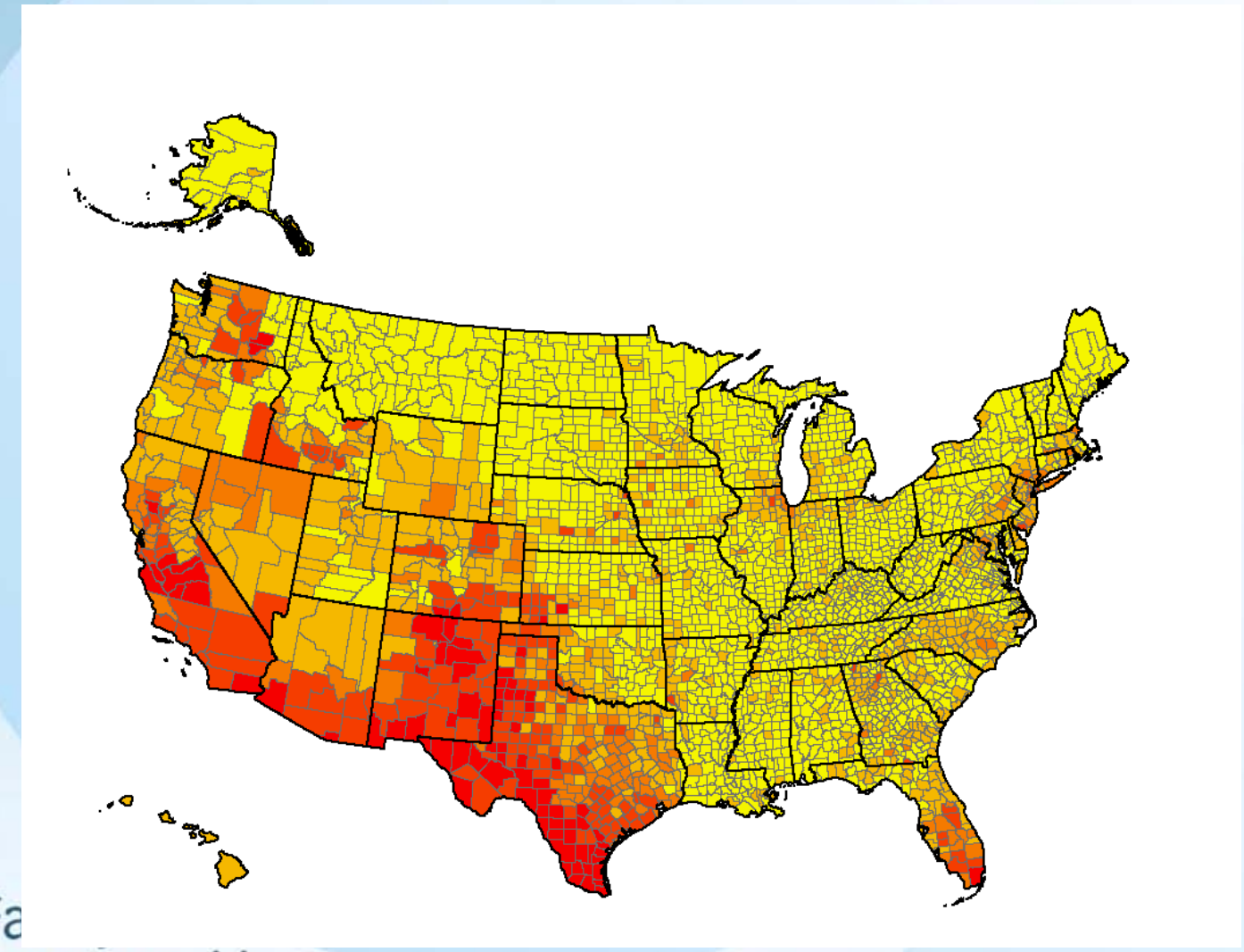
Problem: Alaska and Hawaii Look Funny

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

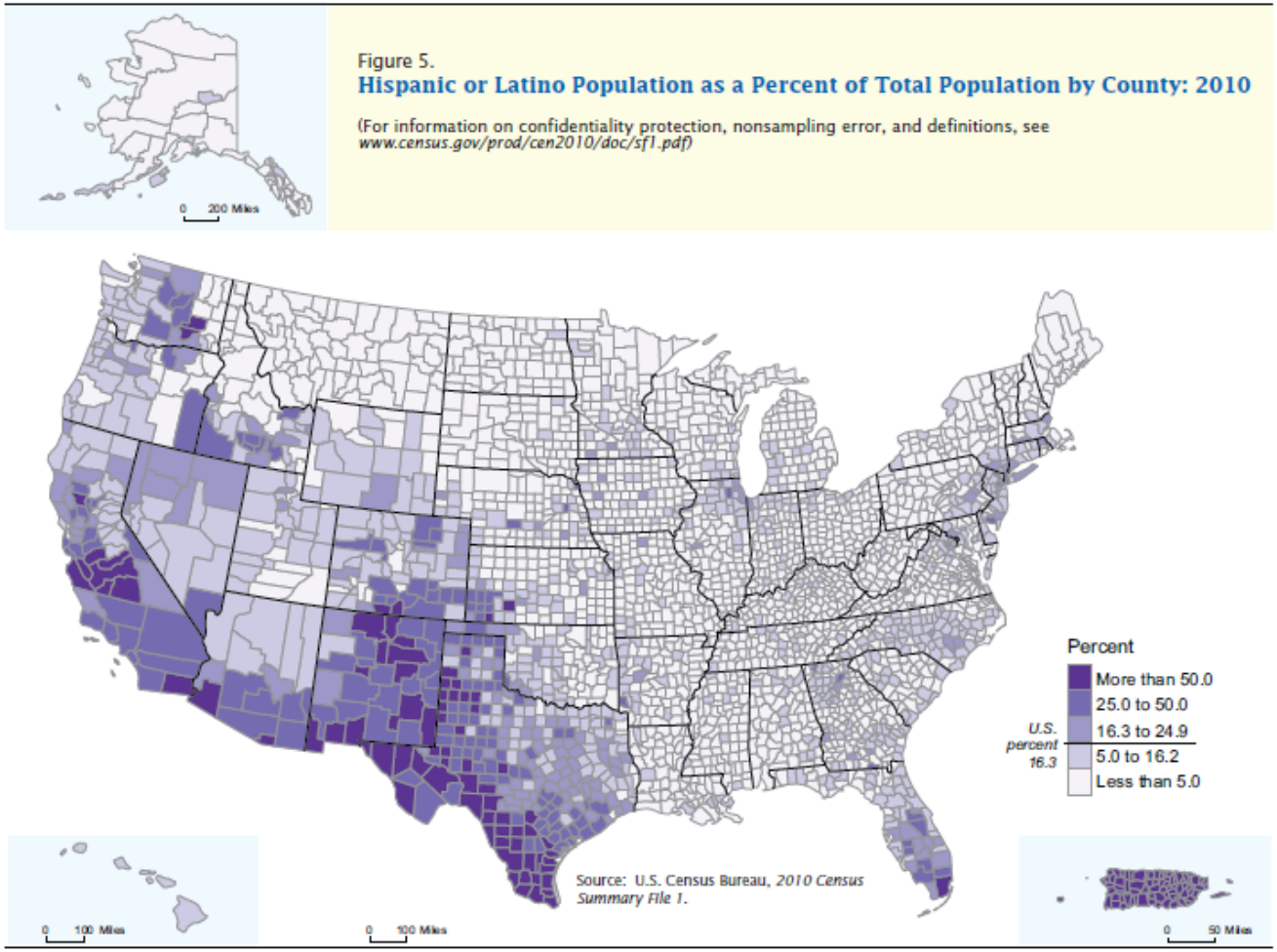
Solution:

- 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

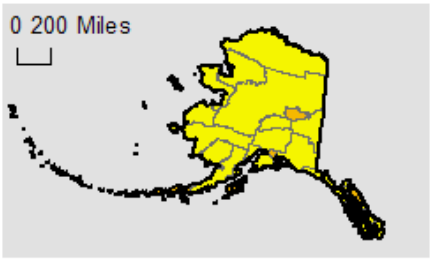
- Change background color for AK & HI
- Add:
  - Legend
    - Flip symbols and reverse sorting (all 3 layers)
  - Scale bars
  - Border
  - Map Information Box
    - Title
    - Name and affiliation
    - Source

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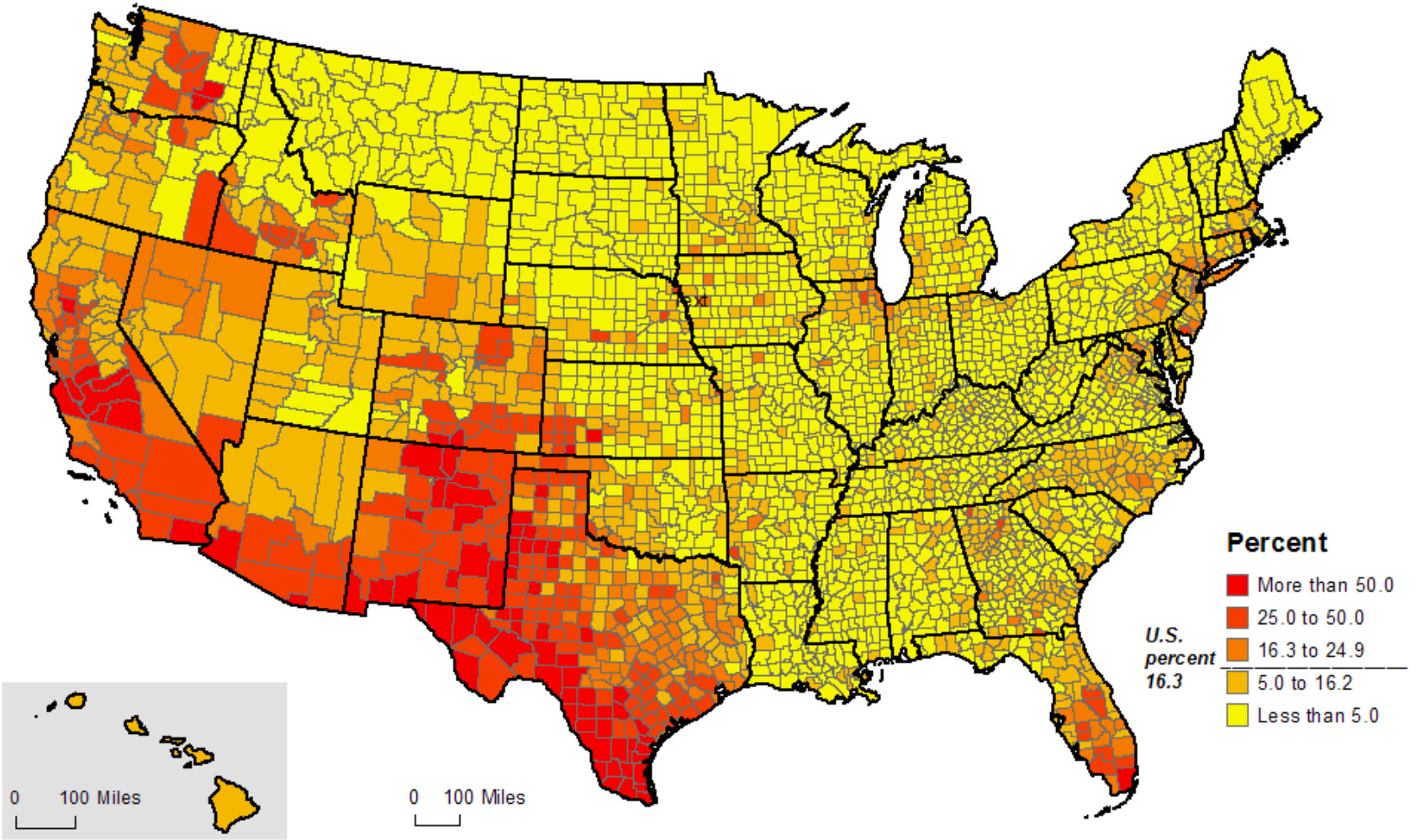
Source: U.S. Census Bureau Cartographic Boundary Files, TIGER/Line® Shapefiles and TIGER/Line® Files, and TIGER/Line® Shapefiles Pre-joined with Demographic Data.



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