Cartography Tips

Author: Barbara Parmenter, Revised by Carolyn Talmadge in October 2015

For detailed help on making scale bars and legends in ArcGIS, see the tip sheet for ***Creating and Editing Scale Bars and Legends*** on the Tufts Tip Sheets under the *Mapping and Presentation* section.

## Cartographic Requirements for Project Maps

All maps must have the following:

- A Descriptive Title – Location and Date
- Your Name as the Cartographer
- Date Created
- A legend -Formatted (real words, not file names -e.g., "water" or "lakes and rivers", not Hydro_25k)!
- North Arrow
- A scale bar (Appropriate units and number of divisions)
- Source citations- including source agency or agencies, time period of content.
- Map projection used (e.g., Massachusetts State Plane Mainland, NAD 1983, meters)

Note that the spatial granularity of elements like census geography or parcels or county boundaries must also be clearly noted either in the title, subtitle, or legend (e.g., population density by census tract, land use by parcel).

General Principles

- Always keep your map viewer in mind! Lay out your maps, text and other material to help the viewer quickly understand what you want to show and to navigate through your narrative. Never make the viewer work too hard!

- Provide both context and focus.

  - The context is "where are we" in terms of a regional or metropolitan perspective. This is usually accomplished by a map showing the study area in its larger geographic region. It may also be accomplished at a more local level by showing major roads and water in pale colors in the background.

  - The focus is where you want the viewer to concentrate. This can be accomplished in many ways – larger maps of the study area; the study area in fully saturated colors (e.g., clipping the land use focus area and showing that in full saturation but maintaining the wider land use context in the same colors but at lower saturation.)

  - Don't include layers or information that is unnecessary for your main focus.

- Be sure your viewer can distinguish categories and classes.

  - In maps showing ranges of numbers or categories, include as few classes as possible to convey your information. Viewers can only comprehend about 5-7 categories and color ranges.
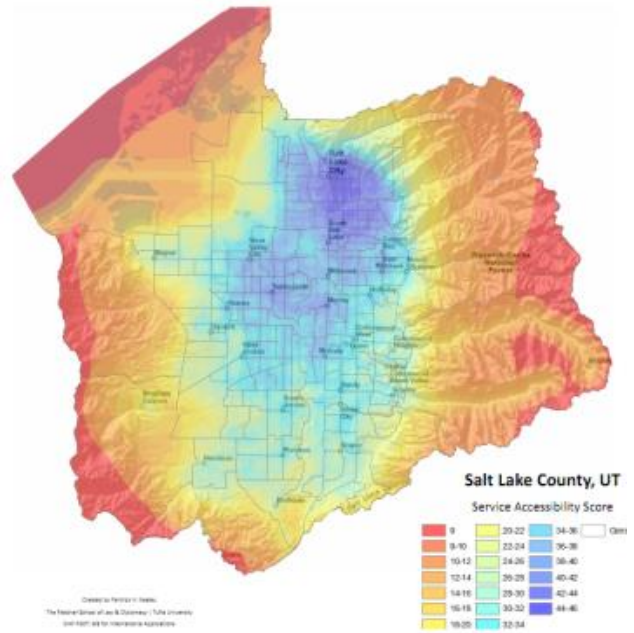
o Format the numbers so they have 2 or so significant digits, or 2 decimal places. You want the ranges to be easy to understand.

o In maps showing ranges of numeric values, stick with one color ramp. If you are showing hot and cold, or above/below mean, you might use a bi-color ramp like blue to red but take great care with these kinds of color schemes.

o Use standard colors where appropriate (e.g., see the American Planning Association's recommendations for standard land use colors here).

- Use white space effectively – make your map as large as possible for the size space you have, then place map elements (e.g., title, scale, legend, etc.) in the remaining white space. The census map of Travis County, Texas, is an example.

- Lower the clutter quotient! Don't repeat things in the title, legend title, and legend classifications. Don't have unnecessary decimals in your tables or legends. Don't repeat units or % in your tables or legends. Use these elements effectively to get information across without repetition. E.g, a title might be "Transit Ridership in Boston" with a subtitle "By Census Tract (2000 Census)". The legend title might be "Percent of Workers Using Transit", and the legend classification could have <10, 10-30, 30-60, >60).
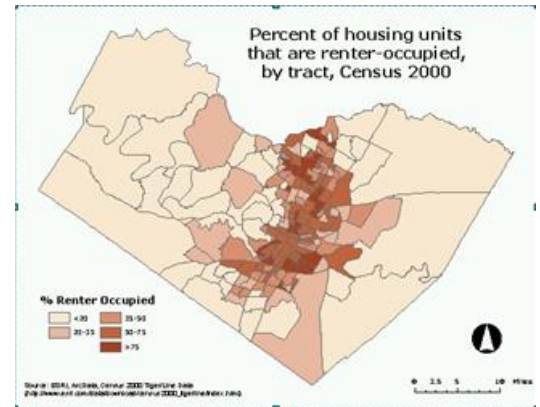
## Setting the Data Frame's Coordinate System

If the data you are using is already projected (e.g., data from MassGIS is already projected into the Massachusetts State Plane NAD 83 coordinate system), you most likely will NOT want to change the coordinate system of your data frame. However, if the data is unprojected (in a geographic coordinate system – GCS), then you should project it for better map results. There are many national data sets that are unprojected, including the US data we have from ESRI. The example below shows how to project a map US data into an appropriate coordinate system.

US Counties – Geographic Coordinate System, NAD 83 (not projected)	US Counties – US Contiguous Albers Equal Area (projected)
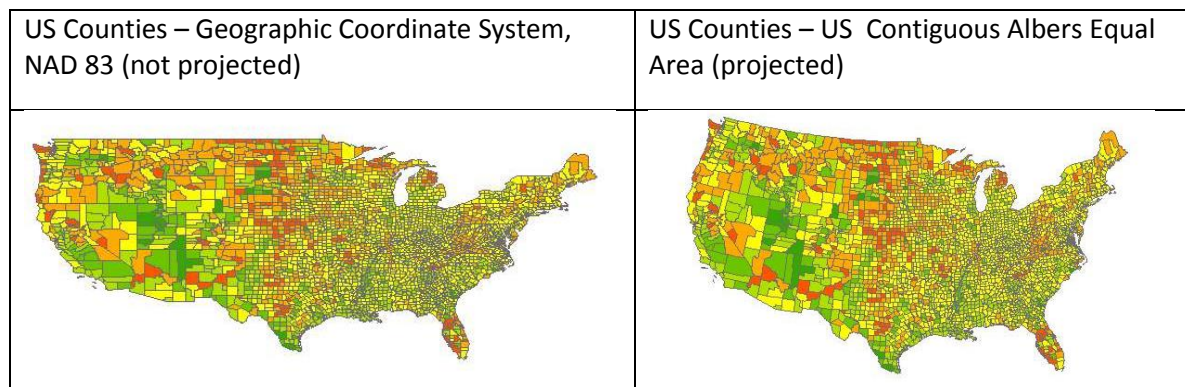
To change the coordinate system of your map, e.g., from what you see on the left of the previous image to what you see on the right (a much better way to show the US):

1. Choose **View – Data Frame Properties** (this takes you to the properties of the entire data frame).

2. Click on the *Coordinate System* tab.

3. Select *Predefined – Projected Coordinate System* and the type of the coordinate system you want. In the case above we went to *Continental – North America – USA Contiguous Albers Equal Area Conic USGS*.

4. Click *OK* when done.
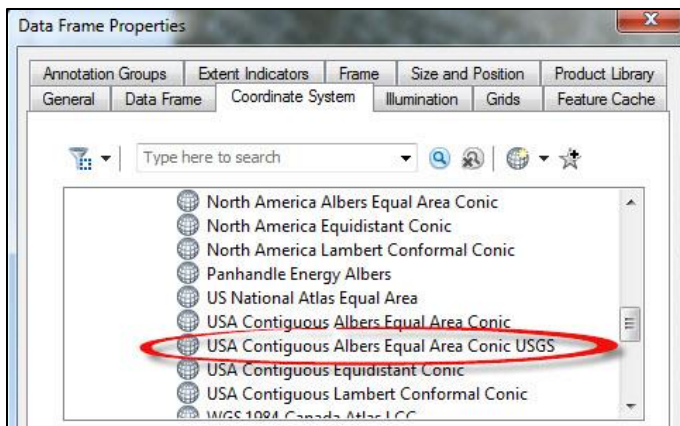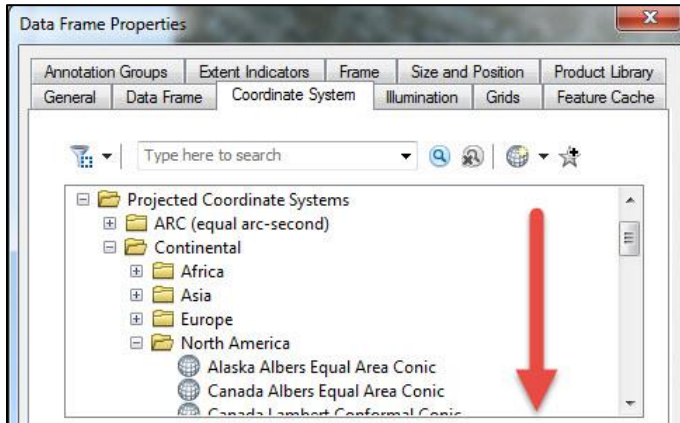
Map Tips

- Don't use fill *patterns* (hatching, dots, etc.) – they are usually very distracting and hard to distinguish – use them if you are forced to because you need to have a black and white map. There ARE a few other occasions where they come in useful, but be careful and sparing with them.

- Focus your viewer on what you want to show – include background / context data in paler colors (e.g., roads in gray, water in a pale blue).

- For choropleth maps, it is simplest to use a single color scheme (e.g., pale blue to dark blue, white-gray-black, pale red to dark red) - there are some other color schemes that work but the safest bet is a very simple color scheme.

- Use the Natural Breaks method of classification unless you think another method more effectively tells the story you want to tell and understand the reasons behind your choices. But do adjust the breaks to make more sense to a map viewer (e.g., 13.9% might be better set at 15%).

- When you are first starting with mapping in ArcGIS, stick with the graduated colors option, again unless you see a pressing need for something else. Other options like graduated symbols or dot density can sometimes be appropriate, but you should wait to use them until you have a better understanding of what impact they convey. Take a look at using charts, like pie charts (e.g., you can show in a pie chart the distribution of vacant, owner-occupied, and renter-occupied units), but these make good maps in very rare circumstances. Just because the computer can do it, doesn't mean you should use it!

- For some layers, there are too many distinct features to show each one by a color (e.g., zoning or watersheds). For these it is often better to simply have the feature outline appear with no fill, and use the name or some other attribute to label each feature.

- Softer, pastel colors are more pleasing to the eye than bright colors (e.g., you can use a pale versions of the standard land use colors for a very effective land use map)

- For background on your different topic maps, you need to include orientation features like streets and rivers but in such a way that they don't distract from the main topic (e.g, land use) - you can color streets a light gray so that the viewer can see them but they are not so dark as to overwhelm the map. With major road and water, also be discrete.

- If your outline colors on some layers are getting in the way, turn them off with the symbology properties or work to adjust them so that they don't distract from the main idea of the map.

- The study area shape may be a challenge to show on paper. To get the most for your space on the actual map, make the data frame on the layout fit your study area, and then put the excess white space on the paper to good use for your other map elements.

- Make sure your scale is easily readable and makes sense - adjust the size so that it is reading whole miles - e.g., 2 miles, not 1.8 miles.

- Adjust the number of columns on the legend so that you can spread it across space if you need to

- Make a digital version of your map before printing on paper or a plotter – you will see how the various elements come out looking on the page size you specify – adjust as necessary

Useful Functions

- To constrain a map to a certain area (e.g., town boundary, pedshed) enable "virtual clipping" by a shape file - *Data frame properties → Data Frame Tab → Enable Clip to Shape*. But use this sparingly – you are eliminating the context when you do this. It could be appropriate in the context of a poster where another map or maps clearly indicate context.

- The Data Frame toolbar has a tool that allows you to rotate the map and north arrow for a map of an area that does not fit well into your standard rectangle framework (e.g., Somerville). Again, use sparingly – people are used to map orientation where up is north, so it is easy to confuse folks where north is pointing to some other direction.

- Get rid of outlines where appropriate – e.g., if outlines are getting in the way of you seeing the color differences between parcel land use or between census tract population density.

- If you have a good coloring and classification set up for a layer, save it as a layer file. Then you can apply it to a clipped copy easily.