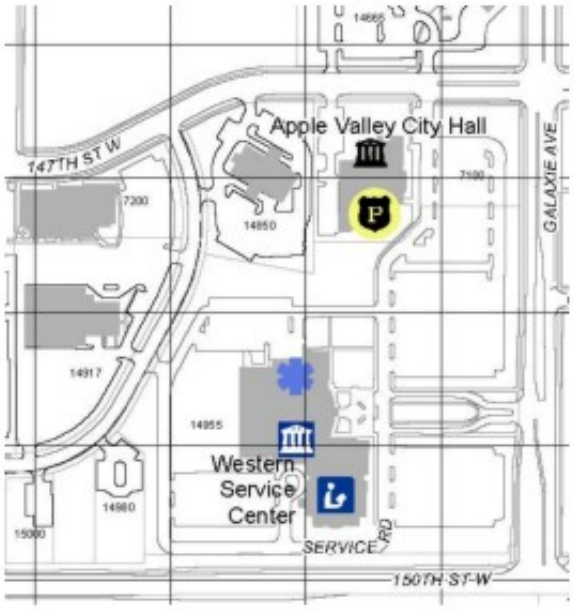
Winter 2009 - Desktop GIS: The National Grid Wants You!

By Todd Lusk

In case of a disaster would you want emergency responders to be able to easily locate you? What would they do if the disaster was as big as something like Katrina, with no structures left on the ground by which to navigate? What if a relatively simple grid system could assist emergency responders in finding any location on the globe? Such a system currently exists. It is called the National Grid.

The Dakota County Office of GIS has been working with other counties, cities and some emergency responders to develop a series of maps using the National Grid for use in just such a scenario. The map series includes three different types of maps which show differing amounts of detail along with the National Grid. The primary dataset is a “points of interest” layer that includes features like police and fire stations, churches, schools and other resources in the community. Depending on the map scale other information is shown as it is available.



An example of a 1:6,000 scale map.

The first map in the series (referred to as "Neighborhood Maps (1K)" in DCGIS) is based on a scale of 1 inch = 500 feet (1:6,000) and shows the most detail. Each map corresponds to a 1,000-meter National Grid “cell” and is named according to its National Grid cell designation.

These “neighborhood” maps also feature street names, house numbers, parcels and other planimetric data where it is available. The maps are designed to fit perfectly on an 8.5” x 11” sheet of paper which makes printing the maps from just about any printer very easy.

The second map in the series (referred to as "Topo Maps (quarter-quad)" in DCGIS) is based on the 1:24,000 USGS quadrangles, and show less overall detail than the 1:6,000 scale maps. These maps do cover a larger geographical area and are based on an already existing standard used by the USGS. They show much of the same “points of interest” information but also add some additional data such as contours. These maps are basically updated versions of the USGS’ 1:24,000 quadrangles without the stringent cartographic design standards used for creating those maps.

An example of a 1:24,000 scale map.

A third variation of the maps (referred to as "Topo Map (10K) in DCGIS) basically looks the same as the 1:24,000 scale maps but instead is based on the individual 10,000-meter National Grid “cells” instead of the USGS quadrangles. Using this approach, each of these maps ties directly to a National grid “cell”, and each 1,000-meter cell subdivision displayed on the maps ties directly to a 1:6,000-scale map. This also helps to avoid the somewhat cryptic naming convention of the USGS Quadrangle map series, and provides a direct interoperability between the 1:10,000 and 1:6,000 scale maps.

Currently, all of the National Grid maps are available for download as PDF documents through Dakota County’s interactive map website, DCGIS. They can be accessed by going to the Dakota County website

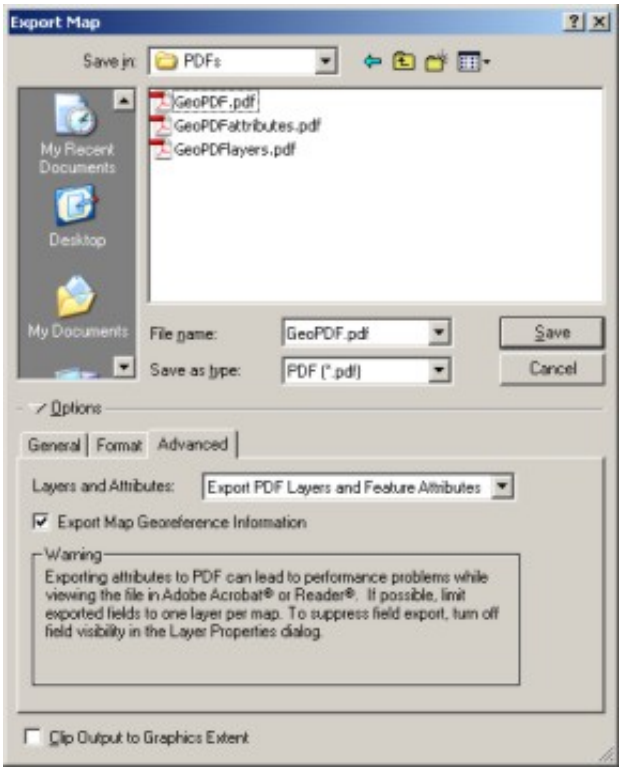
(http://www.dakotacounty.us) then to “Home & Property”. Under the “Property Information” section look for the link to the “Interactive GIS Map” (or search for “Interactive GIS” on the county home page).

In the interactive map, go to the “Layers” tab, then expand the “Base Map” folder and check the box next to “Neighborhood Maps (1K)” or “Topo Maps (quarter-quad)”, depending on which map is desired. The “Identify Features” tool on the toolbar across the top of the map can then be used to click in the map to open the appropriate PDF document. The map may need to be zoomed in slightly before all of the National Grid map indexes become selectable.

Winter 2009 - GIS 101: New Features for PDFs

By Mary Hagerman

Portable Document Format (PDF) has become the de facto standard for sharing maps, and with good reason. PDFs are portable, platform and application independent, relatively small, and the software for viewing PDFs is free. It is easy to export a map from GIS to a PDF, which can then be emailed or posted on a website. This is all good, if what you want is an electronic version of a paper map. With Acrobat 9 and ArcGIS 9.3, however, the PDF has been greatly enhanced. Advanced capabilities of PDFs include the ability to turn layers on and off, retrieve attributes of map features, and view geographic coordinates.

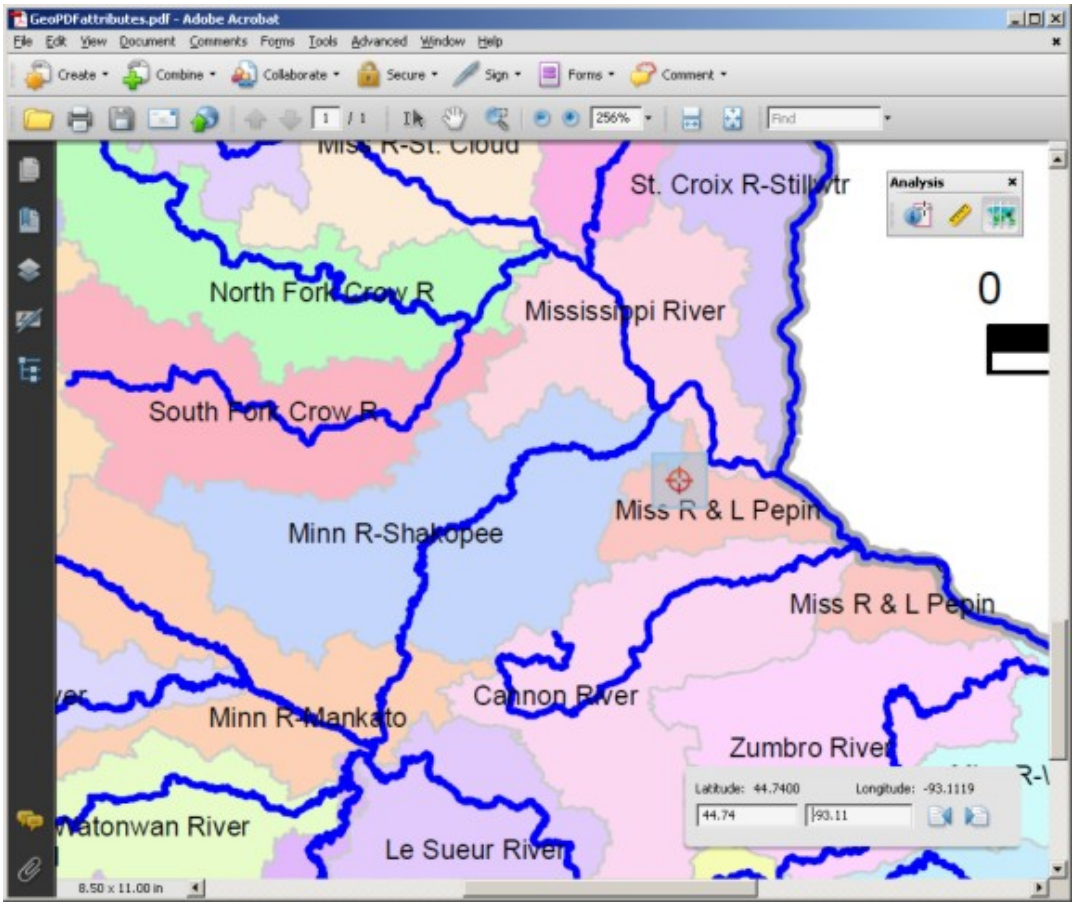


It is possible to create a PDF map that allows the user to control which layers are 'on', or visible. When a map is exported to a PDF from ArcMap, if the *Export PDF Layers Only* or the *Export PDF Layers and Feature Attributes* options are selected in the Export Map window, the layers in the Table of Contents will be included in the PDF. The user will be able to turn layers on and off through the layer panel in Acrobat Reader. This functionality was available in ArcMap 9.2, but at 9.3, group layers and multiple data frames are supported as well. Layers in the PDF are grouped by data frame and group layer, and users can turn on and off either the entire group layer or individual layers within the group. The same is true for data frames.

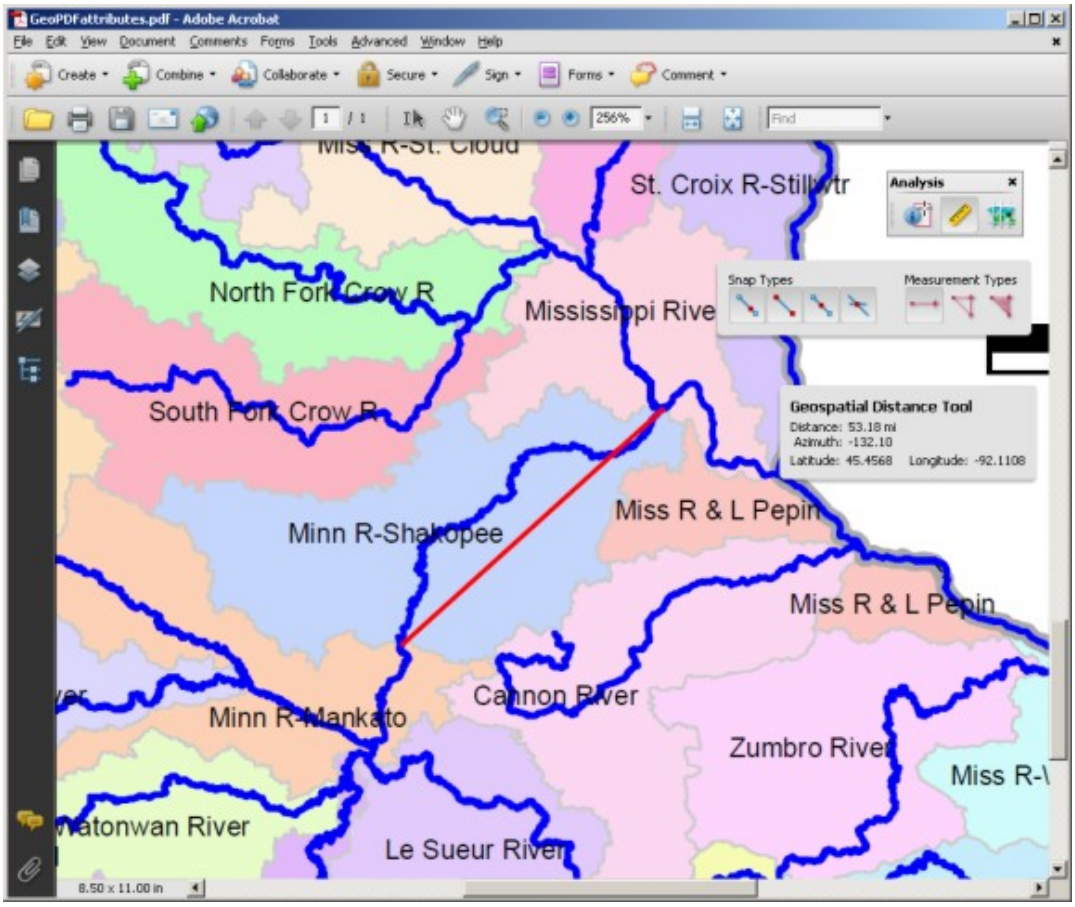
Also available at ArcMap 9.3 is the ability to include attributes in PDF maps with the *Export PDF Layers and Feature Attributes* option. Users can access the attributes of features on the map in Acrobat Reader with the Object Data tool found on the Analysis toolbar. Attributes are displayed in the Model Tree panel and, just like in ArcMap, when a feature is selected in the Model Tree panel, it is highlighted on the map, too. You can even zoom to the selected feature. The attributes that are included in the PDF are determined by what is visible in ArcMap when the PDF is exported. To exclude certain fields from the PDF, hide them in ArcMap.

Probably the most significant new feature for PDFs is the ability to store geographic coordinates in the PDF. This is referred to as a geospatial PDF, and can be created when exporting a PDF from ArcMap by checking the *Export Map Georeference Information* option. Geospatial PDFs provide new features such as the ability to get the coordinates of a location, find a location by its coordinates, and measure distances and areas.

In Acrobat Reader, when the Geospatial Location tool is active, the user is able to move the mouse around the PDF map and the coordinates, in latitude and longitude, are displayed. Additionally, the user can search by coordinates to find a particular location on the PDF map. Find Location, from the Geospatial Location context menu, allows the user to input the latitude and longitude of a location to search for. There is also a Mark Location option that allows the user to add the coordinates of a location to the PDF map as markups.



Another useful feature is the ability to measure distances and areas on the PDF map. The Measuring tool is actually a set of tools for measuring simple point to point distances, perimeters or route distances, and areas. The user can select the desired units used for measuring. Distance measurement units can be meters, kilometers, feet, US feet, miles, or nautical miles. Area measurements can be in square meters, hectares, square kilometers, square feet, acres, or square miles.



Acrobat 9 is required to take advantage of these new PDF capabilities. What the user will be able to do with the PDF depends on the version of Acrobat used to create the PDF. The more advanced the version of Acrobat, the more advanced the features available. Acrobat 9 Pro Extended offers additional features, such as changing the coordinate system, importing shapefiles, and georegistration, that are not available with Acrobat 9 Standard.

Winter 2009 - Department Spotlight: Lebanon Hills Regional Park Gets New Trail Signage

By Terry Vikla, Dakota County Parks Department

There have always been challenges with the trails at Lebanon Hills Regional Park. The public enjoyed the easy access the trails provided into the natural environment, but often became lost or disoriented, and staff dreaded the workload and the damage caused by erosion.

The Parks Department realized that, before they fixed the trail signage, they should fix the trails. Certain mountain bike trail sections were steep with sharp curves, resulting in injuries. Further study found the majority of the trail system was never designed properly; instead, old logging roads once used to remove diseased trees were converted into trails. At the time it seemed to make sense. “Why cut down more trees to make trails when these logging roads can be used?” This saved some trees but caused greater losses from trail erosion and lake eutrophication.

Improved trail design wasn’t close at hand. County staff searched the Metro area; it seemed every county and city had similar trail design and erosion problems. County staff ended up hiring a trail consultant from Georgia, specializing in sustainable trail design. Sustainable trails follow the contours more closely, provide good drainage and reduced erosion while minimizing maintenance labor.

Once there was a plan to rebuild the trails, the need to redo the signage was simple to imagine, but difficult to reach a staff consensus on. It took four years with various workgroups to produce the signage package.

There are large metal signs at every intersection (called “you-are-here” maps), with combined winter and summer trails. This reduced the trail signage change-over period from winter to summer trail use. Maintenance labor was reduced, but it also allowed for continuous trail use when the first snowfall occurs in the fall and during snowmelt in the spring.

Trail use posts are visible from the “you-are-here” maps for each trail segment. These symbol signs explain the trail segment use, skiing in winter and hiking in summer, as an example. To save labor these signs also stay up all year. Where ski trails share summer hiking use, the hiking symbol signs also have text saying you can hike unless the trails are snow covered, thus eliminating confusion defining the winter or summer season.

Some users favor maps for orientation, while others do better with words. To help these users Parks installed some trail destination signage, showing the way to major facilities or other destinations in the park with signs such as, TO VISITOR CENTER -->. Final touches in the signage system include intersection numbers, showing exactly where users are on the map and helping lead users to the next numbered intersection. The “you-are-here” maps all face due north when viewing. This becomes a means of directional orientation at each intersection without the need to carry a compass.

As users benefit from improved signage by not getting lost the park may seem to shrink, enabling greater distances to be covered in the same time period. This may result in more users venturing deeper into the park with increased satisfaction and confidence. Providing the safest experience with high quality signage and trail design focused on the natural environment will remain our goal, today and tomorrow.

Lebanon Hills Regional Park, where your experience will remain - forever wild.

Winter 2009 - Tech Talk: Creating Basic Representations in ArcMap

By Dan Castaneda

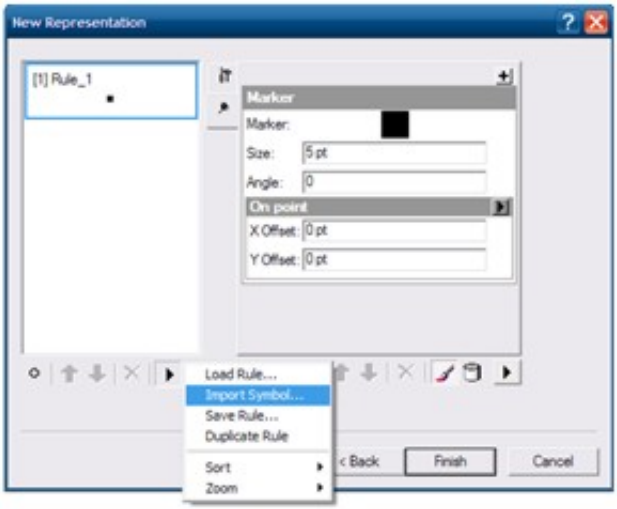
Representations were introduced by ESRI in version 9.2 of ArcGIS as a new way to symbolize data. Representations give you the ability to manipulate how features are displayed without actually modifying the underlying data, so that you are able to fine tune how your features look on the map. Typically, the symbology for a specific feature class or layer is stored in the map document that you create. Representations, however, are stored and maintained in a geodatabase, with attribute fields added to the table to control how the representation is displayed.

In order to create representations, an ArcEditor or an ArcInfo license is required, and you must also have your data stored in some type of geodatabase, whether it is a file, personal, or enterprise geodatabase. Representations are created for individual feature classes, and can be accomplished in either ArcMap or ArcCatalog. If you have existing map documents where you have spent a great deal of time creating your own custom symbology, but would like to take advantage of the control that representations allow, you can easily convert them by right clicking on the layer in ArcMap and choosing “Convert Symbology to Representation”. Finally, the option of loading a layer file is always available.

Once you have loaded your feature classes into a geodatabase in ArcCatalog, you can then navigate to the Representation tab by right clicking and choosing Properties on a particular feature class.

When creating a representation in ArcCatalog, you must make sure that you do not have that particular feature class open in an ArcMap session, as doing so will prevent you from modify the properties. As you create a new representation, you will assign the representation a name, and also have the ability to choose the names of the attribute fields that control the representation. These fields are the Rule and the Override fields.

The next step is choosing the symbol, or the “rule”, as they are referred to in the Representation dialog box. Each rule has a marker, or symbol, which becomes a value in the Rule field in the attribute table. You can assign custom names to each rule, instead of using the default “Rule 1”, “Rule 2” names assigned by ArcCatalog. Each feature class can have multiple representations, and each representation can have multiple rules which will let you symbolize your data the way you prefer.



In this dialog box, you can choose to Import Symbology from the many existing categories and symbols that are in ArcMap, or, you have the option of creating your own symbols using the marker editor.

After creating all of your rules, the next step is to open your map document and change the symbology of your feature class to the representation you created. This is done on the Symbology tab on the Layer Properties dialog box. This is a similar dialog box to the one shown above, but it is in ArcMap instead of ArcCatalog.

Now that your data is “represented” in your ArcMap session, you have the ability to edit the location of the symbol, while leaving the actual point in its original location. You will need to start an edit session, and add the Representation Toolbar. This gives you a set of tools that allow you control either the entire feature or specific segments of a feature, which can be useful if you are working on a line representation. Included are a couple of selection tools, one which allows you to select by clicking on the feature, the other a lasso selection, where you are able to freehand a selection area.

If you have multiple rules for a particular representation, you can edit the rule and change the symbol for each individual feature using the Representation Properties dialog, which is opened using the last tool on the toolbar. You can select the new rule using this dialog box, or in the attribute table.

In the example below, the black square represents the original data point, and the Library symbol is the representation that has been moved. This was done by selecting the point using the selection arrow off of the Representation Toolbar, and simply moving it to the desired location. When you move or change the symbol from the default rule you created, it will be stored in the Override field. Once you are done editing the Representation, all you need to do is save your edits and end your edit session.

Creating Representations for line features will ensure connectivity at intersections as well. We create several maps for the parks in the county, and use the dashed line symbols for the various types of trails. Often the dashes don't connect at intersections, as seen in the picture on the left side below. When you convert the symbology to a representation, it ensures that this doesn't happen, connecting the line features at the intersections, as seen on the right.

One item that needs to be considered when using representations is the scale of your map. Since we all use the same data at different scales, for different map products, you may want to consider creating a representation for each map product or scale. This will ensure that you are creating a nice looking product. Since feature classes can support multiple representations, it is no longer necessary to create multiple copies of the same data for different map products.

For more information and to see what other effects can be achieved with representations, check out the ESRI Mapping Center blog.