

Summer 2008 - Desktop GIS: Navigating the Help Options in Dakota County GIS

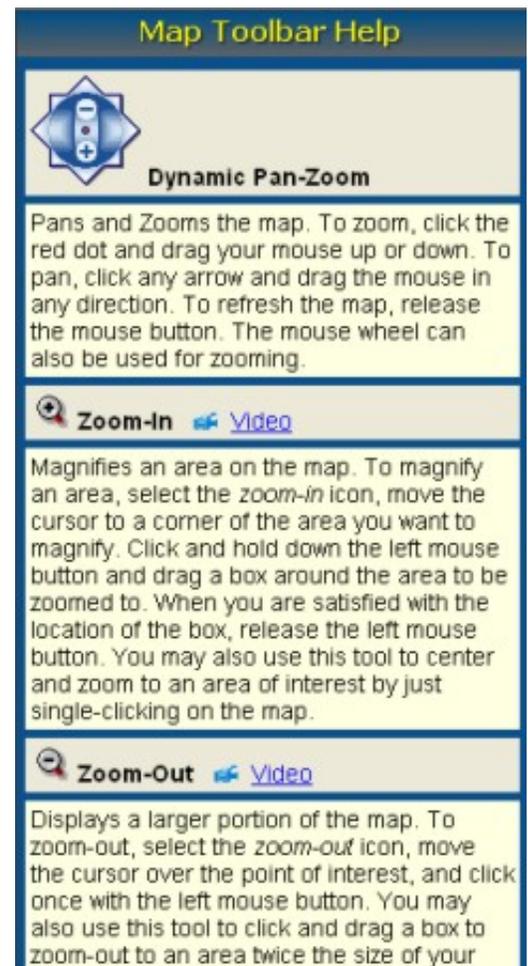
By Mary Hagerman

Ok, you've definitely heard about that *Dakota County GIS* thing by now. You've probably even seen it a few times. Maybe you've even tried it, or you haven't because you think it's just for GIS people. Maybe you're afraid of it, you think it'll be too hard to figure out. It's new, and different, and big, and scary... Not so. It's tame as a kitten once you get the hang of it. And there are lots of built-in help features to assist you.

Did you notice the **Help** menu? There's lots of good stuff in there. Let's start with the **Map Toolbar Help**. This is the mother load of "How To"s. The **Map Toolbar Help** describes all the menu items, tools, and buttons. It tells you what they do and how to use them. There are even videos that walk you through some of the tools. This should be the first place you go for help.

Now hover your mouse over a tool for a few seconds. Did you notice the little pop-up? Hovering your mouse over a tool will tell you what a tool is or does. That way you don't have to remember what all those little buttons are for. Don't remember what the little blue circle with the "i" in it does? That's ok; just hover your mouse over it. "**Identify Features**", great, that's what I needed to do.

Ok, this thing is starting to look a little less ominous. But those more complicated features are still, well, complicated. Don't worry, there's extra help for those. Most of the more advanced features have **Tips** to help you use them correctly. Take the **Parcel Search**, for instance. There are half a dozen paragraphs to help you figure out what to enter in the search boxes. **Select By Attributes** and **Select By Graphics** have tips on how best to use those tools, including information about how to make sure your mailing labels are aligned with those little sticky labels you put in your printer.



Map Toolbar Help

Dynamic Pan-Zoom

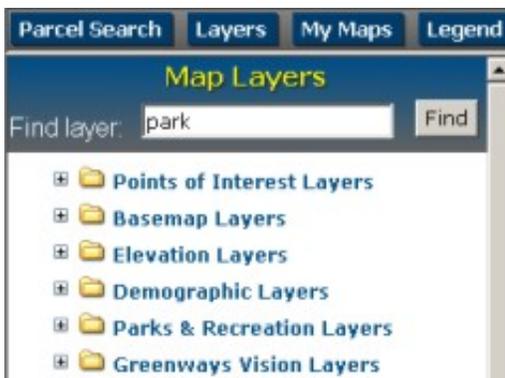
Pans and Zooms the map. To zoom, click the red dot and drag your mouse up or down. To pan, click any arrow and drag the mouse in any direction. To refresh the map, release the mouse button. The mouse wheel can also be used for zooming.

Zoom-In [Video](#)

Magnifies an area on the map. To magnify an area, select the zoom-in icon, move the cursor to a corner of the area you want to magnify. Click and hold down the left mouse button and drag a box around the area to be zoomed to. When you are satisfied with the location of the box, release the left mouse button. You may also use this tool to center and zoom to an area of interest by just single-clicking on the map.

Zoom-Out [Video](#)

Displays a larger portion of the map. To zoom-out, select the zoom-out icon, move the cursor over the point of interest, and click once with the left mouse button. You may also use this tool to click and drag a box to zoom-out to an area twice the size of your



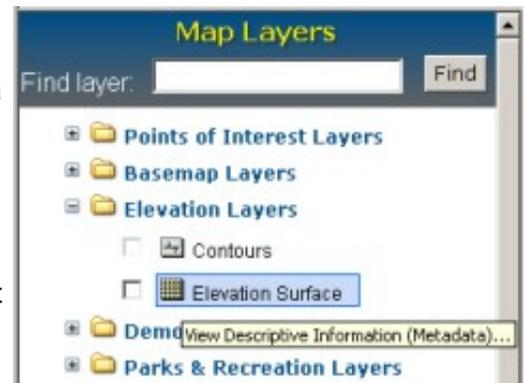
Ready to give it a try? What do you mean there's too much data, and you can't find what you need? More is better; everybody knows that. But relax; there are features to help you find the data you are interested in, too. The first thing you need to know is that in a GIS, data is called layers. So you can start by clicking on the **Layers** tab. Sure, there are a lot of folders, and it would take a long time to look through all of them. But notice right up at the top, where it says, "**Find layer:**"? You can search for layers by entering a word that you think is part of the layer name and clicking '**Find**'. It will return a list of the

layers and what folders they are in. Cool, huh?

Not sure what to search on because you're not sure what a layer is called? Remember that **Help** menu? You'll find a **Layer Index** under the **Help** menu. It will list all the available layers in alphabetical order. If you hover over the layer name, it will tell you what folder it is in. If you are not sure what you are interested in, or just want to see

if there might be something you might be interested in, you can browse the **Layer Index** to see what's available.

So you've found some layers that sound interesting, but you're really not sure what they are? No problem - the layers have metadata. Meta-what? Metadata is a GIS term for information about the data. Metadata includes things like a description of the data, how current it is, and who to contact for more information. You can see a layer's metadata by clicking on the layer name in the layer list. This also works in the **Layer Index** and in the **Find layer** search results.



Here are a couple more helpful hints before you dive right in. You might want to check the **What's New** from time to time. You'll find that under the **Help** menu too. **What's New** will bring you up to speed on any enhancements that have been made. It will also let you know about any new layers that have been added. And, you guessed it - you can click on the layer name to get the metadata.

Contact Information

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And lastly, also under the **Help** menu, you'll find '**Contact Us**'. Consider that the Help Desk for *Dakota County GIS*. On the **Contact Us** page you'll find the Office of GIS hours and our phone number. And the GIS link is a direct email link. Send your questions, comments, delights, frustrations, etc. Someone on the other end will be listening. Using *Dakota County GIS* is intended to increase efficiency and productivity, not cause frustration and migraines. Hopefully you will find this help with the help features helpful. Now get out there and do some GIS!

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Summer 2008 - GIS 101: An Introduction to the National Grid

By Randy Knippel

Emergency responders have learned valuable lessons from recent disasters such as Hurricane Katrina. We can see the importance of training and preparedness, but are humbled and awestruck by the damage and destruction. Responders to these disasters quickly realized that they needed current maps and a common knowledge about using them. A little additional effort has led to some dramatic improvements in these areas.

One such improvement is called the United States National Grid (USNG). The National Grid creates a universal, scalable referencing system for any location in the United States and beyond. The Federal Emergency Management Agency (FEMA) and the Federal Geospatial Data Committee (FGDC), as well as many state and local governments, have adopted it as a standard. It is currently proposed as a Minnesota standard. What this means is that, with proper training, all emergency responders will be able to speak the same language when referring to a location, regardless of where they are or where they are from. They will expect to have current maps that include the National Grid at standard scales to support their efforts for navigation, measurement, resource deployment, and status communication. The maps will be interoperable across jurisdictions and among local, state, and federal government agencies.

The National Grid has actually been around for a while. It was originally identified as a potential standard after Hurricane Andrew in 1992, but its origins are with the Military Grid Referencing System (MGRS), which has been around since World War II and continues to be the military standard. The MGRS and the USNG use the Universal Transverse Mercator (UTM) projection and coordinate systems, with a different notation to make it easier to learn and use.

UTM divides the surface of the earth into zones of 6 degrees of longitude that stretch from pole to pole. The USNG subdivides each of these zones into rectangles, each covering 8 degrees of latitude. Each of these USNG zones is then given a unique alphanumeric identifier. Minnesota is mostly contained by zone 15T, with parts in 5 adjoining zones (Figure 1).



Figure 1 - 6 degrees longitude by 8 degrees latitude grid zones over Minnesota

Each zone is then divided into 100,000-meter squares, based on UTM coordinates, and given a two-character designation formed by rows and columns of single characters. Therefore, Dakota County falls in VK and WK, or,

using the full USNG designation, 15TVK and 15TWK (Figure 2).

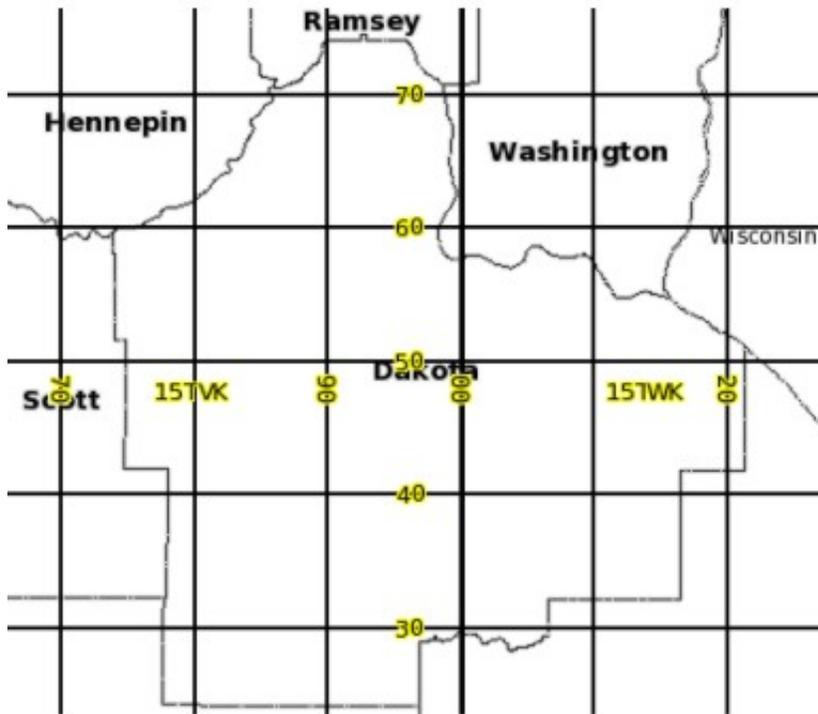


Figure 2 - 100,000m grid designations with 10,000m grid lines over Dakota County

Any location within the 100,000-meter squares is referenced as an offset in meters from the lower left corner of the square, starting with zero, measuring right, then up. Therefore, my current location is 15TVK 83399 53353, which can be easily interpolated or measured using grid lines (Figure 3).



Figure 3 - 100,000m-grid designation with 1,000m grid lines over part of Apple Valley

The real power of the USNG becomes apparent when we see it referenced at various scales. If a major tornado hit Dakota County from Burnsville to Coates, we can simply say that the affected area is in 15TVK and military

resources or volunteers from anywhere will know where we are and that the damage is contained within a 100,000-meter square. That can be further refined to say that the tornado path included VK7050 to VK9050, isolating it further to three 10,000-meter squares. Again, anyone with USNG training will know where that is and be able to begin to acquire maps and plan their deployment. At a detailed level, resources can be deployed by simply using an abbreviated notation representing 1,000- or 100-meter squares. Therefore, if a search operation is contained in 15TVK9751 (1,000-meter square), individuals or teams can be assigned 100-meter squares within that area with simply a two-digit designation.

The Grid also creates a convenient mechanism for tracking resources and status of a response and recovery effort. Based on the extents of the effort, grid cells can be easily selected at varying resolutions of 10,000, 1,000, 100, or even 10 meters and used to record activities that are later represented on maps to provide regular updates to everyone involved. High-resolution squares (10 meter) can be easily aggregated to lower resolution squares (1,000 meter) to represent a broader perspective for high level planning (Figure 4).

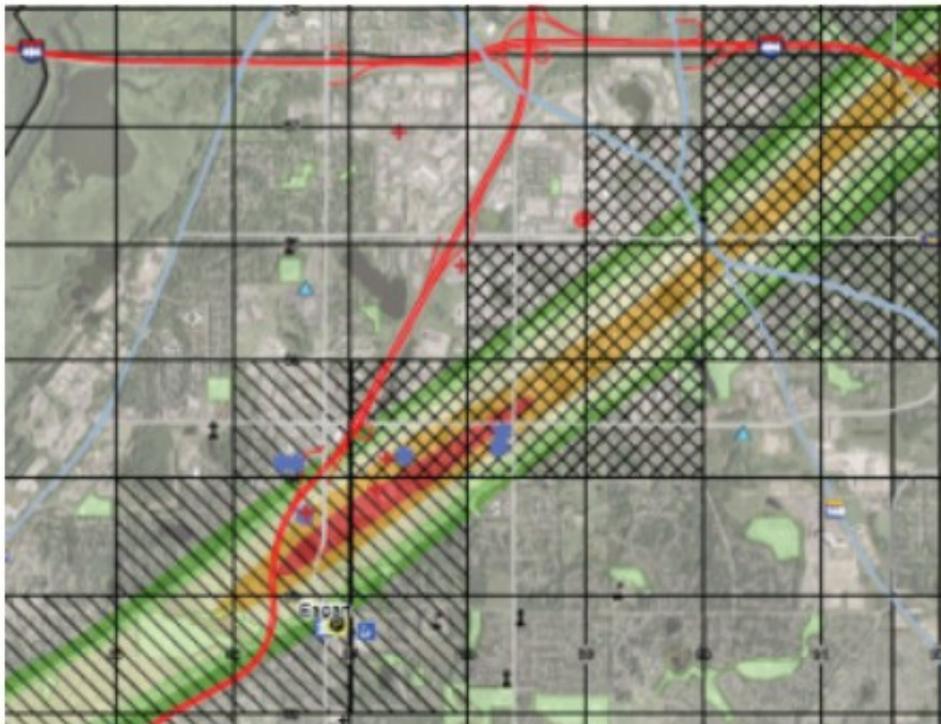


Figure 4 - Mock tornado path with 1,000m grid squares showing status of cleanup operations

GIS has always included making maps; however, the tendency has been to focus on interactive, web-based, and mobile applications. While these will continue to be important, lessons learned from recent disasters, coupled with the availability of the National Grid, strengthen the need to also create high quality printed maps that are interoperable between jurisdictions at various scales to support both large and small events. After all, in an emergency situation, a map with a hole in it is still a precision instrument. A laptop with a hole in it is a paperweight.

Find additional information on the National Grid at <http://www.fgdc.gov/usng> .
To create similar map templates in ArcMap version 9.0/9.1, please use this [style guide](#).

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Summer 2008 - Department Spotlight: Creating a Wetland and Watercourse Inventory and Assessment for Watershed Management

By Dave Holmen, Dakota County Soil and Water Conservation District

Existing GIS databases used to evaluate location and watershed-based protection of our surface waters are out-of-date or unsystematic. An important function of this project was to create a new GIS database that can be continuously updated over time to track future fieldwork and watershed projects. The database's primary functions were to both collect information concerning the wetland basins inventoried and yield an assessment rating for each basin. The project was funded through the Vermillion River Watershed Joint Powers Organization, the North Cannon Watershed Management Organization and the Metropolitan Council, and was completed for the Vermillion River Watershed in 2006 and the Cannon River Watershed in 2007.

The database was designed to collect three categories of information concerning wetland basins: General Information such as location, topographic setting, sub-watershed, National Wetland Inventory type, and a unique identification number; Individual Characteristics such as current Cowardin and Circular 39 community types, extent of open water, alteration and drainage impacts; and Watershed Characteristics such as contributing water sources, adjacent land use practices, buffer vegetation, greenway corridor quality, and wetland functions (Figure 1).

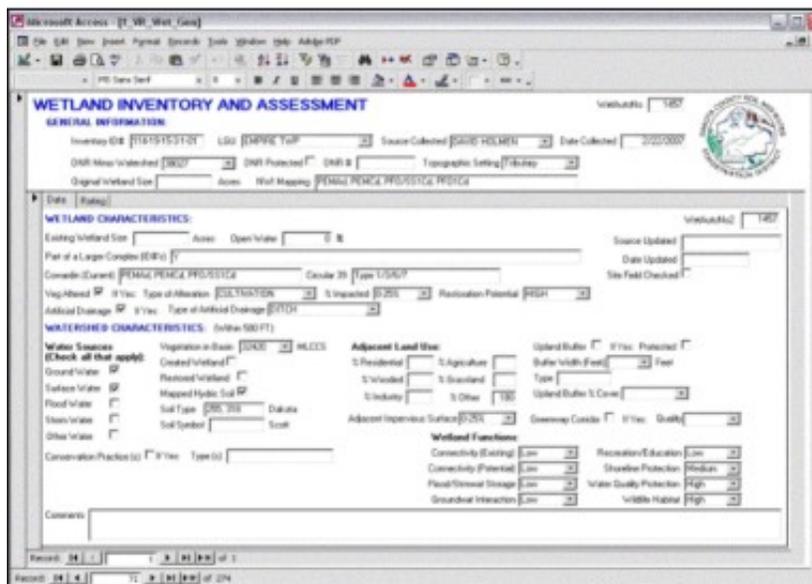


Figure 1. Microsoft Access Database Form used for recording basin information in the database

An assessment tool was built into the database to rank important factors relating to each basin's functions and values and other key elements such as its hydrologic regime, topographic setting, and quality of vegetative communities. Additionally, wetland functions as adapted from the MN Routine Assessment Method were added to the database including connectivity to upland buffer vegetation, flood or storm-water storage, groundwater interaction, recreation and education, shoreline protection, water quality protection, and wildlife habitat (Figure 2).

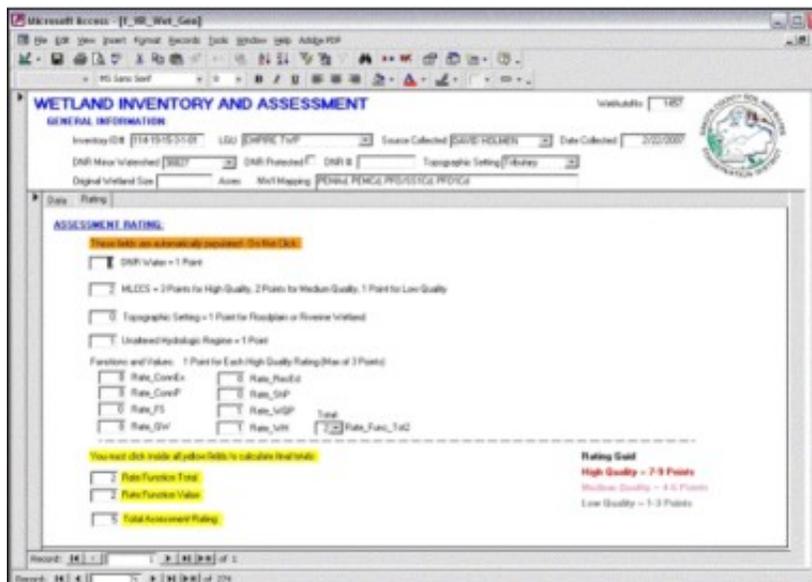


Figure 2. Microsoft Access Database assessment tool used for ranking basin information in the database

The database was developed in Microsoft Access 2000 due to its stability, performance, ability to set data relationships, and robust design capabilities. Related tables were used to store various elements of the information collected to allow originally collected data to exist along with continuously updated data. This feature of the database was achieved by separating the information collected in the category General Information from the Individual Characteristics and Watershed Characteristics data, allowing it to be stored in a separate but related table within the database. The effect is that a basin's general information such as its unique identification number and location will remain static but factors relating to its individual and watershed characteristics can be updated if they change over time. In this way, SWCD and County staff can update a basin's record with new information when needed, and also track what changes in a basin over time (Figure 3).

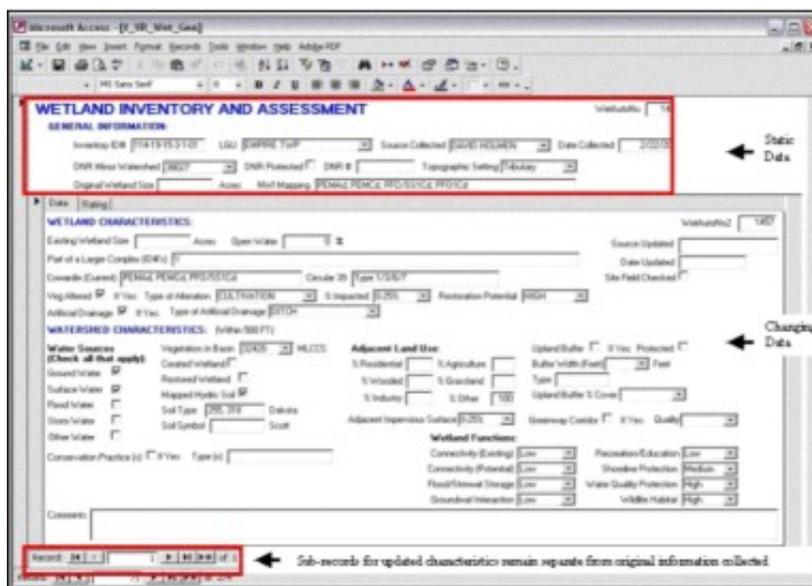


Figure 3. Tracking change by maintaining updated records over time in the database

The final element of the database was its inclusion in a GIS. All basins at least ¼ acre in size were digitized and included within both the Access database and a GIS data layer. A quarter-quarter section was adopted as the work unit for conducting the inventory to create a manageable area for digitizing work and formed the basis for the unique identification process for individual basins. To maintain database integrity, each individual basin needed its own unique identification code. This was accomplished by describing a basin's location within the PLS Township and Range system as follows: (Township)-(Range)-(Section)-(Quarter)-(Section Quarter-Quarter)-(Basin Record). An example would be basin 114-19-15-1-4-01, which would be the first basin located in Township 114, Range 19, Section 15, first quarter, fourth quarter-quarter (Figure 4). For isolated basins larger than a quarter-quarter in area,

the identifier was chosen based on which quarter-quarter contained most of the basin's area. All riparian basins and basins with waterways present were split on quarter-quarter section boundaries.

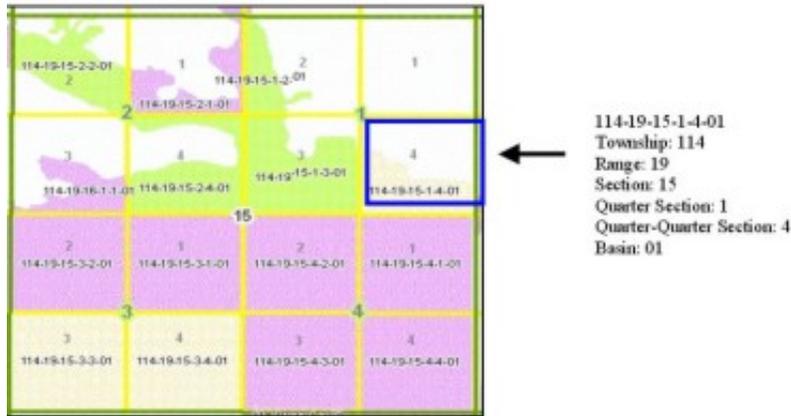


Figure 4. Location-based classification of a basin's unique identifier

Once all basins were recorded in the database and digitized in the data layer, the information from the database was imported into the data layer. The end result was a comprehensive GIS data layer containing all the information collected in the database for each wetland basin that can be easily overlaid and compared with other information in a GIS by SWCD and County staff or disseminated to other agencies, local communities and residents within the watersheds (Figure 5).

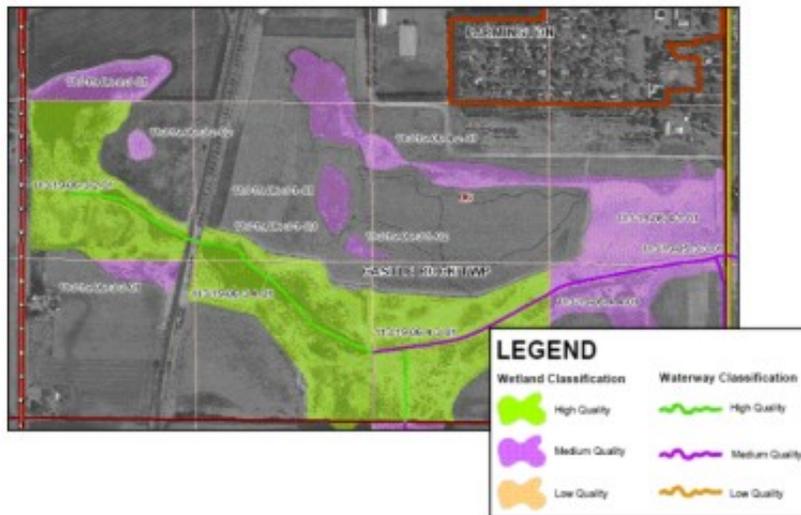


Figure 5. Final GIS Database

Summer 2008 - Tech Talk: Creating Animations in ArcGIS

By Dan Castaneda

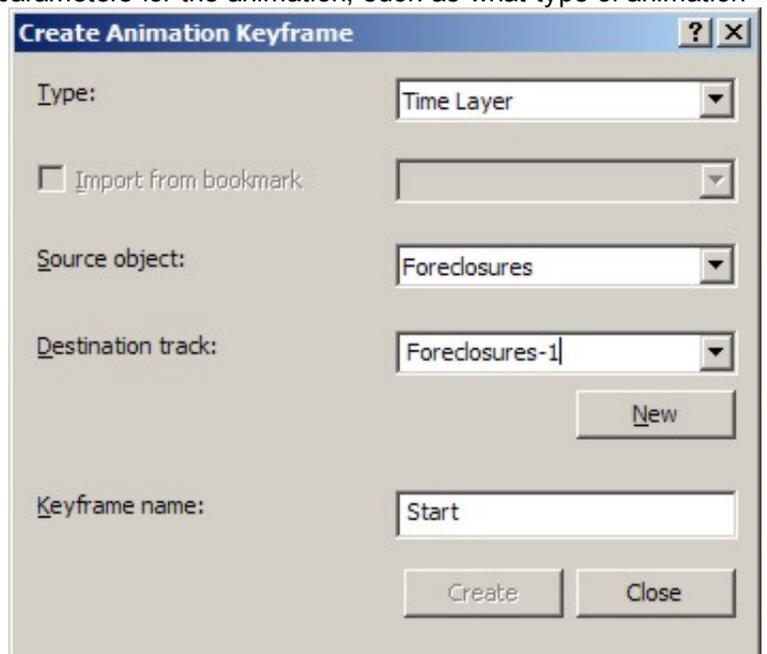
Animating geographic data is a familiar concept to all of us. Examples of this that we all see on a daily basis are the animations used in weather forecasts. ArcGIS gives you the ability to create animations using your own geographic data, and also provides a great way to analyze change over time.

With ArcGIS, you can animate feature classes such as points, lines and polygons, as well as raster catalogs. Any dataset that you use has to have columns containing data values that represent the data at different points in time. When you animate data, what you are doing is displaying the value for the data at a given moment in time, then waiting a few seconds, then displaying what the data looks like at the next given moment in time, then waiting a few seconds, and so on, until you reach the last moment in time that you have data for. The time value can be anything – hours, days, months, years, whatever time scale you want to show your data at.

For this example, some 2007 foreclosure data will be animated to display on a monthly basis. After you have chosen which data set you would like to animate, the next step is to add one or two attribute fields. These fields will give the start time and the end time. In our example, the “time” used will be a month. The end time field is optional, and is only required if you want to show a subset of your data, such as the first six months of the 2007 foreclosures. These fields have to be properly formatted, and the user has the option of breaking down the animation to the second interval, if they choose. The simplest way to format these fields for our example is to create a ‘double’ field type and input the date in the YYYYMMDD format.

Once you have the proper fields created, you can begin to set the parameters for the animation. The first step is to create two ‘Keyframes.’ A Keyframe sets the basic parameters for the animation, such as what type of animation will be done and which dataset will be used. Open the Animation toolbar, and then, using the “Create Keyframe...” option found on the ‘Animation’ dropdown, open the Create Animation Keyframe window. In our example we will title these Keyframes ‘Start’ and ‘End’, set their “Type:” values to Time Layer, their “Source object:” values to the foreclosure data. Finally, create a new ‘Destination Track’ file and make sure they both belong to it. This file will contain the actual animation details, after it is generated.

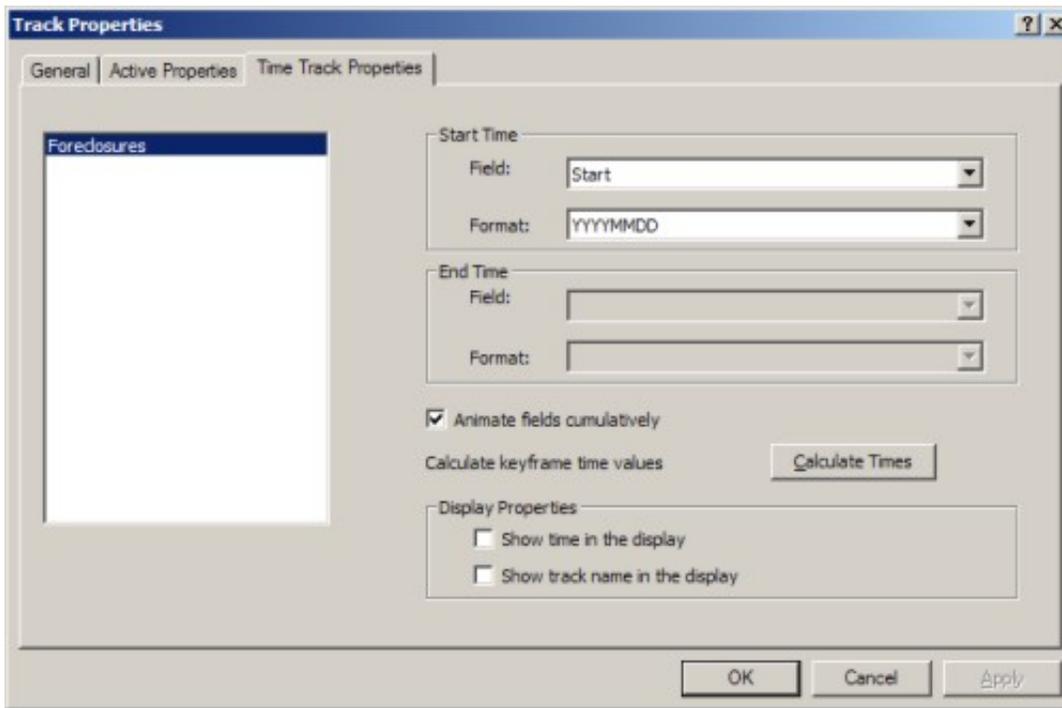
Next you need to open the Animation Manager from the Animation toolbar. Select your track from the Tracks tab, and hit the “Properties...” button. That opens the Track Properties window. Click on the Time Track Properties tab and set the start and end fields and formats.



| | |
|---|----------------|
| Type: | Time Layer |
| <input type="checkbox"/> Import from bookmark | |
| Source object: | Foreclosures |
| Destination track: | Foreclosures-1 |
| Keyframe name: | Start |

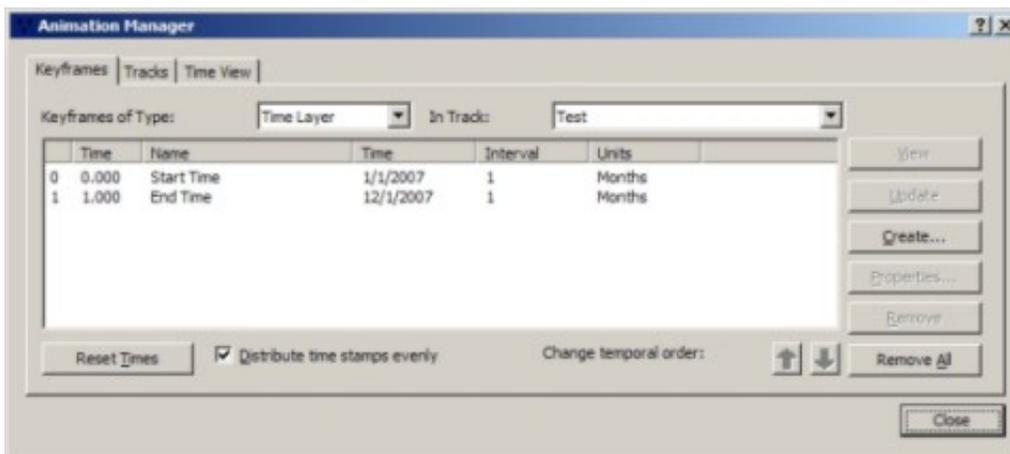
New

Create Close



If you only have a start field, you will need to check the box “Animate fields cumulatively”, which means each month’s data will remain visible after it is initially displayed until the end of the animation. This is also where you have the option of setting labels to appear as the animation plays. These labels will either be the date entered in the start field, or the track name you specified earlier. These labels can be modified later using the Drawing toolbar.

Back in the Animation Manager, on the Keyframes tab, you can set the interval and the units for your animation. If you have daily changes in your data, you can set the animation to display changes for each day, every 4 days, or whatever time interval you would like.



The animation is now ready. You have the option of viewing it in ArcMap, or you can export it as an .avi file and make modifications to it in a video editing software package, as we did. Also, this is a good time to symbolize your data. Remember, if you don’t have your data symbolized differently for each month, it will all look the same as it appears, and it will be difficult to tell that you have animated it!