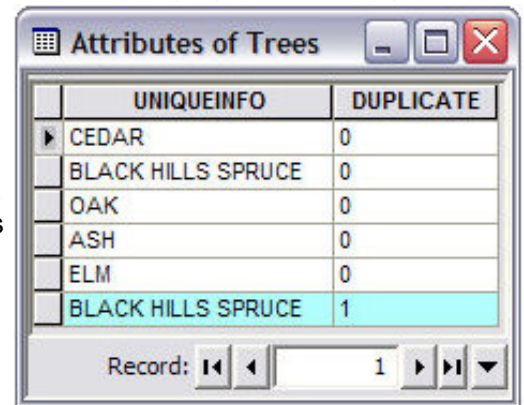


Summer 2009 - Desktop GIS: Extra GIS Tools For Your Utility Belt

By Joe Sapletal, GISP

ArcMap comes with over a hundred tools built in, but you can also find a number of tools that make your job even easier. Below are a few that we have found useful, that you can add to your GIS "utility belt".

"Easy Calculate" isn't exactly a tool, but rather a collection of expressions for use in the ArcGIS field calculator. There are 110 expressions that do everything from calculating and manipulating the spatial characteristics of a feature to creating tabular data in a feature class. An expression that is handy when trying to filter through a lot of data to find any duplicate information is the field_Mark_Duplicates.cal expression. Create a field to put the output in, such as the DUPLICATE field in the table to the right, and modify the expression after you have loaded it to point it at the field that you want to search for duplicates (in this case, UNIQUEINFO). The expression will populate the output field with a zero for every unique or first instance of a value. Any subsequent values that match existing ones will receive a one in the output field. As you can see in the example to the right, we had two Black Hills Spruce in our Tree feature class, and the value of "1" appears in the field DUPLICATE for the second record with that value. You can then do a query for all of the "1"s and delete those records, if they are indeed duplicates. There are 110 expressions to download at [ET Spatial Techniques](#). Just click on *Free* on the menu on the left side of the page, then click on *Easy Calculate*.



	UNIQUEINFO	DUPLICATE
▶ CEDAR		0
BLACK HILLS SPRUCE		0
OAK		0
ASH		0
ELM		0
BLACK HILLS SPRUCE		1

Record: 1

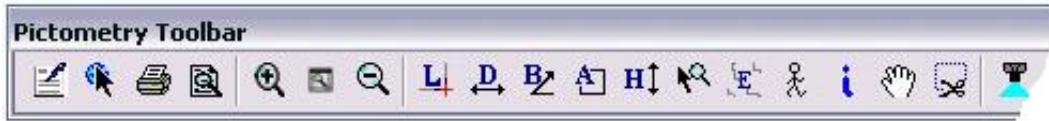
"ET GeoWizards" is a set of functions for manipulating data. "ET GeoWizards" gives ArcView users the ability to use geoprocessing tools that are available to ArcEditor and ArcInfo users. It also includes the ability to do some 3D analysis without the actual 3D Analyst extension for ArcMap. There is an extensive pay version, but also a free version that gives you access to a more limited, yet still lengthy, list of tools. Some tools are accessed through a separate interface, while some can be used in ArcToolbox, in Model Builder or at the command line. We have used a number of the free tools, including the Generalize tool. Generalize uses the Douglas-Poiker algorithm to reduce the number of vertices required to represent a line. This greatly reduces the file size of a geodatabase feature class that needs to be delivered as a shapefile. To download the toolset, visit [ET Spatial Techniques](#), click on *ET GeoWizards* on the menu on the left side of the page, then click on *Download*.

"Hawth Tools" is a free extension for ArcGIS that shows up as an ArcMap tool bar. It was written for ecologic analysis, but many of the tools are useful to many different ArcMap users. They have a number of analysis, sampling and animal movement tools. And they are fast. One of the tools in particular, Zonal Statistics, I found to be many times faster than the same tool built into ArcMap. You can download the "Hawth Tools" by visiting their [website](#).



"View ArcGIS location in Virtual Earth, Yahoo! Maps or Google Maps" is a good tool to have if you don't have access to Pictometry or your own highly refined basemap. It not only gives you access to the Bird's Eye (Pictometry) images in Virtual Earth, but you can also look at the basemaps of two other mapping websites. This is a nice tool to have to quickly verify some information from the Bird's Eye imagery no matter if you have or don't have Pictometry's Electronic Field Study (EFS) installed. And when you pan and zoom around in ArcMap, the online web map viewer does too. You can find the "View ArcGIS location in Virtual Earth, Yahoo! Maps or Google Maps" on ESRI's [ArcScripts](#).

“Pictometry Toolbar” is a toolbar that allows you to access your Pictometry image warehouse without opening EFS, using a resizable and dockable window in ArcMap. In the ArcMap display window a red box will appear showing you where you are in the Pictometry window. As you pan and zoom in the Pictometry window, the red box in the ArcMap window will move and resize as well. The standard measurement tools, printing tools and ‘View from. . .’ tools for Pictometry are available, and the Pictometry window will also display point data from your map document. You have a number of viewer settings you can adjust, such as filtering the type or direction of the imagery displayed, or setting the ArcMap display to rotate with the Pictometry image you are viewing.



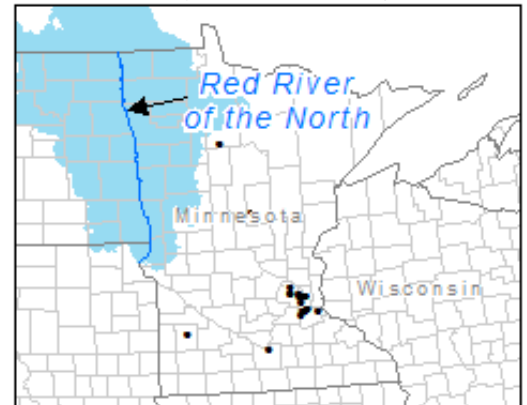
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Summer 2009 - Tech Talk: Working in Virtual Space - Red River Flood Response Mapping

By Randy Knippel

GIS professionals from around Minnesota provided maps for the Red River flood emergency response in April 2009. They were able to work together using collaborative tools on the Internet that are typically associated with “social networking”, including discussion forums and instant messaging (used in “chat” rooms). These tools were valuable additions to the more typical email, teleconferencing and file-sharing applications. The combination of all five tools created a “virtual workspace”, which allowed the volunteers to work together productively without ever meeting face-to-face.

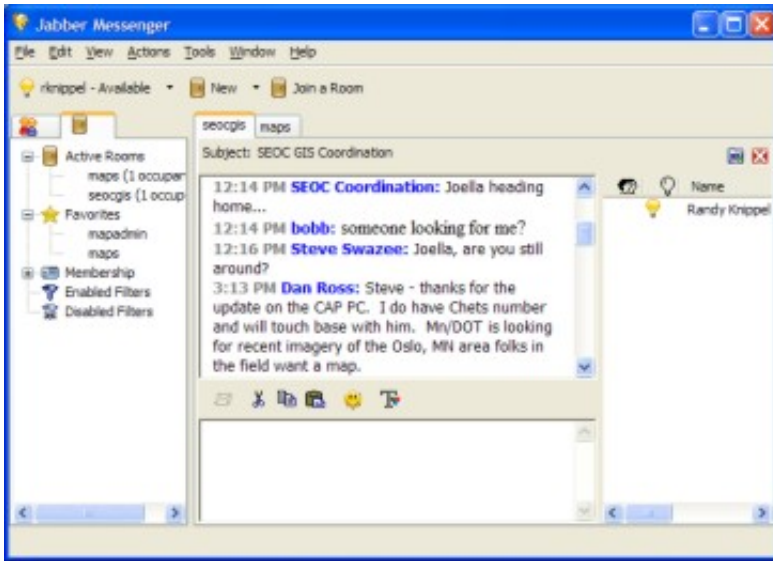
Over 20 GIS professionals from a variety of organizations distributed throughout the state created maps of the entire Red River Valley, leveraging mapping techniques recently used in Dakota County. The map at right shows the area that was mapped (in blue), and the physical locations of participants in the mapping effort. This was the first time such a collaborative effort had been undertaken in Minnesota, and will hopefully set the stage for providing collaborative mapping support for future disasters in the state.



The mapping effort was implemented in an online collaborative environment consisting of Microsoft Sharepoint, email, web servers, file transfer protocol (FTP) servers and Jabber secure instant messaging. This allowed geographically distributed participants to work together as if they were in the same room, without leaving the comforts of their office or home. Using Windows Remote Desktop Connection and leveraging the County’s Virtual Private Network (VPN) allowed County staff to work from home while utilizing their office computer. Other participants had similar capabilities. This meant that all participants could work in an environment in which they were familiar and comfortable, using software and hardware already available to them. They also had the flexibility to adjust their schedules to meet the demand, while balancing their work with personal commitments.

Jabber is a unified communication and real-time collaboration tool. It provided a “chat” site that the GIS professionals could use to quickly converse without missing someone through email or phone conferencing. It allowed them to easily keep in contact with each other and with the managers of various activities. The screen shot at left shows the Jabber environment with topic rooms, time-stamped transcript, participant list, and text entry window. As more people got involved with the mapping team, Jabber became the primary means of communicating. Email and phone conversations were used as a supplement because they were less effective when timing was critical. The typical email technique of using “reply to all”, in a dynamic and fluid situation such as emergency response, would lead to participant inboxes filling up with emails that were disconnected and difficult to follow.

Good communication is essential for an effective response to an emergency. Email, phones, and discussion forums are each suited to certain kinds of communication. However, especially in an emergency, they lack the ability to provide real-time, continuous, and documented communications between large numbers of participants over an extended time period. Participants enter, leave, and return at various times during an event, and they need to be able to catch up on pertinent information. Managers of an event need to know who is available and be able to communicate with them immediately. Jabber provided that additional level of communication, along with a time-stamped transcript archive of all activities.



Ultimately, the virtual work environment used for facilitating a collaborative mapping response for the Red River flooding proved itself among participants. Although many aspects of using the associated tools were not uniformly familiar to everyone, it only took a little time for all to become proficient. Lessons learned will be directly transferable to future events, allowing more GIS professionals distributed through a variety of government agencies and private companies to work together to produce maps to support emergency responders.

For further information and to see the maps produced, visit the Governor's Council on Geographic Information website (<http://www.gis.state.mn.us>) and follow the links

for the Red River Flood. Jabber (<http://www.jabber.org>) is an open source software solution.

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Summer 2009 - GIS 101: Maps, They're Not Just for Directions Anymore

By Mary Hagerman

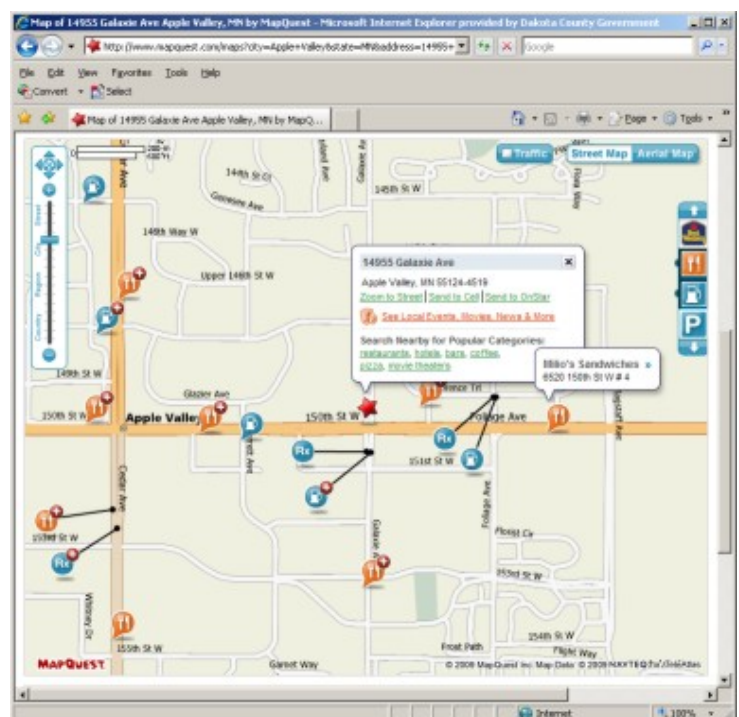
We are all accustomed to using maps to locate places or get directions. We may even use maps to show where things are in relation to other things on occasion. But maps can also be used to help organize and access information and documents. We can use maps to find more than just places. Maps can be used to help us find websites, documents, even other maps.

Try thinking of a map as a directory, or an index. Instead of looking something up alphabetically, you would look it up spatially, that is, by its location. Suppose you needed to find a dentist. You could look in the yellow pages, which may even group listings by city so you could pick something near where you live or work. Then you could get the address and look it up on a map to find out where it is and how far away. You may have to try a few dentists to find one that is in your city and close to where you like or work. Now suppose you also wanted to find a dry cleaner, a florist, and someplace to get your oil changed. You could repeat the process above for each of these places, and plot them on a map to see how close they are to your home or work, and to one another. Bear in mind that just because it is in your city doesn't mean it's in the part of the city near you, so you may need to try a few of each type of place before you get a set that are conveniently located. However, that's not a very efficient way to the gather information.

Location, location, location

If this information were organized by location, the process would be more like this; find your home or work location on a map, highlight dentists, florists, cleaners, and Jiffy Lubes nearby, and click on them to link to information about hours, services provided, etc. Because you are using a map to select the various places, you will not need to try more than one to find one that is on the right side of town. This can be done in [bing maps](#) (the new name for Microsoft's Virtual Earth site) by browsing businesses. They are arranged like the yellow pages, and selecting a category or subcategory adds those businesses to the map. Unfortunately, only one category can be shown on the map at a time.

In [MapQuest](#), there is a map toolbar that allows you to show various amenities on the map with a single click. You can turn on restaurants, pharmacies, and gas stations, for instance, and each will be displayed with a different symbol so it is easy to tell them apart. Clicking on an amenity on the map provides its name, address, and a link to its website. Additionally, when you map an address in MapQuest, the popup for the location offers the ability to "search for restaurants, hotels, bars, coffee, pizza, movie theaters", or to "see local events, movies, news & more". Searching for amenities this way adds them to the map and provides a list of the various businesses sorted by distance. The "see local events..." option returns information on concerts, events, movies, gas prices, used cars, classifieds, best restaurants, local news, sports, and weather for the area. All that with a single click, and all conveniently located nearby.



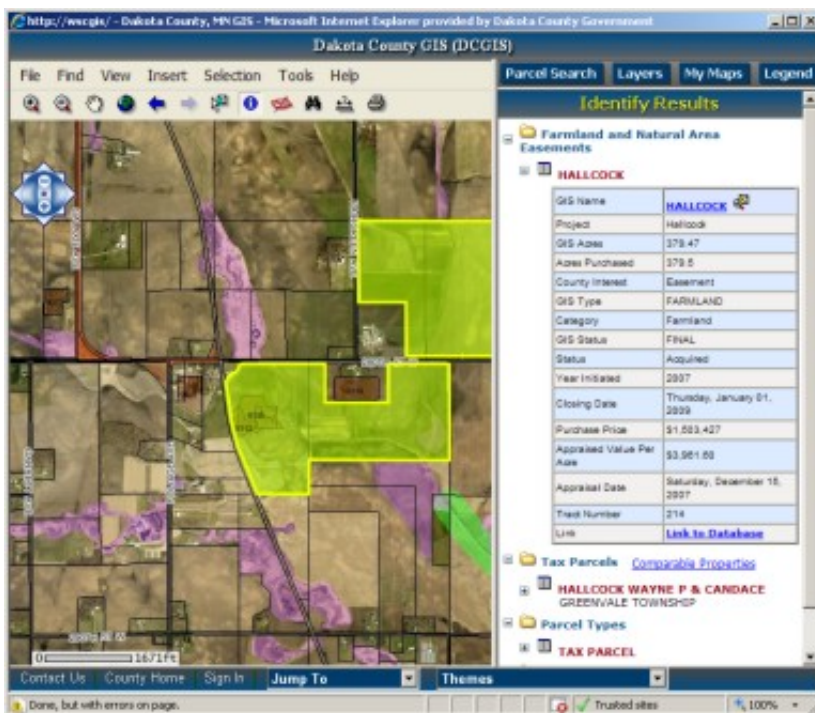
No longer business as usual

This idea of the map as the organizing factor can be applied to business practices as well. It is becoming increasingly more commonplace for businesses and government agencies to store their documents in electronic form, doing away with cumbersome, inefficient paper files. Often these electronic documents are organized and accessed in a similar way as they would have been if they were still paper. There is typically some sort of lookup feature that accesses the documents alphabetically, or by some attribute such as name, number, or date. For some types of documents, however, there may be a better way.

For retrieving documents with strong ties to location, like plat drawings, right-of-way maps, or utility as-builts, access via a map may likely be the most efficient. These documents are directly related to a location on the ground. Those locations can easily be represented on a web map with links to the corresponding documents. Sure, if you know the name of the plat or the number of the as-built, a database-type lookup would suffice for retrieving the document, but that is not always the case. You may just know that you need the right-of-way map for such-and-such intersection, or the as-builts for the sanitary sewer along such-and-such road. Furthermore, organizing these types of documents spatially, on a map, provides the added benefit of being able to easily identify any adjacent or coincident documents at a glance. Try doing that with a database lookup.

More where that came from

Using location to organize information and documents offers more than just efficient access to documents, it can provide access to a wealth of additional information as well. Location can relate things that are otherwise



seemingly unrelated. At Dakota County, documents related to Farmland and Natural Area easements are accessible through an interactive map. By clicking on an easement on the map, you can link to all the associated documents. Because the easements are displayed on a map, it is easy to identify other easements that are adjacent or nearby. But it is also very easy to identify if there are other features in the area that may be of interest, features not directly related to Farmland and Natural Area easements. At a glance, you can determine whether there are any transportation easements nearby, and access the corresponding documents; you can determine where there is county-owned property in the vicinity; or you can determine whether an easement is in or near a floodplain. Additionally, you have access to property information for adjacent

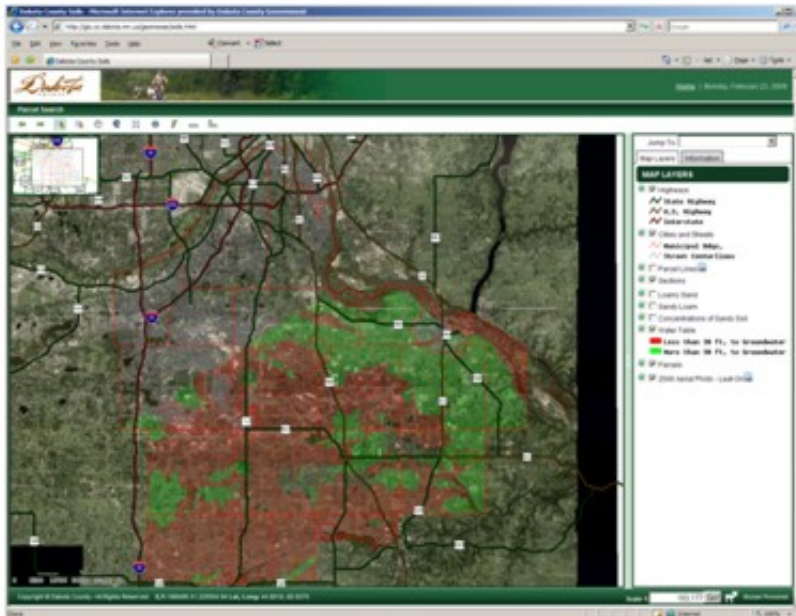
properties, foreclosure sales, construction projects, waste sites, wetlands, soils, geology, and a couple hundred other datasets. Location ties them all together, all on one map, all in one place.

Summer 2009 - Department Spotlight: Interactive Map for Acetochlor (ex. Harness®) Applications

By Phyllis Bongard, Agriculture Production Educator, University of Minnesota Extension - Dakota County

Due to its potential to leach through soil and contaminate groundwater, the label for the corn herbicide acetochlor (ex. Harness®, Degree®, Keystone®) restricts where it can be applied. The label restrictions are based on soil texture, depth to groundwater and soil organic matter content. Specifically, herbicides containing acetochlor cannot be applied to sands with less than 3% organic matter (OM), loamy sands with less than 2% OM, or sandy loams with less than 1% OM where the depth to groundwater is 30 feet or less.

Of the three factors, depth to groundwater has been the most difficult for farmers and applicators to determine. A new interactive map incorporates this information and takes the guesswork out of identifying areas where this herbicide may be restricted. As a result, applicators can be more confident that they are complying with the label requirements.



The overview of potential restrictions quickly and clearly shows areas on a field-by-field basis where acetochlor applications may be restricted. It combines areas of coarse-textured soils with areas where the depth to groundwater is less than 30 feet. Since the overview combines all coarse-textured soils, applicators should continue with a simple, three-step set of instructions if a field is included in one of these potentially restricted areas. When following the Three Step Guide, users look at soil texture layers and depth to groundwater in a step-by-step manner on the website. Soil organic matter, the final piece of information needed to decide whether or not acetochlor may be

applied, can be obtained through a soil test.

- Step 1. Does the field contain a loamy sand (yellow) or sandy loam (orange) soil?
 - a. If yes, go to Step 2.
 - b. If no, acetochlor may be applied.
- Step 2. Is the depth to groundwater less than 30 feet (click on water table)?
 - a. If yes (area is red), go to Step 3.
 - b. If no (area is green), acetochlor may be applied.
- Step 3. According to field soil tests, is the soil organic matter content less than 2.0% for a loamy sand, or less than 1.0% for a sandy loam?
 - a. If yes, acetochlor may not be applied.
 - b. If no, acetochlor may be applied.

The interactive acetochlor map can be accessed through the Dakota County website (www.dakotacounty.us and search "acetochlor") and is a collaborative project between University of Minnesota Extension-Dakota County, the Dakota County Office of GIS, and the Dakota County Water Resources Department.