Fall 2005 Department Spotlight: Historical UMore Park Animated Map

by Steve Scott and Ryan Miller
Dakota County Environmental Management Department

The Environmental Management Department has been preparing information about the former Gopher Ordnance Works (now UMore Park) for possible remedial action by the Army Corps of Engineers. This animated map is used to illustrate the ordnance works as it appeared in 1945.

Historic 1945 Conditions
Windows Media Player Video
(Dial-up 38Kbps) (Med. 340Kbps) (High 1.0Mbps)

Current Conditions Winter Scene
Windows Media Player Video
(Dial-up 38Kbps) (Med. 340Kbps) (High 1.0Mbps)

Using historical proposed and as-built plans, Dakota County Environmental Management Department Site Assessment staff created ArcView shapefiles representing the buildings, structures, transportation networks, and piping infrastructure of the ordnance works as they existed in 1945. The locations and footprints of the estimated 850 buildings and numerous structures making up the smokeless gunpowder works were adjusted using 1945 aerial photographs. Other layers were added from a variety of other sources, including building heights, tanks, pipes, water lines, sewer lines, water wells, French drains and septic systems. These shapefiles were then draped over the modern Dakota County grid to show the terrain.

The animated fly-through of the smokeless gunpowder manufacturing works was created using the ArcGIS 3D Analyst extension. This software allows users to navigate through three-dimensional landscapes and provides the user with the sense of the vastness of the industrial campus and the spatial relationship of the plant with the physical environment.

UMore Park is used for teaching, research and community education about land use planning, natural resources, health and water issues. It is also a significant venue for research and outreach on topics such as recreational trails, equine studies, and renewable energy. The future of UMore Park is dependent, in part, on the commitment of federal funding directed toward the assessment, investigation, and, if needed, cleanup of the former World War II munitions facility. The work undertaken by the Environmental Management Department will advance the understanding of the operation of the plant and assist in the investigation and remediation of the former industrial site.

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Fall 2005 Desktop GIS: Helpful Pictometry EFS Tips

by Joe Sapletal

By now many of you have attended some sort of Pictometry Electronic Field Study (EFS) training, but you are probably still wondering if there are some little helpful tips that would make things easier for you. Or, perhaps you haven't had an opportunity to go to training yet, and you want some tricks to get you by until then. This article is for you!

By now you are probably using the "Image" tool and the five "View from . . ." tools to move from image to image, but did you know that there are two other tools to help you move to an adjacent image?

This is the "Navigate" tool, or the "walking man", if you prefer. By clicking in the currently displayed image this tool will re-center the image that you are viewing, but it will also load the next available image along your "walking path" as you near the edge of the current image.
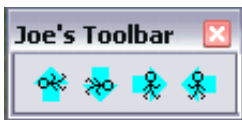
Another set of tools you might not be familiar with for navigating from image to image are the "Move One Image to the . . ." tools, that can send you one image to the north, south, east or west. You can find them listed under the **Navigate** menu drop down list. You can also add icons for the commands to an existing toolbar, or even create your own toolbar that contains them. To add them to an existing toolbar simple click **Tools > Customize**. Click on the "Commands" tab, click on the "Navigate" category and you will see the four icons you need. Click and drag each of those four icons onto one of the existing toolbars, then click okay. Now they are ready to use.
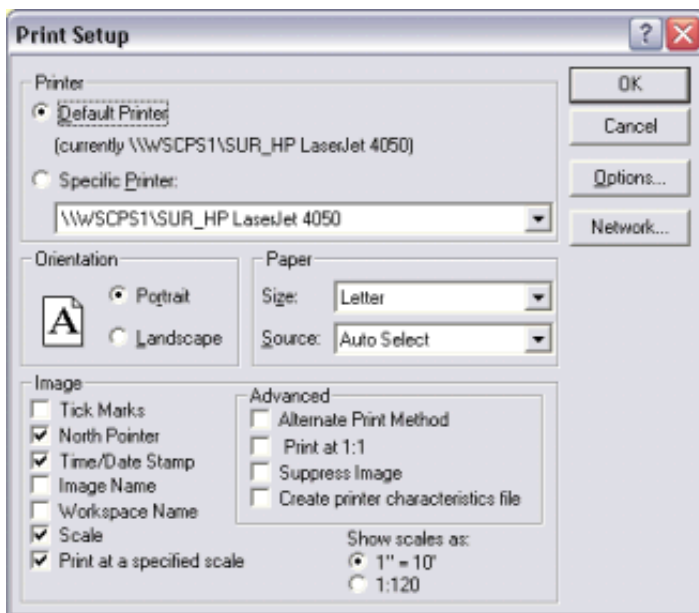
Have you printed anything yet? There are a few features in the "Print Setup" dialog window that you should be aware of. Click **File > Print Setup** and the "Print Setup" dialog window will open. The obvious settings are there, such as which printer you want, the page orientation and the paper size. But did you know that you could also have some additional information added to your printout? In the lower left of the "Print Setup" dialog window are the "Image" features. By clicking in the check boxes you can turn on a few useful features. You can add a north arrow, scale information and even a time/date stamp from the image you are printing. If you turn on the "Print at a specified scale" option, when you print your image another small dialog window will pop up and ask you at what scale you want to print your image. For more information on scale, read Todd Lusk's Weighing in on Map Scale article in this newsletter.

Fall 2005 GIS 101: Weighing in on Map Scale
by Todd Lusk

"Map Scale? That's, like, how much the paper you print the map on weighs, right?"

"Well, not exactly..."

Many people know a map scale when they see one, but do they really understand what it means? The scale of a map is a crucial piece of information to consider when creating or reading map products. It can influence the accuracy and the readability of a map. But do we really understand what map scale is and how it affects us?

Map scale can be an extremely useful piece of information to have if it is used properly. There are three different ways map scale can represented: by ratio or representative fraction, as a word statement, or by a graphic scale. All three ways are perfectly correct and all three represent the same information, just in different ways.

The first method, a representative fraction, indicates scale in the form of a number, followed by a colon, followed by another number (i.e., 1:24,000). This ratio indicates how many units on the map correspond to a number of the same units on the ground. What the units actually are is completely independent of what the scale is. The units could be in feet, inches, miles, even in number of footsteps. What matters is the ratio between them. In the example above one unit on the map equals 24,000 units on the actual surface of the earth. If we measured one inch on the map, then the actual distance covered on the ground would be 24,000 inches (2,000 feet). This information can also be expressed as a fraction (1/24,000). Both expressions give the same scale, they just display it in two different ways.

The second way of expressing map scale is via a word statement. One might see something like "one inch equals 2,000 feet". On a map it would likely be expressed as " 1" = 2,000' " or " 1 in = 2,000 ft ". In this example, the map scale is telling the reader that one inch measured on the map represents 2,000 feet on the surface of the earth. The first part of the expression does not have to be in inches . It can be expressed using any distance unit or measuring system, such as the metric system. Again, the important thing is the ration between the two parts of the statement.

1:24,000

1/24,000

1" = 2,000'

1 inch equals
2,000 feet

The previous two methods both work well as long as a map is not reproduced in a way that changes the scale (i.e., either enlarging or reducing the map on copy machine). If that happens, the given scale will no longer be accurate. A way to avoid this potential problem is to use a graphical scale which uses no words or numbers. Quite simply, a graphical scale is just a series of lines and tick marks which represent distances on the map. The distance between the ticks is often one inch, but it does not have to be. It could be centimeters, meters, or even miles. Inches just happen to be convenient for those of us in the U.S. because most of our maps are relatively small, frequently printed on 8 1/2" x 11" paper or at most a few feet in length. One key difference in using a graphical scale, however, is that the actual distance on the ground will be listed next to the tick marks. This way, a reader can use a ruler, a piece of paper, or even a piece of string to determine the actual distance on the surface of the earth.
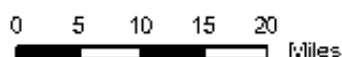
An example of a graphical scale bar

One last piece of the map scale puzzle concerns the terminology used to describe the actual map scale. "Large scale" and "small scale" are typical terms that are used. A "large scale" map is one that shows a lot of detail (i.e., the map is "zoomed in" very close to an area of interest). A "small scale" map is just the opposite, it shows very little detail and is zoomed out to a great degree. To some, this seems counterintuitive. One might think that a "large scale" map would cover a large area. Instead, think of the scale as an indication of the amount of detail shown on the map. A "large scale" map covers a small area, but shows a lot of detail. A "small scale" map covers a large area and shows less detail.

A "small" scale map

A "large" scale map

0   5   10   Miles

0   100   200   300   Feet

1:1,100,000
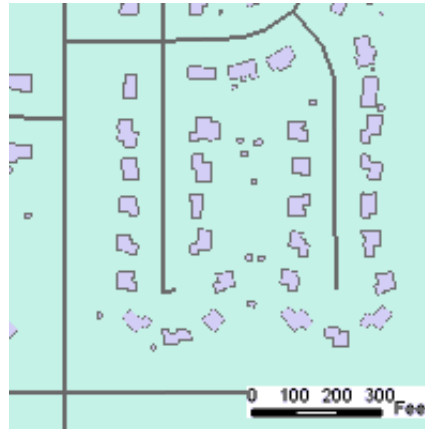
1:6,000

No matter what you do, map scale plays an important role in map making. It influences data accuracy and the amount of detail shown on a map. It is important to understand what a map scale represents and what effect it has on a map. Knowing this will help you better understand exactly what it is you are seeing on the page.

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Fall 2005 Tech Talk: Where's My Buffer Wizard? (or, How I Learned to Stop Worrying and Love ArcToolbox)

by Matt McGuire

Let's get straight to the brass tacks. Q: Where is the buffer wizard in ArcGIS 9.x? A: It's in ArcToolbox.

Okay, now that we've got that out of the way, here's the long answer. The original buffer wizard is still there, it's just hidden, for two reasons. First, along with many other useful tools, it's hidden because there isn't enough space for everything in the ArcMap default view. Second, for anything that has to do with geoprocessing, ESRI would kindly like to guide us to ArcToolbox, which has it's own buffer tool.

ArcToolbox is actually only one way to access all the new functionality in what ESRI calls, "the geoprocessing framework". The framework contains similar tools to 8.x geoprocessing tools, plus many more. These tools can be accessed in five different ways:

- ArcToolbox
- Command Line
- ModelBuilder
- Scripting
- ArcObjects

Using buffering as the focus, we'll look at several different ways to access these tools. This article will look at methods of accessing the tools through ArcToolbox (or just "The Toolbox", as I like to call it). The Toolbox is accessible in both ArcMap and ArcCatalog, but if you're already working in ArcMap, that's the better choice. This is because The Toolbox will have quick access to the contents of your map, and new datasets created from processes are automatically added to your map. So let's just work from ArcMap.

First of all, let's open The Toolbox by clicking the representative little red toolbox button in the ArcMap Standard toolbar. This button opens and closes ArcToolbox. The Toolbox is a dockable window, which means you can put it anywhere you want to on your screen. I like to fit mine underneath the Table of Contents.
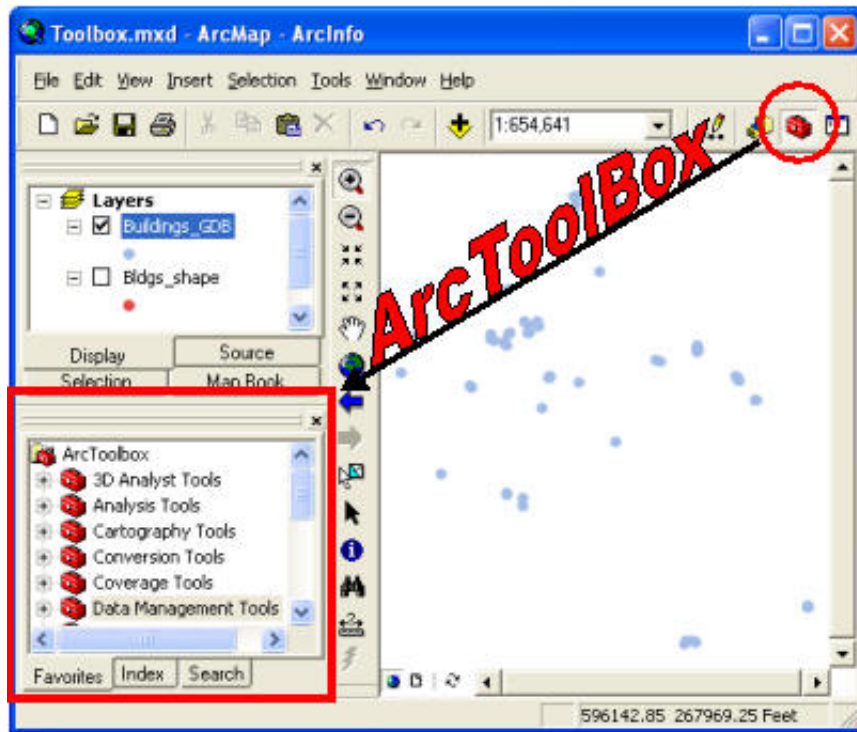
ESRI has arranged The Toolbox with their own logic, and it can be hard to know where to look for, say... the buffer tool - yes, we're still getting to that. While it's tempting to just open and close toolboxes and toolsets until you find what you're looking for, there are easier ways. Notice the three tabs on the bottom, "Favorites", "Index", and "Search".

Favorites is the default view. Once you get comfortable with your setup and know where everything is, this is a straightforward way to access tools. You can make your own toolboxes and add whichever tools to it that make sense to you. These toolboxes can be shared as well. Actually, I found one on ESRI's Support Site that mimics the ArcMap 8.x Geoprocessing tools, including Clip, Dissolve, Intersect, Merge, and Union.
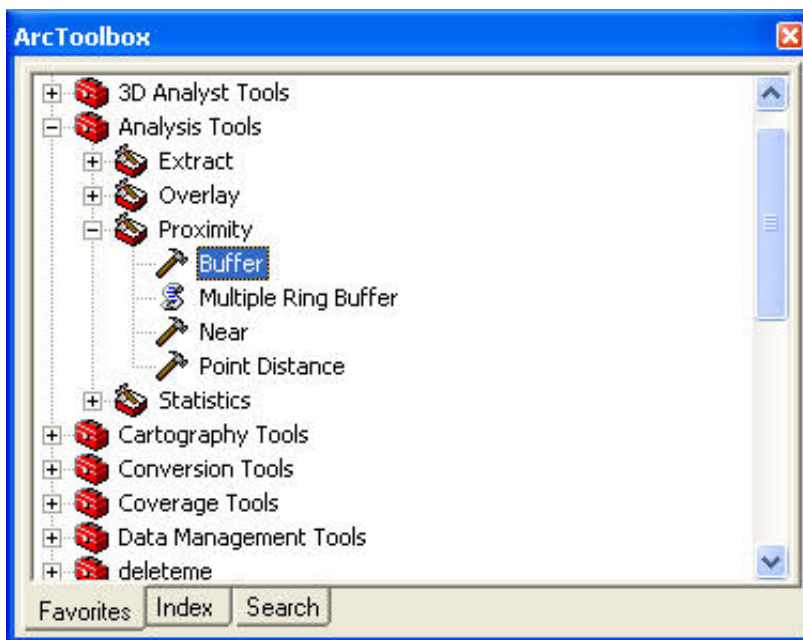

As you can see, ArcToolbox has the familiar tree view, similar to ArcCatalog or Windows Explorer. Clicking on the plus signs next to the icons expands the trees. ArcToolbox is organized with Toolboxes and Toolsets. Toolboxes contain Toolsets and Toolsets contain Tools, Models, and Scripts.

The Index view provides a list of all the tools in alphabetical order. Typing in the name of the tool you are interested in jumps you to the word in the Index as you type it. Clicking on the "Locate" button brings you to the tool in the Favorites view. Double clicking on the tool name in the list opens the tool. This is a quick way to get at a tool if you know the name.
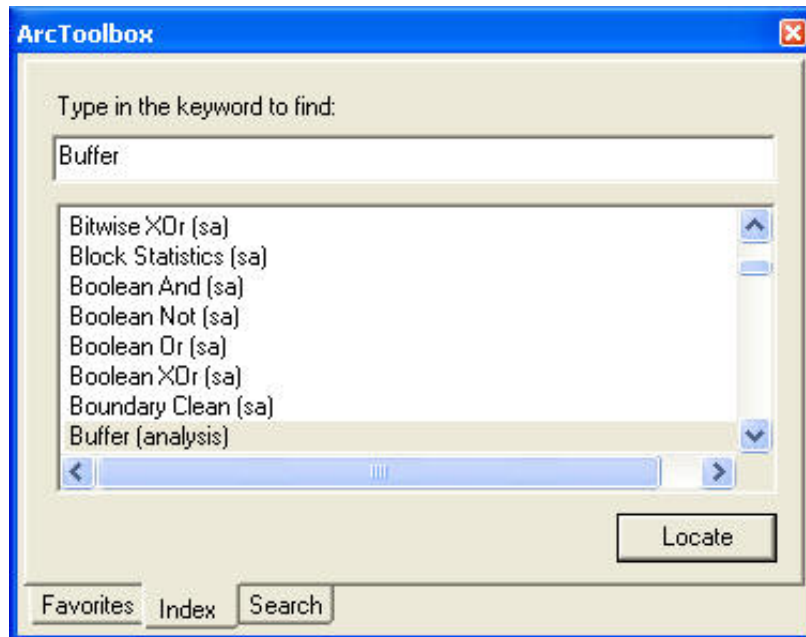

The Search view lets you type in a keyword that may turn up in several different tools. As in the Index, double clicking on a result opens the tool, and clicking on "Locate" brings you to the tool's location in the Favorites view.
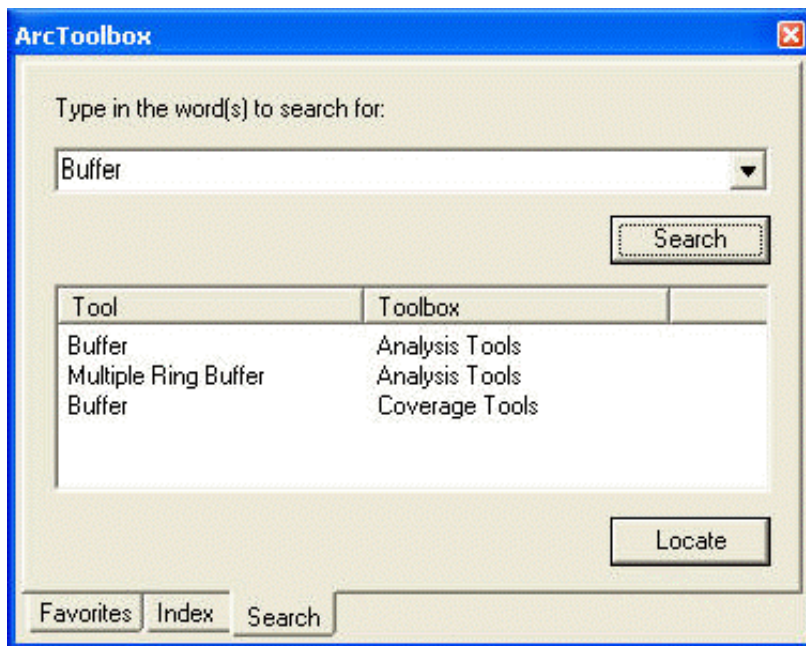

As can be seen here, there a couple of options for buffering that you may not have found in the Favorites view.

All three of these methods allow locating and opening one of the many tools in ArcToolbox. Explaining how all the tools work is beyond the scope of this article, but they all look very similar, and getting familiar with one will get you a long way towards getting comfortable with the others. So, let's take a look at the tool in question, Buffer.
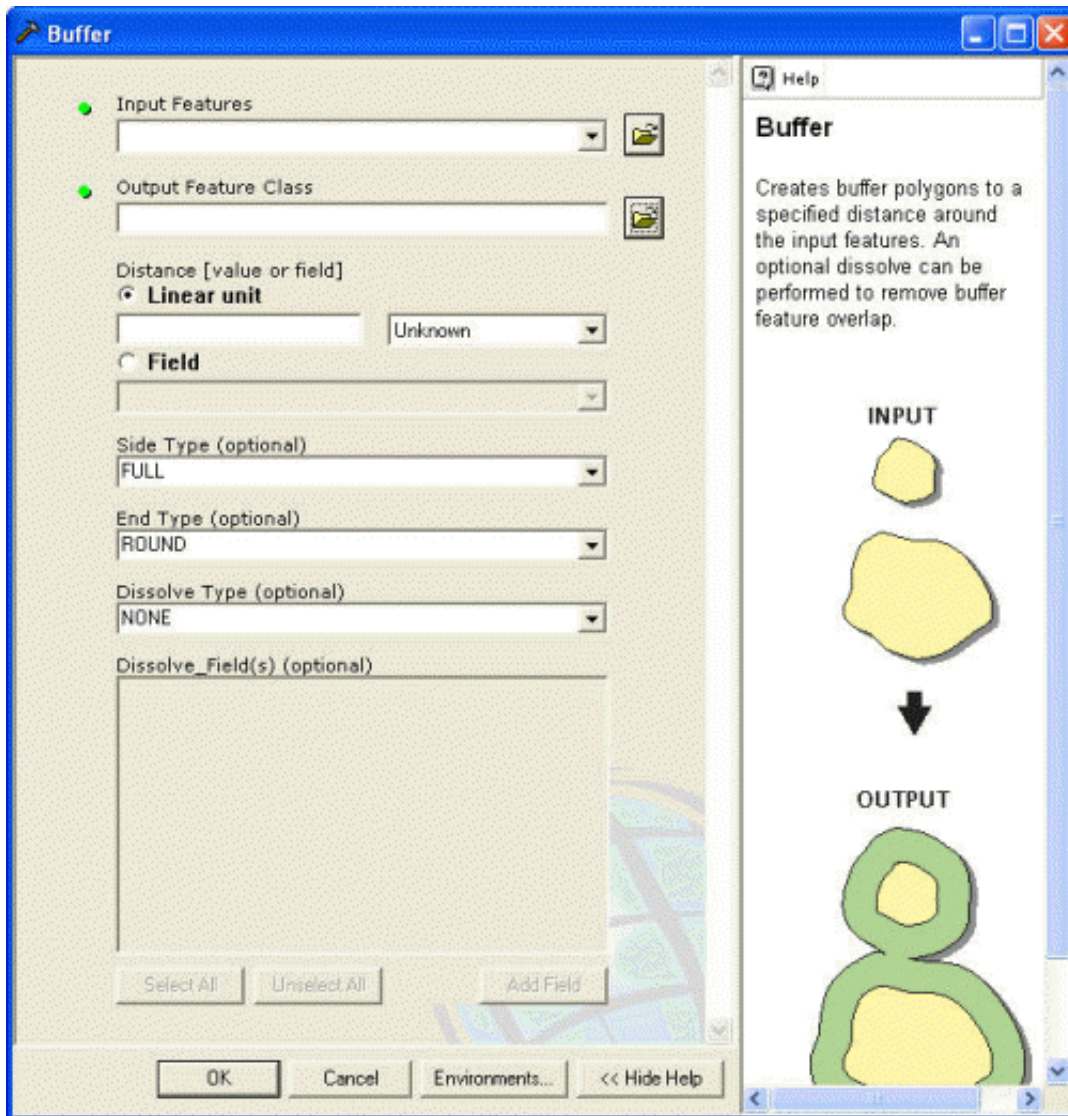
This is pretty much how all the tools look. It is a basic input form, with text boxes, combo boxes, radio buttons, and list boxes, etc. There is a help window on the right side that tells you what the tool will do and how to use it, if you do not know what you're doing. If you are already comfortable using a tool, the help window can be hidden. The help window changes depending on which input control is active. For example, no control is active now, so an overview of the Buffer tool is displayed in the help window. When I click in the "Input Features" box to start choosing the layer I'm going to buffer, the help window changes:
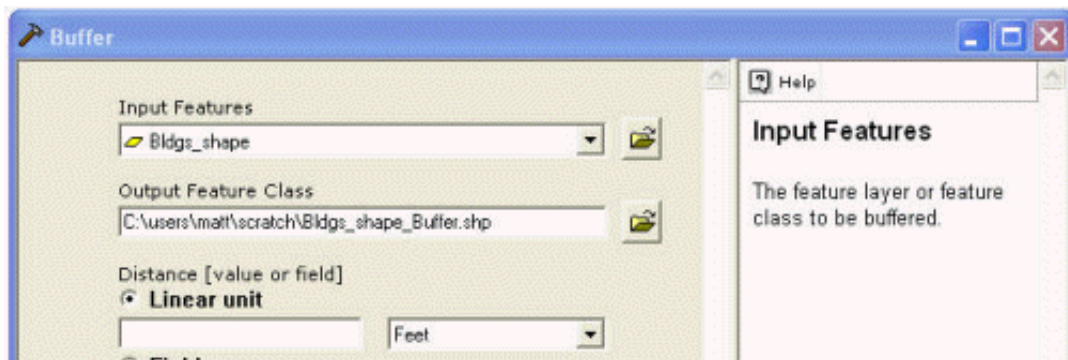
Clicking on OK runs the tool, and adds your newly created layer to ArcMap.

So, we've talked about the geoprocessing framework in ArcGIS. We've looked at the three ways to access tools from ArcToolbox. And, to get familiar with the tools, we've looked at one tool to see a common template that all

the tools share. Hopefully, this is enough to get you comfortable with geoprocessing in ArcMap 9.x. However, there is a lot more to the geoprocessing framework, and I encourage you to explore it on your own.

References

The Geoprocessing Section in ArcGIS Desktop Help:

- General overview of the geoprocessing framework
- Complete tool listing and reference
- Instructions on how to create your own toolboxes
- More