Introduction to MapWindow

Version 4.3

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Notes and Remarks

Notes: In this and following tutorials, the following will be used:

[***NEW***]	a button activated by clicking on it
"(A new blank map project)"	a checkbox activated by put a check in the box by clicking on the box
"(Username)"	a text-box name where the user enter data by typing it in
 ***ISSUE***	a potential limitation to the use of the software
 ***NOTE***	an addition comment to point out addition functionality or information
 ***TASK***	asking the user to practice a skill we just discussed
 ***QUESTION:***	asking the user to collect information provided by a ***TASK***

1.0	Chapter
1.1	Section
1.1.1	Subsection
1.1.1.01	Subsubsection

Chapter 1 Introduction

1.1 General Information

1.1.1 Introduction

1.1.1.01 ***Introduction:***

The ***MapWindow*** application is a free, extensible geographic information system (GIS) that can be used in many ways:

- As an open-source alternative desktop GIS
- To distribute data to others
- To develop and distribute custom spatial data analysis tools

1.1.1.02 ***Features:***

- As an open-source tool, ***MapWindow*** is free to use and redistribute to the user clients and other end users. It may also be modified to fit the user needs, or embedded into proprietary software.

- ***MapWindow*** is more than just a data viewer. It is an extensible geographic information system. This means that advanced users or developers can write plug-ins to add additional functionality (models, special viewers, hot-link handlers, data editors, etc) and pass these along to any number of the user's clients and end users.

- ***MapWindow*** includes standard GIS data visualization features as well as DBF attribute table editing, shapefile editing, and data converters. Dozens of standard GIS formats are supported, including Shapefiles, GeoTIFF, ESRI ArcInfo ASCII and binary grids.

- ***MapWindow*** also includes a complete ActiveX component which may be used to instantly add GIS capabilities to the user's existing software product. Additional geo-processing components are available for .NET-compatible languages.

Chapter 2 Getting the software

2.1 MapWindow

2.1.1 General Information for MapWindow

2.1.1.01 MapWindow is open source

MapWindow is an open source "Programmable Geographic Information System" that supports manipulation, analysis, and viewing of geospatial data and associated attribute data in several standard GIS data formats. ***MapWindow*** is a mapping tool, a GIS modeling system and a GIS application programming interface (API) all in one convenient redistributable open source solution.

2.1.1.02 Developed to address existing needs.

MapWindow was developed to address the need for a GIS programming tool that could be used in engineering research and project software, without requiring end users to purchase a complete GIS system or become GIS experts. It was also developed in order to distribute data, along with a viewer tool, to many users without having to pay expensive royalties.

For example, a researcher or company may want to deploy a tool that lets users build and interact with maps of GPS data overlaid on top of USGS quad maps. One approach is to build the tool as an extension to commercial GIS software, and then require users to purchase that software to run the extension. Alternatively, the company could use ***MapWindow*** as a base platform and build a specialized application that performs the needed function and then give it or sell it directly to end user with no need for third party software purchases.

2.1.1.03 Components of MapWindows

MapWindow consists of the main ***MapWindow*** application, Core Components, and plug-ins.

- Main ***MapWindow*** Application: This is the central interface for ***MapWindow***. From here, the user may view data elements such as Shapefiles and Grids.

- Core Components: These are the components which operate underneath ***MapWindow***. The three main components are MapWinGIS, MapWinInterfaces, and MapWinGeoProc.

- MapWinGIS: This is an ActiveX control which may be placed into any project in any programming language that supports ActiveX. This is the main map component - if the user wanted to write a program that displayed shape data, for example, the user could use this control for the display portion of the user's program.

- MapWinInterfaces: Also called the "Plug-in Interface", this is a DLL file which will allow the user to write the user's own plug-ins to the main ***MapWindow*** application. This may be done from any programming language which supports the creation and use of Microsoft .NET 2.0 Dynamic Link Libraries (DLLs).

- MapWinGeoProc: This is a .NET library of geoprocessing functions, including tools for managing projections, clipping and buffering. This library is under very active development with new capabilities appearing often.

- Plug-ins: These are specialized tools written to interact with the main ***MapWindow*** application. While ***MapWindow*** is mainly a data viewing tool, the real power of ***MapWindow*** comes in the form of plug-ins.

  - The ***MapWindow*** installer includes plug-ins for hyperlinking from geographic features, editing attribute tables, editing shapefiles, labeling shapefiles, identifying features and cells, and performing some geoprocessing.

  - Other plug-ins are available via the ***MapWindow*** website and are under development by the ***MapWindow*** team as well as by third parties for various custom applications.

2.1.2 Getting and Setting up MapWindow

2.1.2.01 Open the web browser and navigate to the ***MapWindow*** GIS website at http://www.mapwindow.org/

2.1.2.02 Click on the [***DOWNLOAD NOW***] Button as seen in Figure 2.1:

Figure 2.1

2.1.2.03 Click on the [***MAPWINDOW GIS APPLICATION***] menu item

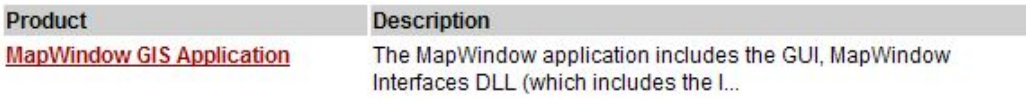


Figure 2.2

NOTE #01**** the MapWindow application includes the GUI, **MapWindow** Interfaces DLL (which includes the legend component), **MapWindow** ActiveX control, table editor plug-in, feature identifier plug-in, and other core plug-ins. The installer includes sample data and is compatible with Windows 98 and up. Source code can be downloaded using the Subvesrion (SVN) code repository (http://www.mapwindow.org/svn.php).*

2.1.2.04 Click on the [***MAPWINDOW43RC.EXE***] menu item. (Higher version numbers may be available, for instance "MAPWINDOW44SR.EXE". Click on the highest available version number.)

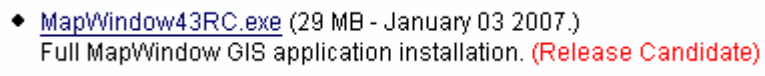


Figure 2.3

NOTE #02**** Two downloads are available for the MapWindow application. MapWindow43RC.exe. The second installer (MapWindow43CFInstall.exe) is for bundling with other application installers for people developing their own applications using **MapWindow**.*

2.1.2.05 The user should see one of the two windows below, depending on the user's web browser.

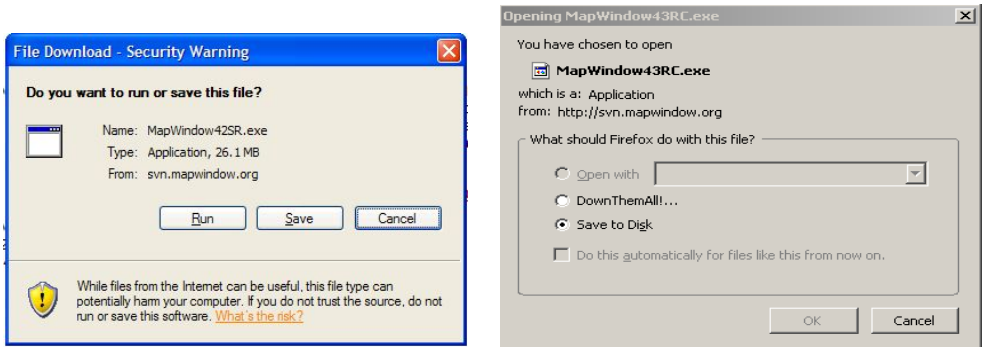


Figure 2.4

2.1.2.06 Click [***OK***]

2.1.2.07 Navigate to the download directory and click on ***MapWindow43RC.exe***

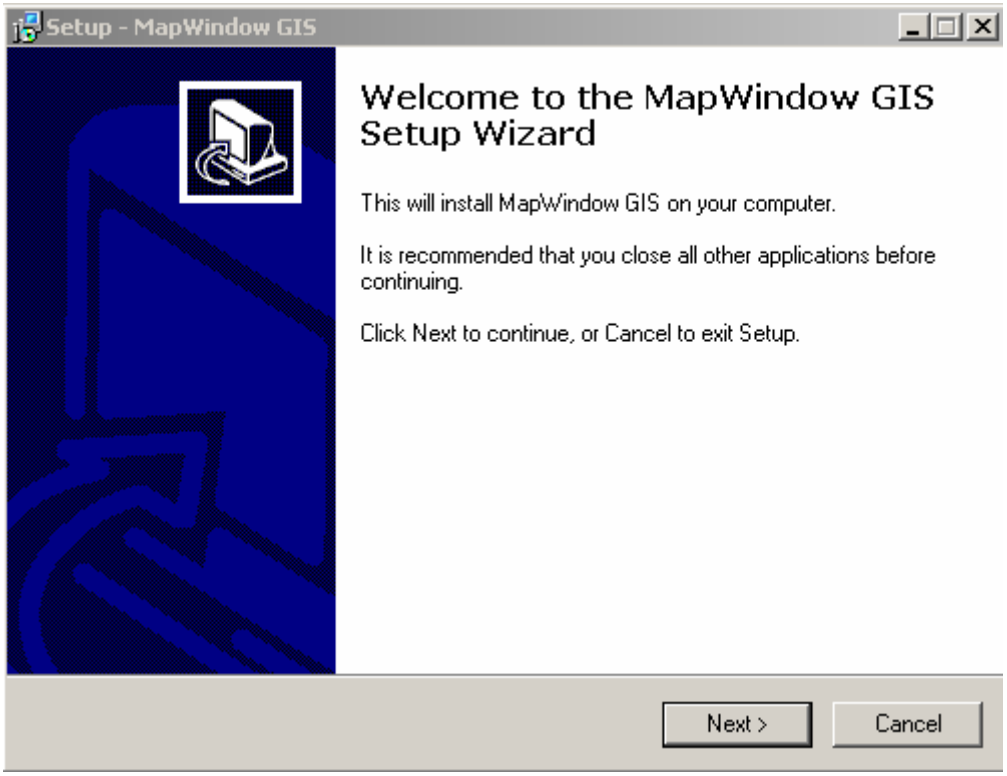


Figure 2.5

2.1.2.08 Click [***Next***]

2.1.2.09 Click on "I Accept the agreement" and then click [***Next***]

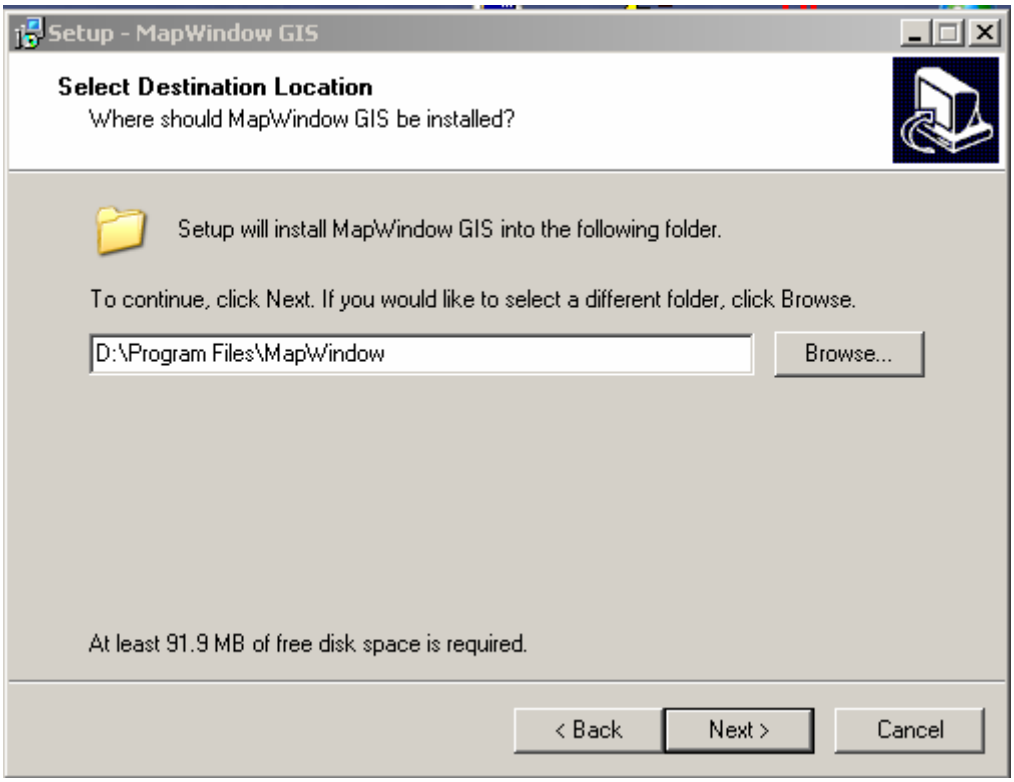


Figure 2.6

2.1.2.10 Set Path and click [***Next***]

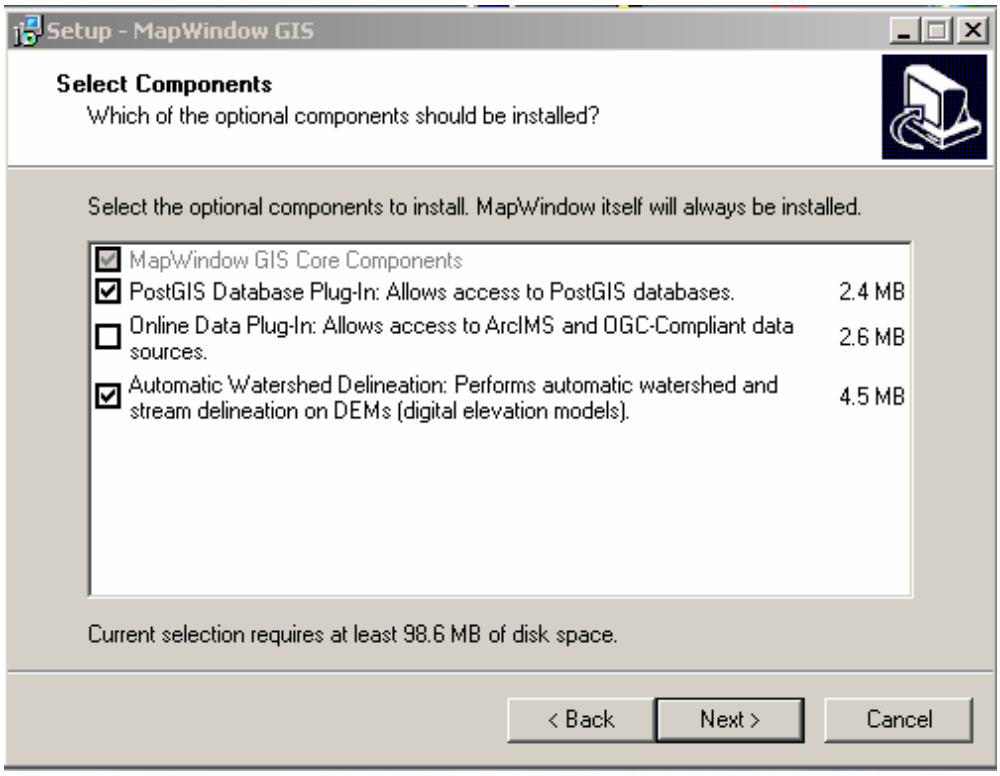


Figure 2.7

2.1.2.11 Select Components as Indicated in Figure 2.7

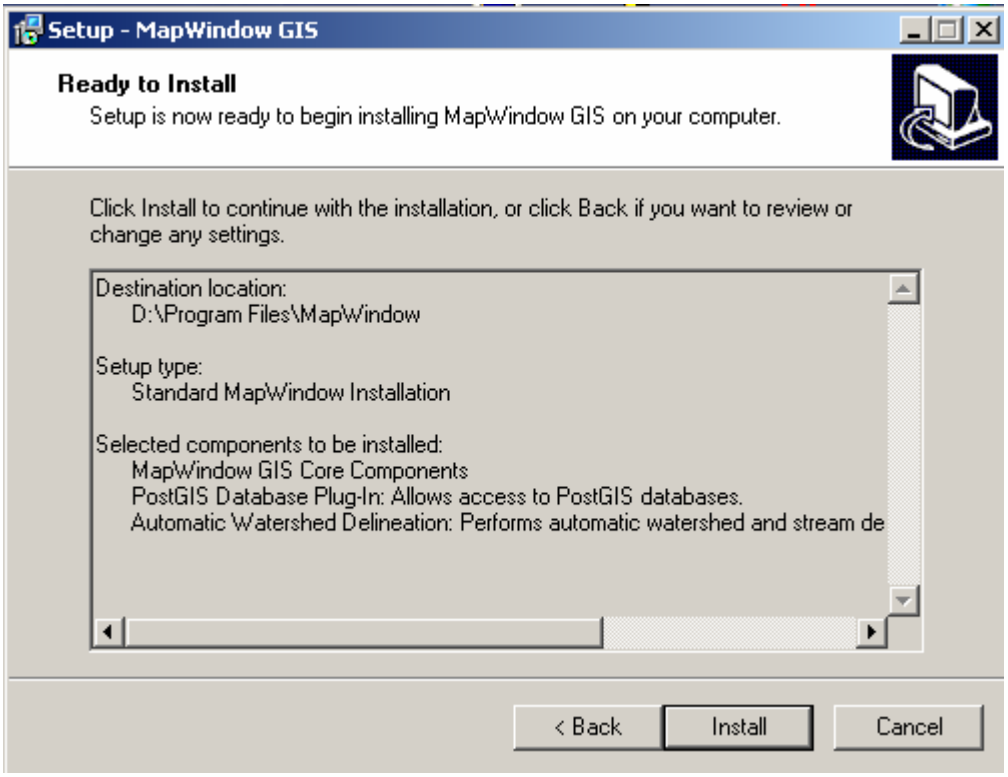


Figure 2.8

2.1.2.12 Click [***Install***]

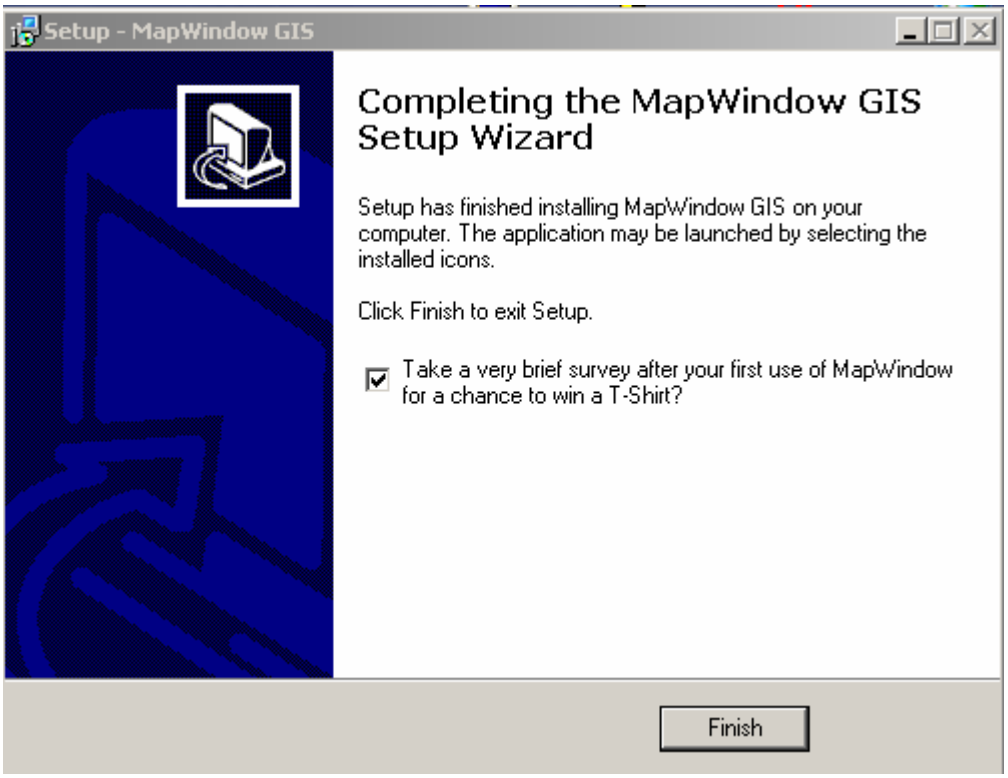


Figure 2.8

2.1.2.13 Click [***FINISH***].

2.1.2.14 This will create a desktop icon (shortcut) labeled MapWindow

Figure 2.9

2.2 7-Zip

2.2.1 General Information for File Unzip software:

2.2.1.01 The following information on ***7-Zip*** is taken from *http://www.7-zip.org/*

2.2.1.02 ***7-Zip*** is a file archive program with high compression ratio. ***7-Zip*** is free software distributed under the **GNU LGPL** (except for the RAR plugin).

2.2.2 Getting and Installing 7-Zip

2.2.2.01 Open the web browser and go to *http://www.7-zip.org/*

2.2.2.02 Click on the [***DOWNLOAD***] button next to type ".exe"

Link	Type	Windows	Size
Download	.exe	32-bit	818 KB
Download	.msi		873 KB
Download		x64	1238 KB

Figure 2.10

2.2.2.03 Select a mirror site and click on [***DOWNLOAD***]

2.2.2.04 When the screen changes to

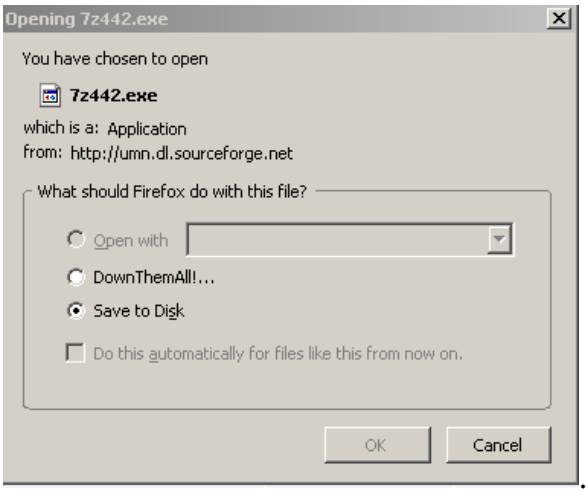


Figure 2.11

Click on radio-button "(Save to Disk)" then [***OK***]

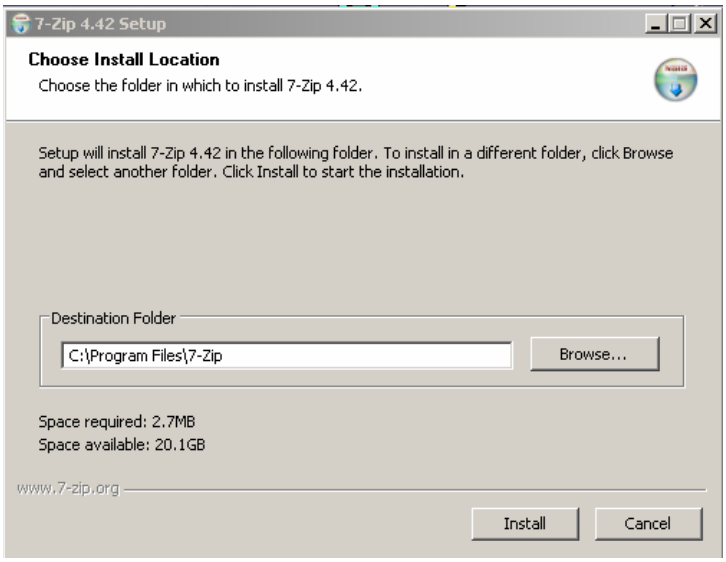


Figure 2.12

2.2.2.05 Click [***INSTALL***]

2.2.2.06 Click [***FINISH***].

Chapter 3 Getting the data

3.1 To Obtain Data from National Atlas

3.1.1 General Information for Obtaining Data from National Atlas:

3.1.1.01 Not Applicable

3.1.2 To Obtain Data from National Atlas

3.1.2.01 Create a directory called workspace on the machine e.g. D:/workspace.

3.1.2.02 Open the web browser and go to
http://www.nationalatlas.gov/atlasftp.html

3.1.2.03 Click on “Boundaries”

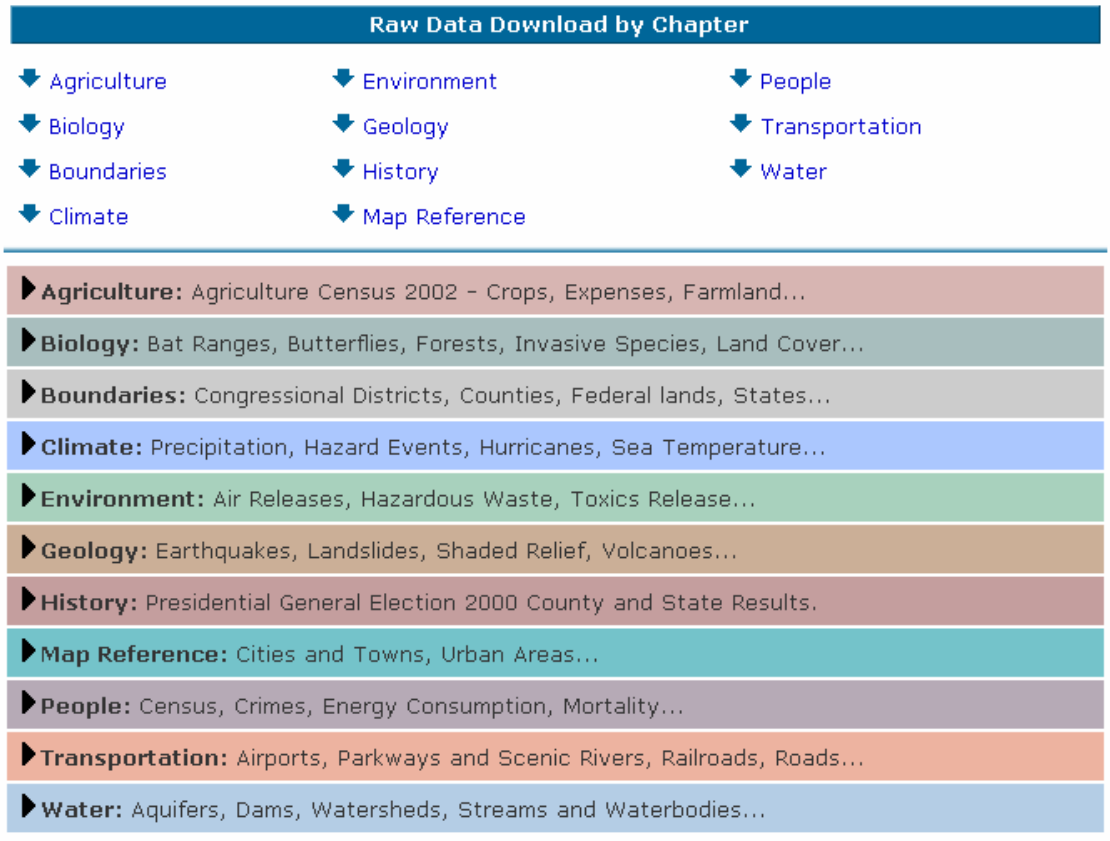


Figure 3.1

3.1.2.04 Download the following Shapefile layers and unzip them into the Workspace folder:

- County Boundaries, 2001
- Federal Lands
- State Boundaries

3.1.2.05 Download the following Shapefile layer from "Map Reference" and unzip them into the Workspace folder:

- Urban Areas

3.1.2.06 Download the following Shapefile layers from "Transportation" and unzip them into the Workspace folder:

- Airports
- Railroads
- Roads

3.1.2.07 Download the following Shapefile layer from "Water" and unzip them into the Workspace folder:

- Streams and Waterbodies

3.1.2.08 Download the following Shapefile layers from "Biology" and unzip them into the Workspace folder:

- Invasive Species - Africanized Honey Bees
- Invasive Species – Zebra Mussel Distribution
- Ecoregions – Bailey
- Ecoregions – Omernik

3.1.2.09 Download the following Shapefile layer from "People" and unzip them into the Workspace folder:

- Mortality, Various Causes

3.1.2.10 Download the following Shapefile layer from "Geology" and unzip them into the Workspace folder:

- Shaded Relief Land - Color - 1 Kilometer Resolution
- Shaded Relief Land - Color - Conterminous United States 200 Meter Resolution
- Coal Fields

Chapter 4 Updating MapWindow

4.1 Updating MapWindow

4.1.1 General Information for Updating MapWindow

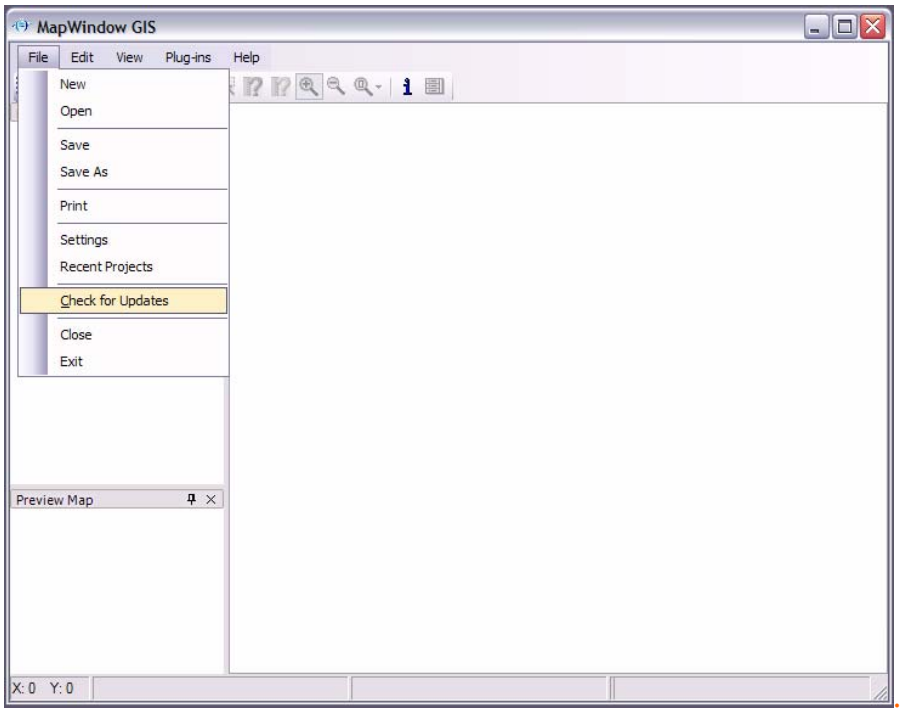


Figure 4.1

4.1.2 Setup for updating MapWindow

4.1.3 Updating MapWindow

4.1.1.01 MapWindow update can be acquired by clicking on [***FILE***]

4.1.1.02 Click on [***CHECK FOR UPDATES***]. This function uses the internet to check for updates. If any updates are available, you'll be given the option to install them.

Chapter 5 Projects

5.1 Creating a New Project

5.1.1 General Information for Creating a New Project:

5.1.1.01 Not Applicable

5.1.2 Setup for Creating a New Project:

5.1.2.01 Not Applicable

5.1.3 Creating a new project

5.1.3.01 Double Click on the Desktop Icon

Figure 5.1

5.1.3.02 Thee following screen should appear (if this is the user's first time running **MapWindow**).

Figure 5.2

5.1.3.03 Click the [***CLOSE***] button and the following main window will appear.

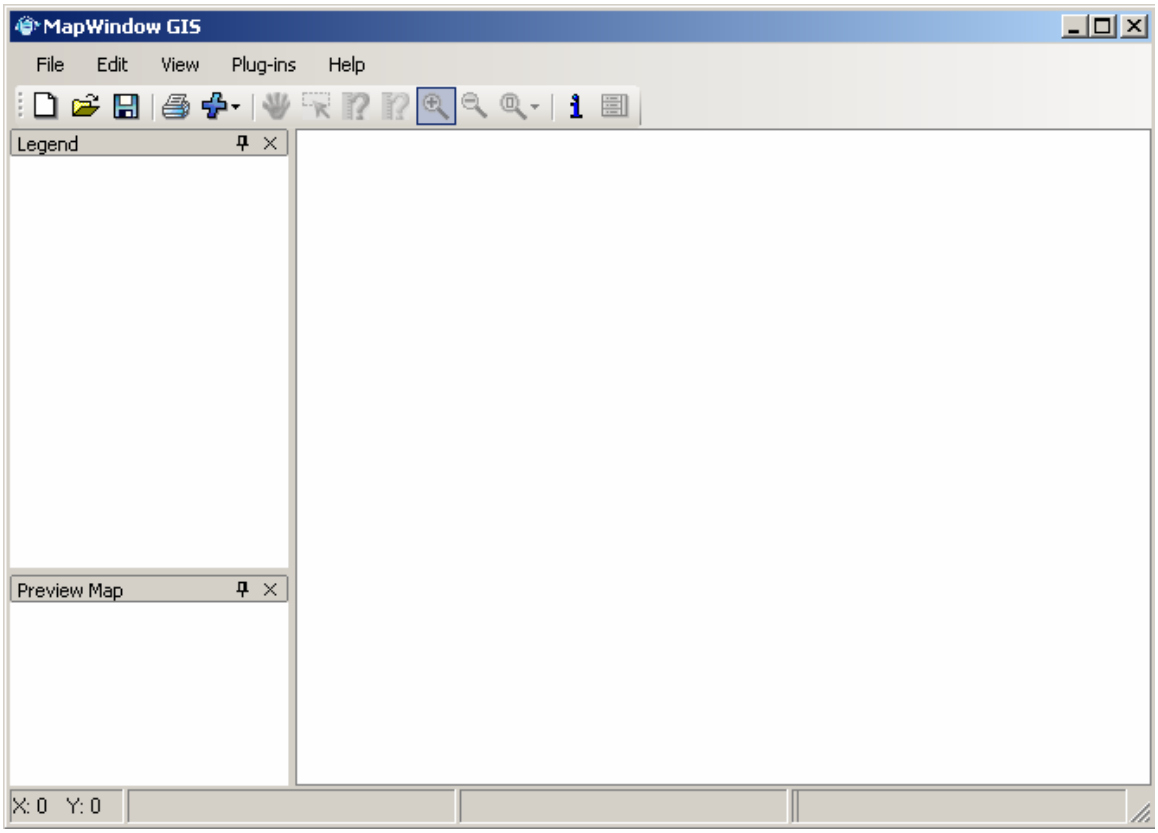


Figure 5.3

5.2 Loading an Existing Project

5.2.1 General Information for Loading an Existing Project

5.2.1.01 Not Applicable

5.2.2 Setup for Loading an Existing Project:

5.2.2.01 Not Applicable

5.2.3 Steps for Loading an Existing Project

5.2.3.01 Click on [***FILE***]

5.2.3.02 Click on [***OPEN***]

5.2.3.03 Select a Project file (ends in .mwprj) and Click [***OPEN***]

NOTE #03**** Several examples of project files can be found at C:\Program Files\MapWindow\Sample Projects*

5.3 Saving a Project

5.3.1 General Information for Saving a Project:

5.3.1.01 Not Applicable

5.3.2 Setup for Saving a Project: Not Applicable

5.3.2.01 Not Applicable

5.3.3 Steps for Saving a Project

5.3.3.01 While working on any project, it is advisable to save regularly to guard against data loss and for later retrieval. When saving a project for the first time, it is necessary to provide a name for the project file. It is important to note that a saved project file does not contain any map data. The project file contains references to map data, as well as other information such as layer symbology. Projects are stored on the hard drive with an .mwprj extension.

5.3.3.02 Click the [***FILE***] on the Main Toolbar.

5.3.3.03 Click the [***SAVE***]. If this is the first time the user has saved the project, the user will be prompted to provide a path and filename.

5.3.3.04 Click the [***SAVE***] button

Chapter 6 Our First Project

6.1 Additional windows

6.1.1 General Information for Additional Windows:

6.1.1.01 All necessary windows are open as default settings: .layers, the map view, and a preview map.

Chapter 7 Rendering

7.1 Rendering

7.1.1 General Information about Rendering:

7.1.1.01 See chapters 11 (Vector Data) and 14 (Raster Data). These sections explain how to customize rendering behavior using the Legend Editor.

Chapter 8 Projections

8.1 Projections

8.1.1 General Information about Projections

8.1.1.01 ***MapWindow*** does not support on-the-fly projection because it gives the user a false sense of the data being in a projection which it is not in. This is a situation that is suitable for viewing, but problematic for modeling. Instead, ***MapWindow*** provides a facility to warn the user when data with mismatched projections are added to the same project. The user is then prompted to optionally reproject the data such that all data is in the same projection, or proceed with the disclaimer that data may not appear as expected.

8.1.2 Setup for Projections:

8.1.2.01 Not Applicable

8.1.3 Usage of Projections

8.1.3.01 The first layer that the user adds will be checked for projection data (an ESRI-style ".prj" file containing Well-Known Text (WKT) projection information). If a .prj file is found, the project will adopt that projection. This information can be viewed under the file/settings menu.

8.1.3.02 When additional layers are added, if they are in the same projection, they simply load.

8.1.3.03 If they are in a different projection, then the user is asked how they would like to handle the situation. The default is to reproject the new layer to the projection of the originally added layer (the “project projection”). This prompt is shown in Figure 8.5.

8.2 Assigning Projections

8.2.1 General Information about Assigning Projections

8.2.1.01 ***MapWindow*** allows the user to assign a projection to a shapefile and thus create a .prj file.

8.2.2 Setup for Assigning Projections:

8.2.2.01 Not Applicable

8.2.3 Usage of Assigning Projections

8.2.3.01 If first time it is used, the Tool bar is not turned on. Click on [***PLUG-INS***] then [***EDIT PLUG-INS***] and put a check next to (GIS tools).

8.2.3.02 Click on [***GIS TOOLS***] then [***VECTOR***] then [***ASSIGN PROJECTION TO SHAPEFILE***]

8.2.3.03 A window will open for the user's work directory. Select the file the user want to create a projection file for.

8.2.3.04 A dialog will open where the user can specify the desired projection.

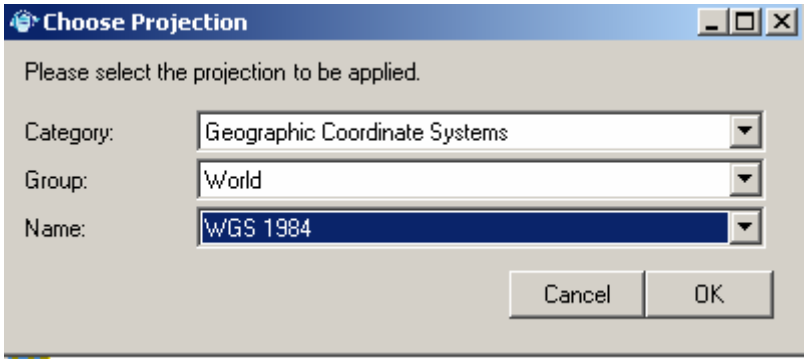


Figure 8.1

8.2.3.05 Select the select the desired entries and press [***OK***]

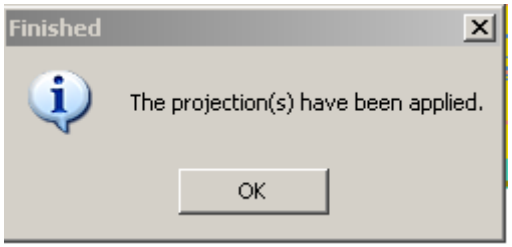


Figure 8.2

8.2.3.06 Click [***OK***]

8.3 Reprojections

8.3.1 General Information about Reprojections

8.3.1.01 ***MapWindow*** allows the user to reproject files, or place them in a new spatial reference system from the currently used reference system, for modeling and mapping. All data for modeling is typically kept in the same projection.

8.3.2 Setup for Reprojections:

8.3.2.01 Not Applicable

8.3.3 Usage of Reprojections

8.3.3.01 Click on [***GIS TOOLS***], then [***VECTOR***] then [***REPROJECT A SHAPEFILE***].

8.3.3.02 A window will open for the user's work directory. Select the file the user want to create a projection file for.

8.3.3.03 A dialog will open where the user can specify the desired projection.

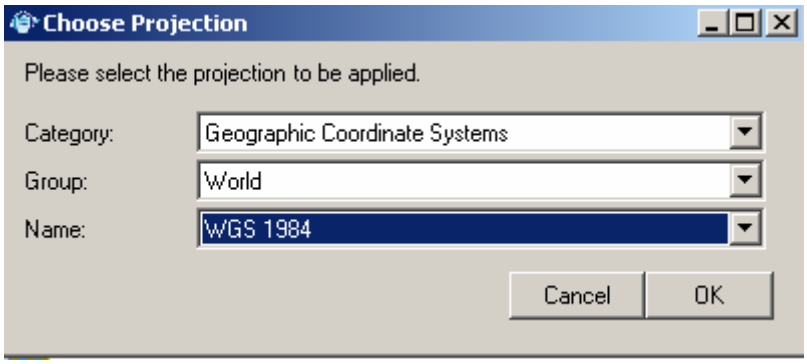


Figure 8.3

8.3.3.04 Select the select the desired entries and press [***OK***]

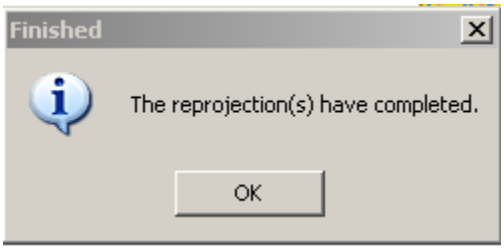


Figure 8.4

8.3.3.05 Click [***OK***]

NOTE #04 ********** *The user can set up the system so that it automatically reprojects into the projection that the user's project is in, as shown in Figure 8.5..*

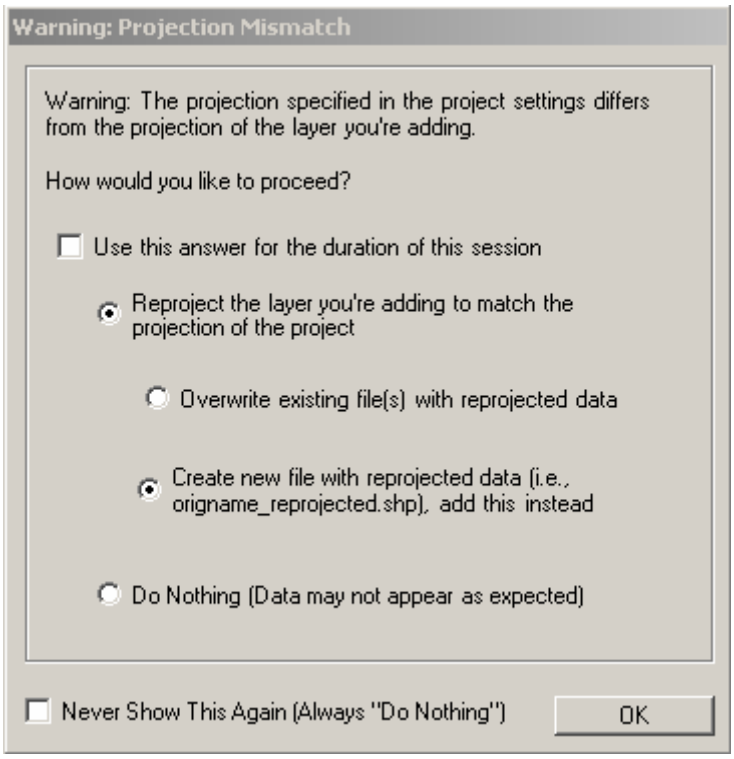


Figure 8.5

8.4 Custom Reprojections

8.4.1 General Information about Custom Projections

8.4.1.01 The user may enter custom projection data for use with a project without permanently adding it to the projections list. In this manner, custom projection information may simply be noted by the user for use with the project in question; or the user can keep a copy of a .prj file representing that custom projection.

8.4.1.02 The user can set up a custom projection by choosing "Custom" in the project settings; it will display a dialog that will help to define it. Subsequently, any data that was added to the map would likely display the mismatch warning and ask if the user would like to reproject the data. The .prj file on the reprojected file would then contain the custom projection; the saved project file will also contain it.

8.4.1.03 The program does not currently support a means by which the user may add a custom projection to the database and have it stay for all time. The database is hard-coded so that the programmers may perform string optimizations on it at build time, making the projection database much faster for day to day use.

8.4.1.04 The program may support a custom projection database of some sort in the future; for now, what's outlined above is the easiest way to deal with custom projection definitions. When ***MapWindow*** loads a shapefile or grid with an unrecognized projection, it can work with it (that is, projecting and reprojecting) cleanly; it just identifies it as "Custom" instead of as a formal name like "Montana State Plane".

8.4.2 Setup for Custom Projections:

8.4.2.01 Not Applicable

8.4.3 Usage of Custom Projections

8.4.3.01 Click on [***File***]

8.4.3.02 Click on [***Setting***]

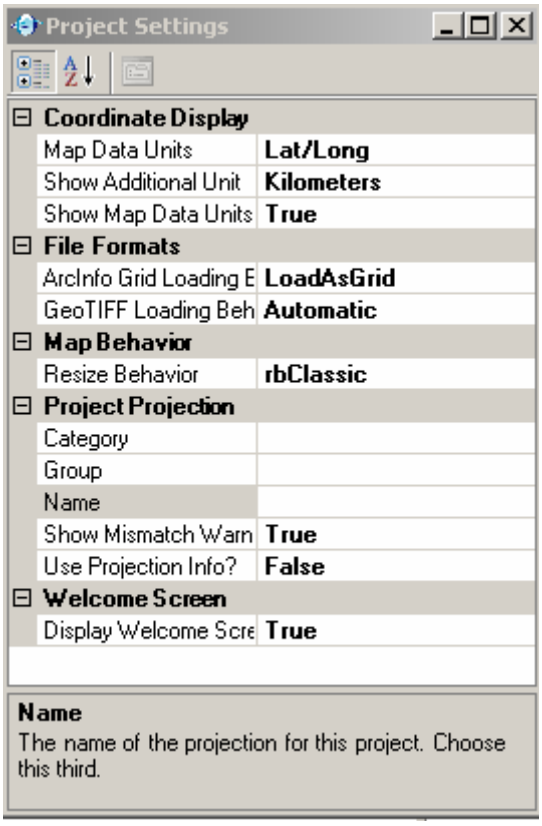


Figure 8.6

8.4.3.03 Click on [***Category***] and set it to "Custom Projection" then click on [***Use Projection Info?***] and set it to "True". This will cause a special dialog to appear

where the user may choose a particular projection as a starting point, and then change particular parameters of that projection to create a custom projection.

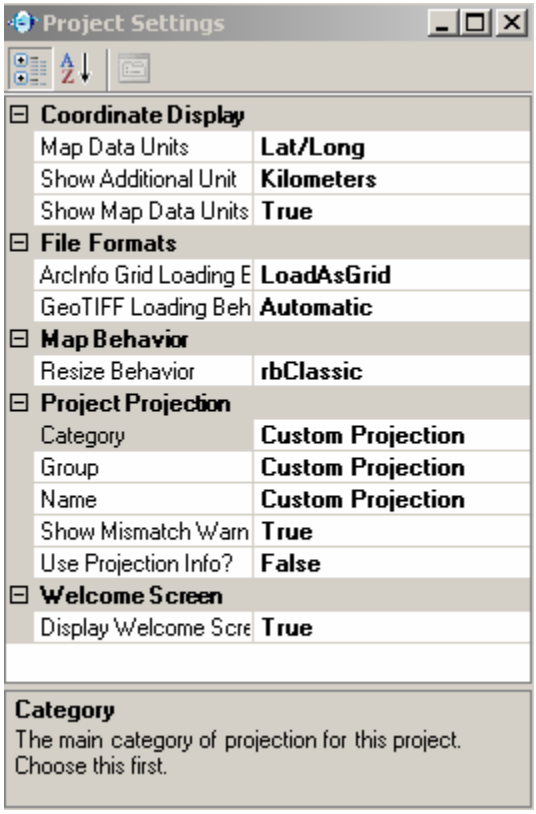


Figure 8.7

8.4.3.04 Enter the values for the custom Projection. The following would be for "Florida Albers". Alternatively the dialog also lets advanced users enter their own PROJ4 projection definition (useful for those coming from ***Quantum GIS***, ***uDig***, or other OSS platforms which also use PROJ4).

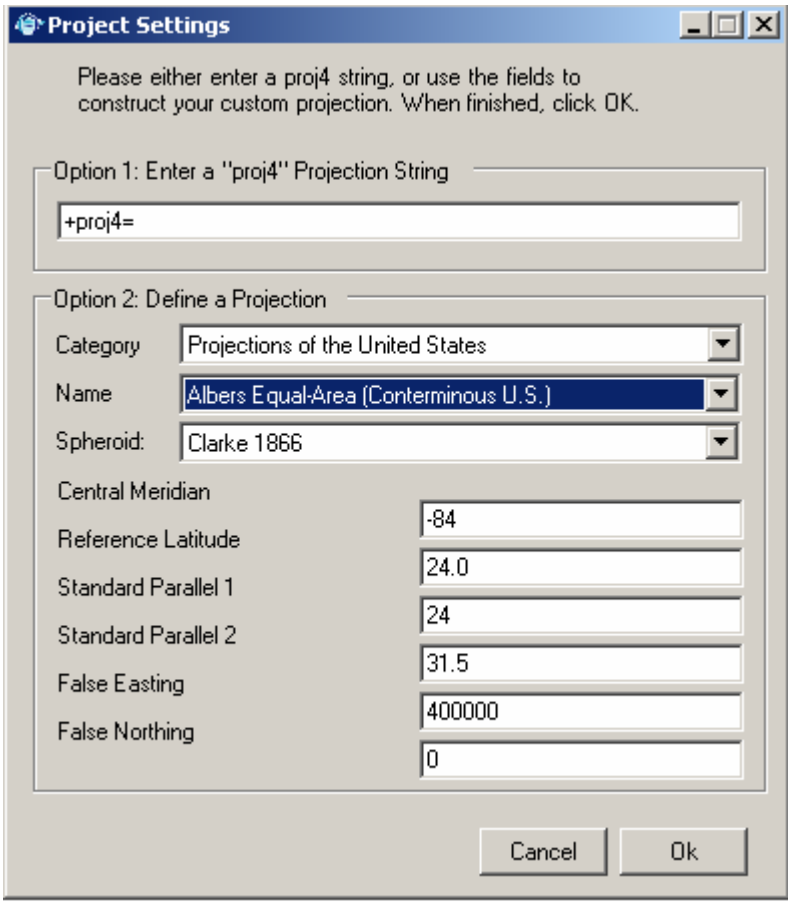


Figure 8.8

8.4.3.05 Click [***OK***]. Once the projection was defined in the project, new shapefiles created inside the project could adopt that projection (the user would be prompted), or shapefiles dropped in could be reprojected to that custom projection, etc.

Chapter 9 MapWindow Interface

9.1 The Standard Toolbars

9.1.1 General Information about the Standard toolbar

9.1.1.01 In the upper left corner of the program is a toolbar with several drop-down menus. Each of the Drop-down lists has several functions within them.

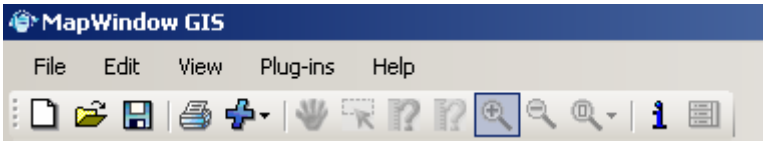


Figure 9.1

NOTE #05**Several of the buttons appear in both the drop-down lists and individual tool bars.*

9.1.1.02 [***FILE***]

- [***NEW***] - Create a new project
- [***OPEN Project***] - Opens an existing project file
- [***GEODATABASE***]
  - [***LOADFEATURES***]
  - [***EXPORT DATA TO SHAPEFILES***]
  - [***IMPORT SHAPEFILES INTO DATABASE***]
- ----------
- [***OPEN PROJECT IN NEW GROUPS***]
- ----------
- [***SAVE***] - Save under an existing project name
- [***SAVE AS***] - Save as a new project
- ----------
- [***PRINT***] - Prints a hard copy of the map
- ----------
- [***SETTINGS***] - Controls general preferences of the application
- [***RECENT PROJECTS***] - Contains a list of recently opened projects.
- ----------
- [***CHECK FOR UPDATES***] – checks for new software updates
- ----------
- [***CLOSE***] – close the project but not the program
- [***EXIT***] - Closes the program

9.1.1.03 [***EDIT***]

- [***COPY >***] - Places any of the following elements on the system clipboard.
  - [***MAP***]
  - [***LEGEND***]
  - [***SCALE BAR***]
  - [***NORTH ARROW***]
- [***EXPORT >***] Exports any of the following elements to a graphic file.
  - [***MAP***]
  - [***GEOREFERENCED MAP***] - Exports a geo-referenced image from the current map view
  - [***SCALE BAR***]
  - [***NORTH ARROW***]
- ---
- [**PREVIEW MAP>**]
  - [***UPDATE USING FULL EXTENTS***] - Updates or refreshes the Preview Map Pane
  - [***UPDATE USING CURRENT VIEW***]
  - [***CLEAR***] - Clears the Preview Map Pane

9.1.1.04 [***VIEW***]

- [***ADD LAYER***] - Adds a geospatial layer to the map.
- [***REMOVE LAYER***] - Removes the selected geospatial layer.
- [***CLEAR LAYERS***] - Clears all layers from the map.
- ---
- [***SET MAP SCALE***]
- [***SHOW FLOATING SCALE BAR***]
- ---
- [***ZOOM IN***] - Changes the current cursor behavior to zoom in mode
- [***ZOOM OUT***] - Changes the current cursor behavior to zoom out mode
- [***ZOOM TO FULL EXTENTS***] - Zoom the map to the full extents of all currently loaded data
- [***ZOOM TO PREVIOUS MAP EXTENTS***]
- ---
- [***PREVIOUS ZOOM***] - Will return the map to the previous zoom.
- [***NEXT ZOOM***] - This is used with Previous Zoom to move back and forward within saved zoom extents.
- ---
- [***PANELS>***]
  - [***SHOW LEGEND***] – Hide or show legend
  - [***SHOW PREVIEW MAP***] – Hide or display Preview Map

9.1.1.05 [***PLUG-INS***]

- [***EDIT PLUG-INS***]
- [***SCRIPTS…***]
- ---

- [***CVS TO SHAPEFILE CONVERTER***]
- [***DOCUMENT LAUNCHER***]
- [***GIS TOOLS***]
- [***MAPSERVER EXPORT***]
- [***SHAPEFILE EDITOR***]
- [***WATERSHED DELINEATION***]

9.1.1.06 [***HELP***]

- [***MAPWINDOW DOCUMENTATION ONLINE***] - During startup MapWindow will check for an active internet connection and, if one is available, this menu will link to the MapWindow web-based documentation. If not, it will link to local documentation.
- [***MAPWINDOW DOCUMENTATION OFFLINE***]
- ---
- [***KEYBOARD SHORTCUTS]***
- ---
- [***WELCOME SCREEN***] - Will display the Welcome Screen
- [***ABOUT***] - Will display the About screen

Figure 9.2

9.1.1.07

- - New Project
- - Open Project
- - Save Project
- - Print
- - Add Map Layer
  - [***ADD LAYER***]
  - [***REMOVE LAYER***]
  - [***CLEAR LAYERS***]
- - Pan
- - Select
- - Measure Distance
- - Measure Area
- - Zoom In
- - Zoom Out
- - Zoom

-  [***PREVIOUS***]
-  [***NEXT***]
- ---
- [***ZOOM TO PREVIOUS MAP EXTENTS***]
-  [***FULL EXTENTS***]
-  [***LAYER***]
- [***SELECTED***]

9.2 Additional Menus:

9.2.1 General Information about Additional Menus:

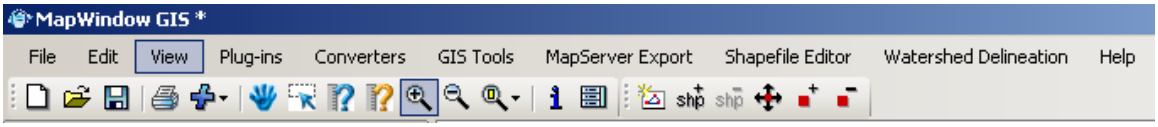


Figure 9.3

9.2.1.01 If the user clicks on the [***PLUG-INS***] menu item, a drop-down menu will appear. By clicking on different plug-in names the user can add extra menus and toolbar buttons.

9.2.1.02 [***CSV TO SHAPEFILE CONVERTER***] – This plug-in converts comma-separated value (csv) text files, which contain geographic coordinates, into shapefiles

9.2.1.03 [***DOCUMENT LAUNCHER***] - This plug-in launches documents or web pages from features on a map If the user's shapefile has a field called "FileOrURL", it will cause the plug-in to activate when a user selects a shape. The specified file or URL in the attribute table will be launched

9.2.1.04 [***GIS TOOLS***] - Generic vector and raster tools for ***MapWindow***

- [***RASTER*** >]
  - [***ASSIGN PROJECTIONS TO GRIDS***]
  - [***REPROJECT GRIDS***]
  - [***CHANGE GRID FORMATS***]
  - [***CREATE GRID IMAGES***]
  - [***RESAMPLE GRIDS***]
  - [***MERGE GRIDS***]
  - [***CLIP GRID WITH POLYGON***]
  - [***GEO-REFERENCE AN IMAGE OR GRID***]
  - [***GENERATE A CONTOUR SHAPEFILE***]
  - [***CHANGE NODATA VALUE***]

- [***VECTOR*** >]
  - [***ASSIGN PROJECTION TO SHAPEFILE***]
  - [***REPROJECT A SHAPEFILE***]
  - [***BUFFER SHAPES***]
  - [***CACULATE POLYGON AREAS***]
  - [***CLIP POLYGON WITH LINE***]
  - [***CLIP SHAPEFILE WITH POLYGON***]
  - [***ERASE SHAPEFILE WITH POLYGON***]
  - [***EXPORT SELECTED SHAPES TO NEW SHAPEFILE***]
  - [***EXPORT SHAPES TO NEW SHAPEFILE BY MASK***]
  - [***MERGE SHAPES***]
- [***IMAGES***>]
  - [***ASSIGN PROJECTIONS TO IMAGES***]
  - [***RECTIFY IMAGE TO WORLD FILE***]
  - [***REPROJECT IMAGE***]

9.2.1.05 [***MAPSERVER EXPORT***]

9.2.1.06 [***SHAPEFILE EDITOR***] - Edit and create shapefiles and shape geometry.

Figure 9.4

-  - Create New Shapefile
-  - Add new Shape to current Shapefile
-  - Remove Shape from current Shapefile
-  - Move an existing vertex in a shape
-  - Add a vertex to an existing shape
-  - Remove a vertex from an existing shape

9.2.1.07 [***WATERSHED DELINEATION***]

- [***AUTOMATIC***]
- [***ADVANCED TAUDEM FUNCTION***]
  - [***SELECT BASE DEM GRID***]
  - [***DO ALL DEM PROCESSING***]
  - [***DEM PROCESSING FUNCTIONS***]
    - [***FILL PITS***]
    - [***D8 FLOW DIRECTION***]
    - [***DINF FLOW DIRECTIONS***]
    - [***D8 CONTRIBUTING AREAS***]

- [***DINF CONTRIBUTING AREAS***]
- [***GRID NETWORK ORDER AND FLOW PATH LENGTHS***]
- [***FULL RIVER NETWORK RASTER***]

- [***SELECT OUTLETS SHAPEFILE***]
- [***DO ALL NETWORK AND WATERSHED STEPS***]
- [***NETWORK AND WATERSHED PROCESSING FUCNTIONS***]
  - [***RIVER NETWORK RASTEER UPSTREAM OF OUTLETS***]
  - [***STREAM ORDER GRID AND NETWORK FILES***]
  - [***STREAM SHAPEFILE AND WATERSHED GRID***]
  - [***WATERSHED GRID TO SHAEPEFILE***]
  - ---
  - [***CONSTANT DROP ANALYSIS***]
- ---
- [***ANCILLARY FUNCTIONS***]
  - [***SLOPE/AREA (WETNESS INDEX INVERSE***]
  - [***FLOW DIRECTIO TO STREAMS***]
  - [***DOWNSLOPE INFLUENCE***]
  - [***DECAYING ACCUMULATION***]
  - [***CONCENTRATION LIMITED ACCUMMULATION***]
  - [***UPSLOPE DEPENDENCE***]
  - [***TRANSPORT LIMITED ACCUMULATION***]
  - [***REVERSE ACCUMULATION***]
  - ---
  - [***GRID CONVERTER***]
- ---
- [***TAUDEM HELP***]
- [***ABOUT TAUDEM***]

Chapter 10 Tools

10.1 Map Zoom Tools

10.1.1 General Information for Map Zoom Tools

10.1.1.01 When working with a map it may be necessary to zoom in to view an area in more detail, or zoom out to see a larger area.

10.2 Zooming In 

10.2.1 General Information for Zooming In:

10.2.1.01 Not Applicable

10.2.2 Setup for Using the Zoom-in Function:

10.2.2.01 Not Applicable

10.2.3 Steps for Using the Zoom-in Function

10.2.3.01 Click the [***ZOOM IN***] button on the Tools toolbar, move the mouse over the map, single click to zoom in around a point.

10.2.3.02 Zoom in to a specific area. Click and hold the left mouse. Move the mouse to drag a rectangle to create the area the user wish to zoom to. Release the mouse button to complete the zoom.

10.2.3.03 If the user's mouse has a scroll wheel on top, it can be used to zoom in by rolling it forward, or zoom out by rolling backward.

10.2.3.04 When in Zoom Out mode, a right-click on the mouse will zoom in.

10.3 Zooming Out 

10.3.1 General Information for Zooming Out:

10.3.1.01 Not Applicable

10.3.2 Setup for Using the Zoom-out Function:

10.3.2.01 Not Applicable

10.3.3 Steps for Using the Zoom-out Function

10.3.3.01 Click the [***ZOOM OUT***] button on the Tools Toolbar, move the mouse over the map. Single Click to zoom out around a point

10.3.3.02 If the user's mouse has a scroll wheel on top, it can be used to zoom out by rolling it backwards, or zoom in by rolling forward.

10.3.3.03 When in Zoom In mode, a right-click on the mouse will Zoom Out

10.4 Zooming to Full Extent 

10.4.1 General Information for Zooming to Full Extent

10.4.1.01 Zooming to full extent resets the map view so that every feature of very layer is contained within the visible extent

10.4.2 Setup for Zooming to Full Extent:

10.4.2.01 Not Applicable

10.4.3 Steps for Zooming to Full Extent

10.4.3.01 Click the [***ZOOM***] button on the Tools toolbar

10.4.3.02 Select [***FULL EXTENTS***] in drop down menu

10.5 Zooming to Previous  *or Next Extent* 

10.5.1 General Information for Zooming to Previous or Next Extent

10.5.1.01 Zooming to previous extent allows stepping back through past map views. For example, start with a map view at full extent then zoom in to an area on the map. Now click the previous extent button; the map will return to the most recent previous map view, which was the full extent.

10.5.2 Setup for Zooming to Previous or Next Extent:

10.5.2.01 Not Applicable

10.5.3 Steps for Zooming to Previous or Next Extent

10.5.3.01 For Zooming To Previous Extent – Click the [***ZOOM***] button on the Tools Toolbar then select [***PREVIOUS***] on drop-down menu

10.5.3.02 For Zooming To Next Extent – Click on the [***ZOOM***] button on the Tools Tool bar then select [***NEXT***] on drop-down menu

10.6 Zoom to Layer Extent 

10.6.1 General Information for Zoom to Layer Extent

10.6.1.01 Zoom to a layers extent will set the map display to an area just big enough to show every feature in the currently selected layer.

10.6.2 Setup for Zooming to Layer Extent:

10.6.2.01 Not Applicable

10.6.3 Steps for Zooming to Layer Extent

10.6.3.01 Click on the [***ZOOM***] button on the main toolbar then [***LAYER***] on drop-down menu

10.6.3.02 Right-click on the layer in the legend, a new menu opens. Click on [***ZOOM TO LAYER***]

10.7 Docking and Undocking Views

10.7.1 General Information for Docking and Undocking Views

10.7.1.01 Window docking is a new and useful way to customize the user's information windows in ***MapWindow.***

10.7.2 Setup for Docking and Undocking Views

10.7.2.01 Not Applicable

10.7.3 Steps for Docking and Undocking Views

10.7.3.01 Docking and tabbing windows in ***MapWindow*** is easy to do by clicking and pulling on the top of the window. Holding down the left mouse key and dragging the window to desired location.

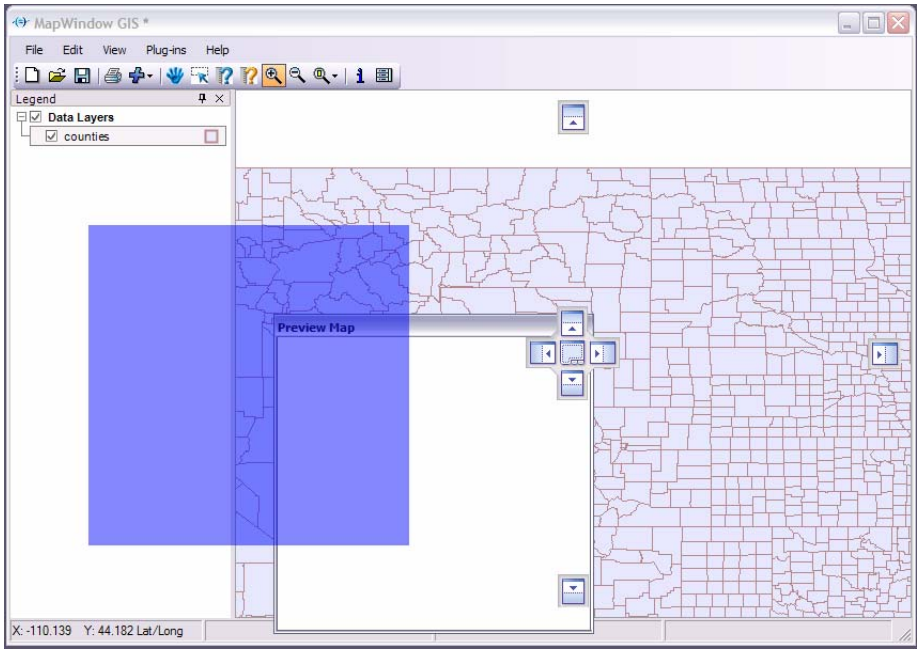


Figure 10.1

10.7.3.02 In the event the windows are undocked in a bad location, you may use the view menu to check or uncheck the (show legend) and (show preview map) options to return the windows to the default position, as shown below.

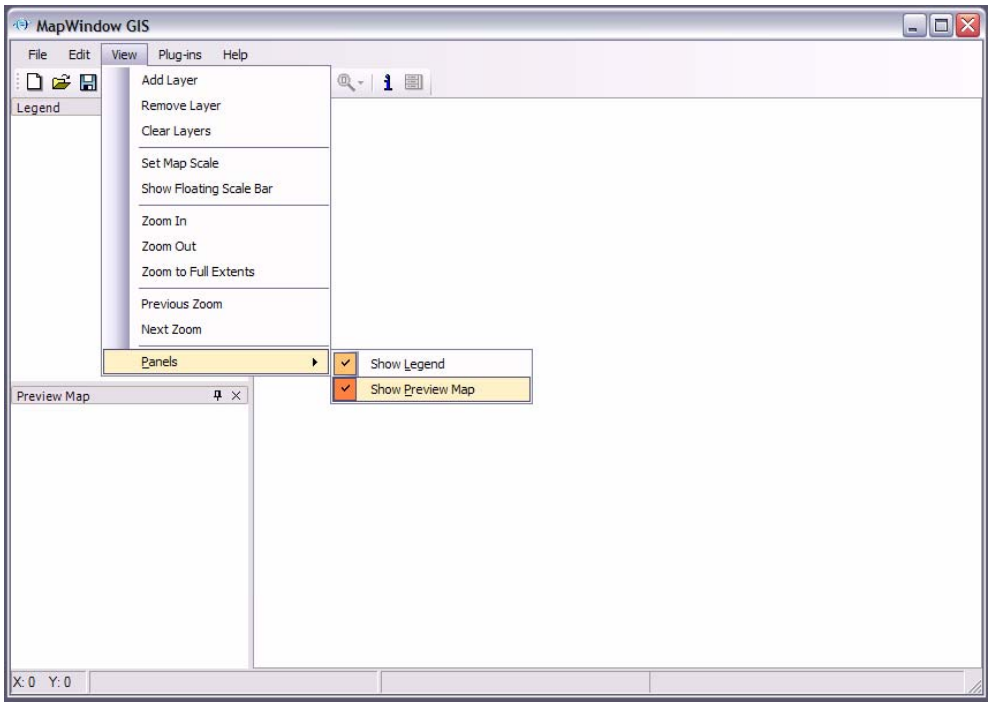


Figure 10.2

10.8 Panning

10.8.1 General Information for Panning

10.8.1.01 Panning allows the user to move the map display around to show areas outside of the current viewing area without changing the scale of the map.

10.8.2 Setup for Panning:

10.8.2.01 Not Applicable

10.8.3 Using the Pan Features

10.8.3.01 Click the [***PAN***] button on the Tools toolbar.

10.8.3.02 Move the mouse over the map.

10.8.3.03 Click and hold down the left mouse button.

10.8.3.04 Move the mouse, still holding down the mouse button. The map will move with the mouse.

10.8.3.05 Release the mouse button to complete the pan operation

10.9 Measuring distance

10.9.1 General Information for measuring distance

10.9.1.01 The measurement tool is used to calculate distances between two or more user-defined points on the map.

10.9.2 Setup for Measuring Distance:

10.9.2.01 Not Applicable

10.9.3 Measuring Distance

10.9.3.01 Click on the [***MEASURE DISTANCE***] Tool

10.9.3.02 Click on the first point

10.9.3.03 Click on the next point

10.9.3.04 On the bottom left of the main application window, the cumulative distance is displayed. Right Click to start over again with new measurement.

10.9.3.05 Click the button again to unselect it and leave Measure mode.

10.10 Measuring Area

10.10.1 General Information for Measuring Areas

10.10.1.01 The measurement tool is used to calculate the area between three or more user-defined points on the map.

10.10.2 Setup for Measuring Area:

10.10.2.01 Not Applicable

10.10.3 Measuring Area

10.10.3.01 Measure Area Click on the [***MEASURE AREA***] Tool

10.10.3.02 Click on the first point, click on the next point and as many points as needed to complete the border around the area needed to be measured

10.10.3.03 Right Click to end and see the results of the area measured. Click [***OK***] to resume map functions.

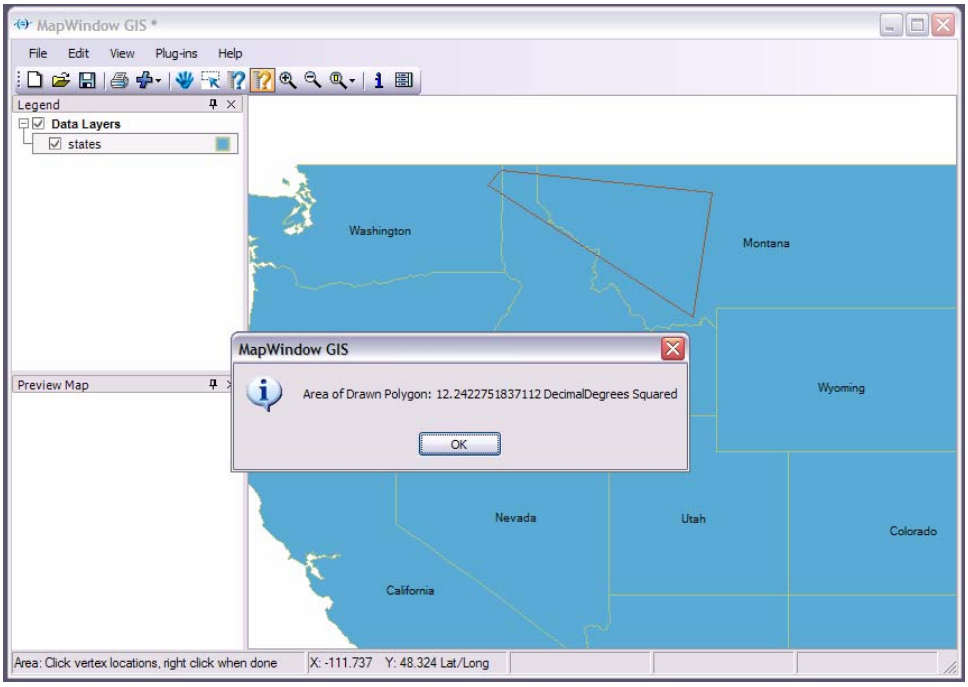


Figure 10.3

Chapter 11 Vector Data

NOTE #06 ****** In this exercise we will use d:\workspace, or the directory the user created when the user installed the software.*

11.1 Adding Vector Map Data

11.1.1 General Information for Adding Vector Map Data:

11.1.1.01 MapWindow supports three different types of Shapefiles:

Legend	Meaning
	Point Layer
	Polygon
	Polyline

Figure 11.1

- Line Shapefile: Composed of line segments that may be interconnected but don't have to be. Can have vertices; these can be anchor points about which a line turns, for example.
- Point Shapefile: Composed of individual points. Cannot have vertices, as the point itself is the shape.
- Polygon Shapefile: Composed of solid shapes which are, in turn, composed of interconnected vertices. These are anchor points about which the lines composing the shape turn.

11.1.1.02 Each GIS data set will be added to the map project as a single layer

11.1.2 Setup for Adding Vector Map Data:

11.1.2.01 Not Applicable

11.1.3 Adding Vector Map Data

11.1.3.01 Add data by clicking on  or by clicking on [***VIEW***] then [***ADD LAYER***]

11.1.3.02 When the Add Map Layer window opens, navigate to the data directory the user wants, then click on the GIS data the user wants to add it as a new layer in the user's project.

---

*NOTE: #07 ***** If the user wants to add multiple layers, hold down the control key and select each addition layer by clicking on it.*

11.1.3.03 Click the [***OPEN***] button. The new layer will be added to the user's project

*TASK #01 ***** Go ahead and add afrbeppp020, airportx020, coalfdp050, countyp020, ecoomrp075, ecoregion075fedlandp020, hydrogl020, hydrogp020, mortalp020, railrdl020, roadtrl020, statep020, urbanp020, and zmussel020 layers to the user's project.*

*TASK #02 ***** Leave the Statep020 Layer turned on and turn the other layers off by removing the check inside the boxes next to the layer names in the legend.*

11.2 Using the Legend to Control the Layers

11.2.1 General Information about Using the Legend to Control the Layers

11.2.1.01 The legend is a graphical representation of all the map layers in the current project. The position of the legend is the left hand side of the screen. The legend offers layer manipulation functionality including but not limited to changing a layers symbology or the order of display for the layers. The legend is always displayed

11.2.1.02 Legend Information

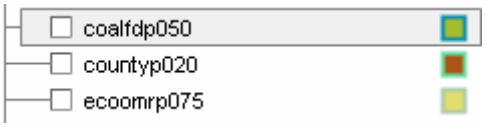


Figure 11.2

- Visibility Checkbox: This indicates whether a layer is always visible (checked), always hidden (blank).
- Text: This is the name of the layer.
- Each line represents a layer of data that's in the main view. The image to the right of the legend is an indicator to help identify the data layer. If, for example, the user had a polygon Shapefile that was filled, the color in this image would be the same as the fill color. For a line Shapefile, the color here will match the color the line is drawn with. Some layers have a plus or minus next to them. This indicates that they are collapsible or expandable. For

---

example, a grid may have a coloring scheme indicating terrain height which may be displayed by expanding the layer, and hidden by collapsing it.

11.2.1.03 Right Click Functionality

- [***ADD GROUP***] – bunch a selected set of layers under a common header
- [***ADD LAYER***]
- [***REMOVE LAYER***]
- [***CLEAR LAYERS***] – Removes all layers
- [***ZOOM TO LAYER***]
- [***VIEW METADATA***]
- [***VIEW ATTRIBUTE TABLE***]
- ---
- [***EXPAND GROUP***]
- [***EXPAND ALL***]
- [***COLLAPSE GROUP***]
- [***COLLAPSE ALL***]
- ---
- [***PROPERTIES***]

11.3 Changing the Layer Name.

11.3.1 General Information for Changing the Layer Name

11.3.1.01 Changing the name of a layer does not affect the underlying data. The layer name is project dependent and will not modify any information stored against the map source.

11.3.2 Setup for Changing the Layer Name:

11.3.2.01 Not Applicable

11.3.3 Steps for Changing the Layer Name

11.3.3.01 Double-click on the layer in the legend and the ‘Legend Editor’ appears

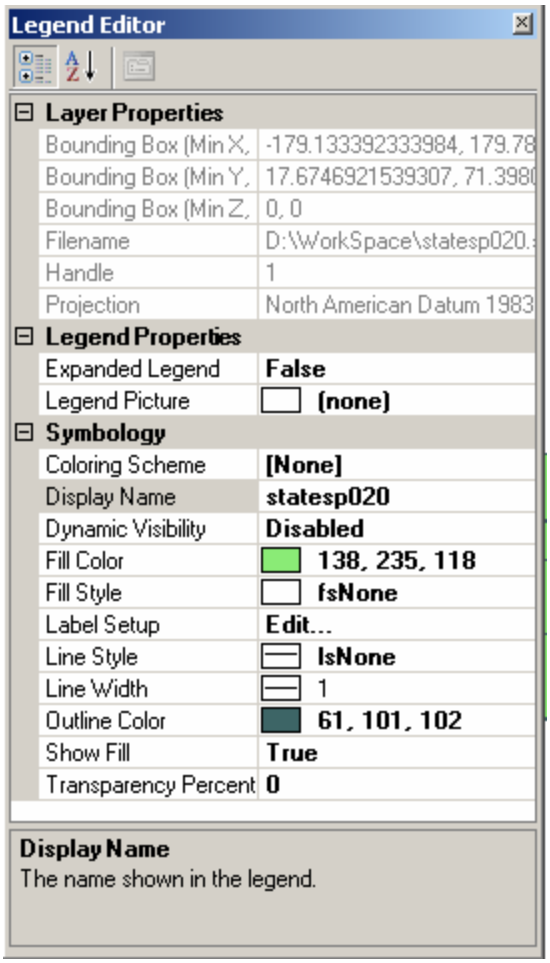


Figure 11.3 (Available options may vary depending on data type)

11.3.3.02 Change the text in the "Display Name" box. This will be the new layer name.

11.3.3.03 Click the [***X***] button to close the Layer Properties dialog. The legend will update to show the new layer name.

TASK #03 ********** *Change*

- *afrbeep020 to Africanized Honey Bees*
- *airportx020 to Airports*
- *coalfdp050 to Coal Fields*
- *countyp020 to U.S. Counties*
- *ecoomrp075 to* Ecoregions – Omernik
- *ecoregp075 to* Ecoregions – Bailey
- *fedlandp020 to Federal Lands*
- *hydrogpl020 to Rivers and Streams*
- *hydrogpp020 to Lakes and Ponds*

- *mortalp020 to Mortality 1988-1992*
- *railrdl020 to Railroads*
- *roadtrl020 to Roads*
- *statesp020 to U.S. States*
- *urbanp020 to Urban Areas*
- *zmusslx020 to Zebra Mussels*

11.4 Changing the Drawing Order:

11.4.1 General Information for Changing the Drawing Order:

11.4.1.01 The legend indicates the order that layers are drawn in. The first layer in the legend is the top layer of the map. The last layer in the legend is the bottom layer on the map. The layers are drawn from bottom up, hence the bottom layer is drawn first then the last but one layer and so on. As a result is it important to carefully order the user's map layers so data is not obscured by layers placed on top.

11.4.2 Setup for Using the Changing the Drawing Order:

11.4.2.01 Not Applicable

11.4.3 Steps for Using the Changing the Drawing Order:

11.4.3.01 Click and drag a layer to the desired location.

TASK #04 ****** Put the layers in the following order from top to bottom,*

- *Zebra Mussels*
- *Africanized Honey Bees*
- *Airports*
- *Roads*
- *Railroads*
- *Mortality 1988-1992*
- *Rivers and Streams*
- *Lakes and Ponds*
- *Federal Lands*
- *Urban Areas*
- *Coal Fields*
- *U.S. Counties*
- *Ecoregions – Omernik*
- *Ecoregions – Bailey*
- *U.S. States*

Then save the user's project

11.5 Removing a Layer from the Map

11.5.1 General Information for Removing a Layer from the Map

11.5.1.01 Removing a layer does not remove or delete the underlying data, it just removes the reference to the layer from the project.

11.5.2 Setup for Using the Removing a Layer from the Map:

11.5.2.01 Not Applicable

11.5.3 Steps for Using the Removing a Layer from the Map

11.5.3.01 Right-click on the layer in the legend, a new menu will popup.

11.5.3.02 Click on [***REMOVE LAYER***]

11.5.3.03 Or select the layer, click on [***VIEW***] then [***REMOVE LAYER***].

11.5.3.04 If the user right-click on a layer in the legend, a new menu will popup. By selecting [***CLEAR LAYERS***], it will ask the user to confirm and then remove all layers.

11.6 Making the Layer Scalable

11.6.1 General Information for Making the Layer Scalable:

11.6.1.01 Not Applicable

11.6.2 Setup for Making the Layer Scalable:

11.6.2.01 Not Applicable

11.6.3 Steps for Making the Layer Scalable

11.6.3.01 Zoom into the scale that the user want the desired layer to appear

11.6.3.02 Double click on the layer in the legend

11.6.3.03 Click the 'Dynamic Visibility' Disabled line and a drop-down arrow will appear.

11.6.3.04 Click on the drop-down arrow

11.6.3.05 Put a check in '(Use Dynamic Visibility)'

11.6.3.06 Click on the drop-down arrow again

11.6.3.07 Click the [***USE CURRENT EXTENT***] button

11.6.3.08 Close the Legend Editor.

NOTE: #8 ****** If the user set up a dynamic visibility, and then unselect the layer in the legend, it will reset the dynamic visibility to disabled. This means the user will have to reset it again.*

TASK #05***** *Zoom into the area around the Pacific Northwest corner of the United States*

TASK #06***** *Zoom out to the Full extent of the map using the [**FULL EXTENT**] Button*

TASK #07***** *using the [**PREVIOUS**] and [NEXT], the user can switch between the Pacific Northwest and the Whole coverage*

TASK #08***** *Zoom into the area around the Pacific Northwest corner of the United States and set the preview map to the Current View*

TASK #09***** *Turn on the Zebra Mussel layer and zoom to its extent*

QUESTION #1 ****** Did the Preview Map change coverage as well?*

11.7 Map Layer Symbolization

11.7.1 General Information for Map Layer Symbolization:

11.7.1.01 Default Symbology - When adding a new map layer to the user's project a default symbol will be automatically generated. ***MapWindow*** will select a random color scheme and pick a pen and fill style appropriate to the geometry type of the data to be used for display purposes.

11.7.2 Setup for Changing the Default Symbology:

11.7.2.01 Not Applicable

11.7.3 Steps for Changing the Default Symbology

11.7.3.01 Double-click on the layer in the legend, the Legend Editor will appear

11.7.3.02 Changes made under the Display properties section will become the new default symbology

TASK #10*** Change the color of the U.S. States Layer. Right-click on the layer in the Legend, Click the [**PROPERTIES**]. Click the 'OutlineColor' and change it to 156, 143, 0. Then go to the ''FillColor' and change it to 240,219, 0. Set 'Line Width' to 2, Click [**X**] to close.*

QUESTION #2 ** When the user changes the color of the U.S. States in the main view, does the colors change in the Preview?*

QUESTION #3 ** Click on [**EDIT**] then [**PREVIEW MAP**] and then [**UPDATE USING CURRENT VIEW**], did the colors change in the Preview?*

TASK #11*** Zoom to the state of Idaho. Turn on the County. Right-click on the layer in the Legend, Click the [**PROPERTIES**]. Click the 'OutlineColor' and change it to 23,169,105. Then go to the ''Show Fill' and change it to False. Select 'Dynamic Visibility', Click [**SET NEW DYNAMIC EXTE**], Set 'Line Style' to lsDotted, Click [**X**] to close.*

11.7.3.03 In this property edit page, the user can further modify change the color scheme (or fill color) of the layer.

11.7.3.04 Double click on the layer to open the Legend Editor

Figure 11.4

11.7.3.05 Click on the Coloring scheme and an icon will appear.

Figure 11.5

11.7.3.06 Click on the icon and a color schema editor dialog box will show up:

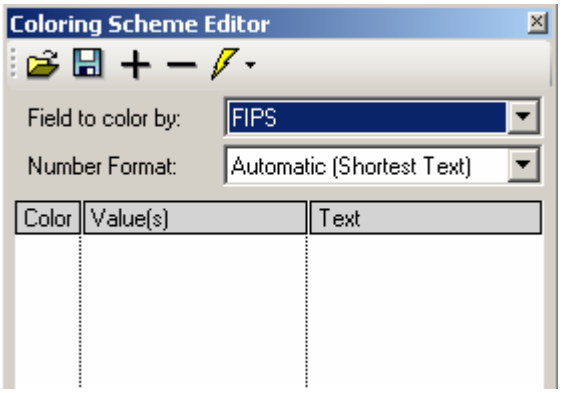


Figure 11.6

11.7.3.07 The user can choose a field in the shape's attribute table to calculate the color on, and assign the number format of it.

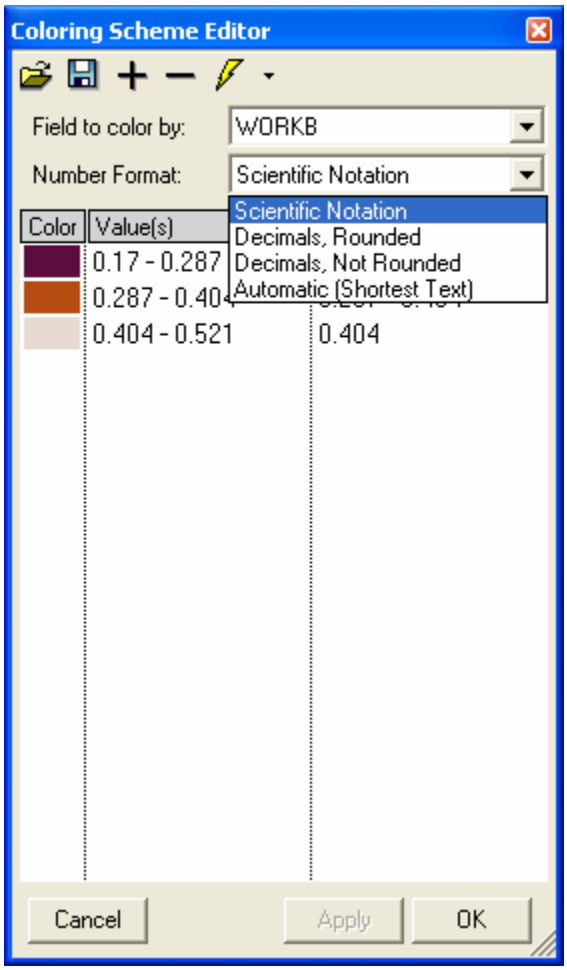


Figure 11.7

11.7.3.08 By clicking on the color, the user can change the color of each category, but the easiest to do it is to use the pre-defined color schema:

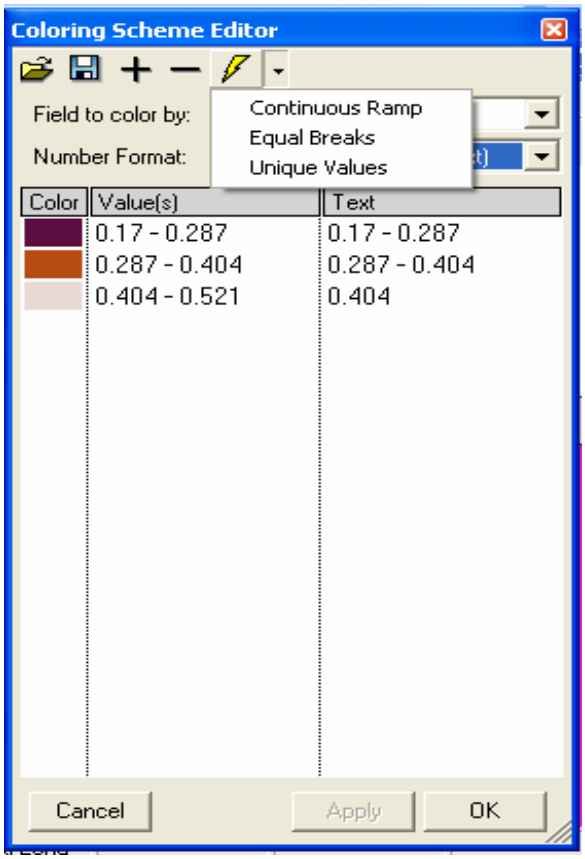


Figure 11.8

11.7.3.09 The Legend Editor will also allow the user to

- Change Display properties like Point/Line color, width, and style.
- Change layer dynamic visibility
- Change Legend properties (Expand, picture)
- Change Map Bitmap and Transparent Color.

TASK #11 ****** Turn on Zebra Mussels, double click the layer in the legend, click on coloring scheme, select Y as field to color by click on*  *and select Continuous Ramp on Dropdown list. Set start color to blue and end color to red, click [**OK**]. Set value and values as follows 1988-1990, 1991-1995, 1996-2000, 2000-2005, 2006-3000, Click [**OK**], Set 'PointStyle' to ptTriangleUp. Set'PointSize' to 9, Click [**X**] to close*

The user can now see the spread of Zebra Mussels across the eastern United States

QUESTION #4 ****** Zoom into the area covering the northern Gulf of Mexico, In what period did Zebra Mussels appear off the State of Mississippi?*

QUESTION #5 ****** In what period did Zebra Mussels appear in the Mississippi River Delta?*

11.8 Adding a Label to a Layer

11.8.1 General Information for Adding a Label to a Layer

11.8.1.01 Labels are an easy way to add dynamic textual labels to geometry features on the map. ***MapWindow*** will extract a user-defined field from the map data to be used as the label text. Labels may be added to raster datasets programmatically, but not directly from within MapWindow.

11.8.2 Setup for Adding a Label to a Layer:

11.8.2.01 Not Applicable

11.8.3 Steps for Adding a Label to a Layer

11.8.3.01 Double Click on the layer in the legend window.

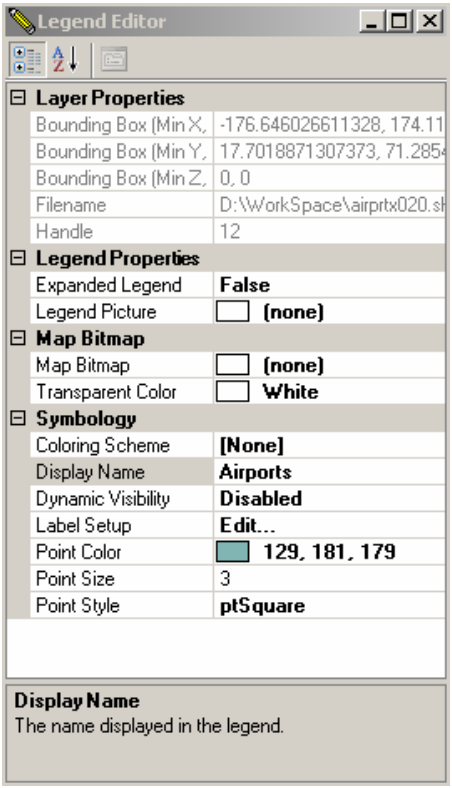


Figure 11.9

11.8.3.02 Click on Label Setup

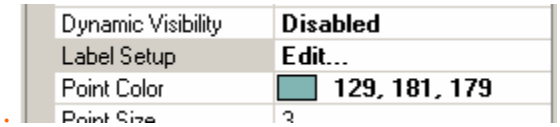


Figure 11.10

11.8.3.02 Click on the "…" button on the Label Setup line.

Figure 11.11

11.8.3.03 Select the '(Label Field for First Line)' drop-down and select the field to label with.

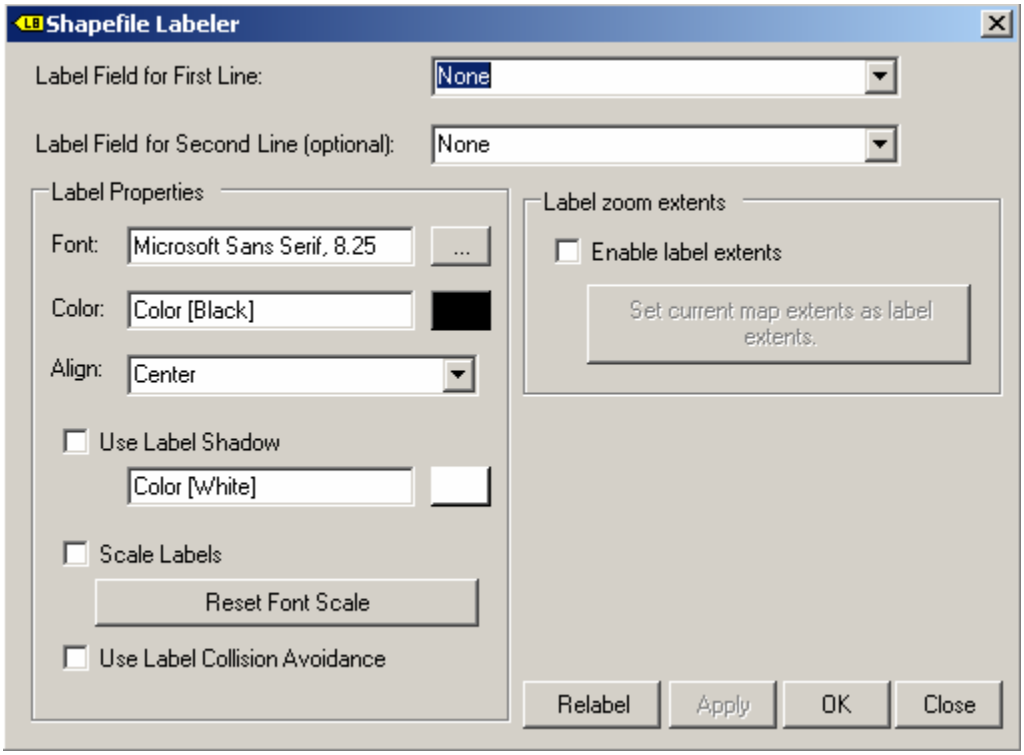


Figure 11.12

11.8.3.03 Click [***Apply***] then [***OK***], or just [***OK***].

ISSUE #02 ****** Apparently, if the user sets a label column or field, the program will label each polygon or segment individually. For instance, if the user labels*

---

*states, each island in Florida would be labeled separately and the labels may overlap. This should not occur if the polygon representing the user's feature is a Multi-part polygon, such that the individual islands are all part of the same shape. For example, see the United States sample in the **MapWindow** samples folder. In this sample data, all of the islands of Florida are part of one shape and so the overall state will get only one label. This behavior may be desirable in some cases, but not others. In all cases, the "Use Label Collision Avoidance" check box may be used to prevent the overlapping of multiple labels.*

11.8.3.04 To remove the labeling for a layer, set the '(Label Field for First Line)' value to 'none'. Click OK to close the window, and labels will disappear.

TASK #12 *******Label U.S. States with the state names. Examine Florida or Maine, then remove the labels.*

TASK #13 ******* Go ahead and label U.S. Counties with the County names. Zoom in until the counties and their name appear and then zoom out again to the Zebra Mussel Coverage*

QUESTION #6 ****** Zoom to the Pacific Northwest, turn on and label Airports using the LOCID attribute. What are the three airports in Southeastern Washington State?*

QUESTION #7 ****** Using the label LOCID , turn on "Use Label Collision Avoidance". This may be seen at the bottom of Figure 11.13. What happened to the labeling in the Seattle Area? Is it as cluttered as it was before collision avoidance was turned on?*

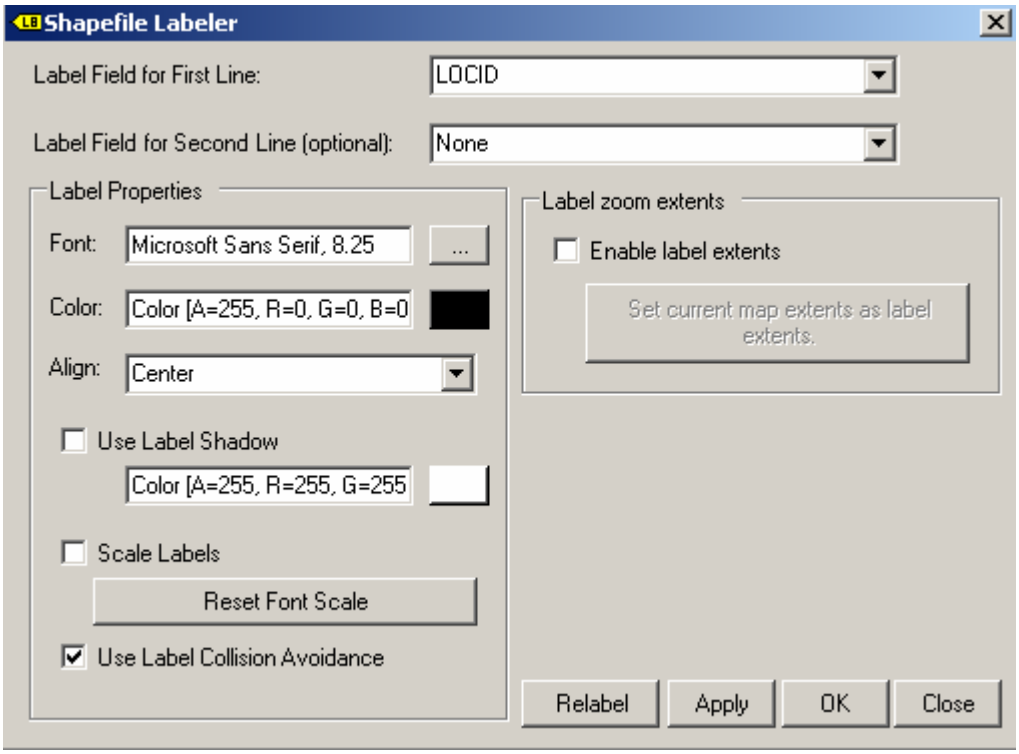


Figure11.13

TASK #14 ***** Right-click on Lakes and Ponds, Select properties, click on Coloring Scheme, set "Field to color by" to 'Feature', click on  and select 'Unique Value",***

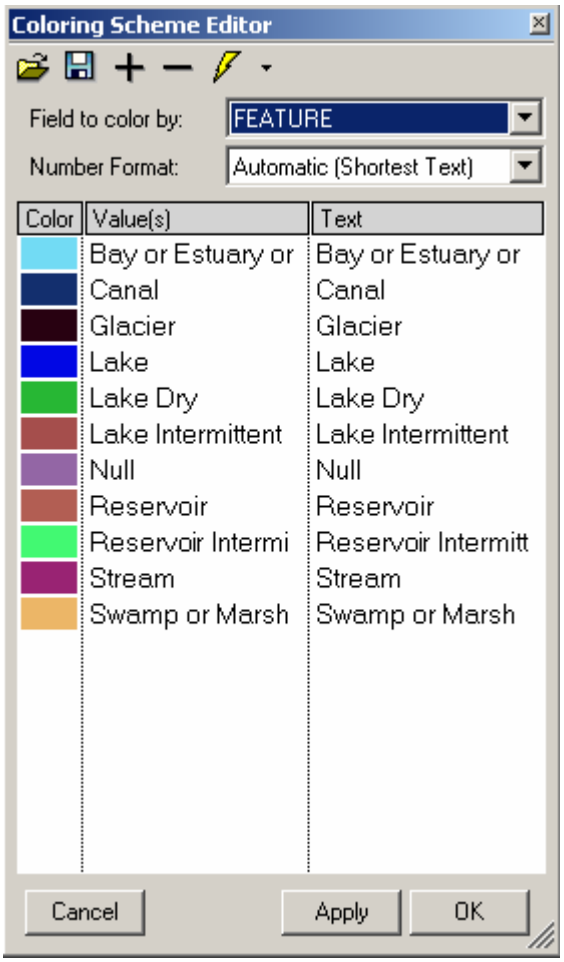


Figure 11.14

Change the colors as follows

'Null' to ''FillColor' RGB 240,219, 0
'Glacier' to RGB 250, 250, 250
'Bay or Estuary or Ocean', Canal, Lake, Reservoir, Stream to RGB 76,143,209
'Swamp or Marsh' to RGB 76,209,185
'Lake Dry', 'Lake Intermittent', 'Reservoir Intermittent', to RGB 197,132, 2
Click [***OK***], set 'Line Width' to 0, Click [**X**] to close.

NOTE #10******* Before the user click [***OK***], the user may want to choose to save this coloring scheme for later use (to avoid having to re-enter it manually). To save the current coloring scheme, click the button on the Coloring Scheme Editor form. This will prompt the user for a name filename where the current coloring scheme should be saved. Similarly, to re-load an existing coloring scheme from a file, and to apply it to the current data, click the button and browse to the coloring scheme file the user previously saved.*

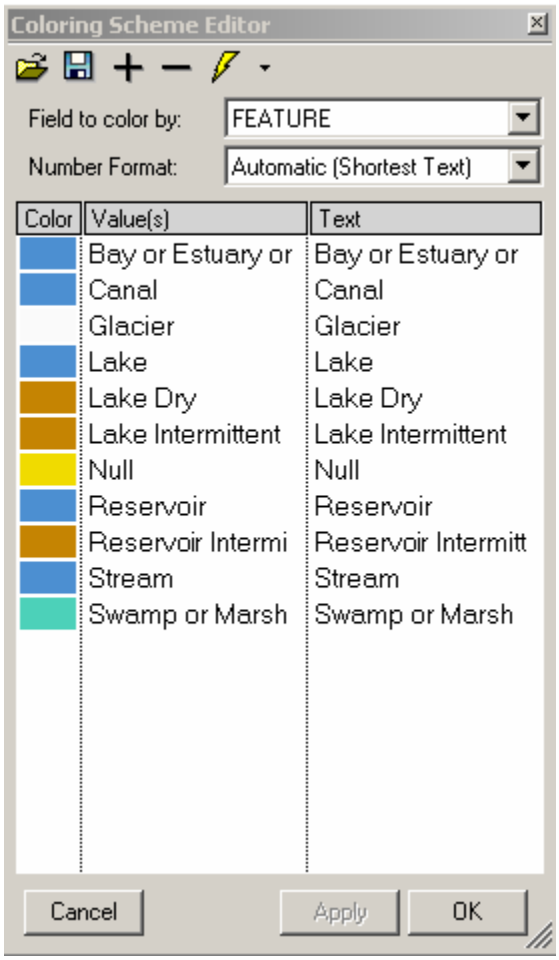


Figure 11.15

TASK #15**Open the State layer properties and set "ShowFill" to 'False' and close. Move the Lakes and Ponds layer to the bottom.*

ISSUE #02 ***** The user cannot hide individual features in the layer if needed, such as "null" in the above example. A possible workaround is to place this layer on the bottom of the stack, which would not allow the user to place this layer over an image.

TASK #16**Zoom into the State of Idaho, Turn on Rivers and Streams, Right click on it in the legend, Click the [Properties]. Set "LineColor" to RGB 76,143,209, Set"DynamicVisibility", zoom in and out*

TASK #17 ***** *Turn on Urban Areas, Right click on it in the legend, Click the [Properties]. Set "FillColor" to RGB 244,150,104; Set "OutlineWidth" to '0', close*

ISSUE #03 ***** *The program does not appear to measure correctly in a north-south direction while in Latitude, Longitude. Data should be reprojected before making measurements. Generally, measurements on unprojected (lat/long) data will be unreliable at best, because some of the factors in the computation change as the user moves north/south, so the computation that's done is an estimate. It would tend to be a more fuzzy estimate at the poles in particular, or if measuring over a large area.*

QUESTION #8 ***** *What is the distance between Airports SMN and PIH in Idaho?*

QUESTION #9 ***** *What is the distance along a route from LWS to BOI to PIH in Idaho?*

Chapter 12 Manipulating the map

12.1 Querying Map Features

12.1.1 General Information for Querying Map Features

12.1.1.01 Identifying features - The identify tool is the simplest way to retrieve attribute data about a feature on the map. Clicking the Identifier button ( ) will activate the Identifier plug-in, and set the mouse cursor into identifier mode.

12.1.1.02 The layer to be identified is set via the selected layer in the legend, as seen below. (The darker rectangle indicates the selected layer).

Figure 12.1

12.1.1.03 If a raster layer is selected, the identifier window will be put into Raster mode, as seen below.

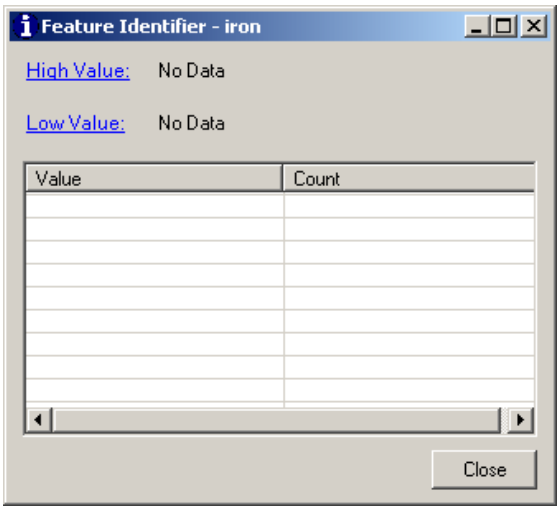


Figure 12.2

12.1.1.04 If a shapefile layer is selected, the identifier window will be put into Shapefile mode, as seen below.

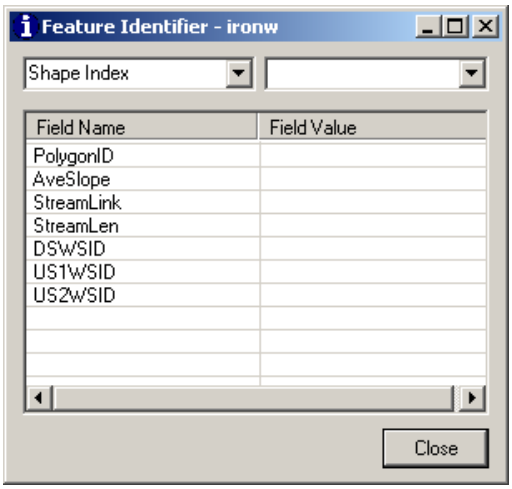


Figure 12.3

12.1.1.05 The identifier can be used to select a shape in a shape layer or a cell or group of cells from a raster and show information on them.

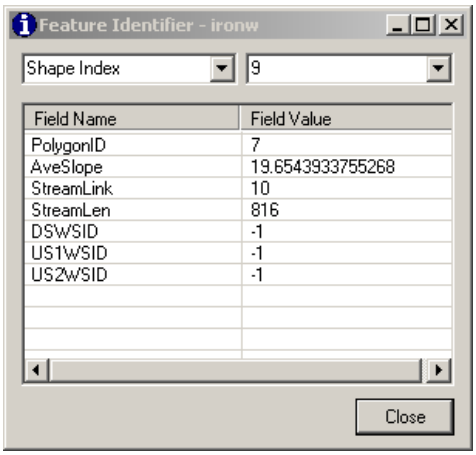


Figure 12.4 - Vector

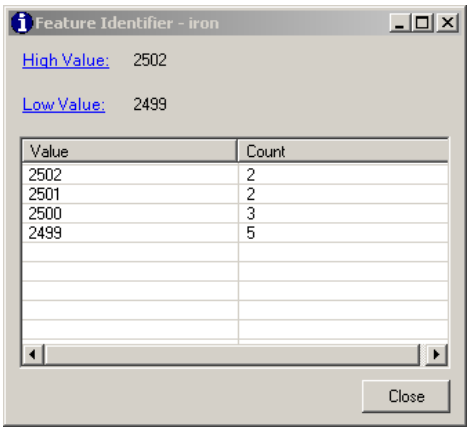


Figure 12.5 - Raster

12.1.1.06 The identify result tool has a limited radius of effect when clicking. The mouse button may be held down and dragged to form a box; features or raster values within this box will be shown in the identifier. This is described below in greater detail.

12.1.2 Setup for Querying Map Features:

12.1.2.01 Not Applicable

12.1.3 Steps for Querying Map Features

12.1.3.01 Select the layer the user wish to query in the legend

12.1.3.02 Click the [***IDENTIFIER***] button on the toolbar

12.1.3.03 Move the mouse over the map and click on the feature to be identified. The Feature Identifier dialog will be displayed.

12.2 Selecting Features by Rectangle

12.2.1 General Information for Selecting Features by Rectangle

12.2.1.01 Select by Rectangle allows the user to select features on the map by drawing a rectangle. Any features of the active layer that fall within the selection tolerance of the rectangle will be selected

12.2.2 Setup for Selecting Features by Rectangle:

12.2.2.01 Not Applicable

12.2.3 Steps for Selecting Features by Rectangle

12.2.3.01 Click on the layer the user wants to select a feature from on the legend. This will make the layer active.

12.2.3.02 Click the [***SELECT***] button  on the toolbar.

12.2.3.03 Move the mouse over the map and click and hold the mouse button. This click will represent the first corner of the rectangle.

12.2.3.04 Move the mouse to another location, keeping the mouse button held down.

12.2.3.05 Release the mouse button to specify the opposite corner of the rectangle. Features of the active layer that fall within the selection tolerance will be selected and drawn.

NOTE #11**** by holding down the control key, the user can draw additional rectangles and add the selection to the original selected data.*

12.2.3.06 Viewing Attribute Data of Selected Features by click on 

12.2.3.07 Click on [***VIEW***]

12.2.3.08 Click on [***SHOW SELECTED***], the Attribute Table data for the selections will be shown.

12.2.3.09 Click on the [***SELECTION***] and then [***EXPORT SELECTED FEATURES***] to create a new shapefile consisting only of these selected features.

List of Questions for Lesson #01

QUESTION #1 ***** *Did the preview Map Change coverage as well?*

QUESTION #2 ***** *When the user changes the color of the U.S. States in the main view, does the colors change in the Preview?*

QUESTION #3 ***** *Click on [**EDIT**] then [**PREVIEW MAP**] and then [**UPDATE USING CURRENT VIEW**], did the colors change in the Preview?*

QUESTION #4 ***** *Zoom into the area covering the northern Gulf of Mexico, In what period did Zebra Mussels appear off the State of Mississippi?*

QUESTION #5 ***** *In what period did Zebra Mussels appear in the Mississippi River Delta?*

QUESTION #6 ***** *Zoom to the Pacific Northwest, turn on and label Airports using the LOCID attribute. What are the three airports in Southeastern Washington State?*

QUESTION #7 ***** *Using the label LOCID, turn on "Use Label Collision Avoidance. What happened to the labeling in the Seattle Area? Is it as cluttered as it was before collision avoidance was turned on?*

QUESTION #8 ***** *What is the distance between Airports SMN and PIH in Idaho?*

QUESTION #9 ***** *What is the distance along a route from LWS to BOI to PIH in Idaho?*

END OF LESSON #01

##########

##

Begin Lesson #02

Chapter 13 Data Editing and Creating

13.1 Creating a New Layer Using Shapefile Editor

13.1.1 General Information about Creating a New Layer Using Shapefile Editor

13.1.1.01 Not Applicable

13.1.2 Setup for Creating a New Layer Using Shapefile Editor

13.1.2.01 Click the [***Plug-ins***] menu from the main menu.

13.1.2.02 Click on the [***Shapefile Editor***]

13.1.2.03 Or Click on [***Edit Plug-Ins***] then Click on the check box next to "(Shapefile Editor)".

13.1.3 Usage of Creating a New Layer Using Shapefile Editor

13.1.3.01 To create a new layer for editing, choose  [***Create New Shapefile***] from the main menu.

13.1.3.02 The New Shapefiles Options dialog will be displayed. Choose the type of layer (point, line, or polygon). See Fig 13.1 below.

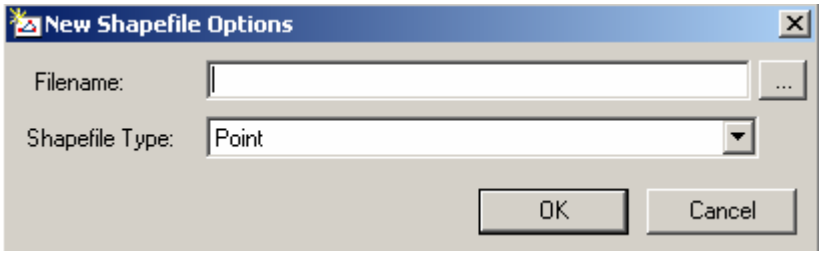


Figure 13.1

13.1.3.03 Type in File name including the full path.

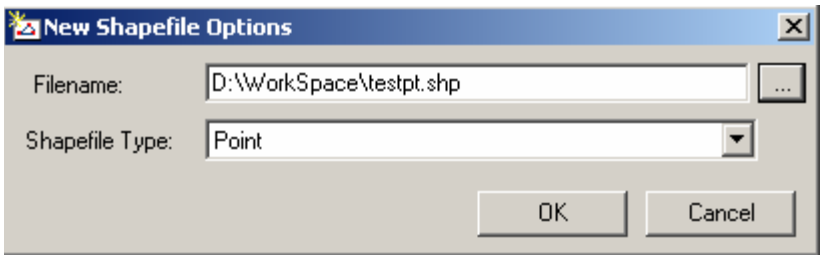


Figure 13.2

13.1.3.04 The following screen will appear:

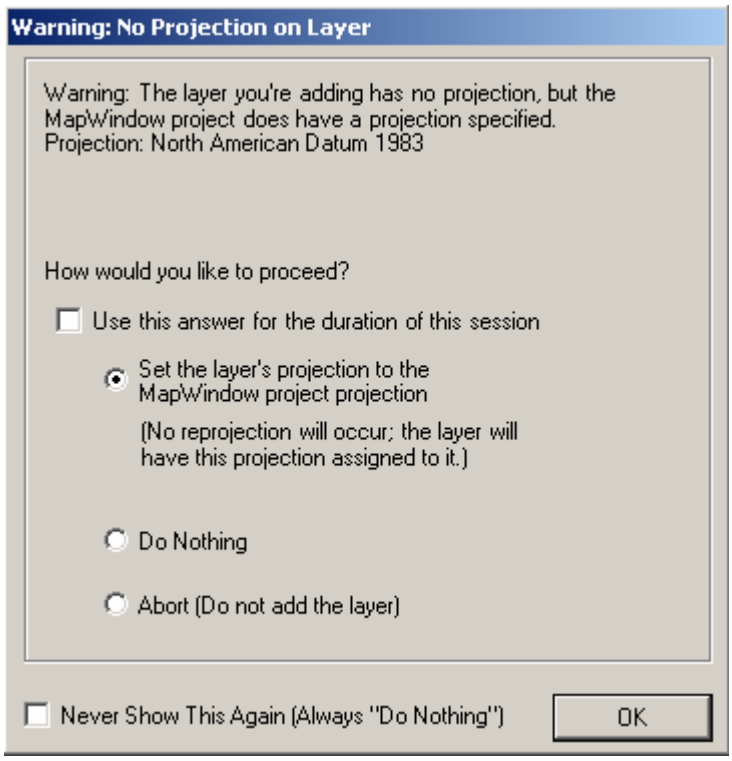


Figure 13.3

13.1.3.05 Check the method that the program should use for handling projections. The file will then be created, and you'll be given a warning message which warns you to be sure to add data to the map to use as a reference to ensure you're in the correct spatial area (the correct extents). This is shown in Fig 13.4:

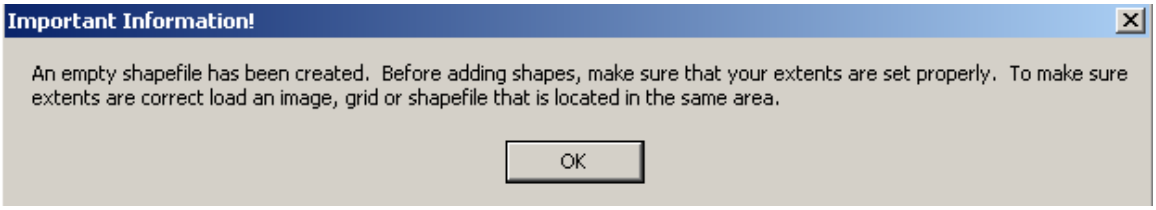


Figure 13.4

13.1.3.06 Click [***OK***]

13.1.3.07 To complete the creation of the new layer, add the desired attributes by clicking on the  button and moving the curser to the point to be added. Continue clicking points to add additional vertices in the case of lines or polygons; right click to finish.

 ***ISSUE #04*** ****** The user should be able to enter the positional data for point shapefiles or for a vertex by entering it in the floating window, rather than just estimating the location off of the map. This has been corrected in version 4.3.*

 ***TASK #18********Create the following layers*

Name	***Type***
testpt	***Point***
testln	***Line***
testpoly	***Polygon***

13.2 Editing a Layer Using Shapefile Editor

13.2.1 General Information for Editing a Layer Using Shapefile Editor

13.2.1.01 ***MapWindow*** supports basic capabilities for editing spatial data. Before performing any edits, always make a backup of the dataset the user is about to edit. Key files to copy when backing up a shapefile include any files ending in .prj, .dbf, .shp, and .shx.

13.2.2 Setup for the Editing a Layer Using Shapefile Editor

13.2.2.01 Not Applicable

13.2.3 Steps for Editing a Layer Using Shapefile Editor

13.2.3.01 To edit an existing layer, highlight the layer in the legend.

13.2.3.02 Add attributes by clicking on the  button and moving the curser to the point to be added.

13.2.3.03 Enter x, y values by left clicking on the location where a point or vertex should be added.

13.2.3.04 To move a point, click on  , then select the point to be moved by left-clicking on it, then drag the selected point to the correct location and release the mouse button.

13.2.3.05 To delete a shape from the shapefile, first click the Select icon () from the toolbar. Next, select one or more shapes to be deleted with the mouse. They will change color to indicate they're selected – now, press the Delete Shape button (). The user will be asked if the user is sure; after answering [**Yes**] the shape(s) will be deleted.

13.2.3.06 If the shapefile being created is a Polygon or a line, the user can add  or remove  a vertex from the existing shapefile.

13.3 Editing a Layer Using Table Editor

13.3.1 General Information for Editing a Layer Using Table Editor

13.2.1.01 Not Applicable

13.3.2 Setup for the Editing a Layer Using Table Editor

13.3.2.01 Not Applicable

13.3.3 Steps for Editing a Layer Using Table Editor

13.3.3.01 Highlight or select the layer in the legend.

13.3.3.02 Click on  to open the attribute table for editing

13.3.3.03 The following view will open:

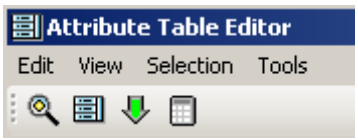


Figure 13.5

- **[*Edit*]**
  - **[*Add a Field*]** – add an attribute column to the attribute table.
  - **[*Remove a Field*]** – deletes an attribute column from the attribute table.

- ---
- **[*Rename a Field*]** – Change the name of an attribute column.

- **[*View*]**
  - **[*Show only Selected Shapes*]** – Displays only those features selected.
  - **[*Show All Shapes*] –** this option appears when **[*Show only Selected Shapes*]** is already selected.
  - **[*Zoom to Selected Shapes*]** – Zoom to only those features selected.
- **[*Selection*]**
  - **[*Query*]** – Queries or searches of the attribute table can be defined.
  - ---
  - **[*Select All*]** – All feature are selected.
  - **[*Select None*]** – Any selected features are unselected.
  - **[*Switch Selection*]** – Any selected features are unselected, and any unselected features are now selected.
  - ---
  - **[*Export Selected Features*]** – Selected Features are exported out as a new shapefile.
- **[*Tools*]**
  - **[*Find*]** – Search and locate text in any column in the attribute table.
  - **[*Replace*]** – Search and locate text in attribute table and replace it with other text.
  - ---
  - **[*Import Field Definitions from DBF*]** – Import the attribute column definitions from a different shapefile (or DBASE IV file).
  - **[*Field Calculator Tool*]** – Allows the user to fill attribute columns with calculated values (calculated from other attribute values).
  - **[*Generate or Update MWShapeID Field*]** – Updates or creates a unique identifier attribute column.
  - **[*Copy ShapeIDs to Specified Fields*]**

 - **[*Zoom to Selected Shapes*]**

 - **[*Show only Selected Shapes*]**

 - **[*Import Field Definitions from DBF*]**

 - **[*Field Calculator Tool*]**

13.2.3.06 Click on [***Edit***] then [***Add Field***].

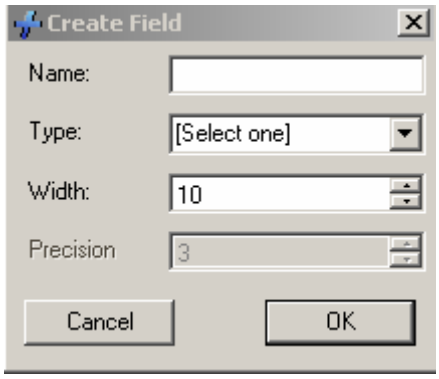


Figure 13.6

The type can be one of the following: Double, Integer, or String. If Double is selected, the precision, or places to the right of the decimal point, is enabled.

13.2.3.07 Click on [***Edit***] then [***Remove a Field***].

Figure 13.7

13.2.3.08 Select the field to be deleted and then click [***OK***].

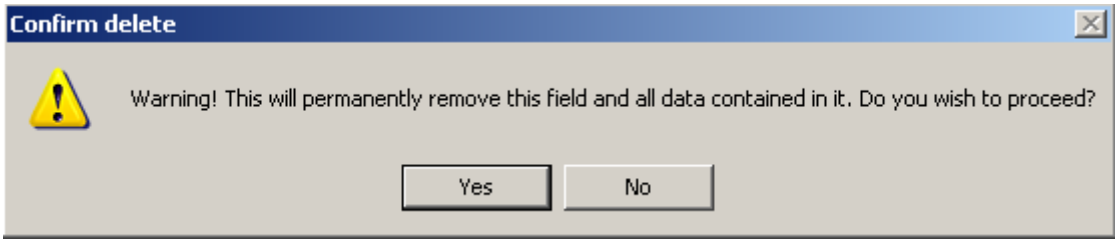


Figure 13.8

13.2.3.09 Click [***Yes***] to confirm deletion, and the field will be removed.

13.2.3.10 Click on [***Edit***] then [***Rename a Field***].

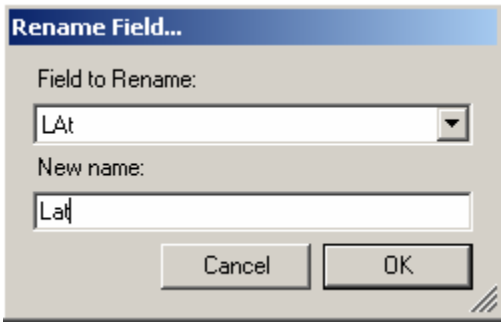


Figure 13.9

13.2.3.11 Select the field to be renamed.

13.2.3.12 Type in new name.

13.2.3.13 Click [***OK***].

13.2.3.14 Click on [***Selection***] then [***Query***].

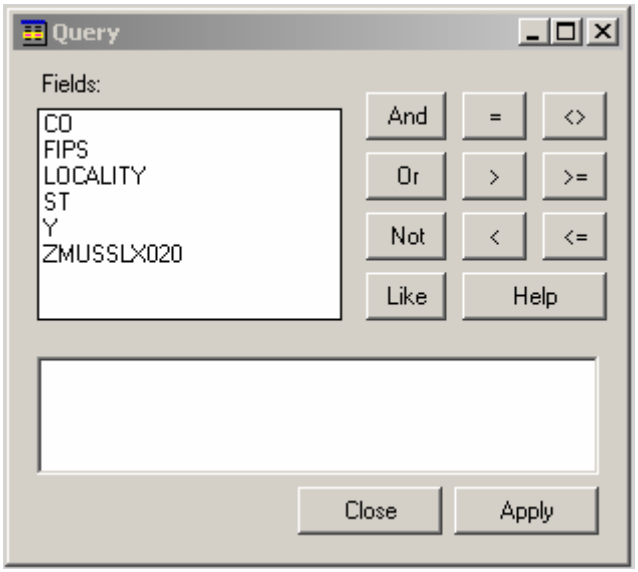


Figure 13.10

13.2.3.15 Build the query and click [***Apply***].

13.2.3.16 The features selected by the Query will be highlighted in the attribute field.

13.2.3.17 Click on [***Tools***] then [***Find***].

Figure 13.11

13.2.3.18 Type in the search string and click [OK]. The first feature with that search string will be selected.

13.2.3.19 Click on [***Tools***] then [***Replace***].

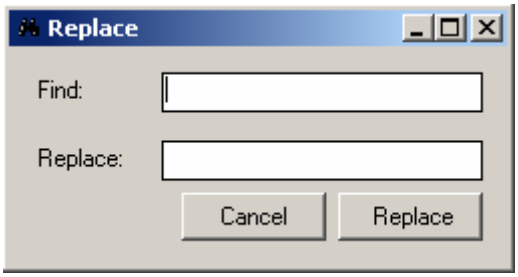


Figure 13.12

13.2.3.20 Fill in the values and click on [***Replace***]. Note that it will replace the value in all locations regards of the column the value is found in.

13.2.3.21 Click on [***Tools***] then [***Field Calculator Tool***].

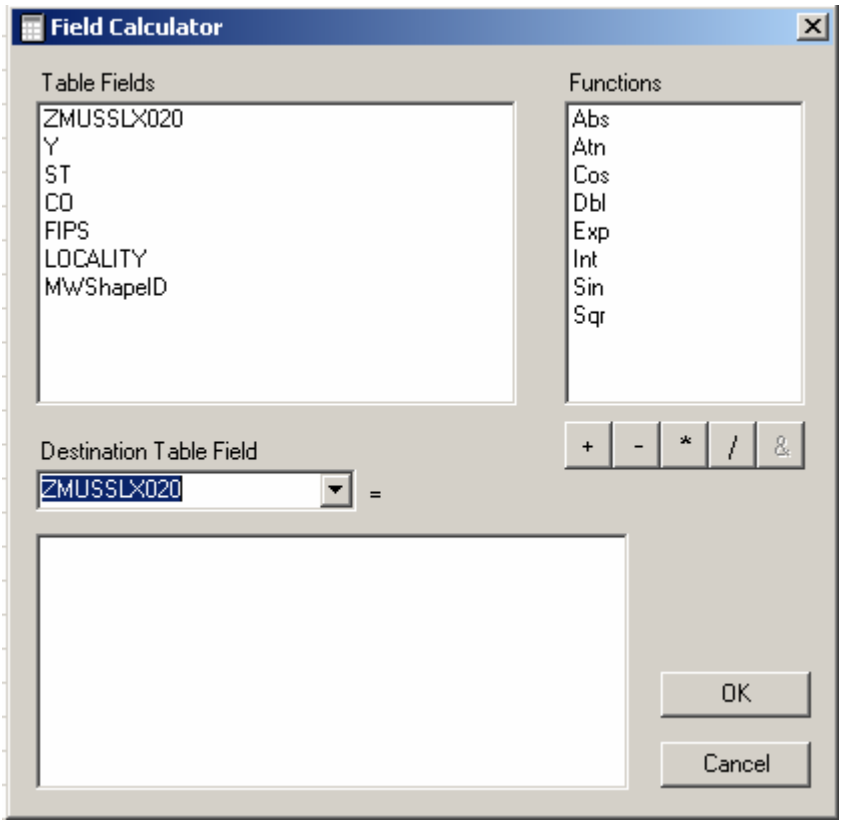


Figure 13.13

13.2.3.22 The field calculator allows the user to build an expression and use the results to populate an attribute column.

TASK #19******For the Point layer (testpt), create an airport at approximately 44.91N 114.93 W. and add the following fields and values:*

Callsign	***XXX***
Lat	***44.91***
Lon	***-114.93***

TASK #20******For the Polygon layer (testpoly), create a polygon between BOI, MYL,SMN and SUN.*

TASK #21******For the Polygon layer (testpoly), Add a Vertex Point and drag it to include MSO.*

TASK #22**For the Line layer (testln), create a line from LWS to FCA, then BTM, and finish at IDA.*

QUESTION #10 ** Were you able to build all three layers? If so, zip the layers together into one file and e-mail them to me. Be Sure to Include the .prj, .shp, .shx and .dbf files for each layer.*

List of Questions for Lesson #02

QUESTION #10 ***** *Were you able to build all three layers? If so, zip the layers together into one file and e-mail them to me. Be Sure to include the .prj, .shp, .shx and .dbf files for each layer.*

END OF LESSON #02

##

##

Begin Lesson #03

Chapter 14 Raster Data

14.1 Raster Data

14.1.1 General Information about Raster Data

14.1.1.01 Definition: Raster data in GIS are matrices of discrete cells that represent features on, above or below the earth's surface. Each cell in the raster grid is the same size, and cells are usually square but can be rectangular in MapWindow. Typical raster datasets include remote sensing data such as aerial photography or satellite imagery and modeled data such as an elevation matrix. In the case of true georeferenced imagery, such as true color land photography (as might be obtained in MrSID or GeoTIFF format), the data of the cells of the raster image is not accessible in the normal manner of grids, but instead it is displayed simply as an image with whatever RGB values are stored within it normally.

14.1.1.02 Supported Raster Formats: MapWindow supports a number of different raster and image formats. Currently implemented formats include:

- Utah State University Binary Grid (*.bgd)
- Arc/Info Binary Grid (sta.adf)
- Arc/Info ASCII Grid (*.asc)
- Arc/Info FLT grid (*.flt)
- GeoTIFF (*.tif)
- USGS ASCII DEM (*.dem)
- Spatial Data Transfer Standard Grids (with some limitations) (*.ddf)
- PAux (PCI .aux Labeled)
- PIX (PCIDSK Database) (*.pix)
- DTED Elevation Raster (*.dhm or *.dt0 or *.dt1)
- ECW Enhanced Compression Wavelet (*.ecw)
- Erdas Imagine Images (*.img)
- Arc/Info Grid Images (*.grd or hdr.adf)
- Arc/Info HDR/BIL Images (*.bil)
- MrSID Images (*.sid)
- Bitmap Images (*.bmp)
- GIF Images (*.gif)
- JPEG/JPEG2000 Images (*.jpg or *.jp2)
- Portable Network Graphics Images (*.pgm, *.pnm, *.png, *.ppm)
- TIF Images (*.tif)
- Windows Metafile (*.wmf)

14.1.1.02 Because the raster implementation in MapWindow is based on the GDAL library, other raster formats implemented in GDAL are may become available.

14.1.103 Unlike vector data, raster data typically do not have an associated database record for each cell.

14.1.2 Creation or Setup Subsection:

14.1.2.01 **Not Applicable**

14.1.3 Loading Raster Data

14.1.3.01 Raster layers are loaded either by clicking on the Add Layers icon () or by selecting the [*View*] and then [*Add Layer*] menu option. More than one layer can be loaded at the same time by holding down the Control key and clicking on multiple items in the file dialog.

14.2 Legend Editor

14.2.1 General Information about Legend Editor

14.2.1.01 The properties associated with Rasters are edited via the layer properties, which can, in turn, be accessed through the Legend Editor.

14.2.1.02 These properties can include the color scheme, hillshading, color transparency, dynamic visibility, and a legend icon

14.2.2 Setup of Legend Editor:

14.2.2.01 Not Applicable

14.2.3 Usage of Legend Editor

14.2.3.01 The Legend Editor is accessed by double-clicking on a layer item in the legend or right-clicking on it and selecting [***Properties***].

14.2.3.02 In the case of Raster Grids, this will display the following window which gives access to the raster properties.

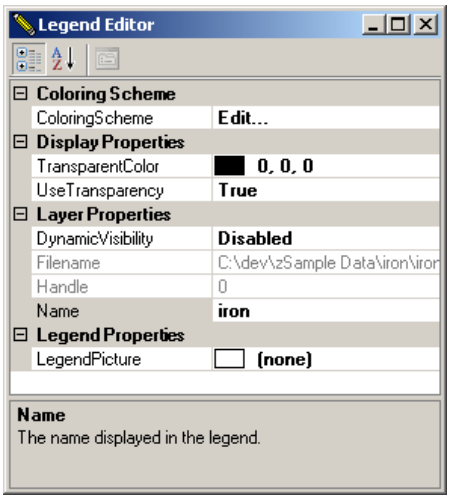


Figure 14.1

14.2.3.03 If the raster properties being viewed are for a Grid-type raster, then it is possible to alter the way in which that raster is displayed and colored. This is done through the Coloring Scheme Editor.

14.2.3.04 MapWindow allows partial transparency of the grids by allowing a user to choose a transparency color and then set Transparency to true.

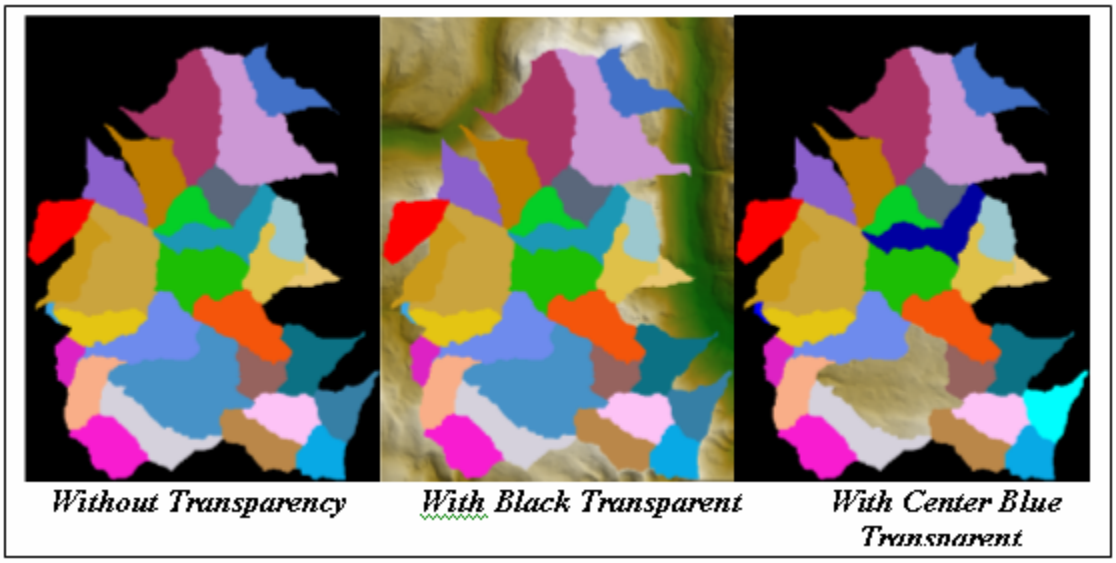


Figure 14.2

14.2.3.05 What this will do is make all cells of that color completely transparent.

14.2.3.06 Most often this is used to set black to the color of the NoData values and then set it transparent so that NoData cells will be transparent in the grid display.

14.2.3.07 Dynamic visibility is a feature in MapWindow whereby a user can set the viewing extents at which a layer is displayed or hidden.

14.2.3.08 Most often this is used with shapefiles to display complex shape files only when zoomed in to a close scale, but it can be used with Rasters as well.

14.2.3.09 To do this, zoom to the scale/extents where the user wish for the layer to be visible, open the Legend Editor and then select the Dynamic Visibility option, then click the [Set New Dynamic Extents] button and it will automatically set visibility to true. Now if the user zoom out beyond those extents, the layer will disappear and if the user zoom in to that level, it will reappear.

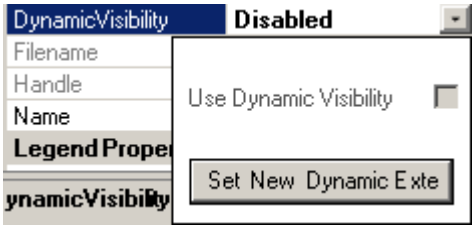


Figure 14.3

14.2.3.10 To turn it off, simply select the Dynamic Visibility option in Legend Editor and uncheck the “Use Dynamic Visibility” Option

14.2.3.11 To change the display name of the layer, open Legend Editor and select the Name option, then change the text found there to the new name.

14.2.3.12 To change the icon which displays to the left of the layer name in the Legend, open Legend Editor and select the LegendPicture option, then click the ... button, which will open up a file browser. Select the icon file the user wish to use and open it and it will be used as the layer icon.

Figure 14.4

14.3 Coloring Scheme Editor

14.3.1 General Information about Coloring Scheme Editor:

14.3.1.01 Not Applicable

14.3.2 Setup of Coloring Scheme Editor:

14.3.2.01 Not Applicable

14.3.3 Usage of Coloring Scheme Editor

14.3.3.01 Within the Legend Editor, select the ColorScheme "Edit…" cell then click the ... button to bring up the Coloring Scheme Editor, as seen below.

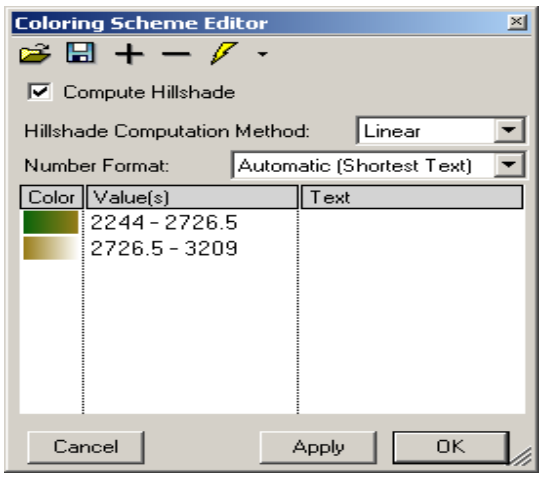


Figure 14.5

14.3.3.02 The  will provide an open file browser which allows the user to select a *.mwleg file which will contain a coloring scheme to use for the grid

14.3.3.03 The  will provide a save file browser which allows the user to select a *.mwleg file which the current coloring scheme will be saved to.

14.3.3.04 The  will add a new color break to the list below. By using this, the user can develop fully custom coloring schemes by adding ranges of values to color in certain ways and changing the display color or gradient as the user wish.

14.3.3.05 The will remove a selected color break from the list.

14.3.3.06 If the Compute Hillshade checkbox is checked, the display of the grid will be generated in such a way that it gives it a three-dimensional feel. This only works well with DEMs however and thus the option can be turned off to simply display the grid as flat values by the color breaks.

14.3.3.07 There are three different types of algorithms to generate the hillshade, the default Linear, a Logarithmic, and an Exponential. Selecting these from the drop-down will change how the hillshade displays and some are more useful for certain datasets.

14.3.3.08 The Number Format dropdown lets the user select different styles for displaying the range of values in the legend, as sometimes decimal or scientific notation are needed. The default is to use the shortest method of display.

14.3.3.09 The [***Cancel***], [***Apply***], and [***OK***] buttons all act as standard dialog buttons to leave without changes, apply changes to the raster without leaving, and apply changes and leave.

14.3.3.10 As can be seen below, the  button is used to automatically colorize the grid by setting up predefined color breaks via the drop down menu

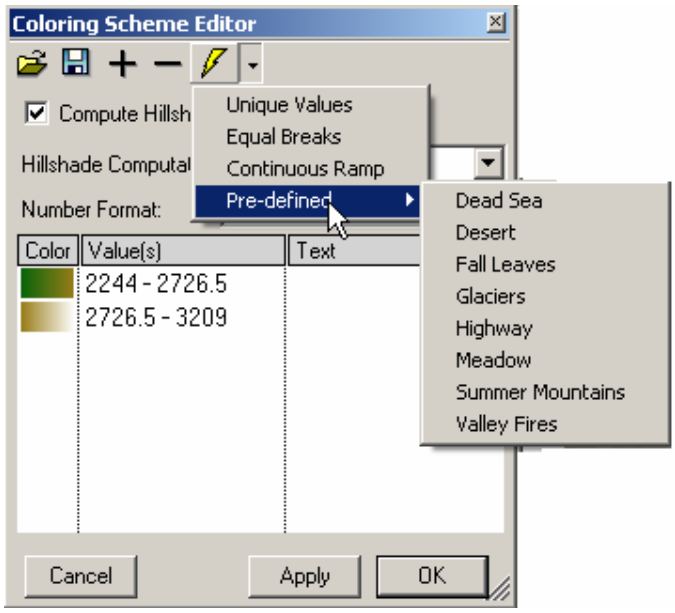


Figure 14.6

14.3.3.11 The Unique Values option will seek to find all the unique data values in a grid and assign a unique color to each of them. In a DEM where there are thousands of unique values, this is not possible, but in other data sets this can be quite helpful for making distinction between different data.

14.3.3.12 The Equal Breaks option will prompt for the number of breaks and then seek to divide the dataset range equally across that number of breaks and assign a unique value to each break. This can be a good way to set up groups within the range.

14.3.3.13 The Continuous Ramp option will prompt for two colors which will then be used in the color scheme as a gradient over the entire data range for coloring the grid. Distinct colors are recommended to avoid confusion of display.

14.3.3.14 Finally, the Predefined sub-menu contains a series of MapWindow custom color schemes which have been developed to work well with DEMs and give

distinct elevation breakdown by use of two gradient color breaks. The default color scheme with which all DEMs are opened is Summer Mountains.

14.3.3.15 As mentioned before, using the + and − buttons the user is able to add and remove custom color breaks from the table, but once a break is added it must be customized to be at all useful.

14.3.3.16 The first and most important thing to do is to set the range of values to be displayed with that given break. To do this, simply select the Value(s) column of that break and it will become editable. A single value or a range with two values separated by a dash (-) can be inputted. It is possible to have overlapping ranges, but not recommended as the behavior may be different than expected.

14.3.3.17 The next part is to set the color for the data to be displayed in. The user do this by clicking on the Color box of the break. If the user left click, the user will be given a color selector of solid colors and all values in the given range will be that one color. If the user right-click instead, the user will be prompted for two colors to be used in a gradient for the range of values. Distinct colors are recommended for clarity of display, as are colors not used in other breaks.

14.3.3.18 Finally, the Text column of the table can be changed to display the entered text. If the Text column is blank, the Value(s) column will be used as the display text of that break.

TASK #23******Save the current project and open the sample project Newton by navigating to the drive where MapWindow was installed and then go to" /Program Files/MapWindow/Sample Projects/Newton/" and click on Newton.mwpj. turn off all the layers except "Shaded Relief Image" under topography which should be at the bottom of the legend.*

END OF LESSON #03

##########

##

Begin Lesson #04

Chapter 15 Plug-ins

15.1 MapWindow Plug-in

15.1.1 General Information about MapWindow Plug-ins

15.1.1.01 MapWindow has an extensible architecture that allows the user to write plug-ins to add functionality using Visual Basic .NET or C#.

15.2 Adding a Plug-in to MapWindow

15.2.1 General Information about adding Plug-ins

15.2.1.01 The user can download plug-ins from http://www.mapwindow.org/download.php and install them using the directions provided in the download.

15.3 Plug-ins Menu

15.3.1 General Information about Plug-in Tool:

15.3.1.01 Not Applicable

15.3.2 Creation of Plug-in Tool:

15.3.2.01 Not Applicable

15.3.3 Usage of Plug-ins Tool

15.3.3.01 Click on the [***Plug-in***] button on the main menu and then select [***Edit Plug-ins***]

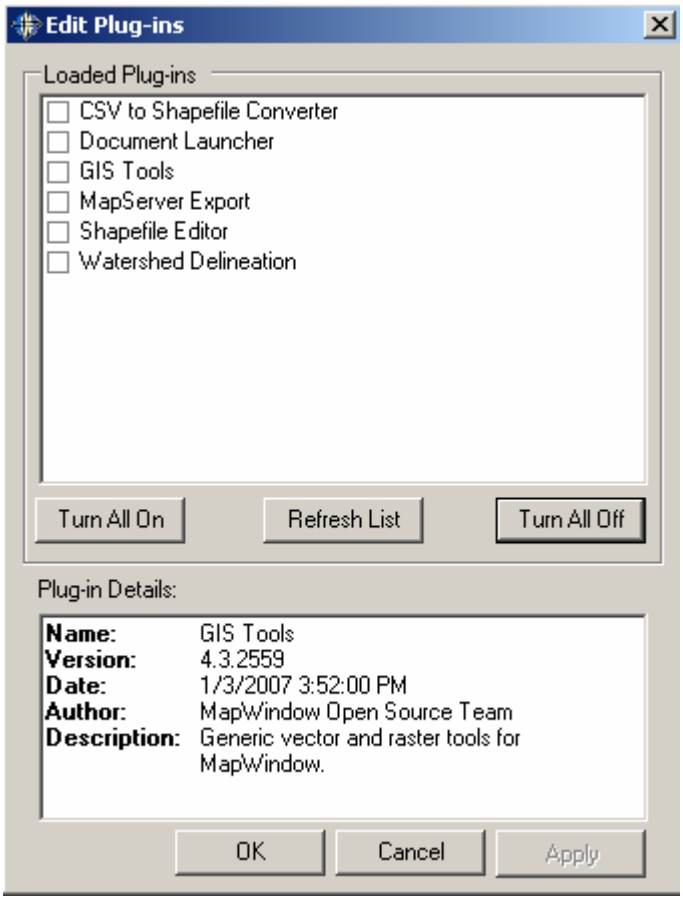


Figure 15.1

This allows the user to load plug-ins and to review details of the plug-in in the lower box

15.3.3.02 Activating/Deactivating Plug-ins by putting a check in the box next to their name.

15.3.3.03 Refreshing Plug-in List by clicking on the [***Refresh List***] button.

15.3.3.04 Viewing Plug-in Details by highlighting a plug-in and then looking at the box at the bottom.

15.4 Scripts

15.4.1 General Information about Scripts

15.4.1.01 The scripting system allows the user to set up custom actions or build the user's own plug-in, without needing a programming environment such as Visual Studio

15.4.2 Setup of Scripts

15.4.2.01 Not Applicable

15.4.3 Usage of Scripts

15.4.3.01 A simple example script is displayed by default. The user may change this to do anything the user wish.

15.4.3.02 Compiling a plug-in will prompt the user to save a .DLL file, which is added to the plug-in menu. Execution may not immediately start until the plug-in is turned on by selecting it from the Plug-in Menu.

15.5 CSV to Shapefile Converter

15.5.1 General Information about CSV to Shapefile Converter

15.5.1.01 Converts comma-separated value (csv) text files which contain geographic coordinates into shapefiles

15.5.2 Setting up CSV to Shapefile Converter

15.5.2.01 Click on the [***Plug-in***] button on the main menu

15.5.2.02 Select [***CVS to Shapefile Converter***].

15.5.3 Using CSV to Shapefile Converter

15.5.3.01 Select [***Converters***] on main menu toolbar

15.5.3.02 Select [***CSV (comma Separated Values) to Shapefile***] on drop-down menu

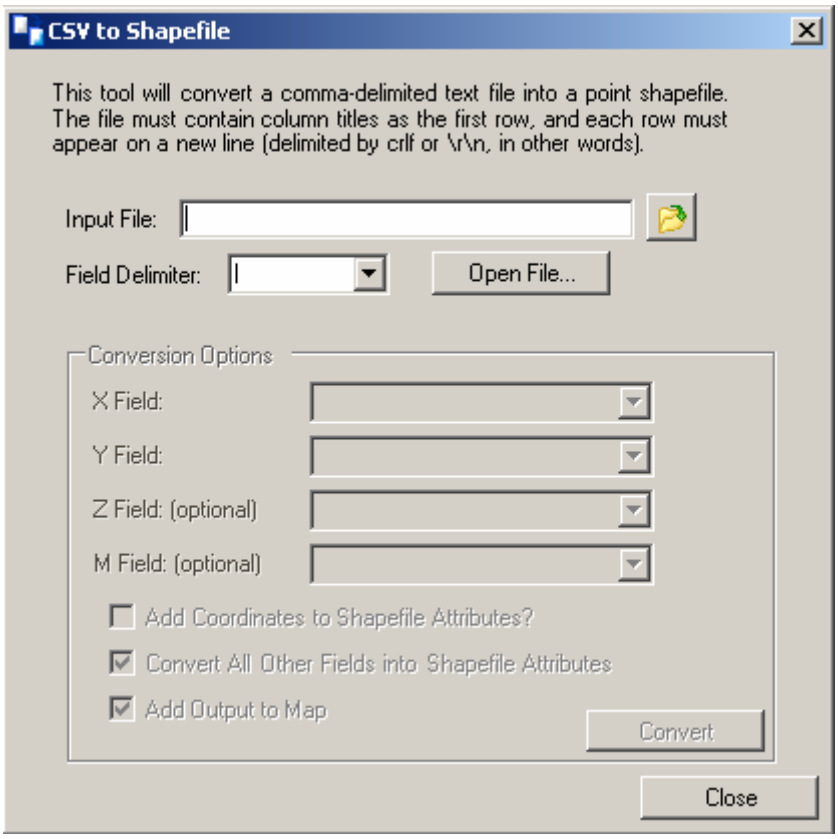


Figure 15.2

15.5.3.03 Select the file to be imported by using the "(Input File)" box

15.5.3.04 Set the "(Field Delimiter)" as comma or the correct symble

15.5.3.05 Click [***Open File***]

15.5.3.06 Select the columns that are used for "(X Field)' and "(Y Field)"

15.5.3.07 Click on "(Add coordinates to Shapefile Attributes?)", "(Convert All other Fields into Shapefile)", and "(Add Output to Map)"

15.5.3.08 Click on [***Convert***].

Figure 15.3

15.5.3.09 A window will open and ask for the new file name. Fill in File name and click [***Save***].

15.5.3.10 Depending what selections made earlier in the project, the program may open the projection box and request that the user set a projection for this layer.

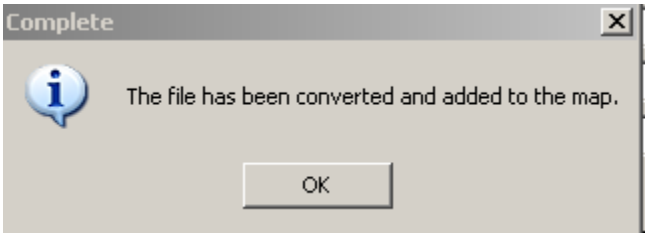


Figure 15.4

15.5.3.11 Click [***OK***]

15.5.3.12 The program will return to the first screen (Figure 15.2). Click [***Close***]

15.6 Document Launcher

15.6.1 General Information about Document Launcher:

15.6.1.01 This is a simple plug-in designed to provide a teaching framework for programming the plug-in interface.

15.6.1.02 Files to compile this plug-in DLL can be found at *http://svn.mapwindow.org/svnroot/MapWindow40/DocLauncher/*

15.6.1.03 Functionally, this particular plug-in will be activated when a shape in a shapefile is selected. If the shapefile has an attribute entitled "FileOrURL" and the selected shape has text in that attribute column, then the plug-in will seek to launch that path as a file or a URL. Most commonly, this is used to launch images or web pages associated with given shapes.

15.6.2 Setup for Document Launcher:

15.6.2.01 Click on the [***Plug-in***] button on the main menu

15.6.2.02 Select [***Document Launcher***].

15.6.3 Usage of Document Launcher: Under Development

15.6.3.01 *This section is under development.*

15.12 Merge Grids (GIS Tools - Raster) under development

15.12.1 General Information about Merge Grids

15.12.2 Creation of Merge Grids

15.12.3 Usage of Merge Grids

15.13 Clip Grid with Polygon (GIS Tools - Raster) under development

15.13.1 General Information about Clip Grid with Polygon

15.13.2 Creation of Clip Grid with Polygon

15.13.3 Usage of Clip Grid with Polygon

15.14 Georeference Image or Grid (GIS Tools - Raster) under development

15.14.1 General Information about Georeference Image or Raster

15.14.2 Creation of Georeference Image or Raster

15.14.3 Usage of Georeference Image or Raster

15.15 Generate a Contour Shapefile (GIS Tools - Raster) under development

15.15.1 General Information about Generate a Contour Shapefile

15.15.2 Creation of Generate a Contour Shapefile

15.15.3 Usage of Generate a Contour Shapefile

15.16 Assign Projection to Shapefile (GIS Tools - Vector)

15.16.1 General Information about Assign Projection to Shapefile:

15.16.1.01 This tool allows the user to create a projection file (.prj) if there is not an existing file

15.16.1.02 A new projection file can be created and overwrite an existing projection file. This does not reproject the data but rather assumes that the data is in the new projection. It does not check if a projection file already exists.

15.16.2 Setup for Assign Projection to Shapefile

15.16.2.01 Click on the [***Plug-in***] button on the main menu

15.16.2.02 Select [***GIS Tools***].

15.16.3 Usage of Assign Projection to Shapefile

15.17.2.01 Click on [***GIS Tools***] on main menu

15.17.2.02 Click on [***Vector***]

15.17.2.03 Click on [***Assign Projection to Shapefile***]

15.17.2.04 Select file that will be assigned projection.

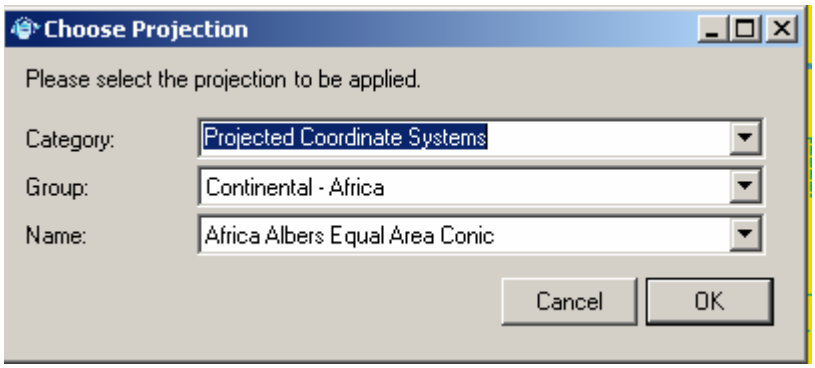


Figure 15.5

15.17.2.05 Enter appropriate projection information and click [***OK***]

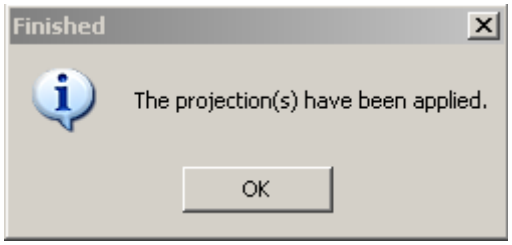


Figure 15.6

15.17 Reproject Shapefile (GIS Tools - Vector)

15.17.1 General Information about Reproject Shapefile

15.17.1.01 The tool reprojects a shapefile from one projection to a second projection.

15.17.2 Setup for Reproject Shapefile:

15.17.2.01 Click on the [***Plug-in***] button on the main menu.

15.17.2.02 Select [***GIS Tools***].

15.17.3 Usage of Reproject Shapefile

15.17.3.01 Click on [***GIS Tools***] on main menu

15.17.3.02 Click on [***Vector***]

15.17.2.06 Click on [***Reproject a Shapefile***]

15.17.2.07 Select file that will be reprojected and click [***Open***]

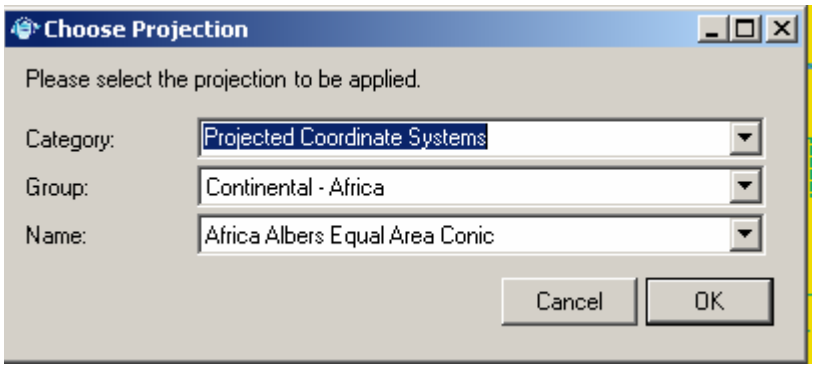


Figure 15.7

15.17.2.08 Enter appropriate projection information and click [***OK***]

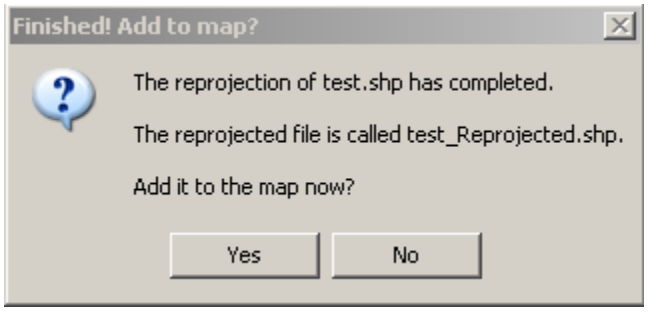


Figure 15.8

15.17.2.09 Click [***Yes***] to add it to map.

15.18 Buffer Shapes (GIS Tools - Vector)

15.18.1 General Information about Buffer Shapes:

15.18.1.01 This tool creates buffer shapefiles at selected distances from the original features

15.18.2 Setup for Buffer Shapes:

15.18.2.01 Click on the [***Plug-in***] button on the main menu.

15.18.2.02 Select [***GIS Tools***].

15.18.3 Usage of Buffer Shapes

15.18.3.01 Click on [***GIS Tools***]

15.18.3.02 Click on [***Vector***]

15.18.3.03 Click on [***Buffer Shapes***]

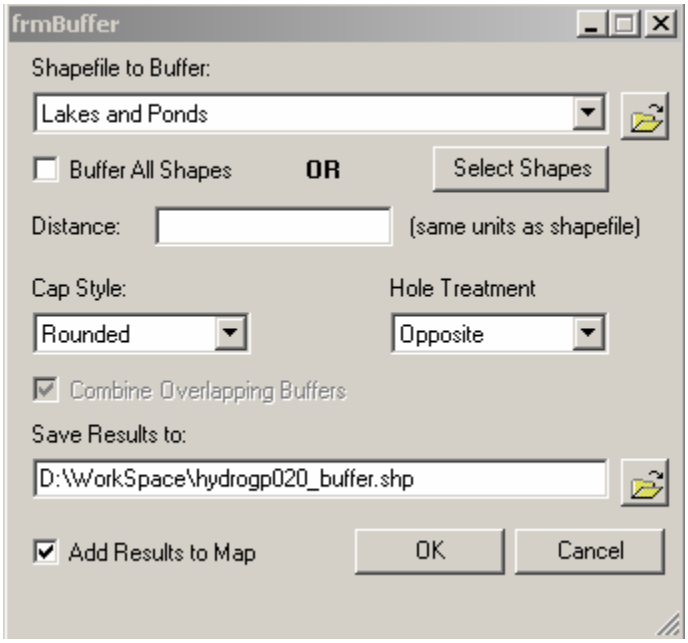


Figure 15.9

15.18.3.04 Select layer to buffer

15.18.3.05 Decide if buffering is applied to all shapes or just selected ones.

15.18.3.06 If selecting features, click to select feature to buffer, or hold down control key and click on multiple features.

15.18.3.07 Select distance; remember it is the same units as the user's data, in this case decimal degrees.

15.18.3.08 Decide if the user want to combine overlapping Buffers

15.18.3.09 Set name of resulting shapefile

15.18.3.10 Click [***OK***]

TASK #24******Zoom into the State of Idaho, Select the airports in Idaho and build a Buffer of .5 Decimal degrees around them, call it buffer1. There should be 8 airports selected.*

QUESTION #11 ****** Do any of the buffers overlap or intersect another buffer.*

TASK #25******Using the selected airports in Idaho and build a Buffer of .1 Decimal degrees around them, call it buffer2. Save both of these buffers for later*

15.19 Calculate Polygon Areas (GIS Tools - Vector)

15.19.1 General Information about Calculate Polygon Areas

15.19.1.01 This tool allows the user to calculate the areas of a selected shapefile.

15.19.2 Setup for Calculate Polygon Areas:

15.19.2.01 Click on the [***Plug-in***] button on the main menu.

15.19.2.02 Select [***GIS Tools***].

15.19.3 Usage of Calculate Polygon Areas

15.19.3.01 Click on [***GIS Tools***]

15.19.3.02 Click on [***Vector***]

15.19.3.03 Click on [***Calculate Polygon Areas***]

15.19.3.04 If it can not detect the shapefile units

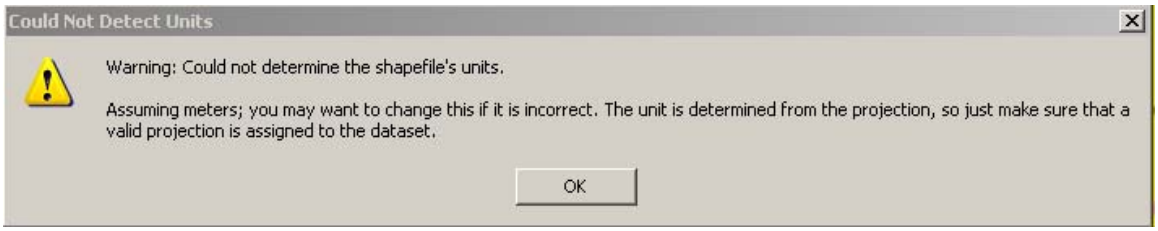


Figure 15.10

15.19.3.05 Click [***OK***].

15.19.3.06 The following appears:

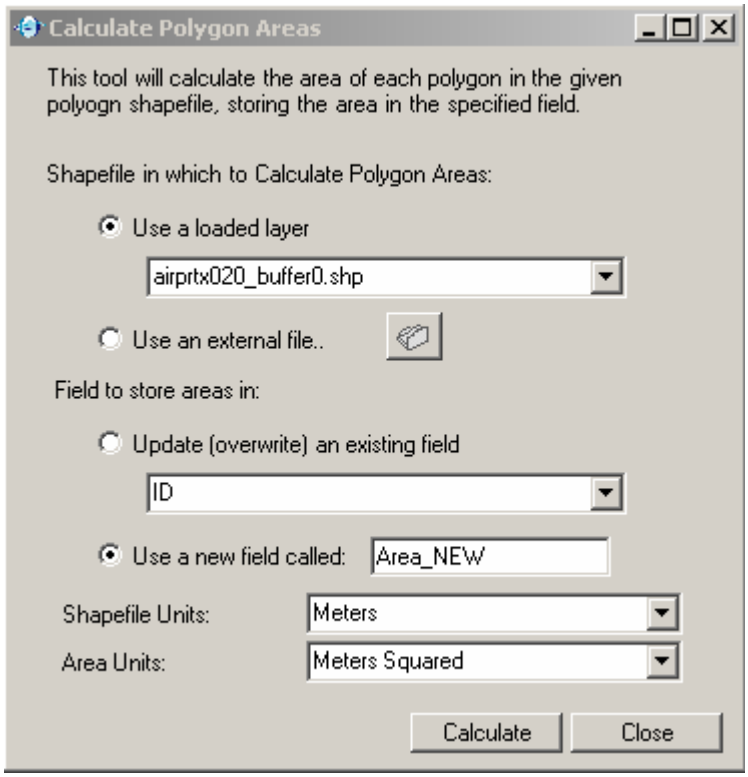


Figure 15.11

15.19.3.07 Select the layer.

15.19.3.08 Set the shapefile units

15.19.3.09 Set the units of the area the user want created

15.19.3.10 Click on [***Calculate***]

TASK #22**Using the buffer1 shapefile, calculate the Square Miles contained by the buffers around the airports. Remember the data is in decimal degrees.*

QUESTION #12 ***** *What is the area of the buffer around MYL. Hint: Select the buffer to highlight it, then open attribute table.*

QUESTION #13 ***** *What is the area of the buffer around MUO/BOI*

15.20 Clip Polygon with Line (GIS Tools - Vector)

15.20.1 General Information about Clip Polygon with Line:

15.20.1.01 There are two clipping tools as well. What the user will need:

- The input shapefile that the user want to clip.
- A shapefile containing at least one polygon (or line) to clip with. If the user doesn't already have one, use the shapefile editor tool to create one.

15.20.2 Setup for Clip Polygon with Line

15.20.2.01 Click on the [***Plug-in***] button on the main menu.

15.20.2.02 Select [***GIS Tools***].

15.20.3 Usage of Clip Polygon with Line

15.20.3.01 Click on [***GIS Tools***]

15.20.3.02 Click on [***Vector***]

15.20.3.03 Click on [***Clip Polygon With Line***]

15.20.3.04 The following appears

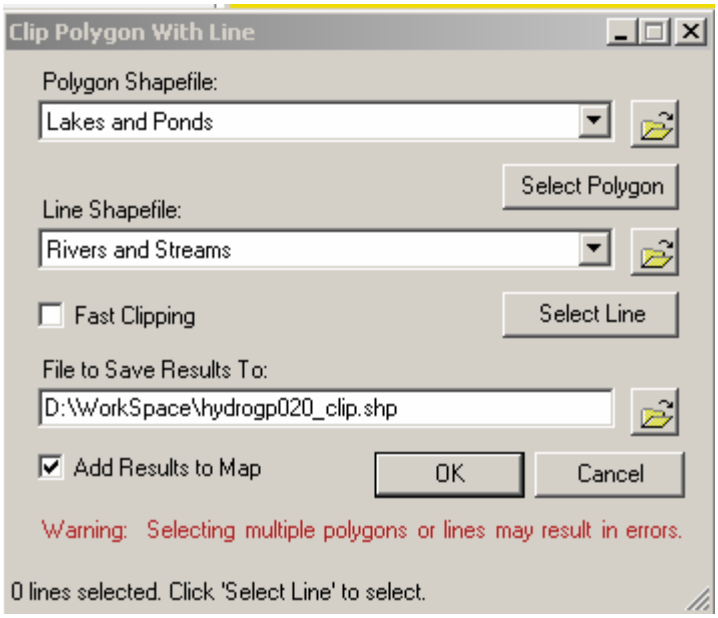


Figure 15.12

15.20.3.05 Select the polygon to be clipped

15.20.3.06 Select the clip file

15.20.3.07 Name the result file

15.20.3.08 Click [***OK***]

TASK #26******Select Lemhi County Airport (SMN) in central Idaho, create a line file that intersects the Buffer1 polygon around Lemhi County Airport, following the screen prompts clip the buffer1 polygon around Lemhi County Airport.*

15.21 Clip Shapefile with Polygon (GIS Tools - Vector)

15.21.1 General Information about Clip Shapefile with Polygon

15.21.1.01 This tool allows the user to clip one polygon by using a second polygon.

15.21.2 Setup for Clip Shapefile with Polygon

15.21.2.01 Click on the [***Plug-in***] button on the main menu.

15.20.2.03 Select [***GIS Tools***].

15.21.3 Usage of Clip Shapefile with Polygon

15.21.3.01 Click on [***GISTools***]

15.21.3.02 Click on[***Vector***]

15.21.3.03 Click on [***Clip Shapefile With Polygon***]

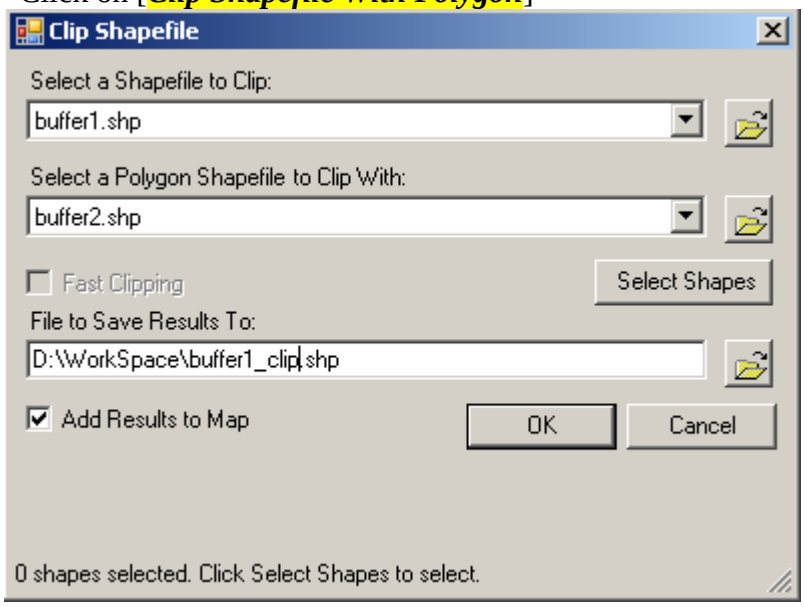


Figure 15.13

15.21.3.04 Select a shapefile to clip from the drop-down list (if already loaded in MapWindow) or browse to one using the button on the far side (folder icon).

15.21.3.05 Select a POLYGON shapefile to clip with from the drop-down list or browse to one.

15.21.3.06 Click the [***Select Shapes***] button. The user's cursor will turn into the selection tool (hand) and the user can now click on the shapes that the user want to do the clipping with.

15.21.3.07 Click the [***Done***] button (it has replaced the [***Select Shapes***] button of the previous step). The number of shapes that the user selected will be displayed on the bottom of the form.

15.21.3.08 If the user do not like the default result file, rename it or browse to a file that the user would like to save the results to (any previous contents will be over-written).

15.21.3.09 Push the [***OK***] button. The cursor should change to an hour glass and the form will close when it has completed the process.

15.21.3.10 The outlines of the user's clipped shapes should now be displayed on the screen (unless the user unchecked the "(Add Results to Map)" box).

15.21.3.11 Clipping with lines is very similar to the above, except that the user must select both the polygon the user want to clip and the line to clip it with (and it really doesn't like the user clipping with multiple lines). Just be sure to always press the [***Done***] button after selecting the user's objects.

TASK #26******Select the buffer1 layer created earlier, clip buffer1 by using buffer2.*

NOTE 08******The user should not need to have any projection set when using the clipping tools. They should work with whatever coordinates they are given. But if it does not work, try setting a projection and try it again.*

15.22 Erase Shapefile with Polygon (GIS Tools - Vector)

15.22.1 General Information about Erase Shapefile with Polygon:

15.22.1.01 This tool allows the user to create holes within a polygon area.

15.22.2 Setup for Erase Shapefile with Polygon

15.22.2.01 Click on the [***Plug-in***] button on the main menu.

15.22.2.02 Select [***GIS Tools***].

15.22.3 Usage of Erase Shapefile with Polygon

15.22.3.01 Click on [***GIS Tools***]

15.22.3.02 Click on [***Vector***]

15.22.3.03 Click on [***Erase Shapefile with Polygon***]

15.22.3.04 The following will appear

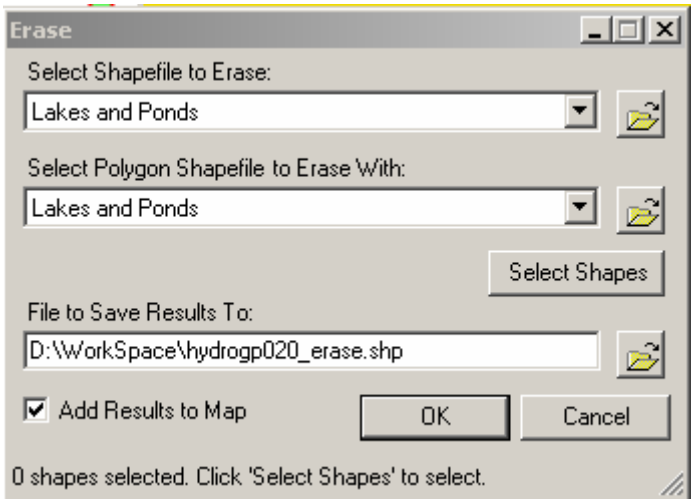


Figure 15.14

15.22.3.05 Select the shapefile to erase

15.22.3.06 Select the shapefile to erase with

15.22.3.07 Name the result file

15.22.3.08 Click [***OK***]

TASK #28******Select the airports in Idaho, erase part of buffer1 using buffer2.*

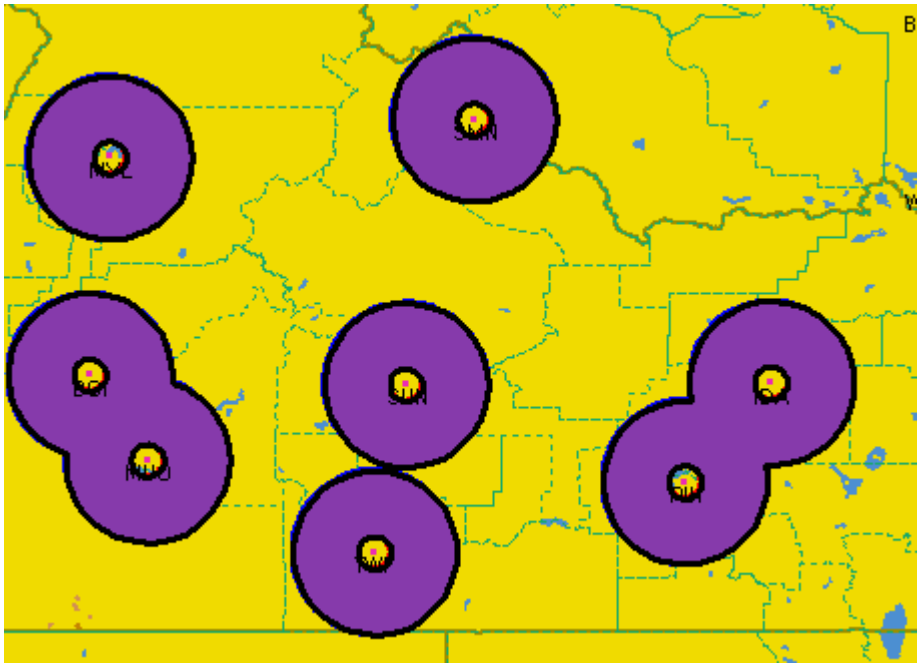


Figure 15.15

TASK #29**Using the buffer_erase shapefile, calculate the Square Miles contained by the buffers around the airports. Remember the data is in decimal degrees.*

QUESTION #14 ***** What is the area of the buffer around MYL. Hint: Select the buffer to highlight it, then open attribute table.*

QUESTION #15 ***** What is the area of the buffer around MUO/BOI*

15.23 Export Selected Shapes to New Shapefile (GIS Tools - Vector)

15.23.1 General Information about Export Selected Shapes to New Shapefile

15.23.1.01 This tool allows the user to select a feature or set of features from one shapefile and export them into a new shapefile

15.23.2 Setup for Export Selected Shapes to New Shapefile

15.23.2.01 Click on the [***Plug-in***] button on the main menu.

15.23.2.02 Select [***GIS Tools***].

15.23.3 Usage of Export Selected Shapes to New Shapefile

15.23.3.01 Select the feature to be exported to new shapefile

15.23.3.02 Click on [***GIS Tools***]

15.23.3.03 Click on [***Vector***]

15.23.3.04 Click on [***Export Selected Shapefile to New Shapefile***]

15.23.3.05 Enter name of new shapefile and click on [*Save*].

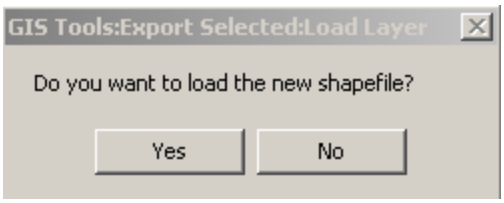


Figure 15.16

15.23.3.06 Click on [***Yes***]

15.24 Export Shapes to New Shapefile by Mask (GIS Tools - Vector)

15.24.1 General Information about Export Shapes to New Shapefile by Mask

15.24.1.01 This tool allows the user to use one shapefile or its features to select features from a second shapefile and then export them.

15.24.2 Setup for Export Shapes to New Shapefile by Mask

15.24.2.01 Click on the [***Plug-in***] button on the main menu.

15.24.2.02 Select [***GIS Tools***].

15.24.3 Usage of Export Shapes to New Shapefile by Mask

15.24.3.01 Click on [***GIS Tools***]

15.24.3.02 Click on [***Vector***]

15.24.3.03 Click on [***Export Shapes to New Shapefile by Mask***]

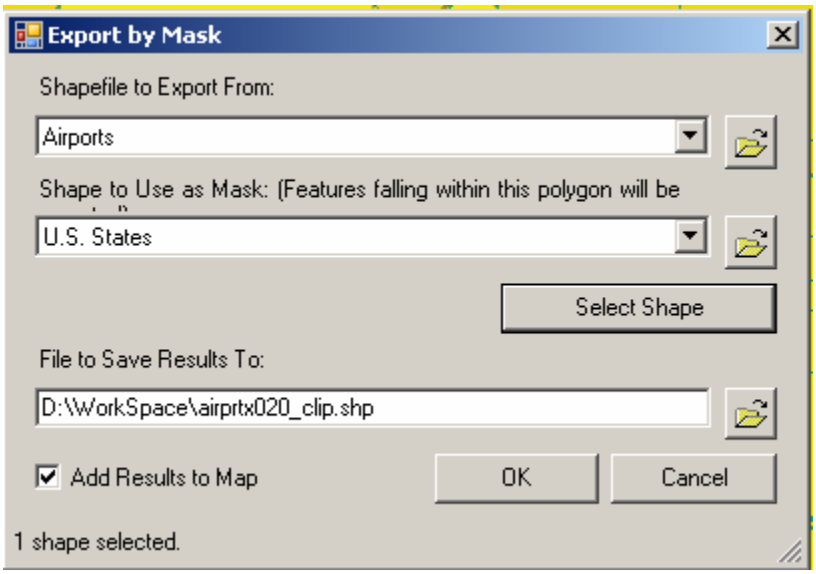


Figure 15.17

15.24.3.04 Select the shapefile that features are to extracted from.

15.24.3.05 Select shapefile to be used as mask

15.24.3.06 Select feature or features within mask file to be used to for selection of the features exported shapefile

TASK #30**Using the state shapefile, And the feature for the state of Idaho, extract the airports in Idaho.*

QUESTION #16 ** How many airports are in the new shapefile.*

15.25 Merge Shapefiles (GIS Tools - Vector)

15.25.1 General Information about Merge Shapefiles

15.25.1.01 This tool allows the user to merge two or more features into one feature.

15.25.2 Setup for Merge Shapefiles

15.25.2.01 Click on the [***Plug-in***] button on the main menu.

15.25.2.02 Select [***GIS Tools***].

15.25.3 Usage of Merge Shapefiles

15.25.3.01 Click on [***GIS Tools***]

15.25.3.02 Click on [***Vector***]

15.25.3.03 Click on [***Merge Shapefile***]

15.25.3.04 The following appears

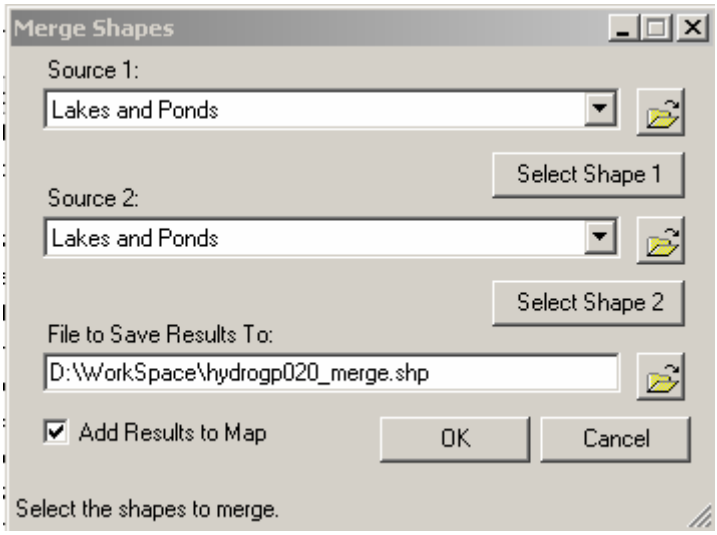


Figure 15.17

15.25.3.05 Select the two shape to be merged

15.25.3.06 Enter output file name

15.25.3.07 Click [***OK***]

15.26 Assign Projection to Image (GIS Tools - Image) under development

15.26.1 General Information about Assign Projection to Image:

15.26.2 Setup for Assign Projection to Image

15.26.3 Usage of Assign Projection to Image

15.27 Rectify Image to WorldFile (GIS Tools - Image) under development

15.27.1 General Information about Rectify Image to WorldFile

15.27.2 Setup for Rectify Image to WorldFile

15.27.3 Usage of Rectify Image to WorldFile

15.27 Reproject Images (GIS Tools - Image) under development

15.27.1 General Information about Reproject Images

15.27.2 Setup for Reproject Images

15.27.3 Usage of Reproject Images

Chapter 16 Third Party Plug-ins

16.1 Utah Water Research Laboratory (EMRG) Plug-ins

16.1.1 General Information about EMRG Plug-ins

16.1.1.01 Plug-ins Contributed by the Utah Water Research Laboratory EMRG

- **3-D TIN Viewer Plug-in** - This source code includes C++ code for an ActiveX control 3-D Triangulated Irregular Network viewer as well as code for a MapWindow plug-in for working with TINs.

  NOTE: You must register tunvuc.ocx (Start - Run - c:\windows\system32\regsvr32.exe c:\path\to\tinvuc.ocx) before using the plug-in, or you will receive a 'Class Not Registered' error.

- **Photo Viewer Plug-in** - This plug-in allows one to link a shapefile of photo points on a map to digital photos.

- **Streamflow Analyst Plug-in** - This plug-in allows one to link a shapefile of streamflow gaging stations to station and streamflow data in an external database. The tool includes functions for computing statistical summaries and producing a variety of plots. To compile the source code, the user will need a license to the GigaSoft ProEssentials graphing library.

- **Water Quality Analyst Plug-in** - This plug-in is similar to the Streamflow Analyst but extends the functionality to include analysis of any number of water quality parameters. This code also requires a valid license for GigaSoft ProEssentials graphing library.

16.6.1.01 ***MapWindow*** Plug-ins

- **Safety Software Suite** - Crash Analysis, Intersection Analysis, Signs management, Road Shape File Attribute correction Wizard, and more... All for Traffic Safety Improvement.

- **Shape to Earth** - Converts shapefiles to Keyhole Markup Language (KML) for viewing in ***Google Earth***

- **DXF to Shapefile Converter** - This is a plugin to convert from AutoCad DXF (Data eXchange Format) files into ESRI Shapefiles (the format also used by ***MapWindow***).

- **AutoCAD Layer Exporter** - The ACAD Exporter will export all entities visible in the window to AutoCAD. This plug-in requires a valid license for AutoCAD on the userr computer. Modified code to not explicitly reference a particular version of the AutoCAD object library. Instead, uses generic objects that seem to allow the code to work with any version of ***AutoCAD***.

- **UMN MapServer Exporter -** This is a ***MapWindow*** plug-in to export the currently loaded project to a University of Minnesota ***MapServer*** project

- **Online Data Plugin** - The ***MapWindow*** Online Data Plug-in is an open-source plug-in intended to allow easy access to online data sources, provided by ***ArcIMS*** or OGC-compliant web servers

- **Bayesian Network Analyst Plug-in** - This plug-in was developed to allow one to build a Bayesian decision network directly in a GIS. It requires the user to have a current license to the Netica Bayes net engine which it utilizes and ties to shapefile points in the map.

- **MapServer Project Generator** - A plugin used to generate a full ***Mapserver*** project from GIS layers opened in ***MapWindow***.

  It will generate a simple ***Mapserver*** template, package all the data files, and generate a .Map file which includes full color scheme support.

  It does not yet include auto generation of a reference image, handling of labels or dynamic visibility, or a help file/documentation.

16.7 Safety Software Suite under development

16.7.1 General Information about Safety Software Suite

16.7.2 Setup for Safety Software Suite

16.7.3 Usage of Safety Software Suite

16.8 Shape2Earth This is Shareware

16.8.1 General Information about Shape2Earth

NOTE 09 *****This plugin is shareware but apparently the too to grab imagery from Google earth works regardless if it is registered or not.

16.8.1.01 Shape2Earth uses symbology created by ***MapWindow*** GIS to render high quality KML files for viewing and sharing through ***Google Earth***.

16.8.1.02 ***Shape2Earth*** leverages freely available and easy to use Geographic Information System (GIS) software to create professional visualizations for viewing in ***Google™ Earth***. No additional software licensing is required!

16.8.1.03 The purpose of Shape2Earth is to provide a very simple and easy to use interface for translating Geographic Information System (GIS) data into Keyhole Markup Language (KML) for viewing in today's premier Earth viewing platform, ***Google(TM) Earth***.

16.8.1.04 Shape2Earth provides an easy interface for GIS novices, as well as advanced rendering and data customization for GIS professionals.

16.8.1.05 As an introductory offer, a single user license of Shape2Earth is available for $29.99 USD. No additional software costs required!!

16.8.2 Setup for Shape2Earth

16.8.2.01 Close the ***MapWindow*** program

16.8.2.02 Open web browser and go to http://www.mapwindow.com/

16.8.2.03 Click on [***Download Now***]

16.8.2.04 Scroll down page and Click on [***Shape2Earth***]

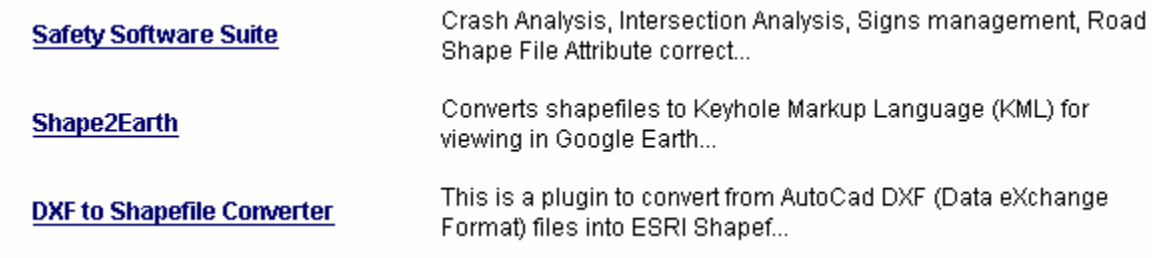


Figure 16.1

16.8.2.05 Click on [***Shape2Earth431_setup.exe***]

Description: Converts shapefiles to Keyhole Markup Language (KML) for viewing in Google Earth

Downloads: (135 total 3 today)

- shape2earth431_setup.exe (603 KB - January 23 2007.) Shape2Earth uses symbology created by MapWindow GIS to render high quality KML files for viewing and sharing through Google Earth. This Version is specific to MapWindow Version 4.3. (135 downloads)

Figure 16.2

16.8.2.06 Save to the plugins directory (i.e. D:\Program Files\MapWindow\Plugins)

16.8.2.07 Execute the file

16.8.2.08 Select the language to be used.

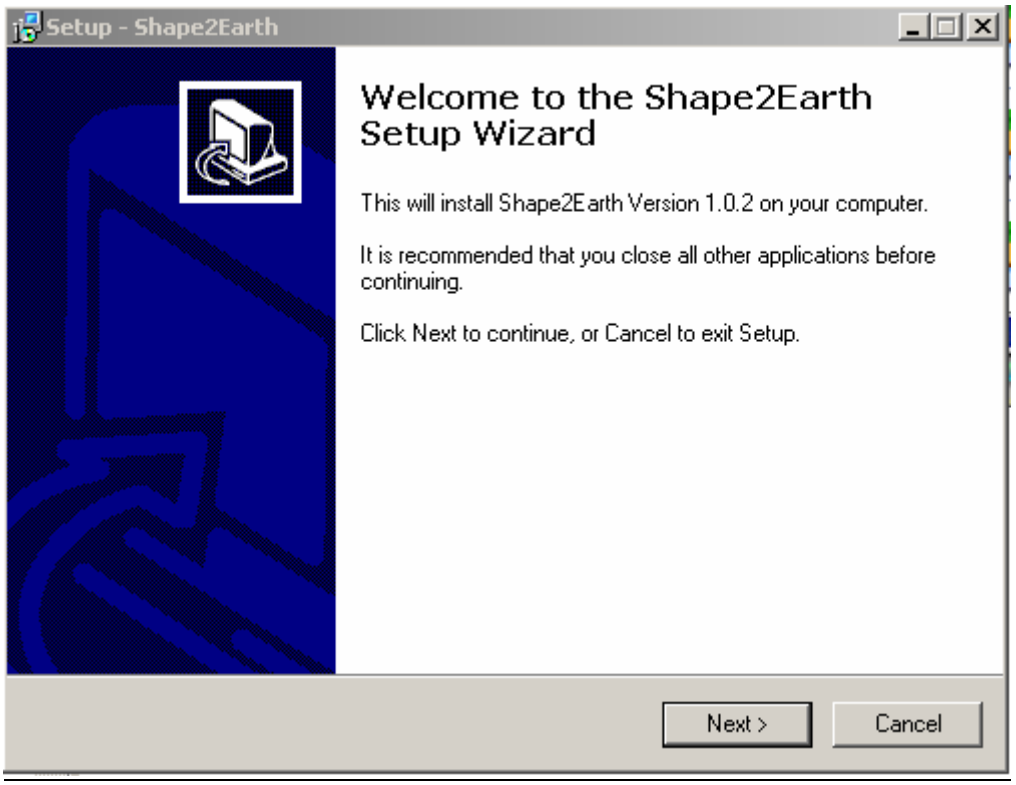


Figure 16.3

16.8.2.09 Click [***Next***]

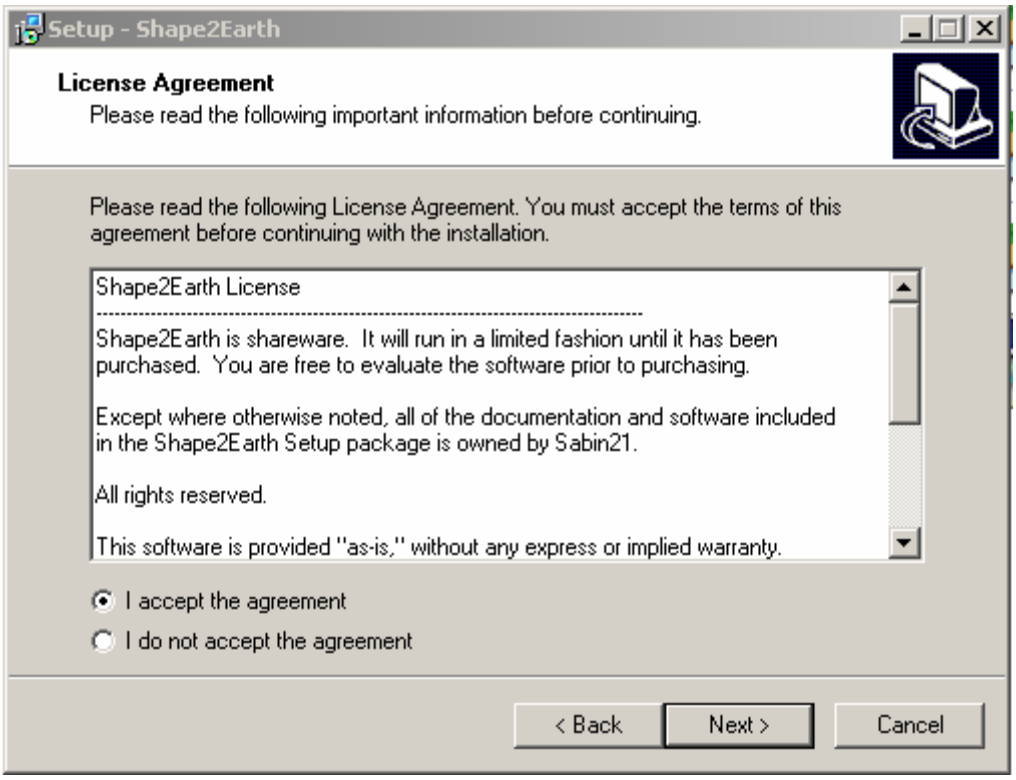


Figure 16.4

16.8.2.10 Agree to the License and click [***Next***]

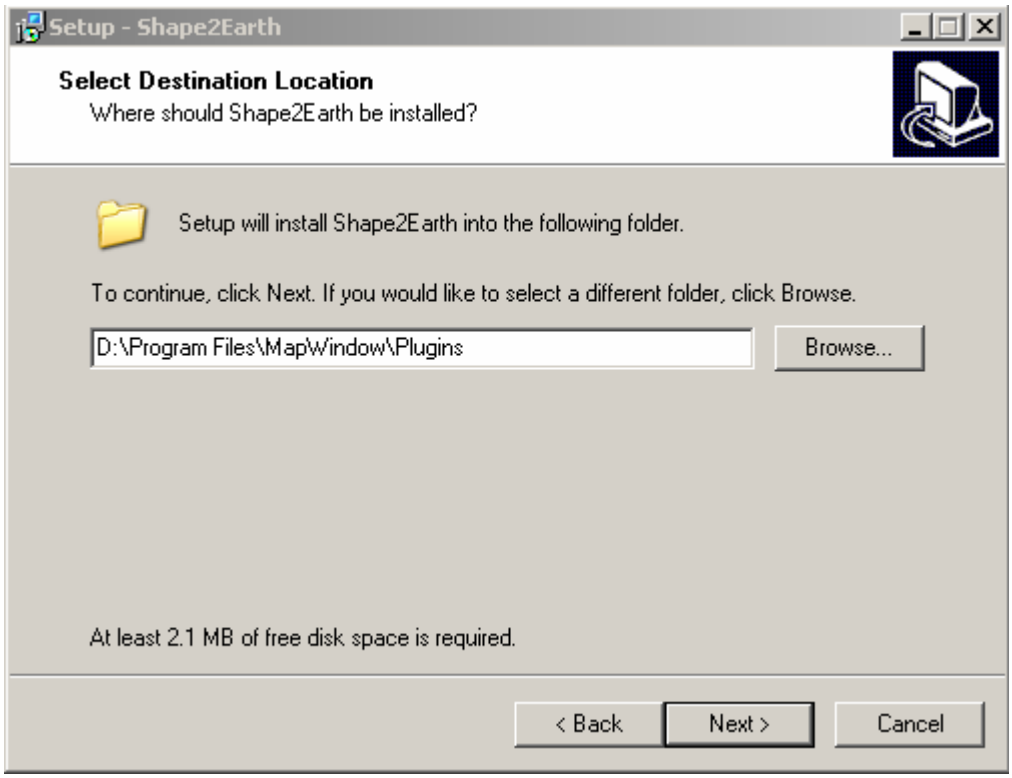


Figure 16.5

16.8.2.11 Set the installation directory and click [***Next***]

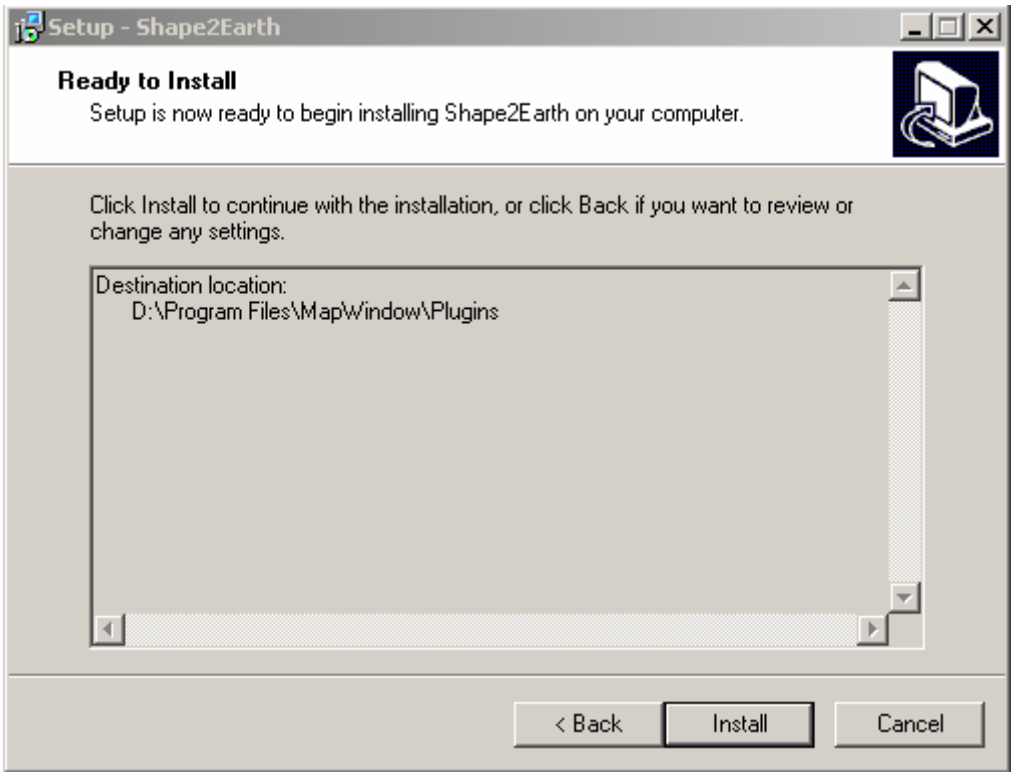


Figure 16.6

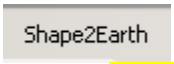
16.8.2.12 Click [***Install***]

16.8.2.13 Restart the ***MapWindow*** Program

16.8.2.14 Click on the [***Plug-in***] button on the main menu.

16.8.2.15 Select [***Shape2Earth***].

16.8.2.16 A new tool drop-down menu will appear on the main toolbar



- [E***xport to KML***]
- [***Get Image from GE***]
- [***About***]

16.8.3 Usage of Shape2Earth

16.8.3.01 Select the layer to be sent to ***Google Earth***

16.8.3.02 Click on [***Shape2Earth***]

16.8.3.03 Click on [***Export to KML***]

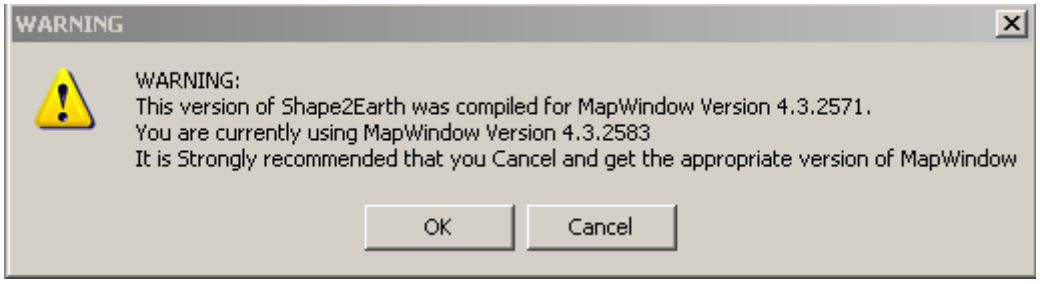


Figure 16.7

16.8.3.04 Click [***OK***]

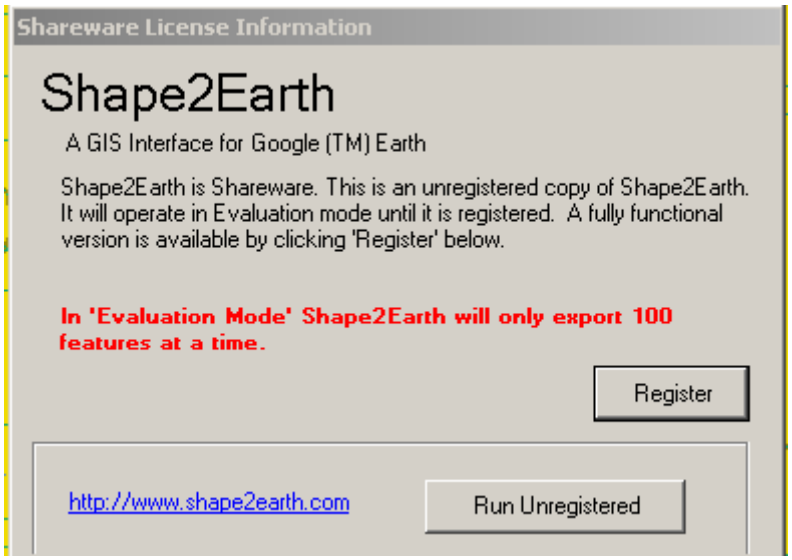


Figure 16.8

16.8.3.05 Click [***Run Unregistered***]

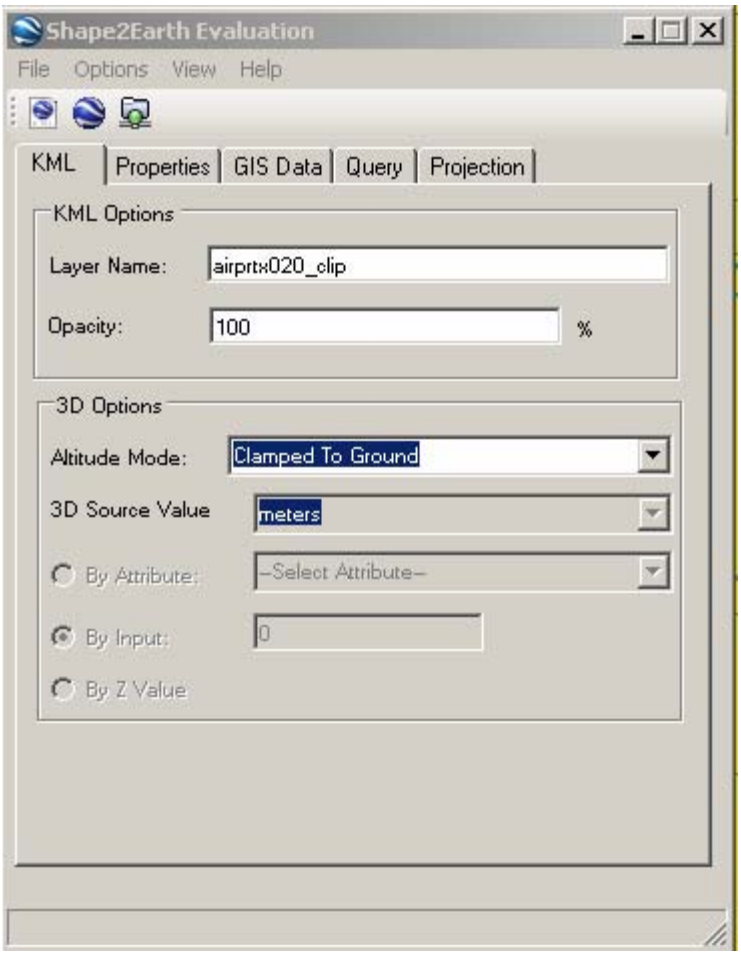


Figure 16.9

16.8.3.06 Set Opacity and 3D Options

16.8.3.07 Click on [***Properties***]

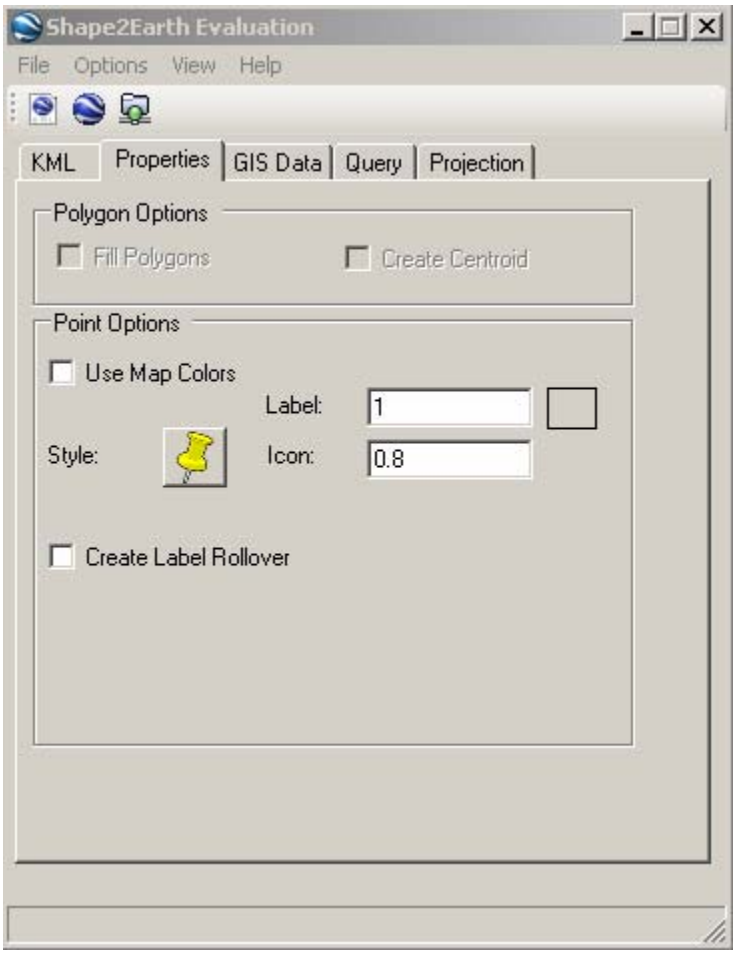


Figure 16.10

16.8.3.08 Set options for the shapefile and then click the [***Style***] button

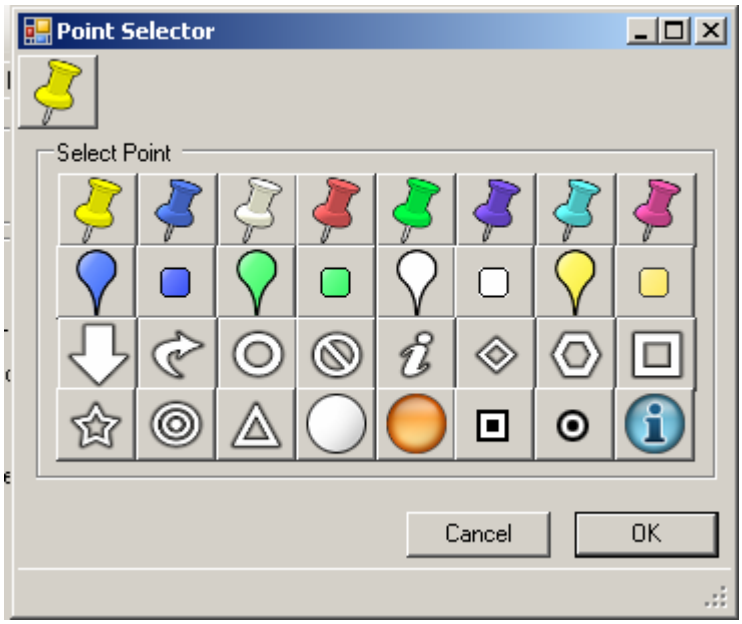


Figure 16.11

16.8.3.09 Select the symbol desired and then click on [***OK***]

16.8.3.10 Click on [***GIS Data***]

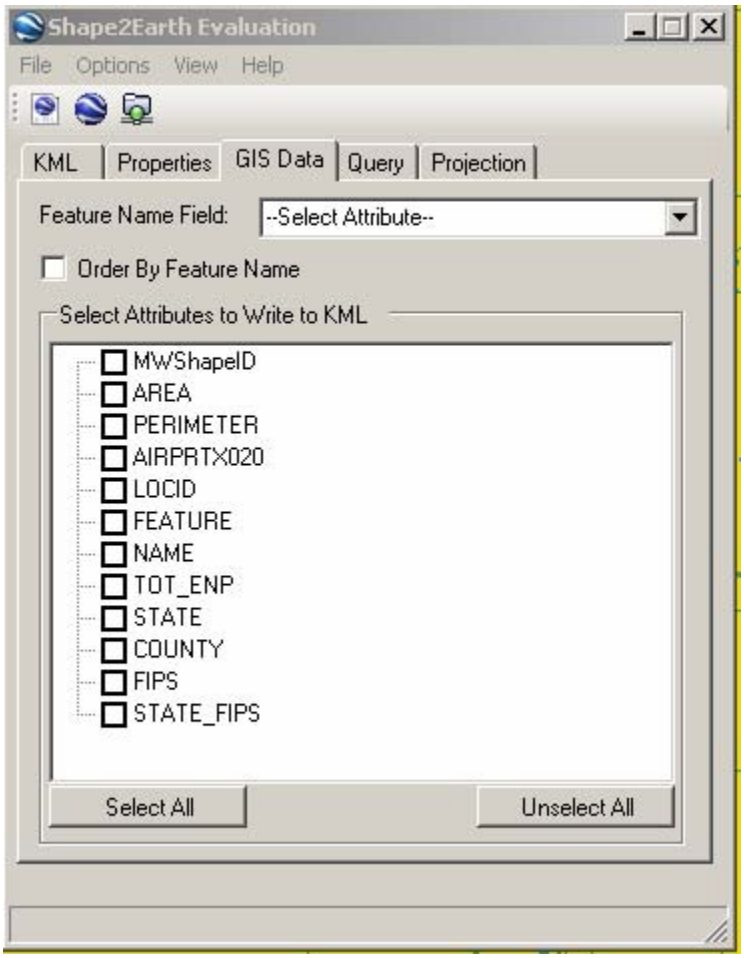


Figure 16.12

16.8.3.11 Select the attribute information to be included in the KML Layer

16.8.3.12 Click on [***Query***]

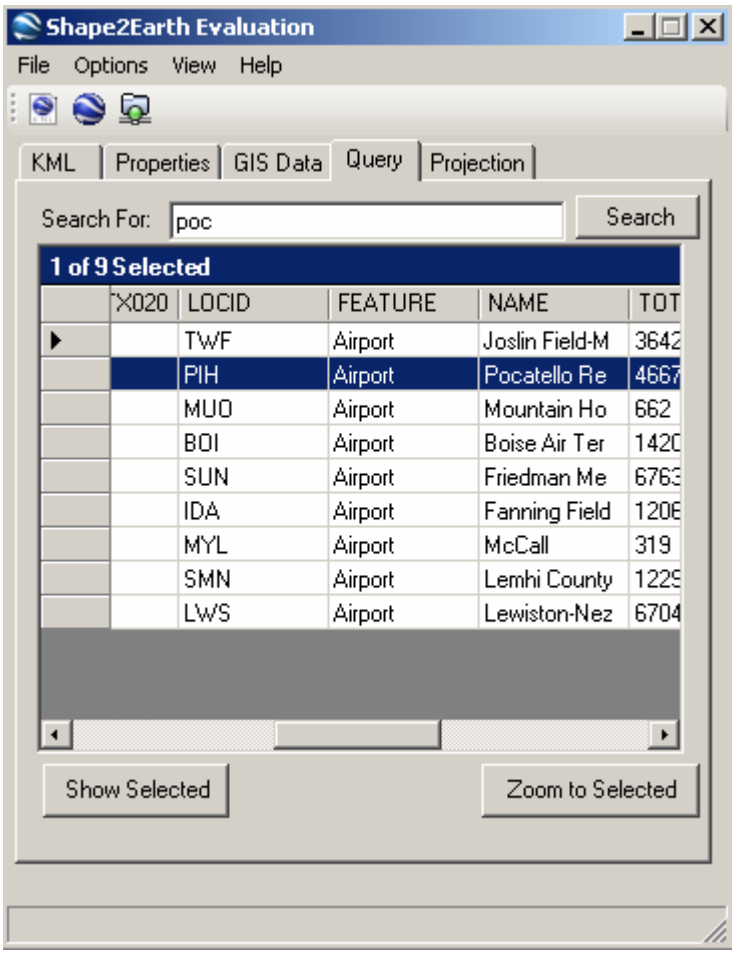


Figure 16.13

16.8.3.13 Use the query tool to define a subset of features if desired

16.8.3.14 Click on [***Projection***]

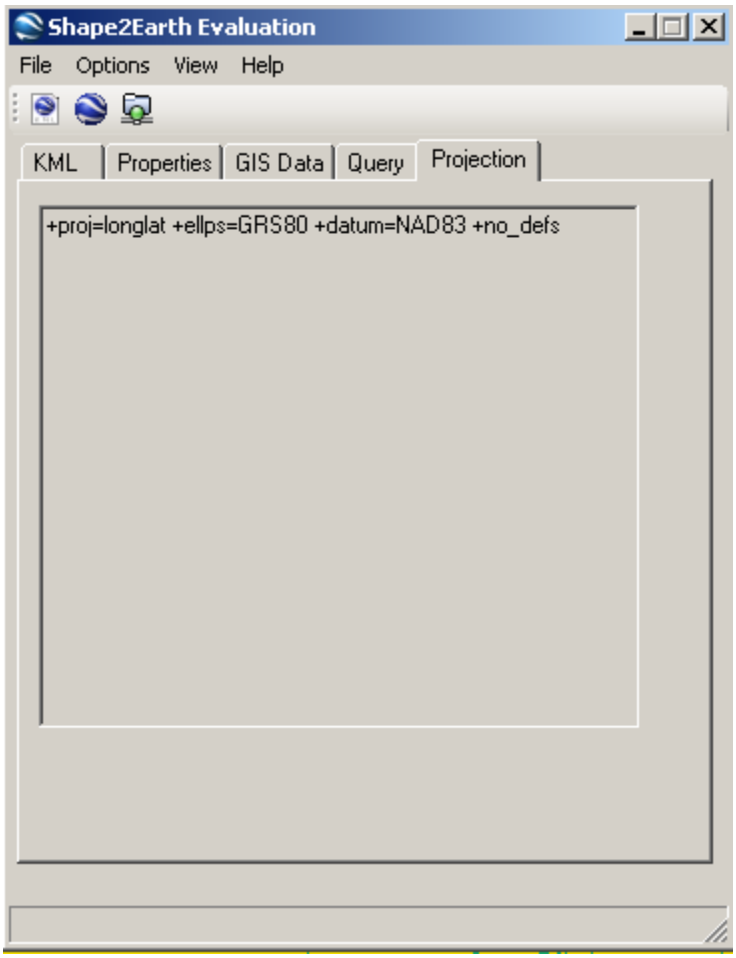


Figure 16.14

16.8.3.15 This indicates the projection of the data being sent to ***Google Earth***

16.8.3.16 Click on [***Save as KML***] or [***Load in GE***]

16.8.3.17 Click on [***Shape2Earth***]

16.8.3.18 Click on [***Get Image from GE***]

16.8.3.19 ***Google Earth*** and a second capture window will open.

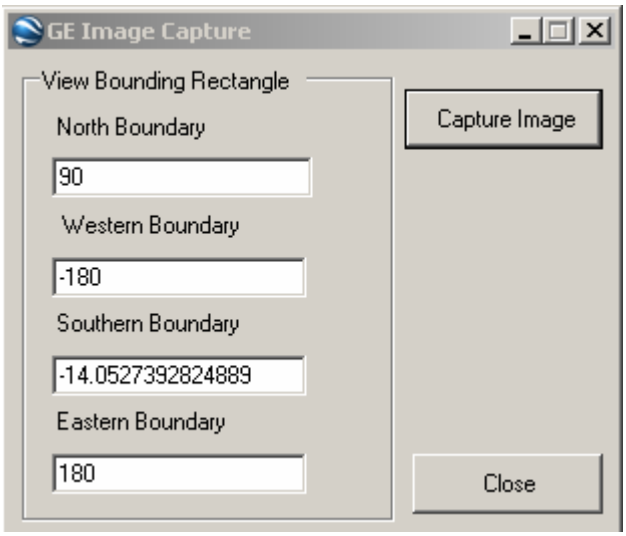


Figure 16.15

16.8.3.20 In ***Google Earth,*** zoom in to the picture to be captured

16.8.3.21 Click on [***Capture Image***] on GE Image Capture Window

16.8.3.22 The program will ask to set the Google Earth View, click [***Yes***]

16.8.3.23 Click on [***Capture Image***] on GE Image Capture Window

16.8.3.24 The program will ask where to save the image file, give the file a name and click [***Save***].

16.8.3.25 Click [*Close*] in GE Image Capture Window

16.8.3.26 Add the new image using the  - Add Map Layer Function

16.9 DXF to Shapefile Converter under development

16.9.1 General Information about DXF to Shapefile Converter

16.9.2 Setup for DXF to Shapefile Converter

16.9.3 Usage of DXF to Shapefile Converter

16.10 AutoCAD Layer Exporter under development

16.10.1 General Information about AutoCAD Layer Exporter

16.10.2 Setup for AutoCAD Layer Exporter

16.10.3 Usage of AutoCAD Layer Exporter

16.11 UMN MapServer Exporter under development

16.11.1 General Information about UMN MapServer Exporter

16.11.2 Setup for UMN MapServer Exporter

16.11.3 Usage of UMN MapServer Exporter

16.12 Online Data Plug-in

16.12.1 General Information about Online Data Plug-in

16.12.1.01 The MapWindow Online Data Plug-in is an open-source plug-in intended to allow easy access to online data sources, provided by ArcIMS or OGC-compliant web servers.

16.12.1.02 the MapWindow Online Data Plug-in will be visible from the MapWindow plug-ins menu. The tool may then be used to access any WFS, WMS, or ArcXML data source. Example data sources are provided in the server drop-down list inside of the tool.

16.12.2 Setup for Online Data Plug-in

16.12.2.01 Open web browser and go to http://www.mapwindow.com/

16.12.2.02 Click on [***Download Now***]

16.12.2.03 Scroll down page and Click on [***Online Data Plug-in***]

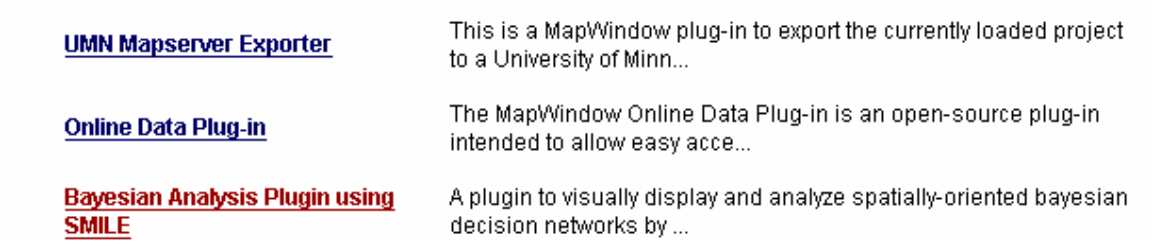


Figure 16.16

16.12.2.04 Click on [***MWODPBinariesLatest.zip***]

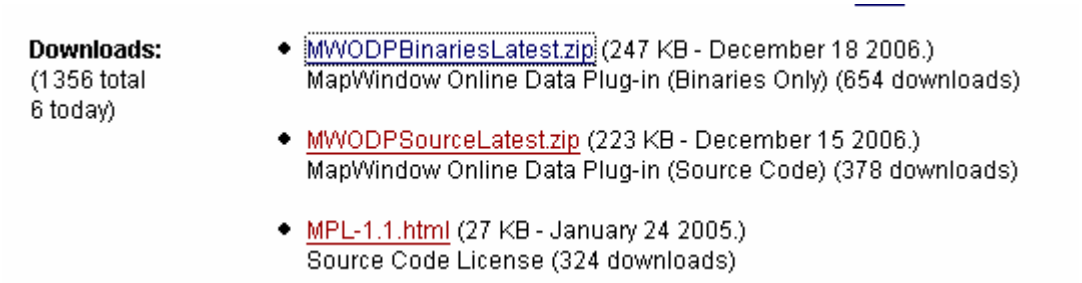


Figure 16.17

16.12.2.05 Save to the plugins directory (i.e. D:\Program Files\MapWindow\Plugins)

16.12.2.06 Unzip the file

16.12.2.07 Click on the [***Plug-in***] button on the main menu.

16.12.2.08 Select [***Online Data Plug-in***].

16.12.2.09 A new tool drop-down menu will appear on the main toolbar

- [***Browse Catalog***]
- [***Add Online Layer***]
- ---
- [***Show or Hide Online Layer Status***]
- [***Settings and Preferences***]
- ---
- [***Check for updates***]
- [***About Online Data Plug-in***]

16.12.3 Usage of Online Data Plug-in

16.12.3.01 Click on [***Online Data***]

16.12.3.02 Click on [***Browse Catalog***]

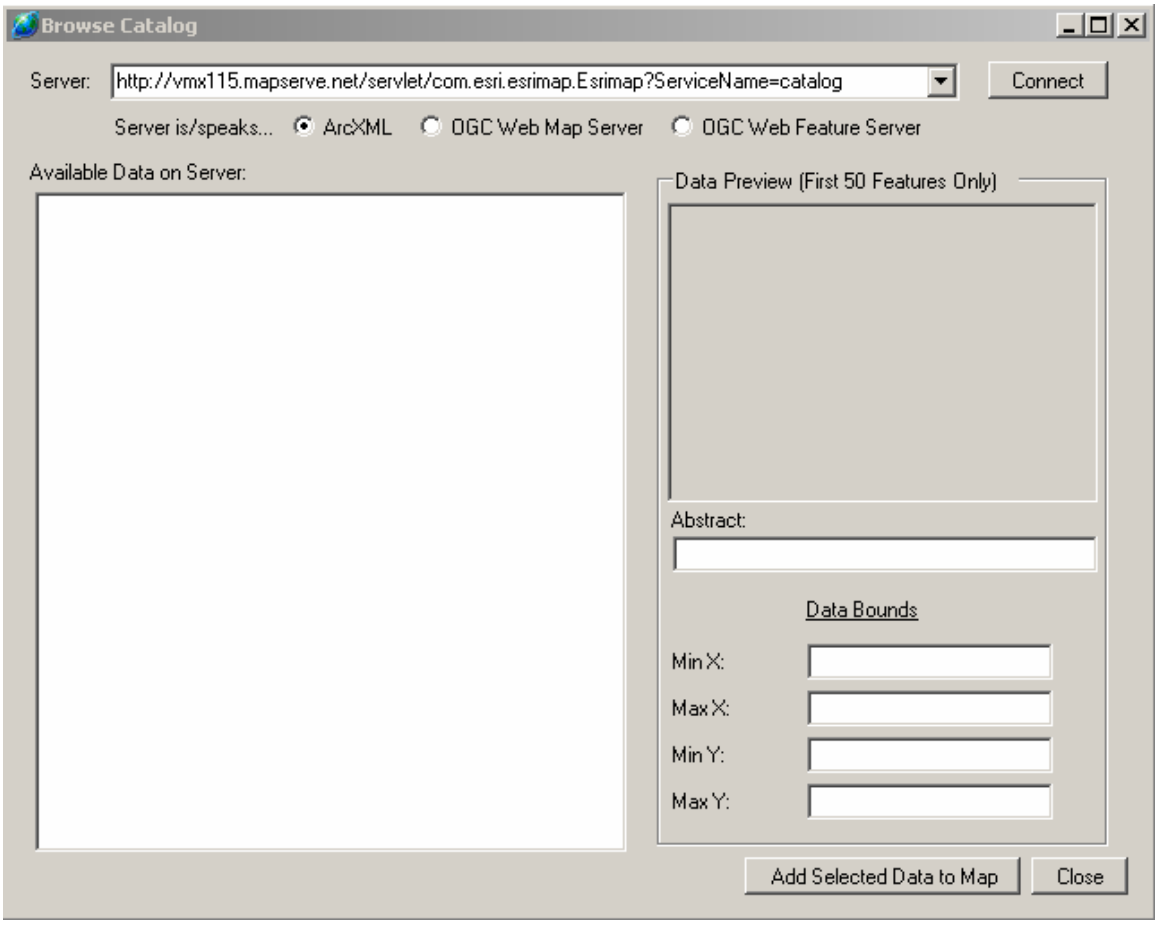


Figure 16.18

16.12.3.03 Click on [***Connect***]

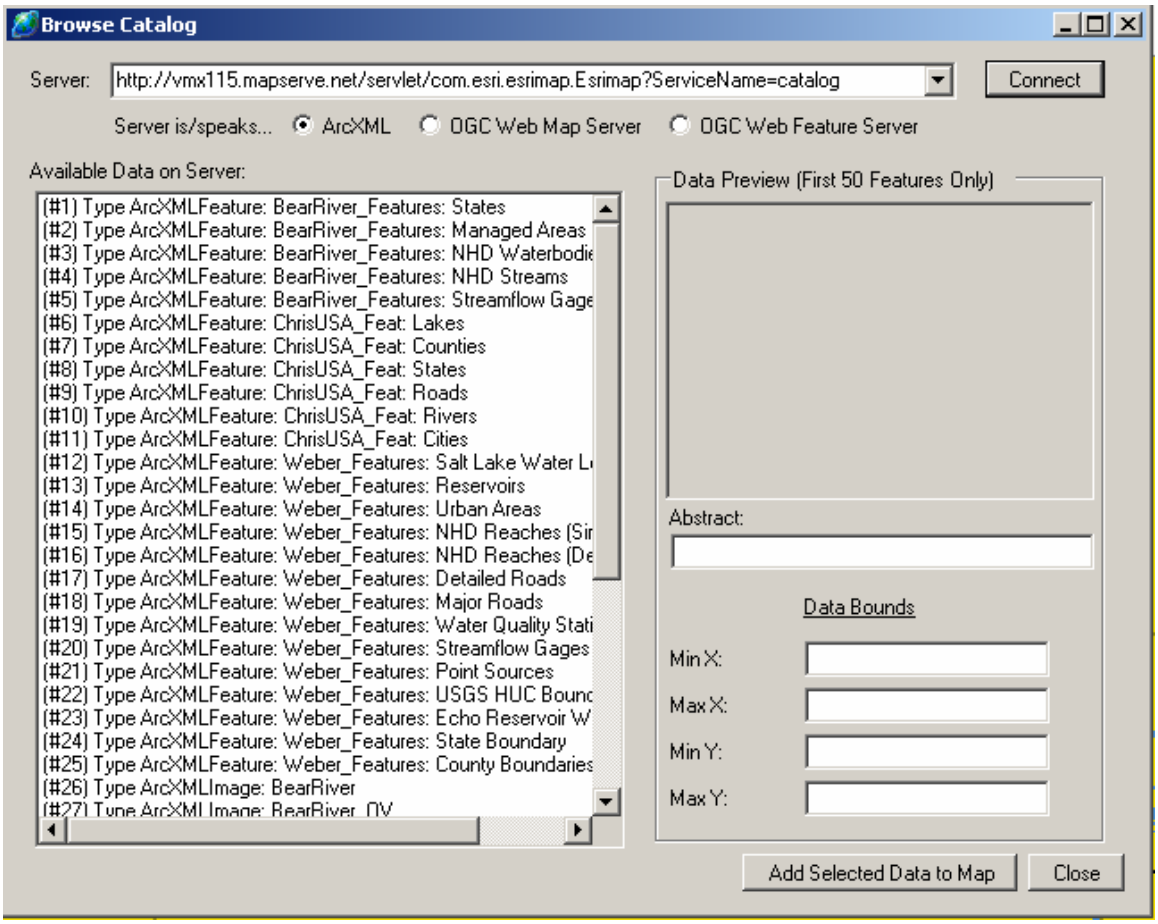


Figure 16.19

16.12.3.04 Select layer to be added and click [***Add Selected Data to Map***]

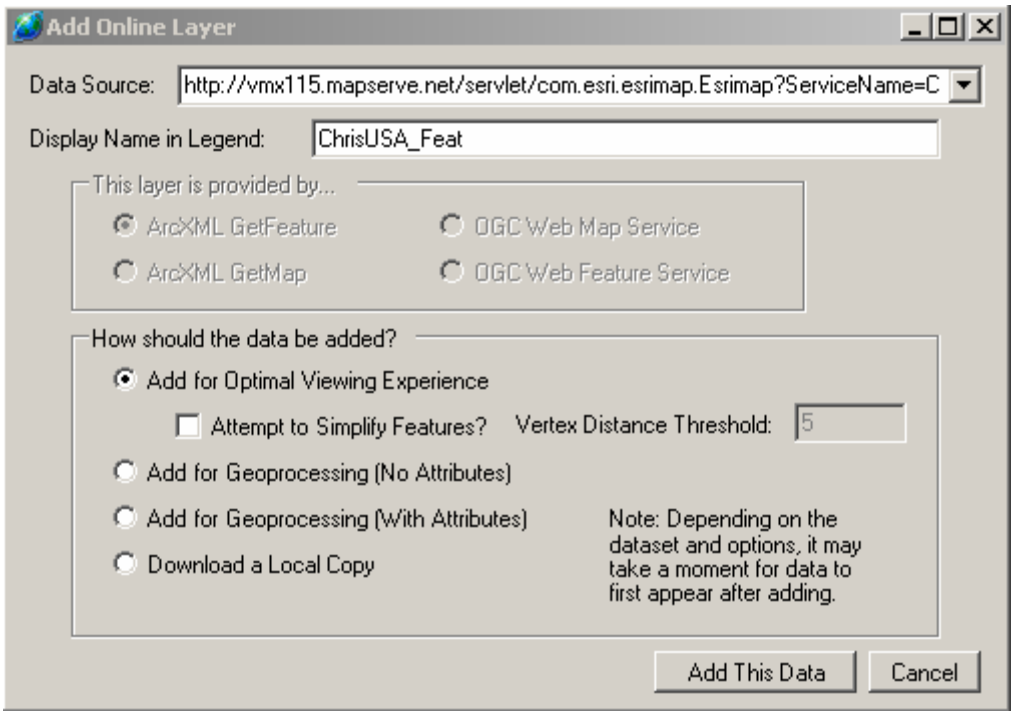


Figure 16.20

16.12.3.05 Select how the data should be added and then click [***Add This Data***]

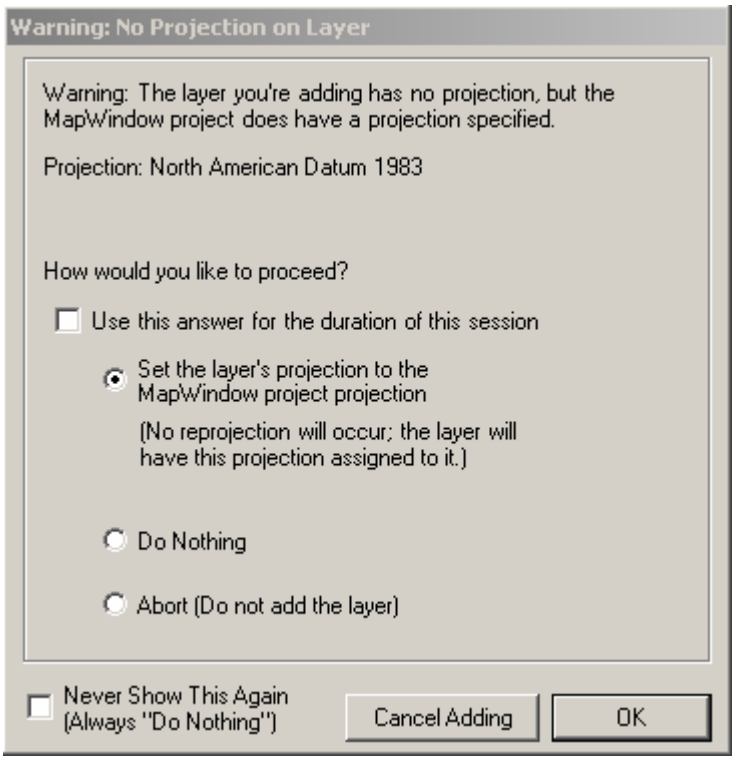


Figure 16.21

16.12.3.06 If there is no projection information, the program will ask the user to set the projection for each feature. So make the projection tool selection, click [***OK***]

16.12.3.07 Click on [***Online Data***]

16.12.3.08 Click on [***Add Online Layer***]

16.12.3.09 Other WMS and WFS Servers can be added to the Browse catalog function.

16.13 Bayesian Analysis Plug-in using SMILE under development

16.13.1 General Information about Bayesian Analysis Plug-in using SMILE

16.13.2 Setup for Bayesian Analysis Plug-in using SMILE

16.13.3 Usage of Bayesian Analysis Plug-in using SMILE

16.14 MapServer Project Generator under development

16.14.1 General Information about MapServer Project Generator

16.14.2 Setup for MapServer Project Generator

16.14.3 Usage of MapServer Project Generator

Chapter 17 Stand Alone Utilities

17.1 Stand Alone Utilities

17.1.1 General Information about Stand Alone Utilities

17.1.1.01 Stand Alone Utilities

- **WayPoint+ to Shapefile Converter** - This is a standalone program to convert WayPoint+ text format files to ESRI Shapefile format files. The program will optionally reproject the data from lat/long during conversion.

- **Georeferencing Tool** - his is a standalone tool to allow a user to georeference an image or raster data file by clicking three points on the image and providing the real-world coordinates for those points. The image can optionally be rectified such that north is straight up. The appropriate world file will then be written

- **MonoComp** - Update: **26March-2006:** MonoComp initially was concieved for analysing image profiles by Variance-CoVariance Analysis methods and as tool to measure image coordinates (pixel positions). The latter could be use in conjuction with a coordinate transformation program, like Trans.EXE, to transform image positions into either photo positions (photogrammetry) or world system positions (GIS). By now it has grown into a tool for georeferencing areial photos and for digitising photo content into GIS shapfiles and much more. **10-Jan-2006:** Added real time GPS data collection, improved layer handling, corrected some bugs. **22-February-2006:** Fixed one more seriuos bug; added attribute table editing. However, a word of warning: MonoComp is work in progress and most likely has plenty of bugs. The current version can digitise point features, (10-January-2006:) polyline and polygon features and their 3D Z-Versions also. Watch this page from time to time for updates.

List of Questions for Lesson #04

 ***QUESTION #11*** ***** *Do any of the buffers overlap or intersect another buffer?*

 ***QUESTION #12*** ***** *What is the area of the buffer around MYL?*

 ***QUESTION #13*** ***** *What is the area of the buffer around MUO/BOI?*

 ***QUESTION #14*** ***** *What is the area of the buffer around MYL?*

 ***QUESTION #15*** ***** *What is the area of the buffer around MUO/BOI?*

 ***QUESTION #16*** ***** *How many airports are in the new shapefile?*

END OF LESSON #04
##

##

Begin Lesson #05

Chapter 18 Extra Features

18.1 Map Overview

18.1.1 General Information for Map Overview

18.1.1.01 The map overview area provides a full extent view of layers added to it. Within the view is a red rectangle showing the current map extent. This allows the user to quickly determine which area of the map the user are currently viewing. Note that labels are not rendered to the map overview even if the layers in the map overview have been set up for labeling.

18.1.1.02 The map overview appears in the lower left corner:

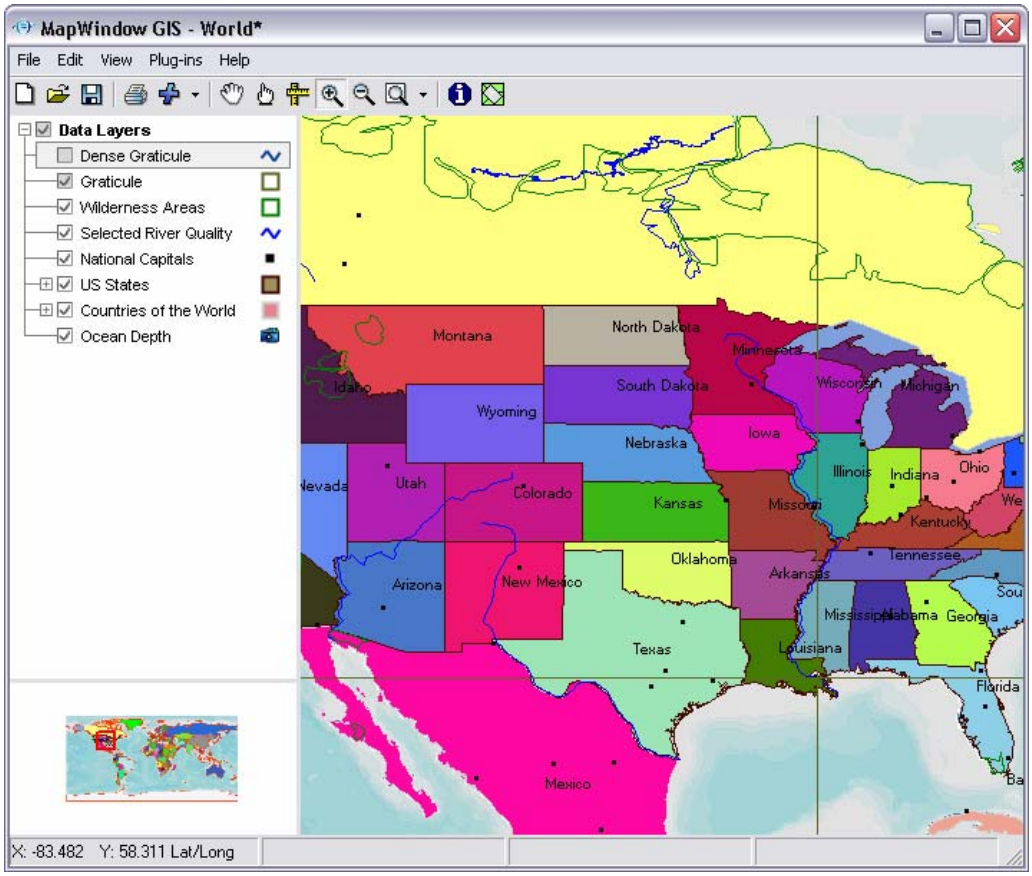


Figure 18.1

18.1.2 Setup for Using the Map Overview

18.1.2.01 Not Applicable

18.1.3 Usage of Map Overview

18.1.3.01 The map overview may be updated at any time by right-clicking the overview map and choosing [***Update using current extent***], or by choosing the [***Edit***] menu, then [***Preview Map***], then [***Update using current extent***]. When the user update the map, the image in the locator window will be built using the layers and symbology currently displayed in the main map. Be sure to turn off any layers which are extremely detailed, leaving only those layers important for orienting the user.

18.1.3.02 If the user don't want to use the overview map, the user may right-click the overview map and choose [***Clear***], or choose the [***Edit***] menu, then [***Preview Map***], then [***Clear***]. This will clear out the current preview map.

Chapter 19 Customization and Programming

19.1 Plug-in Creation

19.1.1 General Information about Plug-in Creation

19.1.1.01 ***MapWindow*** allows users to create plug-ins, which are individual extensions that may be loaded into the software. These are similar in spirit to ArcGIS Extensions or VBA Scripts. A plug-in may be developed in Microsoft Visual Studio using the .NET framework. Plug-ins may operate on the map and map data, allowing a user to create custom tools to perform specialized functions. Often users wish to distribute ***MapWindow*** as a viewing platform for GIS data, including a custom-built plug-in to perform additional analysis or perform specialized database queries.

19.1.1.02 ***MapWindow*** has a very simple plug-in system, making it very easy to learn and use. Unlike other GIS platforms where there are dozens of interfaces that must be implemented, ***MapWindow*** only has one interface which needs to be implemented. This is contained in the file *MapWinInterfaces.dll*, and the interface is called *MapWindow.Interfaces.IPlugin*.

19.1.1.03 ***MapWindow*** plug-ins should be built as a "Class Library" output, in other words, a .DLL file. Once the user has finished implementing the *IPlugin* interface, the resulting .DLL file should be copied into the ***MapWindow*** plugin directory. This is typically *c:\Program Files\MapWindow\Plugins*. If the user wishs, the user may create subdirectories inside this Plugins directory for organizational purposes.

19.1.1.04 While the *MapWindow.Interfaces.IPlugin* interface has many events and properties, only one is absolutely required – *Name*. This name is used by MapWindow to keep track of the userr plug-ins during program execution.

19.1.1.05 A simple example plug-in called *Document Launcher* is available from the MapWindow website at this link:

http://svn.MapWindow.org/svnroot/MapWindow40/DocLauncher/DocLauncher.vb

This plug-in will perform an action every time a shape is selected on the screen. The tool will check the shapefile's attribute table to see if a field called "FileOrURL" exists. If it does, the *Document Launcher* will launch that file or URL. For instance, if the field contained a link to a photo, then the photo would be displayed.

19.1.1.06 For help in developing custom plug-in tools, a number of resources are available:

Online Documentation for Plug-in Developers:
http://www.mapwindow.org/wiki/index.php?title=MapWindow_Developer%27s_Guide

Online Discussion Forum for Plug-in Development Questions:
http://www.mapwindow.org/phorum/list.php?2

19.2 Custom Application Development using MapWinGIS ActiveX

19.2.1 Information about Custom Application Development using MapWinGIS ActiveX

19.2.1.01 If the user wants to develop a standalone application that does not use MapWindow, the user may make use of the *MapWinGIS ActiveX Control* to instantly add mapping and GIS capability to any application developed in an ActiveX-capable language. ActiveX is supported by most programming languages. Some examples include Microsoft Visual Basic 6, Visual Basic .NET, Visual C++, Visual C#, Visual J#, Borland Delphi, and many others. Even Microsoft Access supports the use of ActiveX controls!

19.2.2 Setup for Custom Application Development using MapWinGIS ActiveX

19.2.2.01 Not Applicable

19.2.3 Usage of Custom Application Development using MapWinGIS ActiveX

19.2.3.01 The *MapWinGIS ActiveX Control* is actually used within ***MapWindow*** itself – it is the "white box" area of the ***MapWindow*** application, where map data appears.

19.2.3.02 Once the user adds the *MapWinGIS ActiveX Control* to the user's project, the user will see the same white box. The user can then write code to add data to the map and manipulate it, or tie the control to other elements inside the user's application to allow the user to control the map.

19.2.3.03 The *MapWinGIS ActiveX Control* was designed with simplicity in mind. Common tasks are extremely simple to perform; even complex functionality is easy to create. Regardless of the user's level of experience, from beginner to expert, the user will likely find the ActiveX control to be a pleasant and easy-to-learn tool.

19.2.3.04 A complete sample application has been written in a variety of languages to demonstrate the use of the *MapWinGIS ActiveX Control*:

Microsoft Visual Basic 6.0:
http://www.mapwindow.org/samples/SimpleMap-VB6.zip

Microsoft Visual C++ 2003:
http://www.mapwindow.org/samples/SimpleMap-C++.zip

Borland Delphi: *http://www.mapwindow.org/samples/delphi_sample_bailey.zip*

Microsoft Access 2000:
http://www.mapwindow.org/download/MapWindowInAccess2000.mdb

19.2.3.05 For help in developing applications using the *MapWinGIS ActiveX Control*, there are a number of resources available:

Online Documentation for MapWinGIS:
http://www.mapwindow.org/wiki/index.php?title=MapWinGIS_Developer%27s_Guide

Online Discussion Forum for ActiveX Control Development:
http://www.mapwindow.org/phorum/list.php?3

Chapter 20 Hard Copy / Exporting

20.1 Printing a Hard Copy

20.1.1 General Information about Printing

20.1.1.01 Presently, the printing functionality in MapWindow is not very extensive. It is, however, under very active development and we expect a much-improved printing interface soon.

20.1.2 Setup for Printing:

20.1.2.01 Not Applicable

20.1.3 Printing

20.1.3.01 .In order to print the current map view, select the [***File***] menu

20.1.3.02 Select [***Print***]. The user will be presented with a dialog (shown below) which allows the user to select what map elements the user would like displayed.

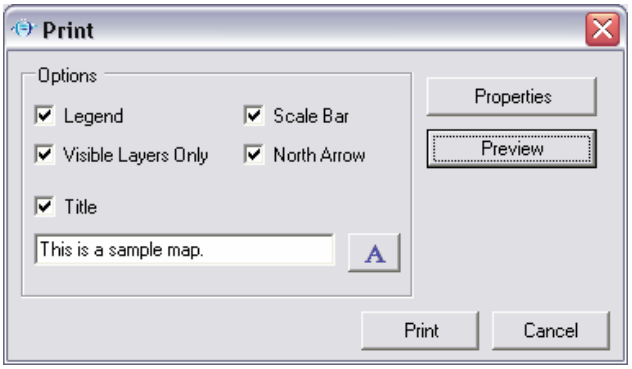


Figure 20.1

20.1.3.03 Select [***Properties***] ands set up the user's windows printer. Press [***OK***]

20.1.3.04 Select [***Print Preview***] to check for changes.

20.1.3.05 Select [***Print***].

20.2 Exporting

20.2.1 General Information about Exporting:

20.2.1.01 The user may export a map image as a bitmap (.BMP) or graphic interchange file (.GIF)

20.2.2 Setup for Exporting

20.2.2.01 Not Applicable

20.2.3 Usage of Exporting:

20.2.3.01 To do this, select the [***Edit***] menu

20.2.3.02 Select [***Export***]

20.2.3.03 Select [***Map***]. The user will be presented with a dialog asking where the user would like to save the file. This option is suitable for including map imagery in word processing documents among other uses.

20.2.3.04 Specify where the user want to save the map and also the file extension (.jpg, .bmp or .gif), then click [***OK***]

ISSUE #05 ******The hard copy export as a .gif file changes the coloring of the map. Other formats do not do this.*

NOTE 10******If the user wish to export a map image including a file that specifies the geographic location, choose the "Export a Geo-Referenced Map Image" option instead of "Export Map Image".*

20.2.3.05 The user may also export a geo-referenced map image. This means that a file will be written along with the image file which specifies the geographic location of the image. This is desirable if the user wish to load the map image into any GIS software.

20.2.3.06 The user may export a scale bar by selecting the [***Edit***] menu, then [***Export***], then [***Scale Bar***]. This will prompt the user for a location to save the resulting image file. This file could then be used in word processing or publishing software.

20.2.3.07 Lastly, the user may export a north arrow by choosing the [***Edit***] menu, then [***Export***], then [***North Arrow***]. This also will prompt the user for a location to save the image.

Chapter 21 Support and Help

21.1 Support

21.1.1 General Information about Support

21.1.1.01 ***MapWindow*** is under very active development, and there is a very large user base to draw upon for questions and experience. Depending upon what kind of help or support the user is looking for, there's a different place to go.

21.1.1.02 If the user have found a problem and wish to report it, or if the user want to request an enhancement or new feature, visit the bug tracking system called BugZilla, located at: *http://bugs.MapWindow.org*

21.1.1.03 There are several different discussion forums available, including one specifically for users of the ***MapWindow*** Application, one for development of plug-ins, one for ActiveX programming, a forum in Spanish, and a forum for those actively working on the development of MapWindow.

All of these forums may be reached at: *http://www.MapWindow.org/phorum*

21.1.1.04 Also available is an online WIKI, or community-editable database of pages, providing documentation on ***MapWindow***. The online documentation is geared toward the developers using ***MapWindow*** for plug-ins and applications using the ActiveX control, but help is also available for some plug-ins such as GIS Tools, as well as ***MapWindow*** itself.

END OF LESSON #05

##

TASK #31******If you are taking this course and not monitoring it, and have been submitting the assignments , please send an email saying that you have completed the tutorial*

Appendix A

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