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Notes and Remarks

Notes: In this publication, the following symbols will be used:

\[NEW\] a button activated by clicking on it

‘(Project)’ a checkbox activated by putting a check in the box by clicking on the box

‘(Username)’ a text-box name where the user enters data by typing it in

[http://www.temp.com](http://www.temp.com) a website

‘[install]’ Popup Window

1.0 Chapter Bold

1.1 Section Bold

1.1.1 Subsection Bold

1.1.1.01 Sub-subsection *Italic*
Lesson #01

Chapter 1  Introduction

1.1 General Information
1.1.1 Introduction

1.1.1.01 MapWindow GIS software is a free open-source package that is quite extensible and has numerous applicable uses:

- A desktop GIS
- A toolset to develop and share datasets with other users
- A development kit for geospatial analysis and display plug-ins and extensions. An extension is a tailor built application that resides in a software package and is designed to increase or enhance the capabilities of the basic package. This increased functionality is usually requested by a group of users. A plug-in, on the other hand, can be loaded at anytime using the “Plug-in Manager” and does not change the functionality of the main program. Numerous plug-ins can be loaded and useable at any given time. A Plug-in can only add functionality and not modify existing functionality.
1.1.1.02 Features

- As an open-source tool, *MapWindow GIS* 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 GIS* 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 GIS* 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 GIS* 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 GIS

2.1.1  General Information for MapWindow GIS

2.1.1.01  MapWindow GIS 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 GIS 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  MapWindow GIS 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.

2.1.1.03  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 GIS 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.

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

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

  o Core Components: These are the components which operate underneath MapWindow GIS

  o The three main components are MapWinGIS, MapWinInterfaces, and MapWinGeoProc. The MapWindow application includes the GUI, MapWindow GIS Interfaces DLL {According to the Wikipedia, the free encyclopedia: Dynamic-link library (also written without the hyphen), or DLL, is Microsoft's implementation of the shared library concept in the Microsoft Windows operating systems. These libraries usually have the file extension DLL, OCX (for libraries containing ActiveX controls), or DRV (for
legacy system drivers}} (which includes the legend component), *MapWindow GIS* ActiveX control. According to the Wikipedia, the free encyclopedia: **ActiveX control** is a term used to denote **reusable software components** that are based on Microsoft **Component Object Model** (COM). ActiveX controls provide encapsulated reusable functionality to programs and they are typically but not always visual in nature.}, 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 Subversion (SVN) code repository* [http://www.mapwindow.org/svn.php](http://www.mapwindow.org/svn.php)

- **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 GIS* 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 GIS* application. While *MapWindow GIS* is mainly a data viewing tool, the real power of *MapWindow GIS* comes in the form of plug-ins.
  - The *MapWindow GIS* installer includes plug-ins for hyper-linking 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 GIS* website and are under development by the *MapWindow GIS* team as well as by third parties for various custom applications.

### 2.1.2 Getting and Setting up MapWindow
GIS

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] link as seen in Figure 2.1:

Figure 2 - 1 - Website

2.1.2.03 Click on the [MAPWINDOW GIS APPLICATION] menu item

Figure 2 - 2 - GIS Application

2.1.2.04 Click on the [MAPWINDOW44RC.EXE] menu item. (Higher version numbers may be available, for instance “MAPWINDOW45SR.EXE”. Click on the highest available version number.)
2.1.2.05 The user should see one of the two windows below, depending on the user’s web browser.

2.1.2.06 Click [SAVE] or [OK]

2.1.2.07 Navigate to the download directory and click on [SAVE]
2.1.2.08 When the software is finished downloading, navigate to the download directory and click on ‘MapWindow44SR.exe’

![Select Setup Language](image)

**Figure 2 - 6 – Select Setup Language**

2.1.2.09 The program will ask what setup language to use, select “English” and click [OK]
2.1.2.08 On ‘[SETUP – MAPWINDOW GIS]’, click [NEXT]

2.1.2.09 Click on ‘(I Accept the agreement)’ and then click [NEXT]
2.1.2.10 On '{SELECT DESTINATION LOCATION}', set folder and click [NEXT]
Figure 2 - 9 - Select Components

2.1.2.11 On ‘[SELECT COMPONENT]’, select components then click [NEXT]
2.1.2.12 On ‘[READY TO INSTALL]’, click [INSTALL].
2.1.2.13 On ‘COMPLETING THE MAPWINDOW GIS SETUP WIZARD’, click **FINISH**.

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

![Figure 2 - 11 - Completing Setup Wizard](image)

**Figure 2 - 11 - Completing Setup Wizard**

2.2 7-Zip (Optional)

2.2.0.01 Most data stored on servers on the web are
in a compressed format in order to reduce the storage requirement and the download time.

2.2.0.02 In order to access data that is in a compressed format (Zip, Tar, or GZ), the user must be able to uncompress the data, in this book, 7-Zip was used as it is free open source.

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 plug-in).

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”
Figure 2 - 13 - 7-Zip Website

2.2.2.03 When the screen changes to

Figure 2 - 14 – 7-Zip Security Warning

2.2.2.04 On ‘{ FILE DOWNLOAD - SECURITY WARNING}', click on [SAVE]
2.2.2.05 On ‘{CHOOSE INSTALL LOCATION}’, navigate to the directory where the 7-Zip file is to be installed and click [INSTALL].

2.2.2.06 Click [FINISH].

2.3 PostgreSQL

(Optional as connection between POSTGIS and MapWindow GIS has several issues which should be resolved by next version)

2.3.1 General Information for PostgreSQL software:
2.3.1.01 The following information on PostgreSQL is taken from http://www.postgresql.org

2.3.2 Getting and Installing PostgreSQL

2.3.1.01 Go to http://www.postgresql.org/

Figure 2 - 16 – Latest Release

2.3.1.02 Click on latest Release Binary

Figure 2 - 17 – FTP Browser

2.3.1.03 Click on ‘Win32’
2.3.1.04 Click on the “postgresql-8.2.4.1.zip” install package and download it to a temp directory.

2.3.1.05 Navigate to the temp directory and unzip the file

2.3.1.06 Double click on “postgresql-8.2.msi”

2.3.1.07 On ‘{WELCOME TO THE POSTGRESQL INSTALLTION WIZARD}', select the language and click [START]

Figure 2 - 18 – Welcome to Installation Wizard
2.3.1.08 On ‘{WELCOME TO THE POSTGRESQL INSTALLTION WIZARD}’, click [NEXT]
2.3.1.09 On ‘{INSTALLATION NOTES}’, read “PostgreSQL 8.2 Installation notes” and click [NEXT]
2.3.1.10 On ‘{INSTALLATION OPTIONS}’ Leave the default settings and click [NEXT]
2.3.1.11 ON ‘{SERVICE CONFIGURATION}’, enter passwords and click [NEXT]
Figure 2 - 23 – Initialize Database Cluster

2.3.1.12  On ‘[INITIALIZE DATABASE CLUSTER]’, enter passwords and click [NEXT]
2.3.1.13 On ‘{ENABLE PROCEDURAL LANGUAGES}’, use the defaults and click [NEXT]
2.3.1.14 On "{ENABLE CONTRIB MODULES}", leave the defaults and click [NEXT]
2.3.1.15 On ‘{READY TO INSTALL}’, click [NEXT]
Figure 2 - 27 - Installing...
2.3.1.16 ON ‘INSTALLATION COMPLETE’, Click [FINISH]

2.4 PostGIS

(Optional as connection between POSTGIS and MapWindow GIS has several issues which should be resolved by next version)

2.4.1 General Information for PostGIS:

2.4.1.01 The following information on PostGIS is taken from http://postgis.refractions.net/
2.4.2 Getting and Installing PostGIS

2.4.2.01 *Windows PostgreSQL* is required for *Windows PostGIS*. When installing the *PostgreSQL*, do not install the *PostGIS* included in the *PostgreSQL* installer.

2.4.2.02 Go to [http://postgis.refractions.net/download/windows/](http://postgis.refractions.net/download/windows/) and click on ‘PostGIS 1.2.1 release for PostgreSQL 8.2’

2.4.2.03 Save the file to a temp directory

2.4.2.04 Navigate to the temp directory and double click on the ‘PostGIS 1.2.1 release for PostgreSQL 8.2.exe’
2.4.2.05 On ‘{LICENSE AGREEMENT}’, Read the GNU General Public License and then click [I
\textcolor{red}{\textbf{AGREE}}]
On ‘{CHOOSE COMPONENTS}’, use the default choices and click [NEXT]
On '{CHOOSE INSTALL LOCATION}', Enter the Destination Folder and click [NEXT].
2.4.2.08 On ‘{DATABASE CONNECTION}’, enter the password for the connection and click [NEXT].
2.4.2.09 On ‘{DATABASE NAME}’, enter the database name and click [INSTALL].
Figure 2 - 34 - Installing
2.4.2.10 On ‘{INSTALLATION COMPLETE}’, click [CLOSE].
Chapter 3  Getting Data

3.1  To Obtain Data from National Atlas

3.1.1  General Information for Obtaining Data from National Atlas:

3.1.1.01  Most of the data used in this publication are taken from the U.S. National Atlas which contains free data for the United States.

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
Download the following shapefile layers from “Biology” and unzip them into the ‘Workspace’ folder:

- Invasive Species - Africanized Honey Bees (afrbeep020.tar.gz)
- Invasive Species – Zebra Mussel Distribution (zmusslx020.tar.gz)
- Ecoregions – Bailey (ecoregp075.tar.gz)
- Ecoregions – Omernik (ecoomrp075.tar.gz)
3.1.2.04 Download the following shapefile layers from “Boundaries” and unzip them into the ‘Workspace’ folder:
   - County Boundaries, 2001 (countyp020.tar.gz)
   - Federal Lands (fedlanp020.tar.gz)
   - State Boundaries (statesp020.tar.gz)
   - Indian Lands (indianp020.tar.gz)

3.1.2.05 Download the following shapefile layers from “Geology” and unzip them into the ‘Workspace’ folder:
   - Shaded Relief Land - Color - 1 Kilometer Resolution (shdrlfi020l.tar.gz)
   - Shaded Relief Land - Color - Conterminous United States 200 Meter Resolution (srld48i200l.tar.gz)
   - Coal Fields (coalfdp050.tar.gz)

3.1.2.06 Download the following shapefile layer from “Map Reference” and unzip them into the ‘Workspace’ folder:
   - Urban Areas (urbanap020.tar.gz)

3.1.2.07 Download the following shapefile layer from “People” and unzip them into the ‘Workspace’ folder:
   - Mortality, Various Causes (mortalp020.tar.gz)

3.1.2.08 Download the following shapefile layers from “Transportation” and unzip them into the ‘Workspace’ folder:
   - Airports (airprtx020.tar.gz)
   - Railroads (railrdl020.tar.gz)
3.1.2.09 Download the following shapefile layer from “Water” and unzip them into the ‘Workspace’ folder:
- Streams and Waterbodies (hydrogm020.tar.gz)
- Hydrological Units – Watersheds (huces00m020.tar.gz)
Chapter 4     Updating MapWindow GIS

4.1 Updating MapWindow GIS

4.1.1 General Information for Updating MapWindow GIS

![MapWindow GIS Update](image)

**Figure 4 - 1 - MapWindow GIS Update**

4.1.2 Setup for updating MapWindow GIS:
No Additional Setup Required

4.1.3 Updating MapWindow GIS

4.1.3.01 MapWindow GIS update can be acquired by
4.1.3.02  Click on [CHECK FOR UPDATES]. This function uses the internet to check for updates. If any updates are available, the user will 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  Projects are where all the work is stored. Work may be stored in several projects using the same data. The data is not stored within a project but rather linked to the project.

5.1.2  Setup for Creating a New Project:  No Additional Setup Required

5.1.3  Creating a new project

5.1.3.01  Double-click on the desktop icon

Figure 5 - 1 - MapWindow GIS Icon

5.1.3.02  The following screen should appear (if this is the user’s first time running MapWindow GIS).
Figure 5-2 – Welcome to *MapWindow GIS*

5.1.3.03 Click the **CLOSE** button and the following main window will appear.
5.2 Loading an Existing Project

5.2.1 General Information for Loading an Existing Project

5.2.1.01 This function will open an existing project

5.2.2 Setup for Loading an Existing Project:
No Additional Setup required

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]

5.3 Saving a Project

5.3.1 General Information for Saving a Project:

5.3.1.01 This will save the project for further use without the user having to redo the work.

5.3.2 Setup for Saving a Project: No Additional Setup Required

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.
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 Legend), the map view, and a preview map.

6.1.1.02 The map view is always open but the user can close and reopen the layers and preview map.

6.1.2   Setup for Addition Windows: No Additional Setup Required

6.1.3   Using Additional Windows

6.1.3.01 Click on [VIEW] on the “Main Menu” then [PANELS]

6.1.3.02 Uncheck the “(show legend)” and the Legend window will close

6.1.3.03 Uncheck the “(show preview map)” and the Preview Map will close

6.1.3.04 Click on [VIEW] on the “Main Menu” then [PANELS], then recheck either of the options, “(show legend)” or “(show preview map)” to return the windows to the default position, as
shown below.
Chapter 7  Rendering

7.1  Rendering

7.1.1  General Information about Rendering:

7.1.1.01  There is no way in this program to stop the rendering of layers once they started to load.

7.1.1.02  There is no way to change the default for rendering so that newly loaded layers are not rendered upon loading. The user must allow the layers to load and draw and then may uncheck the layers to make them invisible.

7.1.1.03  Chapter 11 explains how to customize rendering behavior so that layers become visible or invisible as the user zooms in or out.

7.1.1.04  Chapter 14 discusses a similar functionality when working with raster files.
Chapter 8  Projections

8.1  Projections

8.1.1  General Information about Projections

8.1.1.01  Some software packages are capable of reconciling the data of different coordinate systems. If this works, it saves the user the trouble of converting the coordinate systems of the data (and perhaps having multiple versions of the same dataset.) Effectively, the software converts one coordinate system to the other when needed or 'on-the-fly' (above taken from http://www.geog.ubc.ca/courses/geog376/notes/georeferencing/coordinates.html).

8.1.1.02  MapWindow GIS 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 GIS 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: No Additional Setup Required.

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 by clicking on \[FILE\] then \[SETTING\] on the “Main Menu”.

Figure 8 - 1 – Project Settings
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 GIS allows the user to assign a projection to a shapefile and thus create a .prj file.

8.2.2 Setup for Assigning Projections: No Additional Setup Required

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)” then click [OK]

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.

Figure 8 - 2 – Choose Projection

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

Figure 8 - 3 - Finished

8.2.3.05 Select the desired entries and press [OK]

8.2.3.06 Click [OK]
8.3 Reprojections

8.3.1 General Information about Reprojections

8.3.1.01 MapWindow GIS 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: No Additional Setup Required

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.
8.3.3.04 Select the desired entries and press [OK]

8.3.3.05 Click [OK]
8.3.3.06 Click [OK]

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 GIS 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: No Additional Setup Required

8.4.3  Usage of Custom Projections
8.4.3.01 Click on [FILE]

8.4.3.02 Click on [SETTING]

Figure 8 - 7 – Projection Settings - Default

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.

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

9.1.1.02   [FILE] drop-down menu
   • [NEW] - Create a new project
   • [OPEN PROJECT] - Opens an existing project file
   • [GEODATABASE]
     o [LOAD FEATURES]
     o [EXPORT DATA TO SHAPEFILES]
     o [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

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• [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] drop-down menu
• [COPY] - Places any of the following elements on the system clipboard.
  o [MAP]
  o [LEGEND]
  o [SCALE BAR]
  o [NORTH ARROW]
• [EXPORT] Exports any of the following elements to a graphic file.
  o [MAP]
  o [GEOREFERENCED MAP] - Exports a geo-referenced image from the current map view
  o [SCALE BAR]
  o [NORTH ARROW]

• [PREVIEW MAP]
  o [UPDATE USING FULL EXTENTS] - Updates or refreshes the Preview Map Pane
  o [UPDATE USING CURRENT VIEW]
  o [CLEAR] - Clears the Preview Map Pane
9.1.1.04  [VIEW] drop-down menu

- [ADD LAYER] - Adds a geospatial layer to the map.
- [REMOVE LAYER] - Removes the selected geospatial layer.
- [CLEAR LAYERS] - Clears all layers from the map.
- [CLEAR SELECTED SHAPES]
- [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.

- [ADD BOOKMARKED VIEW]
- [DELETE BOOKMARKED VIEW]
- [BOOKMARKED VIEW]
- [PANELS]
9.1.1.05 [PLUG-INS] drop-down menu

- [EDIT PLUG-INS]
- [SCRIPTS...]

9.1.1.06 [HELP]

- [MAPWINDOW DOCUMENTATION ONLINE] - During startup MapWindow GIS will check for an active internet connection and, if one is available, this menu will link to the MapWindow GIS web-based documentation. If not, it will link to local documentation.
- [MAPWINDOW DOCUMENTATION OFFLINE]
9.1.1.07 “Main Toolbar”

Figure 9 - 2 – Main Toolbar

- [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]
9.2 Additional Toolbars and Menus:

9.2.1 General Information about Additional Toolbars and Menus:

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

[ARCHIVE PROJECT TOOL] - Provides the ability to archive and restore MapWindow projects.

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

[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

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

- [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]
  - [CALCULATE 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]
  - [MERGE SHAPEFILES]

- [IMAGES]
  - [ASSIGN PROJECTIONS TO IMAGES]
  - [RECTIFY IMAGE TO WORLD FILE]
9.2.1.06 **ONLINE DATA PLUG-IN** - A plug-in for MapWindow GIS allowing access to online data sources

- [BROWSE CATALOG]
- [ADD ON-LINE LAYER]
- [SHOW OR HIDE ONLINE LAYER STATUS]
- [SETTINGS AND PREFERENCE]
- [CHECK FOR UPDATES]
- [ABOUT ONLINE DATA PLUG-IN]

9.2.1.07 **SHAPE2EARTH** - Converts shapefiles to ‘Keyhole Markup Language (KML)’ for viewing in ‘Google Earth’.

9.2.1.08 **SHAPEFILE EDITOR** - Edit and create shapefiles and shape geometry.

**Figure 9 - 4 – Shapefile Editor**

- Create new shapefile
- Add a new generic predefined shape to current shapefile
- Add new shape to current shapefile
- Remove shape from current shapefile
• Copy selected shapes to clipboard
• Paste a shape from the clipboard
• Merge two shapes
• Erase current layer at selected shapes
• Erase current layer beneath selected shape
• Move existing shapes in selected layer
• Rotate a shape about its centroid or a specified point
• Resize (expand or shrink) a shape
• Move an existing vertex in a shape
• Add a vertex to an existing shape
• Remove a vertex from an existing shape
• Check and clean up the shapefile

- Undo Options
  o Undo Last Change
  o Enable Undo Capability
  o Disable Undo Capability

9.2.1.09 [Watershed Delineation]
  • [Automatic]
  • [Advanced TauDEM Function]
    o [Select Base DEM Grid]
    o [Do All DEM Processing]
    o [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 FUNCTIONS]
  - [RIVER NETWORK RASTER UPSTREAM OF OUTLETS]
  - [STREAM ORDER GRID AND NETWORK FILES]
  - [STREAM SHAPEFILE AND WATERSHED GRID]
  - [WATERSHED GRID TO SHAPEFILE]

- [CONSTANT DROP ANALYSIS]

- [ANCILLARY FUNCTIONS]
  - [SLOPE/AREA (WETNESS INDEX INVERSE]
  - [FLOW DIRECTION TO STREAMS]
  - [DOWNSLOPE INFLUENCE]
  - [DECAYING ACCUMULATION]
  - [CONCENTRATION LIMITED ACCUMULATION]
  - [UPSLOPE DEPENDENCE]
  - [TRANSPORT LIMITED ACCUMULATION]
  - [REVERSE ACCUMULATION]
Lesson #01 – Chapter 09 - MapWindow GIS Interface

- [GRID CONVERTER]
  - [TAUDEM HELP]
  - [ABOUT TAUDEM]

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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  This decreases the area displayed on the screen but increases the level of detail displayed

10.2.2  Setup for Using the Zoom-in Function:
No Additional Setup Required

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  To 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 This increases the area displayed on the screen but decreases the level of detail displayed.

10.3.2 Setup for Using the Zoom-out Function:
No Additional Setup Required

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 every layer is contained within the visible extent.

10.4.2 Setup for Zooming to Full Extent: No Additional Setup Required

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: No Additional Setup required

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: No Additional Setup Required

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

10.6.1.01 Window docking is a new and useful way to customize the user’s information windows in MapWindow GIS.

10.7.2 Setup for Docking and Undocking Views: No Additional Setup Required

10.7.3 Steps for Docking and Undocking Views

10.7.3.01 Docking and tabbing windows in MapWindow GIS 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.
10.7.3.02 In the event the windows are undocked in a bad location, the user may use the [Panels] tool under “View Menu” to redock the windows.

10.7.3.03 Click on [VIEW] on the “Main Menu” then [PANELS]

10.7.3.04 Uncheck the “(show legend)” and the Legend window will close

10.7.3.05 Uncheck the “(show preview map)” and the Preview Map will close

10.7.3.06 Click on [VIEW] on the “Main Menu” then [PANELS], then recheck either of the options, “(show legend)” or “(show preview map)” to return the windows to the default position, as
Figure 10 - 2 – Redocking Windows

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: No Additional Setup Required

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: No Additional Setup Required

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: No Additional Setup Required

10.10.3 Measuring Area

10.10.3.01 Click on the 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 – Measuring Area
Chapter 11  Vector Data

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:

- 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:  No
Additional Setup Required

11.1.3  Adding Vector Map Data

11.1.3.01  Add data by clicking on add button 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.

11.1.3.03  To add multiple layers, hold down the control key and select each addition layer by clicking on it.

11.1.3.04  Click the [OPEN] button. The new layer will be added to the user’s project.

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

![Legend Example](image)

**Figure 11 - 2 – Part of the Legend**

- 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]**
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: No Additional Setup Required

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
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.

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: No Additional Setup Required

11.4.3 Steps for Using the Changing the Drawing Order:

11.4.3.01 Click and drag a layer to the desired location.

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
11.5.2 Setup for Using the Removing a Layer from the Map: No Additional Setup Required

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 This allows layers to be set up so that they dynamically turn on and off as the scale of the project changes

11.6.1.02 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.

11.6.2 Setup for Making the Layer Scalable:
No Additional Setup required

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.

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: No Additional Setup Required

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

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 - Legend Symbology](image)

11.7.3.05 Click on the Coloring scheme and an icon will appear.
Click on the icon and a color schema editor dialog box will show up:

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

Figure 11 - 8 – Setting Color Type
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 GIS 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 GIS.

11.8.2 Setup for Adding a Label to a Layer: No Additional Setup required

11.8.3 Steps for Adding a Label to a Layer

11.8.3.01 Double Click on the layer in the legend window.
11.8.3.02 Click on Label Setup

11.8.3.03 Click on the “…” button on the Label Setup line.
11.8.3.04 Select the '(Label Field for First Line)' dropdown and select the field to label with.

11.8.3.05 Click [APPLY] then [OK], or just [OK].
11.8.3.06  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.

11.9  PostGIS

11.9.1  General Information about PostGIS

11.9.1.01  Connection between POSTGIS and MapWindow GIS has several issues which should be resolved by next version
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 - Data Layers](image)

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

![Feature Identifier](image)

**Figure 12 - 4 – Showing Vector Feature Information**
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: No Addition Setup Required

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. It needs to be emphasized that even if a small portion of the feature falls within the selection rectangle, the feature would be selected.

12.2.2 Setup for Selecting Features by Rectangle: No Additional Setup Required

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.

12.2.3.06 By holding down the control key, the user can draw additional rectangles and add the selection to the original selected data.

12.2.3.07 Viewing Attribute Data of Selected Features by click on VIEW.

12.2.3.08 Click on [VIEW]

12.2.3.09 Click on [SHOW ONLY SELECTED SHAPES], the Attribute Table data for the selections will be shown.

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

END OF LESSON #01
Exercise #01

Ex01.01 Open Projects

- Several examples of project files can be found at C:\Program Files\MapWindow\Sample Projects\.

- Navigate to and open the project MapWindow\Sample Projects\World\world.mwprj.

- Click [FILE] then [RECENT PROJECT] tools, open the United States project.

Ex01.02 New Projects

- Create a new project.

- Set the project coordinates to “Geographic Coordinate System”.


- If a “no projection on layer” comes up, chose the following:
Exercise #01 - Figure 1 – Warning: No Projection on Layer

- 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.

- Change the color of the Statep020 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.

- Zoom to the state of Idaho. Make sure countyp020 is above statep020, Turn on countyp020. 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.

- Save the project

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex01_01.jpg in the exercise folder

**Ex01.03  Rename and reorder the data**

- Change display names as follows
  - airportx020 to Airports
  - coalfdp050 to Coal Fields
  - countyp020 to U.S. Counties
  - fedlandp020 to Federal Lands
  - indianp020 to Indian Lands
  - hydrogpl020 to Rivers and Streams
  - hydrogpp020 to Lakes, Ponds and Large Rivers
  - railrdl020 to Railroads
  - roadtrl020 to Roads
  - statesp020 to U.S. States
  - urbanp020 to Urban Areas
zmusslx020 to Zebra Mussels

- Put the layers in the following order from top to bottom,
  - Zebra Mussels
  - Airports
  - Roads
  - Railroads
  - Rivers and Streams
  - Lakes, Ponds and Large Rivers
  - Coal Fields
  - Urban Areas
  - Indian Lands
  - Federal Lands
  - U.S. Counties
  - U.S. States

- Then save the user’s project

Ex01.04  **Zoom around in the display window**

- Zoom into the area around the Pacific Northwest corner of the United States

- Zoom out to the Full extent of the map using the [FULL EXTENT] Button

- Using the [PREVIOUS] and [NEXT], the user can switch between the Pacific Northwest and the whole coverage.

- Zoom into the area around the Pacific Northwest corner of the United States and set
the preview map to the Current View.

Ex01.05 Working with Zebra Mussels

- Turn on the Zebra Mussel layer and zoom to its extent

- Make sure Zebra Mussels are the active layer, double click the layer in the legend, click on coloring scheme, select Y as field to color by clicking on and select “Continuous Ramp” on Dropdown list. Set start color to blue and end color to red, number of breaks to 5, click [OK]. Set value and values as follows 1988-1990, 1991-1995, 1996-2000, 2001-2005, 2006-3000, Click [OK], Set ‘(PointStyle)’ to ptTriangleUp. Set ‘(PointSize)’ to 9, Click [X] to close
Exercise #01 - Figure 2 – Legend Editor
Exercise #01 - Figure 3 – Choose Colors
Exercise #01 - Figure 4 – Coloring Scheme Editor
Exercise #01 - Figure 5 – Legend Editor

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

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex01_02.jpg in the exercise folder.
Ex01.06  To Label or not to label

- Label U.S. States with the state names. Examine Florida or Maine, then remove the labels.

- 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 will 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 GIS 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.

Ex01.07  Color More Layers

- Turn off Zebra Mussels

- 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

- 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’,

Exercise #01 - Figure 6 – Coloring Scheme Editor

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’, and ‘Stream’ to RGB 76,143,209
• ‘Swamp or Marsh’ to RGB 76,209,185
• ‘Lake Dry’, ‘Lake Intermittent’, and ‘Reservoir Intermittent’, to RGB 197,132, 2

Click [OK], set ‘(Line Width)’ to 0,

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.

Click [X] to close.
Exercise #01 - Figure 7 – Coloring Scheme Editor

- Open the State layer properties and set ‘(ShowFill)’ to “False” and close.
- Move the Lakes and Ponds layer to the bottom.
- 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

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex01_03.jpg in the exercise folder

- 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)’, Click [X] to close. , zoom in and out

- Turn on Urban Areas, Right click on it in the legend, Click the [PROPERTIES]. Set ‘(FillColor)’ to RGB 244,150,104;   Set ‘(lineWidth)’ to “0”, close

- Zoom into the State of Idaho

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex01_03.jpg in the exercise folder

- Save Project

Ex01.08 Measuring distance and area

- The program will not 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 or 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.

- Open the Newton project.
- Label the Populated Places
- Measure the distance between Woodruff and Amalga
- Measure the distance between Woodruff and Lewiston
- Measure the area bound by Woodruff, Amalga, and Lewiston

END OF EXERCISE #01
Quiz for Exercise #01

Quiz 01-01  Change the color of the United States Layer in the main view, did the “Preview Map” change color as well? Yes/No

Quiz 01-02  Update the preview map by click [EDIT] then [PREVIEW MAP] then [UPDATE USING CURRENT MAP]. Did the “Preview Map” color change? Yes/No

Quiz 01-03  Zoom into the area covering the northern Gulf of Mexico, In what period did Zebra Mussels appear off the State of Mississippi?

- 1988-1990
- 1991-1995
- 1996-2000
- 2001-2005
- 2006-3000

Quiz 01-04  In what period did Zebra Mussels appear in the Mississippi River Delta?

- 1988-1990
- 1991-1995
- 1996-2000
- 2001-2005
- 2006-3000

Quiz 01-05  In what of the Great Lakes did Zebra Mussels first appear?

- Superior
- Huron
Quiz 01-06  Zoom to the Pacific Northwest, turn on and label Airports using the LOCID attribute. What are the three airports in Southeastern Washington State?

- YKM, EAT, MWH
- ALW, PUW, PSC
- MYL, LGD, PDT
- LWS, ALW, TLH

Quiz 01-07  Zoom into the Puget Sound Area. 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?

- More Cluttered
- Less Cluttered
- No Change

Quiz 01-08  What is the distance between Woodruff and Amalga?

- 20-25 km
- 25-30 km
- 30-35 km
- 35-40 km

Quiz 01-09  What is the distance between Woodruff and Lewiston?

- 20-25 km
- 25-30 km
Quiz 01-10  What is the area bound by Woodruff, Amalga, and Lewiston

- 120 - 150 km²
- 150 - 200 km²
- 200 - 250 km²
- 250 - 300 km²

END OF QUIZ #01
Lesson #02

Chapter 13   Data Creating and Editing

13.1   Creating a New Layer Using Shapefile Editor

13.1.1   General Information about Creating a New Layer Using Shapefile Editor: No Additional Setup required

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 Figure 13 - 1 below.
13.1.3.03 The user can browse to the folder by clicking on the browse button, then type in “(File name)” including the full path.

13.1.3.04 The following screen will appear:
Figure 13 - 3 – Warning: No projection on Layer

13.1.3.05  Check the method that the program should use for handling projections. The file will then be created, and the user will be given a warning message which warns to be sure to add data to the map to use as a reference to ensure the data in the correct spatial area (the correct extents). This is shown in 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 cursor to the point to be added. Continue clicking points to add additional vertices in the case of lines or polygons; right click to finish.

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 GIS 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: No Additional Setup Required

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 cursor 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 , 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

13.3.1.01 This tool allows the user to build fields and add to the attribute table for a shapefile, regardless if it is point, polyline, or polygon.

13.3.2 Setup for the Editing a Layer Using Table Editor: No Additional Setup Required

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:

![Attribute Table Editor](image)

Figure 13 - 5 – Attribute Table Editor

- [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 features 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 SHAPEID TO SPECIFIED FIELDS]

- [ZOOM TO SELECTED SHAPES]

- [SHOW ONLY SELECTED SHAPES]

- [IMPORT FIELD DEFINITIONS FROM DBF]

- [FIELD CALCULATOR TOOL]

13.2.3.07 Click on [EDIT] then [ADD FIELD].

Figure 13 - 6 – Create Field
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.

13.2.3.08  Click on [EDIT] then [REMOVE A FIELD].

![Delete Field](image)

Figure 13 - 7 – Delete Field

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

![Confirm delete](image)

Figure 13 - 8 – Confirm Delete

13.2.3.10  Click [YES] to confirm deletion, and the field will be removed.

13.2.3.11  Click on [EDIT] then [RENAME A FIELD].
13.2.3.12 Select the field to be renamed.

13.2.3.13 Type in new name.

13.2.3.14 Click [OK].

13.2.3.15 Click on [SELECTION] then [QUERY].
13.2.3.16 Build the query and click [APPLY].

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

13.2.3.18 Click on [TOOLS] then [FIND].
13.2.3.19 Type in the search string and click [OK]. The first feature with that search string will be selected.

13.2.3.20 Click on [TOOLS] then [REPLACE].

![Replace dialog box]

Figure 13 - 12 - Replace

13.2.3.21 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.

13.2.3.22 Click on [TOOLS] then [FIELD CALCULATOR TOOL].
13.2.3.23 The field calculator allows the user to build an expression and use the results to populate an attribute column.

END OF LESSON #02
Exercise #02

Ex02.01 Open Projects

- Open Project started in Exercise #01
- Zoom into the state of Idaho
- Create the following layers

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idahopoints</td>
<td>Point</td>
</tr>
<tr>
<td>Idaholines</td>
<td>Line</td>
</tr>
<tr>
<td>Idahopolygon</td>
<td>Polygon</td>
</tr>
</tbody>
</table>

Ex02.02 Create Line File

- For the Line layer (Idaholines), create the following lines
  - From BOI to SMN
  - From MYL to SUN
  - From SUN to IDA
  - From SMN to PIH
- Add the Route Information to the Line file and label lines with route information
- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex02_01.jpg in the exercise folder
Exercise #02 - Figure 1 - Lines

Ex02.02 Create Point File

- For the Point layer (Idahopoints), create the following points
  - Intersection of line from BOI to SMN and line from MYL to SUN
  - Intersection of line from SUN to IDA and line from SMN to PIH

- Set point color to Red and size to 10

- Add Id Information
  - Left point id is BSM
  - Right point id is SIS

- Label points with id, using Label shadow and aligned right.

- Click on [EDIT] then [EXPORT] then [MAP],

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save the file as ex02_02.jpg in the exercise folder

---

Exercise #02 - Figure 2 - Points

**Ex02.03 Create Polygon File**

- For the Polygon layer (Idahopolygon), create the following polygon
  - A polygon (Id is Western) from MYL, SMN, SIS, TWF, BOI
  - A polygon (Id is Eastern) from BSM, SMN, IDA, PIH, TWF, SUN

- Add Id Information
  - Left polygon id is ‘Western’
  - Right point id is ‘Eastern’

- Label points with id, using Label shadow and aligned center.

- Color by ID and Unique value

- Click on [EDIT] then [EXPORT] then [MAP],

---

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save the file as ex02_03.jpg in the exercise folder

Exercise #02 - Figure 3 – Polygon

END OF EXERCISE #02
Quiz for Lesson #02

Quiz 02-01 Which new airport is further North?
   ➢ BSM
   ➢ SIS
   ➢ Neither

Quiz 02-02 Which of the four flight lines is the longest?
   ➢ MYL - SUN
   ➢ SUN - IDA
   ➢ SMN - PIH
   ➢ SUN - SIS

   End of Quiz #02
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 GIS. 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 GIS 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)

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

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

14.1.2 Creation or Setup Subsection: No Additional Setup Required
14.1.3.01 Raster layers are loaded either by clicking on the [ADD LAYER] 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 transparent color, use transparency, dynamic visibility, and a legend picture.
14.2.2 **Setup of Legend Editor:** No Additional Setup required.

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.

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 GIS allows partial transparency of the grids by allowing a user to choose a transparency color and then set ‘(Transparency)’ to true.

![Figure 14 - 2 - Transparency](image)

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 GIS* 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 zooms out beyond those extents, the layer will disappear and if the user zooms in to that level, it will reappear.

![Dynamic Visibility](image)

**Figure 14 - 3 – Dynamic Visibility**

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.

![Data Layers](image.png)

Figure 14 - 4 – Data Layers

END OF LESSON #03
Chapter 15  Core Plug-ins

15.1  MapWindow GIS Core Plug-in

15.1.1  General Information about MapWindow GIS Core Plug-ins

15.1.1.01  MapWindow GIS 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 GIS

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  {According to the Wikipedia, the free encyclopedia: A plugin (plug-in, addin, add-in, addon or add-on) is a computer program that interacts with a host application (a web browser or an email client, for example) to provide a
certain, usually very specific, function "on demand". Applications support plugins for many reasons. Some of the main reasons include: enabling third-party developers to create capabilities to extend an application, reducing the size of an application, and separating source code from the application because of incompatible software license.

15.3.1.02 The Plug-in tool is the manager for all plugins. This tool allows the user to turn on plugins as they are needed and to turn off plugins as they are no longer needed.

15.3.2 Setup of Plug-in Tool: No Additional Setup Required

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

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

Refreshing Plug-in List by clicking on the [REFRESH LIST] button.
15.3.3.05 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: No Additional Setup Required.

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 Archive Project Tool

15.5.1 General Information about Archive Project Tool
15.5.1.01 Provides the ability to archive and restore MapWindow projects. Released under GPL 1.1.

15.5.2 Setting up Archive Project Tool

15.5.2.01 Click on the [PLUG-IN] button on the main menu

15.5.2.02 Select [ARCHIVE PROJECT TOOL].

15.5.3 Using Archive Project Tool

15.5.3.01 Click on [FILE]

15.5.3.02 Click on [ARCHIVE/RESTORE PROJECT]
15.5.3.03 Make any notes to further clarify this archive

15.5.3.04 Check “(Preserve original file locations in archive)”

15.5.3.05 Click [ARCHIVE PROJECT].

15.5.3.06 This will open a ‘{Save As}’ window where the user identifies the project name, then click
[SAVE]. This will generate a ‘.mwa’ file.

15.5.3.07 The screen will display a “Finished” box, click {OK}

![Finished dialog box]

Figure 15 - 3 - Finished

15.5.3.08 To retrieve a project archive, navigate to archived location

15.5.3.09 Select the archive file to be retrieved.

15.5.3.10 Select the place to put the retrieved file.

15.5.3.11 Click [RESTORE PROJECT]
Figure 15 - 4 – Retrieve Project

15.6 CSV to Shapefile Converter

15.6.1 General Information about CSV to Shapefile Converter

15.6.1.01 Converts comma-separated value (csv) text files which contain geographic coordinates into shapefiles
15.6.2 Setting up CSV to Shapefile Converter

15.6.2.01 Click on the [PLUG-IN] button on the main menu

15.6.2.02 Select [CVS TO SHAPEFILE CONVERTER].

15.6.3 Using CSV to Shapefile Converter

15.6.3.01 Select [CONVERTERS] on main menu toolbar

15.6.3.02 Select [CSV (COMMA SEPARATED VALUES) TO SHAPEFILE] on drop-down menu
15.6.3.03 Select the file to be imported by using the “(Input File)” box

15.6.3.04 Set the “(Field Delimiter)” as comma or the correct symbol

15.6.3.05 Click [OPEN FILE]

15.6.3.06 Select the columns that are used for “(X Field)” and “(Y Field)”
15.6.3.07 Click on “(Add coordinates to Shapefile Attributes?)”, “(Convert All other Fields into Shapefile)”, and “(Add Output to Map)”

15.6.3.08 Click on [CONVERT].

![File Name](image)

**Figure 15 - 6 - File Name**

15.6.3.09 A window will open and ask for the new file name. Fill in ‘(File name)’ and click [SAVE].

15.6.3.10 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.

![Complete](image)

**Figure 15 - 7 - Complete**

15.6.3.11 Click [OK]

15.6.3.12 The program will return to the first screen (Figure 15 -2). Click [CLOSE]
15.7 Document Launcher

15.7.1 General Information about Document Launcher:

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

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

15.7.2 Setup for Document Launcher:

15.7.2.01 Click on the [PLUG-IN] button on the main menu

15.7.2.02 Select [DOCUMENT LAUNCHER].

15.7.3 Usage of Document Launcher

15.7.3.01 Functionally, this particular plug-in will be activated when a shape in a shapefile is selected.

15.7.3.02 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.

15.7.3.03 Most commonly, this is used to launch images or web pages associated with given shapes.
END OF LESSON #03
Exercise #03

Ex03.01 Open Projects

- Open Project started in Exercise #02
- Zoom into the state of Idaho
- Create a comma delineated text file with the follow values

```
Name,lon,lat,type
Mine1,-115.19,44.95,airport
Mine2,-115.82,45.79,airport
Mine3,-116.87,44.44,airport
Mine4,-114.96,44.63,airport
```

- Import the comma delineated test file into a shapefile
Exercise #03 - Figure 0 1 – CVS to Shapefile

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex03_01.jpg in the exercise folder

END OF EXERCISE #03
Quiz for Lesson #03

Quiz 03-01 Which new airport is further North?
- Mine1
- Mine2
- Mine3
- Mine 4

Quiz 03-01 Which County does Mine3 appear to be in?
- Washington
- Adams
- Valley
- Mineral

Quiz 03-01 Which two new airports are closest to BSM?
- Mine1 and Mine 2
- Mine2 and Mine 3
- Mine3 and Mine 4
- Mine 4 and Mine 1

END OF QUIZ #03
Lesson #04

15.8 Assign Projection to Grids (GIS Tools - Raster)

15.8.1 General Information about Assign Projection to Grids

15.8.1.01 This tool allows the user to assign a projection to an image or grid that does not have an associated Projection File with it.

15.8.2 Setup for Assign Projection to Grids

15.8.2.01 Click on the [PLUG-IN] button on the main menu

15.8.2.02 Select [GIS TOOLS].

15.8.3 Usage of Assign Projection to Grids

15.8.3.02 Select [GIS TOOLS].

15.8.3.03 Select [RASTER]

15.8.3.04 Select [ASSIGN PROJECTION TO GRID]
Figure 15 - 8 – Open Grid File

15.8.3.05 Select the Grid File to be assigned the projection

Figure 15 - 9 – Select Grids

15.8.3.06 Click [OK]

15.8.3.07 Assign the projection to be used and click
15.8.3.08 The GISTool will display a completed window

15.9 Reproject Grid (GIS Tools - Raster)

15.9.1 General Information about Reproject Grids

15.9.1.01 This tool allows for the reprojection of an image or grid from one projection to another projection
15.9.2 Setup for Reproject Grids

15.9.2.01 Click on the [PLUG-IN] button on the main menu.

15.9.2.02 Select [GIS TOOLS].

15.9.3 Usage of Reproject Grids

15.9.3.01 Select [GIS TOOLS].

15.9.3.02 Select [RASTER]

15.9.3.03 Select [REPROJECT GRID]

Figure 15 - 12 – Open Grid File
15.9.3.04 Select the Grid File to be reprojected

![Select Grid](image)

**Figure 15 - 13 – Select Grid**

15.9.3.05 Click [OK]

15.9.3.06 Select the new projection and click [OK]

![Choose Projection](image)

**Figure 15 - 14 – Choose Projection**

15.9.3.07 The program will state that the reprojection is finished and ask if it is to be added to the map.
15.9.3.08 Click [YES]

15.10 Change Grid Formats (GIS Tools - Raster)

15.10.01 General Information about Change Grid Formats

15.10.1.01 This tool allows the user to generate different outputs including an ASCII grid file or a GeoTIFF file

15.10.2 Setup for Change Grid Formats

15.10.2.01 Click on the [PLUG-IN] button on the main menu

15.10.2.02 Select [GIS TOOLS].

15.10.3 Usage of Change Grid Formats
15.10.3.01 Select [GIS TOOLS].

15.10.3.02 Select [RASTER]

15.10.3.03 Select [CHANGE GRID FORMATS]

15.10.3.04 Select the Grid File to be have a new format

Figure 15 - 16 – Select Grids

15.10.3.05 Click [OK]

Figure 15 - 17 - Output Options

15.10.3.06 Select the output option and click
15.10.3.07 The program will take a few minutes and then and the new File to the map.

15.11 Create Grid Images (GIS Tools - Raster)

15.11.1 General Information about Create Grid Images

15.11.1.01 This tool allows the user to take a ASCII or TIFF file and convert it into a BGD Binary file

15.11.2 Setup for Create Grid Images

15.11.2.01 Click on the [PLUG-IN] button on the main menu

15.11.2.02 Select [GIS TOOLS].

15.11.3 Usage of Create Grid Images

15.11.3.01 Select [GIS TOOLS].

15.11.3.02 Select [RASTER]

15.11.3.03 Select [CREATE GRID IMAGES]

15.11.3.04 Select the Grid File to be made into an image
15.11.3.05 Click [OK]

15.11.3.06 Select Color Scheme and Click [OK]

15.11.3.07 Add the new image to the project
15.12 Resample Grids (GIS Tools - Raster)

15.12.1 General Information about Resample Grids

15.12.1.01 This tool allows the user to resample and change the grid size

15.12.2 Setup for Resample Grids

15.12.2.01 Click on the [PLUG-IN] button on the main menu

15.12.2.02 Select [GIS TOOLS].

15.12.3 Usage of Resample Grids

15.12.3.01 Select [GIS TOOLS].

15.12.3.02 Select [RASTER]

15.12.3.03 Select [RESAMPLE GRIDS]

15.12.3.04 Select the Grid File to be resampled
15.12.3.05 Click [OK]

15.12.3.06 Set “(New Cell Size)” and click [OK]
15.12.3.07 Select the ‘(Output Format)’ and click [FINISH]

15.13 Merge Grids (GIS Tools - Raster)

15.13.1 General Information about Merge Grids

15.13.1.01 This tool allows the user to combine two or more grids into one grid

15.13.2 Setup for Merge Grids

15.13.2.01 Click on the [PLUG-IN] button on the main menu

15.13.2.02 Select [GIS TOOLS].

15.13.3 Usage of Merge Grids

15.13.3.01 Select [GIS TOOLS].
15.13.3.02 Select [RASTER]

15.13.3.03 Select [MERGE GRIDS]

15.13.3.04 Select the Grid Files to be merged

Figure 15 - 23 – Select Grid

15.13.3.05 Click [OK]

Figure 15 - 24 – Output Options

15.13.3.06 Enter the “(Output Name)”

15.13.3.07 Select the ‘‘(Output Format)’’ and click
15.14 Clip Grid with Polygon (GIS Tools - Raster)

15.14.1 General Information about Clip Grid with Polygon

15.14.1.01 This tool allows the user to clip part of a grid with a polygon

15.14.2 Setup for Clip Grid with Polygon

15.14.2.01 Click on the [PLUG-IN] button on the main menu

15.14.2.02 Select [GIS TOOLS].

15.14.3 Usage of Clip Grid with Polygon

15.14.3.01 Select [GIS TOOLS].

15.14.3.02 Select [RASTER]

15.14.3.03 Select [CLIP GRID WITH POLYGON]
Figure 15 - 25 – Clip Grid

15.14.3.04  Select grid to be clipped

15.14.3.05  Select polygon shapefile to clip with
Select the polygon(s) to clip with.

Enter ‘(File to save results to)’

Click [OK]

15.15 Georeference Image or Grid (GIS Tools - Raster)

15.15.1 General Information about Georeference Image or Raster

This tool is for registering an image to a Geo-Spatial reference system by specifying the location of three points on the image
15.15.2 Creation of Georeference Image or Raster

15.15.2.01 Click on the [PLUG-IN] button on the main menu

15.15.2.02 Select [GIS TOOLS].

15.15.3 Usage of Georeference Image or Raster

15.15.3.01 Select [GIS TOOLS].

15.15.3.02 Select [RASTER]

15.15.3.03 Select [GEOREFERENCE IMAGE OR RASTER]

15.15.3.04 Load georeferenced data
Figure 15 - 27 – Load Image

15.15.3.05 Load an image into the map

Figure 15 - 28 – Select Three Points
15.15.3.06  Click three points on the image

![Image](image-url)

*Figure 15 - 29 - Corresponding Points*

15.15.3.07  Click the corresponding points on the MapWindow Map

15.15.3.08  Click [GEOREFERENCE]

15.16  Generate a Contour Shapefile (GIS Tools - Raster)

15.16.1  General Information about Generate a Contour Shapefile

15.16.1.01  This tool will create a shapefile with contour lines showing the values in the input raster
These inputs are typically elevation but could be any value.

**15.16.2** Creation of Generate a Contour 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 Generate a Contour Shapefile

15.16.3.01 Select [GIS TOOLS].

15.16.3.02 Select [RASTER]

15.16.3.03 Select [GENERATE A COUNTOUR SHAPEFILE]
Figure 15 - 30 – Generate Contour Shapefile

15.16.3.04 Select Input Raster: Either loaded layer or External File

15.16.3.05 Select contour options: either contour
intervals or fixed levels

15.16.3.06 Check ‘(Add Output to Map)’. *MapWindow GIS* does not support editing 3D shapefiles

15.16.3.07 Click [GENERATE]

15.17 Change NODATA Value (GIS Tools - Raster)

15.17.1 General Information about Change NODATA Value

15.17.1.01 This tool allows the user to change the color value for No Data cells

15.17.1.02 If the dataset is loaded into *MapWindow GIS*, the layer must be removed and then readded for the changes to take effect.

15.17.2 Setup for Change NODATA Value

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 Change NODATA Value

15.17.3.01 Select [GIS TOOLS].
15.17.3.02 Select [RASTER]

15.17.3.03 Select [CHANGE NODATA VALUE]

Figure 15-31 – Change NODATA Value Form

15.17.3.04 Select Raster files to use
Figure 15 - 32 – Change NODATA Value

15.17.3.05 Enter new NODATA Value and click [CHANGE]

Figure 15 - 33 - Successful

15.17.3.06 The program will display a success window
Exercise #04

Ex04.01 Open Projects

- Open New Project
- Find newned30.bmp and newned30.bpw, copy them into the working directory
- Convert newned30.bmp into a .tif file called image01.tif
- Copy newned30.bpw into image01.tfw
- Import image01 into open project.
- Click [FILE] then [SETTINGS]
- Make the settings identical to the below:
Exercise #04 Figure 1 – Project Settings

Ex04.02 Assign a Projection to the Image

- Assign the projection, UTM – WGS 1984, WGS 1984 UTM Zone 12N

Ex04.03 Make a Grid file

- Make An ASCII Grid file of the image01
  - Click on [EDIT] then [EXPORT] then [MAP], save the file as ex04_01.jpg in the exercise folder
Ex04.04  Make a Contour file

- Make a contour file of the image01

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex04_02.jpg in the exercise folder

END OF EXERCISE #04
Quiz for Lesson #04

Quiz 04-01  None

END OF QUIZ #04
Lesson #05

15.18 Assign Projection to Shapefile (GIS Tools - Vector)

15.18.1 General Information about Assign Projection to Shapefile:

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

15.18.1.02 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.

15.18.2 Setup for Assign Projection to Shapefile

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 Assign Projection to Shapefile

15.18.3.01 Click on [GIS TOOLS] on main menu.

15.18.3.02 Click on [VECTOR].
15.18.3.03  Click on [ASSIGN PROJECTION TO SHAPEFILE]

15.18.3.04  Select file that will be assigned projection.

Figure 15 - 34 – Choose Projection

15.18.3.05  Enter appropriate projection information and click [OK]

Figure 15 - 35 - Finished
15.19 Reproject Shapefile (GIS Tools - Vector)

15.19.1 General Information about Reproject Shapefile

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

15.19.2 Setup for Reproject Shapefile:

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 Reproject Shapefile

15.19.3.01 Click on [GIS TOOLS] on main menu

15.19.3.02 Click on [VECTOR]

15.19.3.03 Click on [REPROJECT A SHAPEFILE]

15.19.3.04 Select file that will be reprojected and click [OPEN]
15.19.3.05 Enter appropriate projection information and click [OK]

15.19.3.06 Click [YES] to add it to map.

15.20 Buffer Shapes (GIS Tools - Vector)

15.20.1 General Information about Buffer Shapes:
15.20.1.01 This tool creates buffer shapefiles at selected distances from the original features.

15.20.2 Setup for Buffer Shapes:

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 Buffer Shapes

15.20.3.01 Click on [GIS TOOLS]
15.20.3.02 Click on [VECTOR]
15.20.3.03 Click on [BUFFER SHAPES]
Figure 15 - 38 - frmBuffer

15.20.3.04 Select layer to buffer

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

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

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

15.20.3.08 Decide if the user want to combine
overlapping Buffers

15.20.3.09 Set name of resulting shapefile

15.20.3.10 Click [OK]

15.21 Calculate Polygon Areas (GIS Tools - Vector)

15.21.1 General Information about Calculate Polygon Areas

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

15.21.2 Setup for Calculate Polygon Areas:

15.21.2.01 Click on the [PLUG-IN] button on the main menu.

15.21.2.02 Select [GIS TOOLS].

15.21.3 Usage of Calculate Polygon Areas

15.21.3.01 Click on [GIS TOOLS]

15.21.3.02 Click on [VECTOR]

15.21.3.03 Click on [CALCULATE POLYGON AREAS]

15.21.3.04 If it can not detect the shapefile units
15.21.3.05  Click [OK].

15.21.3.06  The following appears:

15.21.3.07  Select the layer.
15.21.3.08  Set the shapefile units

15.21.3.09  Set the units of the area the user want created

15.21.3.10  Click on [CALCULATE]. This will add a new column added in the attribute table for the area.

15.22  Clip Polygon with Line (GIS Tools - Vector)

15.22.1  General Information about Clip Polygon with Line:

15.22.1.01  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.

15.22.2  Setup for Clip Polygon with Line

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 Clip Polygon with Line

15.22.3.01 Click on [GIS Tools]

15.22.3.02 Click on [VECTOR]

15.22.3.03 Click on [CLIP POLYGON WITH LINE]

15.22.3.04 The following appears

![Clip Polygon With Line](image)

**Figure 15 - 41 – Clip Polygon With line**

15.22.3.05 Select the polygon to be clipped

15.22.3.06 Select the clip file
15.22.3.07 Name the result file

15.22.3.08 Click [OK]

15.23 Clip Shapefile with Polygon (GIS Tools - Vector)

15.23.1 General Information about Clip Shapefile with Polygon

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

15.23.2 Setup for Clip Shapefile with Polygon

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 Clip Shapefile with Polygon

15.23.3.01 Click on [GIS Tools]

15.23.3.02 Click on [VECTOR]

15.23.3.03 Click on [CLIP SHAPEFILE WITH POLYGON]
Select a shapefile to clip from the drop-down list (if already loaded in *MapWindow GIS*) or browse to one using the button on the far side (folder icon).

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

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.

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.

15.23.3.08 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).

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

15.23.3.10 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).

15.23.3.11 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.

15.23.3.12 The user should not need to have any projection set when using the clipping tools. They should work with whatever coordinates they are given.
15.24  Erase Shapefile with Polygon  (GIS Tools - Vector)

15.24.1  General Information about Erase Shapefile with Polygon:

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

15.24.2  Setup for Erase Shapefile with Polygon

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 Erase Shapefile with Polygon

15.24.3.01  Click on [GIS TOOLS]

15.24.3.02  Click on [VECTOR]

15.24.3.03  Click on [ERASE SHAPEFILE WITH POLYGON]

15.24.3.04  The following will appear
15.24.3.05 Select the shapefile to erase

15.24.3.06 Select the shapefile to erase with

15.24.3.07 Name the result file

15.24.3.08 Click [OK]. The new shapefile with an erased portion can be added to the legend as a separate layer.

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

15.25.1 General Information about Export Selected Shapes to New Shapefile

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

15.25.2 Setup for Export Selected Shapes to New Shapefile

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 Export Selected Shapes to New Shapefile

15.25.3.01 Select the feature to be exported to new shapefile

15.25.3.02 Click on [GIS Tools]

15.25.3.03 Click on [VECTOR]

15.25.3.04 Click on [EXPORT SELECTED SHAPEFILE TO NEW SHAPEFILE]

15.25.3.05 Enter name of new shapefile and click on [SAVE].
15.25.3.06 Click on [YES]

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

15.26.1 General Information about Export Shapes to New Shapefile by Mask

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

15.26.2 Setup for Export Shapes to New Shapefile by Mask

15.26.2.01 Click on the [PLUG-IN] button on the main menu.

15.26.2.02 Select [GIS TOOLS].

15.26.3 Usage of Export Shapes to New Shapefile by Mask

15.26.3.01 Click on [GIS TOOLS]
15.26.3.02  Click on [VECTOR]

15.26.3.03  Click on [EXPORT SHAPES TO NEW SHAPEFILE BY MASK]

**Figure 15 - 45 – Export by Mask**

15.26.3.04  Select the shapefile that features are to extracted from.

15.26.3.05  Select shapefile to be used as mask

15.26.3.06  Select feature or features within mask file to be used to for selection of the features exported shapefile
15.27 Merge Shapes (GIS Tools - Vector)

15.27.1 General Information about Merge Shapes

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

15.27.2 Setup for Merge Shapes

15.27.2.01 Click on the [PLUG-IN] button on the main menu.

15.27.2.02 Select [GIS TOOLS].

15.27.3 Usage of Merge Shapes

15.27.3.01 Click on [GIS TOOLS]

15.27.3.02 Click on [VECTOR]

15.27.3.03 Click on [MERGE SHAPES]

15.27.3.04 The following appears
15.27.3.05 Select the two shape to be merged

15.27.3.06 Enter output file name

15.27.3.07 Click [OK]

15.28 Merge Shapefiles (GIS Tools - Vector)

15.28.1 General Information about Merge Shapefiles

15.28.1.01 This tool allows the user to merge two or more shapefiles into one feature.
15.28.2 Setup for Merge Shapefiles

15.28.2.01 Click on the [PLUG-IN] button on the main menu.

15.28.2.02 Select [GIS TOOLS].

15.28.3 Usage of Merge Shapefiles

15.28.3.01 Click on [GIS TOOLS]

15.28.3.02 Click on [VECTOR]

15.28.3.03 Click on [MERGE SHAPEFILES]

15.28.3.04 The following appears
Figure 15 - 47 – Merge Shapefiles

15.28.3.05 Select the shapefiles to be merged

15.28.3.06 Enter output file name
Figure 15 - 48 – Combine multiple shapefiles

15.28.3.07 Click [MERGE SHAPEFILE].
Exercise #05

Ex05.01 Open Projects

- Open Project started in Exercise #03
- Zoom into the state of Idaho
- Turn on the layer with the airports, Mine1, Mine2, Mine3, Mine4

Ex05.02 Building Buffers

- Build a Buffer of .5 Decimal degrees around them, call it buffer1. There should be 4 airports selected
- 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
- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex05_01.jpg in the exercise folder

Ex05.03 Calculating Area

- Using the buffer1 shapefile, calculate the Square Miles contained by the buffers around the airports. Remember the data is in decimal degrees.
Ex05.05  Combining Polygons Area

- Combine the Western Region and the Eastern Region into a Regions Polygon

- Calculate the Square Miles contained by the Regions polygon.

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex05_02.jpg in the exercise folder.

Ex05.05  Clipping Polygons Area

- Using the Regions shapefile, clip it with the Buffer1 polygon from earlier, and create a Regions1 polygon

- Calculate the Square Miles contained by the Regions1 polygon.

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex05_03.jpg in the exercise folder.

END OF EXERCISE #05
Quiz for Lesson #05

Quiz 05-01  Do any of the buffers overlap or intersect another buffer? Yes/No

Quiz 05-02  What is the area of the buffer around Mine2?
  ➢  2000-2500
  ➢  2500-3000
  ➢  3000-3500
  ➢  4000-4500

Quiz 05-03  What is the area of the buffer around Mine1-Mine4?
  ➢  3000-3500
  ➢  3500-4000
  ➢  4000-5000
  ➢  5000-5500

Quiz 05-04  What is the area of the Regions polygon?
  ➢  15000-20000
  ➢  20000-25000
  ➢  30000-35000
  ➢  35000-40000

Quiz 05-05  What is the area of the Regions1 polygon?
  ➢  2500-3000
  ➢  3000-3500
  ➢  4000-4500
  ➢  4500-5000

END OF QUIZ #05
Lesson #06

15.29 Assign Projection to Image (GIS Tools - Image)

15.29.1 General Information about Assign Projection to Image:

15.29.1.01 This tool allows the user to assign a projection to an image that does not have an associated Projection File with it.

15.29.2 Setup for Assign Projection to Image

15.29.2.01 Click on the [PLUG-IN] button on the main menu.

15.29.2.02 Select [GIS TOOLS].

15.29.3 Usage of Assign Projection to Image

15.29.3.01 Select [GIS TOOLS].

15.29.3.02 Select [RASTER]

15.29.3.03 Select [ASSIGN PROJECTION TO IMAGES]
Select the image to be assigned the projection

Click [OK]
15.29.3.06 Assign the projection to be used and click [OK]

15.29.3.07 The GISTool will display a completed window
15.30 Rectify Image to WorldFile (GIS Tools - Image)

15.30.1 General Information about Rectify Image to WorldFile

15.30.1.01 This tool has several issues which should be resolved by next version

15.31 Reproject Images (GIS Tools - Image)

15.31.1 General Information about Reproject Images

15.31.2.01 This tool has several issues which should be resolved by next version
15.32 Online Data Plug-in

15.32.1 General Information about Online Data Plug-in

15.32.1.01 The MapWindow GIS ‘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.

15.32.1.02 The MapWindow GIS ‘Online Data’ Plug-in will be visible from the MapWindow GIS 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.

15.32.2 Setup for Online Data Plug-in

15.32.2.01 Click on the [PLUG-IN] button on the main menu.

15.32.2.02 Select [ONLINE DATA PLUG-IN].

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

- [BROWSE CATALOG]
- [ADD ON-LINE LAYER]
- [SHOW OR HIDE ONLINE LAYER STATUS]
15.32.2.04 Settings can be changes by click on [ONLINE DATA PLUG-IN] then [SETTINGS AND PREFERENCES]

15.32.2.05 To check for updates to the plug-in, click [ONLINE DATA PLUG-IN] then [CHECK FOR UPDATE], then click [EXIT]

15.32.2.06 Open up a web browser.

15.32.2.07 Type “REQUEST=GetCapabilities” in search box.

15.32.2.08 Click [SEARCH]

15.32.2.09 Select a listed sight and copy the text similar to http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi?CONFIG=main&amp;SERVICE=WMS&amp;?VERSION=1.1.1&amp;REQUEST=GetCapabilities

15.32.2.10 Paste the above in The Browse catalog Server Window

15.32.2.11 See Appendix B for other WMS/WFS Servers
15.32.3 Usage of Online Data Plug-in

15.32.3.01 Click on [ONLINE DATA]

15.32.3.02 Click on [BROWSE CATALOG]

Figure 15 - 53 – Browse Catalog

15.32.3.03 Click on [CONNECT]
When the server is connected

Select layer to be added and click [ADD]
SELECTED DATA TO MAP

Figure 15 - 56 – Add Online Layer

15.32.3.06 Select how the data should be added and then click [ADD THIS DATA]
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].

Click on [ONLINE DATA].

Click on [ADD ONLINE LAYER].

Other WMS and WFS Servers can be
added to the Browse catalog function
15.33 Watershed Delineation

15.33.1 General Information about Watershed Delineation (The following taken from http://hydrology.neng.usu.edu/taudem/#copy)

15.33.1.01 The following material was derived from the TauDEM website (http://hydrology.neng.usu.edu/taudem/) and used with permission of David Tarboton

15.33.1.02 Delineation is

- Creating a boundary that represents the contributing area for a particular control point or outlet
- Used to Define boundaries of the study area, and/or to divide the study area into smaller sub-areas
Delineation is a part of the process known as watershed segmentation or dividing the watershed into discrete land and channel segments to analyze watershed behavior.

15.33.1.03 **TauDEM** (Terrain Analysis Using Digital Elevation Models) incorporates the Digital Elevation Model (DEM) analysis tools and functions developed by David Tarboton at Utah State University with support from a variety of sponsors.

15.33.1.02 The MapWindow Watershed Delineation plug-in uses TauDEM to provide the following...
functionality:

- Pit removal by flooding to ensure hydraulic connectivity within the watershed
- Computation of flow directions and slopes
- Contributing area using single and multiple flow direction methods
- Multiple methods for the delineation of channel networks including curvature-based methods sensitive to spatially variable drainage density
- Objective methods for determination of the channel network delineation threshold based on stream drops
- Delineation of watersheds and subwatersheds draining to each stream segment and association between watershed and segment attributes for setting up hydrologic models.
- Specialized functions for terrain analysis, including:
  - Wetness index
  - Distance to streams
  - Downslope influence function to map locations downslope that may be influenced by activities in an area
  - Upslope dependence function to map the locations upslope where activities have an effect on a downslope location
  - Decaying accumulation that evaluates upslope contribution subject to decay or attenuation
  - Concentration limited accumulation
  - Transport limited accumulation
A Practical Look at MapWindow GIS (1st Edition)
Lesson #06 – Chapter 15 – Core Plug-ins (Watershed Delineation)

15.33.1.03 The Manual Watershed Delineation tool allows the user to divide a watershed into two or more hydrologically connected subwatersheds. This is useful in watershed characterization and modeling. The tool provides the user with flexibility in editing shapes and attributes of manually delineated watersheds and outlets, and in generating stream networks.

15.33.1.04 The Manual Watershed Delineation tool allows the user to define and create a boundary around the entire land area contributing to the flow in a stream. Watersheds can be delineated based on Reach File, V1: NHD; or user-defined blue lines, depending on which reach data will be used for modeling. Analysis can be performed on delineated watersheds using the BASINS Watershed Characterizing Report Tools. Modeling can be performed on one or more delineated watersheds using WinHSPF or SWAT.

15.33.2 Setup for Watershed Delineation

15.33.2.01 Click on the [PLUG-IN] button on the main menu.

15.33.2.02 Select [WATERSHED DELINEATION].

15.33.3 Usage of Watershed Delineation
15.33.3.01  Go to http://www.webgis.com/terr_us75m.html and download a DEM for Northern Utah, Click on “Newton” from http://www.webgis.com/terr_pages/UT/dem75/cache.html.

15.33.3.02  Download the file 1647564.zip and uncompress it to 80.52_75m.dem

15.33.3.03  Start a New Project: ‘Watershed’, Set the project settings to Projected Coordinate Systems, UTM – WGS 1984, WGS 1984 UTM Zone 12N, Use projection Information to ‘True’

15.33.3.04  Use the [GIS TOOLS] then [RASTER] then [CHANGE GRID FORMAT] to change DEM into tif image and add to ‘Watershed’ project.

15.33.3.05  From the [WATERSHED DELINEATION], select [ADVANCED TAUDEM FUNCTIONS].

15.33.3.06  Click on [SELECT BASE DEM GRID].

Normally, the user would get a DEM file from the
internet but here will use image01

15.33.3.07 Click on [WATERSHED DELINEATION], then [ADVANCED TAUDEM FUNCTIONS], and then [DO ALL DEM PROCESING]

![Figure 15 - 60 – DEM Processing]

15.33.3.08 Click [COMPUTE]. It will take several minutes

15.33.3.09 The program will generate a series of grids
- Pit Filled Elevation Grid (FEL)
- D8 Slope Grid (SD8)
- D8 Flow Direction Grid (P)
- Dinf Flow Direction Grid (ANG)
- Dinf Slope Grid (SLP)
- D8 Contributing Area Grid (AD8)
- Dinf Specific Catchment Area Grid (SCA)
• Strahler Network Order Grid (GORD)
• Longest Upslope Length Grid (PLEN)
• Total Upslope Length Grid (TLEN)
• Stream Raster Grid (SRC)

**Figure 15 - 61 – DEM Grids**

15.33.3.10 Create a point file called outletpoints

15.33.3.11 Turn off all the grids except “Strahler Network Order Grid”.

15.33.3.12 Add a point to outlet points at a point downstream of the watershed the user is working on.
Click on [WATERSHED DELINEATION], then [ADVANCED TAUDEM FUNCTIONS], and then [DO ALL NETWORK AND WATERSHED STEPS].

The program will generate several grid files:
- Stream Order Grid (ORD)
- Watershed Grid (W)
- Stream Reach Shapefile
- Watershed shapefile
Figure 15 - 63 – Watershed Grids
Exercise #06

Ex06.01 Open Projects

- Open New Project

Ex06.02 Create a Tif File from DEM

- Select a DEM from anyplace in the United States, download it, change the format and produce a tif image. The natural project of DEM is in UTM, Be careful to get the right zone.

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex06_01.jpg in the exercise folder

Ex06.03 Run Manual Watershed Delineation tool

- Run the Manual Watershed Delineation Tool and produce all the grids associated with the tool.

- Click on [EDIT] then [EXPORT] then [MAP], save the file as ex06_02.jpg in the exercise folder

END OF EXERCISE #06
Lesson #07

Chapter 16  MapWindow Additional Plug-ins

16.1  MapWindow GIS Additional Plug-ins

16.1.1  General Information about MapWindow GIS Plug-ins

  16.1.1.01  MapWindow GIS Plug-ins
  • Safety Software Suite
  • Shape2Earth
  • DXF to Shapefile Converter
  • AutoCAD Layer Exporter
  • UMN MapServer Exporter
  • Bayesian Network Analyst Plug-in
  • MapServer Project

16.2  Safety Software Suite

16.2.1  General Information about Safety Software Suite

  16.2.1.01  Crash Analysis, Intersection Analysis, Signs management, Road Shape File Attribute correction Wizard, and more... All for Traffic Safety Improvement.
16.2.1.02  This will add several tools to the ‘[Edit Plugins]’ drop-down window

- [ADA] -
- [CRASH TOOL] - This plug-in accesses data associated with collision reports
- [GPS CONTROL] - This plug-in gives GPS device functionality to MapWindow GIS
- [NOTE PLUG-IN] - This Plug-in adds the ability to add a note/photo to a location on the map.
- [ROAD CUTS PLUG-IN] - This Plug-in adds the ability to record Road Cuts.
- [RSA PLUG-IN] - This plug-in accesses data associated with collision reports
- [SHAPEFILE CORRECTION WIZARD] - This plug-in accesses data associated with collision reports
- [SHAPEFILE QUERY TOOL] - This plug-in selects shapes in a shapefile based on general queries
- [SIGNS] - This plug-in accesses data associated with the signs displayed in the signs layers

16.2.1.03  Several new tools appear as a toolbars

Figure 16 - 1 – New tools

- [ADA]
- [CRASH TOOL DATA ENTRY]
• [CRASH TOOLS COLLISION VIEWER]
• [INTERSECTION ANALYSIS TOOLS]
• [DISTANCE ALONG A ROUTE TOOL]
• [ACTIVATE GPS UNIT]
• [ADD A NOTE TO THE MAP]
• [ROAD SHAPEFILE CORRECTION WIZARD]
• [QUERY THE CURRENT LAYER]
• [ATTRIBUTE QUERY]
• [SPATIAL QUERY]
• [CLEAR SELECTED SHAPES]
• [ADD A NEW SUPPORT]
• [COPY AN ASSEMBLY FROM FAVORITES]

16.2.1.04 [ADA] Drop-down Menu
• [OPEN ADA DATABASE]
• [ADD NEW ADA LOCATION]
• [PRIORITIZE LOCATION]
• [SELECT]
  o [SELECT ADA LOCATIONS FROM SCREEN]
  o [SELECT ADA LOCATIONS BY ATTRIBUTE]

16.2.1.05 [CRASH TOOLS] Drop-down Menu
• [OPEN/CREATE CRASH DATABASE AND...
SHAPEFILES
• [ADD CRASH]
• [SELECT CRASHES FROM SCREEN]
• [CRASH ANALYSIS/QUERY TOOLS]
• [RESET CRASH CONNECTIONS]
• [SET DEFAULTS]
  o [SET COLLISON DEFAULTS]
  o [SET UNIT DAFAULTS]
  o [SET PASSENGER DAFAULTS]
• [BATCH UPDATE]
  o [GENERIC DATABASE UPDATE]
  o [GENERIC LOCATION]
  o [STATE OF IDAHO]
  o [STATE OF UTAH]

16.2.1.06 [INTERSECTION TOOLS]
• [OPEN/CREATE INTERSECTION DATABASE AND SHAPEFILE]
• [ADD INTERSECTION]
• [SELECT INTERSECTION FROM SCREEN]
• [INTERSECTION ANALYSIS/QUERY TOOL]
• [RESET INTERSECTION CONNECTION]

16.2.1.07 [PHOTO LOG VIEW]

16.2.1.08 [ROAD CUTS]
• [SHAPEFILE AND DATABASE CONNECTION]
• [ADD ROAD CUTS]
• [SELECT ROAD CUTS]
16.2.1.09 [RSA] – Road Safety Audit

- [SET RSA SHAPEFILES AND DATABASE]
- [NEW ROAD SAFETY AUDIT]
- [SELECT ROAD SAFETY AUDIT PROJECT]
- [SELECT ROAD SAFETY AUDIT LOCATION]
- [CREATE A PRIORITY GRID OF ALL PROJECT LOCATION]
- [CREATE PRIORITY GRID BY IMPLEMENTATION PERIOD]
  - [CREATED FOR LESS THAN 6 MONTHES]
  - [CREATE FOR 6 MONTHES TO 1 YEAR]
  - [CREATE FOR 1 TO 3 YEARS]
  - [CREATE FOR GREATER THAN 3 YEARS]

16.2.1.10 [SHAPEFILE ATTRIBUTE CORRECTION]

- [ROAD SHAEFILE CORRECTION WIZARD]
- [ROAD SHAEFILE SEGMENTATION WIZARD]
- [SET ROAD SHAPEFILE CONNECTIONS AND FIELD NAMES]

16.2.1.11 [SUPPORT/SIGNS TOOLS]

- [OPEN/CREATE SIGN DATABASE AND SHAPEFILES]
- [ADD SUPPORT LOCATIONS]
- [SELECTION SUPPORT LOCATIONS]
  - [SELECT SUPPORT LOCATIONS FROM SCREEN]
  - [SELECT SUPPORT LOCATIONS BY POLYGON]
  - [SELECT SUPPORT LOCATIONS BY SIGN ATTRIBUTE]
Lesson #07 – Chapter 16 – MapWindow Additional Plugins

- [SELECT SUPPORT LOCATIONS BY SUPPORT ATTRIBUTE]
- [SUPPORT/SIGN QUERY]
- [SET DEFAULTS]
  - [SET SUPPORT DEFAULTS]
  - [SET SIGN DEFAULTS]
- [MORE TOOLS]
  - [SIGN OPTIONS]
  - [MOVE A SUPPORT]
  - [COPY COMPLETE SIGN ASSEMBLY]
  - [BUILD ASSEMBLY FROM FAVORITES]
  - [GENERATE A WORK COMPLETED REPORT]
  - [SELECT BY MUTCD TOOL]
  - [MERGE SLAVE AND MASTER]
- [BATCH UPDATES]
  - [BATCH UPDATE LOCATION INFORMATION]
  - [BATCH UPDATE FROM OLD TAMS DATABASE]
- [ONHAND INVENTORY]
  - [MANAGE SIGN INVENTORIES]
  - [MANAGE SUPPORT INVENTORIES]
  - [MANAGE SUPPORT BASR INVENTORY]

16.2.2 Setup for Safety Software Suite

16.2.2.01 Navigate to http://www.mapwindow.org/download.php

16.2.2.02 Click on Safety Software Suite
Download SSUpdate4.4.5.exe into a temporary directory

Navigate to temporary directory and double-click on SSUpdate4.4.5.exe

Shape2Earth

General Information about Shape2Earth

This plugin is shareware but apparently the tool can grab imagery from Google earth works regardless if it is registered or not.

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

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

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!

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*.

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

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

16.3.2  Setup for Shape2Earth

16.3.2.01  Close the *MapWindow GIS* program

16.3.2.02  Open web browser and go to [http://www.mapwindow.org/](http://www.mapwindow.org/)

16.3.2.03  Click on [DOWNLOAD NOW]

16.3.2.04  Scroll down page and Click on [SHAPE2EARTH]

<table>
<thead>
<tr>
<th>Safety Software Suite</th>
<th>Crash Analysis, Intersection Analysis, Signs management, Road Shape File Attribute correct...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape2Earth</td>
<td>Converts shapefiles to Keyhole Markup Language (KML) for viewing in Google Earth...</td>
</tr>
<tr>
<td>DXF to Shapefile Converter</td>
<td>This is a plugin to convert from AutoCad DXF (Data eXchange Format) files into ESRI Shape...</td>
</tr>
</tbody>
</table>

**Figure 16 - 2 – Download table**

16.3.2.05  Click on [Shape2Earth431_setup.exe]
16.3.2.06 Save to the plugins directory (i.e. D:\Program Files\MapWindow\Plugins)

16.3.2.07 Execute the file

16.3.2.08 Select the language to be used.

**Figure 16 - 3 - Download**

**Figure 16 - 4 – Setup – Shape2Earth**
16.3.2.09 Click [NEXT] 

Figure 16 - 5 – License Agreement 

16.3.2.10 Agree to the License and click [NEXT]
16.3.2.11 Set the installation directory and click [NEXT]
16.3.2.12 Click [INSTALL]

16.3.2.13 Restart the MapWindow GIS Program

16.3.2.14 Click on the [PLUG-IN] button on the main menu.

16.3.2.15 Select [SHAPE2EARTH].

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

- [EXPORT TO KML]
16.3.3 Usage of Shape2Earth

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

16.3.3.02 Click on **SHAPE2EARTH**

16.3.3.03 Click on **EXPORT TO KML**

![WARNING]

WARNING:
This version of Shape2Earth was compiled for MapWindow Version 4.3.2571.
You are currently using MapWindow Version 4.3.2503.
It is strongly recommended that you cancel and get the appropriate version of MapWindow.

[OK] [Cancel]

**Figure 16 - 8 - Warning**

16.3.3.04 Click **[OK]**
16.3.3.05 Click [RUN UNREGISTERED]
Figure 16 - 10- Evaluation

16.3.3.06  Set Opacity and 3D Options

16.3.3.07  Click on [PROPERTIES]
16.3.3.08 Set options for the shapefile and then click the [STYLE] button
16.3.3.09 Select the symbol desired and then click on [OK]

16.3.3.10 Click on [GIS DATA]
16.3.3.11 Select the attribute information to be included in the KML Layer

16.3.3.12 Click on [QUERY]
16.3.3.13 Use the query tool to define a subset of features if desired

16.3.3.14 Click on [PROJECTION]
16.3.3.15 This indicates the projection of the data being sent to Google Earth

16.3.3.16 Click on [SAVE AS KML] or [LOAD IN GE]
16.3.3.17 Click on [SHAPE2EARTH]

16.3.3.18 Click on [GET IMAGE FROM GE]

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

![Image Capture Window](image.png)

*Figure 16 - 16 – Image Capture*

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

16.3.3.21 Click on [CAPTURE IMAGE] on GE Image Capture Window

16.3.3.22 The program will ask to set the Google Earth View, click [YES]
16.3.3.23 Click on [CAPTURE IMAGE] on GE Image Capture Window

16.3.3.24 The program will ask where to save the image file, give the file a name and click [SAVE].

16.3.3.25 Click [CLOSE] in GE Image Capture Window

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

16.4 DXF to Shapefile Converter

16.4.1 General Information about DXF to Shapefile Converter

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

16.4.2 Setup for DXF to Shapefile Converter

16.4.2.01 Navigate to http://www.mapwindow.org/download.php

16.4.2.02 Click on DXFtoShapefile-BinariesONLY.Zip

16.4.2.03 Download and uncompressed the file into the MapWindow GIS Plug-ins Directory
16.4.2.04 Click on [PLUG-INS] then [AUTOCAD DXF IMPORTER]

16.4.3 Usage of DXF to Shapefile Converter

16.4.3.01 Click on [IMPORTERS] on “Main Menu”

16.4.3.02 Click on [IMPORT AUTOCAD DXF FILE]

Figure 16 - 17 – Import AUTOCAD DXF FILES
16.4.3.03 Fill in appropriate fields and click [CONVERT]

16.5 AutoCAD Layer Exporter

16.5.1 General Information about AutoCAD Layer Exporter

16.5.1.01 The ACAD Exporter will export all entities visible in the window to AutoCAD. This plug-in requires a valid license for AutoCAD on the user’s 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.

16.6 UMN MapServer Exporter

16.6.1 General Information about UMN MapServer Exporter

16.6.1.01 This is a MapWindow GIS plug-in to export the currently loaded project to a University of Minnesota MapServer project

16.6.2 Setup for UMN MapServer Exporter

16.6.2.01 Navigate to http://www.mapwindow.org/download.php
A Practical Look at MapWindow GIS (1st Edition)
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16.6.2.02 Click on UMN Mapserver Exporter

16.6.2.03 Click on mwmapserverExport-Binary.zip

16.6.2.04 Download and uncompress the file into the MapWindow GIS Plug-ins Directory

16.6.2.05 Click on [PLUG-INS] the [MAPSERVER EXPORT]

16.6.3 Usage of UMN MapServer Exporter

16.6.3.01 Click on [MAPSERVER EXPORT] on “Main Menu”

16.7 Bayesian Analysis Plug-in using SMILE

16.7.1 General Information about Bayesian Analysis Plug-in using SMILE

16.7.1.01 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.

16.8 MapServer Project Generator

16.8.1 General Information about MapServer Project Generator
16.8.1.01 A plug-in used to generate a full MapServer project from GIS layers opened in MapWindow GIS.

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

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

16.8.2 Setup for MapServer Project Generator

16.8.2.01 Navigate to http://www.mapwindow.org/download.php

16.8.2.02 Click on Mapserver Project Generator

16.8.2.03 Click on mwMapServerGeneratorPlugin.zip

16.8.2.04 Download and uncompress the file into the MapWindow GIS Plug-ins Directory

16.8.2.05 Click on [PLUG-INS]

16.8.2.06 Click on [MAPSERVER GENERATOR]

16.8.3 Usage for MapServer Project Generator

16.8.3.01 Click on [MAPSERVER GENERATOR] on ‘Main Menu’.
16.8.3.02 Click on \textbf{[GENERATE MAP FILE]} 

![Generate Mapserver Files](image)

Figure 16 - 18 – Generate MapServer File

16.8.3.03 Fill in appropriate values and click on \textbf{[OK]}. Note that the user must have a valid server path identified in the tool for it to run.
Exercise #07

Ex07.01 Open Projects

- Open Project started in Exercise #03
- Generate a MapServer Project File using the following values.
  - Replace `<user name>` in “Project Path on Server” with the word ‘server’ i.e. server.
  - Remove `<sub-directory>`. From this path
- Replace `<user name>` in “Project Root Path on Server” with the word ‘server’ i.e. server
Exercise #07 - 1 – Generate MapServer File
Lesson #08

Chapter 17  Third Party Plug-ins

17.1  Utah Water Research Laboratory (EMRG) Plug-ins

17.1.1  General Information about EMRG Plug-ins

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

- 3-D TIN Viewer Plug-in
- Photo Viewer plug-in
- Streamflow Analyst plug-in
- Water Quality Analyst Plug-in

17.2  3-D TIN Viewer Plug-in

17.2.1  General Information about 3-D TIN Viewer Plug-in

17.2.1.01  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.

17.2.1.02  The user must register tunvuc.ocx (Start - Run - c:\windows\system32\regsvr32.exe c:\path\to\tinvuc.ocx) before using the plug-in, or he/she will receive a 'Class Not Registered' error.
17.3 **Photo Viewer plug-in**

17.3.1 **General Information about Photo Viewer plug-in**

17.3.1.01 This plug-in allows one to link a shapefile of photo points on a map to digital photos.

17.4 **Streamflow Analyst plug-in**

17.4.1 **General Information about Streamflow Analyst plug-in**

17.4.1.01 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.

17.5 **Water Quality Analyst Plug-in**

17.5.1 **General Information about Water Quality Analyst Plug-in**

17.5.1.01 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.
Chapter 18  Stand Alone Utilities

18.1  Stand Alone Utilities

18.1.1  General Information about Stand Alone Utilities

18.1.1.01  Stand Alone Utilities
  • WayPoint+ to Shapefile Converter
  • Georeferencing Tool
  • MonoComp

18.2  Waypoint+ to Shapefile

18.2.1  General Information about Waypoint+ to Shapefile Converter

18.2.1.01  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.

18.3  Georeferencing Tool

18.3.1  General Information about Georeferencing Tool

18.3.1.01  This 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
18.4 MonoComp

18.4.1 General Information about Monocomp

18.4.1.01 Update: 26 March-2006: MonoComp initially was conceived for analysing image profiles by Variance-CoVariance Analysis methods and as tool to measure image coordinates (pixel positions). The latter could be use in conjunction 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 aerial photos and for digitising photo content into GIS shapfiles and much more.

18.4.1.02 10-Jan-2006: Added real time GPS data collection, improved layer handling, corrected some bugs.

18.4.1.03 22-February-2006: Fixed one more serious 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.
Chapter 19  Extra Features

19.1  Map Overview

19.1.1  General Information for Map Overview

19.1.1.01  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 is 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.

19.1.1.02  The map overview appears in the lower left corner:
19.1.2 Setup for Using the Map Overview: No Additional Setup Required

19.1.3 Usage of Map Overview

19.1.3.01 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 [UPDATING 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.

19.1.3.02 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 20    Customization and Programming

20.1     Plug-in Creation

20.1.1    General Information about Plug-in Creation

20.1.1.01    MapWindow GIS 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 GIS as a viewing platform for GIS data, including a custom-built plug-in to perform additional analysis or perform specialized database queries.

20.1.1.02    MapWindow GIS 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 GIS 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.

20.1.1.03    MapWindow GIS 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 GIS plugin directory. This is typically c:\Program Files\MapWindow\Plugins. If the user wishes, the user may create subdirectories inside this Plugins directory for organizational purposes.

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

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


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.

20.1.1.06 For help in developing custom plug-in tools, a number of resources are available:
Online Documentation for Plug-in Developers:


Online Discussion Forum for Plug-in Development Questions:

http://www.mapwindow.org/phorum/list.php?

20.2 Custom Application Development using MapWinGIS ActiveX

20.2.1 Information about Custom Application Development using MapWinGIS ActiveX

20.2.1.01 If the user wants to develop a standalone application that does not use MapWindow GIS, 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!

20.2.2 Setup for Custom Application Development using MapWinGIS ActiveX: No Additional Setup Required

20.2.3 Usage of Custom Application
Development using MapWinGIS ActiveX

20.2.3.01 The MapWinGIS ActiveX Control is actually used within MapWindow GIS itself – it is the “white box” area of the MapWindow GIS application, where map data appears.

20.2.3.02 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.

20.2.3.03 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.

20.2.3.04 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_baley.zip

Microsoft Access 2000:

http://www.mapwindow.org/download/MapWindowInAccess2000.mdb

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

Online Documentation for MapWinGIS:


Online Discussion Forum for ActiveX Control Development:

Chapter 21       Hard Copy / Exporting

21.1       Printing a Hard Copy

21.1.1       General Information about Printing

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

21.1.2       Setup for Printing: No Additional Setup Required

21.1.3       Printing

21.1.3.01   In order to print the current map view, select the [FILE] menu

21.1.3.02   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.
Chapter 21 - Figure 1 - Print

21.1.3.03 Select [PROPERTIES] ands set up the user’s windows printer. Press [OK]

21.1.3.04 Select [PRINT PREVIEW] to check for changes.

21.1.3.05 Select [PRINT].

21.2 Exporting

21.2.1 General Information about Exporting:

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

21.2.2 Setup for Exporting: No Additional Setup Required

21.2.3 Usage of Exporting:

21.2.3.01 To do this, select the [EDIT] menu
21.2.3.02 Select [**EXPORT**]

21.2.3.03 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.

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

21.2.3.05 If the user wishes 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”.

21.2.3.06 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.

21.2.3.07 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.

21.2.3.08 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 22  Support and Help

22.1  Support

22.1.1  General Information about Support

22.1.1.01  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.

22.1.1.02  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

22.1.1.03  There are several different discussion forums available, including one specifically for users of the MapWindow GIS 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

22.1.1.04  Also available is an online WIKI, or community-editable database of pages, providing documentation on MapWindow GIS. The online
documentation is geared toward the developers using MapWindow GIS 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 GIS itself.

END OF LESSON #08
Appendix A  Quiz Answers

Quiz #01
01-01  no
01-02  yes
01-03  2001-2005
01-04  1991-1995
01-05  Erie
01-06  ALW, PUW, PSC
01-07  less
01-08  30-35
01-09  30-35
01-10  200-250 km²

Quiz #02
02-01  BSM
02-02  SMN – PIH

Quiz #03
03-01  Mine2
03-02  Washington
03-03  Mine 4 and Mine 1

Quiz #05
05-01  yes
05-02  2500-3000
05-03  4500-5000
05-04  20000-25000
05-05  4500-5000
Appendix B Sample WMS and WFS Links

http://www2.dmsolutions.ca/cgi-bin/mswms_gmap?Service=WMS&amp;VERSION=1.1.0&amp;REQUEST=GetCapabilities

http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi?CONFIG=main&amp;SERVICE=WMS&amp;?VERSION=1.1.1&amp;REQUEST=GetCapabilities

http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi?CONFIG=main&amp;SERVICE=WMS&amp;?VERSION=1.1.1&amp;REQUEST=GetCapabilities

http://libcwms.gov.bc.ca/wmsconnector/com.esri.wsit.WMSServlet/ogc_layer_service?REQUEST=capabilities

http://www.geographynetwork.com/servlet/com.esri.wms.Esrimap?ServiceName=GFW_Forest&amp;VERSION=1.0.0&amp;request=capabilities

http://www.lifemapper.org/Services/WMS/?Service=WMS&amp;VERSION=1.1.1&amp;request=getcapabilities

http://www.geographynetwork.ca/wmsconnector/com.esri.wsit.WMSServlet/Geobase_NRN_NewfoundlandAndLabrador_I_Detail?request=GetCapabilities

http://www.demis.nl/mapserver/request.asp?Service=
WMS&Version=1.1.0&Request=GetCapabilities

http://mapserv2.esrin.esa.it/cubestor/cubeserv/cubeserv.cgi?VERSION=1.1.1&REQUEST=GetCapabilities&SERVICE=WMS

http://terraservice.net/ogccapabilities.ashx?version=1.1.1&request=GetCapabilities

http://vision.edina.ac.uk/wmsservlet/servlet/gt2wms?version=1.1.0&request=getCapabilities

http://wms.cits.rncan.gc.ca/cgi-bin/cubeserv.cgi?VERSION=1.1.0&REQUEST=GetCapabilities

http://datamil.udel.edu/servlet/com.esri.wms.Esrimap?servicename=DE_census2k_sf1&VERSION=1.0.0&request=capabilities

http://maps.customweather.com/image?REQUEST=GetCapabilities&service=WMS

http://www.refractions.net:8080/geoserver/wfs/GetCapabilities

http://map.ns.ec.gc.ca/MapServer/mapserv.exe?map=/mapserver/services/envdat/config.map&service=WFS&version=1.0.0&request=GetCapabilities

http://emandev.cciw.ca/cgi-bin/mapserv.exe?map=/inetpub/wwwroot/emanco/cgi-
A Practical Look at MapWindow GIS (1st Edition)
Appendix B– WMS/WFS Links

-------------------------------------------------------------------------------
bin/mapserver/naturewatch.map&version=1.0.0&service=WFS&request=GetCapabilities


http://www2.dmsolutions.ca/cgi-bin/mswfs_gmap?version=1.0.0&request=getcapabilities&service=wfs

http://gws2.pcigeomatics.com/wfs1.0.0/wfs?service=WFS&request=getcapabilities

http://ogc.intergraph.com/OregonDOT_wfs/request.asp?VERSION=0.0.14&request=GetCapabilities

http://dev.geographynetwork.ca/ogcwfs/servlet/com.esri.ogc.wfs.WFSServlet?Request=GetCapabilities

http://www.bsrsi.msu.edu/cgi-bin/wmt/wms.cgi?WMTVER=1.0.0&REQUEST=capabilities


-------------------------------------------------------------------------------
http://www.digitalearth.gov/wmt/xml/capabilities_1_0_0.xml

http://gis.vibamt.dk/ArealInfo/AI_WMS.asp?service=wms&VERSION=1.1.0&REQUEST=Getcapabilities

http://atlas.gc.ca/cgi-bin/atlaswms_en?VERSION=1.1.0&request=GetCapabilities

http://www.bsc-eoc.org/cgi-bin/bsc_ows.asp?version=1.1.1&service=WMS&request=GetCapabilities

http://ceoware2.ccrs.nrcan.gc.ca/cubewerx/cubeserv/cubeserv.cgi?version=1.1.1&service=WMS&request=GetCapabilities

http://cgns.nrcan.gc.ca/wms/cubeserv.cgi?request=getCapabilities

http://cgns.nrcan.gc.ca/wfs/cubeserv.cgi?request=getCapabilities

http://mds.glc.org/cgi-bin/carolwms?VERSION=1.1.1&REQUEST=GetCapabilities

http://ogc.cast.uark.edu:8080/tnm/servlet/mapserver?REQUEST=Capabilities&WMTVER=1.0.0

http://maps.customweather.com/image?REQUEST=Get
Capabilities

http://webapps.datafed.net/dvoy_services/ogc.wsfl?SERVICE=WMS&VERSION=1.1.1&REQUEST=GetCapabilities