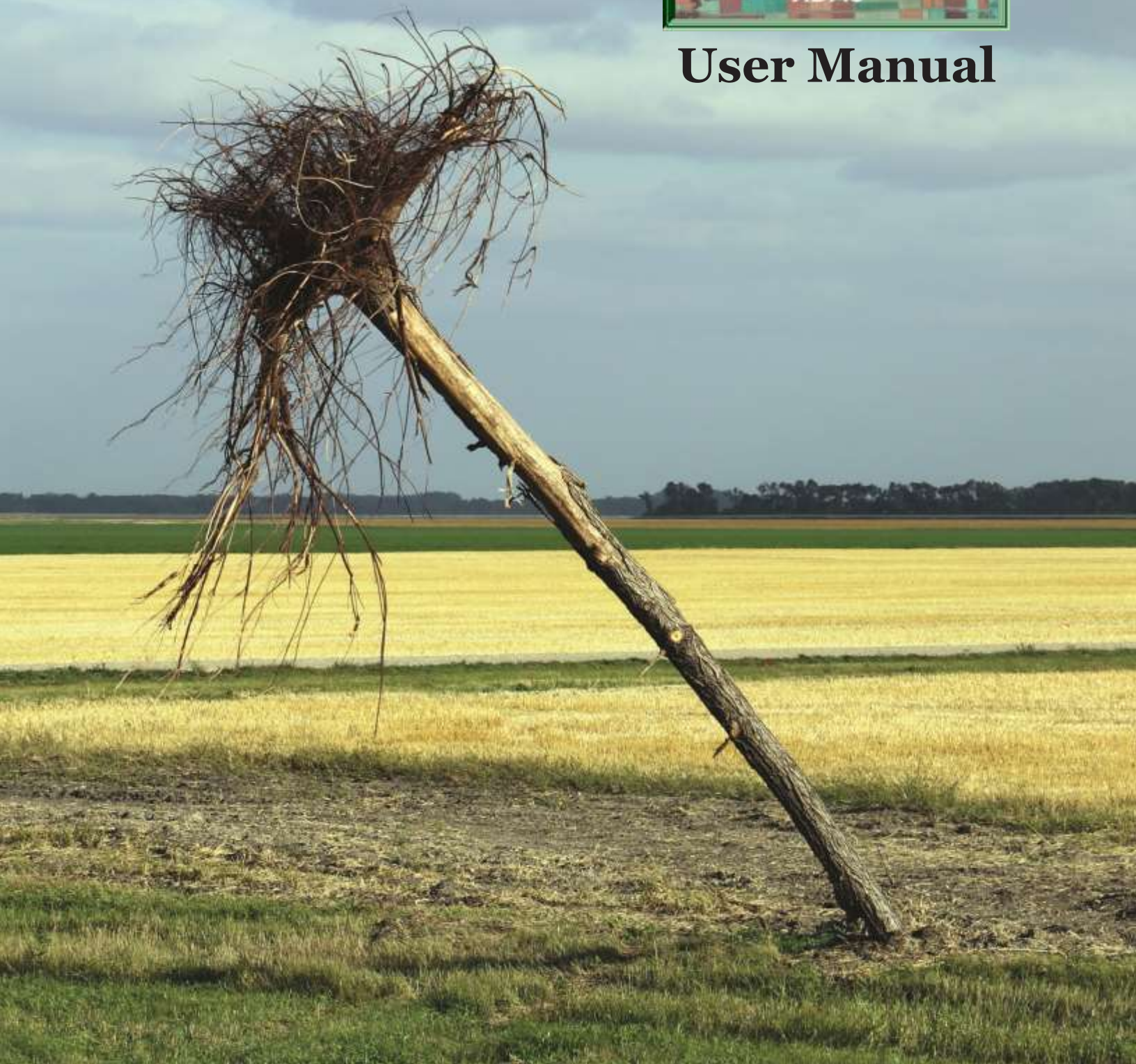


2019



User Manual



Contents

<u>File Storage & Structure Layout</u>	8
Getting Started with Ag Data Mapping Solution	9
<u>Settings</u>	10-17
Window Dock Settings	18-20
<u>Toolbars</u>	
Top Toolbar—Map Toolbar	21-22
Bottom Toolbar—Drawings / Surfaces /Web Layers/ Multi-Band Images	23-28
<u>Drawing Tools (Polygons, Lines & Points)</u>	29
Extracting Drawing Layers from a Mass Collection (CLU or Yield)	30-32
Hand Drawing - Polygons, Lines & Points	33-35
Merging Boundaries –Boundary Tools (Poly-Polygons)	36-37
Collect with GPS Using Ag Data Mapping Solution (Map Window)	38
Decomposing a Poly-Polygon	39
Editing- Moving Vertices & Moving Points	40-41
Drawing & Editing- Selecting Active Layer	42
Drawing- Point, Line, or Polygon Shapefile-Settings	43-44
Drawing- Snap—Trace	45
Drawing- Rectangle or Circle	46
Drawing Tools– Move, Rotate, Copy, Split, Clip	47-51
Shape Tools—Buffer, Clip, Dissolve, Union, Merge	52-57
<u>Display Properties</u>	
Points	58-60
Lines	61-63
Polygons	64-66
Display Settings for ADMS Pre 8.2	67
MY NOTES	68
<u>Quick Notes for Satellite Imagery</u>	69
<u>Creating Zones from Imagery</u>	
Creating Grower, Farm, Field	70
Creating Boundaries (Drawing—CLU—Auto Draw Yield)	71-75
Extract TIFF Image From NAIP	76
Extract Images From Web Layers	77-81
Creating Guide Lines for Image Extraction	82
Extract from Image to Zone	83
Image Re-Projection	84
Manual Image Extraction	85-88
MY NOTES	89
Surface Editing Tools (Invert—Border Effect—End Values—Smoothing)	90-92
Raster Tools (Difference—Intersect—Mosaic—Pixelize—Resample—Clip)	93-99
Correlation Matrix	100-101
Merging Images (Average of All Layers)	102
Manual Zone Creation	103-105
Thematic Raster Settings & Quick Zones	105-106

Contents

[Creating Nutrient Layers—\(Prescriptions\)](#)

Creating Fertilizer Products	107
Creating Prescription Maps	108
Creating Prescription Maps—Manually	109-111
Common Name Mapping Database	112
Color Layers—Fixed Color Theme	113-117

[Using CSV - XLS Soil Test Results](#)

Using CSV - XLS Soil Test Results Phosphorous Conversion	118-121
Using CSV - XLS Soil Test Results Phosphorous Conversion	119-120
Using Blend Groups	122
Enforcing Min and Max Rates	123
Creating a ModArea or Check Strip & Editing Raster Values	124-125
Creating Yield Goal Map—Merge Zone Results Manually	126-127

MY NOTES 128

[Quick Notes for Grid Sampling](#)..... 129

[Grid Sampling](#)

Setting up a Grid	130-133
Labeling Grid Points	134
Moving Grid Points	135
Creating Custom Grid Points	136-140
Creating Nutrient Layers	141-147
Creating Nutrient Layers Phosphorous Conversion	143-144
Common Name Mapping	146
Printing Grid Nutrient Layers	148-150
Using Scripts to Write Prescriptions	151-153
Sampling Methods	154-155

MY NOTES 156

[VRT Map from Hand Drawn Polygons](#)..... 157-158

[Making a Test Prescription](#) 159-161

[Exporting Prescription Maps](#)

Shape Grid—Export Overview... ..	162-165
Shape Grid—Supported Controllers... ..	166-172
Increment Raster— Increment SHP— Dissolve.....	173-175
Shape Contours—Export Process	176-177
Shape Export to Websites (my John Deere & FieldView)	178-179
John Deere GRX—2600 & 2630 Controller	180
FODM Device—Export Overview	181-183
FODM Device—Supported Controllers	184-189
Topcon X20 / Zynx	190-191

MY NOTES 192

[Printing \(Tools / Batch / Multi-Layer\)](#) 193-195

Creating Print Templates & Using Templates... ..	196-198
Print Map to Bitmap.....	199

[Exporting Files as KMZ for Google Earth™](#) 200-201

Files as KML for Google Earth™	202-203

Contents

<u>Quick Notes for Topography RTK</u>	204
<u>Quick Notes for Topography LIDAR</u>	205
<u>Creating Topography & Watersheds</u>	206
Importing Data	207
Adjusting Levels between Multiple "Point" .shp Files	208
Merge .shp files with Z Adjust	209
Merge All Visible .shp files	210
Cleaning Elevation SHP - Database	211
Creating the Topography Map	212
Grid the Points	213
Select the Boundary	214
Cropping the Grid to a Boundary	215
Processing LIDAR LAS Files	216-218
Running the Watershed Modeling Routine	219-220
Using Point Offset Routines	221
Apply the Point Offset	222-223
Re-Project the Raster	224
LiDAR-RTK Merge	225-229
MY NOTES	230
<u>Quick Notes for Drainage Planning</u>	231
<u>Quick Notes for Surface Drainage</u>	232
<u>Surface Drainage</u>	233
Buttons & Tools	233
Scraper Settings	234
Show Design Errors	235
Setting Raster Source - Profile	236
Profile Button	237
Reverse Ditch Direction	238
Edit Graph	239
Profile Graph Window	240
Printing	241
MY NOTES	242
<u>Creating Tile Plans</u>	243-244
Overview of Tile Planning and Project	243-244
Creating Outlet Points	245
Adjusting Elevation With Mod Area	246
Merge Topography.grd files	247
Setbacks (Buffer Select Items)	248
Calculating Tile Size	249
Drawing in Sized Tile	250
Right Side Buttons	251
Tile Settings	252-253
Setting Raster Source - Tile Profile	254
Creating Tile Profile	255
Creating Proposed Main	256
Creating Ancillary Layers	257
Drawing Laterals "Tile Design" Tab	258
Adding in Random Laterals	259
Reverse Tile Direction	260
Reviewing Tile Plan	261
Printing Profile	262

Contents

MY NOTES	263
3D Map Window	264-265
Surface Drainage - Import from SD Drain	266
Exporting Files to SD Drain	267-269
Exporting Tile Plan to AGPS Pipe Pro	270-273
 <u>Processing Yield Data</u>	
Processing through Yield Editor	274-277
Processing KB / GK Yield Data	278-284
Cleaning Yield In ADMS	285-287
Normalizing & Merging Yield	288-289
Yield—Create Grid From Polygon	290
Yield—Create Grid From Points	291
Cleaning Yield Data - Raster Method & Pixelize	292-296
Processing Yield Data to Net Profit Map	297
 <u>Processing Veris Data</u>	
Importing & Surfacing Veris DAT Files	298-299
 <u>Query Tools</u>	299-301
 <u>Summarize Another Layer</u>	302-304
 <u>Advanced Scripting</u>	
Getting Started with Map Math	305
What is a Null Value? & Declaring and Using Variables	306-307
Introduction to Functions, Object, Enumerations and Collections	308-309
Raster Object and the Rasters Collection	310
Example: Minnesota P & K Recommendation for Corn	311
Opening a Script Editor in Excel 2007 & 2003	312-313
P & K Continued—Introducing—Select Case	314-315
Script Functions, Using Functions, Map Math Controls	316-317
System.Math Functions	318
Using GK Created Scripts	319-322
 <u>Quick Notes for GPS</u>	
In Field Use - General / Points / Lines / Boundaries / Drainage Surveys	323-326
Connection Instructions	327
General GPS Information	328
 <u>GK—VR Control Quick Start Guide</u>	329-330
 <u>Veris Logging</u>	
Hardware Setup	331
Cables	332
Software Setup	333-334
"Run" Tab Items	335
 <u>Setting Up Web Based Background Layers (WMS)</u>	336-338

Contents

[Downloading USDA Geospatial Data](#)..... 339-345

[Downloading USDA NAIP Data](#) 346-348

[Soil SURGO Download](#)..... 349-350

[Downloading and Processing USGS Imagery \(EarthExplorer\)](#)

Earth Explorer & Settings 351-352

Downloading Landsat & Sentinel & Lidar 353-356

Landsat Data Processing - Extracting & Merging Images..... 357-358

Landsat Data Processing - Cutting Images by Shape File 359-361

Landsat Data Processing - Cutting to Trade Territory 362-363

Sentinel Data Processing - ADMS- 64bit vs 32bit..... 364-365

[Downloading LIDAR Data](#)

USGS National Map site..... 366-367

USGS Rocky-FTP LiDAR 368-369

ND LIDAR Dissemination 370-373

Minnesota DNR FTP 374-375

Iowa LIDAR Data..... 376-377

[LIDAR—LAS Catalog Creation \(LAS & LAZ\)](#) 378

MY NOTES 379

[Glossary](#)

GIS Terms 380-382

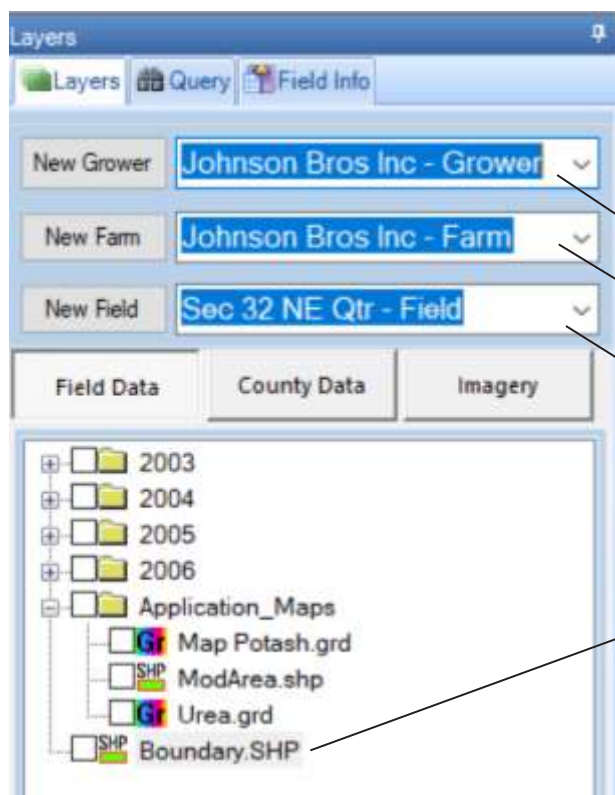
File Storage & Structure Layout

When you open up ADMS you will find that every window has Grower-Farm-Field as drop downs in the upper left corner. This is how to select the field and files to be used. Also, the names located in these drop downs are going to print on the side of most of the maps. Ag Data Mapping Solution software is based on a very simple folder file format. When you go to Windows Explorer to look at your files and folders, the names displayed on the folders in the "GKData" folder are the same seen in Ag Data Mapping Solution. You can name, rename and create folders in either ADMS or Windows Explorer (you may get errors in both windows if you have files open in the folders you are renaming).

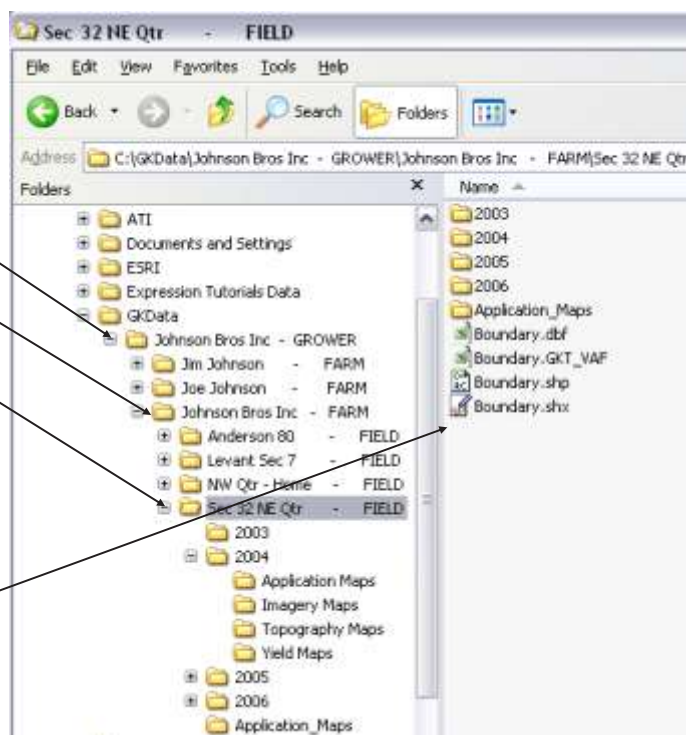
Below is an example of how to build the file structure. If you are a farm with only one (1) entity, then use this structure: (ex. Grower-"Johnson Bros Inc" & "Farm-Johnson Bros Inc" then your Fields). Take note of Field "Sec 32 NE Qtr"; it is populated with folders of years. At the end of each year, place all your data into a completed year folder. Using some sort of file structure similar to the "2004" example (Application, Imagery, Yield and Topography folders). If "Topography" data is only collected

every few years, you may want to move that up one level to be stored in the "Field" folder. Only create folders for information that is there, having an empty "Topography" folder stored in a "Year" folder can be confusing. It may make you think data was collected that year when it really was NOT. If the field is farmed as one field year-in and year-out, the "Boundary" file should stay in the "Field" folder. If the field is farmed differently every year, then the "Boundary" should be stored in the "Year" folder. As each project is finished throughout the year, go ahead and create a folder, ex. "Application Maps". Then at the end of the year, create a "2007" folder and move the "Application", "Yield" and "Topography" folders into the "Year" folder. This will make for quicker and more efficient use of ADMS. It also makes it easier to know where all the files are from year to year.

Ag Data Mapping Solution



Windows Explorer



Getting Started With Ag Data Mapping Solution

To get started with Ag Data Mapping Solution, you need to have some base data in place to work with. You will need some “Properly” geo-referenced pieces of data. Meaning that the data sets are in either Latitude / Longitude or UTM projections system using WGS84 or NAD83.

TO GET STARTED YOU NEED AT LEAST 1 OF THESE ITEMS

County Data set for geography you are working (**County Data**—tab/folder)

NAIP images (USDA-Geospatial)

DRG images (USDA-Geospatial)

Soils Maps (USDA-Geospatial)

Townships & Sections Maps (USDA-Geospatial)

Roads, Railroads & Water ways (TIGER Data)

Data Set to build Maps—need one or more of these (more is usually better)

Satellite / Aerial Imagery (**Imagery**—tab/folder)

Images USGS

Images UMAC

Topography from LIDAR

Other Imagery sources

Yield data (Raw Data card or .shp files) (**Field Data**—tab)

Veris data (Raw Data card or .shp files) (**Field Data**—tab)

Topography from RTK (Raw Data card or .shp files) (**Field Data**—tab)

Below is a “Rough Outline” of the Process to use this data in the field.

Build - Grower / Farm / Field structure in ADMS

Draw <> Collect <> Extract <> Import - Field Boundary

For VRT Mapping

Create Management Zones or
Sample Grids

Soil Sample

Set application rates

Enter application values (create VRT
prescriptions)

Write prescription to controller

Print “Hard copy” map with total LBS of
product

For Topography Mapping

Import & Process topography data

Inspect topography accuracy / outlets

Process watersheds / contours

Create surface / tile drainage plan

Create background data sets for control-
ler or infield display

Print “Hard copy” map for taking notes &
taking to the field

Settings Window

Data Storage



Settings

These next pages will walk you through the base settings for ADMS.

The screenshot shows the 'Settings' window with the 'Data Storage' tab selected. The window has a title bar with standard Windows controls. Below the title bar is a tabbed interface with tabs for 'Data Storage', 'User Interface', 'User Interface 2', 'GPS Settings', 'GPS Config', 'UTM Zone', and 'Veris Settings'. The 'Data Storage' tab is active and contains the following text and fields:

These are the default data locations for the different types of data stored.
County Data should be stored in a structured manner in the "CountyData" folder.
Satellite Imagery should be stored in the "Imagery" folder.

Below the text are four settings:

- Root Data Folder:** A dropdown menu showing 'C:\GKData\' with a 'Browse' button to its right.
- County Data Folder:** A text input field containing 'C:\GKData\CountyData\' with a 'Browse' button to its right.
- Imagery Folder:** A text input field containing 'C:\GKData\Imagery\' with a 'Browse' button to its right.
- Operator Name:** A text input field containing 'Kelly'.

Use the "Browse" button to set a location where the software will look for the different data sets.
Software DEFAULTS are shown above.

Root Data Folder = Grower / Farm / Field data sets and the location of many operating files (color tables, templates, blend groups, scripts and base operating database).

County Data Folder = Location where you store data relative to your County or Region. This data may be roads, sections, townships, soils or county wide images (NAIP). Mostly data downloaded from USDA Geo-Spatial website.

Imagery Folder = Location where you store satellite imagery and LiDAR topography data.

Operator Name = users name used for tracking processed data.

NOTE: The name and spaces must be less than 12 characters long.

The beauty of ADMS is the ability to run and utilize data sets off of USB devices and your Local disk drives simultaneously

Example would be leaving all you Root Data (grower data) on the "C:" drive and running all your County Data off a USB device "D:" or a "Mapped Network Drive"

NOTE: Read / Write speeds may be GREATLY reduced depending on the speed of your device. We do not suggest running "Root Data Folder" off of USB or drives that may not be there every time you start your PC.

Settings Window

User Interface



Settings

NOTE: Above are optional settings, not the software defaults.

Default Color Table—color table used for most functions in the software.

Default Color Table (Zones) - color table used only in Auto Zone & Extract Image to Zone

Default Units for New Layers—Units that will be used as default in creating "GRD" files

Default World Point Size—data point would be "10" "Feet" wide

Zoom in = point getting larger

Zoom out = point getting smaller

Default Image Resolution (Meters) - Resolution of surfaces created using Auto Zone & Extract Image to Zone tools, (suggest 3 meters).

Default Point Style—Is the shape of "Data Points" (circle / square / triangle/cross-hair)

Default Point Scale Mode—Using either "**Pixel Scale**" or "**World Scale**" (see setting for each)

Default Pixel Point Size—zooming in and out on a data point would always be 2 "PIXELS" wide.

Print Map to Bitmap Multiplier— value of 1 = 1to1 ratio to the pixels on the PC display screen.

2 will double the resolution making the files 4 times larger (also affect "Printing File Size")

Line Width Multiplier for Printing—as we adjust the "Bitmap Multiplier" or work with High Resolution monitors you may notice that "Lines and Boundaries" are not showing in printed files.

Using a "Multiplier of 1" with line width of "2 pixel" x Multiplier of 1 = 2 pixels on print

Bumping "Multiplier to 2" with line width of "2 pixel" x Multiplier of 2 = 4 pixels on print

Boundary Effect Filter Distance—how many "METERS" in the "Boundary Effect Filter" reaches in perpendicular to the boundary to grab it value to stretch to the boundary edge.

Settings Window

User Interface 2


Settings

Data Storage
User Interface
User Interface 2
GPS Settings
GPS Config
UTM Zone
Veris Settings

Map Background Color

White ▾

Cursor Coordinate Units

Latitude/Longitude Decimal Deg ▾

Area Measure Unit

Acre ▾

Linear Measure Unit

Ft ▾

Above/Below Grade Units

Feet ▾

Zone Results Folder Name

Zone Results

Grid Results Folder Name

Grid Results

Current Season

2017

☒ Start Search for Sample Results in Field Folder

NOTE: Above are optional settings, not the software defaults.

Map Background Color—Allows users to switch map background color to Black or White. Suggest using white for mapping, the black is useful for GPS—in field use.

Cursor Coordinate Units—changes the cursor location units at the bottom of the screen as you move the “mouse cursor” around the screen. (has no effect on the maps or projections)

Area Measure Unit—changes the method by which the area of the surface and area of polygon drawings are calculated.

Linear Measure Unit—changes the method of measuring distance. This will effect the measure tools and how lines in drawing layers are calculated.

Above/Below Grade Units—changes the units in the “Drainage Window” “Profile” area only, giving you option of seeing your cut in “Feet” or “Inches”.

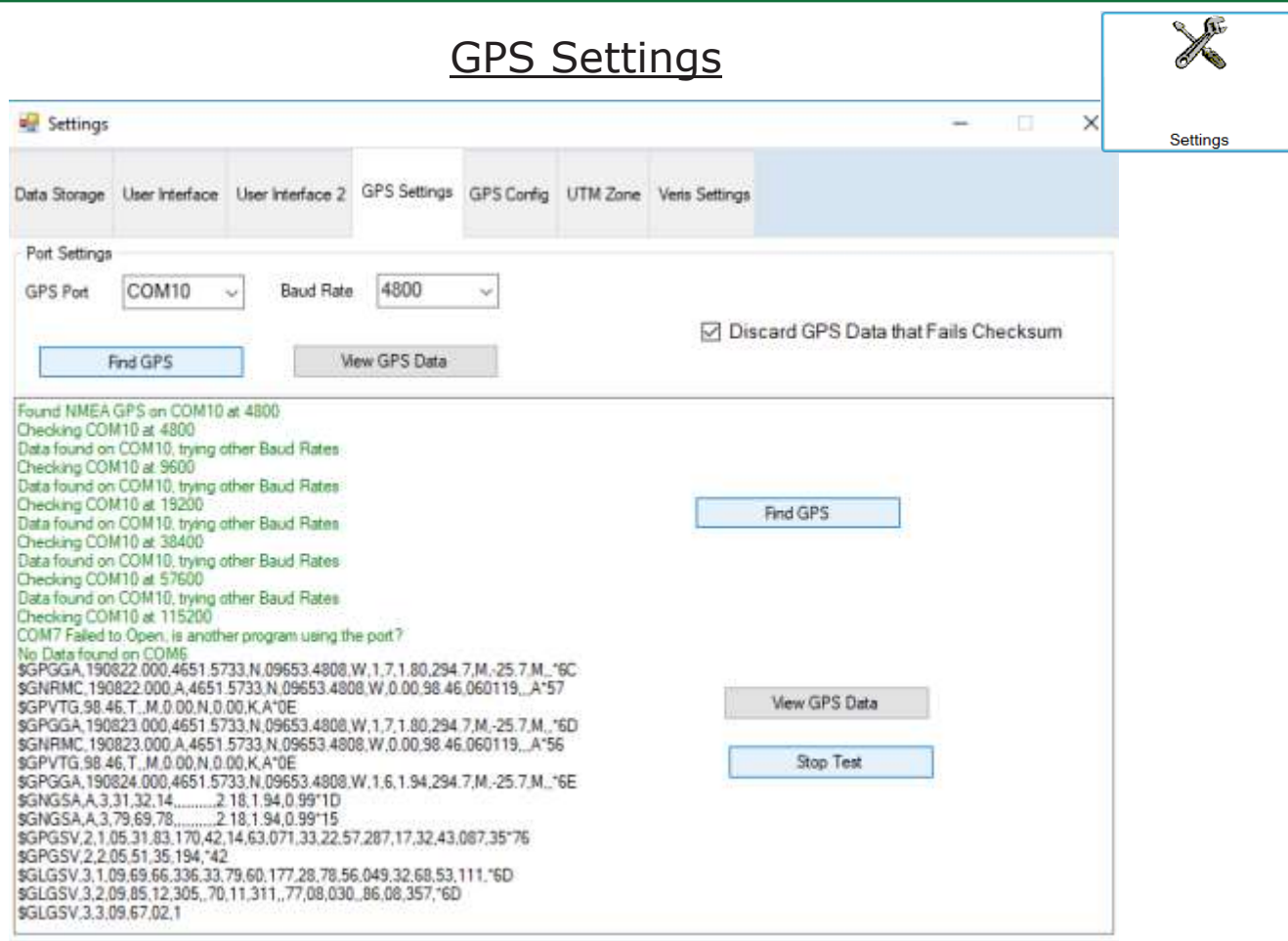
Zone Results Folder Name—is the “folder name” created when writing / creating new maps in the “Merge Zone Results” window

Grid Results Folder Name—is the “folder name” created when writing / creating new maps in the “Merge Grid Results” window

Current Season—adds the “year” to the folder name in “Merge Grid Results” & “Merge Zone Results” windows when writing / creating new maps.

Start Search for Sample Results in Field Folder—Check=start in “Field” folder you are working
No check = Start search in last folder browsed to.

Settings Window



GPS Port— This is the “COM” (serial communication port) the GPS is connected to. To find out what COM port your device is connect, use the “Find GPS” button or open “Device Manager” and look under “Ports (COM & LPT)”

Baud Rate— Set this value to match the GPS receiver output rate

Discard GPS Data that Fails Checksum—If checked “ON” the GPS data strings will be checked for all correct data strings, removing “bad” data stings.

Find GPS Button— Searches through all the COM ports & all the BAUD rates looking for a valid GPS signal. Function may not work if you are indoors and have no GPS signal.

View GPS Data Button— Shows GPS data strings in the window below to confirm you have signal.



ADMS GPS REQUIRES— the source GPS to supply the following data strings

- GGA
- GSA
- RMC (or VTG can be used in its place)
- GST (this data string is OPTIONAL)

Settings Window

GPS Config Warning Criteria



Settings

Settings

Data Storage User Interface User Interface 2 GPS Settings GPS Config UTM Zone Veris Settings Yield Settings

Warning Criteria GPS Cursor Garmin Config General Config

Check the boxes next to define the criteria that will be used to filter GPS points

☒ GPS Status at Least GPS Only

GGA Data ☐ HDOP Less than 3.0

☐ Differential Age Less Than 30

☐ PDOP Less Than 3

GSA Data ☐ VDOP Less Than 3

☐ Horizontal Error Less Than 0.10

GST Or Garmin RME Data ☐ Vertical Error Less Than 0.10 Meters

☒ Continue Logging and Mark operations if these criteria are not met.

Above are suggested settings for "Soil Sampling" only (not collecting field boundaries or topo data)

If these Criteria are not met the GPS status bar will flash "RED" and you will hear a "Ding"

GPS Status at Least—logs data that has a GPS Signal of at least this or greater (ex-GPS Only)

HDOP Less Than— only logs data that has a value less than this number (ex-3.0)

Differential Age Less Than— logs data that has a value less than this number (ex-30)

PDOP Less Than— logs data that has a value less than this number (ex-3)

VDOP Less Than— logs data that has a value less than this number (ex-3)

Horizontal Error Less Than— logs data that has a value less than this number (ex-0.10 meters)

Vertical Error Less Than— logs data that has a value less than this number (ex-0.10 meters)

Continue Logging and Mark Operations if these criteria are not met.

Checked will allow you to continue logging if there is any valid GPS signal.

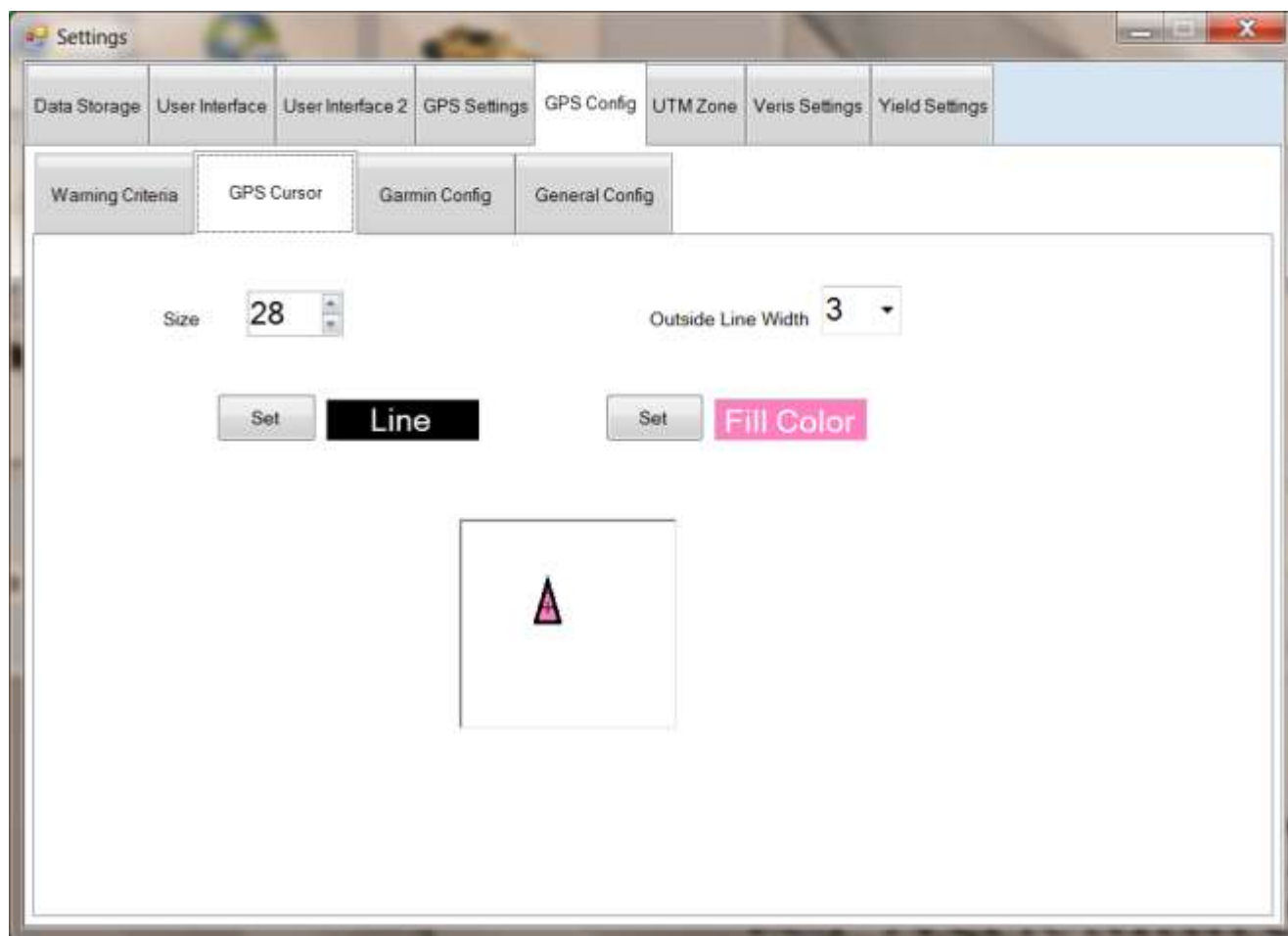
Not checked the software will stop ALL logging & application functions.

Settings Window

GPS Config **GPS Cursor**



Settings



Above are optional setting, not software defaults.

Size—is in the number of "Pixels" not feet. (size preference is relative to your Screen Resolution)

Outside Line Width—is in number of "Pixels" wide

Line Color— set to your color preference. (think about background map colors-contrast is good)

Fill Color— set to your color preference. (think about background map colors-contrast is good)

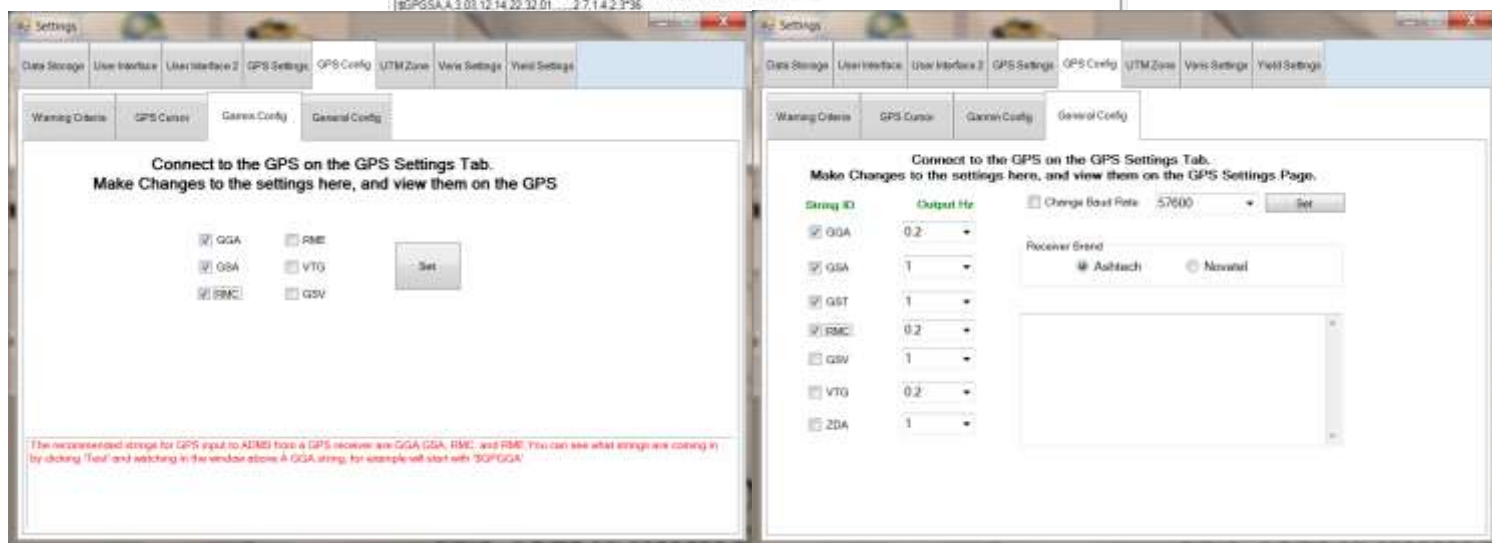
For these settings to take affect. The "Map Window" or "Log & Sample" window must be closed and re-opened if you are trying to adjust these settings with these windows open.

Settings Window

GPS Config Garmin Config & General Config



Settings



Above settings are recommended if working with one of these three GPS receivers (Garmin / Ashtech / Novatel).

To use these options you must have the "GPS Settings" tab in the "View GPS Data" mode. This means that data is "STREAMING" across the viewing area of the screen. Then go to the "GPS Config" tab either the General or Garmin setting.

Check on the data strings you want the device to put out.

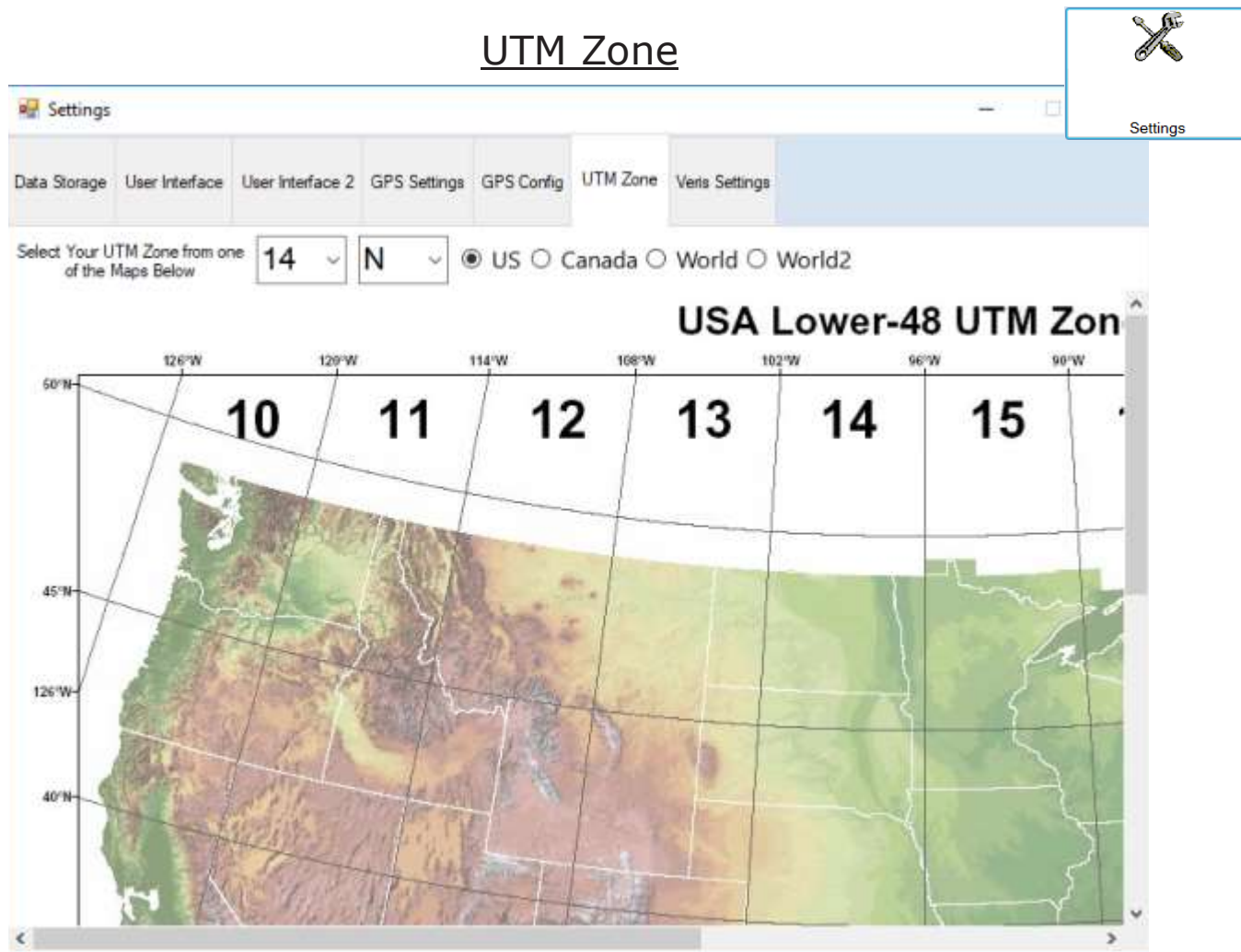
Set the Hz rate (Data strings per second)

- 2 = 1 data string every 2 seconds or 1 string every 2 seconds
- 1 = 1 data string every 1 second or 1 string per 1 second
- 0.2 = 1 data string every 0.2 seconds or 5 strings per 1 second

If you want to change the baud rate check the box and adjust the rate.

Click the "Set" button

Settings Window



Choose the correct zone for where you are working. One of the major drivers for what UTM you use is the FSA—NAIP imagery. We suggest setting your UTM to match what the Government has assigned for the Imagery. If you are in an area where there is no NAIP imagery, use the UTM zone of the Landsat data that best fits your area. Questions here please contact your support staff at GK Technology Inc.

UTM—Acronym for “Universal Transverse Mercator”. A projected coordinate system that divides the world into 60 north and south zones, 6 degrees wide. This is what everything is projected in within the software. Being in the correct UTM zone is critical to ensure the location is accurate.

N vs S—Behind the UTM # is a N/S dropdown for Northern Hemisphere vs Southern Hemisphere choose the correct one for where you are at.

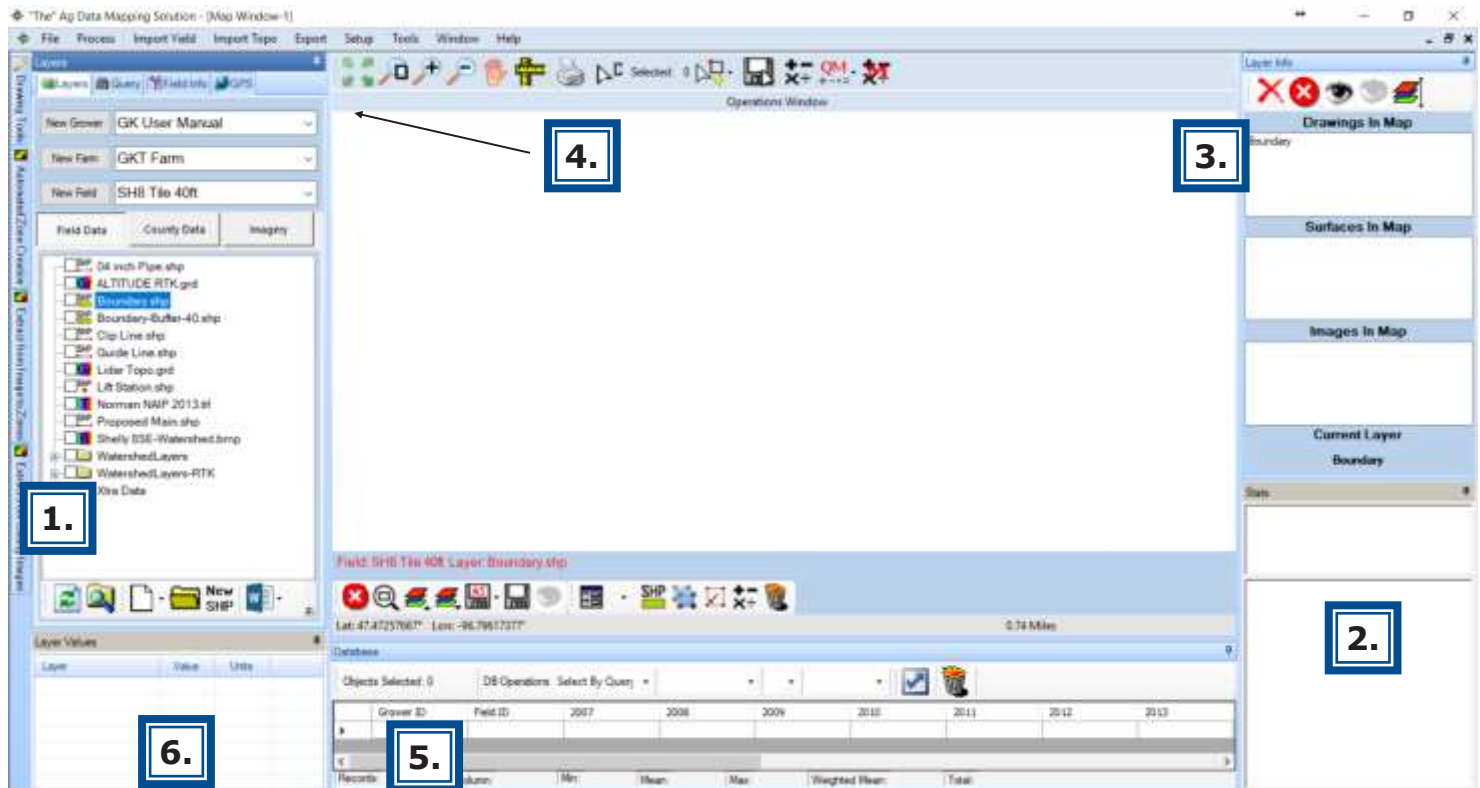
Other Notes on Projection and Units for ADMS.

- Vector data (SHP) files in UTM or LAT/LON coordinate systems and WGS84 or NAD83.
NOTE: upon either “Save” or “Save As” all SHP Vector files are converted to LAT/LON-WGS84
- Raster Data or Images coming in must be in UTM coordinate system and WGS84 or NAD83.
ALL UTM objects must have the units in METERS (for Northing / Easting).

The use of LAT/LON on the Vector-SHP files and UTM on all Raster data is done to confirm your projections on all maps and keep you from using maps in the WRONG projection.

Window Dock Settings

Within ADMS there are many different window configurations. Depending on which unlock you have there may be different panels available to you. At a minimum there will be (1)-Side Bar // (2) Stats// (3) Layer Info // (4) Layers // (5) Database // (6) Layer Values. By default the Layer Selection panel is pinned open when the software first is started.



Drawing Tools— The drawing tools window has tools to merge polygons together to create polygons as interior or exterior polygons, clipping, dissolving, unions, move, copy & more.

Stats—This panel will show layer statistics of the active surface layer.

Layer Info—This breaks apart the layers that are loaded into the software in three different categories: Drawings in Map, Surfaces in Map, and Images in Map. In this panel layers can be cleared, made active, and re-ordered.

Layers—This panel has the data tree in it along with the query tool and GPS.

Database—The database gives the user access to the database (.dbf) in a SHP file, or a attribute table in a CSV. Data can be queried, sorted, added, deleted, and have math operations performed on it.

Layer Values—Show the Surface Values under mouse pointer of all Surfaces checked on.

Docking the Windows

Each of these windows will have a thumbtack icon in the top right corner. If the thumbtack is in the "Pinned" position, the window will be permanently docked open. This can be useful for certain types of data processing and allow for easier access to some of the toolbars. Once pinned open the map window and toolbars will automatically resize.



Unpinned



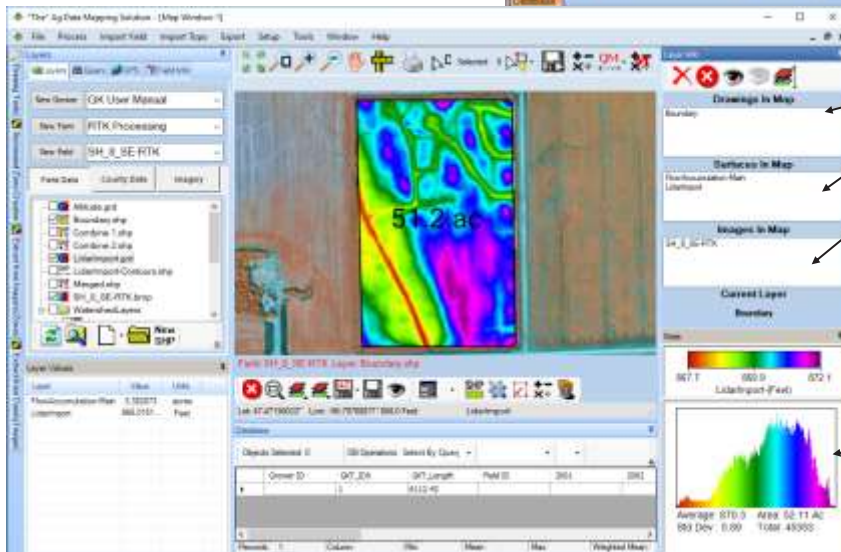
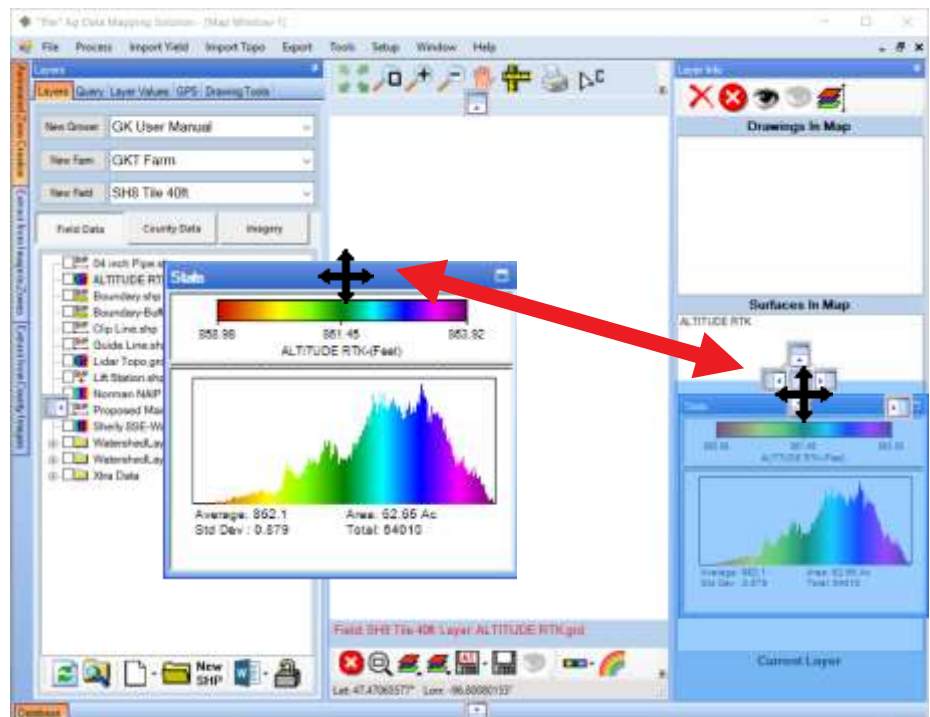
Pinned

Window Dock Settings

These panels can also be docked inside each other or moved to a different location. This gives the software users many options to fit their preferences.

To dock or move a panel first open and pin everything you want open permanently. Next click on the panel you wish to move. For this example the statistics window will be used and get docked under the Layer Info Panel. This allows the user to see all the layers that are loaded and allow for easy visibility to layer statistics.

- Click on Layer Info to open it followed by the thumbtack to dock it open.
- Click on the Statistics to open the window over top of the Layer Info.
- Left click on the window header to make a four way crosshair cursor appear.
- Hold and drag the window out of the side to where you want it. In this example will want to dock it under the Layer Info so drag it to the bottom of layer info. Once there it will show a preview of it snapping in place.
- Once you see it snapping in place let go of the cursor. It will then be docked in place.



After docking now all the layers are visible that are currently turned on within ADMS.

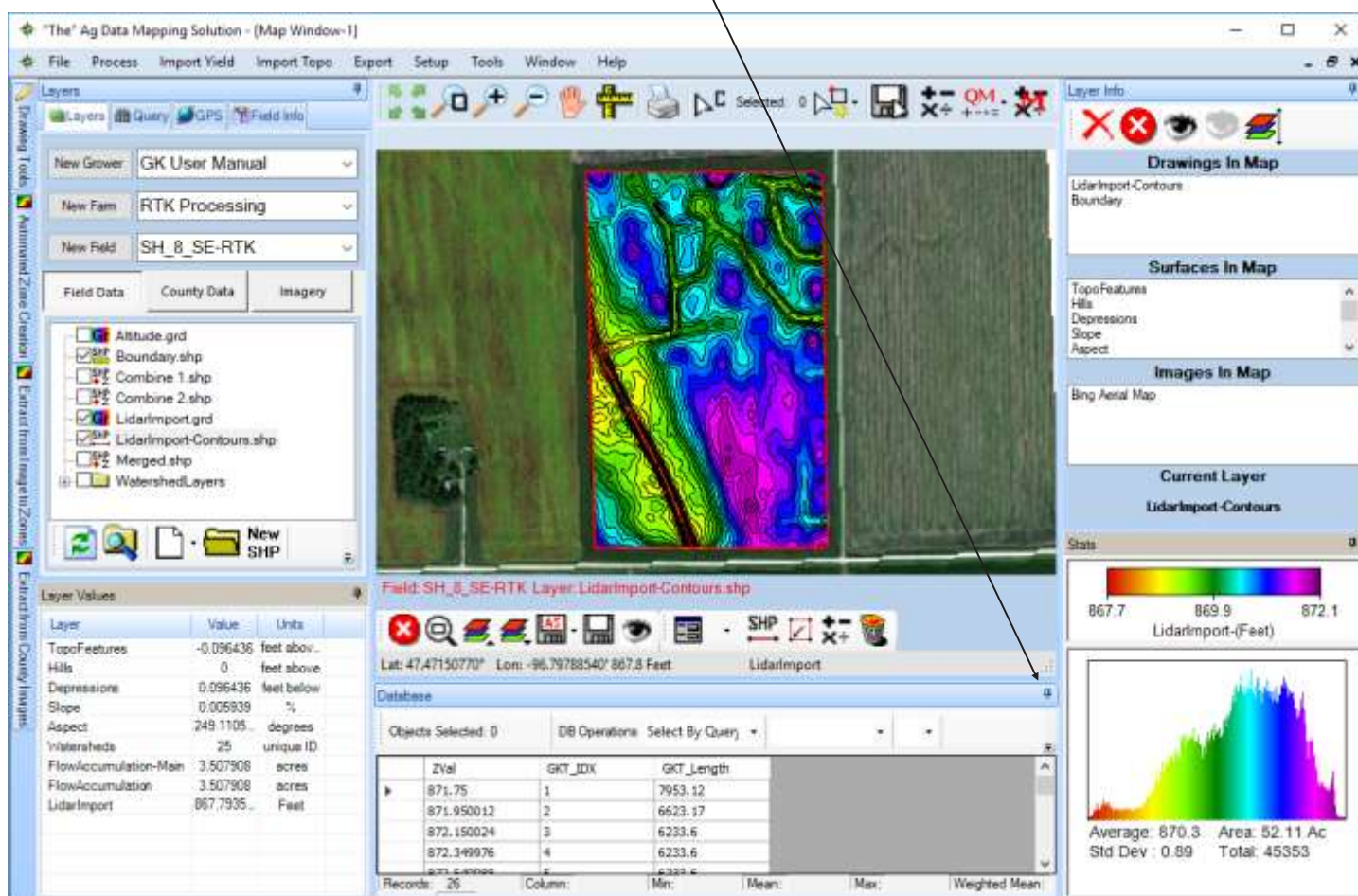
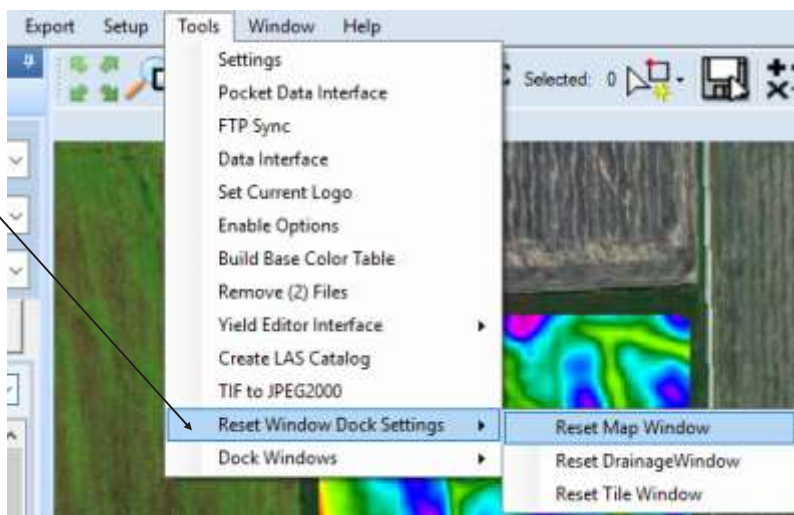
The histogram is easily visible for the surface layer turned on in the map window.

Window Dock Settings

Resetting Window Dock Settings

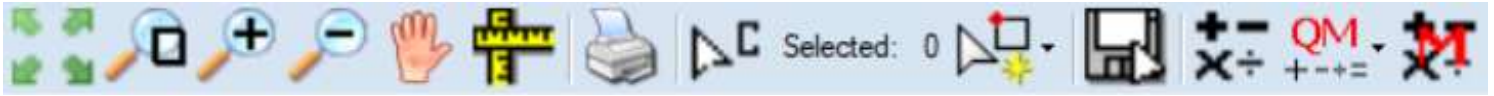
Sometimes when working with different windows one will “disappear.” What actually happens is a panel will get moved behind the main window and it can’t be accessed. Also, if the windows are in a configuration that you aren’t happy with they can be reset.

- Go to the Menu bar at the top of the window select “Tools” & “Reset Window Dock Settings” & choose —
 - Rest Map Window
 - Rest Drainage Window
 - Rest Tile Window
- A window will appear that says “Done.”
- Open the Map Window. All the panels will be docked the same way they were when the software was first installed.
- NOTE: If you want the “Database” hidden, Click on the Thumb Tack  in the top right of the “Database” window to Collapse / Hide the “Database”.



Top Map Toolbar

Map Window Toolbar



Zoom to Project Extents - Zooms out to the full extent of ALL the layers that are open.



Zoom to Rectangle - Zooms to the user drawn rectangle on the map.



Zoom In - Doubles the "ZOOM" extents, zooming IN on the center of the Map Window area.



Zoom Out - Doubles the "ZOOM" extents, zooming OUT on the center of the Map Window area.

Mouse Scroll Wheel - Rolling the Scroll Wheel "ZOOMS" OUT / IN on the location of the mouse. Similar to the "Zoom In" and "Zoom Out" buttons.



Move - Click on the "Move" button and "Left Click", hold down and drag on the map - when you release the "Left Mouse Button", your image will move ("Right Click" to turn off tool).

Right Click/Drag - Right Clicking/holding and dragging your mouse in the Map Window area of the software will Slide or Move map. Similar to the "Move" button.



Tape Measure - Allows you to find distances and heading by left clicking around your screen.



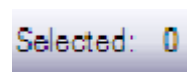
Print - Takes you directly to the "Print Map" function.

Top Map Toolbar

Map Window Toolbar



 **Clear Selection** - Clears all selected items (clears **lime green objects** in the maps window (of **Active-"Drawing Layer"**)

 **Selected Objects** - Shows you how many objects you have "Selected" in your Drawing Layer.

 **Area Replace** - Sets mode of selection to add a single set of selections, hold Ctrl Key to add more selections, using either a click or click hold draw rectangle (of **Active-"Drawing Layer"**) On by Default.

 **Area Add** - Sets mode of selection to add multiple selection areas, using either a click or click hold draw rectangle (of **Active-"Drawing Layer"**).

 **Area Remove** - Sets mode of selection to remove multiple selections, using either a click or click hold draw rectangle (of **Active-"Drawing Layer"**).

 **Poly Replace** - Sets mode of selection to add a single set of selections, hold Ctrl Key to add more selections, using left clicks to define object & right click to finish area (of **Active-"Drawing Layer"**)

 **Poly Add** - Sets mode of selection to add multiple selection areas, using left clicks to define object & right click to finish area (of **Active-"Drawing Layer"**).

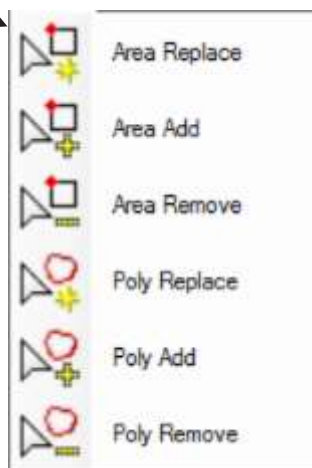
 **Poly Remove** - Sets mode of selection to remove multiple selections, using left clicks to define object & right click to finish area (of **Active-"Drawing Layer"**).

 **Save Selected Objects to New Layer** - Once you have "selected" your Points, Lines and Polygons from a layer, you can "Save" these items to a newly named layer.

 **Multi Layer Map Math** - Opens a new page in which you can write scripts to perform different functions and apply algorithms on your selected layers.

 **Multiple Output Map Math** - Consultants only option. Opens a new page in which you can write scripts to perform different functions and apply algorithms on you selected layers. This function will allow you to create "Multiple Output maps" in one click from a script.

 **Quick Math** - Consultants only option. Allows scripts to be quickly run from a dropdown menu that have previously been saved as a DLL.



Bottom Layer Toolbar

Bottom Toolbar—Basic Buttons



Remove Layer - Removes the selected layer from the map (does not DELETE layer). The layer can be turned on again later.



Zoom To Layer - Zooms to the extent of the selected layer.



Bring to Front - Moves the selected layer to the front of (or on top) all layers.



Send to Back - Moves the selected layer to the back of (or bottom) all layers.



Save Changes - Quickly saves any changes made to the selected layer.



Layer Visibility On/Off - Turns the visibility of the layer on and off.

Address Bar and Active Layer

Cursor Coordinates—Values will be in either Latitude / Longitude **or** UTM—Northing / Easting of the “Cursor” location (adjusted in the settings)

These values only show when drawing a LINE or POLYGON

LSLeng: Line Segment Length = distance from your last click to cursor.

LS Bear: Line Segment Bearing = degrees for your last click to the cursor

Total Len: Total Length = length of line or polygon drawn from first click to cursor

FP Bear: is First Point Bearing in Degrees

Value on the RIGHT is the distance across the “Map Window” (East to West)

Lat: 47.472229; Lon: -96.79926 Ls Len:653 Foot LS Bear:2.3 Tot Len:6,337 Foo FP Bear:2 1.57 Miles
Field: 2006-Wheat Layer: Boundary.shp

The data in RED—is the **ACTIVE LAYER — VERY IMPORTANT !!!!!**

This line tells you what layer you are actively working on and what layer the buttons will affect or change.

Bottom Layer Toolbar

Drawings Buttons



Layer Display Properties - Opens the properties of SHP file allowing you to do the 5 items below— Style, Thematic, Label, Save As Template and Load Template.



Style - Changes the line & point attributes (color, sizes & fill).



Thematic - Opens a new window which allows the user to change color themes, adjust the number of color ranges, view statistics of the color ranges, and fill and size the points and lines.



Labels - Allows the user to view data from the objects data table in the viewing window as a label. Also allows label size, font, and color adjustment.



Save As Template - Once SHP is colored and labeled correctly. Click button and "Save" all the settings to repeat later.



Load Template - In a click, all "Saved Templates" will show up to be reused or applied to your SHP file. Also on Bottom Toolbar



Load Template - In a click, all "Saved Templates" will show up to be reused or applied to your SHP file. Also in Layer Display Properties.



or



or



Draw New Object - Once selected, you may draw a polygon, line or point (left clicking to draw and right clicking to end lines and polygons).



Decompose a selected PolyPolygon to its Component Polygons - To use this button "select" a PolyPolygon then click the button. Suggest doing a "Save As" and rename the drawing layer. This will save the Polygon in it's component state.



Move Vertices of Selected Object - Is a TOGGLE on/off button that allows you to move the Vertices of Polygons and Lines. Object must be "selected" before using this button.



Intra-Layer Math - Allows use of simple mathematical functions on a column of the data base.



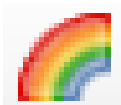
Delete Selected Objects to the Fiery Can of Death - Once an object of this layer is selected, this will delete the selected objects. Changes must be saved to be made permanent.

Bottom Layer Toolbar

Surfaces Toolbar



Change Color Theme - Changes the color pallet used on the selected layer.



Thematic Color - Opens a window to view image statistics, adjust color themes, number of zones, and adjust zone sizes automatically or manually.



Load Fixed Thematic Table - Applies a color theme that has been previously created to active layer.



Quick Zone Set - Applies the "Default Color Table (Zones)" from "Settings" using the selected method of color grouping and the selected number of zones.



Smoothing Filter - Combines pixels of the image creating a smoother image.



Fill Filter - Fills null values in and around the image by stretching or copying the value of the nearest pixel.



Apply Mod to Selected Polygon - Allows use of simple mathematical functions on selected layers using a combination of Polygons with Raster.



Trim End Values - Allows the change or deletion of values above, or below, a given value (making all the removed values equal to the trim value). Deleted values create a hole that will need to be filled.



Surface Properties - Tools to change "Units" and adjust the Geo Reference and Resolution of the Surface.



Crop Raster to Selected Polygon - To use this tool, FIRST SELECT A POLYGON. Once the polygon is selected and you have reselected the surface layer you want to cut to, this button will remove all the image outside of the selected polygon. ("Just this Layer" Don't forget to SAVE or SAVE AS!) ("All Visible" cuts all loaded surfaces and AUTO SAVES — BE CAREFUL)



Reduce Boundary Effect - Will go around the field boundary looking in X—Meters and stretch that value over the selected distance.

Bottom Layer Toolbar

Surfaces Toolbar



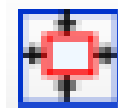
Invert - Inverts the Pixel "Values"



Intra-Layer Math - Allows use of simple mathematical functions on the active layer.

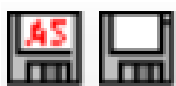


Correlation Matrix - Runs Correlation analysis on all loaded surfaces.

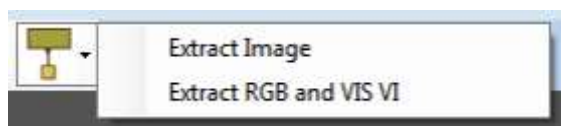


Crop Null Values - After cropping some raster's you may have "Blank Pixels" left in the Surface. Crop Null Values will remove these "Blank Pixels" and "Save" the object.

Web Layers Toolbar

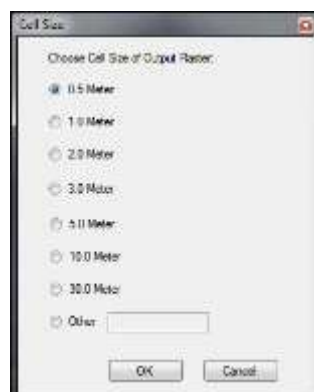


Save/Save As - When working with web layers both buttons do the same thing. They allow the layer to be saved back to "Field Data."



Extract Layer - This button gives two options.

1. Extract the RGB image and save it back to "Field Data."
2. Extract the RGB image as TIF file and extract the VIS VI as a GRD surface. Both of these layers will be saved back to "Field Data."



Choose Cell Size - This option appears after the above save options are used. Different resolutions can be chosen for the final image/extracted surface.

Bottom Layer Toolbar

Multi-Band Image Buttons (TIF & BMP)



Multi-Band Image (SID & JP2)

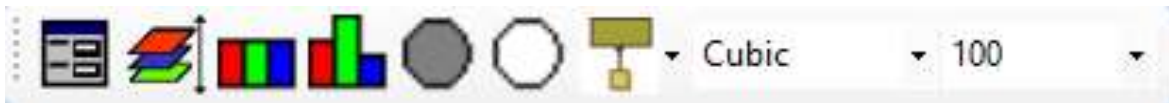


Image Properties - Allows the geo-referencing of an image to be adjusted.



Multi-Band Layer Display - Select which bands of light and what order they are displayed.



Equalize Image Display - Lighten or equalize the bands of light being displayed.



Reset Color Adjustment - Move the color bands back to their original settings.



Darken - Adjusts the brightness of the displayed image darker.



Brighten - Adjusts the brightness of the displayed image brighter.



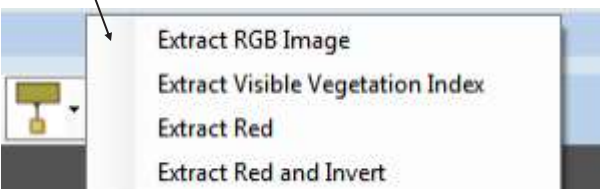
Single Band Extraction - Lets individual bands be extracted from an image. These are the bands that are adjusted in the "Multi-Band Layer Display"



Visual Index - Applies different vegetative indices depending on the type of image and bands available. For RGB images the option will be "RGB VI" (Red, Green, Blue Vegetative Index). If the image is CIR or has an Infrared band there will be a RNDVI and GNDVI option.



Extract From Image - *This is a consultants package only option. To use this button, must SELECT a boundary first. This button will give a list of different extraction types and after extraction they will be saved back to "Field Data." This button eliminates the need to extract a TIF from SID/JP2 first.



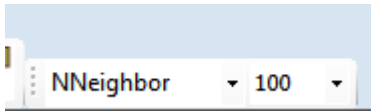
Bottom Layer Toolbar

Images - Re-Sample Display Modes

Both images and surfaces can have their appearance adjusted by changing the re-sample modes on the bottom toolbar. This affects only how the data is displayed and does not affect processing.



NNeighbor—Selects the value of the nearest point and does not consider the value of neighboring cells



Bilinear—Linear interpolation is done in one direction and then again in another direction

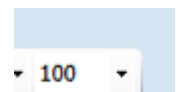


Cubic—Takes 16 pixels into account and generally has a smoother appearance than Bilinear or NNeighbor interpolation



Transparency Settings

Both Images and surfaces can have their transparency adjusted for visual purposes. The number is in a Percentage (%).



**Note: Windows 7 there are issues with the transparency settings for surfaces. Therefore, if layering with an image the image should be brought to the front and it's transparency should be adjusted.*

Drawing Layers (Polygons, Lines, & Points)

In Ag Data Mapping Solution, there are 4 ways to create/add Drawing Layer Data. Drawing Layer Data can consist of Boundaries, A-B Lines, Tile Lines, Sample Points, Sample Grids, As Applied Maps, some Application Maps & many more files. *All the below examples are using the "Map Window". Other windows in ADMS may not have the same functionality.*

1. Import from Another Source

2. Extract Drawing Layers from a Mass Collection (FSA-CLU Field Boundaries/Roads/Yield Data)

3. GK Drawing Tools-Hand Drawing

4. Collect with GPS Using Ag Data Mapping Solution

- Importing from Another Source

Polygons (boundaries), lines and points that have been collected using another source such as a tractor, pickup, ATV or hand drawn (in other software), all of these would be coming from a different software package. If these files are coming from another software package, export the files out as Shapefiles (.shp) and save them into the appropriate Grower / Farm / Field (C:/GKData/xxx/xxx/xxx). If you are copying these Shapefiles, make sure you get all the extensions of the shape file (Min requirement .shp, .shx & .dbf). Paste them in to the appropriate Grower / Farm / Field (C:/GKData/xxx/xxx/xxx). ADMS does handle "Imports" from certain sources. Generally, you need to have the original data cards from the equipment. Find out by clicking on the "Import" tab while using "Map Window".

Drawing Layers (Polygons, Lines, & Points)

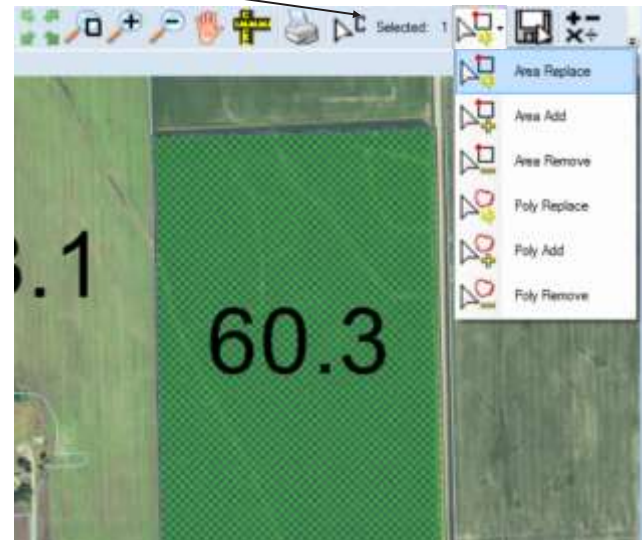
Extracting Drawing Layers from a Mass Collection (FSA - CLU Field Boundaries/Roads/Yield Data)

- To use this function "SELECT" the Drawing object to be "SAVED" or "CREATED"
- There are three ways of selecting these objects. To use them first turn on the drawing layer that contains the objects to be saved (CLU-Yield Data-Roads-Topo Data). Key to this process is watching your **"ACTIVE LAYER on the Bottom Toolbar"**
 - Select by Area**—Simply left clicking on or in the object or drag a rectangle around the objects to select 
 - Selecting by Poly**—Basically drawing a boundary around the object. 
 - Selecting by Database**  -Using the "Database" tab (below the map window) and choosing the object out of the dataset.

The next examples will explain these functions.

Selecting by Click—(Example with "POLYGONS")

- For this example, turn on FSA (CLU) field boundaries (Multiple SHP file Object).
- Select **"Area Replace"** on the top toolbar. 
 - ** Note: This is selected by default when software starts **
- "Left Click" inside the Polygon (Boundary) you want. *Hold down the "Ctrl" key to select multiple objects.*
- Note that the Polygons have turned "Lime Green" showing they have been selected. *The cross hatching may disappear as you work, but the boundary will stay "Lime Green"*
- Top toolbar -note number of "Selected:" objects
- On the TOP TOOLBAR, select **"Save Selected Objects to a New Layer"**. 
- This will open into a "Save" Window so that the selected objects can be saved to a new shapefile.
- Notice it is saving back into your "Field" level data every time.
- Name the object & click **"Save"**.



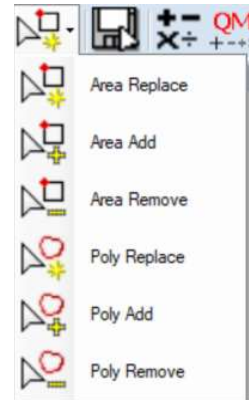
Drawing Layers (Polygons, Lines, & Points)

Extracting Drawing Layers from a Mass Collection

(FSA - CLU Field Boundaries/Roads/Yield Data)

Selecting by Area—Example with "POINTS")

1. For this example, turn on Yield Data, Veris Data or Topo Data as "Points" Shape file.
2. Then Click  select either **"Area Add"** or **"Poly Add"**
3. Then follow the directions below the top Toolbar.
4. Note that the objects have turned **"Lime Green"** showing they have been selected.
5. Top toolbar -note the number of "Selected:" objects.
6. On the TOP TOOLBAR, select **"Save Selected Objects to a New Layer"**. 
7. This will open into a "Save" window.
8. Notice it is saving back into the "Field" level data every time.
9. Name the object (***you MUST Re-Name the object***) & click **"Save"**.



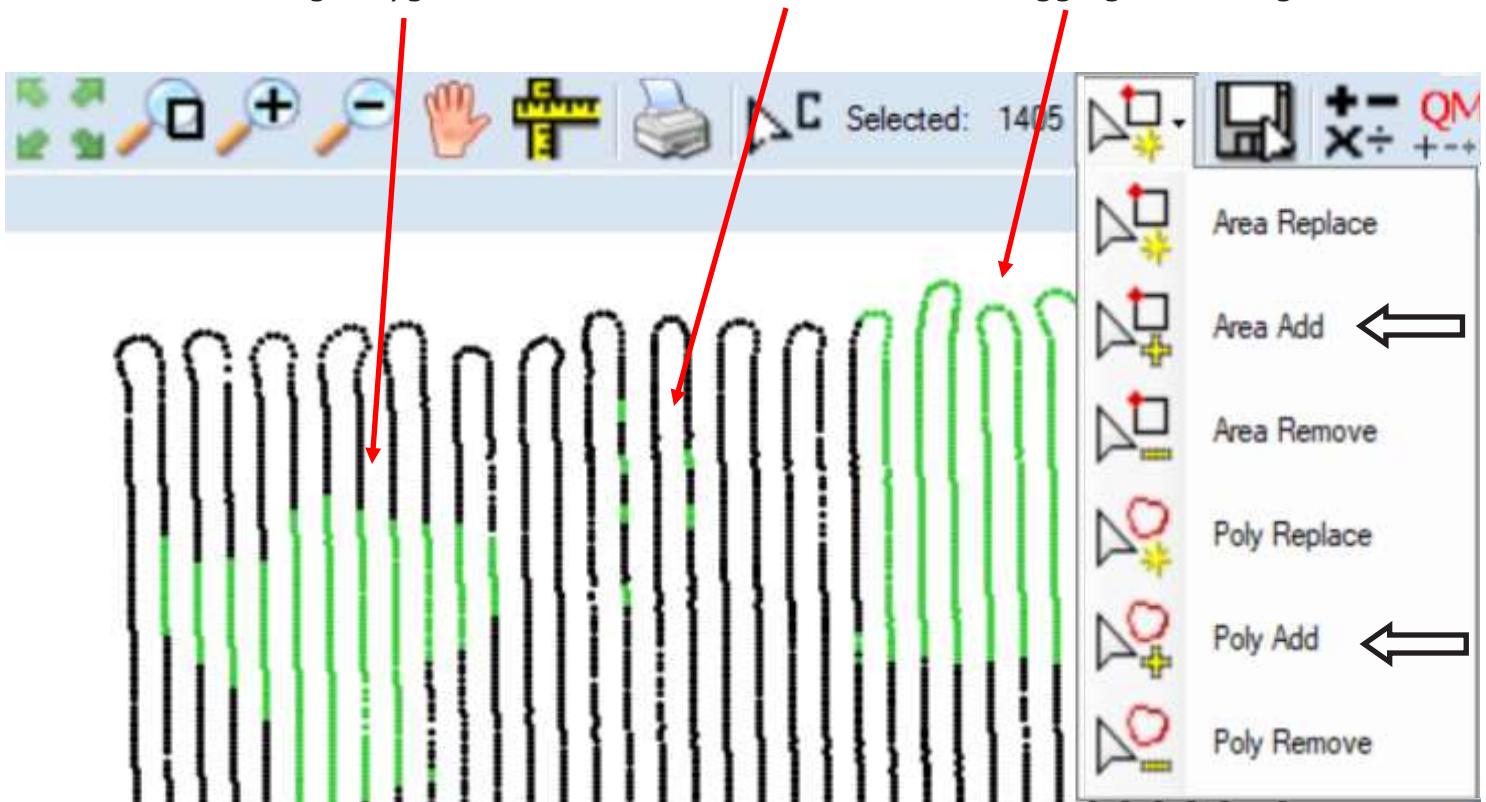
Selected by "Poly Add"

Left Clicking Polygon

Selected by "Area Add"

Left Click on Point

Dragging a Rectangle



Drawing Layers (Polygons, Lines, & Points)

Extracting Drawing Layers from a Mass Collection

(FSA - CLU Field Boundaries/Roads/Yield Data)

Selecting by Database—(Example with "POINTS")

1. For this example, turn on the yield data points.
2. On the bottom left corner of the screen, click on **"Database"** tab.
3. This will open the database of the "Active Drawing Layer" or the last active SHP.

Database



LATITUDE	GKT_IDX	LONGITUDE	YIELD_VOLUM	C.F.	FIELD_NAME	UID	THE_HEADING	DISTANCECTRA	ELEVATION_H
47.47039413	4029	-96.79776001	104.81719971	M.S.	BULL FARM	209	1.66469002	5.56833982	861.01507568
47.47039413	4030	-96.79776001	11.47381973	M.S.	BULL FARM	210	1.04469001	2.91086006	861.01507568
47.47039413	4031	-96.79776001	10.09710026	M.S.	BULL FARM	211	359.25	8.20750046	861.01507568
47.47038269	4032	-96.79776001	7.17785978	M.S.	BULL FARM	212	359.1000061	8.40435028	861.01507568

4. Selection Methods :

- A. By "Left Clicking" on the gray cell on the left side of the table. (Note the Database Row highlights and the Map Object turned "Lime Green" showing they have been selected).
- B. By holding down the "Shift" key and left clicking a row further down in the database, you can select groups of objects.
- C. By holding down the "Ctrl" key and left clicking a row and another row, you can select multiple individual objects throughout the database.
- D. Using the DB Operations : "Select by Query", you can select a "Column" and Query out objects (>,<,<=,>=,<= (on numeric columns)) and (=,<> (on character columns)), put in your values and click **"Run Query"**.

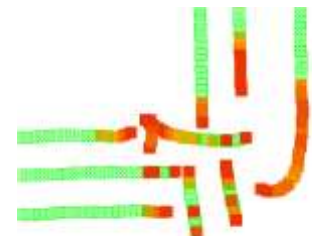
NOTE: The **"Object Selected:"** in the upper left hand corner of the Database window, this will tell you how many objects are selected in the Database.

5. On the TOP TOOLBAR, select **"Save Selected Objects to a New Layer"**.

6. This will open into a "Save" window.

7. Notice it is saving back into the "Field" level data every time.

8. Name the object (**you MUST Re-Name the object**) & click **"Save"**.

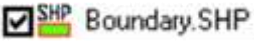
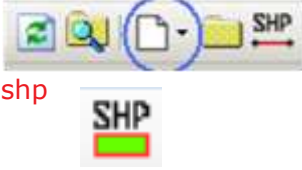


Drawing Layers (Polygons, Lines, & Points)

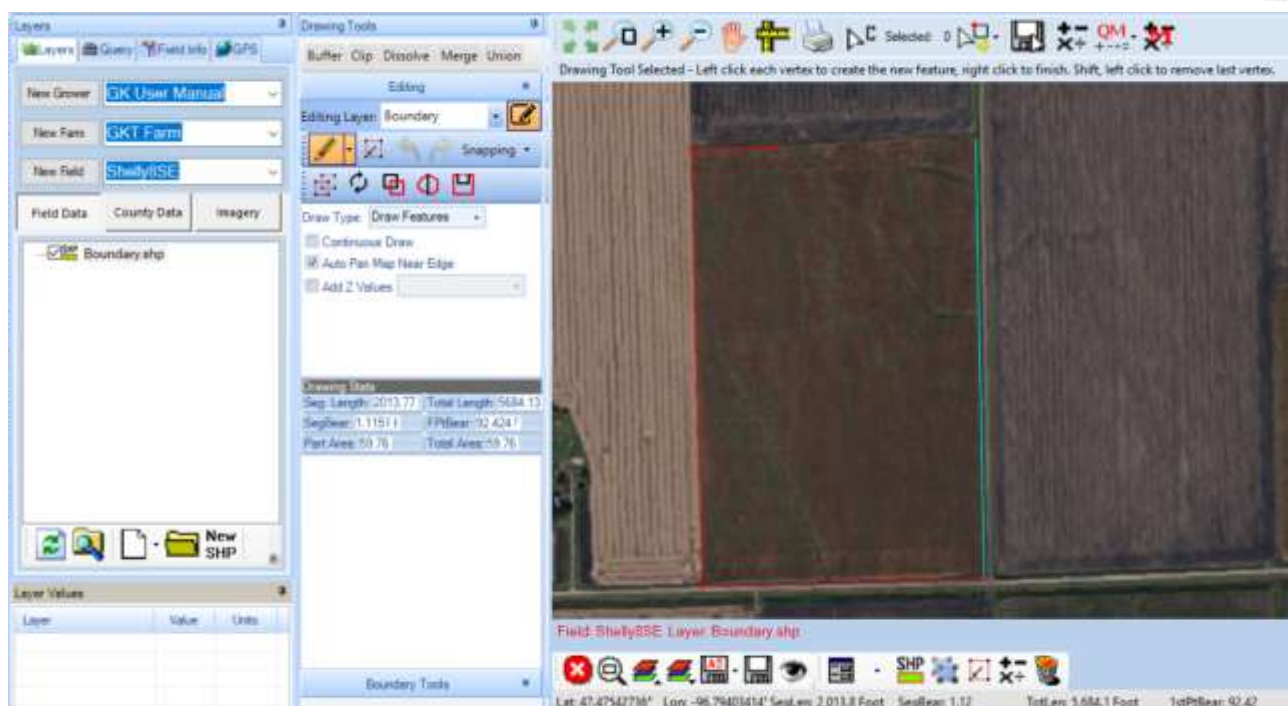
GK Drawing Tools - Hand Drawing (Polygons)

- Using the hand drawing tools, you will need to have a "Layer" turned on that you can Trace, or Mark, on top of for geo-referencing purposes. (Accurate, high quality data is needed).
- Look at drawing Polygons & Merging Interior / Exterior Polygons (Poly-Polygons)

- Polygons (Drawing—Field Boundaries)

- Hand Drawn is done using either field collected data points or 1-3 meter aerial-images. Both giving geo-referenced data to trace.
- Zoom into the field close enough to see and draw all details.
- At the bottom of the "Data Tree" Select "Create New Layer From Template". ↓
- Select "Boundary" from the template list.
- In the "Data Tree" check the **"Boundary.shp"**.  

Note: ACTIVE LAYER—Below the Map Window — Field:Name Layer:Boundary.shp
- On the "Bottom Toolbar" click on the **"Draw New Object"** button .
- In the map window area, follow the instructions at the top of the "Map Window"
Drawing Tool Selected, Left Click each Point, to Define the New Object, Right Click to Finish
Note: if you make a mistake while drawing—Hold Down the "Alt" - Key and "Left Click" to undo last point.
- "Right Click" to finish the Polygon.
- If there is a second & third boundary (interior or exterior) repeat 6—8. The next page will create the "interior—exterior" polygons
- Once finished drawing the "Boundary", click **"Save"** on the bottom tool bar. 

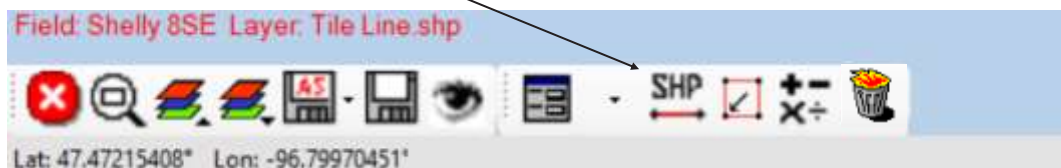


Drawing Layers (Polygons, Lines, & Points)

GK Drawing Tools - Hand Drawing (Lines & Points)

- Lines

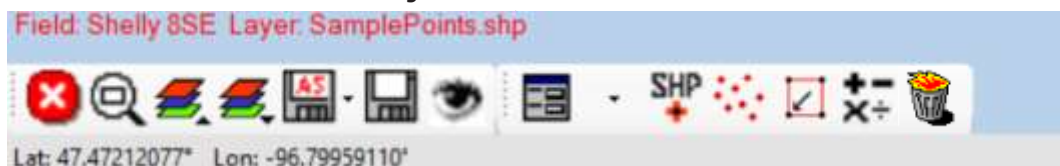
1. Typically, we like to draw this data off of either field collected data points or 1-3 meter ortho-images (Geo-Referenced very well).
2. Zoom into the field as close as possible (all parts of the field must be visible).
3. At the bottom of the "Data Tree" Select **"Create New Layer From Template"**.
4. Select **"Tile Line"** from the list.
5. Check the **"Tile Line"**. ☒ SHP Tile Line.shp
6. Click on the **"Draw a New Object"** button on the "Bottom Toolbar"



7. In the Map Window area, follow the instructions at the top.
Drawing Tool Selected, Left Click each Point, to Define the New Object, Right Click to Finish
Note: if you make a mistake while drawing—Hold Down the "Alt - Key" and "Left Click" to undo last point.
8. For the Polygon & Line tool, "Right Click" to finish the object.
9. Repeat the previous 3 steps adding all the lines you need.
10. Click **"Save"** on the "Bottom Toolbar". 

- Points (Single Point Drop)

1. Typically we like to draw this data off of either field collected data points or 1-3 meter ortho-images (Geo-Referenced very well).
2. Zoom into the field as close as possible (normally want to see the whole field).
3. At the bottom of the "Data Tree" Select **"Create New Layer From Template"**.
4. Select **"Sample Points"** from the list.
5. Check the **"Sample Points"**. ☒ SHP SamplePoints.SHP
6. Click on the **"Draw a New Object"** button on the "Bottom Toolbar"



7. Left click where the point is to be placed.
8. Repeat the previous 2 steps adding all the points you need.
9. Click **"Save"** on the "Bottom Toolbar". 

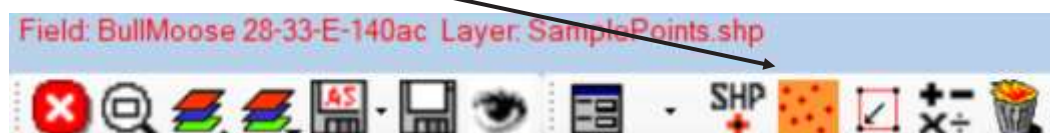
Drawing Layers (Polygons, Lines, & Points)

GK Drawing Tools - Hand Drawing (Multi-Point)

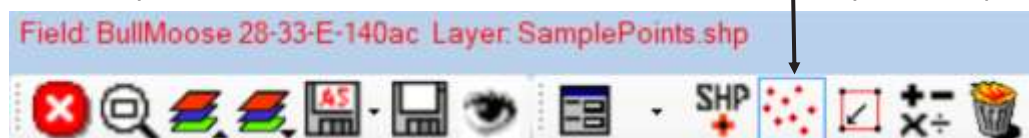
- Points (Draw Multiple points)

There are time you may want to mark many points on a field. In these cases you will NEED to have a "Surface.grd" or "Surface.bmp" built for the field. In this example "Zones ID.grd"

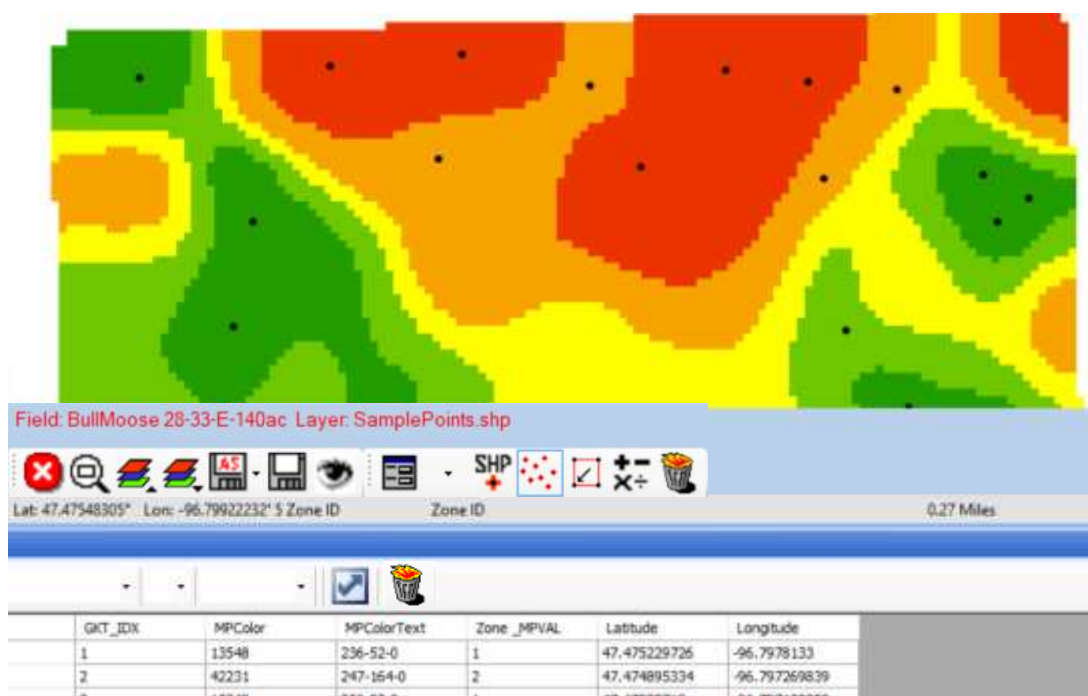
1. Select your Grower / Farm / Field
2. Check on the Surface.grd (ex. Zones ID.grd) (This tool will NOT work without a SURFACE Checked)
3. At the bottom of the "Data Tree" Select "Create New Layer From Template".
4. Select "Sample Points" from the list.
5. Check the "SamplePoints.shp" in the "Data Tree" ☒ ^{SHP} SamplePoints.SHP
6. Click "Multi Point Draw Tool" on the bottom toolbar below your map window. (this is a toggle on/off)



7. Click out the points in the order you would want them sampled and in the spot you want sampled.
8. When you are finished deselect the "Multi Point Draw Tool" your new points will automatically save.



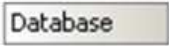
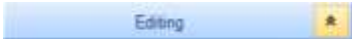
9. You now should have your custom points that look similar to the image below.
10. Once finished click "Save" on the bottom toolbar.

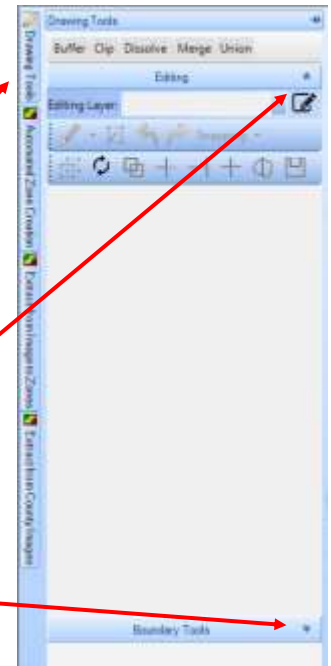


Drawing Tools Tab

Drawing Tools - Boundary Tools

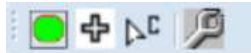
Exterior / Interior Polygons (Creating Poly-Polygon)

1. Turn on your Multiple Polygon Boundary.
2. Open the **"Database"** tab (lower left corner). 
3. Click on the row tabs in the "Database" that contain exterior polygons, this will highlight the whole row and the object will highlight "Lime Green" in the map window.
4. Click on the **"Drawing Tools"** tab on the Right side.
5. Click the Double Arrow on the Editing bar to minimize the Editing Tools 
6. Click the Double Arrow on the Boundary Tools bar to expand it



Multi-Polygon Builder

Exterior



- **Draw New Exterior Polygon** - Select to draw an exterior polygon in the shapefile and add it to the list



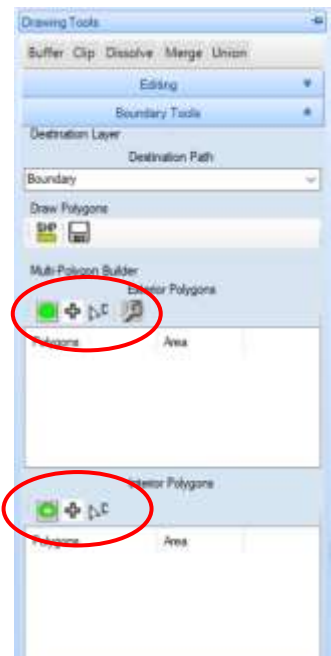
- **Add Selected Polygon as an Exterior Polygon** - Once the proper exterior polygons have been selected, click the Add button to add them to the Exterior Polygons list



- **Clear Polygon Collections** - Clears any exterior polygon selections in the list



- **Merge Interior and Exterior Polygons to PolyPolygon** - Creates the polypolygon



Interior



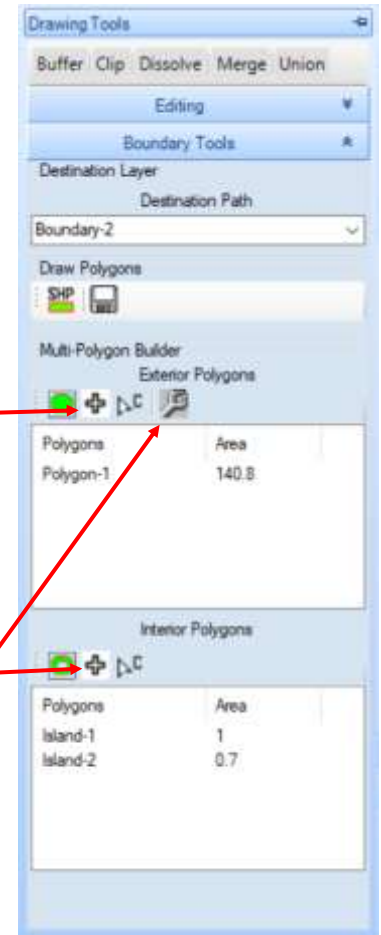
- **Draw New Interior Polygon** - Select to draw an interior polygon in the shapefile and add it to the list

Drawing Tools Tab

Drawing Tools - Boundary Tools

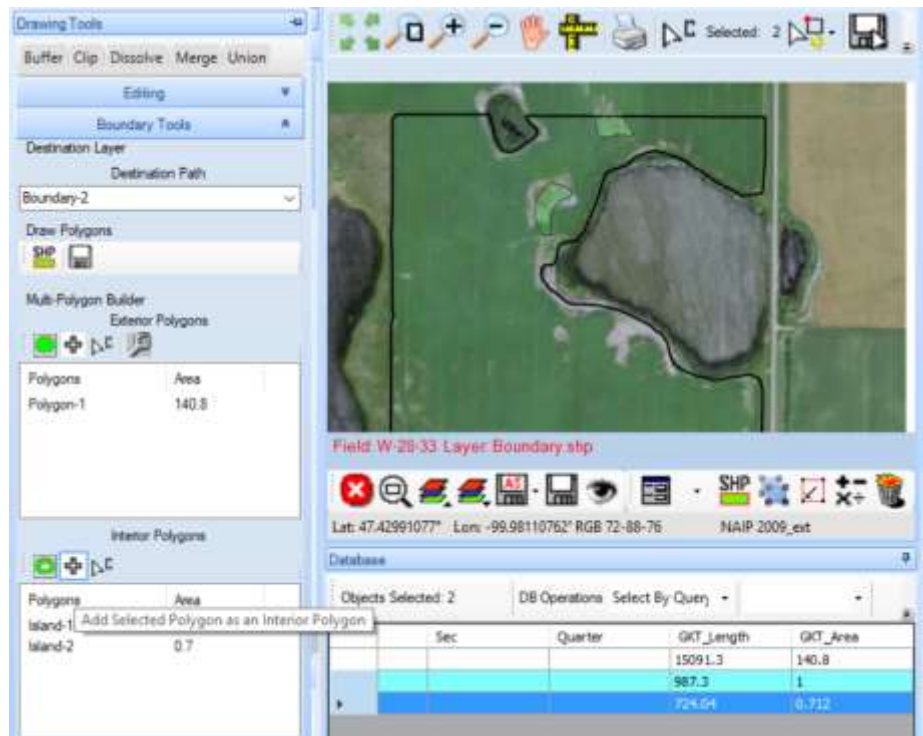
Exterior/Interior Polygons (Creating Poly-Polygon)

1. Suggest starting with a "BLANK Boundary.shp" as "**Destination Path**" (Ex. Boundary-2.shp)
2. Set "**Active Layer**" to Boundary.shp with Exterior Boundary
3. **Select** the Polygons to add in Map Window area
4. Click "**Add Selected Polygon a Exterior Polygon**"
5. Set "**Active Layer**" to Boundary.shp with Interior Boundary. This may be the same boundary.
6. **Select** the Polygons to add in Map Window area
7. Click "**Add Selected Polygon a Interior Polygon**"
8. Confirm the "**Destination Path**"
9. Click "**Merge Interior and Exterior Polygons to PolyPolygon**"
10. Click "**Save File**" and choose "**Save**"



Notes: "**Save File**" is a Save As process.

- If you skip step 1 and have "**Destination Path**" as "original Boundary.shp"
- There's an option to "Re-Name" the Boundary.
- This process may give you extra objects in the database and extra SHP Polygons.
- You can **Select** these objects and send them to the Fiery Can of Death.



Drawing Layers (Polygons, Lines, & Points)

Collect with GPS Using Ag Data Mapping Solution (Map Window)

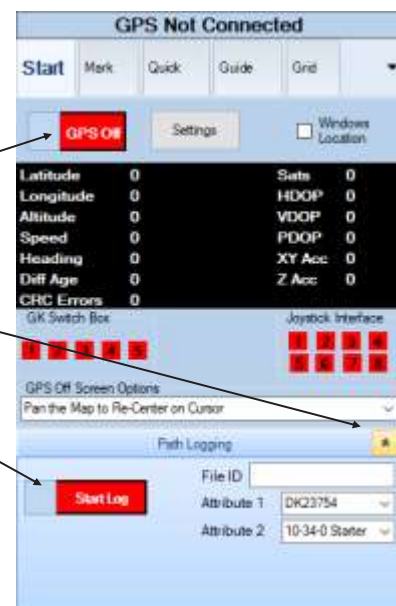
1. Turn on all layers you want to view for background maps
2. Check on "EXISTING" "Boundary" or "Ditch Line" or "Sample Point" if you want to add to Existing data.

- Connect GPS



1. Go to the "GPS" tab.
2. Go to the "Start" tab.
3. Click "GPS Off" to change it to "GPS On"
4. Click the expand button on the "Path Logging" bar.
5. For Topography collection, check "Start Log".

*NOTE: if "Logging" is "ON" you **WILL NOT** be able to turn on or off Layers or Data.*



- Marking Data

1. Go to the "Mark" tab.
2. For New Shape File "Create Layer From Template".
3. For "Existing SHP" files, Click "Save To Layer"
4. Click "Start".
5. "Pause" will allow you to go around wet un-drivable areas - click "Continue" button on other side of wet area.
6. Click on "Stop" once you have reached your finish point.
7. The object will automatically "Save".
8. Repeat steps 1-6 drawing in all the Interior & Exterior Boundaries for this field.
9. To view acres, make sure the object is the "Active Layer".
"Double Click" on the object - or click on the "Database" tab for acres.
10. For fields with no interior boundaries, you are finished.
11. For Interior Boundaries, go back two pages "Exterior/Interior Polygons (Creating PolyPolygon)" section



** More GPS information in the "Using GPS Controls" Section of the manual. **

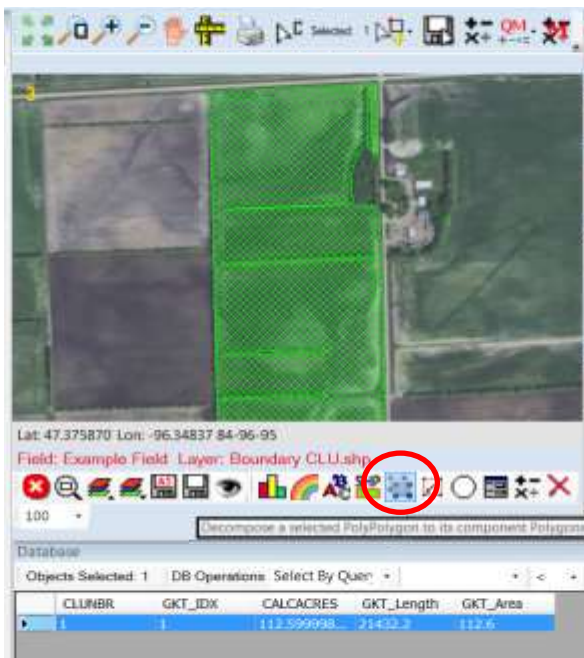
Drawing Layers (Polygons, Lines, & Points)

Decomposing a Poly-Polygon

Some boundaries may come in or have been built as Poly-Polygons. These interior polygon may need to be removed. These instructions will show you how to do this. This example will show how to remove 2 tree rows from a field.

1. Turn on our Poly-polygon boundary (note-turned on NAIP in background for this example)
2. Click inside the Boundary (making it a "Selected Object" - **Lime Green**)
3. On the bottom toolbar click on the "**Decompose a selected PolyPolygon to its component Polygons**" 
4. This is a good time to do a "Save As" & Re-Name (ex. Boundary 2012.shp)
5. Make sure the active layer is Boundary 2012.shp
6. Select the polygons to remove. (either by Clicking in them or using the Database)
7. Click on "Delete Selected Objects" button on bottom toolbar. 
8. Click "Save" on the bottom toolbar. 

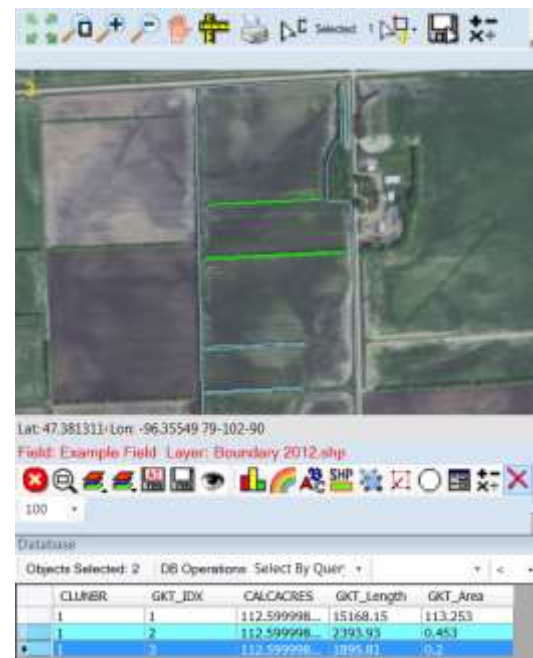
Boundary as Poly-Polygon



Only has 1 Database entry

Note : The Database of each object.

Boundary as Multiple Polygon



Has multiple database entries

Drawing Layers (Polygons, Lines, & Points)

Sometimes it is simpler to modify a point, line, or polygon shapefile rather than redrawing the object. This could include moving, adding, or removing a vertex or point.

Moving Vertices or Points

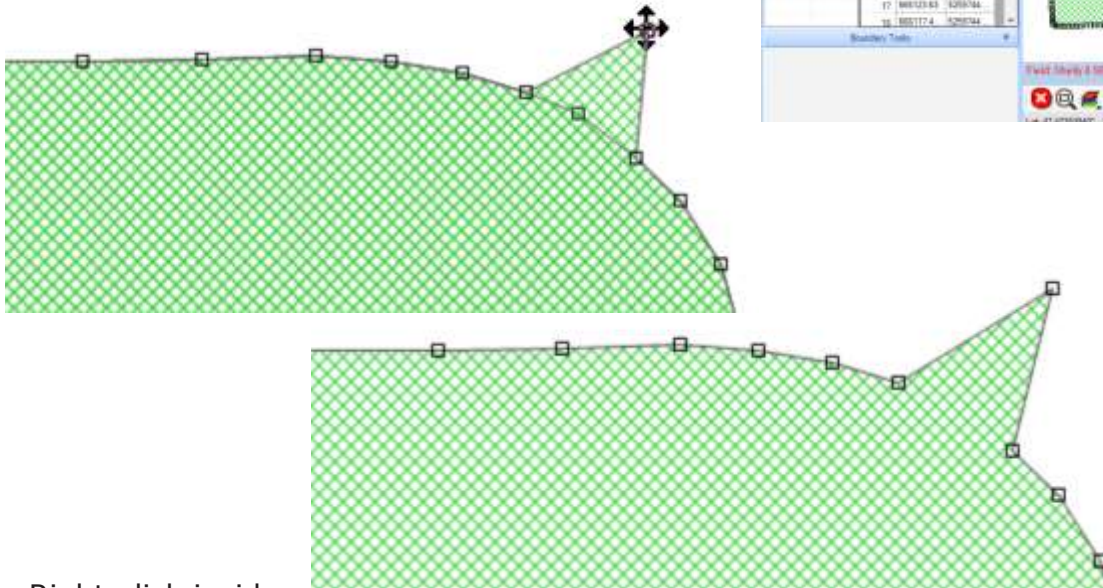
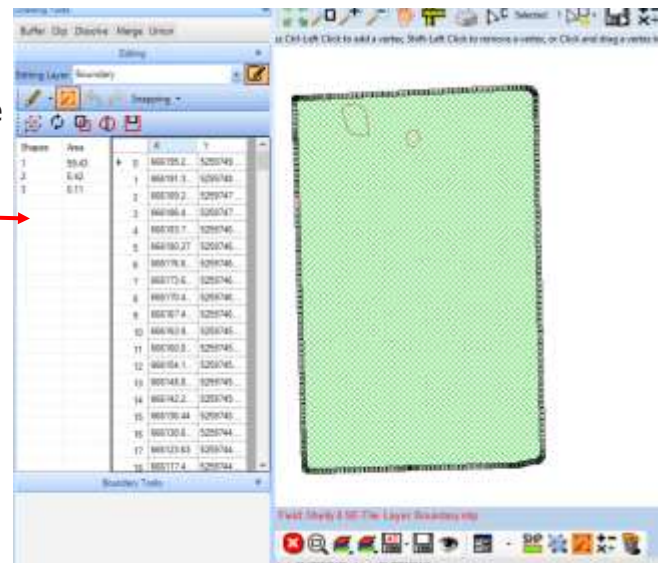
1. Turn on a shapefile
2. Click on a point or line & inside a polygon to select the object (the selected object will then become cross-hatched and/or turn green)

3. Click on the **Move Vertices of a Selected Object** button  to activate it

Note: This is a toggle button and must be turned off when finished

4. The Drawing Tools panel should now be open and will show the vertices (on the right) for the selected object. You can also select the various objects in the shapefile, which are shown on the left

5. In the map window, move your cursor over one of the vertices until the cursor arrow becomes a four-way pointer then left-click and hold to move the vertex or point



6. Right-click inside the map window or click on the **Move Vertices** button when done to turn off the tool

Drawing Layers (Polygons, Lines, & Points)

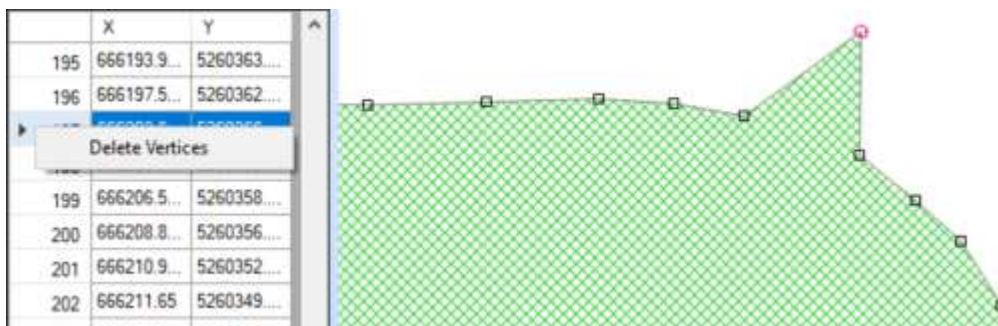
Adding Vertices to a Line or Polygon

1. Turn on a line or polygon shapefile
2. Select the line or polygon that you want to add the modification
3. Click on the **Move Vertices of a Selected Object** button  to activate it
Note: This is a toggle button and must be turned off when finished
4. While holding down the **Control key**, Left-click on the location of the new vertex and one will be added to the line or polygon
5. Right-click inside the map window or click on the **Move Vertices** button when done to turn off the tool



Removing Vertices from a Line or Polygon

1. Turn on a line or polygon shapefile
2. Select the line or polygon of the active layer that you want to add the modify
3. Click on the **Move Vertices of a Selected Object** button to activate it 
Note: This is a toggle button and must be turned off when finished
4. While holding down the **Shift key**, hover your cursor near the vertex to be removed until it is highlighted by the color pink, then Left-click to remove it
 - It is also possible to select a vertex from the list in the Drawing Tools panel, right-click, & select Delete Vertices to remove the point



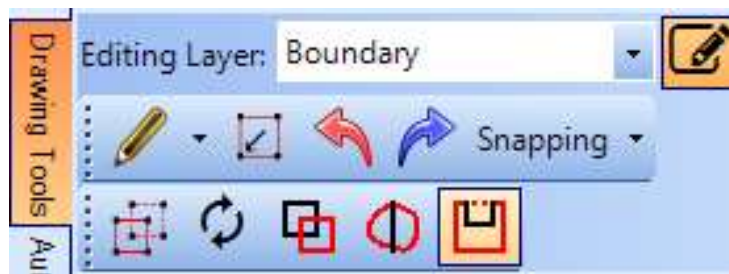
5. Right-click inside the map window or click on the **Move Vertices** button when done to turn off the tool

Drawing Tools Tab

ADMS has greatly increased its shapefile editing capabilities to include a variety of tools. From something as simple as creating a point on a map to copying polygon features to another shapefile entirely; ADMS now has a much wider range of functions.

Sometimes, it is simpler or faster to modify a point, line, or polygon shapefile rather than re-drawing the object, which could include moving, adding, or removing a vertex, point or object.

This section explains the use of the many functions found in the **Drawing Tools** tab located along the left edge of the screen



Selecting the Active Layer to be Modified



Note: To begin and end each shapefile modifying session, you will need to follow these important steps:

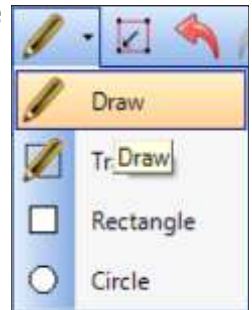
1. Turn on a line or polygon shapefile
2. Select the Editing Start button 
3. Select the layer to be edited from the Dropdown list to make it the active layer
Note: As long as the Edit button is on or active you will be unable to change the active layer unless it is a layer found in the Dropdown list
4. Select the Editing Stop button when finished editing 

Drawing Tools Tab



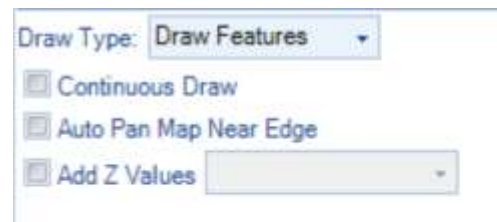
Drawing in a Point, Line, or Polygon Shapefile

1. Turn on a line or polygon shapefile.
2. Select the Editing Start button 
3. Select the layer to be edited from the Dropdown list to make it the active layer.
4. Click on the Drawing dropdown and select Draw.
5. Click to place points or vertices.
6. Select the Editing Stop button when finished editing. 



Drawing Settings for Polygons & Points

- **Draw Type**
 - **Draw Features** is used for drawing individual features, which is shown as a single entry in the database for each feature.
 - **Draw Parts** is used for continuously drawing many features that are polypolygons and can have several features represented by a single entry in the database.
- **Continuous Draw**
 - Used to draw multiple features in succession without having to re-select the Draw function
- **Auto Pan Map Near Edge**
 - Causes the map to automatically pan while drawing when the cursor gets near the edge of the map window
- **Add Z Values**
 - Information from a raster layer can be included as an attribute of the shapefile. One common use is to have an elevation map on in the background and as a point is created the elevation at that point is read and included in the database information for that point



Drawing Stats for Polygons

- As a polygon is being drawn, useful information is displayed in the Drawing Tools panel that can be used to draw a feature with specific lengths, widths, bearings, &/or sizes.

Drawing Stats			
Seg. Length:	1581.32	Total Length:	10809.91
SegBear:	266.872	FptBear:	82.8881
Part Area:	0.71	Total Area:	0.71

Drawing Tools Tab



Drawing Settings for Lines

- **Draw Type**

- **Draw Features** is commonly used for drawing larger features like boundaries
- **Draw Parts** works well for continuously drawing many smaller features

- **Continuous Draw**

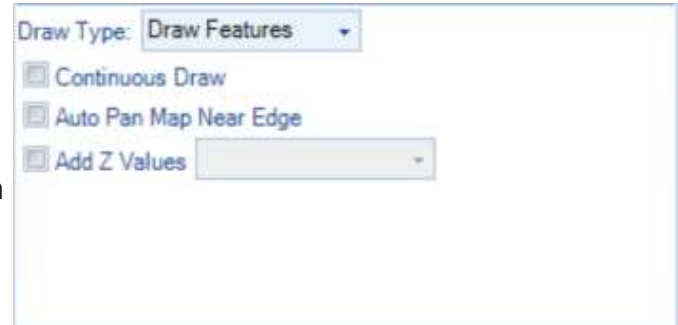
- Used to draw multiple features in succession without having to re-select the Draw function

- **Auto Pan Map Near Edge**

- Causes the map to automatically pan while drawing when the cursor gets near the edge of the map window

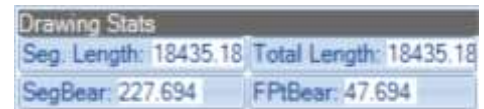
- **Add Z Values**

- Information from a raster layer can be included as an attribute of the shapefile. One common use is to have an elevation map on in the background and as a point is created the elevation at that point is read and included in the database information for that point



Drawing Stats

- As a feature is being drawn, useful information is displayed in the Drawing Tools panel that can be used to draw a feature of a specific length & bearing.



Drawing Line Options

- **Max Segment Length**

- Set a specific distance of a line to be drawn in inches

- **Draw Angle**

- Set a specific angle to be drawn

- **Parallel to Segment**

- Draw a line that is parallel to another line

- **Distance From Other Feature**

- Set a specific distance from another feature that prevents a line from being drawn any closer than that distance (units in inches). A dropdown box allows another shapefile to be used when selecting which features to measure the setback from



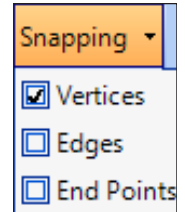
Drawing Tools Tab



Snapping

When using certain functions of the Drawing Tools it is helpful to use existing vertices to place a new vertex. There are three different features that can be snapped to.

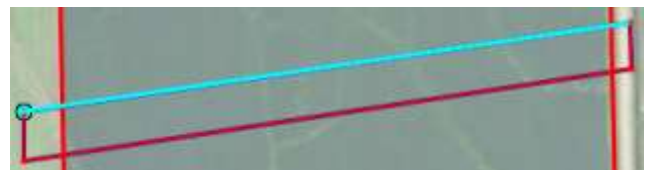
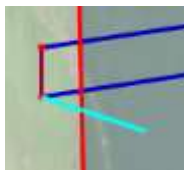
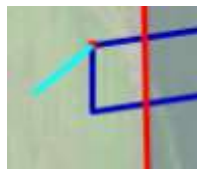
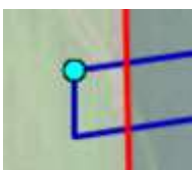
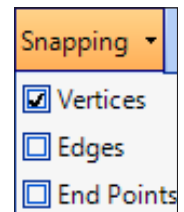
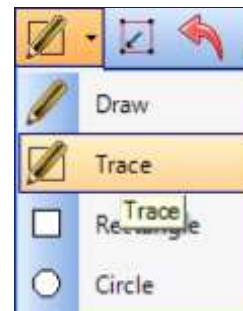
- **Vertices** - When the cursor is moved close to an existing vertex of a shapefile the cursor will "snap" to that point so that a left-click will place a point directly on top of the existing point.
- **Edges** - When the cursor is moved to the edge of a feature it will snap to that edge
- **End Points** - The cursor will only "snap" to the first and last vertices of the feature when it was created.



The three tools can be selected in any combination, depending what is trying to be achieved.

Tracing a Line or Polygon

1. Turn on the line or polygon shapefile that contains the feature to be traced and added to another shapefile.
2. Turn on the line or polygon shapefile that the traced feature will be drawn in and make sure it has been selected in the Editing Layer Dropdown list as the active layer.
3. Select the **Trace Tool** from the Drawing list, then click on the Snapping dropdown list and select **Vertices**.
4. Move the cursor over a vertex until you get a blue dot to show it has snapped to the vertex.
5. Click once to start tracing.
6. Move the cursor along the perimeter, snapping to each Vertex without clicking for the desired distance and right-click to stop tracing. To remove an undesired point hold the ALT key and left-click. It is also possible to free-hand draw while tracing if only certain parts of the feature need to be included.

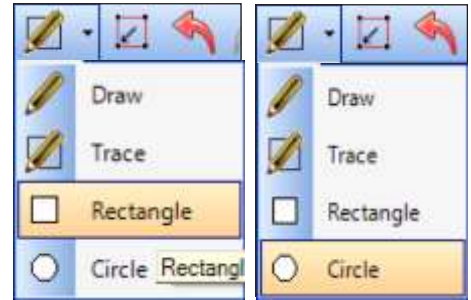


Drawing Tools Tab



Drawing a Rectangle or Circle

1. Turn on a line or polygon shapefile.
2. Select **Rectangle** or **Circle** from the Drawing dropdown list.
3. In the map window, left-click, hold and drag to create a feature of the desired size.
4. Release the mouse button to create the feature.



Notes: The initial click for drawing a rectangle will be the location of the top left corner of the rectangle. The initial click for a circle will be the center of the circle. Snapping to a vertex from another shapefile can be a very useful tool in getting accurate placement.



Additional Tools



Move Vertices of a Selected Object

This tool is a duplicate of the Move Vertices button found on the bottom toolbar and is used to move, add, and delete vertices from a point, line, or polygon.



Undo

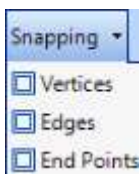
- This tool is used to undo the previous task that was completed.



Redo

- This tool is used to restore the previous undo.

Snapping



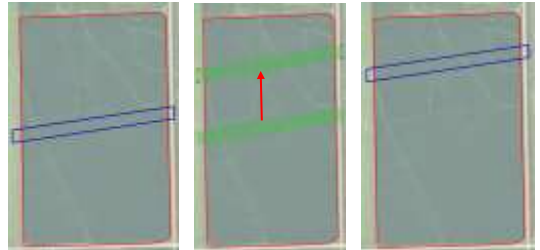
- The snapping tool is useful when trying to draw a feature directly over another by creating common vertices.
- **Vertices** allows snapping to a vertex.
- **Edges** allows snapping to the line without needing a vertex.
- **End Points** allows snapping to only the first and last points created in a line or polygon.

Drawing Tools Tab



Moving a Line or Polygon

1. Turn on a line or polygon shapefile.
2. Select the feature to be moved.
3. Click on the **Move Feature** button  to activate it and cause the cursor to turn into a four-way arrow.
Note: This is a toggle button and must be turned off when finished.
4. Left-click and drag the selected object to the new location.
5. Right-click inside the map window or click on the **Move Feature** button when done to turn off the tool.



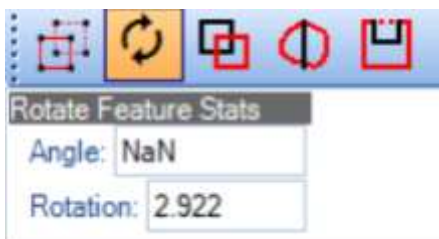
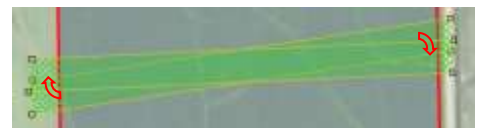
*Note: To move multiple features, select all points, lines or polygons you wish to move before clicking the **Move Feature** button, then continue from step 4.*

Rotate a Feature

1. Turn on a line or polygon shapefile.
2. Select the line or polygon that you want to rotate.
3. Click on the **Rotate Feature** button  to activate it.
4. Left-click and drag somewhere off-center in the feature to cause it to rotate.

*NOTE: Rotation Feature Stats in the Drawing Tools area.
Also, can TYPE #s in "Rotation:" box.*

5. Once the object is in the proper orientation, release the mouse button.
If the object needs adjusting, click and drag again.
6. Once you are satisfied, right click to drop the tool.



Drawing Tools Tab



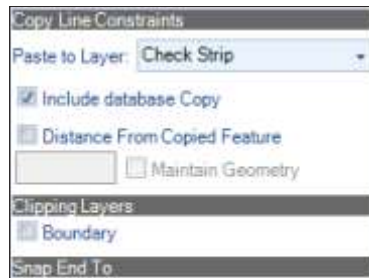
Copy a Line or Polygon

1. Turn on a line or polygon shapefile.
2. Select the feature to be copied.
3. Click on the **Copy Feature** button  to activate it.
Note: This is a toggle button and must be turned off when finished.
4. When you move your cursor back to the mapping window, the selected feature will automatically be attached to your cursor.
5. Place the object in the desired location and right-click to drop the object and the **Copy Feature** tool.



Copy Line Constraints

The Copy Feature tool has additional settings that can be applied to achieve different results.



Paste to Layer

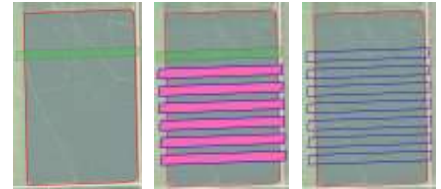
1. Turn on the shapefile that you want to paste into, then turn on the shapefile that contains the feature that you would like to copy.
2. Select the line or polygon that you want to copy.
3. Click on the **Copy Feature** button  to activate it .
4. In the **Paste to Layer** dropdown of the **Copy Line Constraints** window, select the layer that will receive the new feature.
5. In the mapping window, place the copied feature (solid pink) in the desired position and right-click to drop the tool and paste the new feature in the receiving shapefile.
6. Turn off the donor shapefile to see the copied feature.

Drawing Tools Tab



Distance from a Copied Feature

1. Turn on a line or polygon shapefile.
2. Select the object to be copied.
3. Click on the **Move Feature** button  to activate it .
4. Check the box next to **Distance from Copied Feature** and enter the distance you want between features in the box.
Note: This distance is between shared points of each feature. For example, all the top left corners of each polygon will be separated by the distance specified.
5. Move the cursor the desired distance from the original to get the number of copies you want.
6. Right-click to create the copied features and drop the tool.

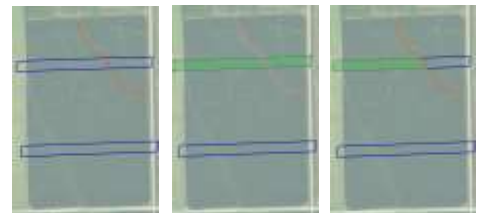


Clipping Layers

1. This area will be populated with the other layers that have been turned on.
2. By checking the box next to one of the layers listed, it will cause the new copied features to be clipped to the specified feature.
Note: This works well with something like a field boundary.

Split Line for Polygons

1. For this tool, in order to split a feature you must use a line shapefile.
2. Turn on a line shapefile and a polygon shapefile.
3. Select the layer to be split in the **Editing Layer** dropdown list.
4. Click on the Split Line button .
5. Select the polygon to be split and hover your cursor over the line that will be used to split the polygon (it should change colors).
6. Right-click to split the polygon and drop the tool.

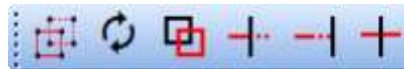
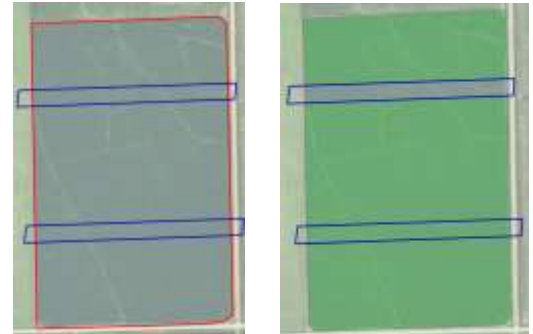


Drawing Tools Tab



Cut Out Area from Polygon

1. Turn on two polygon shapefiles.
2. Select the layer to be cut as the active layer in the **Edit-
ing Layer** dropdown list.
3. Click on the **Cut Out** button  to activate it .
4. Click on the polygon to remove its overlapping area from the other polygon.
5. Right-click to drop the tool.



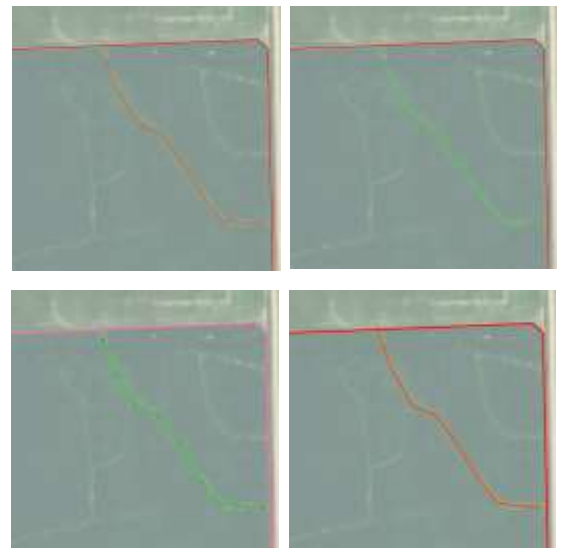
Clipping a Line

1. Turn on at least two line shapefiles.
2. Select the layer to be clipped in the **Editing Layer** dropdown list.
3. Select the line to be clipped. 
4. Click on the **Clip Line** button.
5. Hover your cursor over the line to clip to until it turns pink, then click to clip the other line.



Extend a Line

1. Turn on a line shapefile to be modified and another shapefile.
2. Select the layer to be extended in the **Editing Layer** dropdown list.
3. Select the line to be extended.
4. Click on the **Extend Line** button 
5. Hover your cursor over the feature that the line will be extended to until it turns pink and click to extend the line.

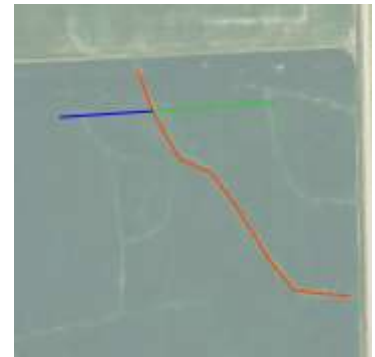
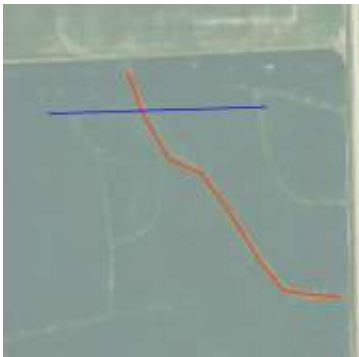


Drawing Tools Tab

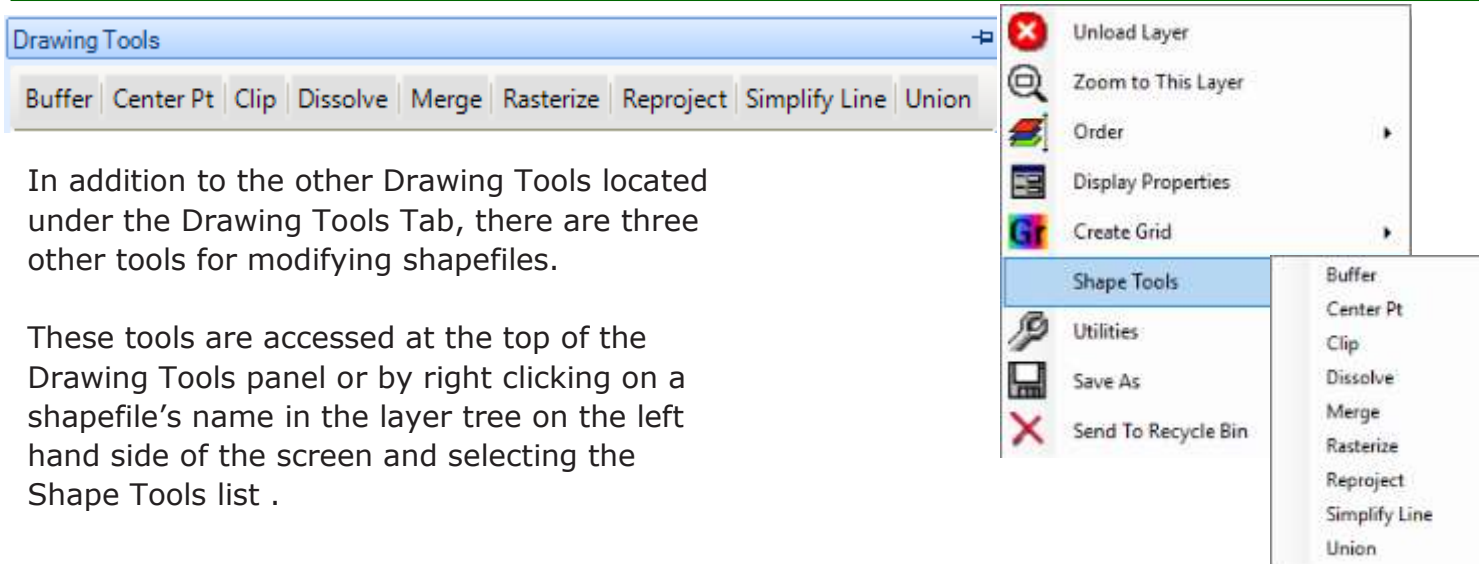


Split a Line

1. Turn on the line shapefile to modify and another layer with a feature that intersects the line to be split.
2. Select the layer to be cut as the active layer in the **Editing Layer** dropdown list.
3. Click on the **Split Line** button  to activate it.
4. Click on the line to be split.
5. Hover your cursor over the feature that will be used to split the line until it turns pink, then click to make the split.



Drawing / Shape Tools

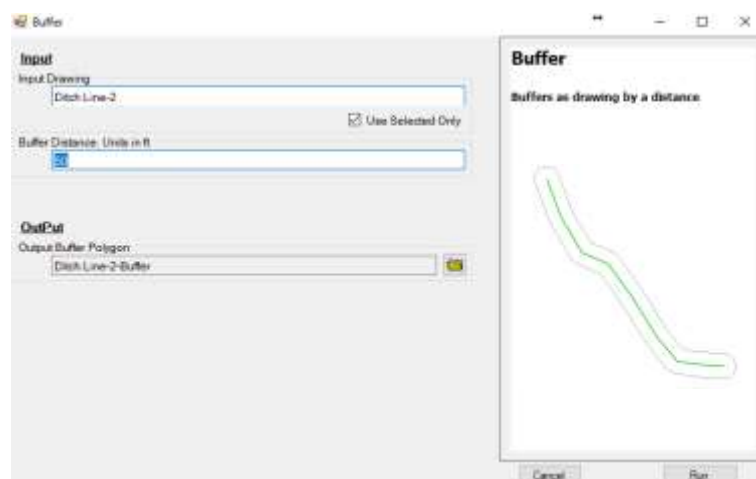


In addition to the other Drawing Tools located under the Drawing Tools Tab, there are three other tools for modifying shapefiles.

These tools are accessed at the top of the Drawing Tools panel or by right clicking on a shapefile's name in the layer tree on the left hand side of the screen and selecting the Shape Tools list .

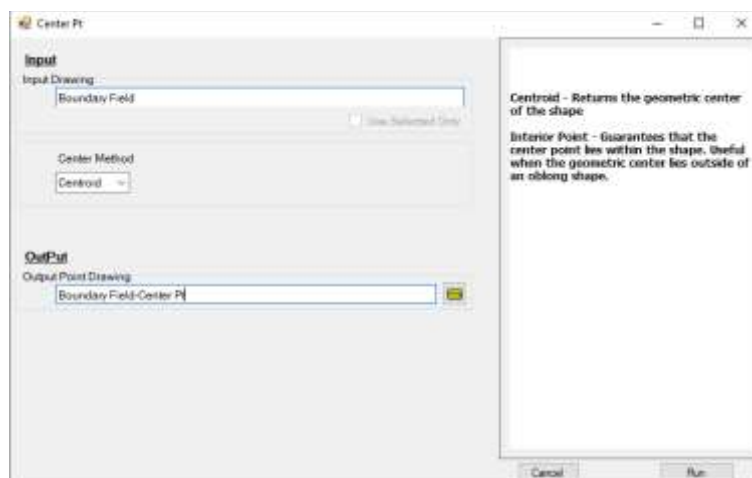
Buffer

1. Turn on a shapefile.
2. Select the desired feature to be buffered.
3. Enter a buffer distance. The default is 10 feet and can be a positive or negative number.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Center Point

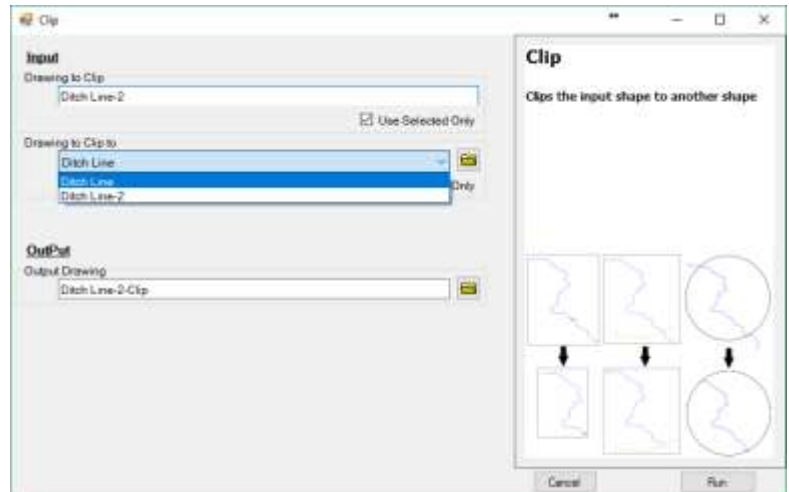
1. Turn on a shapefile.
2. Select the desired Input Drawing at the top.
3. Choose either Centroid or Interior Point.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Drawing / Shape Tools

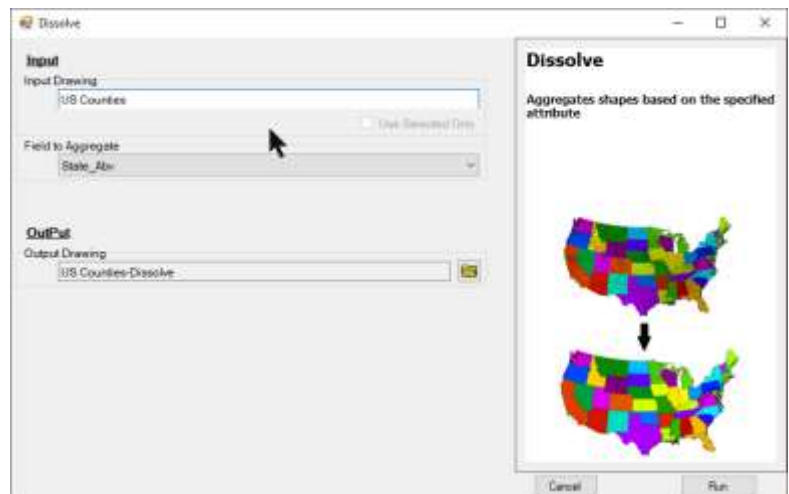
Clip

1. Turn on a shapefile.
2. Select the input layer to be clipped.
3. Select the drawing to clip to.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Dissolve

1. Turn on a shapefile.
2. Select the input layer.
3. Select an attribute to dissolve by.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.

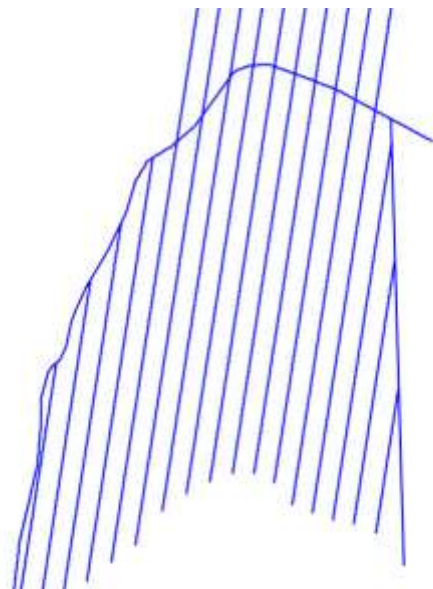
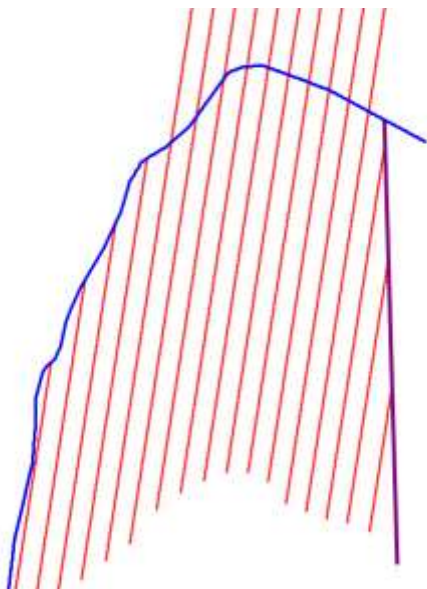
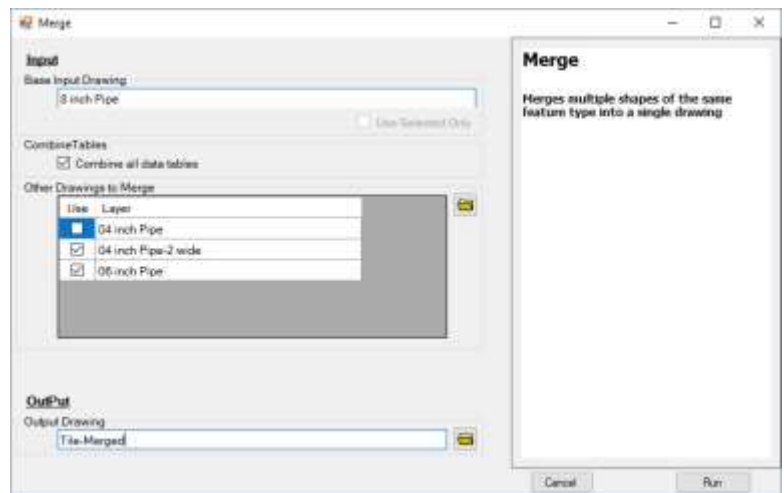


Note: the example in the software has the USA by Counties—then it is “Dissolved” by State Name. Giving us 48 states as a poly-polygon, meaning that the “Database” will only have 48 objects in it.

Drawing / Shape Tools

Merge

1. Turn on the shapefiles to merge.
2. Select the Base Input Layer.
3. Select Other Drawings to Merge
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Rasterize

Create a raster from values extracted from another raster or from shapefile values based on a shapefile feature.

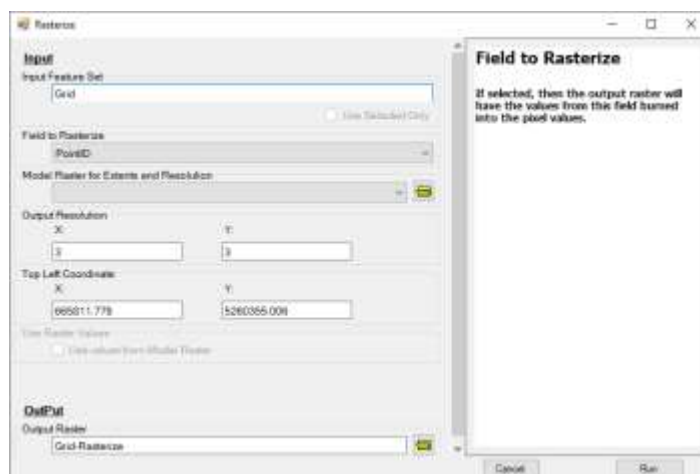
For instance, for polygon shapefiles, it is possible to create a raster based on a field in the attribute table (database) of the shapefile. It's also possible to draw a line across the field and create a raster from the elevation values along that line or lines.

It can also be used to extract values from different rasters and the resulting files will have their pixels aligned to one another based on the shapefile for a more exact analysis between datasets.

Drawing/Shape Tools

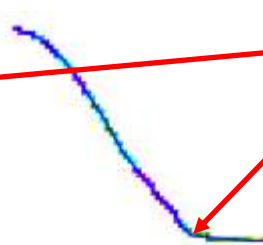
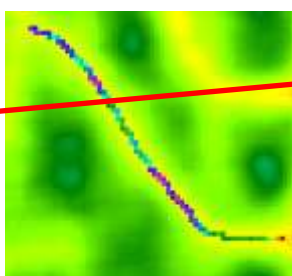
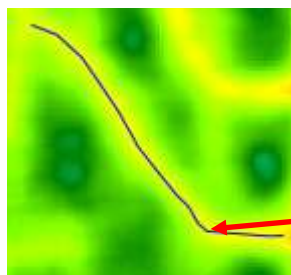
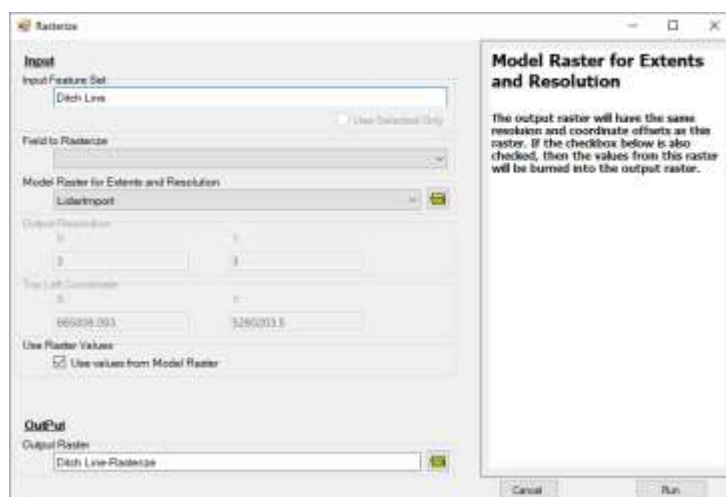
Rasterize a Polygon

1. Turn on a polygon shapefile.
2. Select the **Input Feature Set**.
3. Select the **Field to Rasterize** (do not use GKT_* fields)
4. Adjust the output resolution if desired.
5. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
6. Click **Run**.



Rasterize a Line

1. Turn on a line shapefile
2. Select the **Input Feature Set**
3. Select the **Model Raster**
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Layer	Value	Units
Lider Topo	869.7	Feet
Ditch Line-Rasterize	869.69	

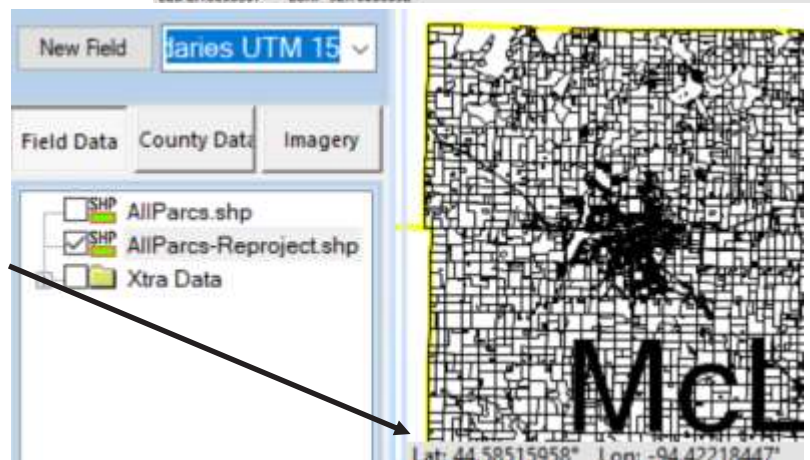
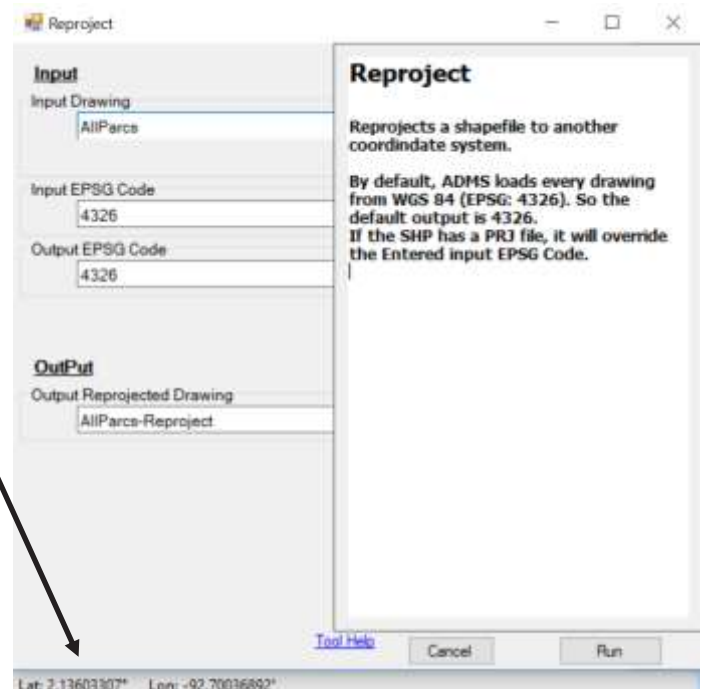
Drawing / Shape Tools

Reproject

From time to time you may run into SHP files that are not in "Lat-Lon-WGS84" or "UTM-WGS84" projections. These are "Projection" methods that are used in GIS software. There are 100's if not 1,000's of projections out there. The two that I have mentioned will have the data turning on in the right spot in ADMS. Please note to check this, I like to have my "Cursor Coordinate Units" set to Lat-Lon-Decimal Degrees (Settings & User Interface 2).

So if you have a file from someone / somewhere that is turning on in the wrong part of the world, it may be a "projection" problem. All "Shape" files need SHP / SHX / DBF, it is suggested that they also have a PRJ file. The PRJ file has the "projection" info for the file that makes this work. If the data does not have the PRJ file, this is a guessing game.

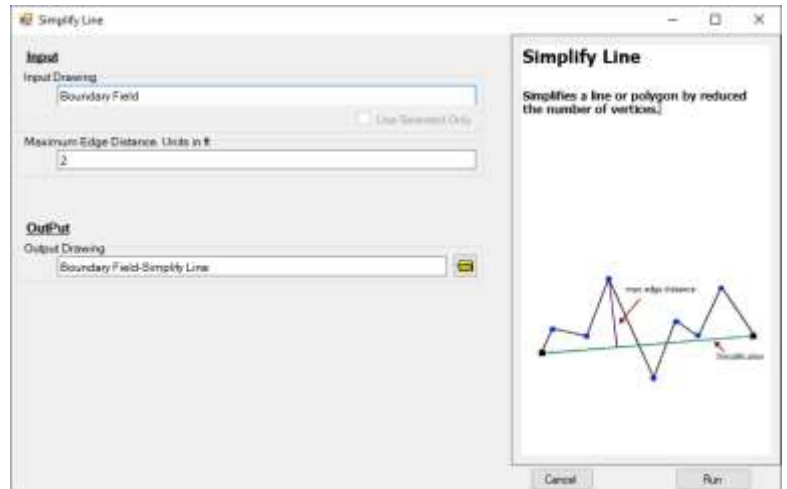
1. Check you are in the correct UTM in ADMS
2. Turn on data that is in the correct spot (State-County Boundaries work well).
3. Note the Lat—Lon values for this area.
4. Turn on your ?data? file and "Zoom to this Layer" on bottom tool bar.
5. Scroll over the data and note the Lat—Lon
6. Right click on file to re-project
7. Choose "Shape Tools" and "Re-Project"
8. "Reproject" window opens
9. Don't change any values in the top 3 boxes.
10. "Output" - Rename if you want.
11. Click "Run"
12. Refresh tree and your new layer is in the tree.
13. Turn on the "Reproject.shp"
14. Zoom to layer and notice it lines up with county boundary and Lat—Lon.



Drawing/Shape Tools

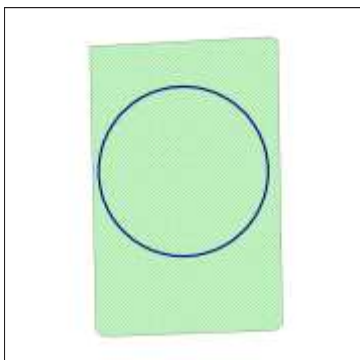
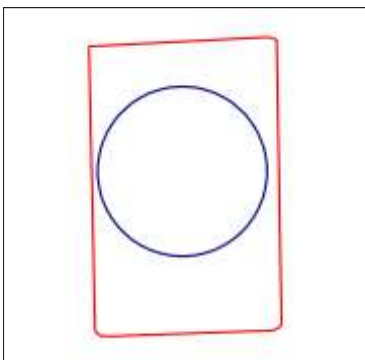
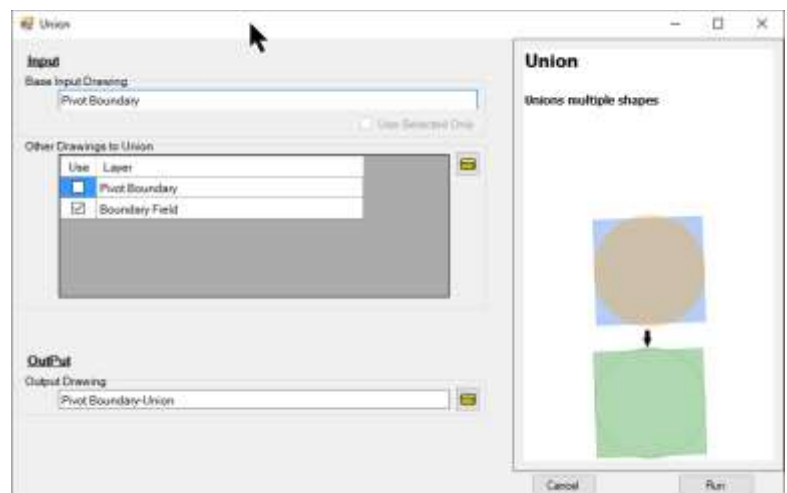
Simplify Line

1. Turn on a line or polygon shapefile.
2. Select the Input Layer.
3. Adjust the Max Edge Distance if needed
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Union

1. Turn on the shapefiles to merge.
2. Select the feature.
3. Check the Selected box .
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Display Properties Points

To access the Layer Display Properties of shapefiles, either right click on the layer to be modified and select "Display Properties" or make the layer active and click on the "Layer Display Properties" button on the bottom toolbar. The drop down arrow beside the button will allow you quick access to saved templates.



Style Tab

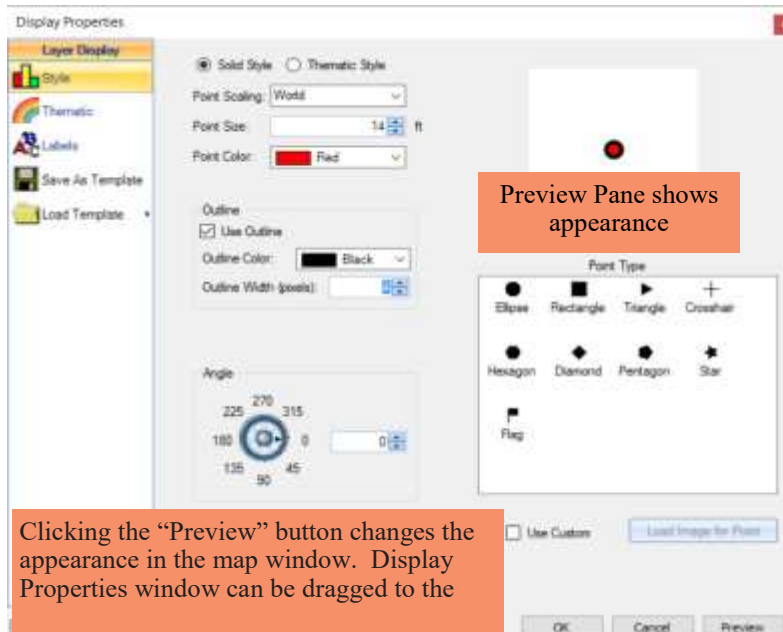
• Styles

Solid - all points will be the same color.
Thematic - displays color based on data

• Point Scaling

Fixed - keeps points the same number of pixels no matter the level of zoom so it is always visible.
World - will get larger or smaller on screen as zoom changes.

- **Point Size** - Select point size
- **Point Color** - Select point color
- **Outline** - Select color and width.
- **Point Type** - Custom points may be loaded from an image file.
- **Angle** - rotates the point direction.

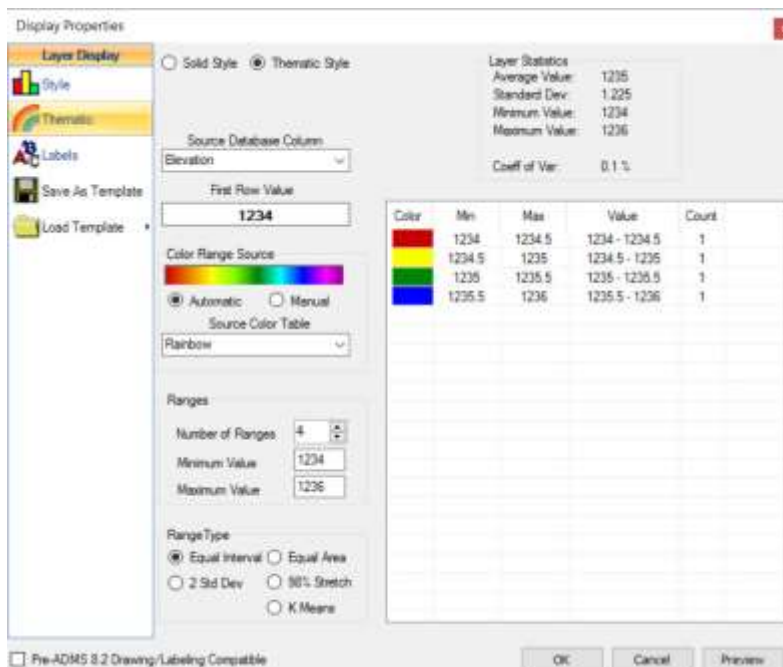


Pre-ADMS 8.2 Drawing/Labeling Compatible.
Check this if you are using ADMS V 8.2 and older on any computers.

Thematic Tab

- **Source Database Column** - Must have a variable range of data to get multiple colors.
- **Source Color Table** - Choose color table
- **Ranges** - Corresponds to the data you are working with. Min/Max Values will populate from the Source Database Column selected.
- **Range Type** - Changes how the ranges are grouped

Note- Thematic styles do not save in a template.



Display Properties Points

To access the Layer Display Properties of .SHP files, either right click on the layer you want to modify and select "Display Properties" or make the layer active and click on the "Layer Display Properties" button on the bottom toolbar. The drop down arrow beside the button will allow you quick access to saved templates.

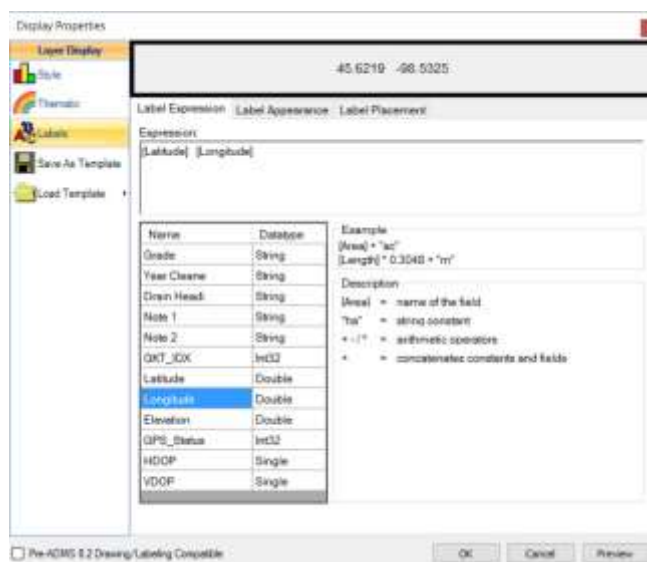
Labels Tab

• Label Expression

Click on a "Name" in the database column and it will populate the "Expression" box. Multiple "Names" may be added.

Add descriptors following the value by adding a + "xxx". By adding spaces before the descriptor " Ac", separation can be added between the value and the descriptor.

It is also possible to do math within the label, like converting acres to hectares or feet to meters.



• Label Appearance

Font Family - Changes font style

Scale

Pixel Scale - keeps the label the same number of pixels no matter the level of zoom so it is always visible.

World Scale - the label will get larger or smaller on screen as you zoom in or out. The height in "x" will vary depending on the Linear Measure Unit setting.

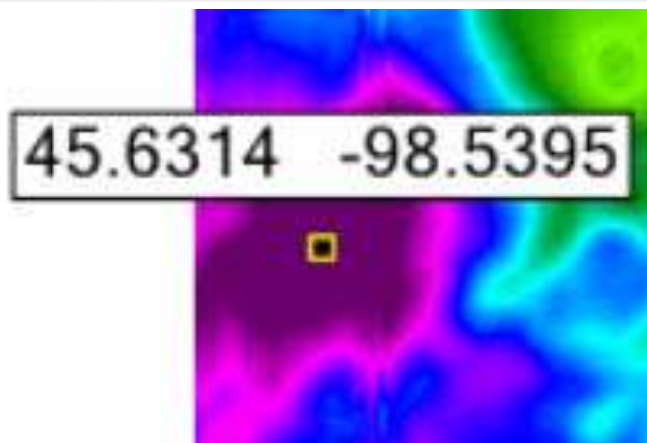
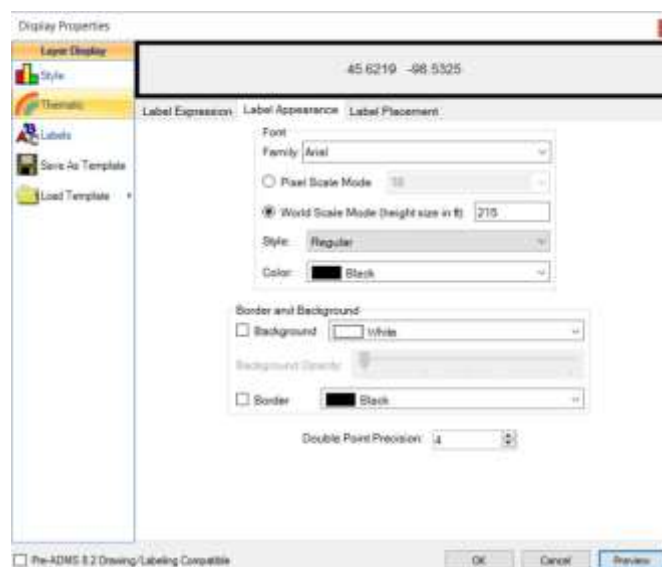
Style - choose from Regular, **Bold**, *Italic*, Underline, or a combination of these.

Color - changes the color of the text

Background and Border - adds a solid or outlined box around your label for better visibility against different images.

Background Opacity - can make the line visible through the background.

Double Point Precision - allows you to select how many digits display beyond the decimal point. Only applies to numeric values.



Display Properties Points

Label Placement

• Label Rotation

Common angle - all labels at the same angle.

Individual angle - different angles to each individual point. In the database, enter the angles you want applied in a column and select that column.

• Advanced Labeling Properties

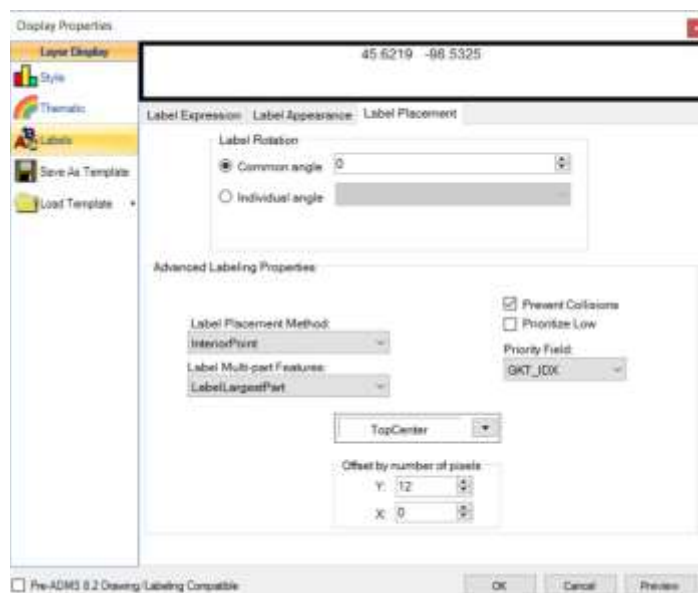
Label Placement Method - assigns location around the point the label will be placed.

Label Multi-part Features - applies the label to the largest segment or to all segments.

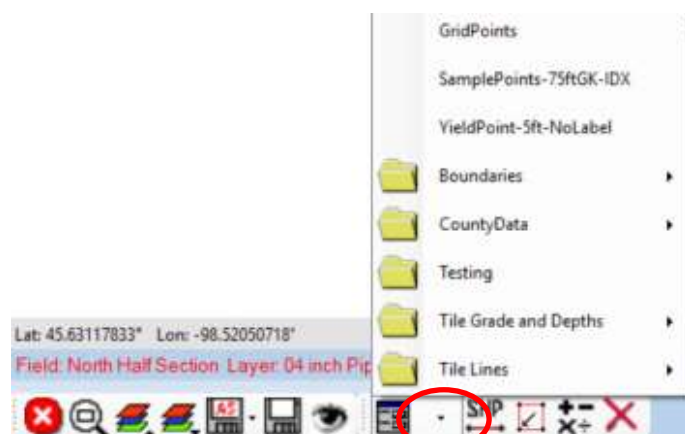
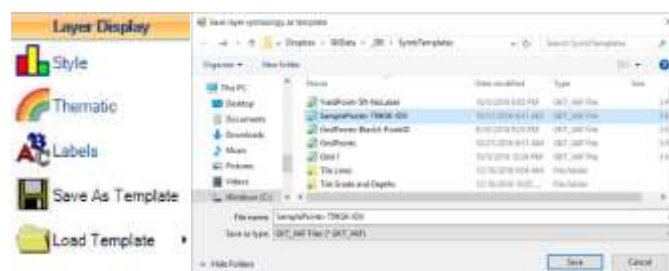
Prevent Collisions - will turn off the lowest value labels that overlap so they do not conflict with each other. Checking "

Prioritize Low - turns off the highest value over lapping labels.

Offset - select which direction and distance to offset a label from its point on the X and/or Y axis.

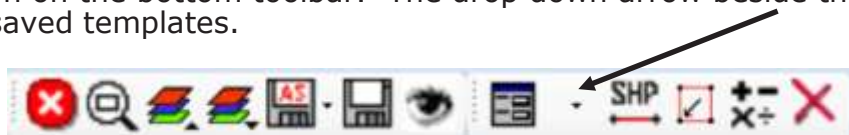


- When done with Label Settings save for future use by selecting "Save As Template".
- This will open the SymbTemplates folder within your GKData folder.
- Name the template to fit the description of the label, for example "SamplePoints-75ftGK-IDX" which indicates File type, label size and data-base column used.
- Within the SymbTemplate folder, subfolders can be added to help better organize your templates.
- To access templates, either open the "Layer Display Properties" and select Load Template or click on the dropdown arrow beside the Display Properties button on the bottom toolbar.



Display Properties Lines

To access the Layer Display Properties of .SHP files, either right click on the layer you want to modify and select "Display Properties" or make the layer active and click on the "Layer Display Properties" button on the bottom toolbar. The drop down arrow beside the button will allow you quick access to saved templates.



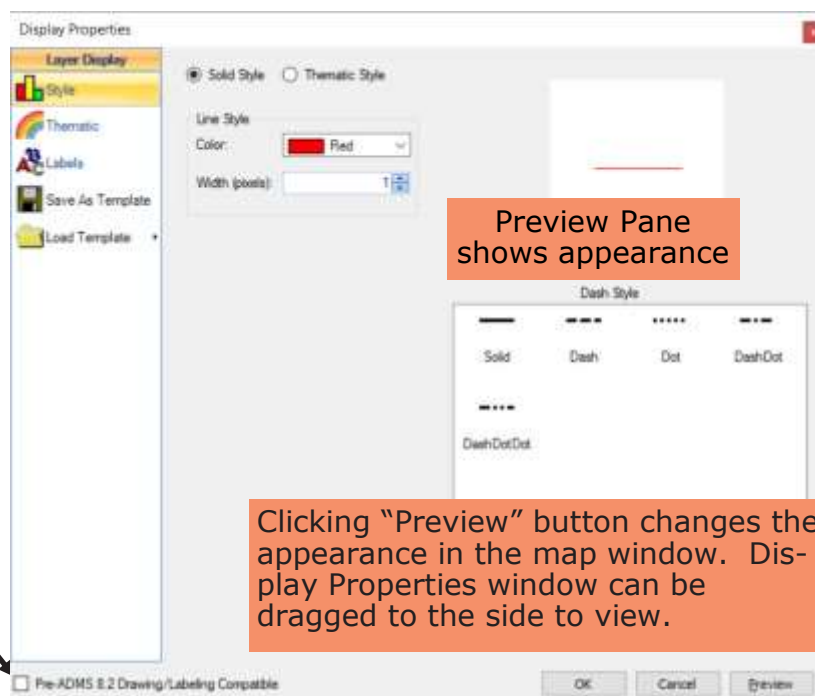
Styles Tab

• Styles

Solid - all points will be the same color.
Thematic - displays color based on data

- **Color** - choose a line color
- **Width** - choose a line's width in pixels
- **Dash Style** - choose a solid or dot/dash combination.

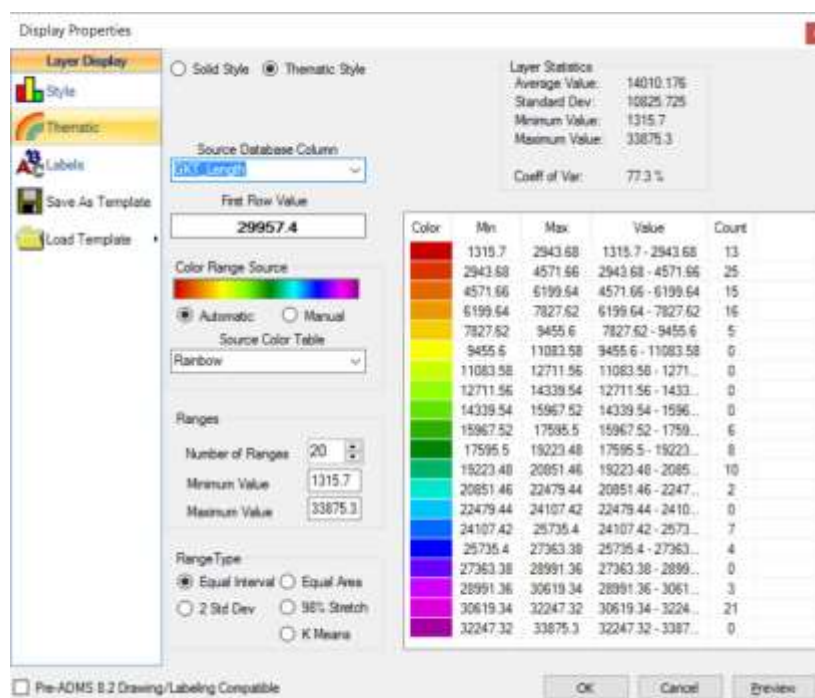
Pre-ADMS 8.2 Drawing/Labeling Compatible.
 Check this if you are using ADMS V8.2 and older on any computers.



Thematic Tab

- **Source Database Column** - Must have a variable range of data to get multiple colors.
- **Source Color Table** - Choose color table
- **Ranges** - Corresponds to the data you are working with. Min/Max Values will populate from the Source Database Column selected.
- **Range Type** - Changes how the ranges are grouped

Note- Thematic styles do not save in a template.



Display Properties Lines

To access the Layer Display Properties of .SHP, files either right click on the layer you want to modify and select "Display Properties" or make the layer active and click on the "Layer Display Properties" button on the bottom toolbar. The drop down arrow beside the button will allow you quick access to saved templates.

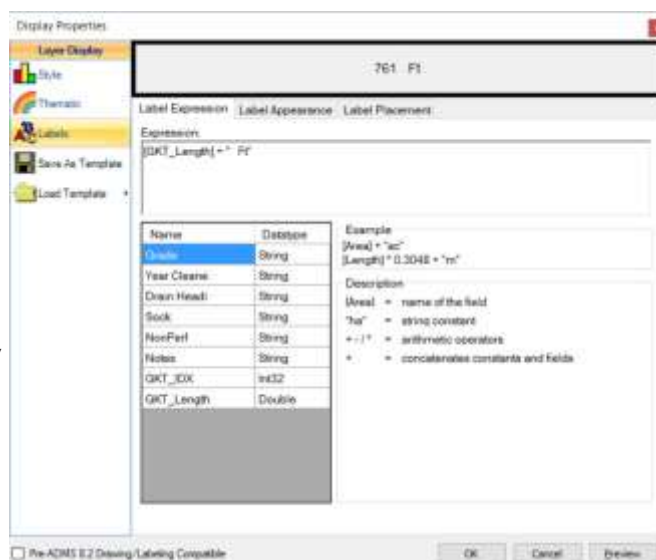
Labels Tab

• Label Expression

Click on a "Name" in the database column and it will populate the "Expression" box. Multiple "Names" may be added.

Add descriptors following the value by adding a + "xxx". By adding spaces before the descriptor " Ac", separation can be added between the value and the descriptor.

It is also possible to do math within the label, like converting acres to hectares or feet to meters.



• Label Appearance

Font Family - Changes font style

Scale

Pixel Scale - keeps the label the same number of pixels no matter the level of zoom so it is always visible.

World Scale - the label will get larger or smaller on screen as you zoom in or out. The height in "x" will vary depending on the Linear Measure Unit setting.

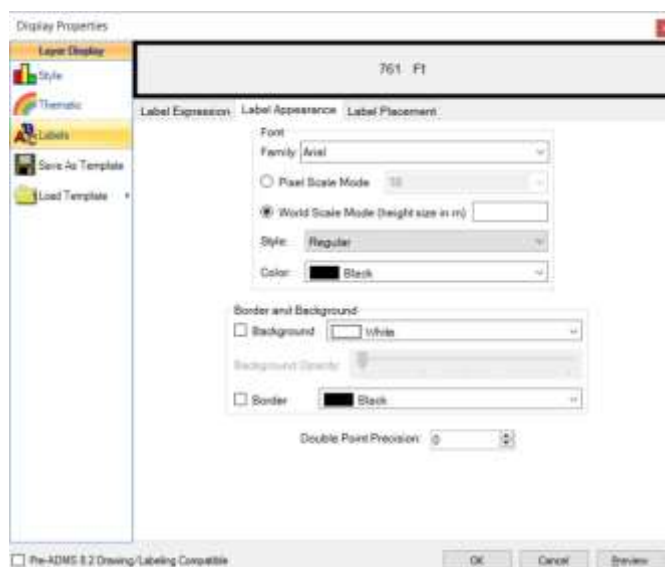
Style - choose from Regular, **Bold**, *Italic*, Underline, or a combination of these.

Color - changes the color of the text

Background and Border - adds a solid or outlined box around your label for better visibility against different images.

Background Opacity - can make the line visible through the background.

Double Point Precision - allows you to select how many digits display beyond the decimal point. Only applies to numeric values.



Display Properties Lines

Label Placement

• Label Rotation

Common angle - all labels at the same angle.

Individual angle - different angles to each individual line. In the database, enter the angles you want applied in a column and select that column.

• Advanced Labeling Properties

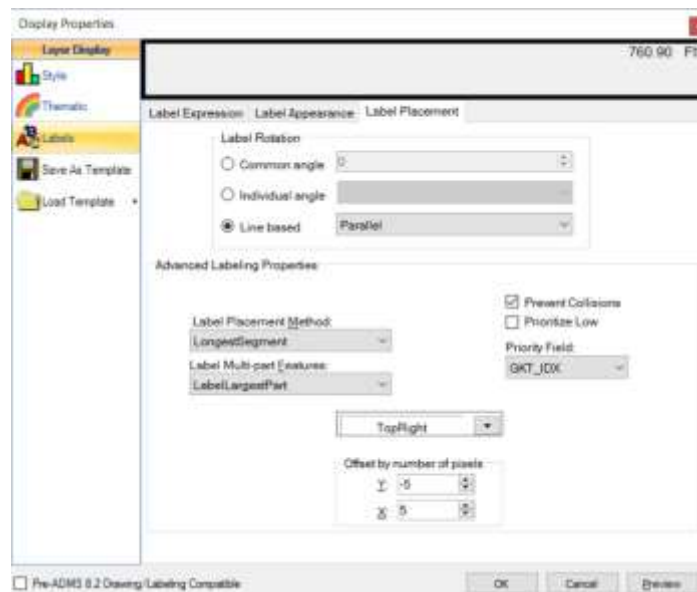
Label Placement Method - assigns location around the line the label will be placed.

Label Multi-part Features - applies the label to the largest segment or to all segments.

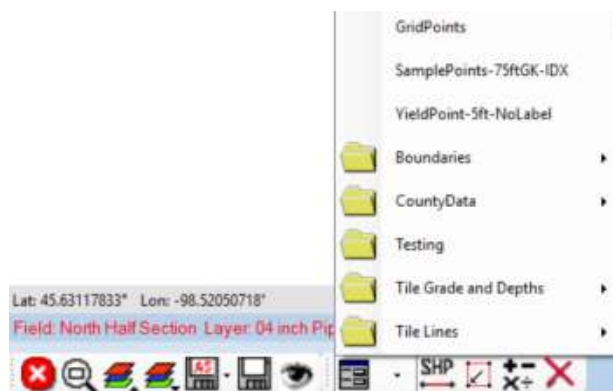
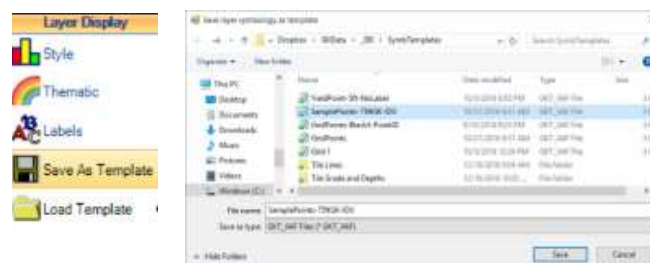
Prevent Collisions - will turn off the lowest value labels that overlap so they do not conflict with each other. Checking "

Prioritize Low - turns off the highest value overlapping labels.

Offset - select which direction and distance to offset a label from its point on the X and/or Y axis.



- When done with Label Settings save for future use by selecting "Save As Template".
- This will open the SymbTemplates folder within your GKData folder.
- Name the template to fit the description of the label, for example "SamplePoints-75ftGK-IDX" which indicates File type, label size and database column used.
- Within the SymbTemplate folder, subfolders can be added to help better organize your templates.
- To access templates, either open the "Layer Display Properties" and select Load Template or click on the dropdown arrow beside the Display Properties button on the bottom toolbar.



Display Properties Polygons

To access the Layer Display Properties of .SHP files, either right click on the layer you want to modify and select "Display Properties" or make the layer active and click on the "Layer Display Properties" button on the bottom toolbar. The drop down arrow beside the button will allow you quick access to saved templates.



Styles Tab

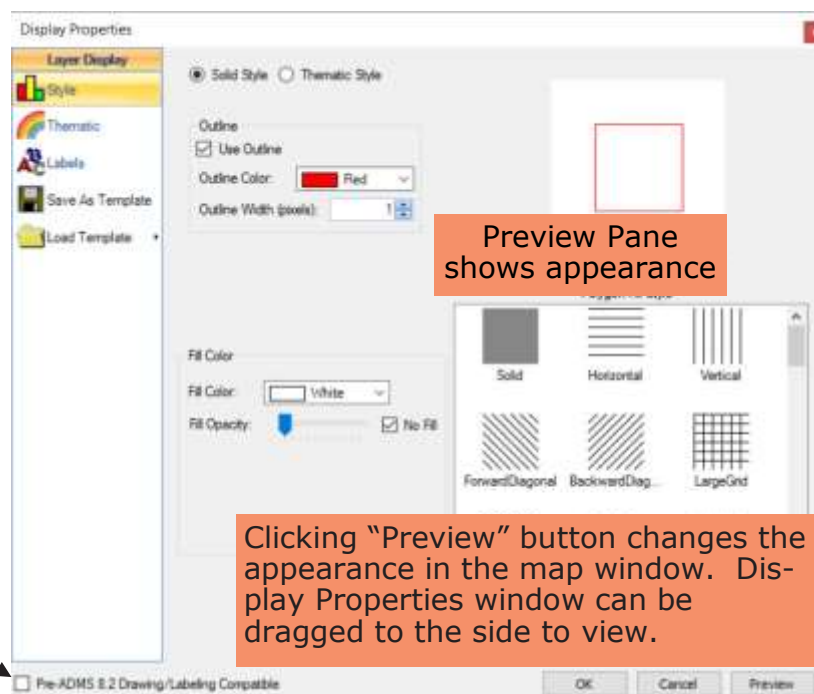
• Styles

Solid - all points will be the same color.

Thematic - displays color based on data

- **Outline Color** - choose a outline color
- **Outline Width** - choose an outline's width in pixels
- **Polygon Fill Style** - choose different fill colors, opacities, and patterns.

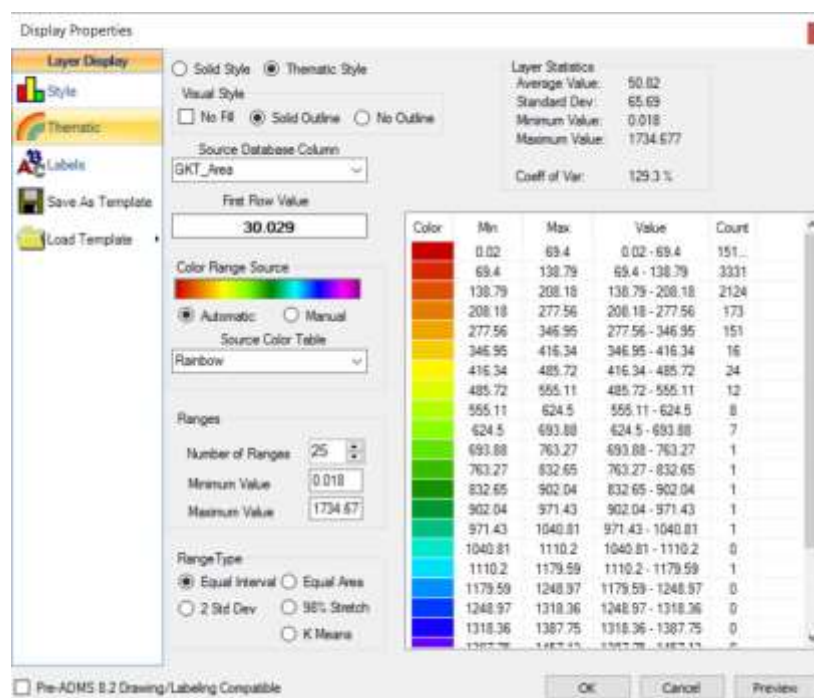
Pre-ADMS 8.2 Drawing/Labeling Compatible. Check this if you are using ADMS V8.2 and older on any computers.



Thematic Tab

- **Source Database Column** - Must have a variable range of data to get multiple colors.
- **Source Color Table** - Choose color table
- **Ranges** - Corresponds to the data you are working with. Min/Max Values will populate from the Source Database Column selected.
- **Range Type** - Changes how the ranges are grouped

Note- Thematic styles do not save in a template.



Display Properties Polygons

To access the Layer Display Properties of .SHP files, either right click on the layer you want to modify and select "Display Properties" or make the layer active and click on the "Layer Display Properties" button on the bottom toolbar. The drop down arrow beside the button will allow you quick access to saved templates.

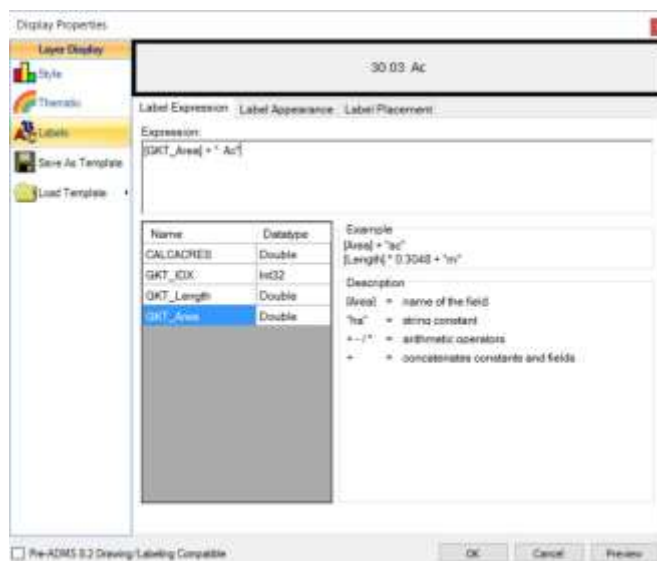
Labels Tab-

Label Expression -

Click on the "Name" of the database column and it will populate in the "Expression" box.

Add descriptors following the value by adding a + "xxx". This could be "Ac" for area. By adding spaces before the descriptor " Ac", separation can be added between the value and the descriptor.

It is also possible to do math within the label. You can convert Ac to Ha or Ft to M.



Label Appearance -

Family is the font.

Pixel or World Scale.

Pixel Scale will keep the label the same number of pixels no matter the level of zoom in or out so it will always be visible.

World Scale will get larger or smaller on screen as you zoom in or out. The height in "x" will vary depending on the Linear Measure Unit setting.

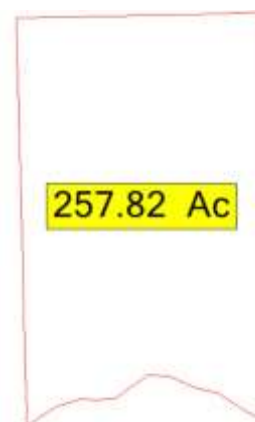
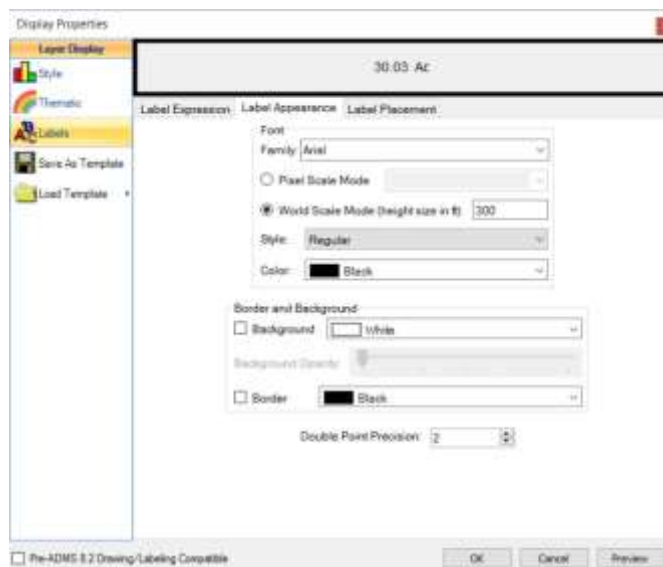
Style - choose from Regular, **Bold**, *Italic*, Underline, or a combination of these.

Color of the font.

Background and Border adds a solid or outlined box around your label for better visibility against different images.

Adjusting the Opacity of the background can make the line visible through the background

Double Point Precision allows you to select how many digits display beyond the decimal point. This only applies to numeric values.



Display Properties Polygons

Label Placement

• Label Rotation

Common angle - all labels at the same angle.

Individual angle - different angles to each individual line. In the database, enter the angles you want applied in a column and select that column.

• Advanced Labeling Properties

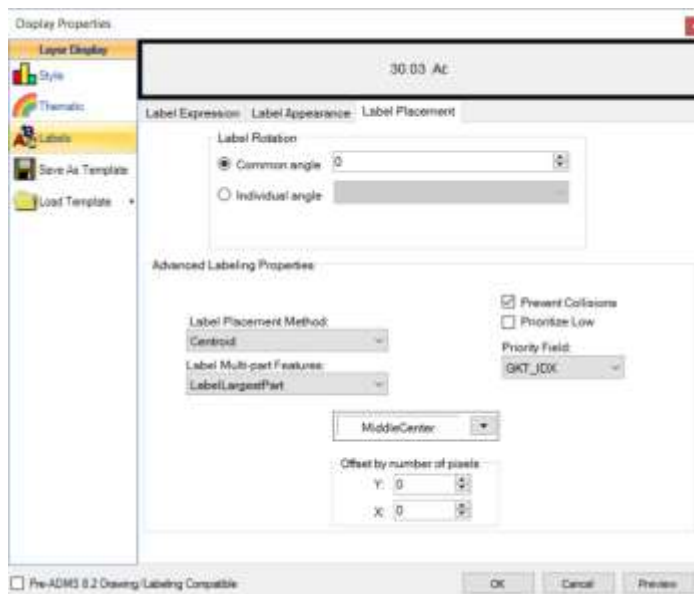
Label Placement Method - assigns location around the line the label will be placed.

Label Multi-part Features - applies the label to the largest segment or to all segments.

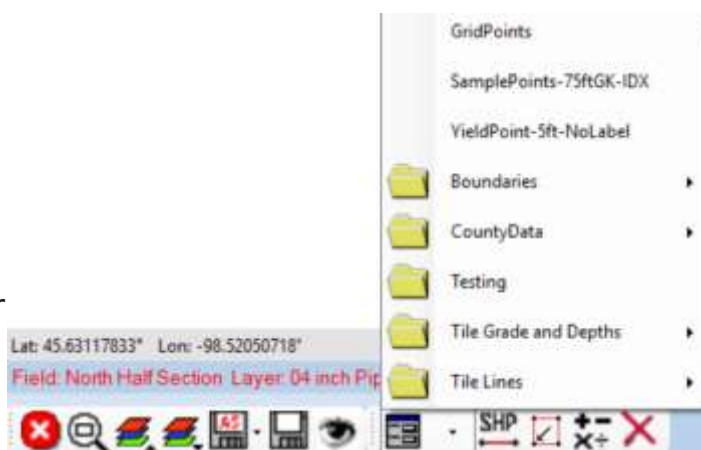
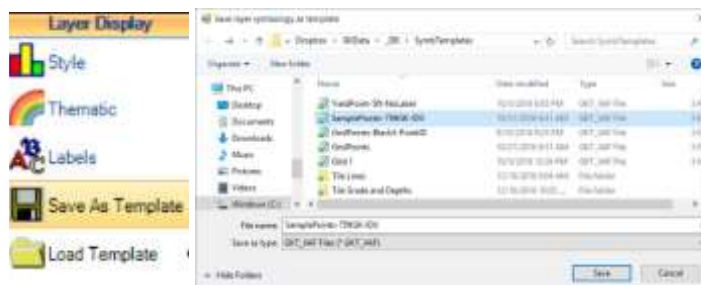
Prevent Collisions - will turn off the lowest value labels that overlap so they do not conflict with each other. Checking "

Prioritize Low - turns off the highest value over lapping labels.

Offset - select which direction and distance to off set a label from its point on the X and/or Y axis.



- When done with Label Settings save for future use by selecting "Save As Template".
- This will open the SymbTemplates folder within your GKData folder.
- Name the template to fit the description of the label, for example "SamplePoints-75ftGK-IDX" which indicates File type, label size and data-base column used.
- Within the SymbTemplate folder, subfolders can be added to help better organize your templates.
- To access templates, either open the "Layer Display Properties" and select Load Template or click on the dropdown arrow beside the Display Properties button on the bottom toolbar.



Display Properties for Older Versions

Pre-ADMS 8.2 Drawing/Labeling Compatible

Style Tab-

Line or Point Color-

Fill color for Polygons-

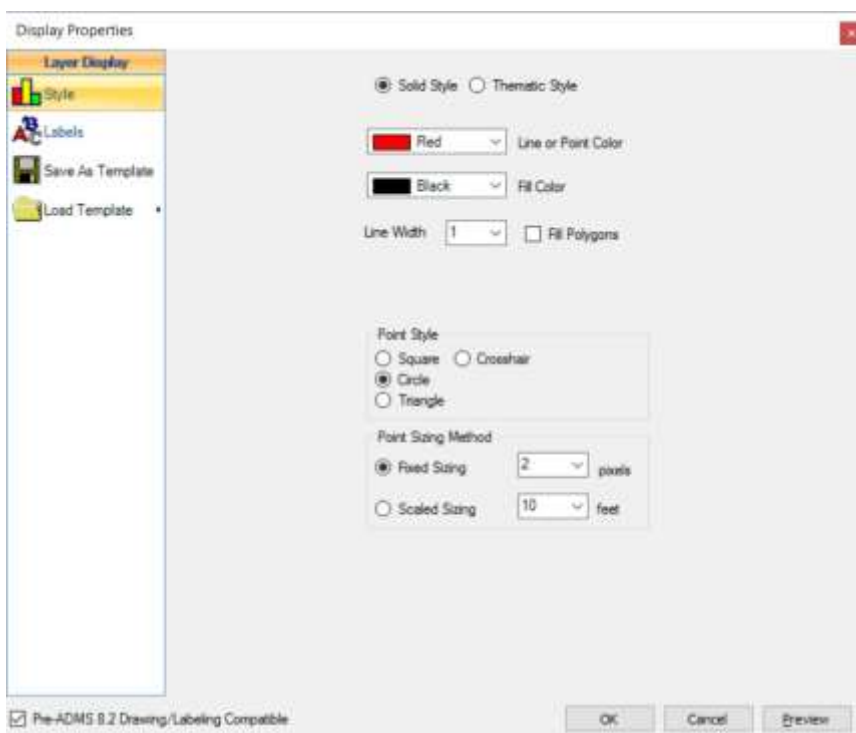
Line Width and Option to Fill Polygons-

Point Style-

Point Sizing Method-

Fixed sizing in Pixels. Object will stay the same number of pixels no matter the level of zoom in or out so it will always be visible.

Scaled Sizing will get larger or smaller on screen as you zoom in or out.



Label Tab-

Check "Labels Visible" to display in the Map Window.

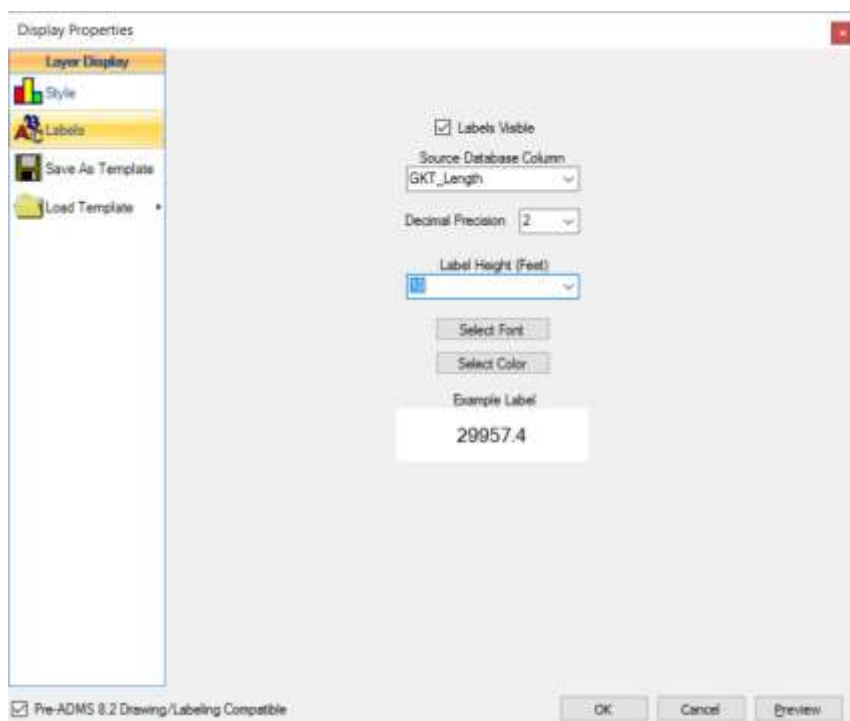
Select Source Database Column for data to be displayed. Color by Name does not function in Pre-ADMS 8.2

Select "Decimal Precision" to fit the data.

Choose Label Height-

Select Font-

Select Font Color-



My Notes

Quick Notes For Satellite Imagery

Creating Boundaries and Guidelines

1. Draw a field boundary or save it from a CLU file. Refer to creating boundaries section.
2. Turn on a NAIP image (County Data)
3. Create a new layer from Template— Guidelines 
4. Draw reference lines from the NAIP image. This will be used to help align extracted imagery.

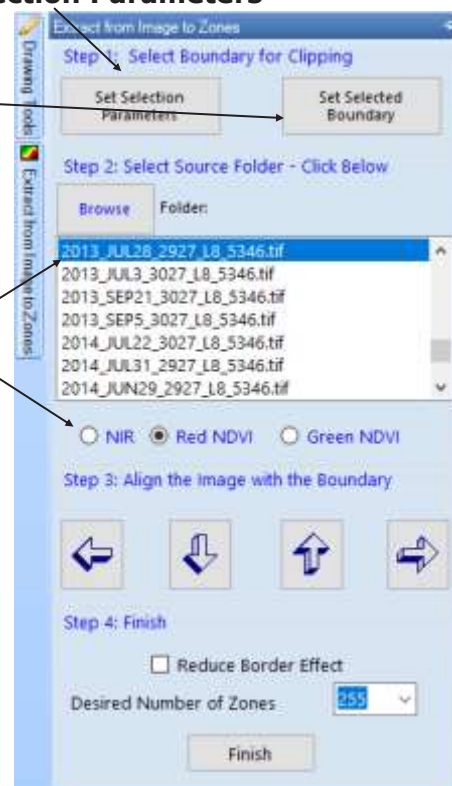


Selecting Polygon - Boundary

1. A Boundary is needed for this process. Refer to the creating boundaries section to create a Boundary.
2. Turn on Boundary.shp and make sure it is the **active layer**.
3. Go to the **(EIZ)"Extract from Image to Zones"** Tab—Click **"Set Selection Parameters"**
4. Click inside the Boundary.shp polygon in the "Map Window"
5. The object will appear **"Lime Green"**.
6. Go to **"EIZ"** tab—Click **"Set Selected Boundary"**
7. Go to the "EIZ" Tab

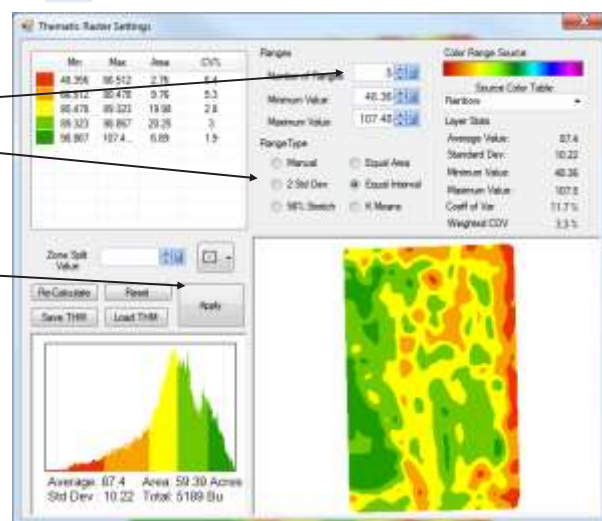
Cutting the Raster

1. "Step 2:" - "**Browse**" to the folder that contains "Landsat.tif" files
2. Turn on the Guidelines.shp that were created.
3. Choose the Extraction Type - NDVI=Vegetation/NIR=Bare Soils
4. "**EIZ**" Tab and "Click" on the LandSat Image Date.tif to extract
Note : Image will shows up in map window
5. Use the Alignment Arrows to move Image (if needed) according to guidelines
6. Choose "Desired Number of Zones" (suggest 255)
7. Click "Finish" (Repeat 3-7 for all the Images desired)



Coloring & Zoning Raster

1. Make sure your zone.grd is the **active layer**.
2. Useful tools at this time (if needed)
 - **"Reduce Border Effect"** 
 - **"Trim End Values"** 
 - **"Invert"** 
3. Click on **"Smooth Filter"** 5x5 - two times 
4. Turn all images to be merged. Open **Multi Output Map Math**
5. Open "Average Of All Layers" script => Compile => Run
6. **"Save As"** Zones.grd 
7. Click on **"Thematic Color"** 
8. Adjust **"Number of Ranges"** to desired # of Zones
9. Adjust the settings like the window to the right
10. Normally use **"2 Std Dev"** or **"K Means"**.
11. Mouse over the **"Color Chips"** to adjust and use the "Scroll Wheel" on the mouse for custom coloring.
12. When finished, click **"Apply"**.
13. In "Map Window" do a "Save As"
 - Name "Field Name-Zones-CropYear.grd"



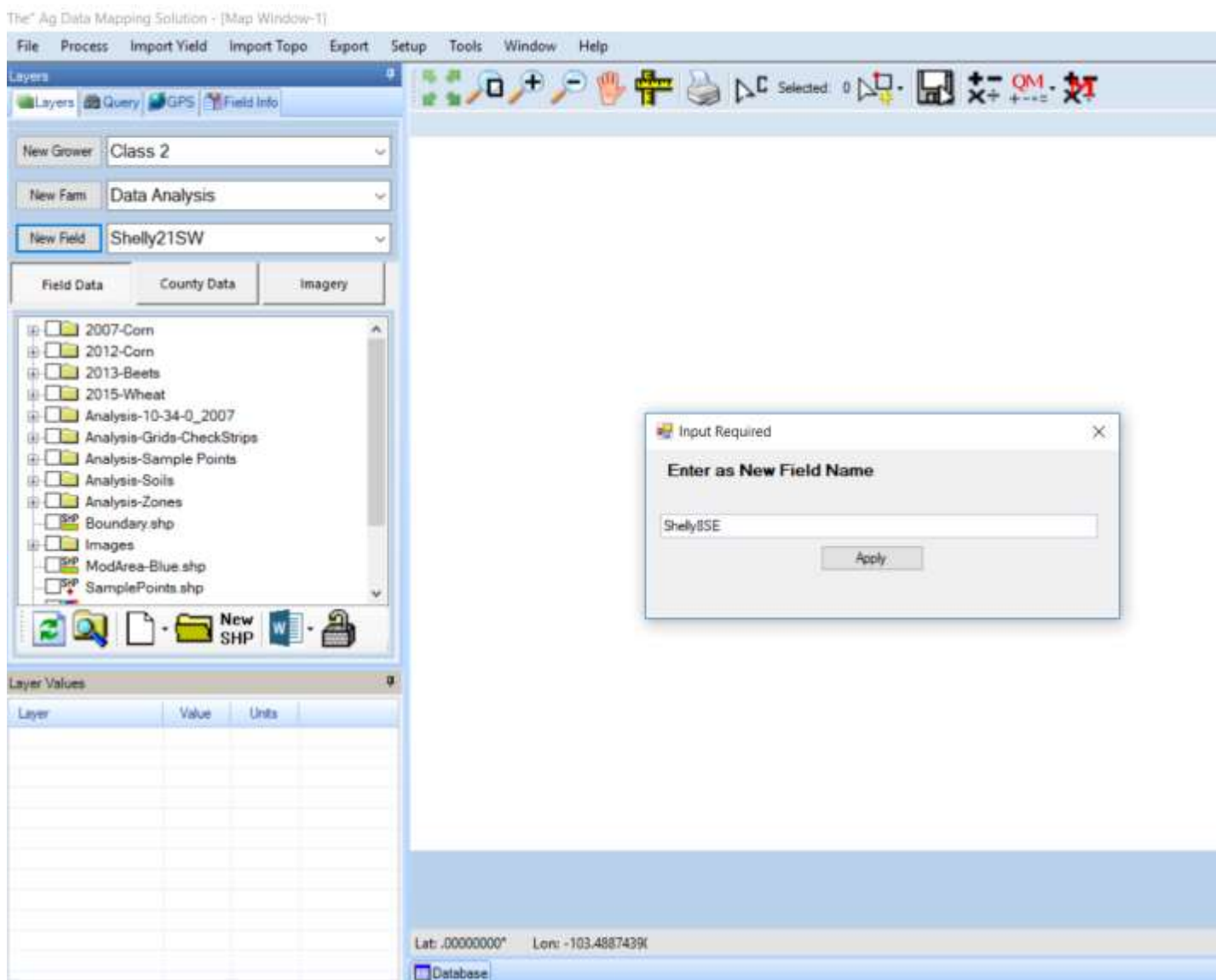
Saving for—Soil Sampling

1. Right click on the file name.grd in the data tree and select save as BMP (most soil samplers) /// save as Google Earth KMZ /// Or go to "File" & "Print Map" & "Print Map to Bit-map". Many options here.

Creating Zones From Imagery

For this section of the help guide, we will be looking at Extracting and Handling Imagery. In the reference to "Handling" Imagery, we refer to colorization and zone creation. We will be working in the New Map Window, but many of these tools will carry across into other windows in Ag Data Mapping Solution.

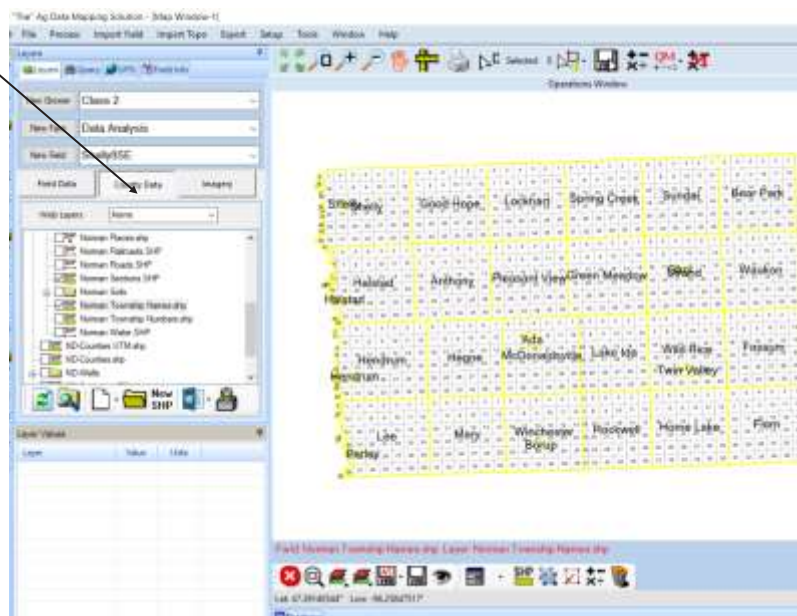
1. Start up Ag Data Mapping Solution and select the **"Map Window"**  button.
2. When the **"Map Window"** opens, select the desired "Grower", "Farm" and "Field". If they do not exist, click on the "New" buttons to the left of the name. An **"Input Required"** window will open up in the middle of the screen to enter the new name, do so, and click "Apply". Now the field is selected.



Creating Zones From Imagery

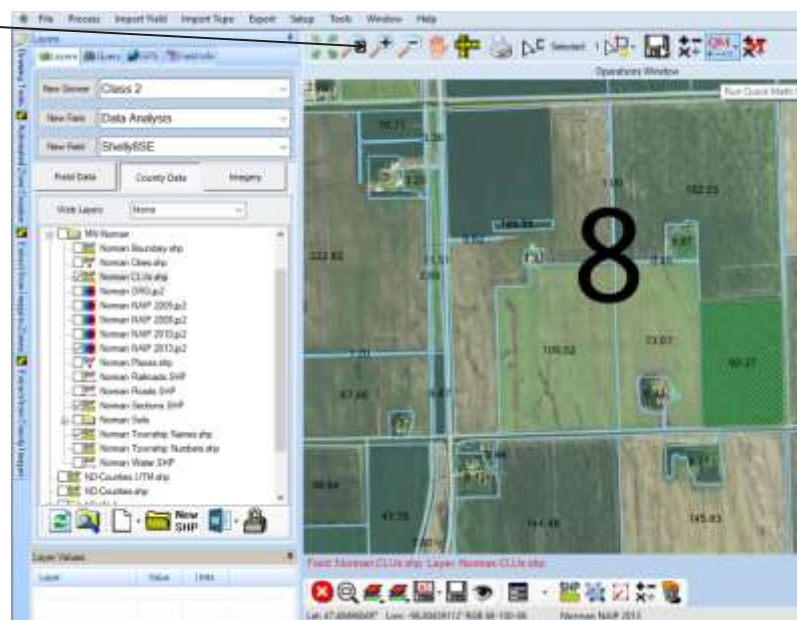
Creating Boundaries

1. Select the "County Data" tab in the "Layer Control" area on the left side of the window. Open up the "County" folder, turn on a "NAIP" file, a "Township" file, a "Section" file and a "CLU" file if there is one.
2. If you already have a boundary created or have a "CLU" and do NOT want to create an individual field boundary, skip to the Automated Zone Creation or the Manual Zone Extraction section.



3. Using the Township and Section data, use the zoom tools on the top tool bar to find the desired field.
4. Once zoomed to the desired field, boundaries can be created two different ways in the office:

- **Draw a Field Boundary**
- **Save Boundary from a CLU**
- **Mass Data Collection (harvest / application data)**

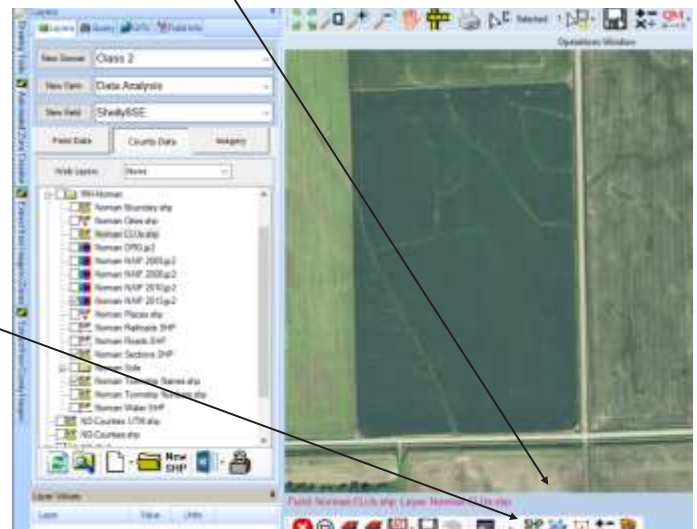
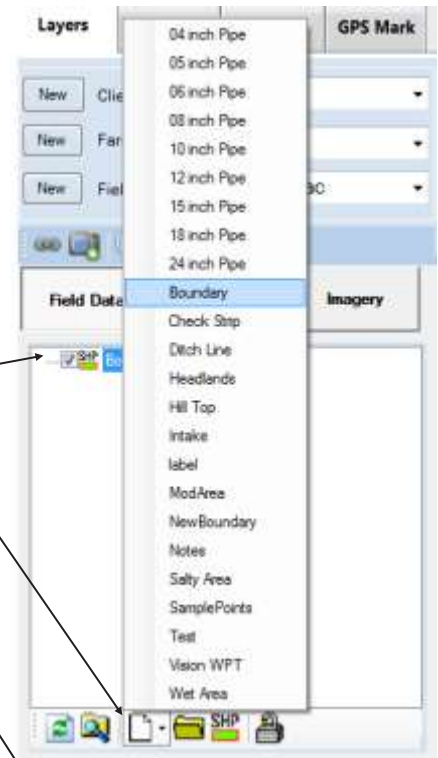


Creating Zones From Imagery

Creating Boundaries

Hand Draw a Field Boundary

1. Make sure all the correct Grower, Farm, Field data is selected and go to the bottom of the "Data Tree" window and click on **"Create New Layer from Template"** and select "Boundary".
2. You will see the "Boundary" file you created under the "Field Data" tab. Check the box in front of the file name **"Boundary.shp"**, this will make it the **Active Layer**.
3. Go down to the bottom tool bar and select the **"Draw New Object"** button.
4. Once this is selected, "Left Click" on the field edge. Notice the blue line dragging behind the cursor. The line will not draw until you "Left Click" again at the next location (*If you mark a point at an incorrect position, hold down the "ALT" key and left click to undo the last point marked*). Once finished going around the field, "Right Click" to complete the drawing. When you "Right Click", the software will close the boundary by snapping the line back to the first point marked.
 - a) Take note as the line is drawn, there is a tool at the bottom – center of the screen to help. Giving the line lengths and headings to help guide.
5. Once finished creating your boundary, save the boundary by selecting **"Save"** on the bottom toolbar. This will open a save window - click on "Save".



Creating Zones From Imagery

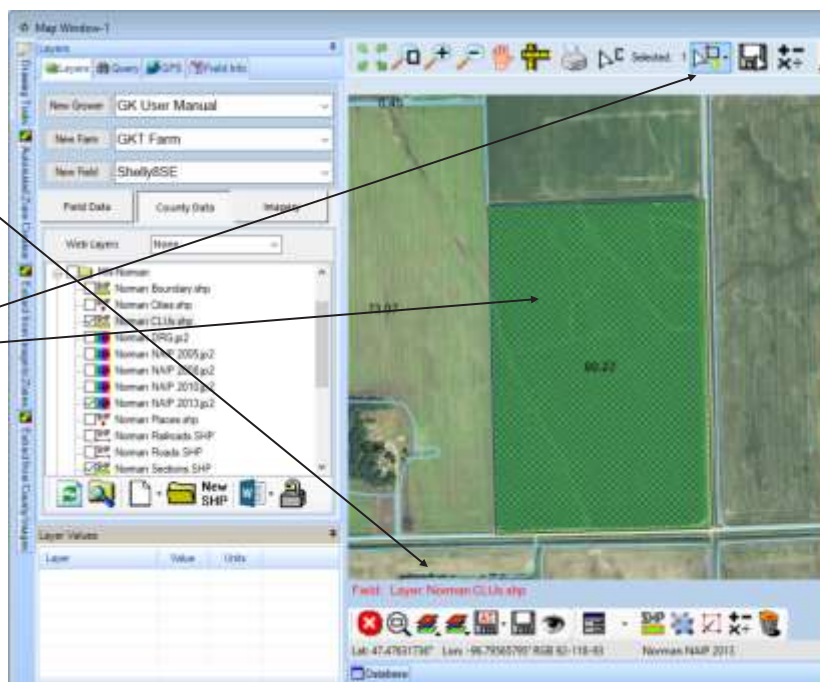
Creating Boundaries

- **Save Boundary from a CLU**

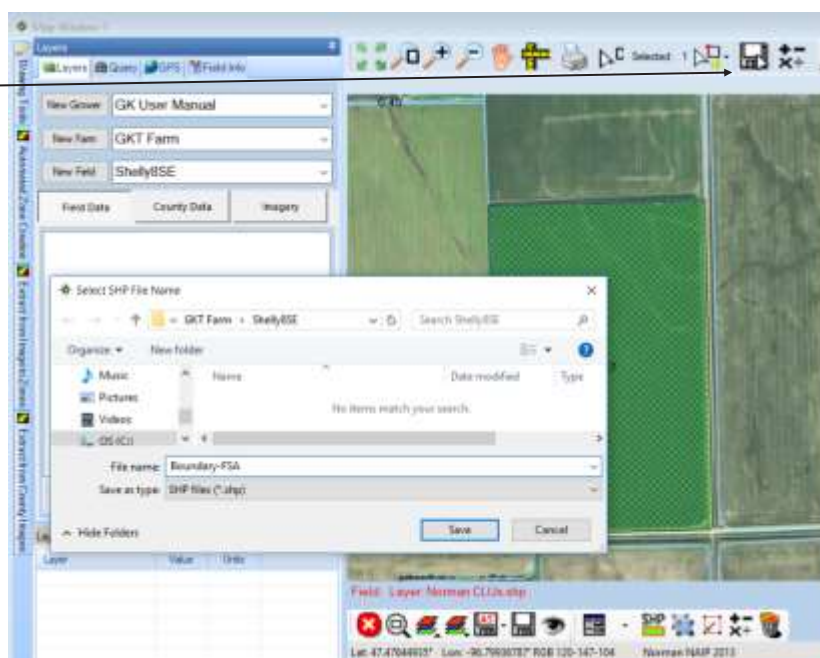
1. Make sure the bottom active layers has the address of the CLU.
Example- **Layer: Norman CLU.shp**
2. Select the polygon of the field to be saved. Do this by clicking on the **"Area Replace"** on the top tool bar and click inside of the polygon; it will appear **Light Green** to show it's selected (Hold down the "Ctrl" key to select multiple objects).

- Note: "Area Replace" is on by default when ADMS starts.

- Note: the **"Selected"** on the top toolbar. Should match the # of objects selected.



3. Select the **"Save Selected Objects to New Layer"** on the upper toolbar. Make sure to save in the correct location. "Name" the object (Example-Boundary FSA.shp) and Click "Save".



Creating Zones From Imagery

Creating Boundaries—From Application/Yield Points

With some tools within ADMS boundaries can automatically be generated.

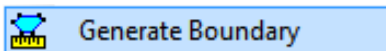
To automatically generate a boundary a point data collection is needed. This can be anything as long as it's point data. A few good sources are:

- Yield Data
- Elevation Survey Data
- As-Applied Data

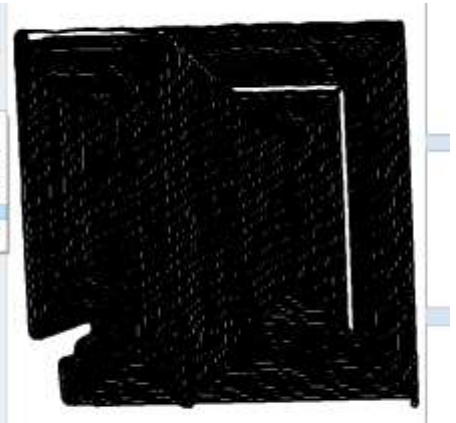
Make sure there are now outlier points in the collection otherwise this process will take much longer to run.

**Note: If yield is being used and has been cleaned up some of the data around the edge of the field may be missing and the boundary will be inaccurate. In this situation consider exporting the raw data for the purpose of boundary creation.*

1. Turn on a data points file (SHP or CSV).
2. Right Click on the field in the data tree and select **"Generate Boundary."**



3. After that is selected the "Generate a Boundary from Points" window will appear. This window gives instructions along with different options of how the new boundary will be created.

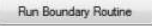


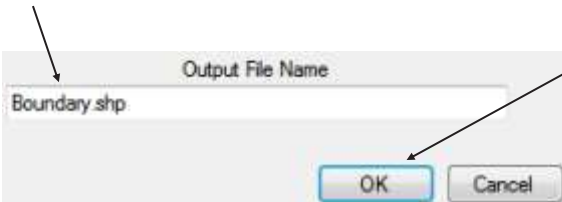
The two options on this window are the "Smoothness" and "Subset" values.

- **Smoothness Value:** How close the boundary follows the original points. The lower the value the smaller the search radius will be.
- **Subset Value:** How many points are used out of the whole collection. (e.g. If the subset value is set at 3, every 3rd point will be used during the calculation. Likewise, if it's set at 20 it will use every 20th point.)
- The boundary routine can be run multiple times before saving the final boundary. This allows you to adjust the smoothness and subset values.
- It is recommended to keep the subset value so it uses less than or equal to 10,000 points.

Creating Zones From Imagery

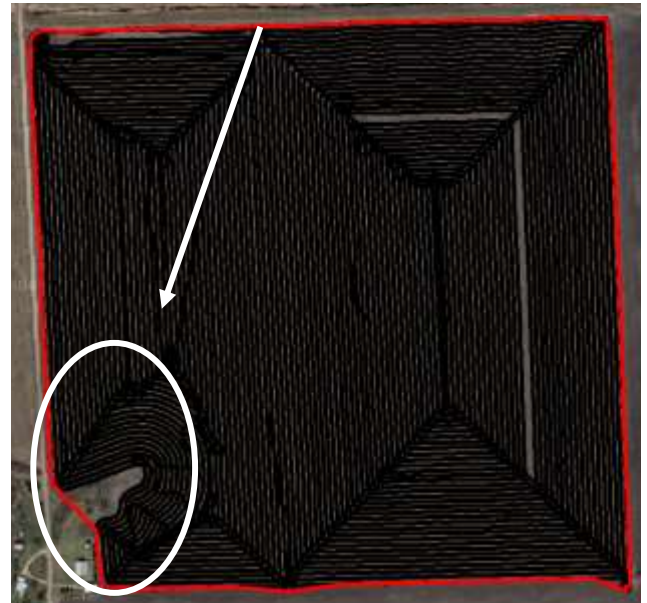
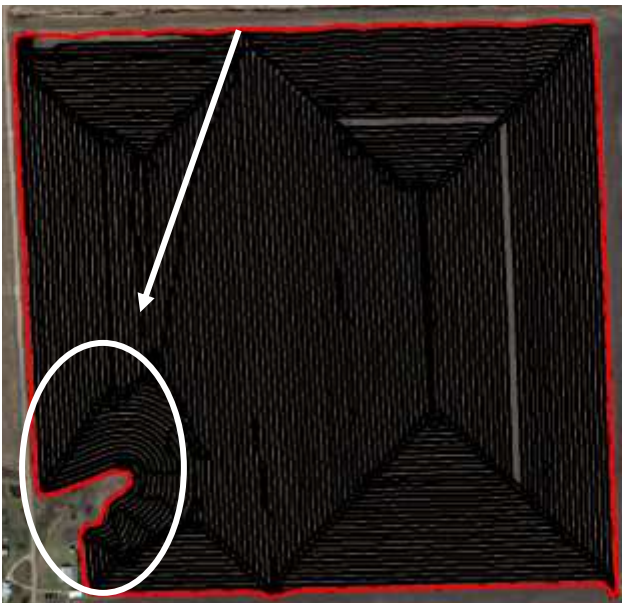
Creating Boundaries—From Application/Yield Points

4. The smoothness and subset values will automatically be set by the software, but can be adjusted to change how the boundary follows the points.
5. Click "Run Boundary Routine" 
6. Adjust the "Output File Name" if needed. If the name is changed make sure the *.shp extension stays on. Otherwise the boundary will not be recognized in the software.



7. Click "OK"

8. The polygon will be saved back to the data tree with the



Final adjustments can be made to the boundary using the "Move Vertices" tool on the bottom toolbar.

- Select inside the boundary to turn it green.
- Select "Move Vertices of Selected Object." 
- Hover over the vertices and left click and hold to move them. 
- After all vertices are moved click the "Move Vertices of Selected Object" button again to turn it off. 
- Save changes. 

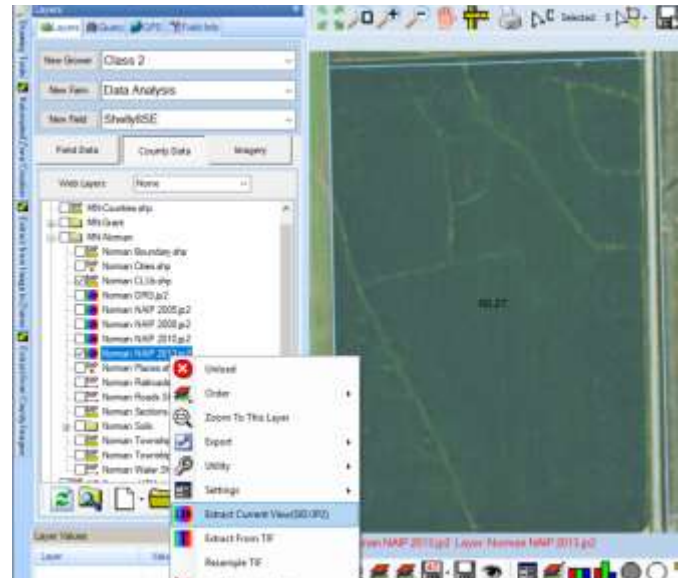


Extracting Images From NAIP

FSA—National Ag Imagery Program (NAIP) supplies us with high resolution .sid & .jp2 images. Typically 1 & 2 meter resolution. These instructions walk you through converting a small area into a .tif format to create a surface for making “Zones”. Keep in mind there is not a “NIR” channel in most of this data. So we are working with the “Red / Green / Blue” spectrum of visible light.

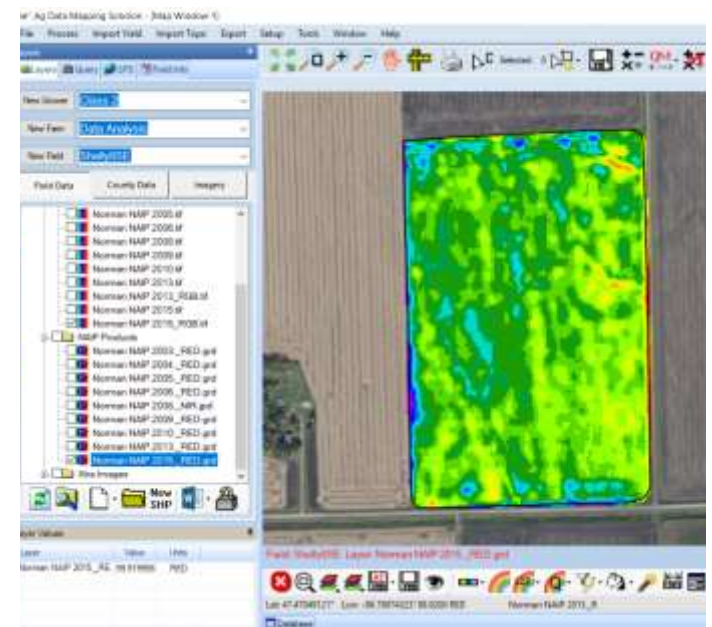
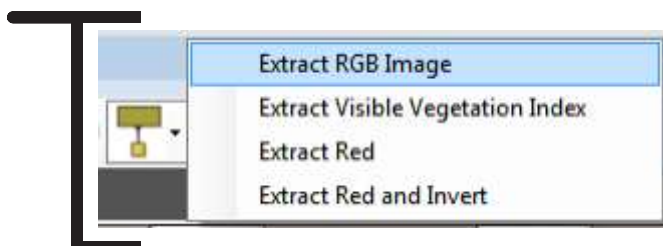


1. Turn on the “Boundary.shp”
 - Note: you must be zoomed to the “Field”
2. Go to the “County Data” Tab
3. Turn on a NAIP image.sid (or .jp2)
4. Right click on the “NAIP Image.sid” name
5. Select “Extract Current View (SID/JP2)”
6. Go to the “Field Data” Tab
 - Refresh the data tree
 - Open “Images/NAIP” Folder
7. Check on the new “County NAIP.tif”
make it the **active layer (in RED)**
8. Follow the image extraction instructions
Using - “Manual Extractions”



Consultant Users:

1. Turn on “Boundary.shp”
 - Note: Must be zoomed to the “Field”
2. Go to the “County Data” Tab
3. Turn on a NAIP image.sid (or .jp2)
4. Click the extract from SID/JP2 icon
5. Several different options will appear in a list.



6. Choose the appropriate extraction method
7. Go to the “Field Data” tab
 - Refresh the data tree
 - Open “Images/NAIP” Folder
8. The extracted file will have an extension on it to define the extraction type (ex: _Red, _RGB_VisVI)

Extracting Images From Web Layers



ADMS has functionality to give users access to web based background imagery. In order to use these options, the computer must have an active internet connection. This allows the software to connect to a WMS (Web Map Service) server. Once the connection is made a geo-referenced background is returned to be viewed in the Map Window.

There are two main types of WMS layers that are handled in ADMS.

1. Built in ADMS WMS links

- These links will be standard within the software. The user has no ability to change, add, or remove them. Examples would be ESRI & Bing Maps and cover a bigger geography including the United States and Canada.

2. Local/Specialty WMS links

- WMS links that the software user can change, or may have special access to. These may be limited to a specific state or region. The links will be stored in the county data folder and visible in the data tree.

Using ADMS Web Layers

- Turn on a layer to be used as reference layer. This will bring ADMS to the field level instead of loading the entire country. (e.g., boundary or surface of the field)

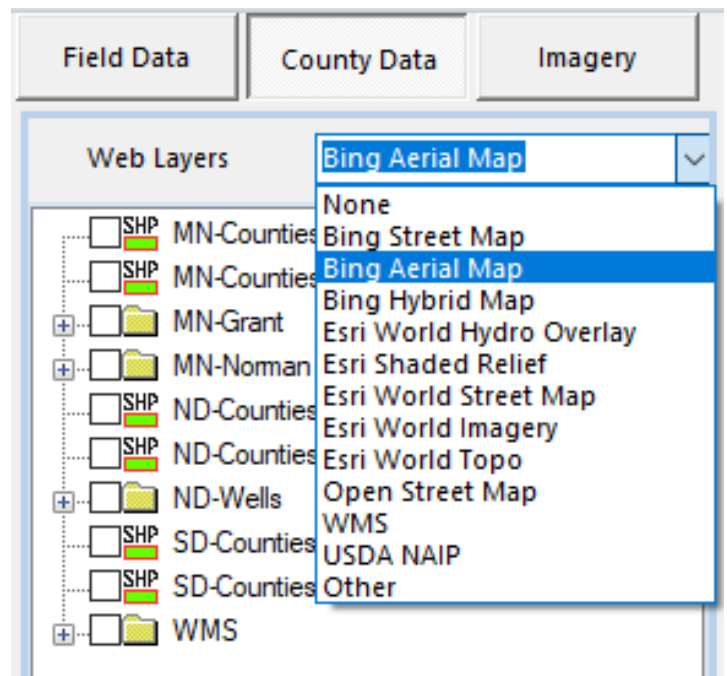


- Select the **"County Data"** tab.

- From the **"Web Layers"** drop down menu there will be a list of available layers to select.

- Select on the layer to be used as the background image. After the desired layer is selected from the list it will load on the back of all layers that are currently loaded in ADMS.

**Note: If another image is currently loaded in the software the web layer may not be visible since by default it is loaded behind all other layers.*



Extracting Images From Web Layers



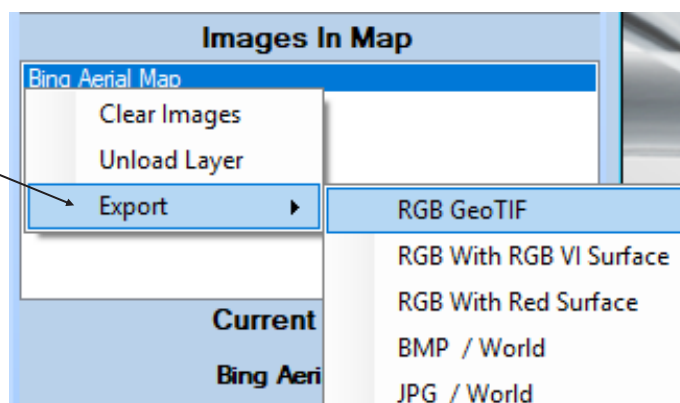
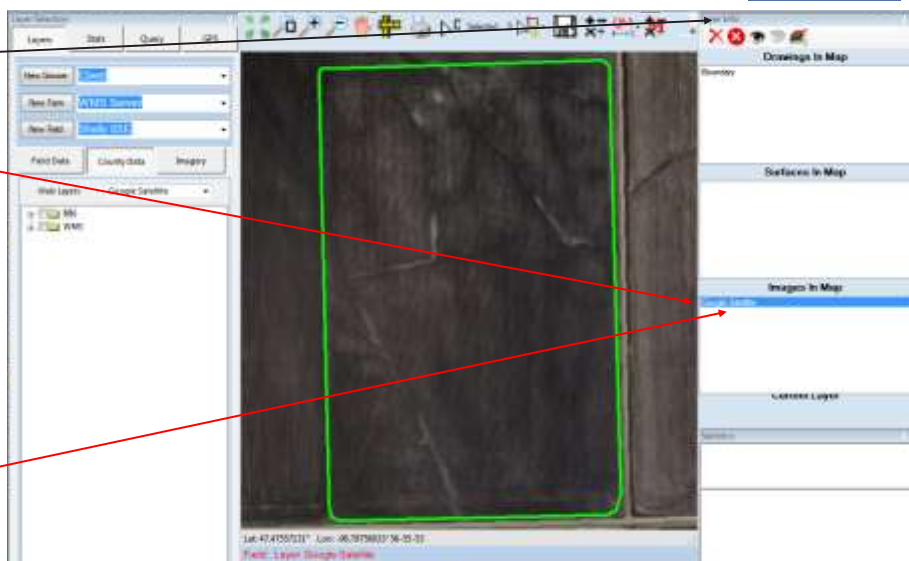
Using ADMS Web Layers—Saving & Extracting Images

5. In the “**Layer Info**” panel under “**Images In Map**” the web layer will appear.

6. To save this layer to use offline or for zone creation **Right Click** on the layer name (e.g. Google Satellite).

7. After right clicking choose “**Export.**” A menu will appear with several different extraction methods.

*To use the surface extractions the boundary **MUST BE SELECTED** first.



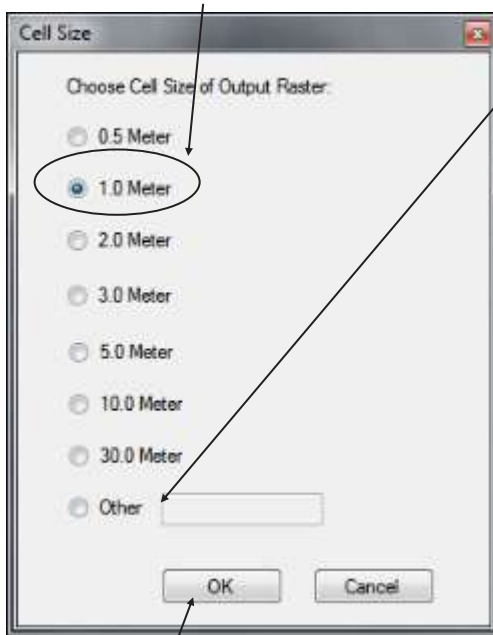
- * **RBG (Red, Green, Blue) GeoTIF**—Extracts the true color image as a TIF file. It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **RGB With RGB VI Surface**—Extracts the true color TIF file and it extracts and saves the RGB VI (Red, Green, Blue Visual Index) as a GRD map to the “Field Data.”
- * **RGB With Red Surface**—Extracts the true color TIF file and the Red band is extracted and saved as a GRD file.
- * **NRG (Near Infrared, Red, Green) GeoTIF**—Use this option if there is an infrared band in the image. Usually you can tell if the image has a reddish color to it. This will save it as a color infrared GeoTIF in “Field Data.” It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **NRG With NDVI**—Extracts the NRG GeoTIF and a NDVI GRD is created and saved in “Field Data.”
- * **NRG With NIR Surface**—Extracts the NRG GeoTIF and the NIR band is extracted and saved as a GRD in “Field Data.”
- * **BMP / World**—Saves the file as a geo-referenced BMP file.
- * **JPG / World**—Saves the file as a geo-referenced JPG file.

Extracting Images From Web Layers

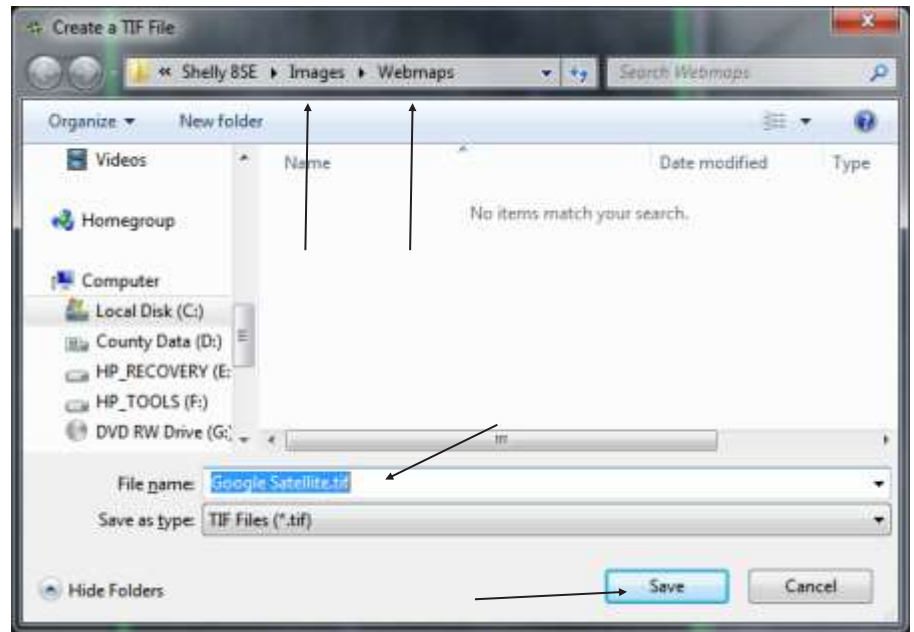


Using ADMS Web Layers—Saving & Extracting Images

8. After choosing the extraction option a box will appear asking which resolution to export it as. The higher the resolution the less detailed the image will be. For most field situations 1-3 meters is adequate. By choosing "Other" a custom size can also be entered.

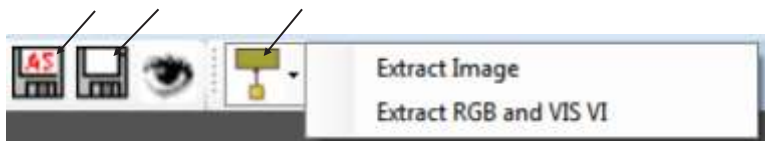


8. Click **"OK."**

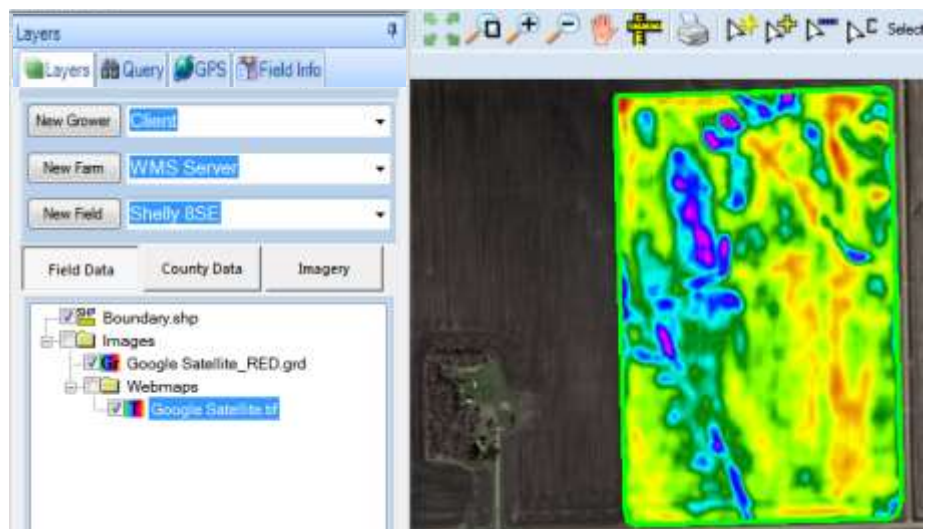
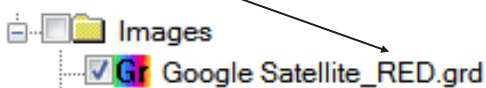


9. The file will, by default, be saved back to the "Field Data" and be placed in "Images/Webmaps." If desired the TIF file can be renamed in this window.
10. Click **"Save"**

The image can also be saved by using the buttons on the bottom toolbar.



If a surface was extracted it will have the extraction type as an extension on the file name. Such as _RED.



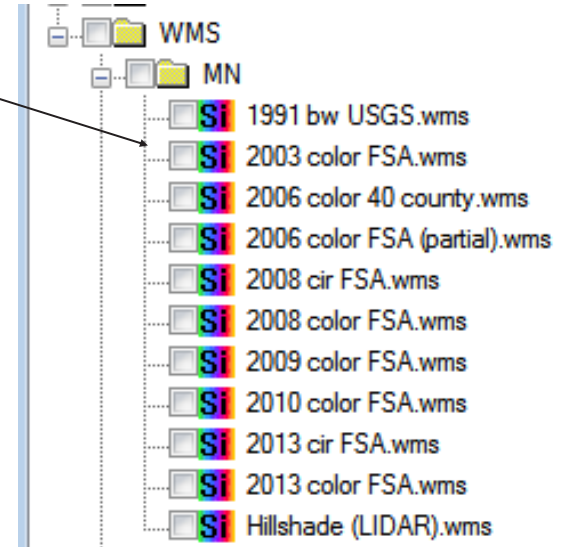
Extracting Images From Web Layers



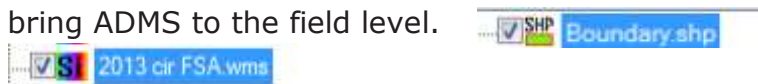
Using Custom WMS (Web Map Service) Layers—Saving & Extracting Images

There are many different WMS layers that may be added into ADMS as an additional layer and be utilized within the software. Often these layers are state or region specific and require some setup before they can be used. To set up WMS layers refer to that section in the book.

- Once the WMS layers have been properly set up they will show up as an additional layer in the data tree just like a SID or TIF file.
- The example on the right shows an example of some different layers that are available through the Minnesota WMS server.
- These layers can be placed in folder structures, emailed, and are treated like other layers that ADMS automatically recognizes.



- Turn on a boundary or reference layer to bring ADMS to the field level.
- Turn on the WMS layer to be extracted.



There are several different ways that the layer can now be extracted.

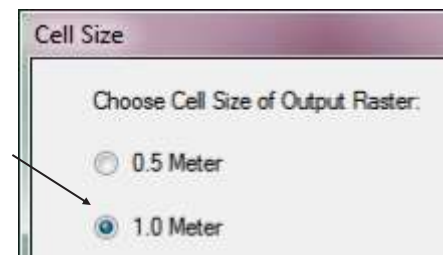
1) Right clicking on the layer in "Layer Selection."



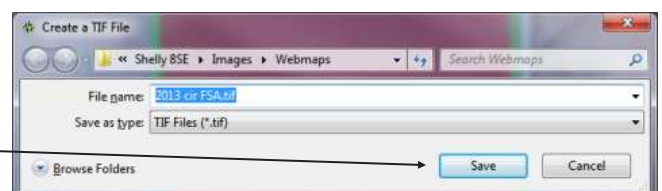
This brings up 3 different extraction options:

1. TIF/World—Saves the image as a TIF file. This is recommend for image processing and zone creation.
2. BMP/World—Saves the image as a geo-referenced BMP file.
3. JPG/World—Saves the image as a geo-referenced JPG file.

- Choose the output resolution. For most field situations 1-2 meters is adequate.
- Click "OK."



- The file will automatically be named and saved back to the "Field Data" file structure.
- Click "Save."

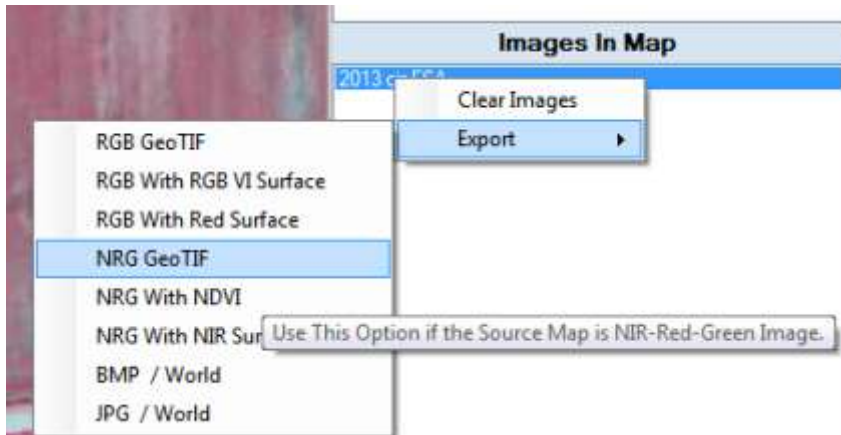


Extracting Images From Web Layers

Using Custom WMS (Web Map Service) Layers—Saving & Extracting Images



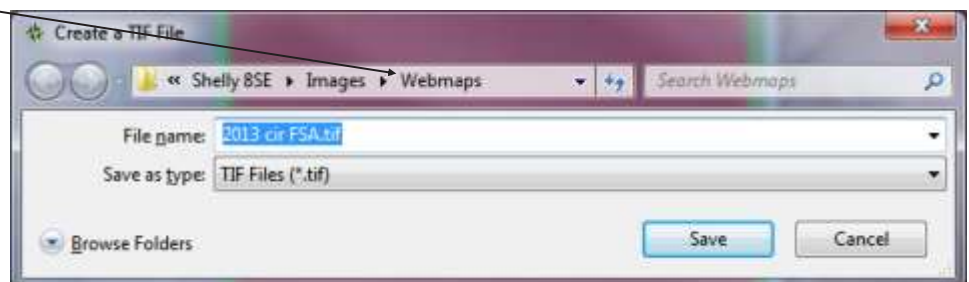
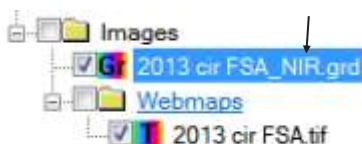
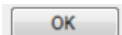
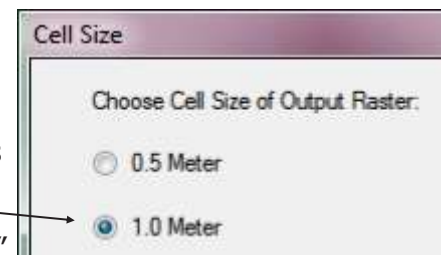
2) Right clicking on the layer in "Layer Info."



- This gives you several different extraction options. If the RGB VI, Red Surface, NDVI, or NIR Surface is used the boundary **MUST BE SELECTED** first.

- * **RBG (Red, Green, Blue) GeoTIF**—Extracts the true color image as a TIF file. It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **RGB With RGB VI Surface**—Extracts the true color TIF file and it extracts and saves the RGB VI (Red, Green, Blue Visual Index) as a GRD map to the "Field Data."
- * **RGB With Red Surface**—Extracts the true color TIF file and the Red band is extracted and saved as a GRD file.
- * **NRG (Near Infrared, Red, Green) GeoTIF**—Use this option if there is an Infrared band in the image. Usually you can tell if the image has a reddish color to it. This will save it as a color Infrared GeoTIF in "Field Data." It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **NRG With NDVI**—Extracts the NRG GeoTIF and a NDVI GRD is created and saved in "Field Data."
- * **NRG With NIR Surface**—Extracts the NRG GeoTIF and the NIR band is extracted and saved as a GRD in "Field Data."
- * **BMP / World**—Saves the file as a geo-referenced BMP file.
- * **JPG / World**—Saves the file as a geo-referenced JPG file.

- Choose the output resolution of the extracted image. 1-2 meters is adequate for most fields.
- Click "OK."
- The file will automatically be named and saved back to "Field Data" in a "Images/Webmaps."
- Click "Save."
- If a surface was extracted it will have the extension of the extraction type on the end of the file name. (_NIR, _NDVI)



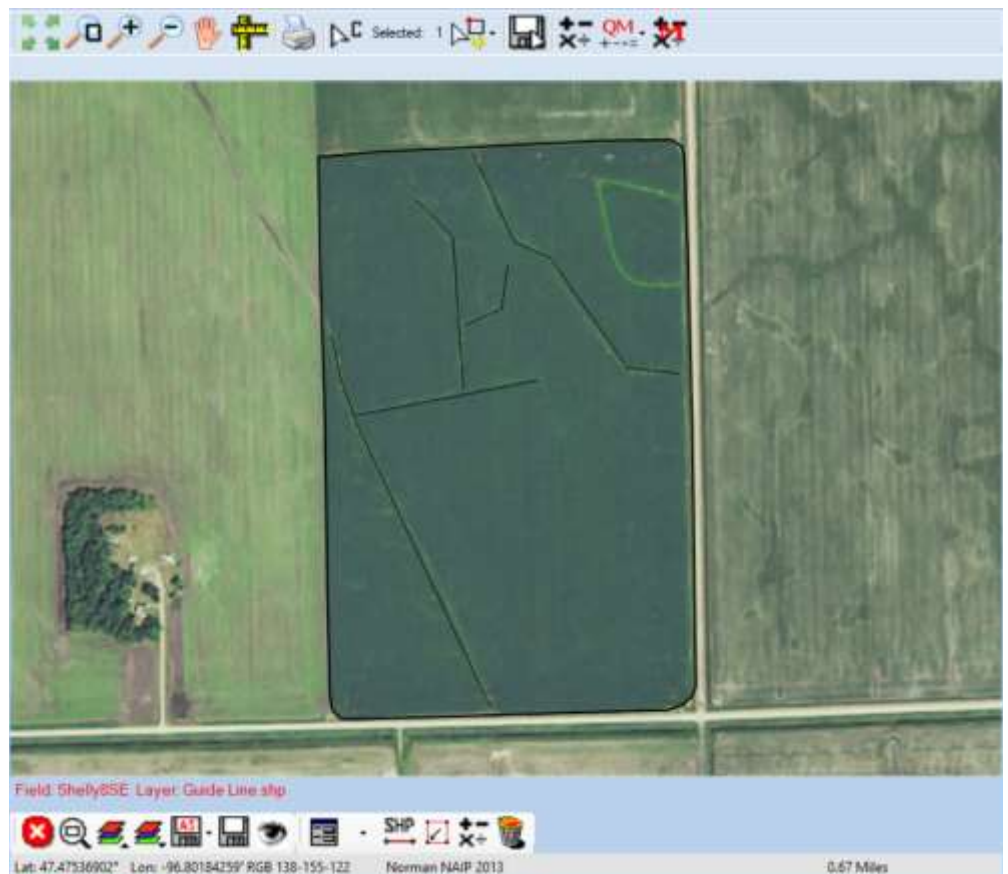
Creating Guide Lines for Extracting Imagery (Landsat)

As you may know if you have ever worked with Landsat data it is low resolution (30 meter raw data). The geo-referencing is ok at best. So you must use the tools in the software to "align" the data. Clicking between images can be time consuming, but it is very accurate. If you are going to be extracting many images on a field using Landsat data. Suggest looking at using "Guide Lines".

1. Turn on Field Boundary
2. Turn on a NAIP image that has all the "details" to be highlighted.
Prefer to use extracted NAIP.tif files (see previous page).

Details Like: ditches / sandy knob & veins / salty spots / clay knobs

3. Click on the "Create Layer from Templates" below the data tree.
4. Choose "Guide Lines"
5. Check the "Guide Lines.shp" file
6. Click on the SHP button on the bottom toolbar
7. Draw in all these areas, reminder ADMS is drawing LINES not Polygons
8. Repeat 6 & 7 as needed to highlight all events
9. Click the "Save" button
10. Leave the "Guide Lines" on while extracting Landsat Images. Very helpful..



Extract from Image to Zones (EIZ)

Step-by-Step Procedure:

Step 1:

Click on the "Browse" button to browse imagery files. Select file folder containing the desired imagery.

Step 2 & 3:

Turn the field boundary on and highlight the interior area of the boundary.

Step 4:

Click the "Set Selected Boundary" button.

Step 5:

Select desired image.

Step 6:

Select desired format. (See "Image Extraction Suggestions" below)

Step 7:

If necessary, adjust image to align with border or other known landmark.

Step 8:

Select desired number of zones. (Recommend 255)

Step 9:

Click the "Finish" button.

Step 10:

Click the "Refresh Tree" button in the Layer Selection window.

Step 11:

An "Images" file folder will magically appear in the File Tree containing the newly zoned image.

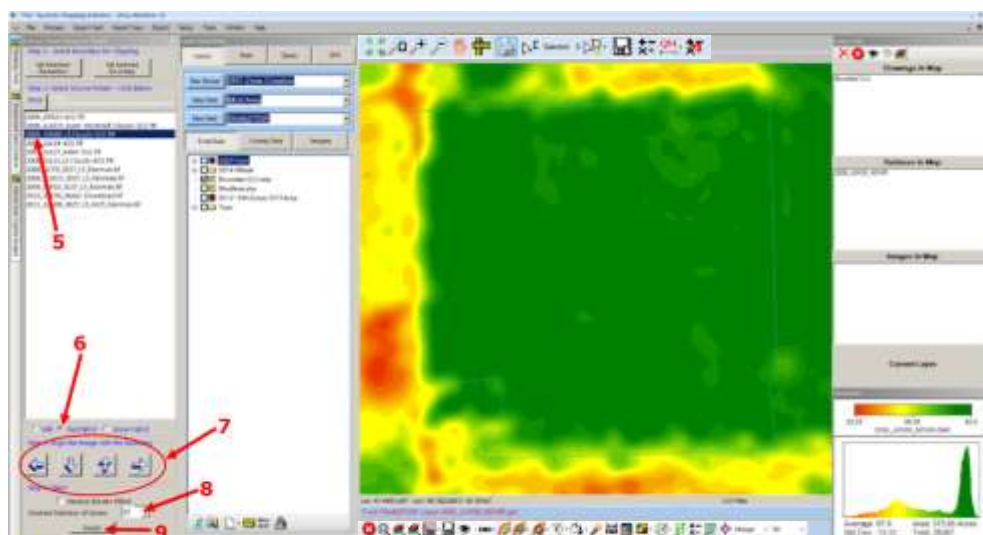
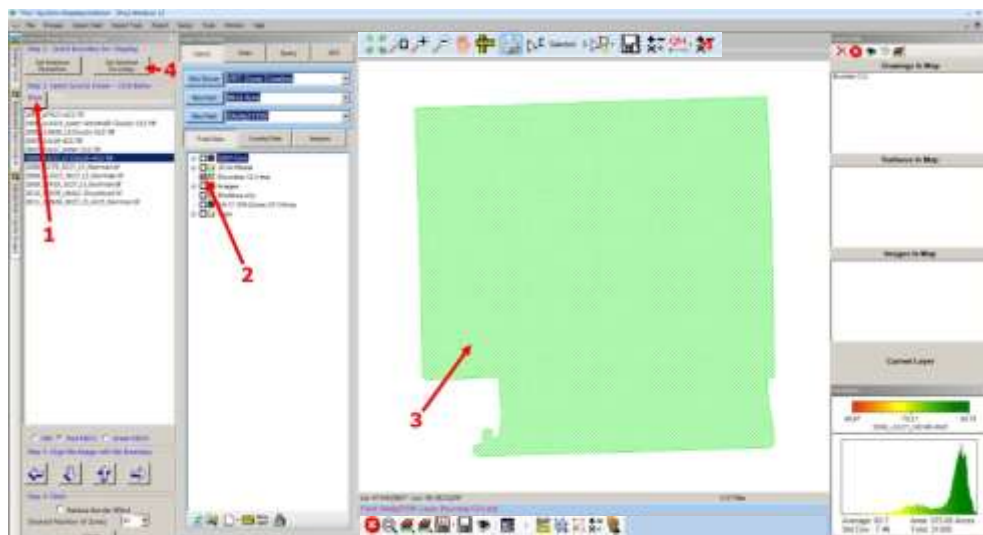
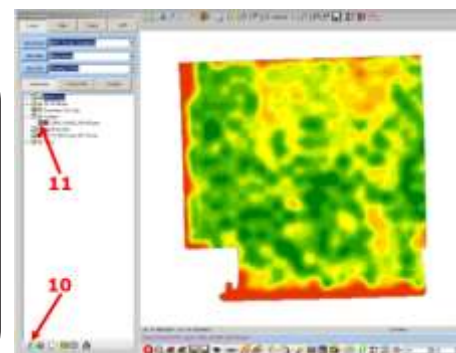


Image Extraction Suggestions

NIR - Best for bare soils or no vegetation

Red or Green NDVI - Best for moderate to heavy vegetation.

NDVI Values - higher than "35" shows full ground cover.



Notes

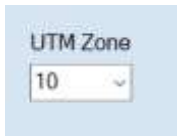
✓ After the extraction of your first image, you can continue to extract multiple images in a single session. Each time you click the "Finish" button (Step 9) the image in the main window will stay till you click the next image date. Select the next image to extract (Step 5) and repeat steps 6, 7, and 9. All images will be saved automatically into the "Images" folder in the data tree.

Creating Zones From Imagery—Re-Projecting Imagery

Re-Projecting Imagery

From time to time you encounter an image whose projection is not in the UTM Zone of the current project. These instructions will work with most TIF images. These instructions will not re-project SID / JP2 / or other compressed images.

This utility shows the projection of the original image. (this example is UTM11)



Make sure the UTM on the ADMS Start Screen to the correct output UTM Zone for this project. It may just be that the UTM zone of the data in this project needs to be displayed in a different UTM Zone.

This is where you want all the data to be when finished. (this example—UTM 10), make sure no other ADMS windows are open.

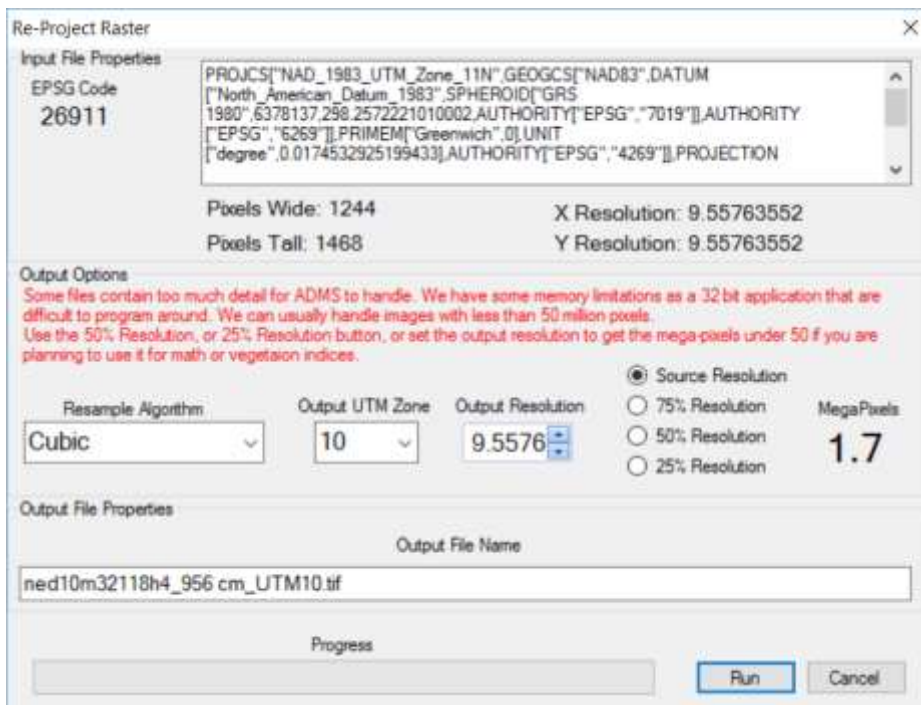
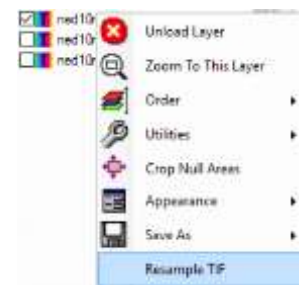
Open **"Map Window"**



Turn on "check" the image you want to re-project.

In most cases the software will see that the image needs to be re-projected. And will open the **"Re-Project Raster"** window.

If the "Re-Project Raster" window does not come up, Right click on the "image name" xxx.tif and choose **"Resample TIF"**



Re-Project Raster Window

If, the image file has projection information in the file it will show up at the top **"Input File Properties"**

Read through the **"Output Options"**

Suggest using

- Cubic
- UTM should be correct
- Output Resolution will change with the selection of the "Resolution %"

If working with aerial imagery suggest using 1 meter for "output resolution"

The Name will "auto populate" adding the new UTM zone # to the name. Suggest leaving this, but you can adjust or edit this name.

Click **"Run"**. You now have a re-projected image in the data tree at the same location as the original.

Creating Zones From Imagery—Manual Zone Extraction

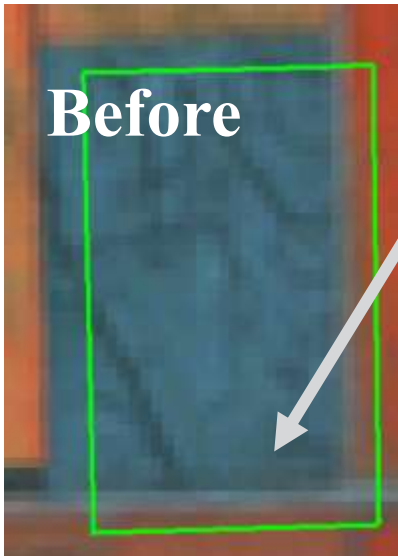


Introduction

Images used for zone creation will have multiple bands of data that can be utilized to create management zones for precision applications. With the tools available in ADMS different types of images can be extracted in different ways. This can be extracting individual bands, or by using several vegetative indices. These tools use the native resolution of the image, and default color table.

Geo-referencing an Image

Often images; especially Landsat will not be perfectly geo-referenced. To update the position of an image a known reference layer such as a boundary is needed.

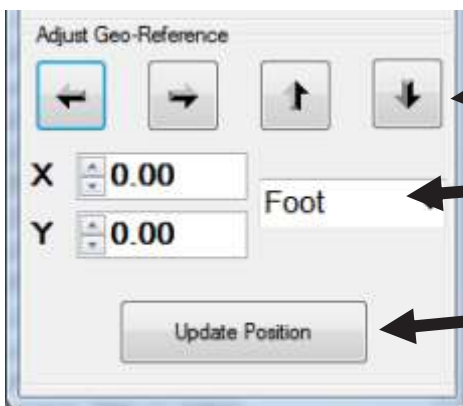


- Turn on the boundary.
- Turn on the image that needs to be aligned (It needs to be the **Active Layer** in red at the bottom of the Map Window).

Notice the road (light red) is on the wrong side of the field boundary.

The image needs to be the Active Layer.

On the bottom toolbar select the "Image Properties" button.



Use the arrows to adjust the image position.

From the dropdown menu different units can be selected. Each click will be equal to one unit. Additionally numbers can be entered manually into the boxes.

Once satisfied with the position of the image click "Update Position."



Creating Zones From Imagery—Manual Zone Extraction

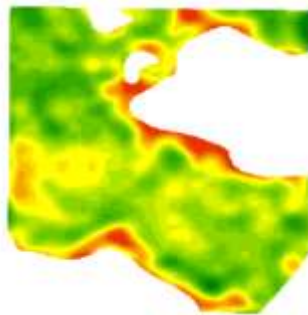
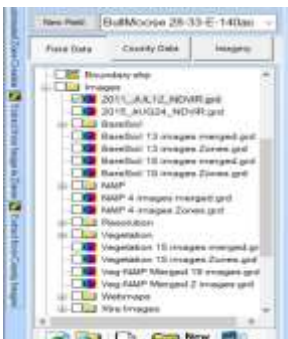
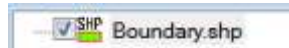


4 Band Images

Four band images (Landsat) usually have the Red, Green, Blue, and an Infrared band in the image. The bands can be extracted out individually, or a vegetative index like NDVI or NDVIG can be used.

Using NDVI

1. Turn on a field boundary.
2. Select inside the boundary so it turns **green**.
3. Turn on the image to be extracted.
 - Make sure it is the **active layer**
4. On the bottom toolbar select the Vegetative Index icon.
5. Choose either the Red NDVI or Green NDVI option.
6. Go to "Field Data."
7. Refresh the data tree.
8. The extracted surface will be automatically saved in a folder called "Images."



3 Band Images

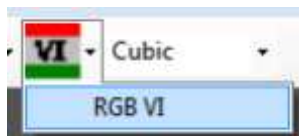
Three band images most commonly have the Red, Green, and Blue (RGB) bands in the image. Each of the bands can be extracted out individually, or the RGB vegetative index (RGB VI) can be used. The visible vegetation index will enhance the vegetation the field.

Using Visible VI

1. Turn on a field boundary.
2. Select inside the boundary so it turns **green**.
3. Turn on the image to be extracted.
 - Make sure it is the active layer
4. On the bottom toolbar select the Vegetative Index icon.
5. Click **"RGB VI"**

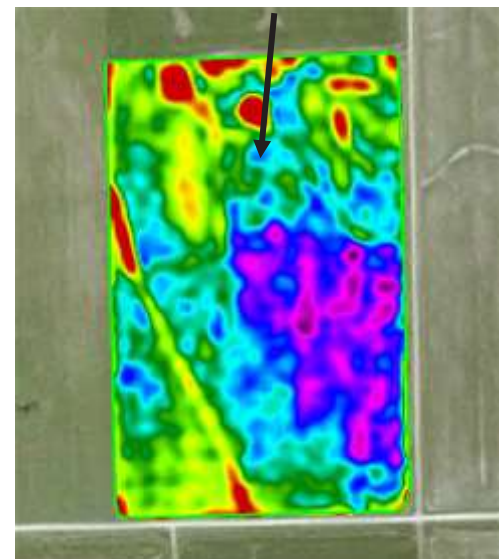


Field: Shelly 8SE Layer: Norman NAIP 2004_RGB.tif

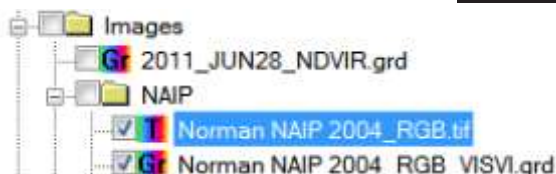


6. The extracted image will be saved in the "Field Data" tab under the folder "Images/NAIP" with the extension **"_VISVI"**

Visible VI Extraction



RGB NAIP Image



Creating Zones From Imagery—Manual Zone Extraction

Extracting .grd from Sentinel .tif



At this time all Sentinel data is in formats and file sizes are very large and need to be Processed ADMS 64bit. Extracting may or may not work in 32bit ADMS? If it does not work see the User Manual section on Sentinel Processing and ADMS 32bit vs 64bit.

Sentinel Images are Four band images and have Red, Green, Blue, and Near-Infrared band in the image. The bands can be extracted out individually, or a vegetative index like NDVIR or NDVIG can be used.

Using NDVI

1. Turn on a field boundary & **"Select" the boundary polygon area.**

3. Turn on the image to be extracted.

- Make sure it is the **"active layer"**

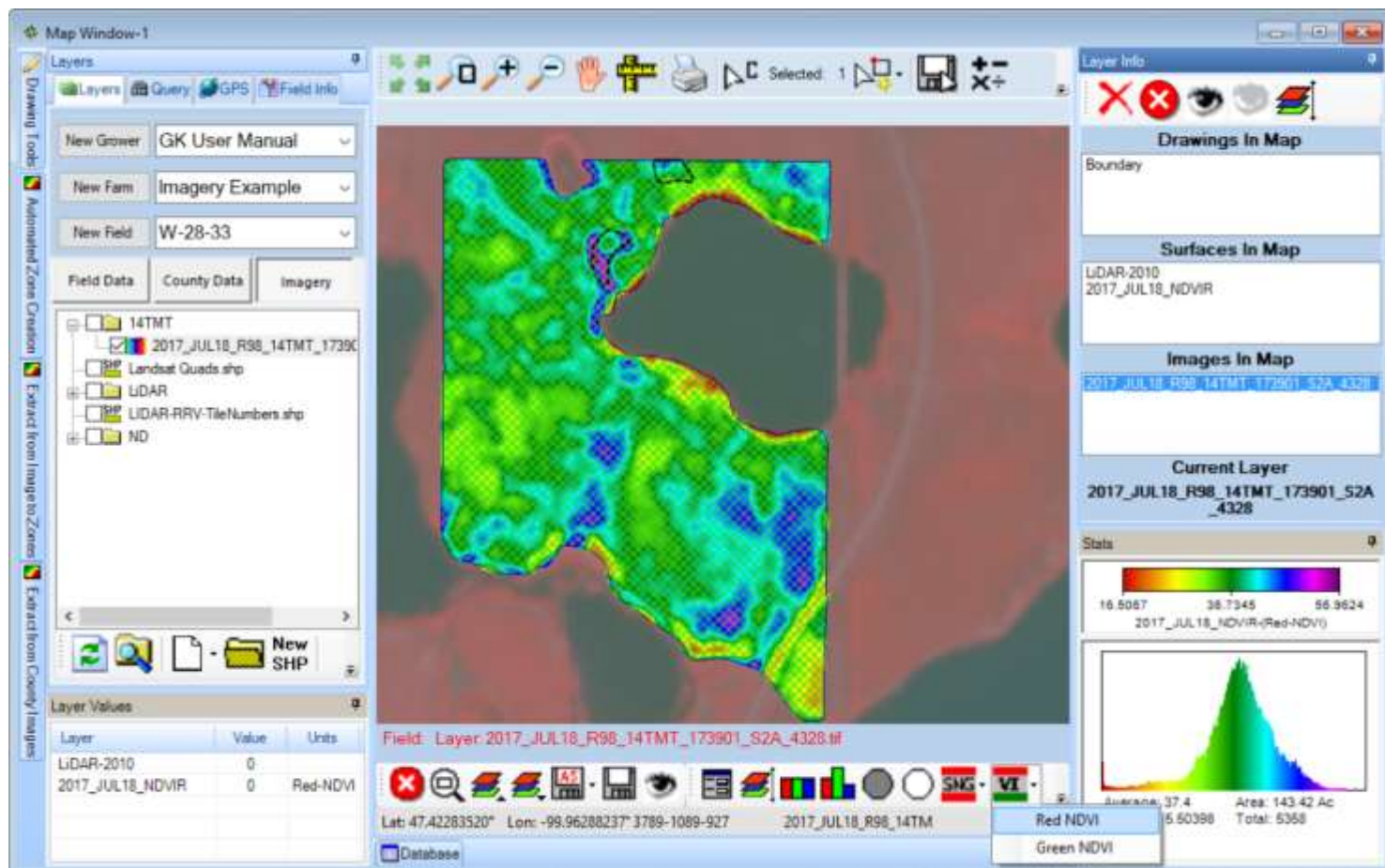
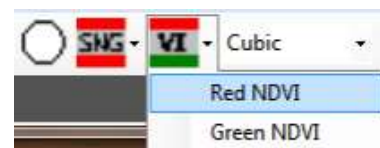
4. On the bottom toolbar select the **"VI"** Vegetative Index icon.

5. Choose either the **Red NDVI** or **Green NDVI** option.

6. Go to **"Field Data"** Tab

7. Click **"Refresh Tree"**.

8. The extracted surface will be automatically saved in a folder called **"Images."**



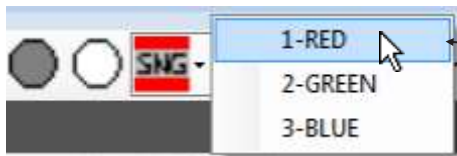
Creating Zones From Imagery—Manual Zone Extraction



Individual Band Extraction

All multi band images can have each band extracted out individually. Commonly, the red, green, blue, and NIR bands will be used. By using the following process each band can be analyzed by itself.

1. Turn on the field boundary and select inside it.
2. Turn on the image to be extracted and make the active layer.
3. On the bottom toolbar select the single band extraction icon.



4. Select the band to extract.

The extracted surface will be saved under "Field Data" in the "Images" folder. The extracted surface will have an extension of the extracted band (_NIR,_GREEN,_RED) that was chosen.



Individual Band Extraction—Changing Band Order

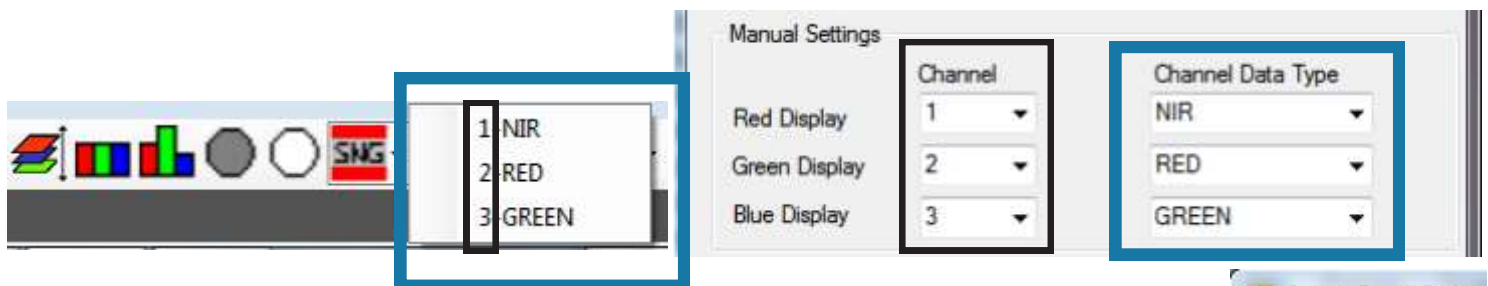
ADMS gives different options to change band orders of images. This can be useful for choosing how the images are extracted and which bands are available for extraction. When the band orders are changed the options in the single band extraction icon on the bottom toolbar dynamically change with it.

To access these options:

1. Make sure the desired image is the active layer.
2. Select the multi-band layer display icon on the bottom toolbar.
3. The "Select Band Order" window will appear.

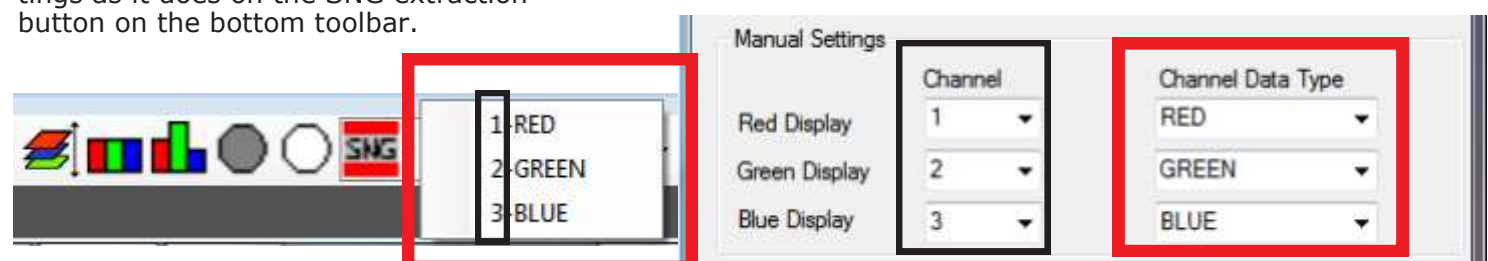


4 Band Image



4. The Channel and Channel Data Type will appear the same in the Manual Settings as it does on the SNG extraction button on the bottom toolbar.

3 Band Image



My Notes

Surface Editing Tools

Invert Surface Values

At times you will find "Surfaces" that may have values that are inverted from other data sets.

Generally you want to have "Low" values in poor producing areas and "High" values in better producing areas. You can use inverted "Color Tables" to give the surface the proper appearance.

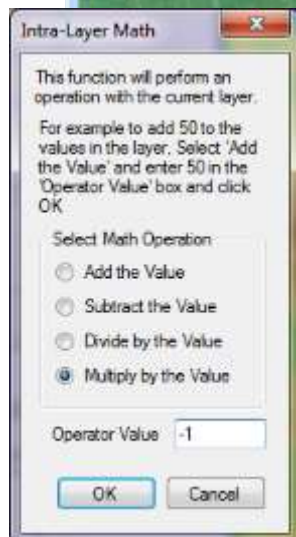
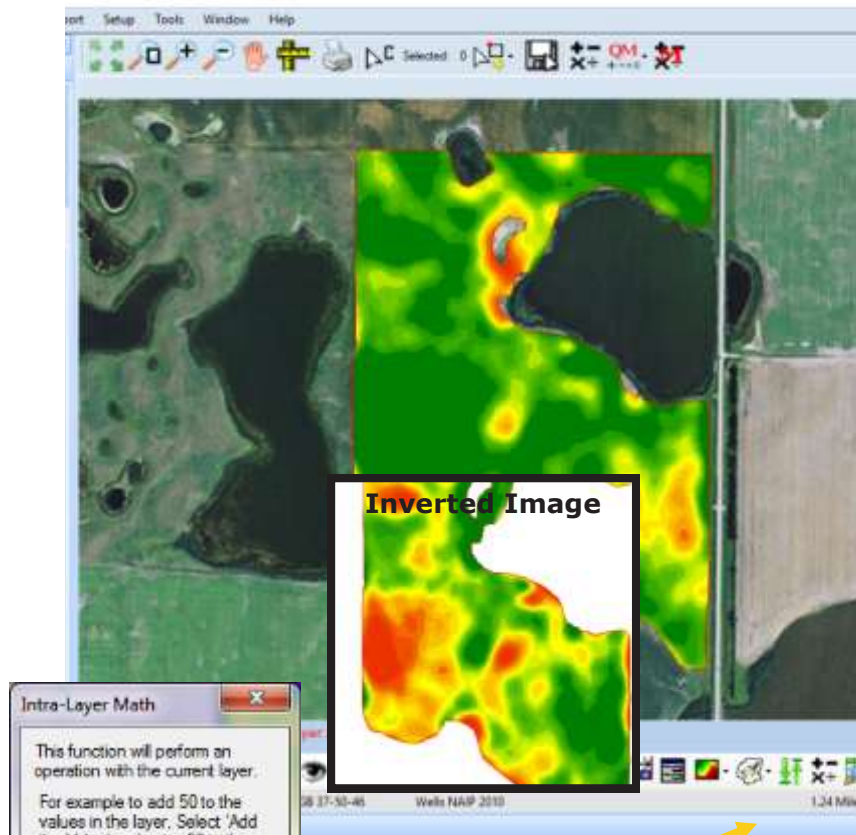
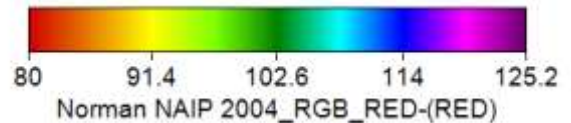
Inverting the "Values" will allow you to merge this surface with Yield and other images.

To invert the surface click the  "Invert" button and you are done.



The process of "Invert" surface values does the following
—Below is the Manual Process of Inverting—

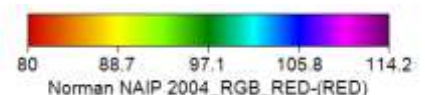
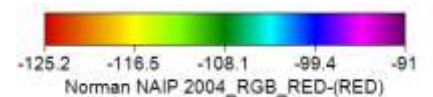
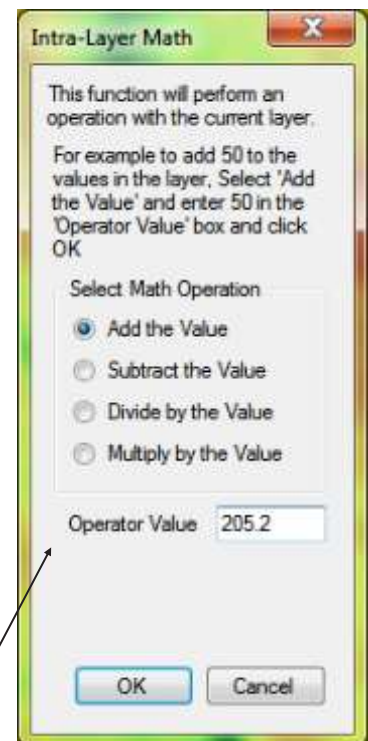
1. Look at your "Color Bar"
2. Add your Min Value + Max Value = New Value
 $80 + 125.2 = 205.2$



3. Using "Intra Layer Math" button, Multiply by a -1
 -Looks "Correct" go to step 4
 -Looks "Incorrect", don't save changes & go to next map or a new map

4. Using "Intra Layer Math" button, Add the surface by the "New Value"

5. Select "Save As" and give the new surface a name
 Example—"Norman NAIP 2004 Inverted.grd"

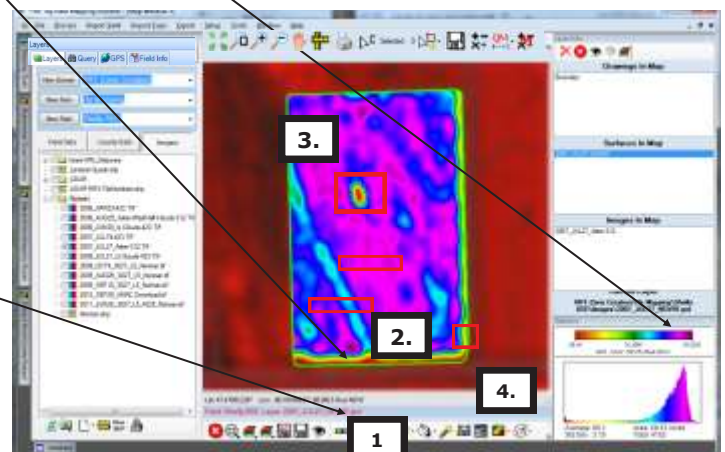
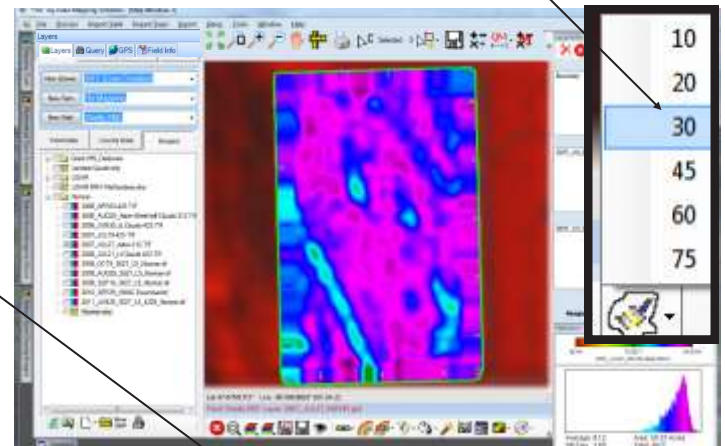
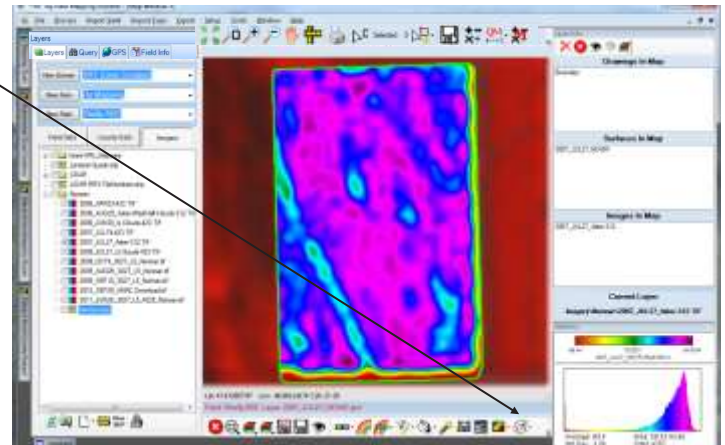


Surface Editing Tools

Reduce Border Effect & Trim End Values



1. There is a very distinctive Red Border along the south side of the field. This is not representative of the field. This is called a Border Effect. There is a tool **"Reduce Border Effect"**  that will help clean up these edges. Knowledge of the field is the factor that will tell you if you need to use this tool or not.
2. This field has some obvious "Border Effects" so, select the **"Reduce Border Effect"** button. Take note this will not work if the Boundary is not selected.
3. Click on the **"Reduce Border Effect"** button, the software will reach in x-meters perpendicular to the Border and pull that value out to the border.
4. Once the new colored image shows up, move the mouse over the image. Notice there is a number at the bottom center of the screen (labeled #1) that is changing as the mouse moves. That value is the pixel value of that location on the map (note the "Color Bar" on the right side of the screen). The higher the value of the pixel, the greater the vegetation.
5. Notice the box around the area labeled #2. That little bit of red on the edge is most likely bleeding of non-crop influence from the original satellite image. The pixel values in this area are 43 to 50 in this red area.
6. Looking at the area labeled #3. Moving the cursor around over this area, we find out the lowest values in the reddish area is 56. These are all "Actual" or true field values.
7. Once the image is inspected, decide if there is anything that needs to be cleaned up or "Trimmed". On this image, it is fairly clear that this value does not represent what is happening in the field. So we are going to "Trim" the image. On the bottom tool bar click on the **"Trim End Values"** button (labeled #4).



Surface Editing Tools

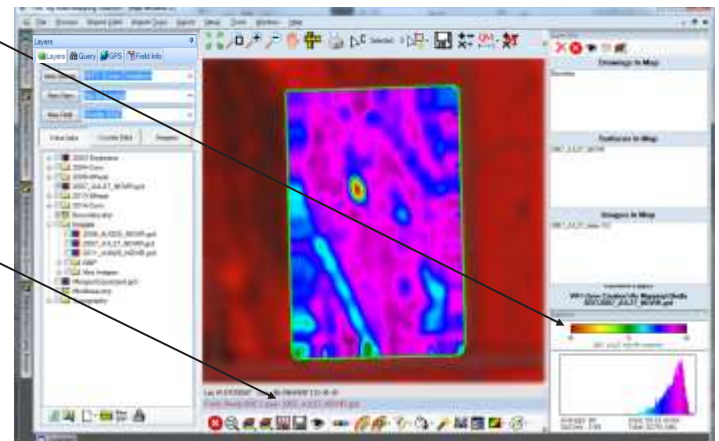
Trim End Values & Smoothing Filters

8. The **"Apply Threshold"** window will open. For doing Imagery, select "Lower" check box. Make sure the "Delete Cells" is **not** selected. Inspecting the image in the prior few steps, we found that 56 was the lowest "real" value in the field. So type in 56 in the "Threshold Value" box, and click **"Apply"**.



9. Notice that the **"Color Bar"** on the right side of the screen now reads from 56 to 96, confirming that the "Trimming" did work.

8. Looking at the image that has been created, you will notice the image looks a little rough. Use the **"Smoothing Filters"** button by selecting the drop down on the right side. In most cases, the "5x5 Low Pass" will smooth out the rough edges.



11. Select **"Save Changes"** button on the lower tool bar.

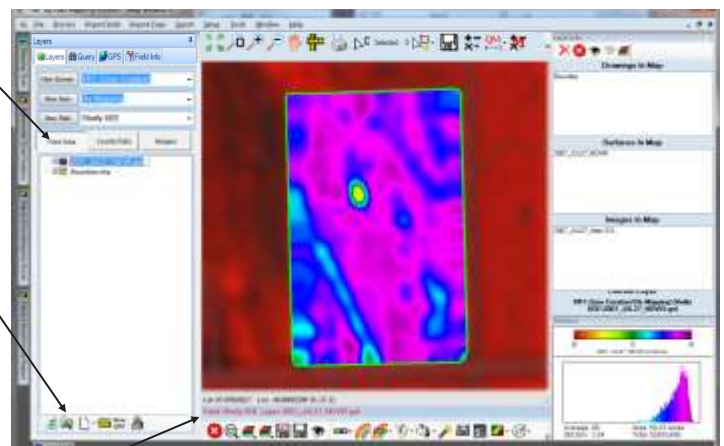
12. The **"Save As"** window will open up. Make sure the file is being saved into the correct folder under the GKData folder (this should be the same location as the field boundary, if you created one).



13. Make sure that in the **"File name:"** box to use the Image date as part of the name of the file. This is the only way to identify the year and date of the image. When finished, click on the **"Save"** button.

14. Now back to the Ag Data Mapping Solution window direct yourself to the **"Field Data"** tab on the left side of the window and make sure to be set to the proper "Grower", "Farm" and "Field". Click on the **"Refresh Tree"** button on the bottom of this window.

15. Notice that the new field image (*.grd) is not showing up in the **Active Layer** below the viewing window. If not, select the field from under the "Field Data" tab by simply clicking on the file name one time.



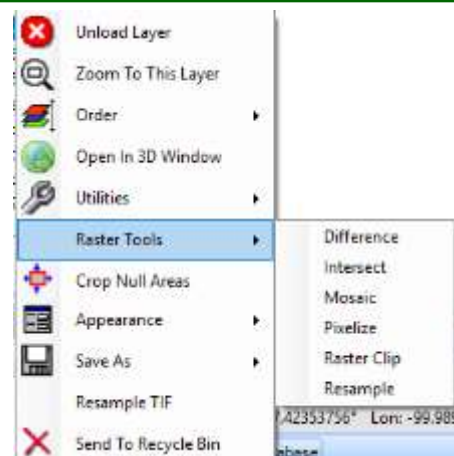
Field: Shelly 8SE Layer: 2007_JUL27_NDVI.grd

Raster Tools

Raster is a "Surface" or an "Image" layer in ADMS. Basically these are pretty pictures. Majority of them will be .grd or .bmp or .tif files. There are specialized tools for modifying raster layers. These special tools for amending the picture are found in the "Raster Tools"

Tools can be accessed by right clicking on the xxxx.grd name in the **layer tree on the left hand side of the screen** and selecting the Raster Tools list .

These tools will be used primarily for xxxx.grd layers.



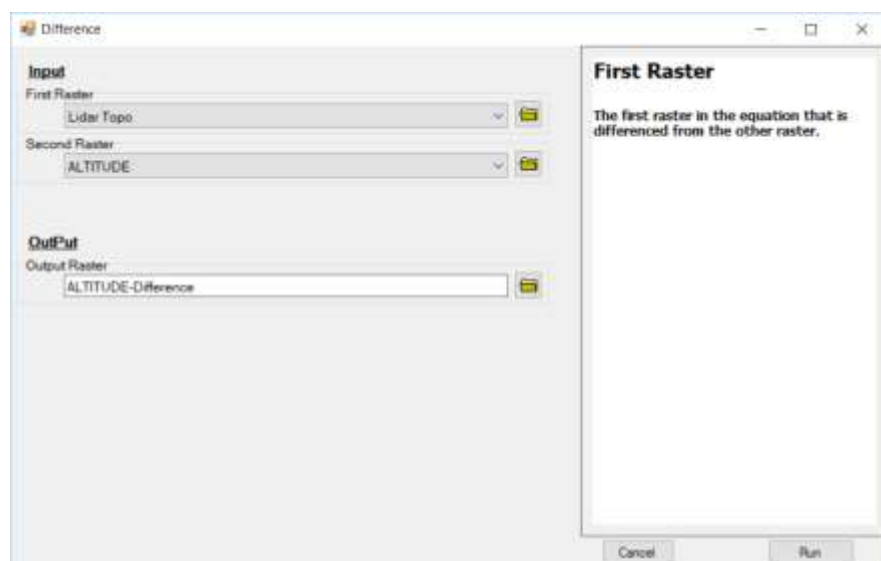
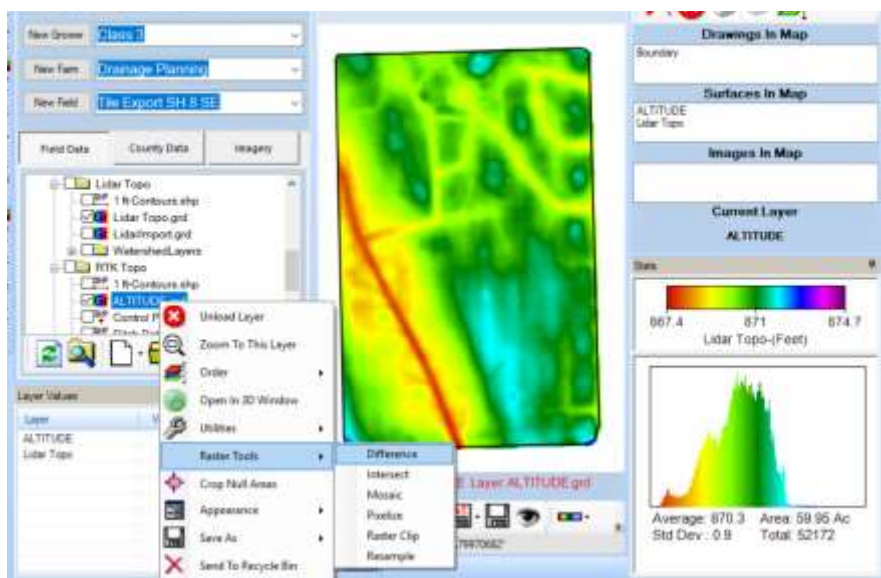
Difference

Difference runs the difference between two "surface" raster's, such as two elevation layers or two yield data layers as a couple examples.

Note: Tool not for "Images".

1. Turn on the First Raster layer (Lidar Topo.grd)
2. Turn on the Second Raster layer (ALTITUDE.grd)
3. Right click on either xxx.grd and select raster tools and difference.
4. Select the Raster layer names in the drop down menu that are going to be used.
5. Name the Output Raster.
6. Click Run.

Note: The new surface raster is in the field data tree, the values of the data are listed in the layers "Stats" window.



Raster Tools

7. In this example the "Difference" is off by a factor of 8.3' due to the relative difference in the "Non-Benchmarked Data". We are going to find the "Relative Difference", Zeroing out the Difference map.

8. Make "ALTITUDE-Difference.grd" the active layer in Red

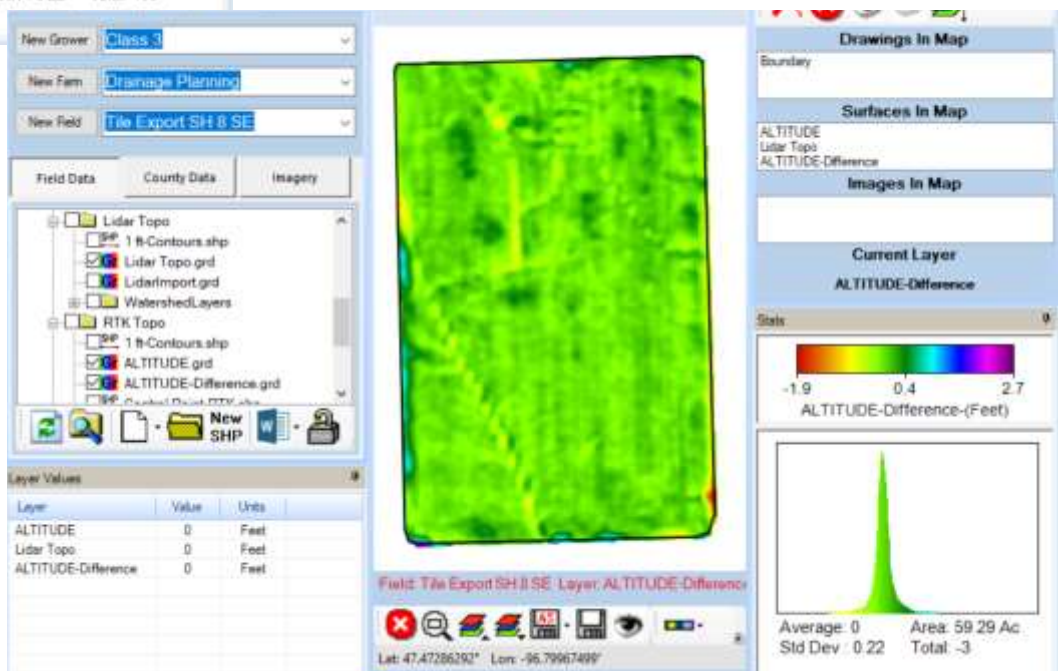
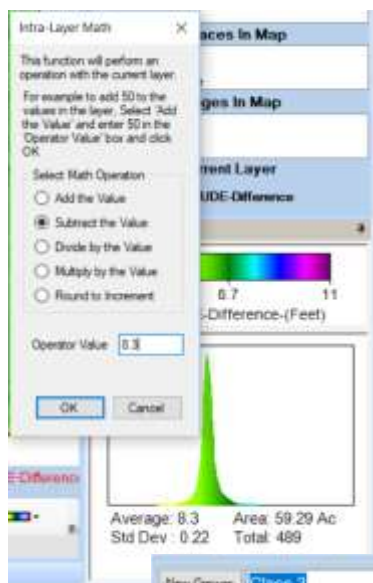
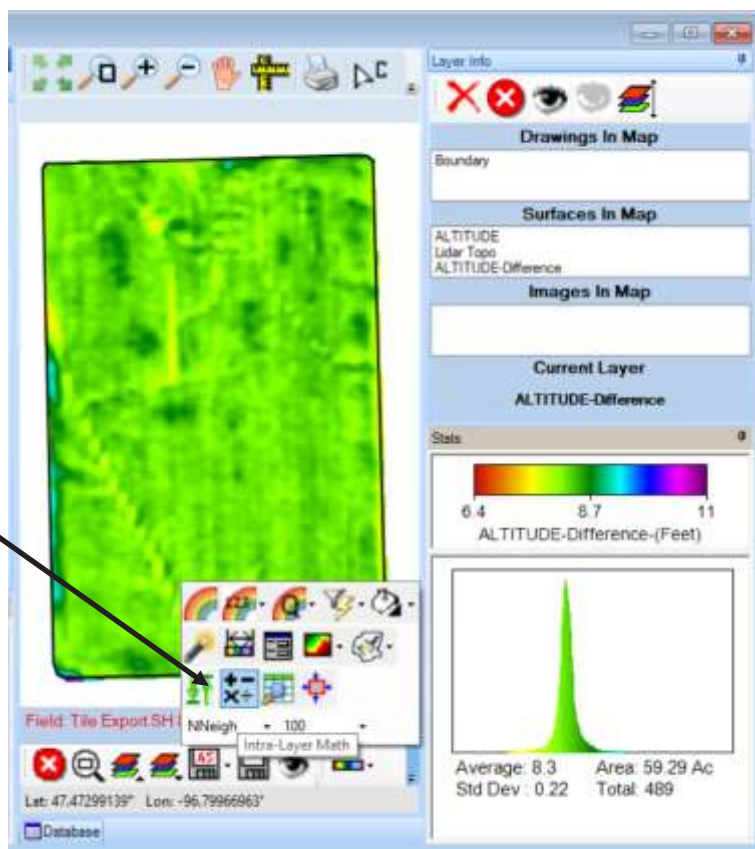
9. Click on the "Interlayer Math" button to correct.

10. Subtract by 8.3

11. Click OK

12. Suggest clicking "Save"

The difference between LIDAR and Altitude = Altitude-Difference.grd with the average of "0" and a range of -1.9 to 2.7 feet of change.

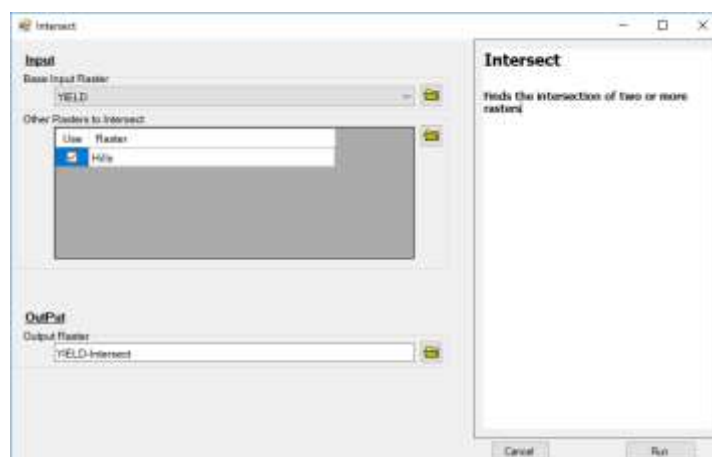
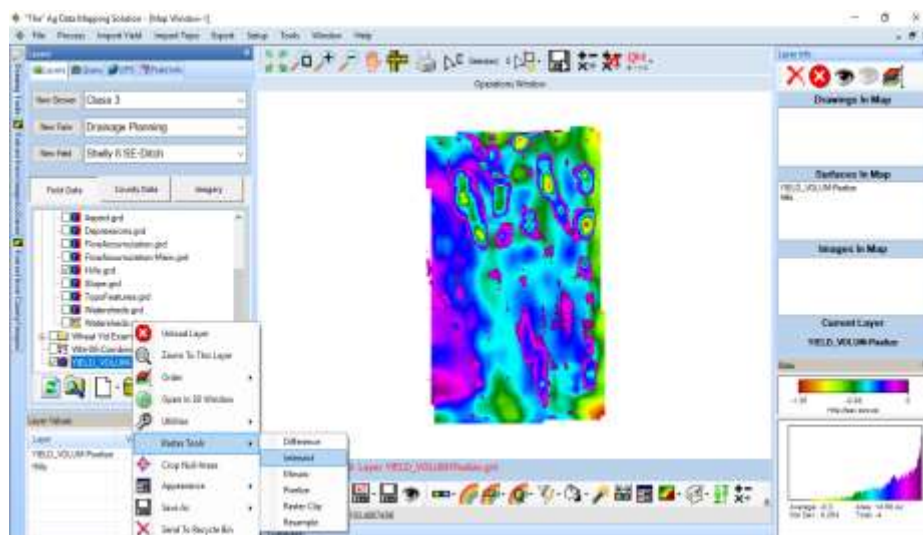


Raster Tools

Intersect

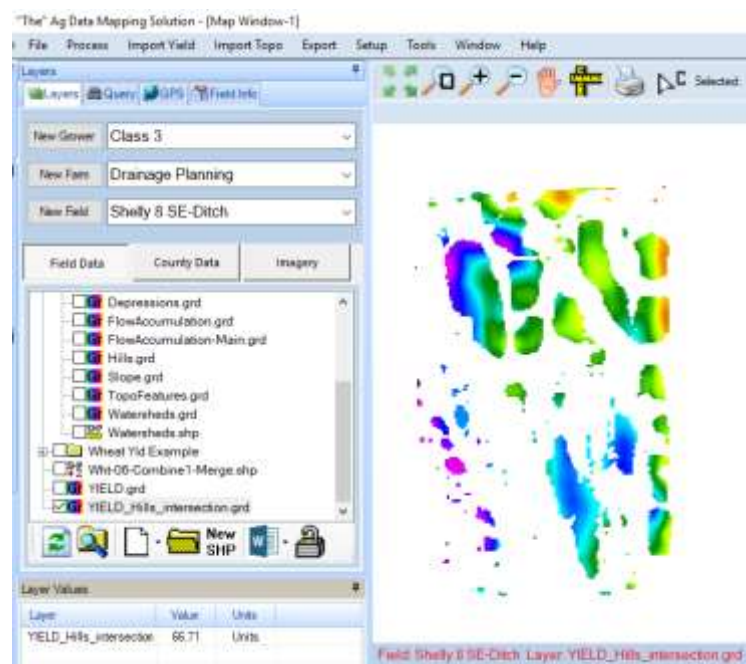
Intersect finds the intersection between two or more raster's and displays the values.

1. Turn on the first raster (Hills.grd).
2. Turn on the second raster (Yield.grd).
3. Right click on the raster and select raster tools, and difference.
4. Select the input raster that is going to be used.
5. Make sure the raster that is going to be used to intersect is correct.
6. Name the output raster.
7. Click Run.



The intersect between the hill.grd and yield.grd is Yield_Hills_intersection.grd.

The new raster will be in the field data window and the intersected values of the new raster can now be viewed.



Raster Tools

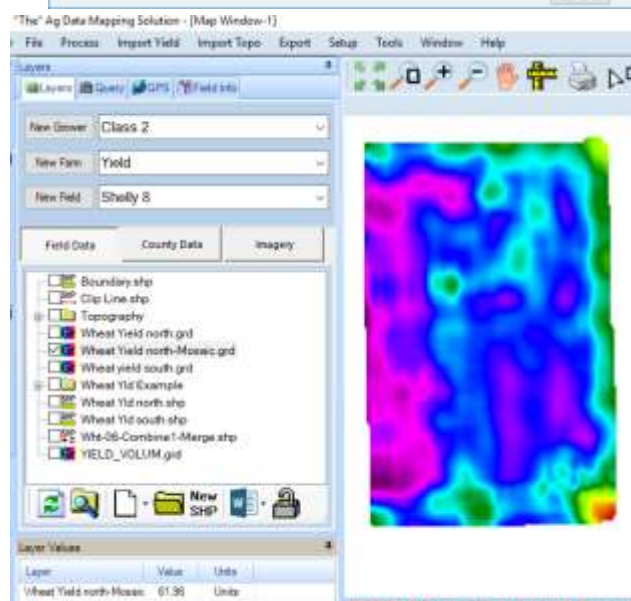
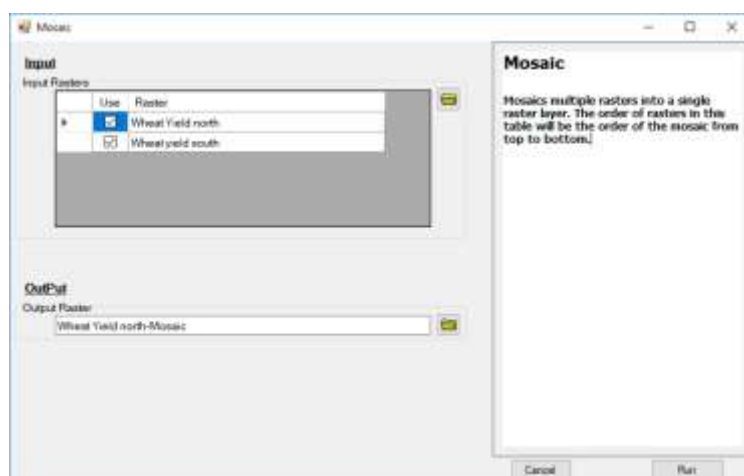
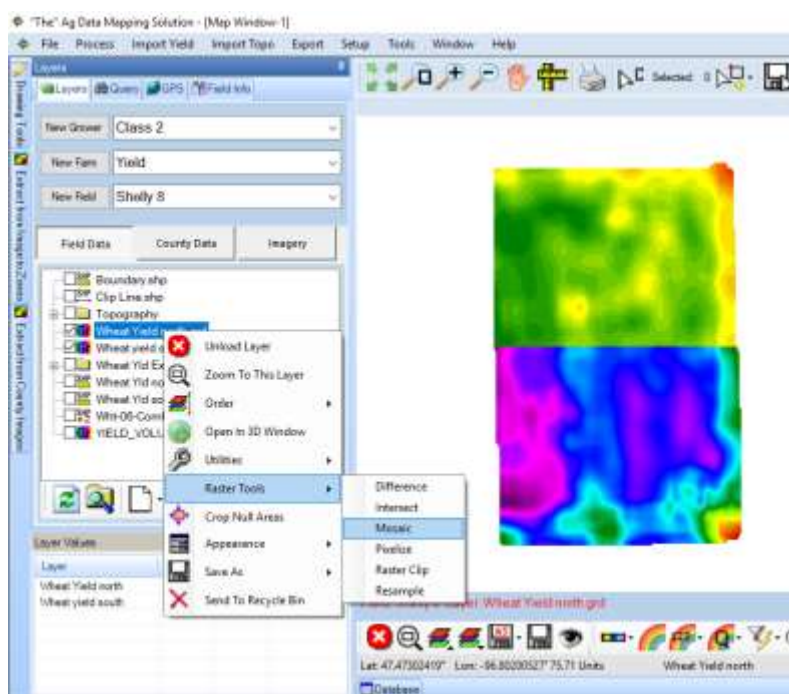
Mosaic

Mosaic is used to stitch together images or surfaces. Ex: merging two yield maps that are side by side.

1. Turn on the first raster. (Wheat Yield north.grd)
2. Turn on the second raster. (Wheat Yield south.grd)
3. Right click on either raster, click Raster Tools, select Mosaic.
4. Make sure the rasters that are going to be used are "checked on".
5. Name the output raster.
6. Click Run.

The wheat yield north has been stitched with the wheat yield south creating the new "Wheat Yield north-Mosaic.grd" as one surface.grd.

- Please note: if there was any overlap the layer that was "turned on first" will be returned "on top" in the newly merged image.



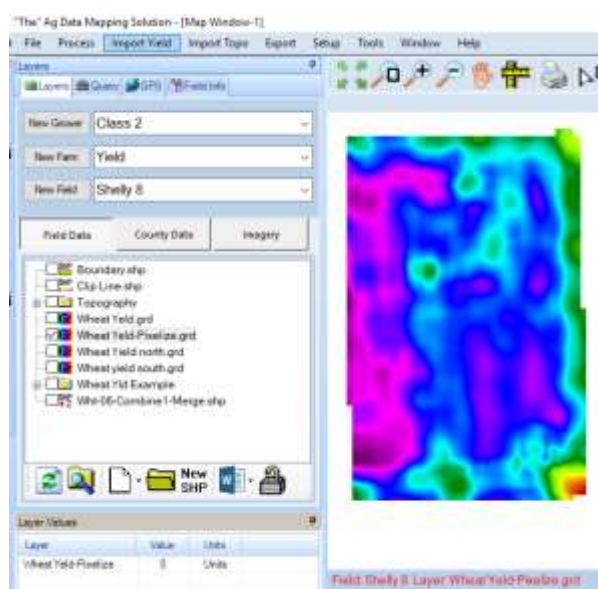
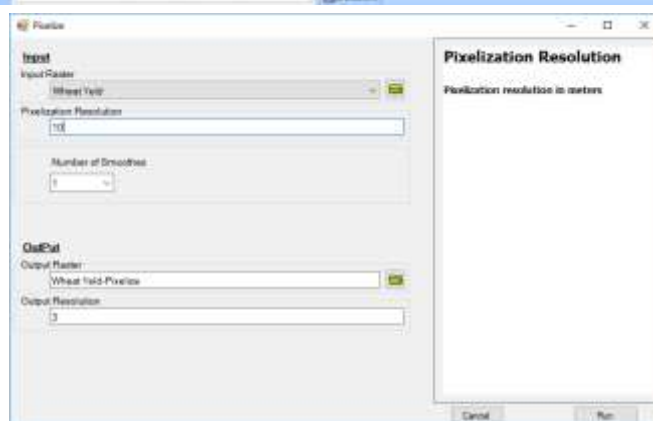
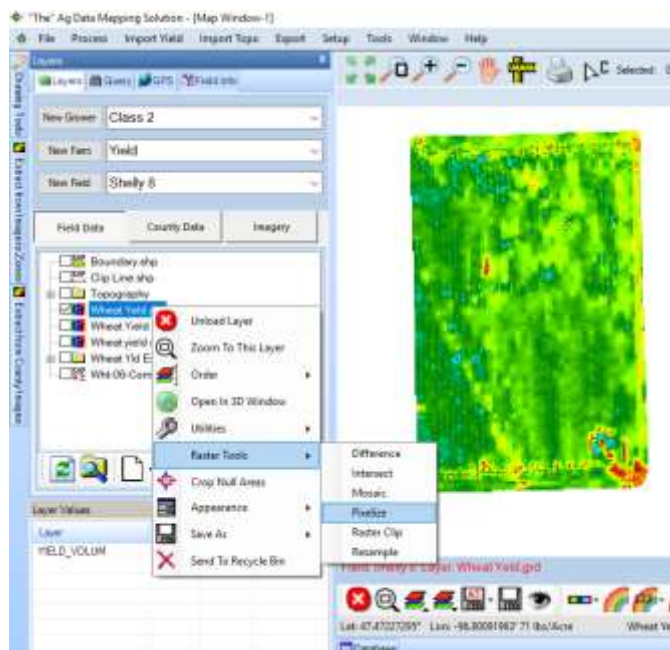
Raster Tools

Pixelize

Pixelize smooths a raster by going to lower resolution (10m as example), running 5x5 smooth on it and then back standard resolution (3m is ADMS default).

1. Turn on the raster. (Wheat Yield.grd)
2. Right click on the raster and select "Raster Tools", select "Pixelize".
3. Select the "Pixelization Resolution" for the raster. Set the resolution for the size of the event that is going to be smoothed. (Event example = header width in meters)
4. Select the "Number of Smooths" (5x5) that are going to be run on the raster when it is at the "Pixelization Resolution". (suggest using 1 smooth)
5. Make sure the "Output Raster" name and folder location are correct.
6. Select the "Output Resolution". (suggest using 3 meter)
7. Click "Run".

Your new "Pixelized" raster will now be in the field Data Tree.



Raster Tools

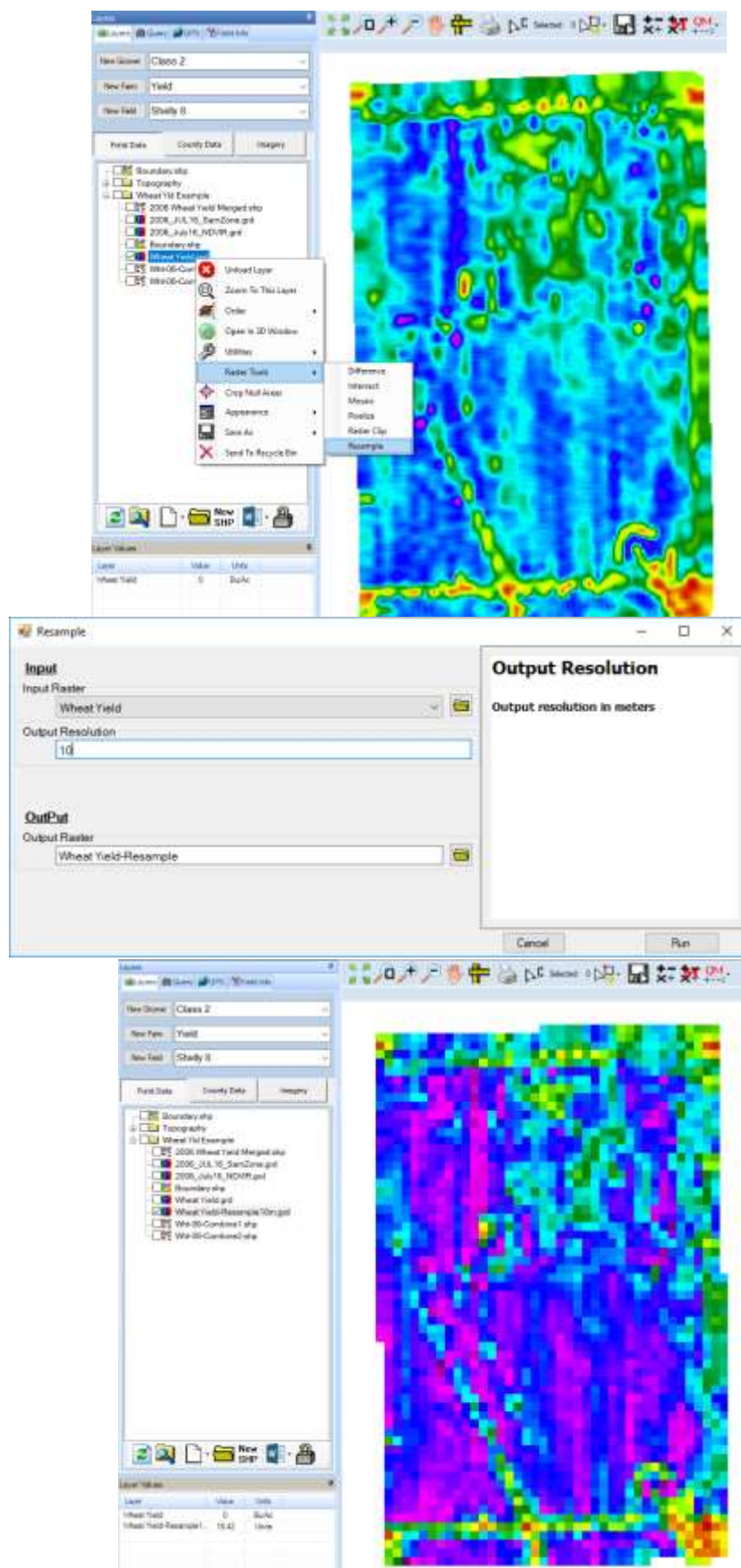
Resample

Resample changes the output resolution of a raster.

1. Turn on the raster or surface.grd.
"Wheat Yield.grd" (2 meter data)
2. Right click on the raster, select
"Raster Tools", and click on
"Resample"
3. Select the "Output Resolution" in
meters.
4. Under "Output Raster" select the
name and destination of the new
object or layer.
5. Click "Run".

The "Wheat Yield-Resample10m.grd" is now in the data tree and is resampled to 10 meter. Please note 1—5x5 Smoothing Filter will do wonders here!

The new resampled raster will now be in the field data tree, and can now be smoothed out use as you see fit.

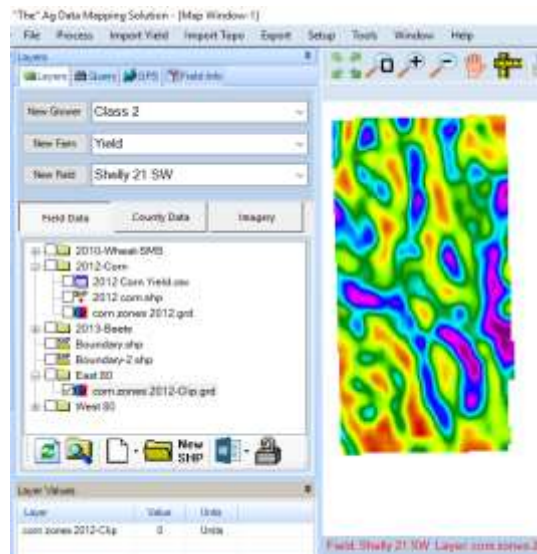
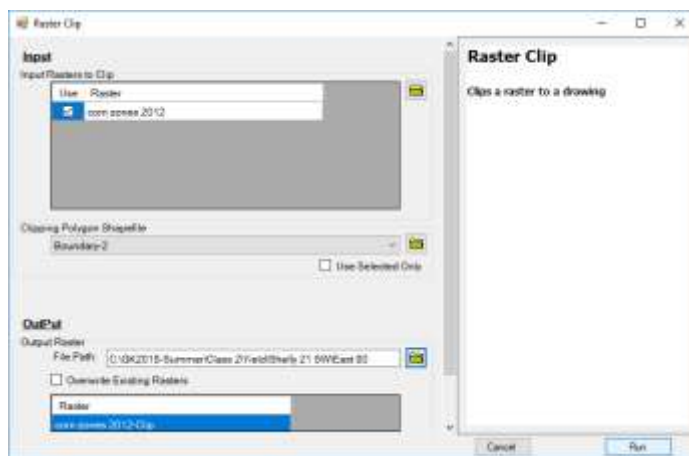
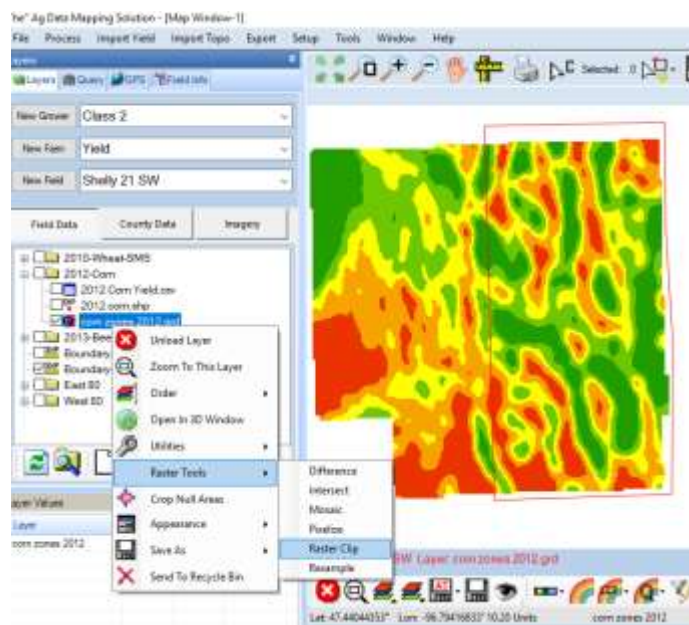


Raster Tools

Raster Clip

Raster Clip—clips images and surfaces to boundaries, allows multiple files to be clipped, and saves them to a different folder.

1. Turn on the raster to be Clipped. Corn Zones 2012.grd
2. Turn on the Boundary.shp file to define the area to be clipped.
3. "Right Click" on one of the raster, select "Raster Tools", left click on "Raster Clip".
4. Make sure the raster or rasters are checked on in the "Input Raster's to Clip" window
5. Under "Clipping Polygon Shapefile", confirm the correct SHP and also if you are "Use Selected Only" if the boundary has multiple Polygons / Boundaries.
6. Check "Output Raster" window to make sure the file path. NOTE: the option to create and put data in a "New Folder" and "Overwrite Existing Rasters" - (Overwriting is permanent)
7. Click "Run".



The "corn zones 2012-clip.grd" is now in the "East 80" folder we designated in the Data tree. The original raster has not been changed.

Correlation Matrix



Introduction

Within ADMS, there is a tool called the Correlation Matrix. This tool is used to measure similarities and differences between multiple layers that are turned on. This tool can be used on any surface including imagery, yield, and prescription maps. It is helpful for measuring the similarities between different images as well as aiding in blending nutrients. The correlation matrix uses the Pearson correlation coefficient and measures the linear correlation between two variables. The output value will be between -1 & +1. The closer the value is to +1 the stronger the correlation.

Correlation Value

Less than 0.3

Meaning

Not Meaningful

0.3—0.5

Weak Correlation

0.5—0.7

Moderate Correlation

0.7—1.0

Strong Correlation

- Correlation does not imply Causation
 - Because two variables are similar or have a strong correlation does not mean that they are related to each other.
- Negative numbers indicate an inverse correlation. An example would be a correlation between yield and soluble salts. If the salts are at a higher or toxic level in the field the yield would be lower. Therefore a negative correlation would result.

Using the Correlation Matrix

- Clear the Map Window so no layers are turned on. Even if the layers are not visible but still turned on, the correlation matrix will run on all of them. The more layers that are turned on, the longer it will take to calculate.
- Turn the layers on that the correlation matrix will be calculated on.
- On the bottom toolbar, select "Calculate Correlation Matrix."



- The utility will run and display a window with a table in it showing the correlation values.

Correlation Matrix Display

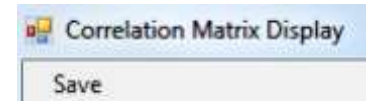
Layers/Names	Traverse NAIP 2003_ext_NDVI.grd	Traverse NAIP 2004_ext_NDVI.grd	Traverse NAIP 2005_ext_NDVI.grd	Traverse NAIP 2006_ext_NDVI.grd	Traverse NAIP 2008_ext_NDVI.grd	Traverse NAIP 2009_ext_NDVI.grd	Traverse NAIP 2010_ext_NDVI.grd
Traverse NAIP 2003_ext_NDVI.grd	1.000	0.310	-0.209	-0.100	0.170	-0.426	0.201
Traverse NAIP 2004_ext_NDVI.grd	0.310	1.000	0.030	0.306	0.018	0.080	0.470
Traverse NAIP 2005_ext_NDVI.grd	-0.209	0.030	1.000	0.002	-0.074	0.561	0.232
Traverse NAIP 2006_ext_NDVI.grd	-0.100	0.306	0.002	1.000	-0.120	0.033	0.400
Traverse NAIP 2008_ext_NDVI.grd	0.170	0.018	-0.074	-0.120	1.000	-0.907	0.166
Traverse NAIP 2009_ext_NDVI.grd	-0.426	0.080	0.561	0.033	-0.907	1.000	0.107
Traverse NAIP 2010_ext_NDVI.grd	0.201	0.470	0.232	0.400	0.166	0.107	1.000

RULES OF THUMB FOR INTERPRETING CORRELATION COEFFICIENTS:

- The larger the correlation coefficient, the better.
- A correlation of less than 0.3 is typically considered "unmeaningful," a correlation between 0.3 and 0.5 is typically considered "weak," a correlation between .5 and .7 is typically considered "moderate," and a correlation that is greater than 0.7 is typically considered to be a strong correlation.
- CORRELATION DOES NOT IMPLY CAUSATION: Because two variables are correlated, even if they are statistically significant, does not mean that one variable causes changes in the other - it means nothing more than "they are related."
- Negative numbers indicate an inverse correlation, an example in agriculture would be soluble salts in soil. When entering a correlation of yield of soluble salts to yield, if the salts are too high in the field, you will see an "inverse correlation" represented as a negative number.

Credits for this definition: <http://www.statisticstips.com/correlation.php>

- If desired, this table can be saved as a *.CSV file by clicking Save in the top left corner.



Correlation Matrix—Explained



This example was done on 3 years of corn yield and an image from each year.

- The yield maps are 2008, 2009, and 2010
- The image maps are NDVIR from July in 2008, 2009, and June in 2010.
- This table can be read top to bottom, or left to right.
- From the values it can be seen that the same map correlates perfectly with itself each time.

LayerNames	Corn Yield 2008	Corn Yield 2009	Corn Yield 2010	2008_JUL14_NDVIR	2009_JUL01_NDVIR	2010_JUN18_NDVIR
Corn Yield 2008	1	0.107	0.607	0.641	0.262	0.383
Corn Yield 2009	0.116	1	0.225	0.061	0.324	0.089
Corn Yield 2010	0.614	0.214	1	0.71	0.396	0.685
2008_JUL14_NDVIR	0.636	0.06	0.706	1	0.457	0.591
2009_JUL01_NDVIR	0.264	0.319	0.398	0.457	1	0.279
2010_JUN18_NDVIR	0.376	0.09	0.682	0.591	0.279	1

Correlation Value	Meaning
Less than 0.3	Not Meaningful
0.3—0.5	Weak Correlation
0.5—0.7	Moderate Correlation
0.7—1.0	Strong Correlation
1	Perfect Correlation

- Now this tool can be used as part of the image selection process when choosing NDVI images to use in zone creation.
- Looking on the table, it can be seen that Corn Yield 2010 and 2010_JUN18_NDVIR have a 0.685 correlation value meaning it is MODERATE. This would be an image that could be considered for a final zone map.

- Other similarities can be seen. Such as how similar yield maps are from one year to the other.

Using the Correlation Matrix for Determining Blends

The correlation matrix can also be used for determining which products could potentially go together in a product blend. An example of this would be if multiple products had to be spread, but only a single bin spreader was going to be used for the application.

1. Turn on all the product application maps.
2. Run "Calculate Correlation Matrix."



LayerNames	0-0-60	11-52-0	46-0-0
0-0-60	1	-0.017	0.88
11-52-0	-0.017	1	-0.489
46-0-0	0.88	-0.489	1

3. From the results, it can be seen which products spatially correlate with each other.
 - This example uses 0-0-60, 11-52-0, and 46-0-0. The resulting table shows a strong correlation between the
 - 0-0-60 application map and the 46-0-0 application map. This would be an indicator that these two products could fit well if blended together.
 - Likewise, there is a negative correlation between 11-52-0 and 46-0-0 & 11-52-0 and 0-0-60
 - These products should not go together in a blend.

Creating Zones From Imagery

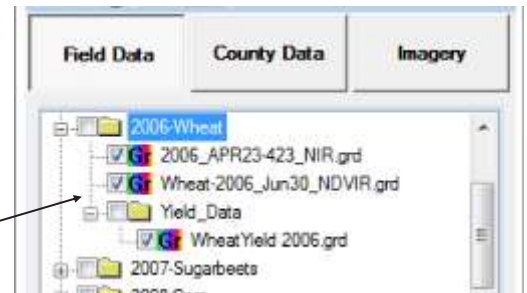


Average All Layers Script (Images / Yield / Topo / Veris)

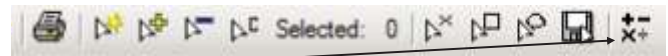
If multiple .grd files exist for one "Field", these surfaces can be merged to combine traits.

1. Click "**Layer Info**" and "**CLEAR MAP**" 

2. Turn on JUST THE .grd maps you want to "Merge" (2—200 surface rasters from Imagery / Yield / Topo / Veris)



3. Now, click the "**Multi Layer Map Math**" button located in the top map toolbar.



4. The "**Map Math**" window opens.

5. Click the "Open Existing Scripts" Button.



6. Find the "**Average All Layers-Equalized.txt**" file and click open.

7. Note the "Code Window" should populate with some data looking like this.

8. Click "**Compile Script**".

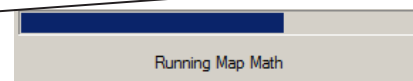
(If all is correct you should see this)

The Script Compiled without errors! :-)

9. Click "**Run Script**".

Compile Script

Run Script

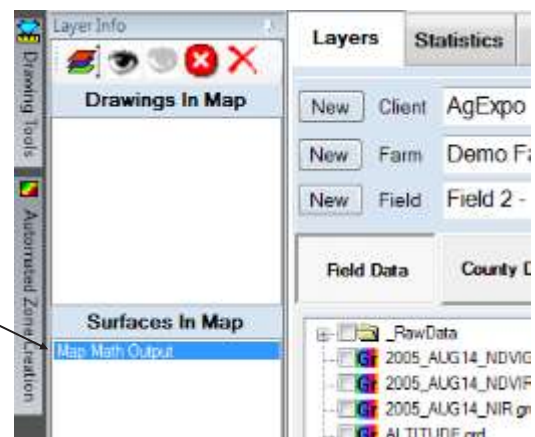


10. Close the "**Map Math**" window.

11. Go to the "Layer Info" tab on the left side of the screen

12. Select the "MLayers Merged-Eq" from the "Surfaces In Map" list

13. Click on the "Save As"  button on the bottom toolbar and call this "3 surface merged.grd" (or whatever name represents the new object created).



* More detailed information on Map Math Controls under the Advanced Scripting section .

Creating Zones From Imagery

Manual Zone Creation

1. In the zoning process, the values of the image do NOT change (unless end values are changed). We are just changing the colors associated with the values. These colors are used to isolate areas of the field that perform differently.

2. Select the **"Thematic Color"** button of the lower toolbar.

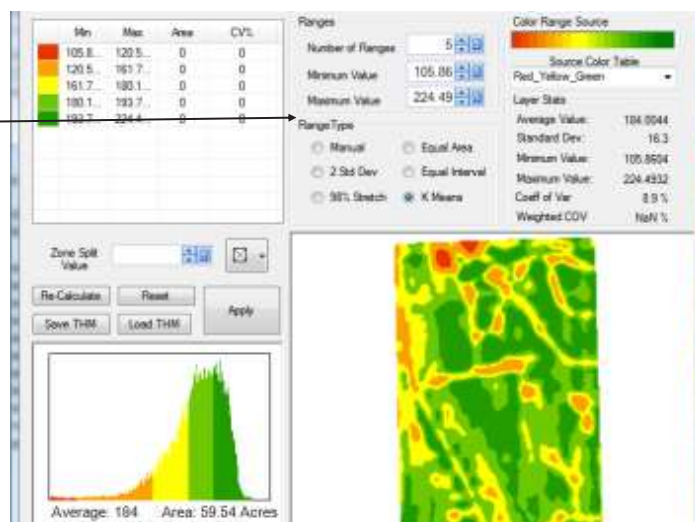
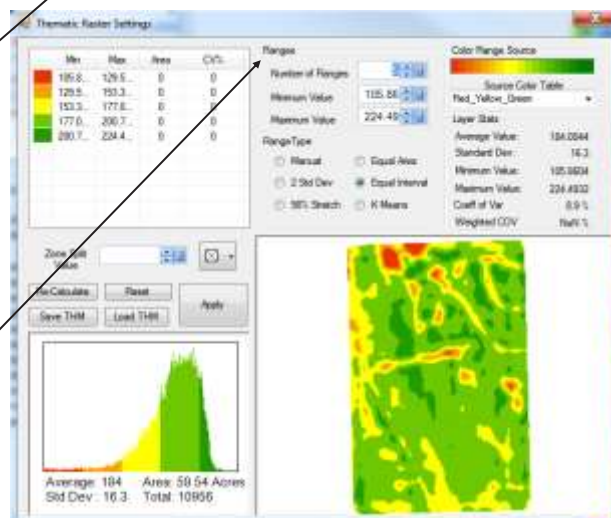
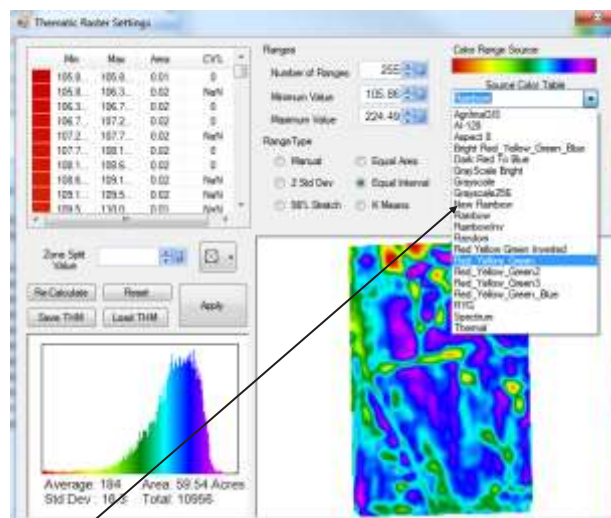


3. The **"Create 'Color By Value' Table"** window will open up.

4. Select the **"Source Color Table"** to use and leave the setting on "Automatic".

6. Adjust the number of zones by changing the value in the **"Number of Ranges"**. If creating sample zones in your field, it is important to keep in mind the number of samples to pull.

5. Next, select the **"Range Type"** to use. These are mathematical ranges based on the inputs and number of ranges selected. Typically for satellite imagery, use "2 Std Dev" or "K Means".



Creating Zones From Imagery



Manual Zone Creation

6. The statistical methods may not give the exact zones you are looking for. You may want to adjust the zones manually.

7. To manually adjust a zone, place the mouse over a color chip and "Scroll" the mouse wheel. This will adjust the "Min" value of the range.

8. Repeat this process to adjust all the zones to be changed. Note: adjusting the highest value does nothing, you are moving the top value of the color chip.

9. If the map in the preview window is acceptable, click on the **"Apply"** button. This will automatically save these settings to the desired image.

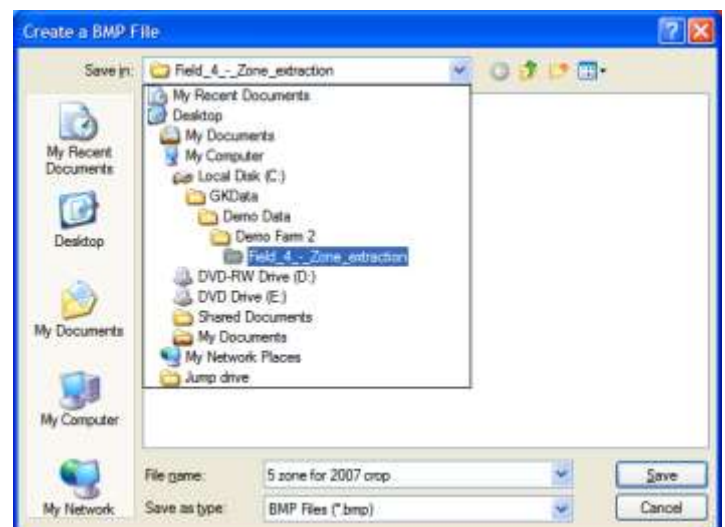
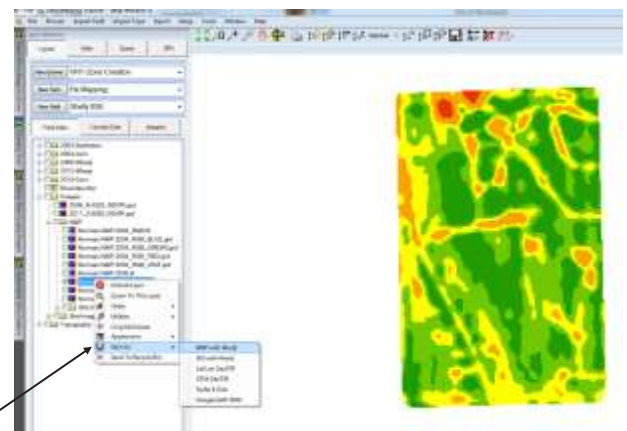
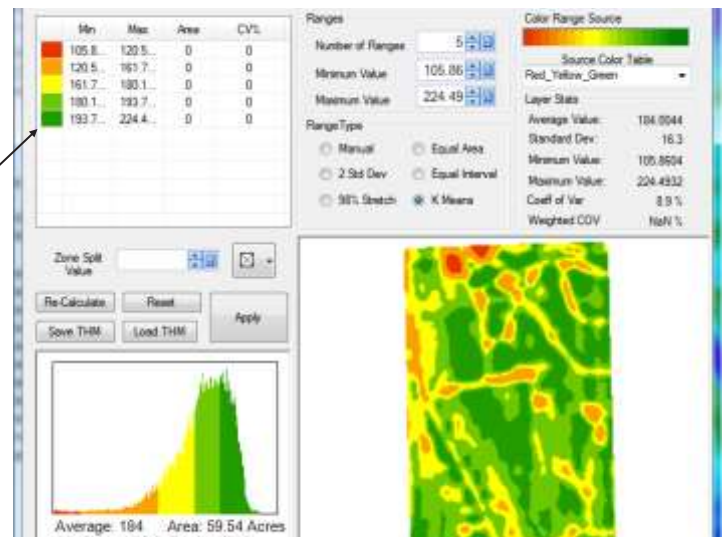
10. If using Ag Data Mapping Solution to find the zones for sampling, you are done. If using a PDA or exporting to another program, save this image in another format.

11. To save this image in a new format, "Right Click" on the file name to save, select "Save As".

12. There are several options of export types, here we will do a BMP format.

13. When the **"Create a BMP File"** window opens, save the file in a location where it is easily accessed for transfer. We suggest using the "Field Name" as part of this "File name:"

14. End of manual zone creation.



Creating Zones From Imagery



Thematic Raster Settings

The “Thematic Raster Settings” change how raster surfaces are displayed. This window will now allow any of the values in the map to be changed. Instead it changes colors and how they are represented.

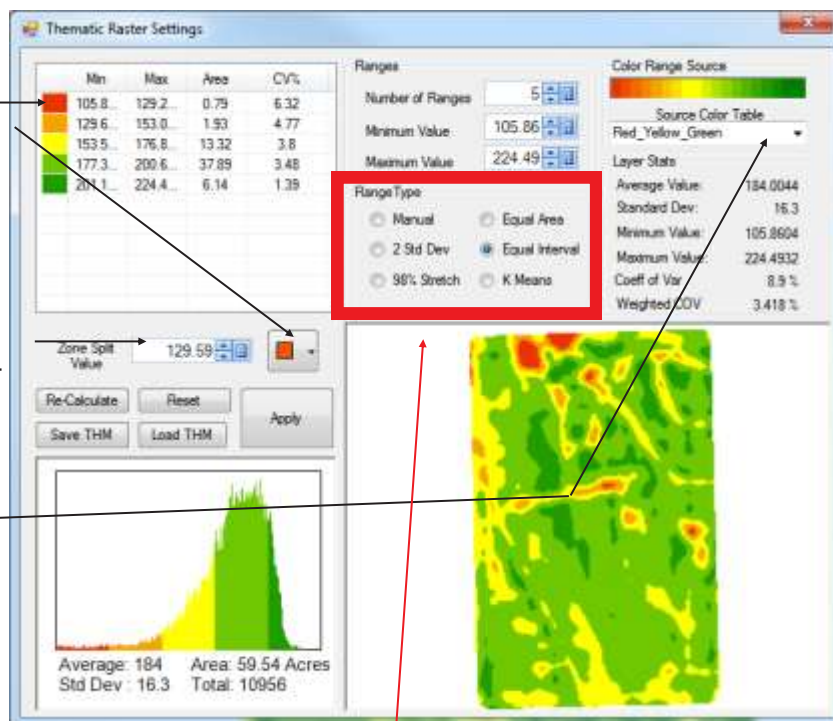
To access these settings click on the “Thematic Color” icon on the bottom toolbar. This will open the “Thematic Raster Settings” window.



Color Chips—These can be changed or modified individually to add custom colors to the map. Each color chip as a min, max, area, and coefficient of variation value.

The split values can be adjusted by scrolling over it with the mouse wheel or manually adjusting the zone split value. This will only adjust the Max value.

Color Tables—Different color tables can be applied to the map.



Range Types—Allow for automatic statistical grouping of the colors by values on the map.

- **K Means**—Recommended for imagery and zone creation.
 - ⇒ Clusters the data in a way so each zone has the lowest coefficient of variation possible. This minimizes the variation between data groups.
- **2 Std Dev**—Recommended for imagery and zone creation.
 - ⇒ Multiplies the Standard Deviation by 2. Then it adds and subtracts that value from the mean. These are the new high and low values.
- **98% Stretch**—Recommended for imagery and zone creation.
 - ⇒ 1% of the values are taken from the top and 1% of the values are taken from the bottom end.
- **Equal Interval**—Recommended for topography or prescriptions when creating contour polygons.
 - ⇒ Makes each color have an equal range of values.
- **Equal Area**—Not commonly used.
 - ⇒ Each zone has equal area

Creating Zones From Imagery

Thematic Raster Settings

Quick Zones—

The function of coloring "Zone" maps gets to be a lot of clicks going into the "Thematic" window every time. Also, changing "Default Color Tables" in setting when you are making Zones vs Rx or Topo Mapping. So we added a function called "Quick Zones". Quick Zones uses the "Default Color Tables (Zones)" for the Settings window.

With the "Settings" set like this. >



After "Merging Images" I have a ZONE.GRD that is in Rainbow colors.

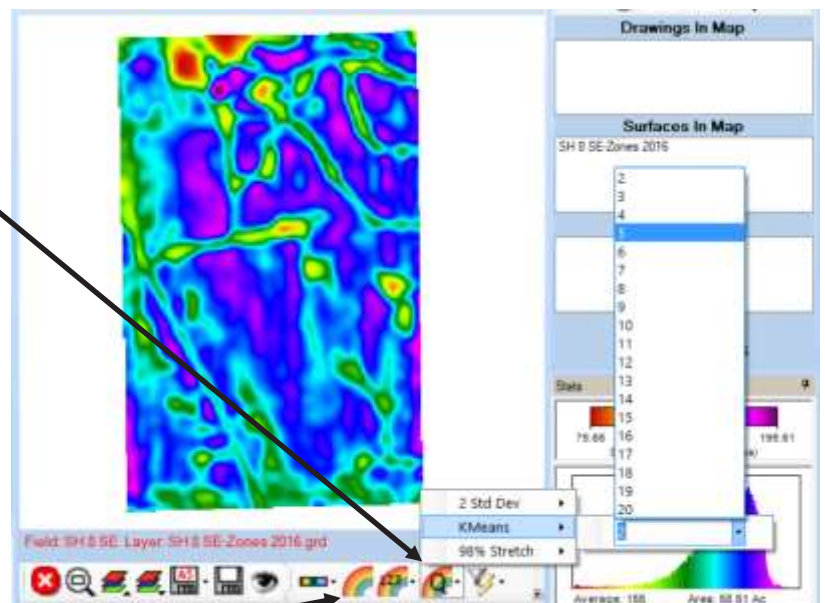
Click on the "QuickZoneSet"

Suggest "KMeans" & 5-7 Zones

Note: Scroll of mouse wheel on the Zone # dropdown.

Click back in the "Map Window" the list will disappear & apply settings using the "Default Color Table (Zones)"

If you are happy with the Zones, your done.



If you want to "Tweak" a Zone

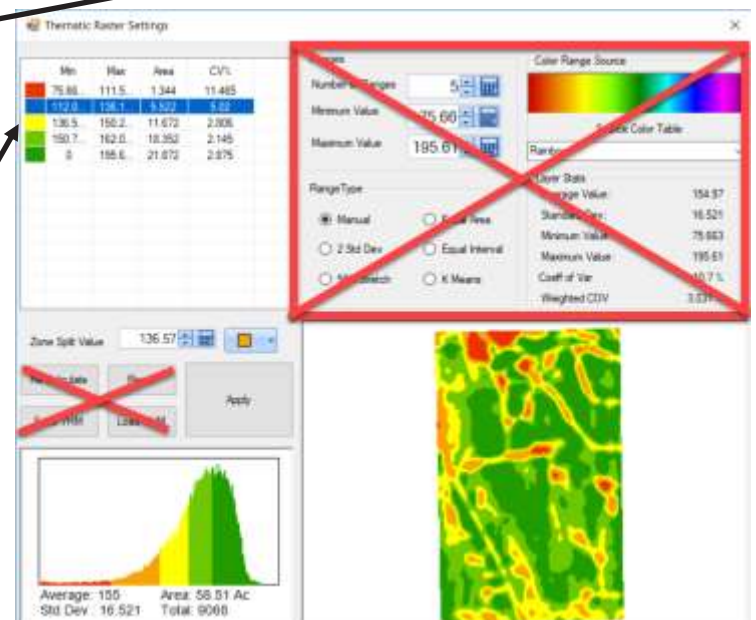
Click on "Thematic Color"

Note: Color Table on the Left is in Red Yellow Green!

Do NOT Click on or in the Red Areas! If you do the color table will go to Rainbow.

Put mouse pointer over "Color Chip" and scroll the mouse wheel to "Tweak" the zone color changing the "Max Value of the "Color Chip"

When Finished Click "Apply"



Nutrient Layers

Creating Fertilizer Products

Before getting started with writing Prescription maps it is suggested that you confirm that you have all the "Products" you would want to use.

1. On the top toolbar, select **"Setup"** and **"Fertilizers"**.
2. At the **"Edit Fertilizer Products"** window, select **"Add New"**.
3. Enter all the values for the product (custom PK)
 Keep names less than 12 characters
 "N Conc" is the % by weight analysis
 If you enter all the "Conc" values on the right,
 the product will be available for "Blend Groups"
 Seed products do not enter "Conc" values
4. When finished, select **"Save"**.
5. Create as many Fertilizer Products as needed by starting at step # 1
6. When finished "Close" this window



19 of 19

Select Product Type: Fertilizer

Product ID: PKBlend2

Product Name: PKBlend2

Product Form: Dry

Product Type: Fertilizer

Density: 66

Default Rate: 150

Market Unit: ton

Transfer Unit: ton

App Unit: lb

Minimum App Rate: 0

Maximum App Rate: 500

Price/Unit:

N Conc: 9

P Conc: 44

K Conc: 48

S Conc: 0

Zn Conc: 0

Fe Conc: 0

Nutrient Layers

Creating Prescription Maps

For this section, we will be combining your soil test / application rates to your zone map for the purpose of creating an application map for single or multiple products. It is your responsibility to understand the output maps and what the values on the maps mean.

1. Start up Ag Data Mapping Solution and Select the **"Merge Zone Results"** Icon, or go to the top tool bar and select the **"Process"** button and **"Merge Zone Results"**.

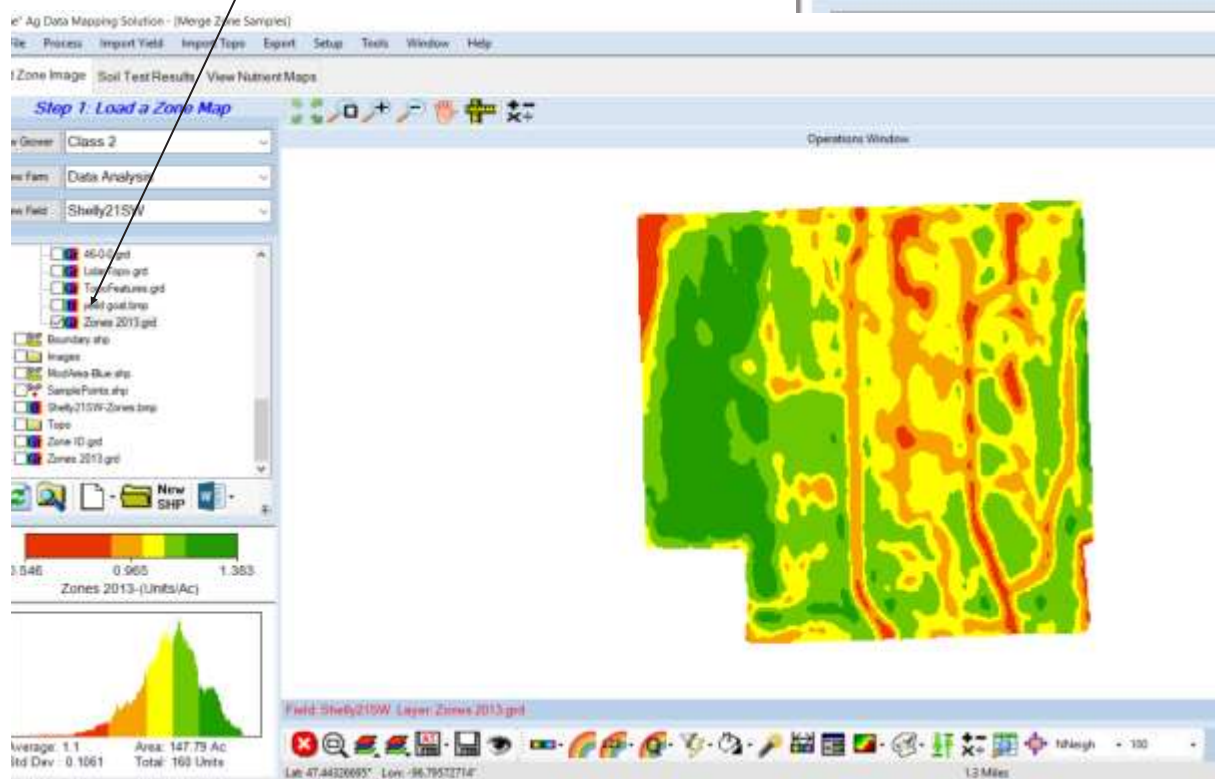


2. Select the Correct "Grower", "Farm" and "Field" where you created the zone maps.

Step 1: Load a Zone Map

New Grower	Class 2
New Farm	Data Analysis
New Field	Shelly21SW

3. Select the **"Zone Map"** for this field.



Use one of the following sections:

"CSV Soil Test Results"

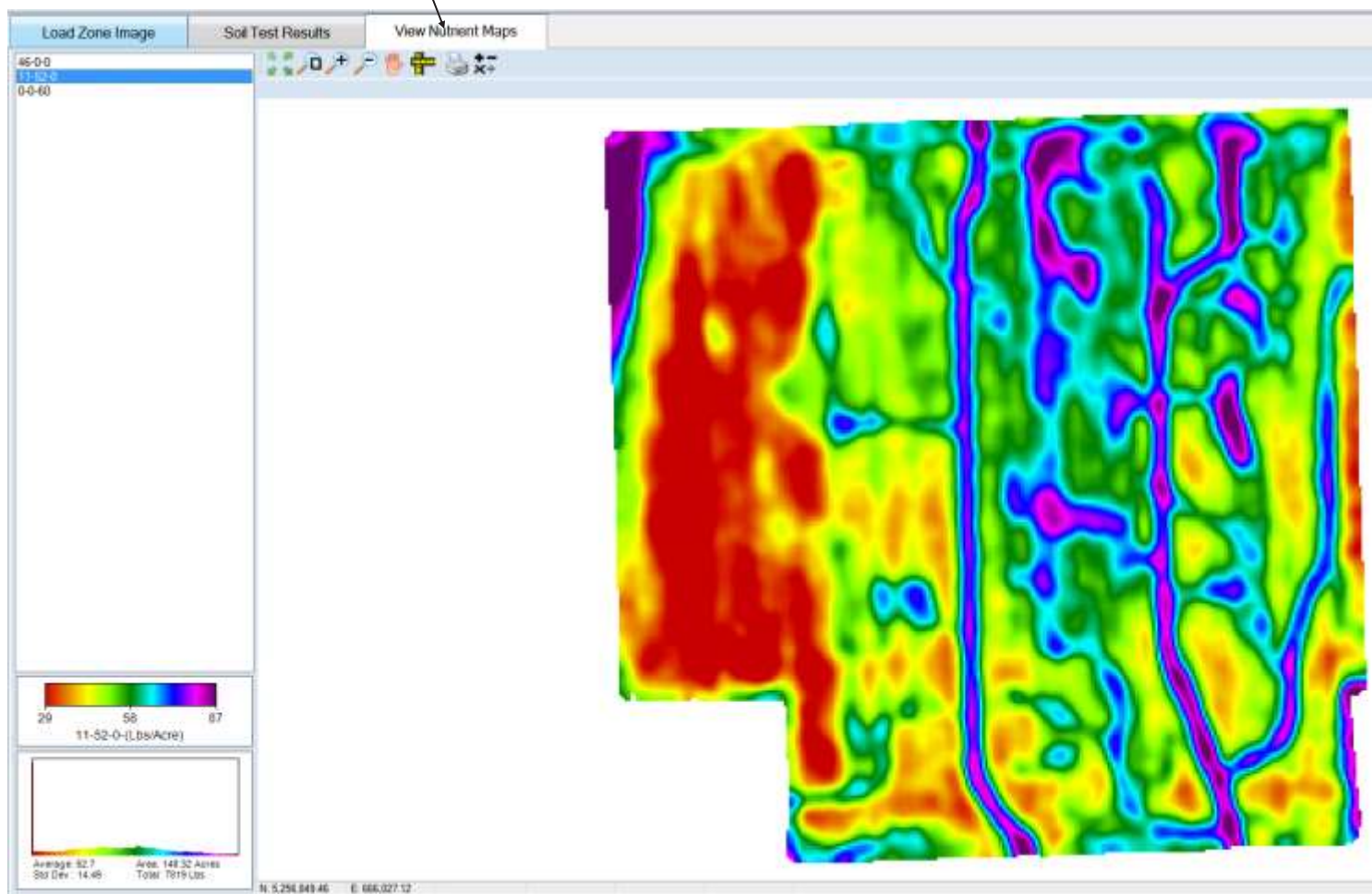
"Creating Prescription Maps—Manually"

"Using Blend Groups"

Nutrient Layers

Creating Nutrient Layers Manually

9. Select the **"View Nutrient Maps"** tab. You now have Nutrient Maps for each product you desire.



As you click on the "11-52-0" on the Left side of the window you will get a preview of the 11-52-0.grd map.

Click through the maps to assure your rates are all assigned correctly. What you see is what is applied (Example 29 lbs to 87 lbs of 11-52-0 & average of 52.7 lbs/ac)

If rates are not correct, return to the "Soil Test Results" tab and correct the rates.

NOTE: Go to "Map Window" for printing maps & exporting to controller.

Nutrient Layers

Creating Prescription Maps Manually

Adjusting Rates—Map Math

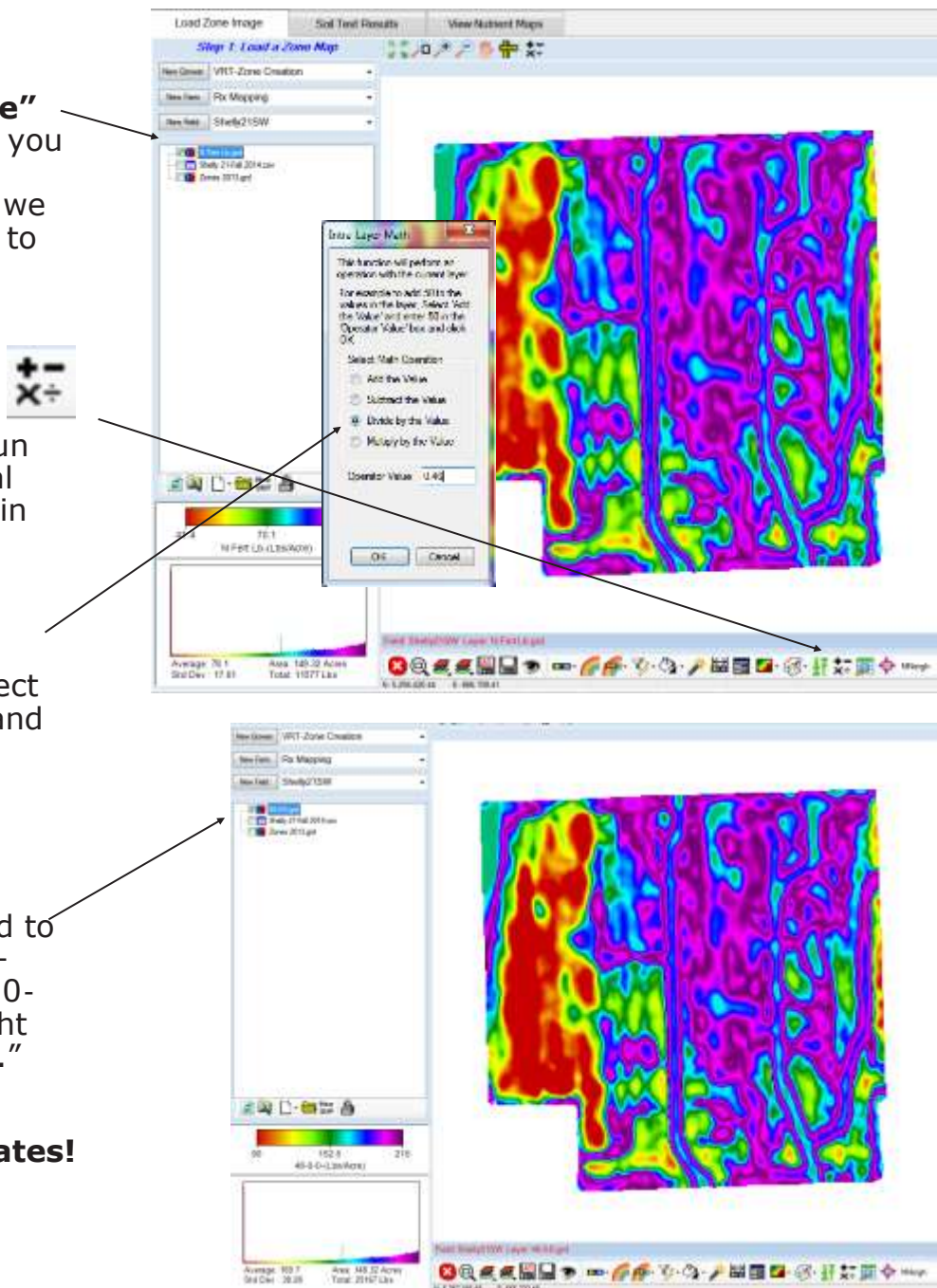
10. Go to **"Load Zone Image"** tab, and turn on the map you would like to use for the application (for example, we will convert the N Fert Lb to 46-0-0).

11. Select the **"Intra-Layer Math"** button. This will run the selected mathematical function over every pixel in the surface.

12. For this math, we will select **"Divide by the Value"** and **"Operator Value 0.46"**, click "OK".

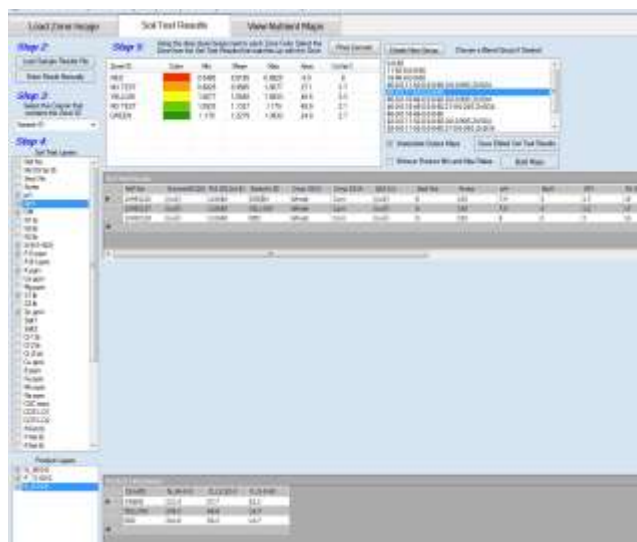
13. The map is now converted to LBS of Urea (46-0-0). Re-name or "Save As" to 46-0-0.grd as shown to the right and delete the "N Fert Lb."

14. **Confirm the Correct Rates!**



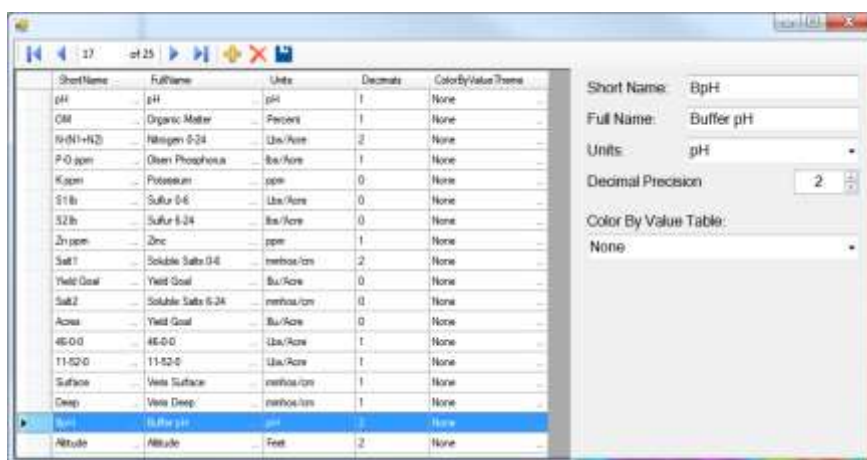
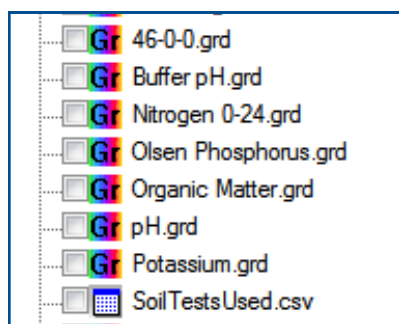
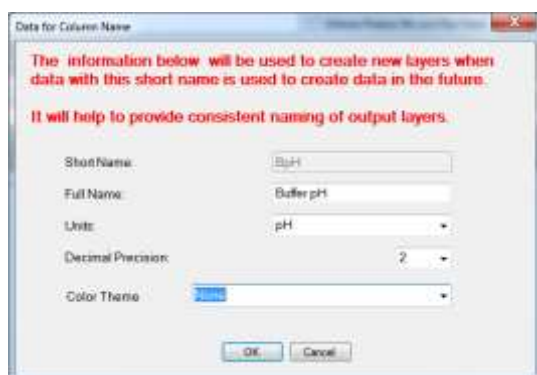
Nutrient Layers

Common Name Mapping Database



Above is a standard Zone Nutrient mapping box.

1. When building a map for a Soil Test Layer or Product the first time, it will ask for information about that column (Fill in all the blanks).
2. This information is stored in a database and used to create the maps from that column from then on. This is the name it will always use.
3. For example a column named BpH in an Agvise Export, if used to create a layer, will create a layer named "Buffer pH" and the units will be set to pH, and set to display 2 decimal points.
4. To Edit the names. Go to the Top Toolbar, Setup, Common Name Mapping.



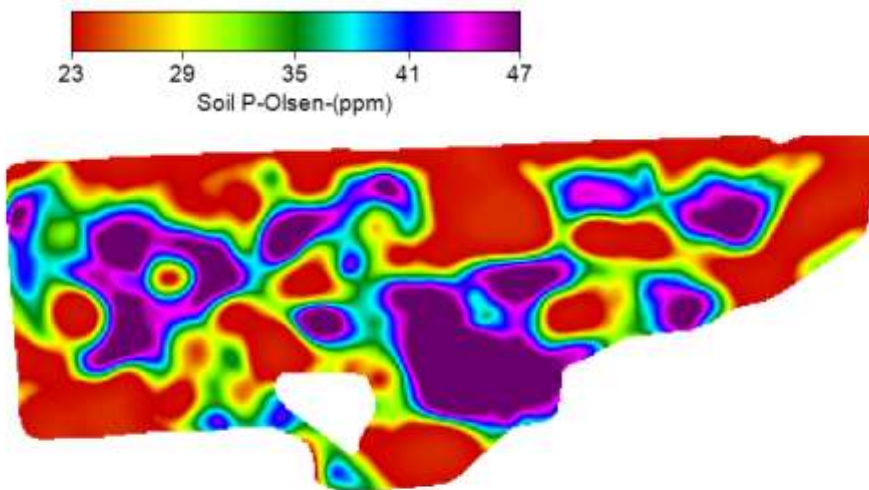
Nutrient Layers



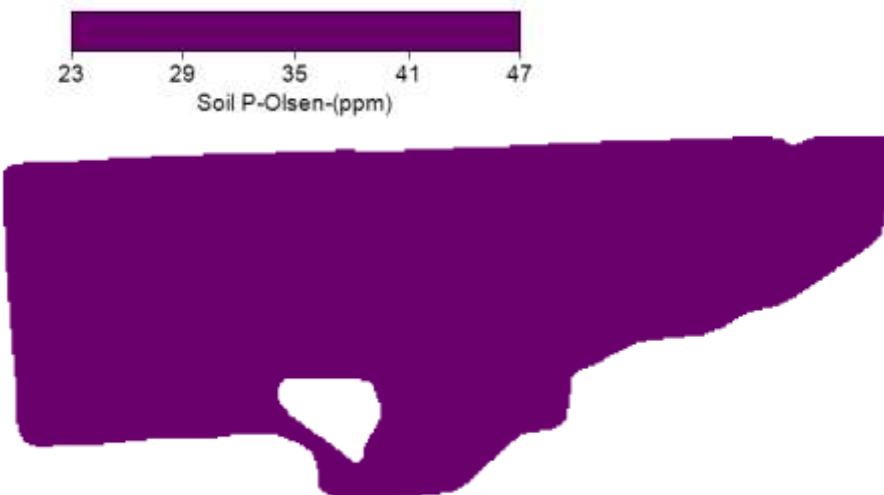
Fixed Color Themes

In ADMS there are some tools that allow raster layers to be colored by certain values or color themes. The benefit of having color themes is that it gives visual consistency when looking at certain types of maps such as nutrient layers. Traditionally when a map gets created a color table gets applied which ranges from the low end color to the high end color despite the values. For example a rainbow color table would always have all the colors no matter what the values are. When dealing with nutrient maps you may want certain colors to always represent certain values. For example red will equal low nutrient levels while purple will equal adequate or excess nutrient levels.

See the phosphorous Olsen map below as an example.



By looking at the map by itself it would appear that a majority of the area is lacking in phosphorous. However, after looking at the color bar it is clear that the Phosphorus values are adequate for this field.



A color theme is applied to this map that tells the software any values 3 or below are bad (red) and 20 and above are good (purple) it is easy to visually see that the Soil P Olsen values are adequate in this field since it is all purple.

Nutrient Layers

Fixed Color Theme

Creating a Fixed Color Themes

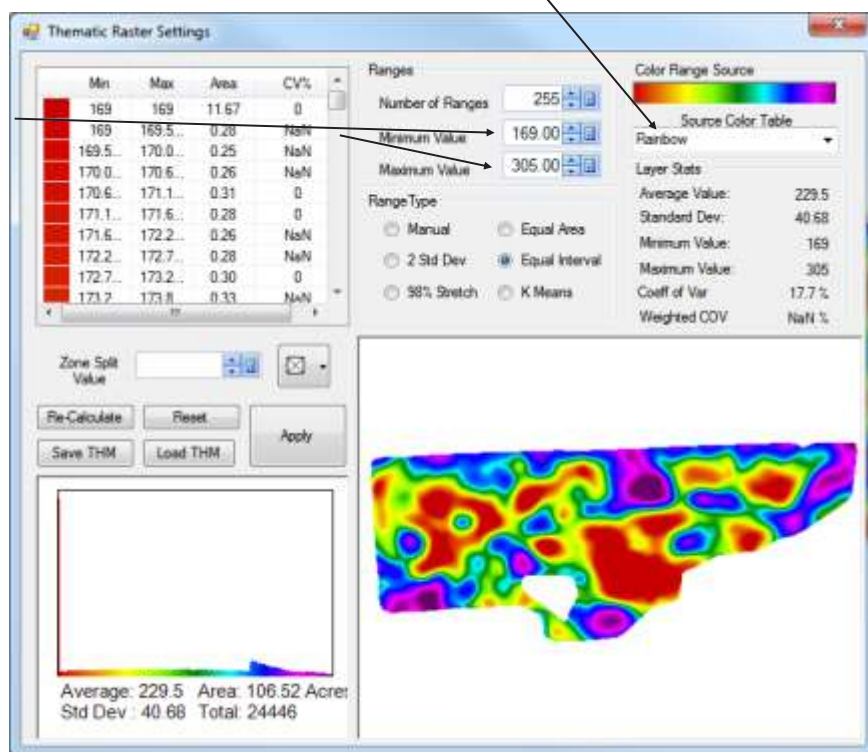
Before color themes can be used they first must be created. In order to create color themes to be used in ADMS you'll need a map to use as a template. For the following examples nutrient maps will be used.

1. Turn on the map that will be used for a template.
2. Open the Thematic Coloring on the bottom toolbar.



3. Once the "Thematic Raster Settings" window is open choose the color table that will be used as the base for the color theme from the "Source Color Table" dropdown menu.

4. Next look at the Minimum and Maximum Values. They will by default be the Min and Max values that exist on the map. To set the range for the color theme these values can be manually adjusted to skew the color table in one direction or another.



This example will use Soil K. We will say that anything 40 ppm or below will be lacking in nutrients and represented by the low end of the color table (Red). Likewise, anything 300 ppm or above will be represented by the high end value of the color table (Purple). Any values between 40-300 ppm will be scaled accordingly.

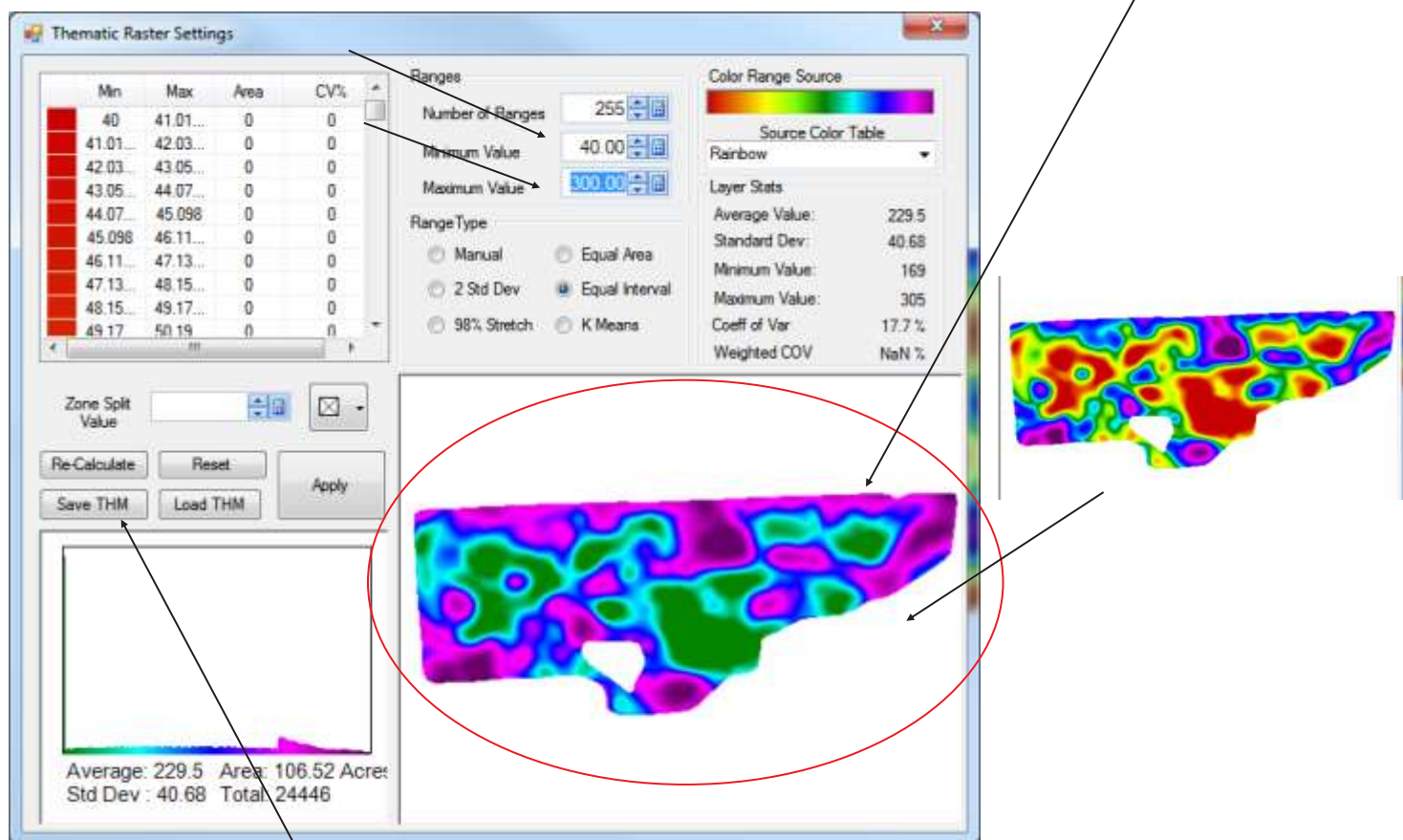
Nutrients	Low Val	High Val
P-Olsen	3	20
P-Bray	3	35
Nitrogen	1	150
Sulfur	5	80
Potassium	40	300
Zinc	0.2	2
pH	5	8
CEC	7	40
OM	1	6

Here are some common value ranges to consider using for different nutrients.

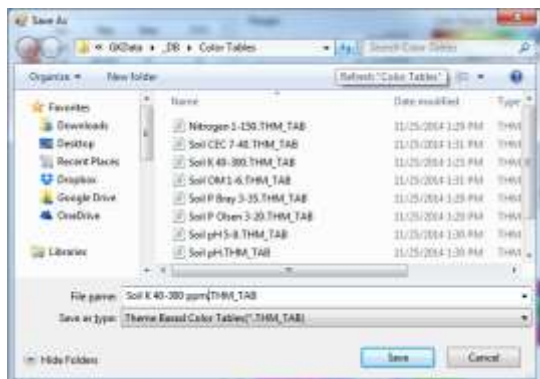
Nutrient Layers

Fixed Color Theme

5. In the area that says "Minimum Value" enter "40" and in the area that says "Maximum Value" enter "300."
6. In the preview window the color adjustments to the map will be visible. Since there is no values below 40 ppm there is no red in the map.



7. After the top and bottom end values are sent properly the theme will need to be saved. Click "Save THM."
8. Give the color table a name. We recommend including the value range used to have it for future reference. This will be stored in the _DB\Color Tables folder.



An example of name would be "Soil K 40-300 ppm." That way if there were multiple Soil K themes it will be easy to distinguish the differences. Since some nutrients may be reported with different units it is also a good idea to include them in the name.

9. Click "Save." Close out of the "Thematic Raster Settings" window. The color theme is now saved and can be applied to other maps. Repeat this process for additional nutrients.

Nutrient Layers

Fixed Color Theme

Applying Color Themes

Color themes can be applied easily two different ways. By using the "Load Fixed Thematic Table" button on the bottom toolbar, or through the common name mapping database when nutrient layers are created.

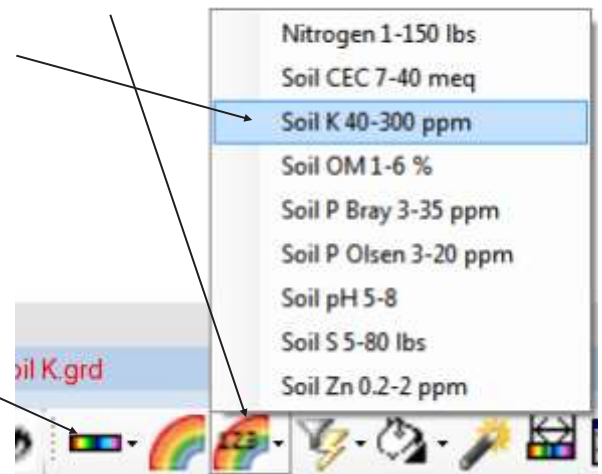
1) Load Fixed Thematic Table—Bottom Toolbar

To load a fixed color theme on any raster the button on the bottom toolbar can be used.

1. Make sure the desired map is the active layer (in red on the bottom of the map window).

Field: Delaware 10 NW106 Layer: Soil K.grd

2. Click the "Load Fixed Thematic Table" button. This will bring up a list of all the color themes that are currently saved.
3. Click on the theme you want applied to the active layer.
4. The theme will be applied.
5. To go back to the original color table use the "Change Color Theme" icon on the bottom toolbar and choose the original color table.



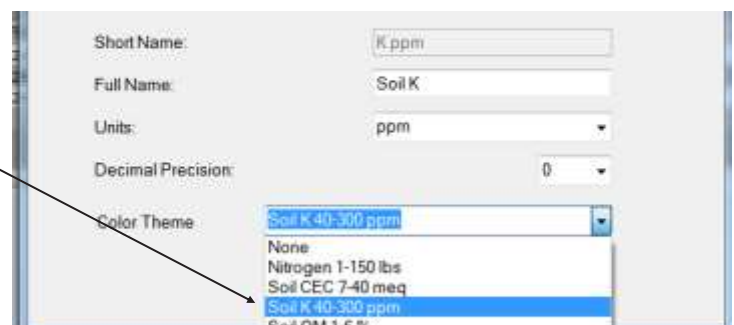
2) Load Fixed Thematic Table—Common Name Mapping Database

Color themes in the "Common Name Mapping" database will only get applied to layers created in the Merge Zone Results or Merge Grid Results windows.

When new layers are created off of a column heading that has not been used before the "Data For Column Name" window will appear. The entries in this window will get applied to the "Common Name Mapping" database and get applied to every layer created from that same column name.

To set a color theme Choose it from the "Color Theme" dropdown menu after all the other information has been entered.

These color themes can be changed in the future by editing the "Common Name Mapping" database.



Nutrient Layers

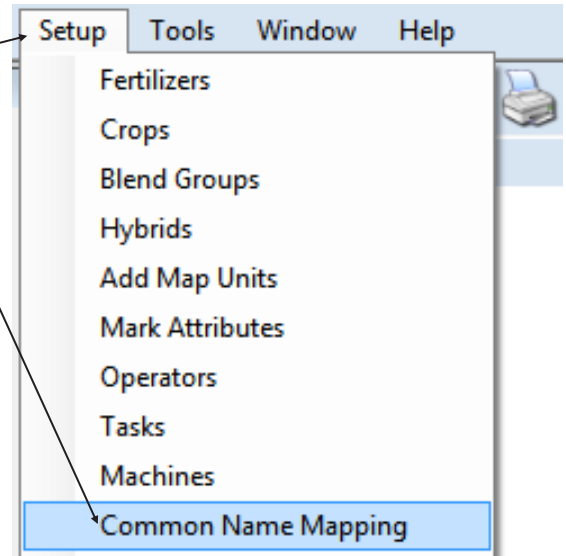
Fixed Color Theme

2) Load Fixed Thematic Table—Editing The Common Name Mapping Database

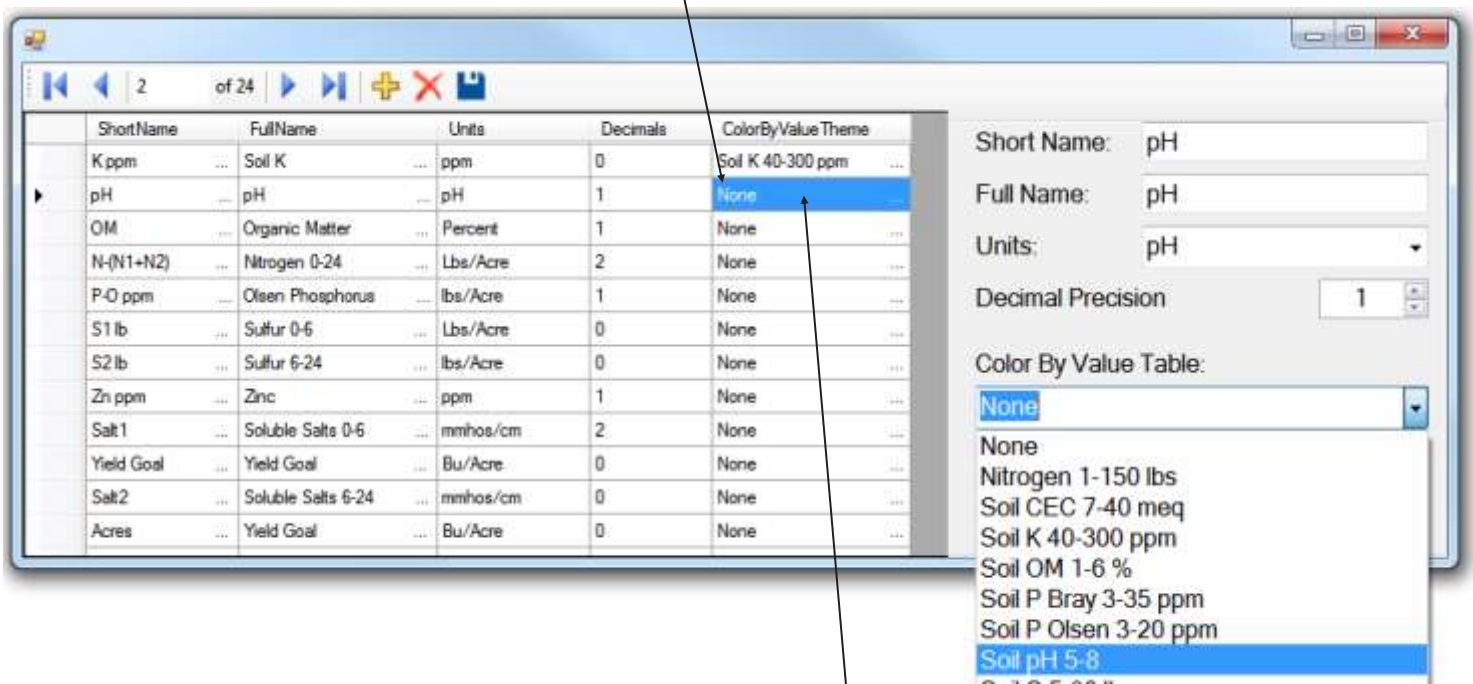
To open up the "Common Name Mapping" database go to Setup > Common Name Mapping at the top of the window.

This will open Common Name Mapping.

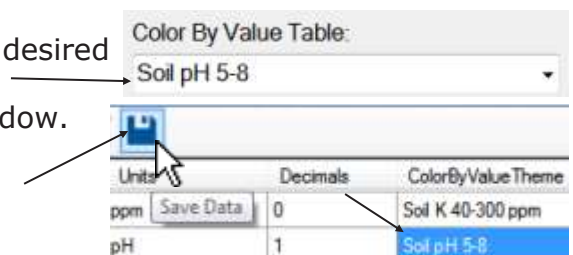
All previous entries can be edited and have a color theme applied, removed, or changed.



By default all default entries will be set to "None."



1. To change or edit an entry click in the ColorByValueTheme area for the name you wish to be changed. This example will be pH. After clicking on "None" by the pH entry the options or pH layers are populated on the right side of the window.
2. In the "Color By Value Table" dropdown menu choose the desired theme.
3. After the theme is chosen click "Save" at the top of the window.
4. Repeat for additional layers.
5. Exit out of the "Common Name Mapping" database.



Nutrient Layers

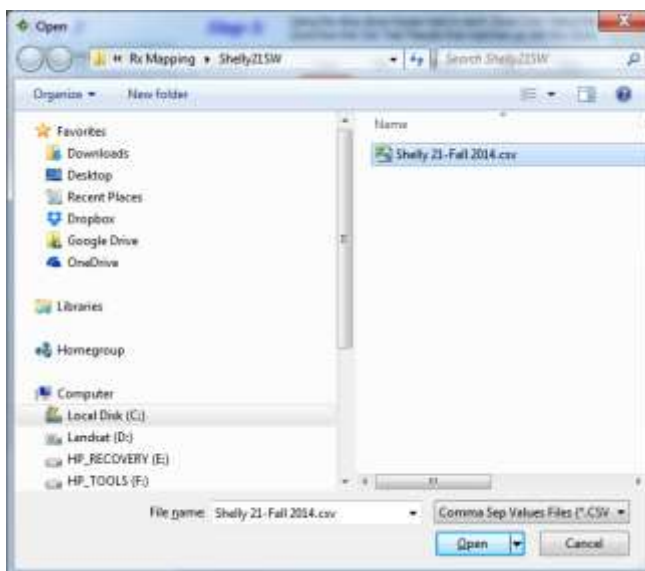
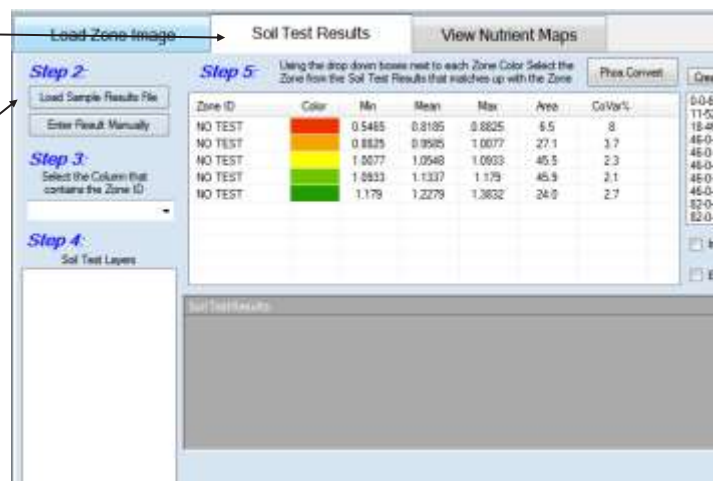
Using CSV / XLS Soil Test Results

1. Select the **Soil Test Results** tab on the top of your Nutrient Layers window.
2. Select the **Load Sample Results File** button.

A. These soil tests are normally exported from Agvisor Gold software as "Agvise with Recs" as CSV (Comma Separated Value). ADMS can accept files from other sources as long as they are in a .CSV format.

3. Locate the .CSV file and open it. (We recommend storing the soil test in the "Grower" "Farm" "Field" and "Year" when you import results).

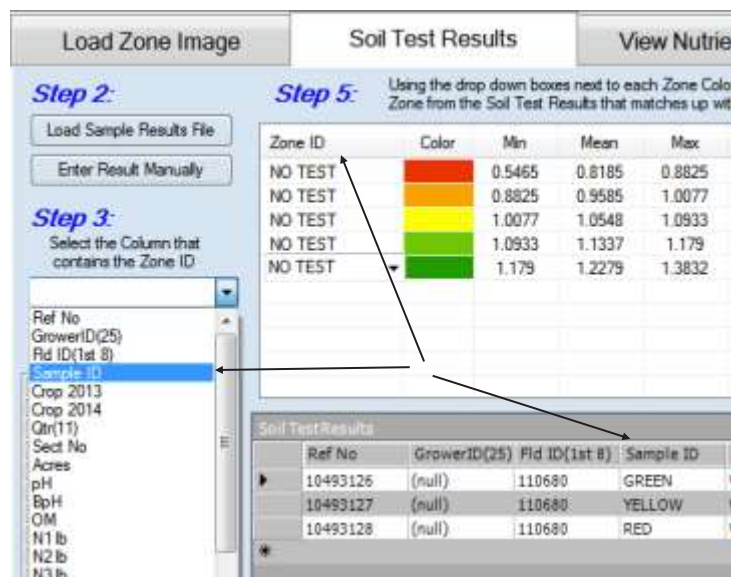
**Note: There is an option where to start browsing for soil sample results. Go to Tools > Settings > User Interface 2. At the bottom of the window there is the option to "Start Search Results in Field Folder." If this is checked windows explorer will open up to field location. If it is unchecked it will open to the last location.*



4. Step 3: **"Select the Column that contains the Zone ID"**, select the appropriate column to reflect the Zone ID - Color (usually "Sample ID").

NOTE: ADMS supports CSV / DBF / MDB / TXT / XLS files for this process.

At this time we DO NOT support XLSX files.



Nutrient Layers

Using CSV / XLS Soil Test Results—Phosphorous Conversion

Soil phosphorous values may be tested and reported in several different ways such as Olsen, Bray, and Mehlich 2 & 3. Due to variables like pH differences, some samples may be tested as one type and other samples tested as another. For example a high pH test may have an Olsen result where a lower pH may have a Bray result. ADMS cannot distinguish these differences. So there are some conversion tools to update columns that may have zeros in them, or create a new column if the phosphorous result needs to be a certain type for recommendations or scripts.

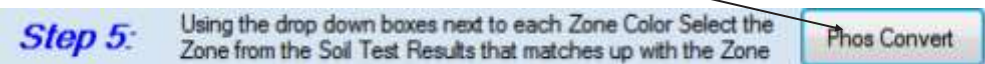
Updating Existing Columns

If there is a column that has only some values reported in it. It can be updated using the other Soil P column. For example these results have three zones reported as Olsen Values and only one zone reported as a Bray value.

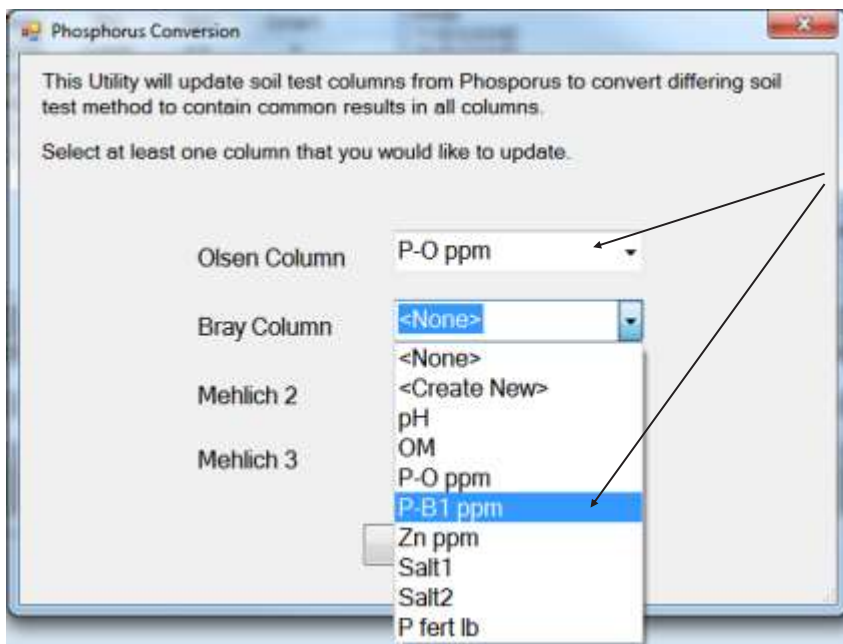
P-O ppm	P-B1 ppm
9	0
7	13.3
6	0

To report everything in P-B1 a conversion must be ran before the maps are created.

1. Click on the "Phos Convert" button.

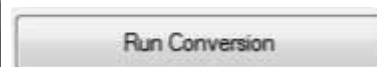


The "Phosphorous Conversion" window will appear.



If the columns have values in them they will show up as a dropdown option.

2. Choose the corresponding columns.
3. To update values two columns must be filled in. ADMS will use the values in one column to convert to the other value. In this example the Olsen values will be converted to Bray (P-B1).
4. After the dropdowns are filled in click "Run Conversion."



5. After clicking "Run Conversion" the missing values will be updated.

P-O ppm	P-B1 ppm
9	14
7	13
6	9

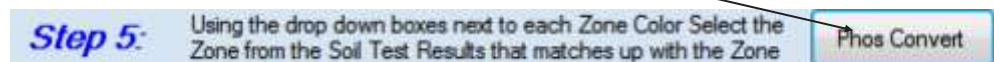
Nutrient Layers

Using CSV / XLS Soil Test Results—Phosphorous Conversion

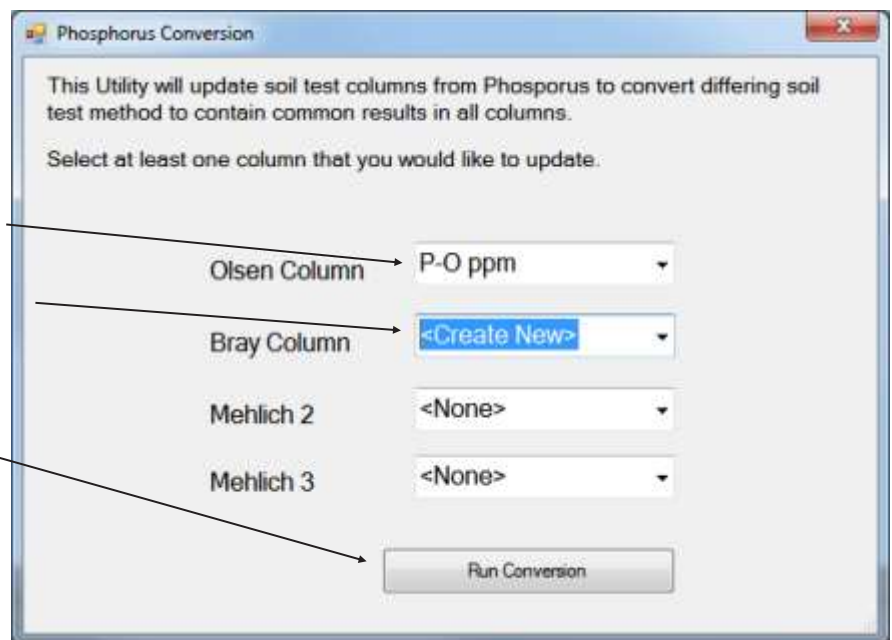
Creating New Columns

If soil test results are reported as one value, but they need to be converted for use in recommendations or scripts it can be done using the same tool. Instead of updating an existing column it will create a new one based on existing values.

1. Click on the "Phos Convert" button.



2. The "Phosphorous Conversion" window will open.
3. Select the existing Soil Phosphorous column from the dropdown.
4. Select "<Create New>" for the soil test value that needs to be converted.
5. Click "Run Conversion."



After the phosphorous conversion has run it will create a new column of the converted soil test values.

Nutrient layers can be built off of these the same as any other column.

☐ Zone2 Salt	
☒ PBray1Conv	

PBray1Conv
14
10
9

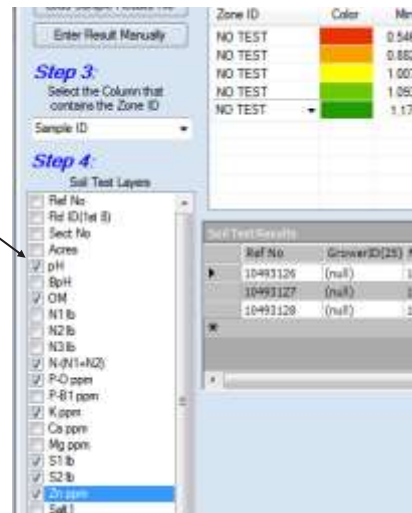
Nutrient Layers

Using CSV / XLS Soil Test Results

6. Select the **"Soil Test Layers"** you wish to create a Nutrient map for. This can be one layer for a single product application, or many layers for multi-product application.

7. Put a check mark in front of the products of the "Soil Test Layers" you would like to make maps for. By selecting the soil test results, you will produce a zone soil test map.

Table Columns in Agvisor Gold are in Lbs of N / P / K (not Urea / MAP or DAP / Potash) and will **need to be converted**.



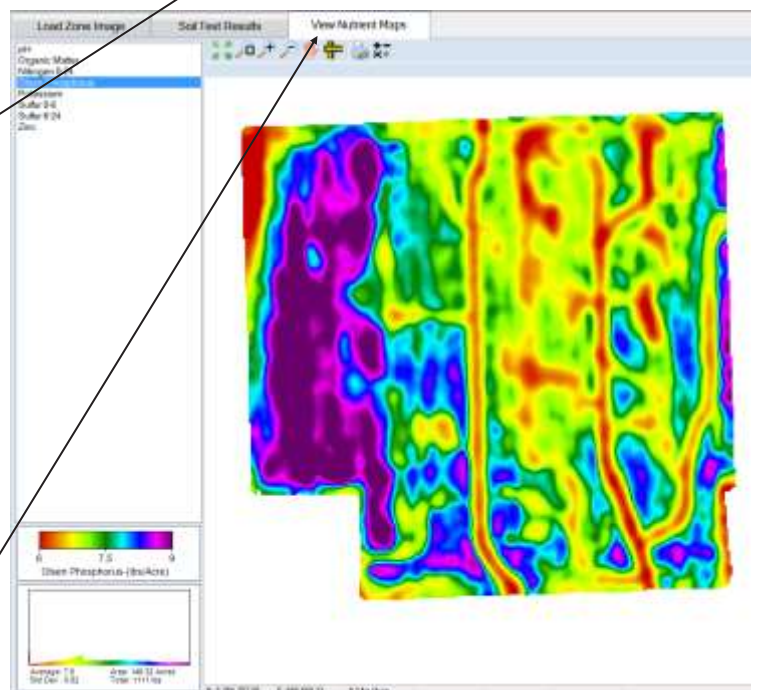
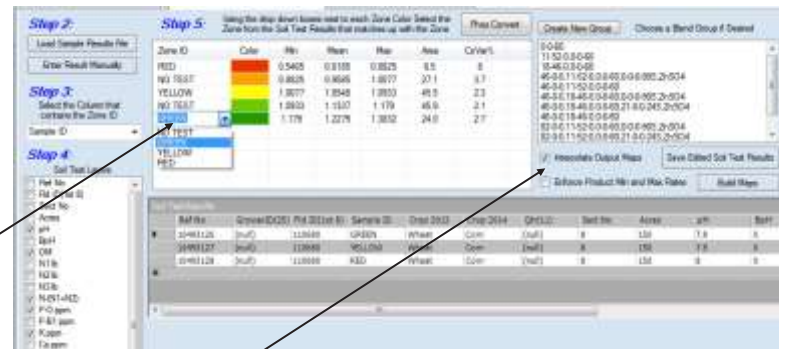
8. Use values as LBS of Nutrient and convert later using steps 11 -14, or change the values in the "Soil Test Results" table.

9. Choose which Soil Test should be associated with which color Zone, using the Pull-down menu for each color. With a 3 zone soil tests and a 5 zone map, **the remaining zones need to read "No Test"**.

10. With all these items selected, check **"Interpolate Output Maps"** and click **"Build Maps"**. (By NOT checking the "Interpolate" box, a 5 rate zone application map recommended for seeding maps is created).

11. If soil test results have been edited then they can be saved by clicking "Save Edited Soil Test Results".

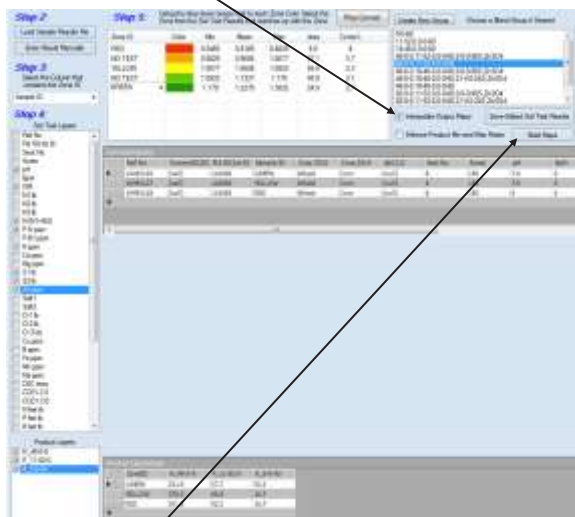
12. Choose the **"View Nutrient Maps"** tab, and view the Nutrient Map(s) created for each product.



Nutrient Layers

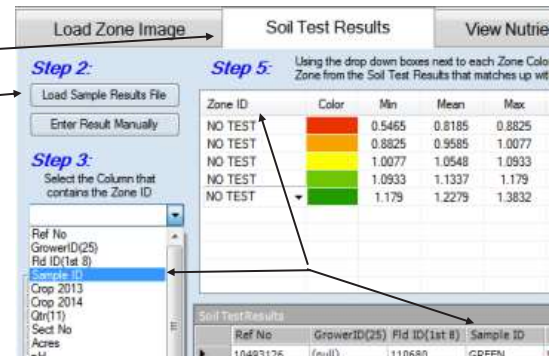
Using Blend Groups

1. Select the **"Soil Test Results"** tab on the top of the Nutrient Layers window.
2. Step 2: Select **"Load Sample Results File"**
 - a. These soil tests are normally exported from Advisor Gold software as "Prescription with Recs" as CSV (Comma Separated Value). We can accept files from many other formats also, CSV / DBF / MDB / TXT / XLS (not xlsx)
3. Step 3: **"Select the Column that contains the Zone ID"**, select the appropriate column to reflect the Zone ID - Color. (Usually "Sample ID").
4. Choose a Product Blend Group to use. If you do not see the desired Blend Group, you need to create one. **"Create New Group"**
5. Choose the preferred Product Blend Group. The Product Calculations Window at the bottom of the screen will show the amounts of each product that corresponds to the Zone ID's. **These values are in LBS of product Urea (46-0-0) not Nitrogen.**
6. Select the desired Product Layers.
7. With all these items selected, check **"Interpolate Output Maps"** and click



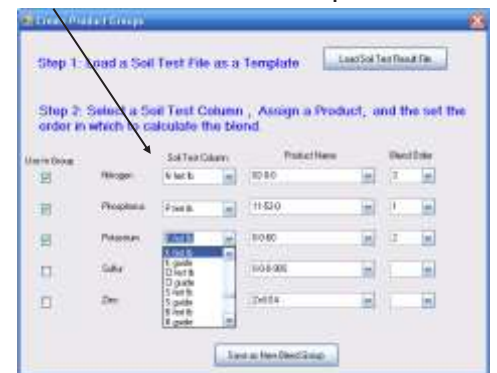
"Build Maps" (by NOT checking the "Interpolate" box, you will get a 5 rate zone application map recommended for seeding maps).

8. Select the **"View Nutrient Maps"** tab and confirm the maps have all the correct rates.



Create Blend Group

- a. Select the **"Create New Group"** button
- b. Select **"Load Soil Test Result File"**, and choose a soil test to use.
- c. Locate the Soil Test CSV (Comma Separated Value) file you're using for your soil test (this table layout and column names must be standard for all tests).
- d. On the **"Soil Test Column"** pull-down menus, choose the Soil Test Column from the soil test that you want to use with the given Nutrient.
- e. Check the boxes **"Use In Group"** for all the products you want and fill in the Dropdowns for that Nutrient.
- f. Select what order you want these products built. Ex. #1 (11-52-0) #2 (0-0-60) #3 (46-0-0) This will account for the Nitrogen coming from the 11-52-0 and subtract it from the 46-0-0.
- g. **"Save As New Blend Group"**



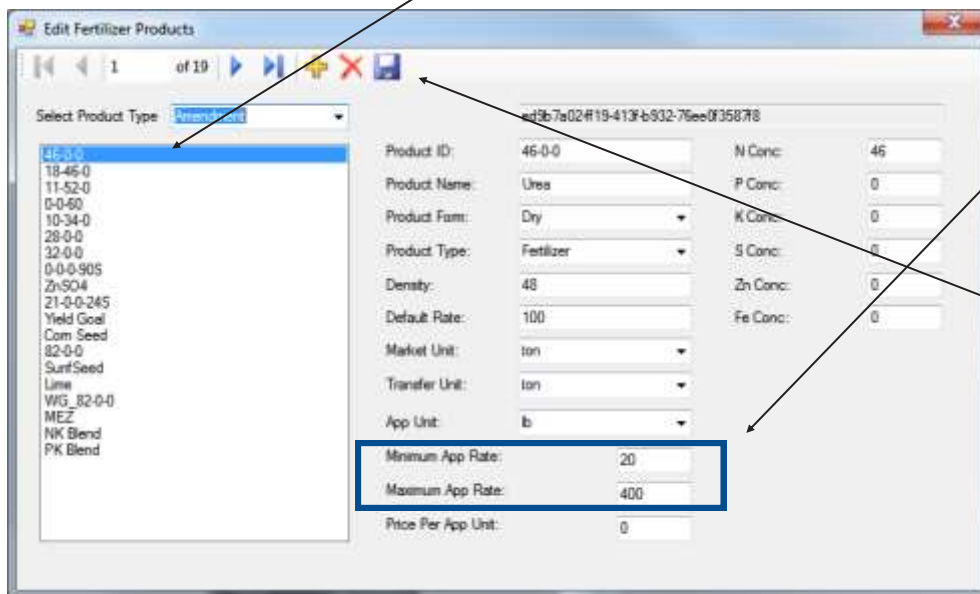
Nutrient Layers

Enforcing Min and Max Rates

There are times when product application maps may need an minimum or maximum rate enforced. This is easily accomplished through the "Merge Zone Results" window when the application maps are created. To utilize this tool there the values have to be assigned in the fertilizer product database.

Setting Up Min & Max Rates

1. Go to Setup > Fertilizers
2. This opens the database where fertilizer products can be added, removed, or edited.
3. On the left select the fertilizer product.



4. After the product is selected enter the Minimum and Maximum App Rate on the bottom of the window. These values will be enforced when the product maps are created.
5. When the desired rates are entered "Save Data" before moving on to the next product.



Applying Min & Max Rates

The min and max rates will be applied to maps created by entering results manually or using a blend group to create products.

Entering Results Manually

1. Click "Enter Results Manually" (**Step 2**) and enter the product rates.
2. Before building maps put a check mark in front of **"Enforce Product Min and Max Rates."**
3. Click **"Build Maps"** the values that were entered in the database will be applied to the product map.



Using a Blend Group

1. Follow the steps on creating nutrient maps from a blend group.
2. **BEFORE** clicking the blend group to create products put a check in front of **"Enforce Product Min and Max Rates."** If it is selected after the blend group the rates will not be applied to the products and the blend group will have to be reselected.
3. Click **"Build Maps."**

ZoneID	N_46-0-0	P_11-52-0	K_0-0-46
GREEN	231.3	57.7	33.3
YELLOW	276.3	60.6	29
RED	181.3	42.5	29

Minimum App Rate: 20

Nutrient Layers

Creating a "ModArea" or "Check Strip" & Editing Raster Values

1. Turn on the map that is to be modified. (i.e. NH3 or Urea VR map.)
2. Click on "Create New Layer From Template".
3. Select "ModArea" from the list (You may have fewer options).
4. Now you should have a new shapefile called "ModArea.shp" appear in your data tree. If you do not, click the "Refresh" button.



5. Now Check the "ModArea.shp" to turn it on & make it the Active Layer (**Shown here in RED**).

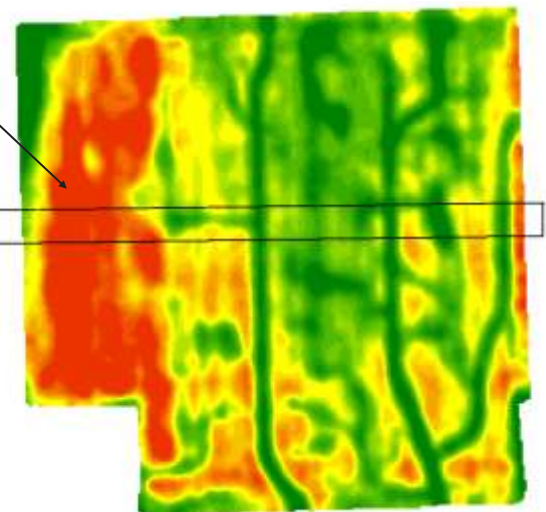
6. Now click on the **"SHP"** button on the bottom toolbar to start drawing the modification area. (Take note of the instructions at the top of the screen.)



7. Now draw your modified area. (Take note of the Length and Bearing to help with drawing.) To the right is an example of a check strip "ModArea".

8. Finished Drawing the ModArea. Go back to step 6 if you want to have more areas in the field. Repeat as needed.

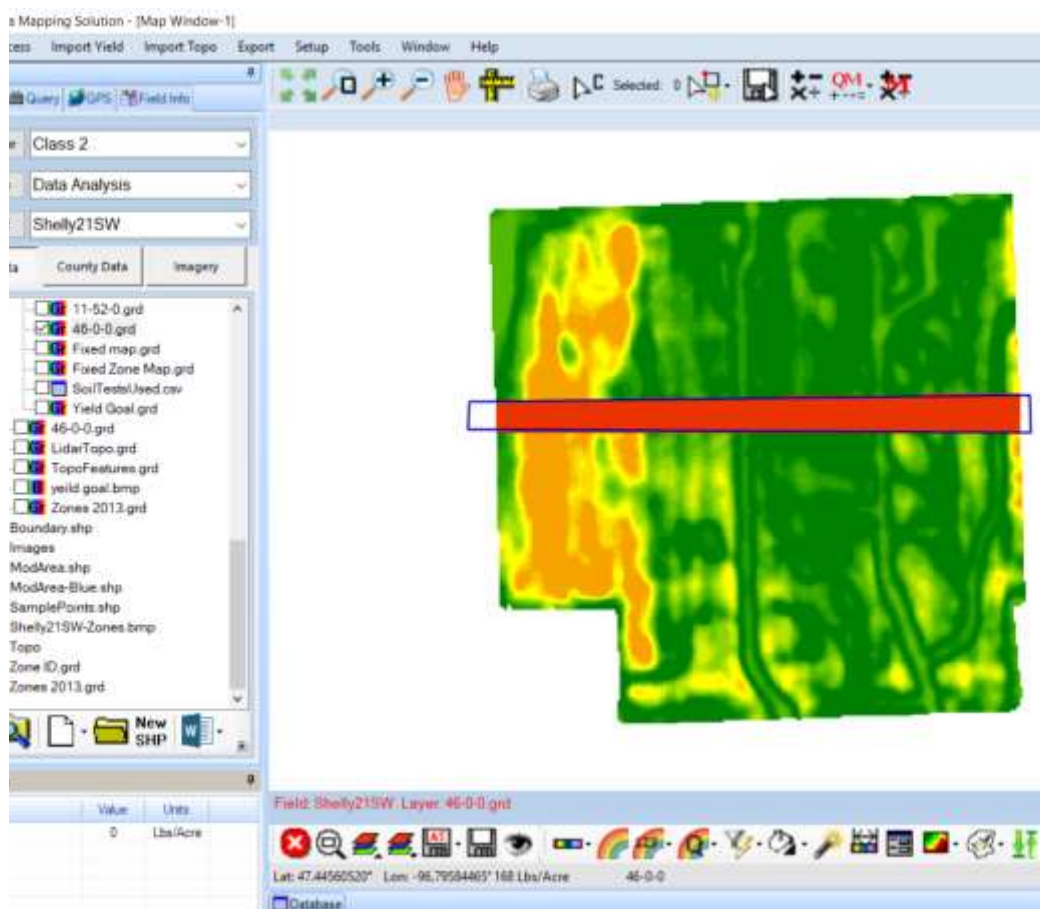
9. Click the "Save Changes" when finished.



Nutrient Layers

Creating a "ModArea" or "Check Strip" & Editing Raster Values

1. Make the "ModArea" the active layer
2. Select the "ModArea" objects you want to amend by "Left Clicking" in the object in the MAP WINDOW
(Hold the "Ctrl" key to choose multiple objects)
3. Turn on your Surface Map to amend (Ex. 46-0-0.grd)
4. From the bottom tool bar, click on "Apply Mod to Selected Polygon" 
5. "Modify Pixels Under Drawn Area" Window will open. Now assign a value or add / subtract / multiply / divide the pixels in the ModArea.
6. Click the "Save Changes" when finished (you may want to do a "Save As" & Re-name if you want to keep the original object)



Creating a Yield Goal Map

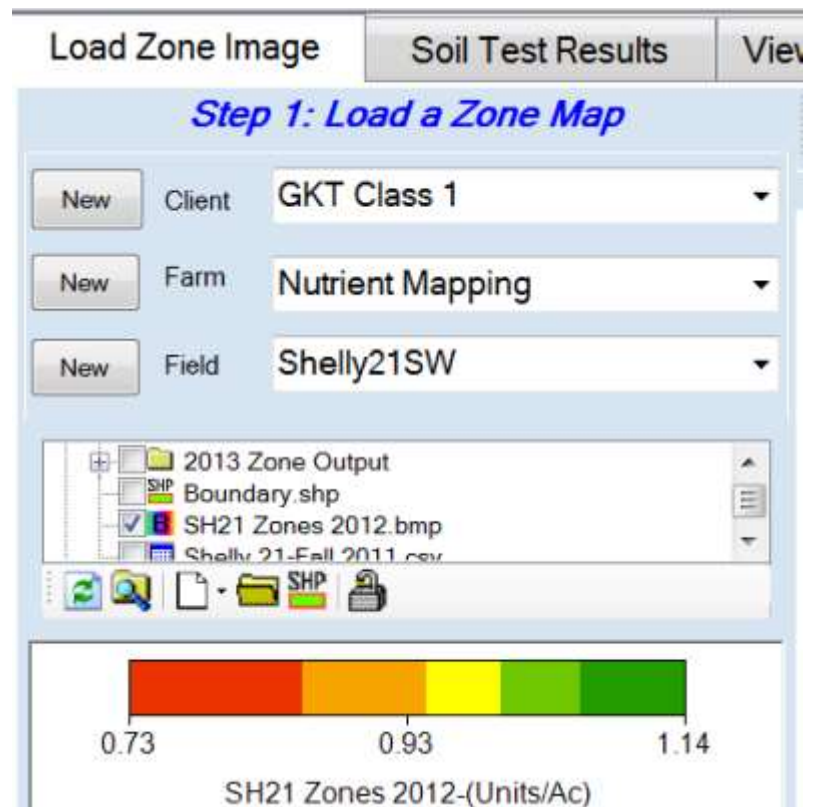
Yield Goals in Merge Zone Results

1. Go into the "Merge Zone Results" Window



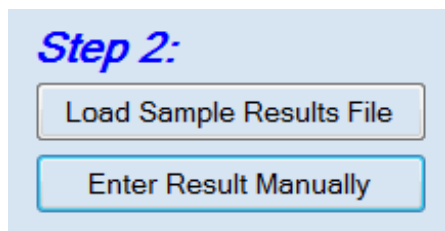
2. Select the zone map you are using

3. Go to "Soil Test Results" tab

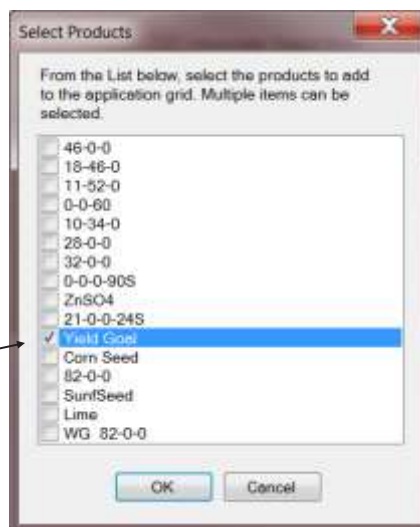


Creating a Yield Goal Map

4. Select "Enter Result Manually" at Step 2:



5. Choose "Yield Goals" & Click "OK"



6. Assign yield values to each of the zones.

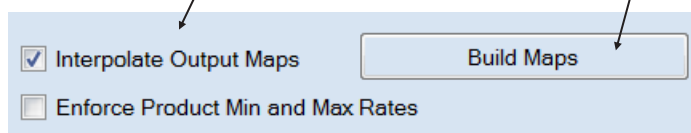
7. Type in the yield value in the Yield Goal column under "Soil Test Results" to correspond with the correct Zone ID and color.

Step 5: Using the drop down boxes next to each Zone Color Select the Zone from the Soil Test Results that matches up with the Zone

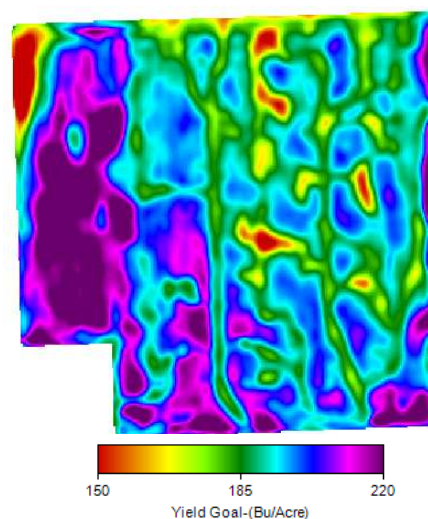
Zone ID	Color	Min	Mean	Max	Area	CoVar%
1	Red	0.733	0.813	0.857	3.9	4.2
2	Orange	0.857	0.916	0.947	22.6	2.6
3	Yellow	0.947	0.978	1.001	46.7	1.5
4	Light Green	1.001	1.027	1.058	49.7	1.6
5	Dark Green	1.058	1.083	1.135	27.0	1.5

Zone ID	Yield Goal
1	150
2	180
3	190
4	200
5	220

8. Select Interpolate Output Maps then the "Build Maps" button



9. Go to the "View Nutrients Maps" tab to see your Yield Goals.grd maps



My Notes

Quick Notes For Grid Sampling

1. Setting Up a Grid



1. Go to "Map Window" or "Log and Sample"
2. Select the field from desired grower, farm, and field.
3. Turn on field boundary and any desired background map (County NAIP)
4. Go to GPS mark in the top right hand corner of Layer Selection
5. Select Grid
6. Select your field boundary from the "Bound the Grid to this Layer" dropdown.
7. Select the desired X and Y dimensions of the field grids. Click **"Apply"**
8. Check on the show grid box
9. Align the grid over the field using the up, down, side, to side arrows

☐ Show Grid

10. Rotate the grid if needed by typing in a number or using the arrows in the rotate grid box



11. Check Save Grid & Save Points

12. Click Save Layers and select the location to save them to and the desired name

0.0

13. By default the grid and grid points will be stored under your field data folder for the field you are working

- ☒ Save Points
☒ Save Grid

Save Layers

2. Merging Soil Test Results



1. Go to Merge Grid Results section on main screen, or go to the top and select process => Merge Grid Results
2. Locate the field from the grower, farm, field and select the sample points and the boundary of the field
3. Go to the Soil Test Results tab on the top middle of the screen.
4. **Step 2:** Click load sample results file button and search for your *.xls or *.csv file containing test results
5. **Step 3:** Assign the appropriate columns for the Sample ID on your Samples and Sample ID on the test results
6. **Step 4:** Check which layers you want to build maps for, columns containing any null values will not work (can replace these with zero values so they will merge)
7. Click Merge Tables, the test results should merge with the grid Sample ID file
8. You can now choose to build your maps with Surfer Kriging or Inverse Distance which is default (Kriging smooth's the maps out and requires demo of Surfer 8 installed on your PC)
9. Click the Build Maps button
10. Click on the View Nutrient Maps tab to preview the created nutrient maps
11. Your nutrient maps will be automatically stored under a Grid Sample Folder under "Field Data" with the year of the growing season (set in settings/user interface 2) in front of it.

Soil Test Results

Merge Tables

Build Maps

3. Writing a Prescription Using Scripting

1. Go to "Field Data", check on all of the layers you will be using in the script. Click on the "Map Math" button on the top toolbar.
2. Open the desired script you want to use
3. Assign all the selected nutrient layers in the scripting window => Compile Script => Run Script
4. Click the output layers and "Save As." => Rename as the created product. => Repeat Steps for all products.



Grid Sampling—Setting Up A Grid

In this section, we will discuss grid sampling. We will explain how to lay out your grid, take the samples, create nutrient maps, set yield goals, and combine them all to create your prescription.

Creating a Boundary

- Refer to the section in the book—**Drawing Layers (Shapefiles—Vector Data-Polygons, Lines & Points)**
- You can create a boundary with GPS in field (recommended), hand draw it, or from a CLU FSA file

Setting Up a Grid

- You can do this in the "Log and Sample" Window or "Map Window."

Window or "Map Window."

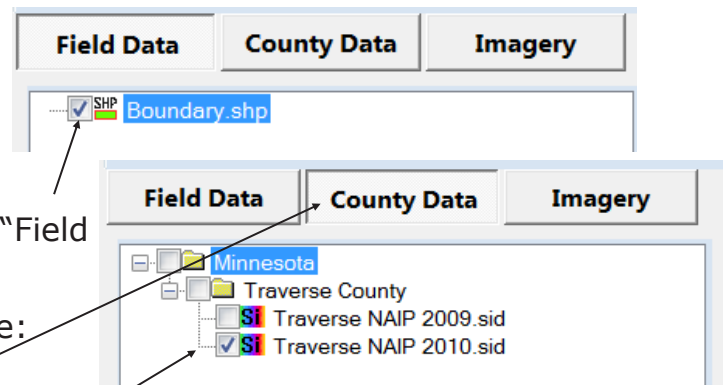
1. Check the boundary of the field under "Field Data"

2. If you wish to have a background image:

- Go to your "County Data" tab
- Check a NAIP Image for the county you are working in

***If the boundary is selected first, it will zoom to the field**

3. Once you have the boundary and background images both selected, go to the "GPS Mark" button on the top right of the layer selection options.



4. Next, select the "Grid" button



Grid Sampling—Setting Up A Grid

5. From the drop down menu select your boundary which was turned on. Click "Apply"

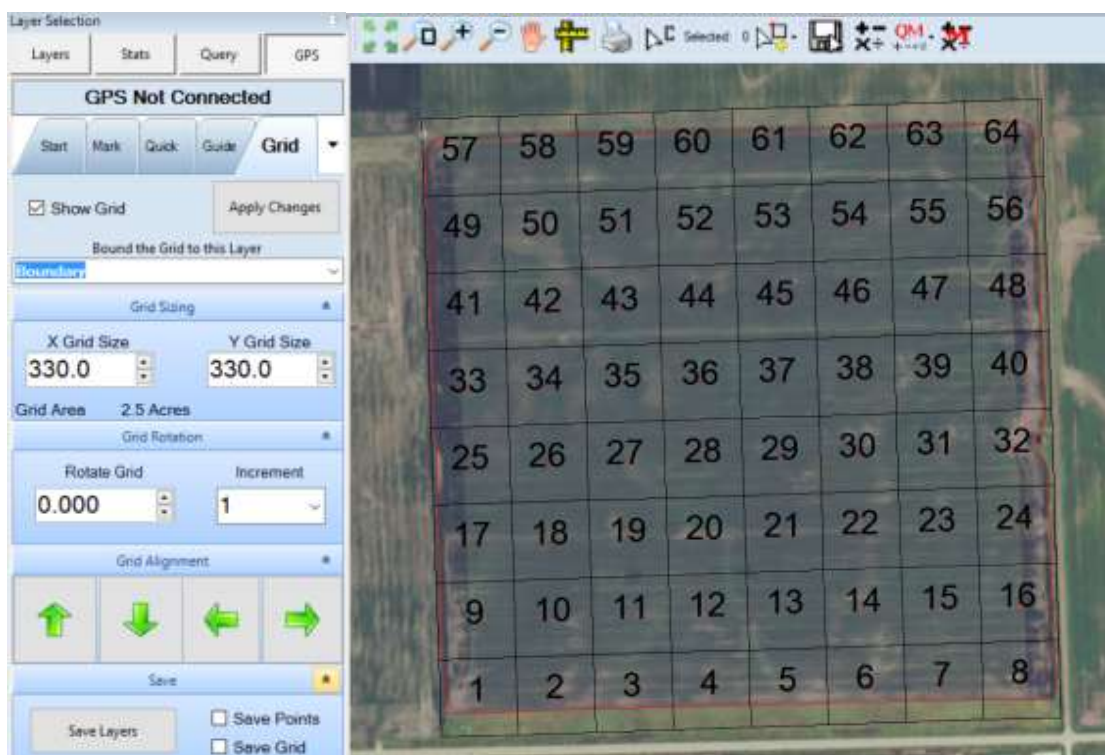
Apply



6. Check the "Show Grid" Box



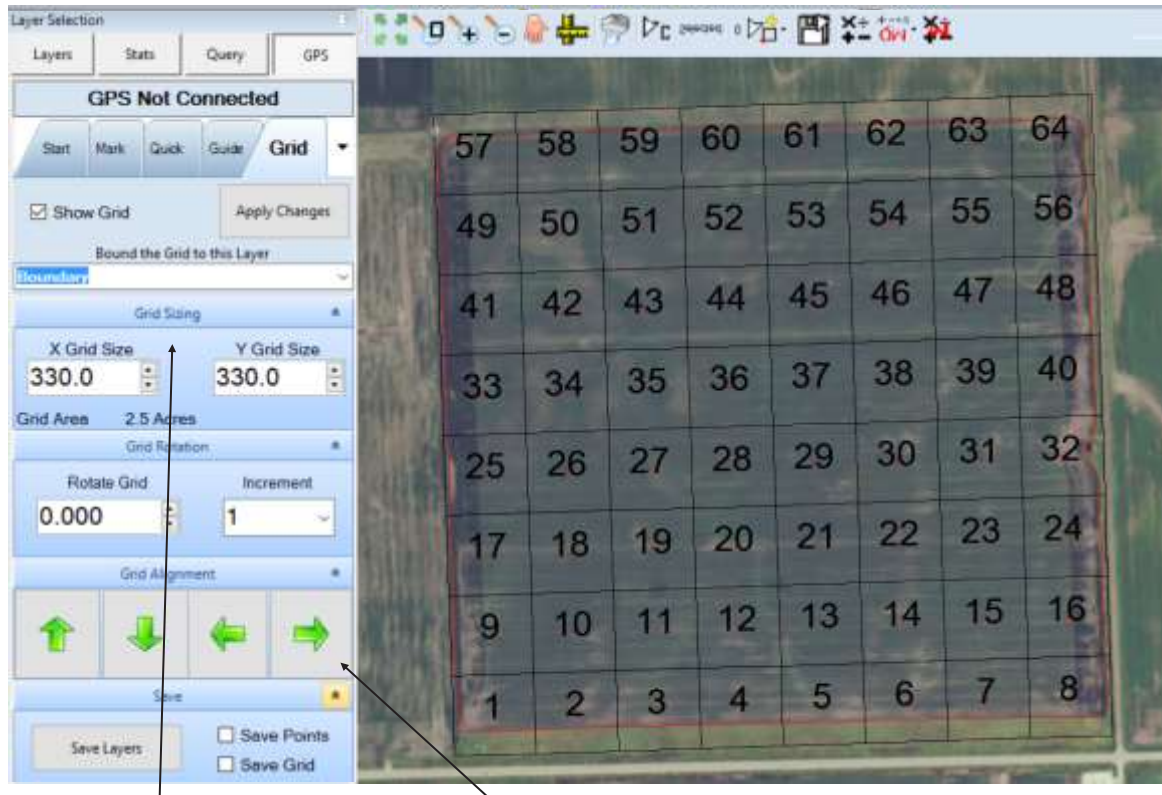
Your screen should now look similar to the image below. The grid size will be defaulted to 330 X 330. From here you can adjust grid alignment, rotation, size, and save your grid and points.



Grid Sampling—Setting Up A Grid

Adjusting Grid

Using the options below, you can adjust the alignment size, and rotation of the grid.



Adjusting Size

- You can adjust the size of your grid by inputting your desired X and Y lengths in the boxes. This can be done by using your keyboard, or using the number pad that appears when you click on the "1 2 3."

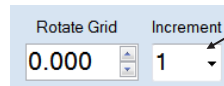


Common Grid Sizes

1 Acres	208.7 X 208.7
2.5 Acres	330 X 330
4.5 Acres	442.7 X 442.7
5 Acres	466.7 X 466.7

Adjusting Rotation and Alignment

- The alignment (Up & Down, Side To Side) can be adjusted by using the arrows until you are satisfied with the alignment of the grid.
- The grid can also be rotated. To do this, you can use the up & down arrows on the "Rotate Grid" box or you can enter a value with your keyboard.



Increment—Allows for smaller movements of the grid rotation as 1, 0.1, or 0.01

Grid Sampling—Setting Up A Grid

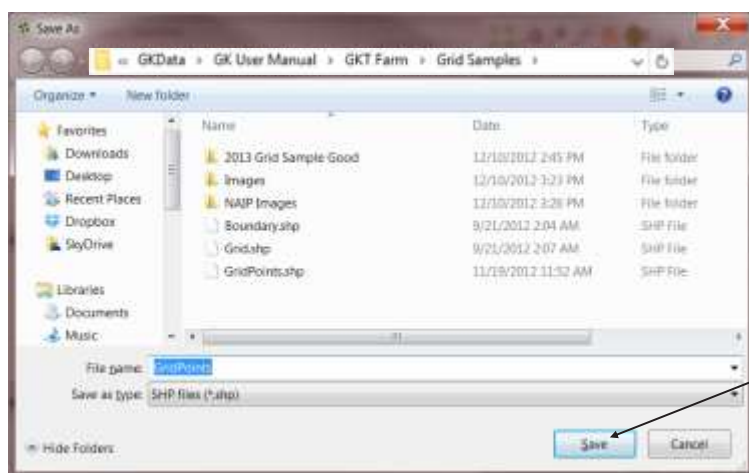
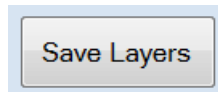


Saving Your Grid

- When the grid is in the ideal position
- Click "Save Layers"

Save the Points & Grids

1. Check "Save Points" & "Save Grid"
2. Once they are checked on, click "Save Layers."

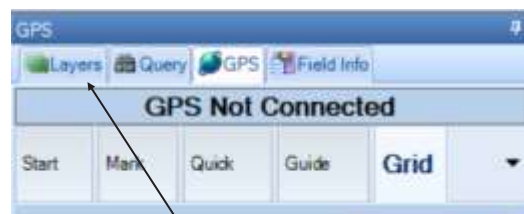
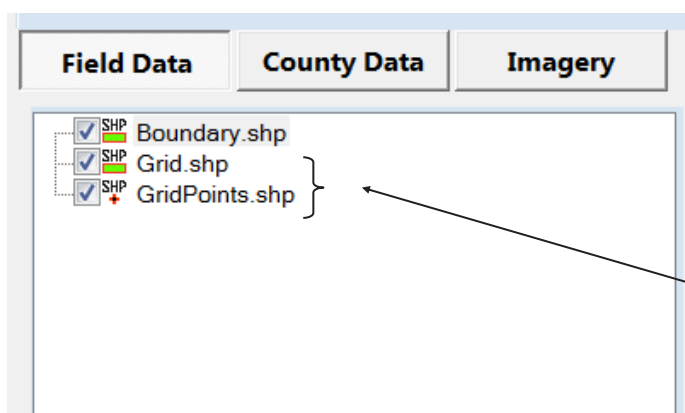


3. Choose the location of where you want to save the layers and their names

**It will be defaulted to your "Field Data" for that field and saved as Grid & GridPoints*

4. Click "Save."

5. Uncheck "Show Grid."



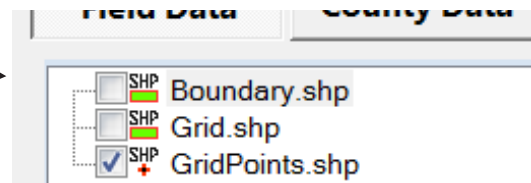
- Go back to the "Layers" tab
- Grid Points & Grid Polygons should now be located under your "Field Data" tab.

Grid Sampling—Labeling The Grid

Labeling Grid Points

- You can now choose which label your grid points have when you are out in the field sampling.

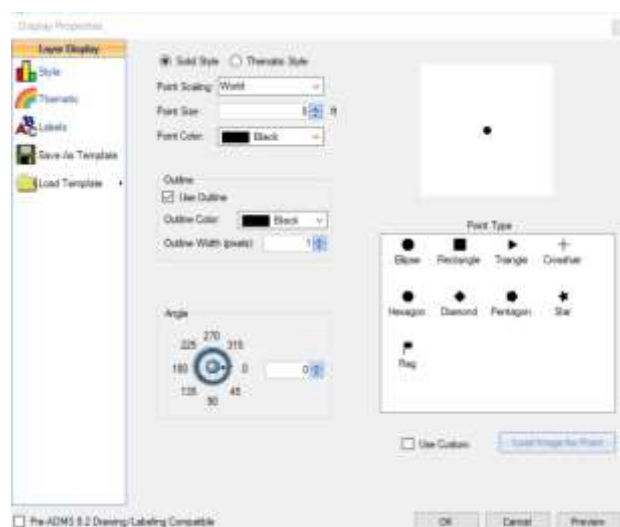
1. Check "GridPoints"
2. Select the "Layer Display Properties" option below the map window



**Note: make sure your grid points is your active layer*

3. The Layer Display Properties box should come up
4. Select Scaling, Point Size and Point Color
 - ⇒ Fixed Sizing—Always equals that pixel size
 - ⇒ World Sizing—Size changes when you zoom in and out
5. You can also select:

⇒ **Point type**



Changing Label Style

You can also change the size and color you wish the labels to appear

Field: Field 1 Layer: Grid Points.shp

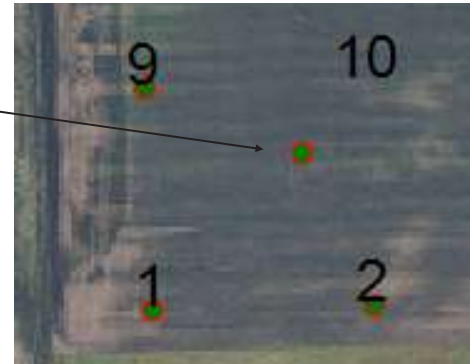
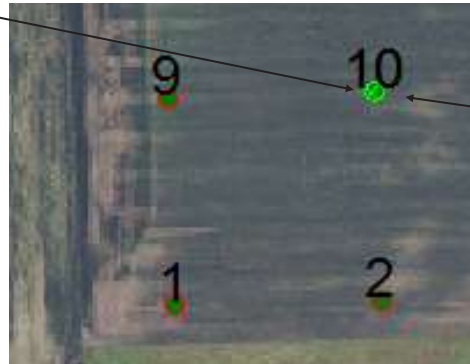
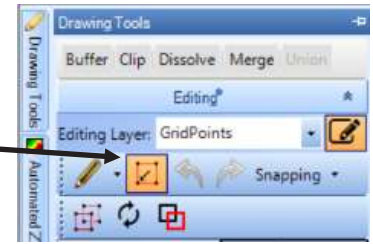
1. Make sure your active layer is the grid points.
2. Select "Layer Display Properties" on the bottom toolbar
3. Label Expression tab, select column to display
4. Label Appearance Tab size and color for label
5. Label Placement Tab for location of label in relation to point.

⇒ Refer to "Layer Display Properties" section of manual for full description

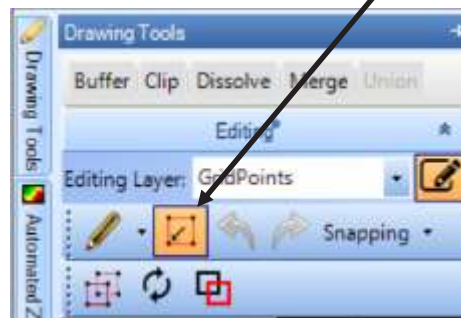


Grid Sampling—Moving Grid Points

1. Open the "Drawing Tools" tab, Select the Layer to be edited
2. Click on "Edit Vertices".
3. Hover over the point. The cursor should change to a four directional arrow.
4. Click, Hold & Drag on the point you wish to move and drag it to the new desired location and release.



5. When done, make sure you **de-select** by clicking on the "Edit Vertices" tool.



6. If the point is in the desired location, make sure you save the layer.

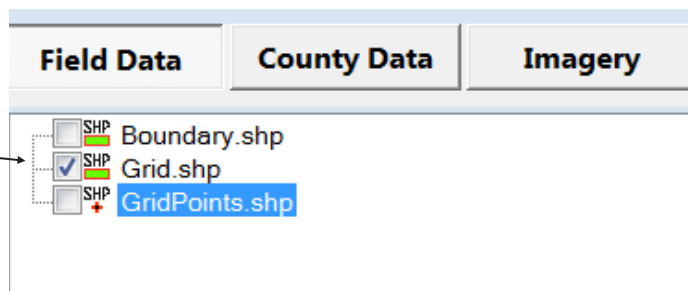


Grid Sampling—Creating Custom Grid Points

Creating a Custom Grid

If you have followed the previous steps, you will have a grid polygon file that shows the grid squares. This is the file we will be using for this portion of creating a custom grid. If you have not done this, go back and follow the instructions on how to create the grid polygon file.

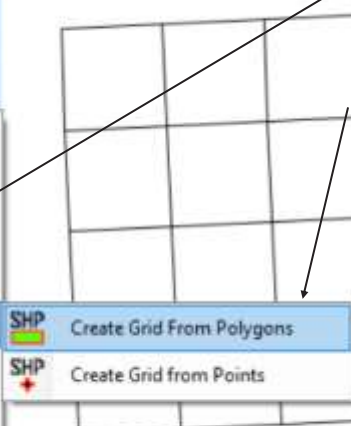
1. Check the grid polygon shape file under "Field Data."



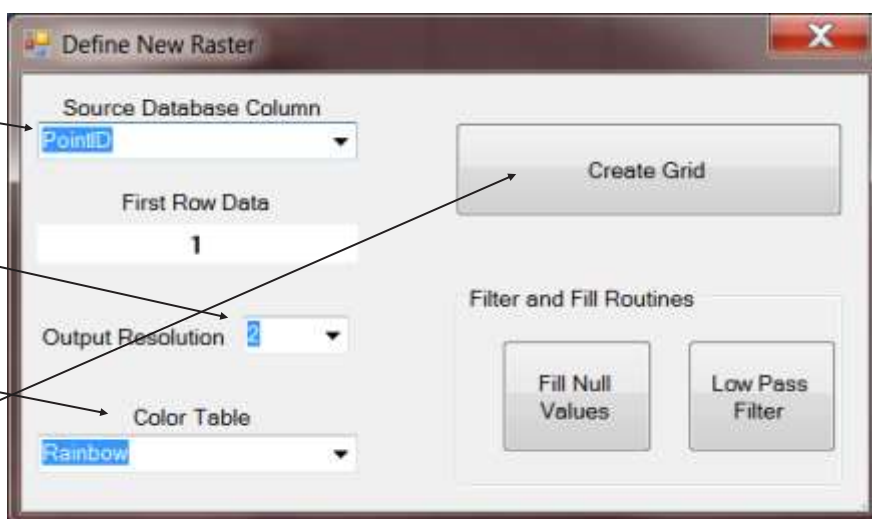
2. Right Click on the File



3. Go to "Create Grid"
4. Select "Create Grid From Polygons"



5. Select PointID in the "Source Database Column"
6. Select the output resolution
7. "2" Meters (recommended)
8. Choose a "Color Table" . (Example—Rainbow)
9. Click the "Create Grid" Button



Grid Sampling—Creating Custom Grid Points

The information below will be used to create new layers when data with this short name is used to create data in the future.

It will help to provide consistent naming of output layers.

Short Name:

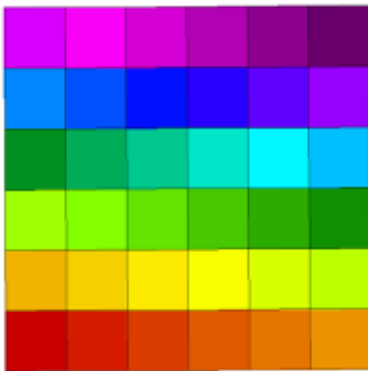
Full Name:

Units:

Decimal Precision:

Color Theme:

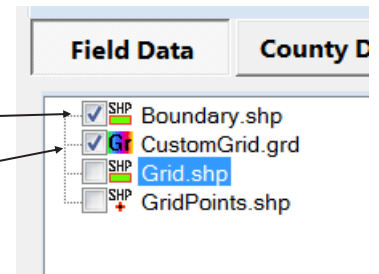
- Your grids should now be colored and look similar to this



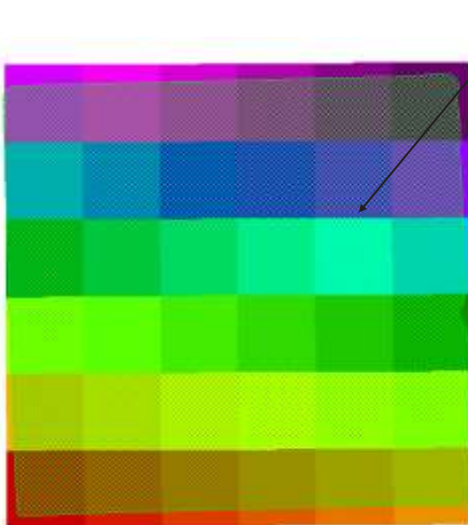
Cropping to Field Boundary

To make sure your points will be within the field, crop this layer to your field boundary.

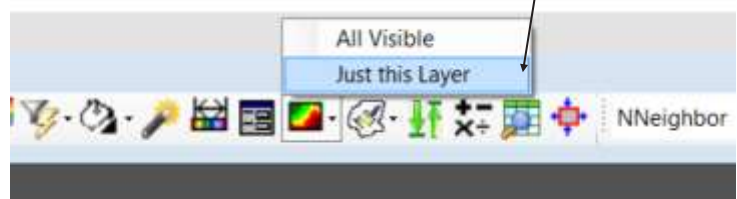
1. Click "Clear Map" 
2. Check the boundary under "Field Data"
3. Check CustomGrid.grd file



4. Make the boundary your **active layer** Field: Field 3 Layer: Boundary.shp
5. Click inside the boundary in the Map Window so it is selected (it will have green hatching on it)

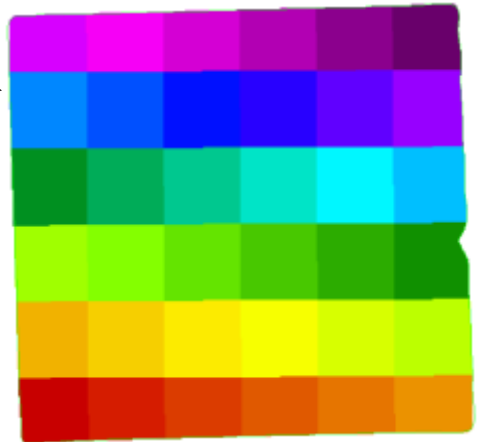


6. Make your colored grids (*.grd file) your **active layer**
7. On the bottom toolbar, select "Crop Raster to Selected Polygon" Click on "Just this Layer" 



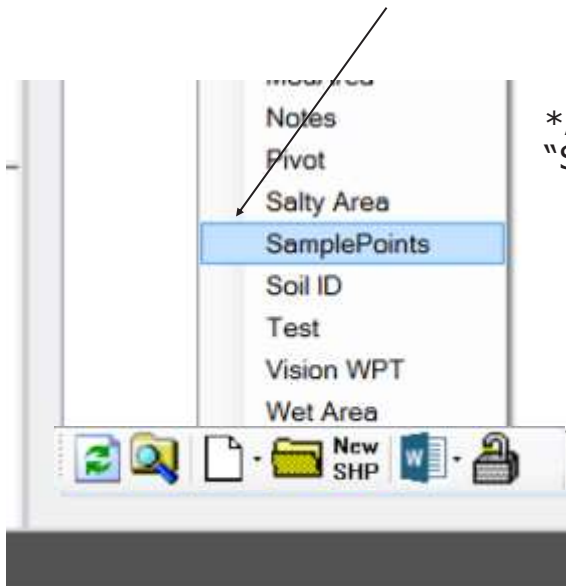
Grid Sampling—Creating Custom Grid Points

8. Click "Save" on the bottom toolbar 
9. Your image should now be cropped to the field boundary 



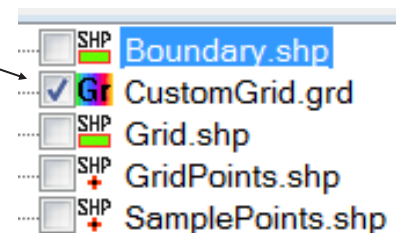
Creating Your Sample Points

1. Click "Clear Map" 
2. Under "Templates"  on the bottom of layer selection, choose "Sample Points"

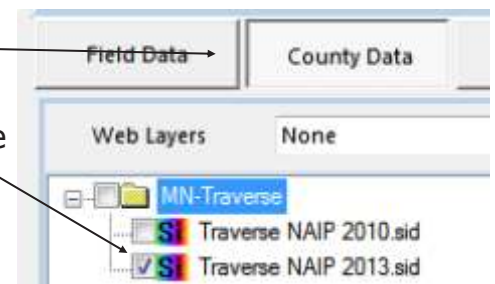


*A new Point Shape File will be created labeled "SamplePoints"

3. Make your colored grid image (*.grd file) your **active layer**.



4. Go to the "County Data" button and check on a NAIP image that represents the field you are working on. This will allow you to have a visual image when you are deciding where to drop the new points.



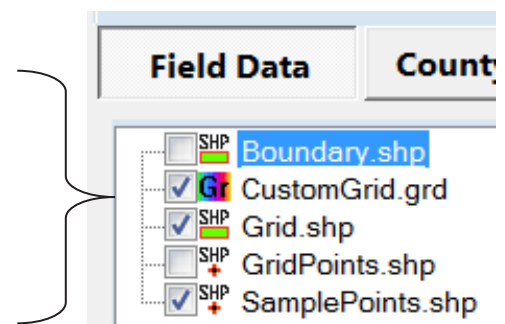
5. Go back to the "Field Data" button.

6. Check on the Grid.shp file

7. Check on the SamplePoints.shp file

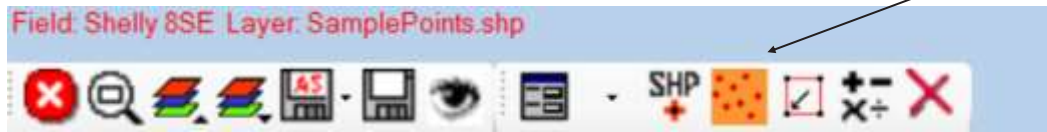
(nothing will appear when SamplePoints.shp is checked on)

This allows you to make a custom grid while remaining in the selected grid size



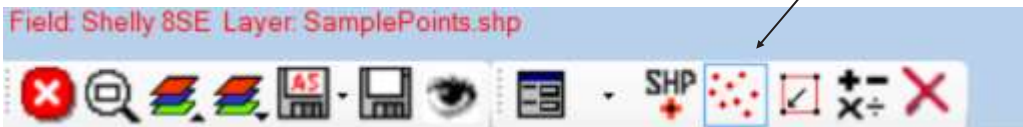
Grid Sampling—Creating Custom Grid Points

8. With "SamplePoints.shp" as your new active layer, select the "Multi Point Draw Tool" on the bottom toolbar below your map window.



9. Click in the grids in the order in which you would like them sampled. (Start at the first one and go to the last one)

10. When you are finished, de-select the "Multi Point Draw Tool". Your new points will automatically save.



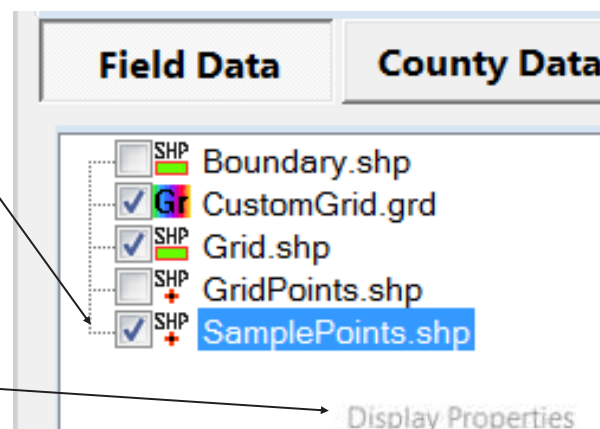
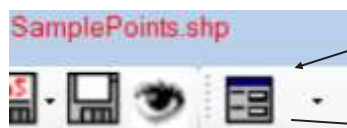
11. You now should have your custom points that look similar to the image below.



Grid Sampling—Creating Custom Grid Points

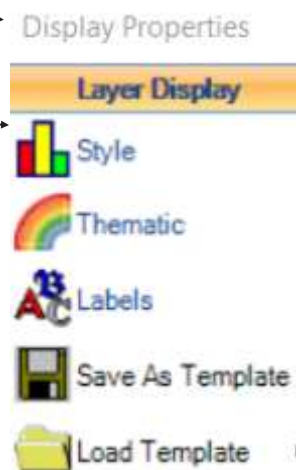
Sizing & Labeling Sample Points

1. Select the sample points file under "Field Data"
2. On the bottom toolbar below the map window, select "Display Properties" Button



Layer Display

1. Go to "Style" button
2. Select your Line or Point Color and Fill color
3. Choose the size of the points
 - Fixed Sizing—Stays the same size (3 pixels recommended)
 - World sizing changes when you zoom in and out (15 to 30 feet recommended)



4. Click "**Preview**"

5. Go to "Labels" button

- a. Label Expression Tab - Select "GKT_IDX" from list
- b. Label Appearance Tab - Set Pixel Scale to 12 pt
- c. Label Placement Tab - TopCenter

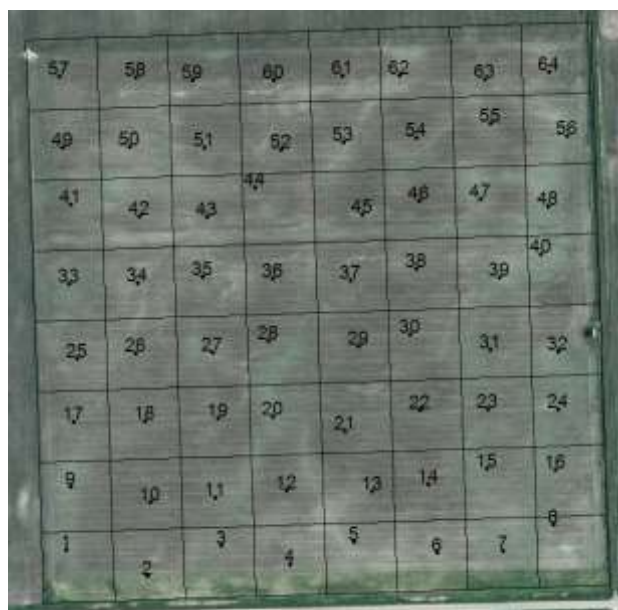


6. Click "**Preview**"

7. If Good—Suggest "Save as Template"

8. Click "**OK**"

- **In the Future—Use the "Template Button" on bottom toolbar.**
- **You will now have a custom grid to go sample with.**
- **See "Using GPS Controls" for in-field GPS use.**

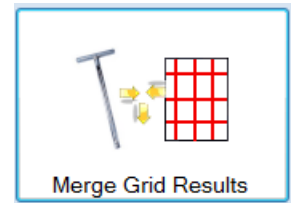


Grid Sampling—Creating Nutrient Layers

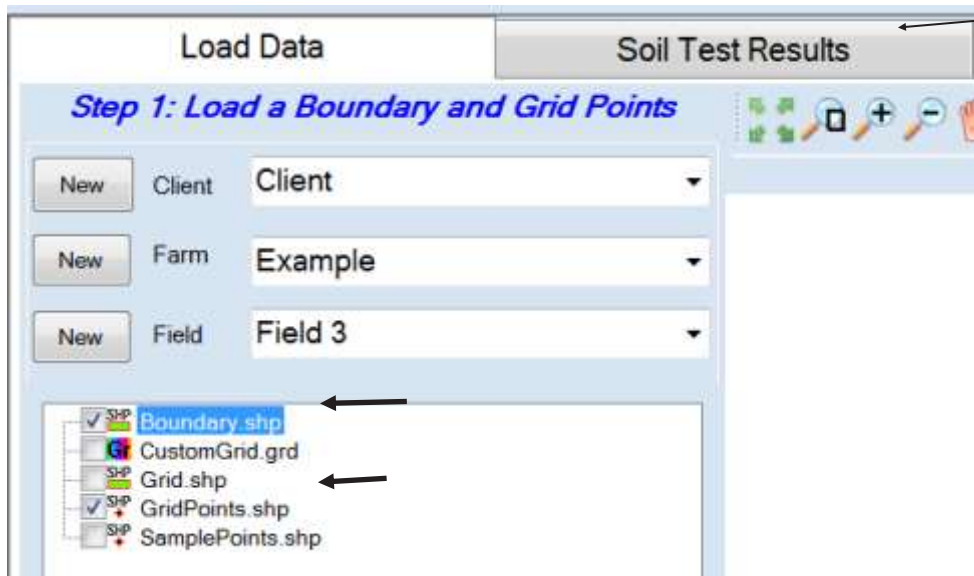
Creating Nutrient Layers

Once you get your soil test results back from the lab, you can now use them to create nutrient maps of the field.

- *This is going to be done in the "Merge Grid Results" window.*



1. Once you are inside the "Merge Grid Results" window, select the appropriate "Grower" "Farm" "Field"
2. Select the grid points and boundary files that are associated with the field



3. When the Grid Points are your active layer, switch to the Soil Test Results tab on the top of the screen.

4. Click the "Load Sample Results File" button

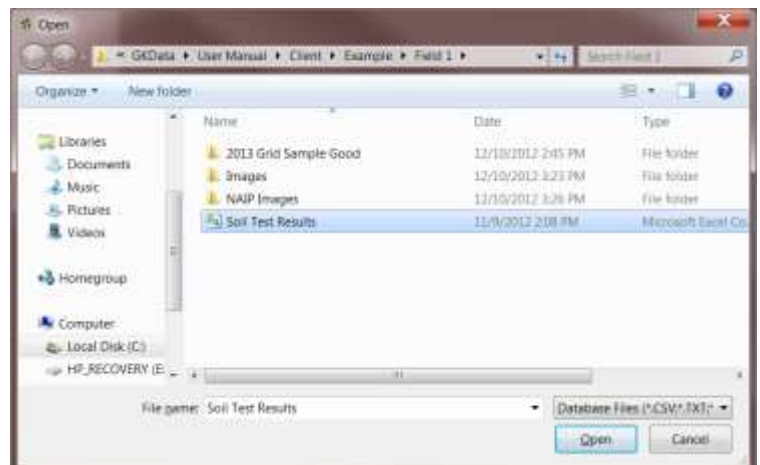
Step 2:

Load Sample Results File

This is where you will choose your soil test results file.

Both *.csv and *.xls file formats can be imported.

Make sure you have only one set of results per sheet on excel when loading a *.xls file



Grid Sampling—Creating Nutrient Layers

5. **Step 3:** Assign Sample Point Grid ID

(Select Column ID that corresponds to the Field—sample points numbers)

6. **Step 3:** Select Soil Test Grid ID

(Select Column ID on the Soil Test that matches - sample point numbers)

Make sure that the sample results file has the EXACT same numbering system as the points.

You can temporarily change or delete any value or row in the soil test results they will not be changed on the original file.

A column with any null values cannot be merged or mapped.

If a value in the sample results is null it can be changed to 0 to merge correctly.

Grid Sample Points

GridID	Latitude	Longitude	PointID	GKT_IDX
1-1	45.716419	-96.45787	1	1
2-1	45.716419	-96.45658	2	2
3-1	45.716419	-96.45528	3	3
4-1	45.716419	-96.45398	4	4
5-1	45.716419	-96.45269	5	5
6-1	45.716419	-96.45139	6	6
7-1	45.716419	-96.45009	7	7
8-1	45.716419	-96.44879	8	8
1-2	45.717323	-96.45787	9	9
2-2	45.717323	-96.45658	10	10
3-2	45.717323	-96.45528	11	11
4-2	45.717323	-96.45398	12	12
5-2	45.717323	-96.45269	13	13
6-2	45.717323	-96.45139	14	14
7-2	45.717323	-96.45009	15	15
8-2	45.717323	-96.44879	16	16

Soil Test Results

Ref No	GrowerID(	Field ID(1st	Sample ID	County
6564901	Example	Field 1	1	MN
6564902	Example	Field 2	2	MN
6564903	Example	Field 3	3	MN
6564904	Example	Field 4	4	MN
6564905	Example	Field 5	5	MN
6564906	Example	Field 6	6	MN

Loading Equations Directly From MS Excel

- You can bring equations directly in from Excel if from recommendations already on the spreadsheets

- Instead of selecting the nutrient, select the column name which contain the equation to create the map for (ex: 11-52-0)
- The software will read the value in the column and not the whole equation

- Choose which nutrients you want to build maps for. You can select multiple items at once.

- When all the desired nutrients are selected, click "Merge Tables"

Soil Test Layers:

- ☐ Ref No
- ☐ GrowerID(25)
- ☐ Field ID(1st 8)
- ☐ Sample ID
- ☐ County
- ☐ Twp
- ☐ Qtr(11)
- ☐ Sect No
- ☐ Acres
- ☐ pH
- ☐ BpH
- ☐ OM
- ☐ N1 lb
- ☐ N2 lb
- ☐ N3 lb
- ☐ N-(N1+N2)
- ☐ P-O ppm
- ☒ P-B1 ppm
- ☒ K ppm
- ☒ Ca ppm
- ☒ Mg ppm
- ☐ S1 lb
- ☐ S2 lb
- ☒ Zn ppm
- ☐ Salt1
- ☒ 11-52-0
- ☐ Cl-1 lb
- ☐ Cl-2 lb
- ☐ Cl (Tot)

Merge Tables

Grid Sampling—Creating Nutrient Layers Phosphorous Conversion

Using CSV / XLS Soil Test Results—Phosphorous Conversion

Soil phosphorous values may be tested and reported in several different ways such as Olsen, Bray, and Mehlich 2 & 3. Due to variables like pH differences some samples may be tested as one type and other samples tested as another. For example a high pH test may have an Olsen result where a lower pH may have a Bray result. ADMS cannot distinguish these differences. So there are some conversion tools to update columns that may have zeros in them, or create a new column if the phosphorous result needs to be a certain type for recommendations or scripts.

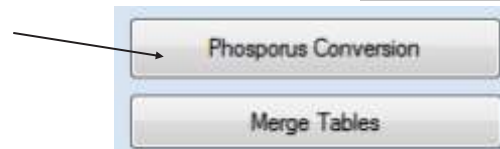
Updating Existing Columns

If there is a column that has only some values reported in it. It can be updated using the other Soil P column. For example these results have three zones reported as Olsen Values and only one zone reported as a Bray value.

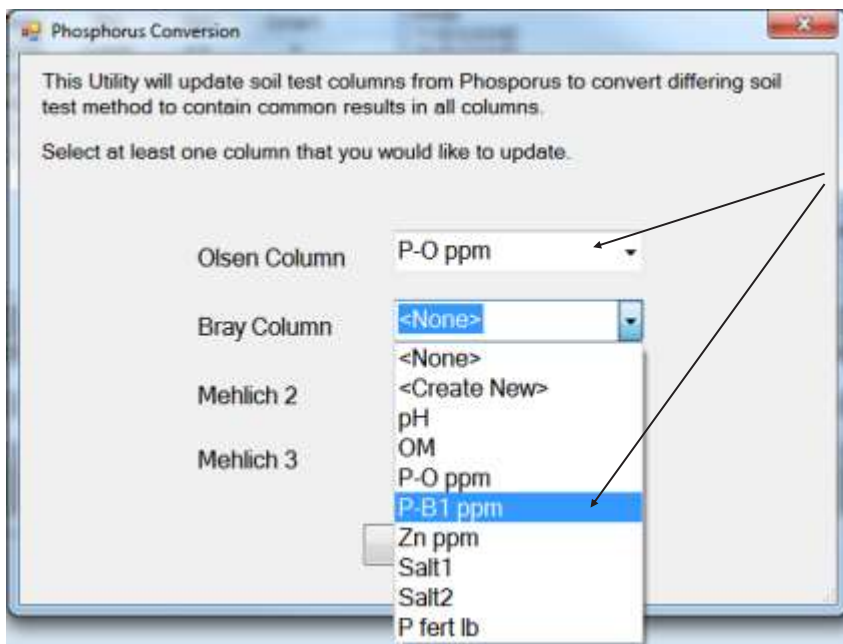
P-O ppm	P-B1 ppm
9	0
7	13.3
6	0

To report everything in P-B1 a conversion must be ran before the maps are created.

1. Click on the "Phosphorous Conversion" button.

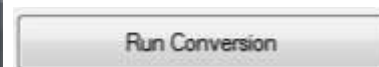


The "Phosphorous Conversion" window will appear.



If the columns have values in them they will show up as a dropdown option.

2. Choose the corresponding columns.
3. To update values two columns must be filled in. ADMS will use the values in one column to convert to the other value. In this example the Olsen values will be converted to Bray (P-B1).
4. After the dropdowns are filled in click "Run Conversion."



5. After clicking "Run Conversion" the missing values will be updated.

P-O ppm	P-B1 ppm
9	14
7	13
6	9

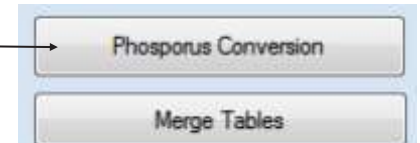
Grid Sampling—Creating Nutrient Layers Phosphorous Conversion

Using CSV / XLS Soil Test Results—Phosphorous Conversion

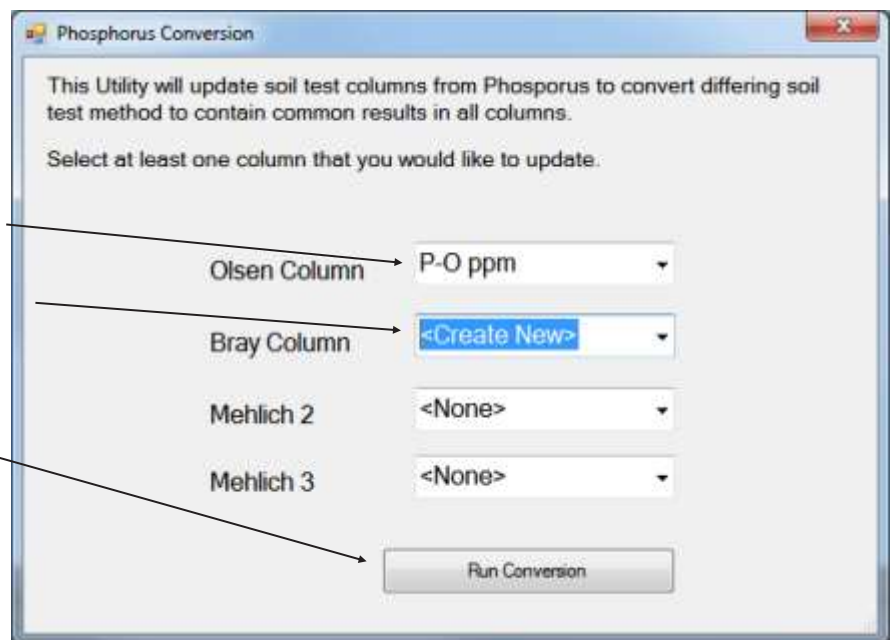
Creating New Columns

If soil test results are reported as one value, but they need to be converted to be used in recommendations or scripts it can be done using the same tool. Instead of updating an existing column it will create a new one based on existing values.

1. Click on the "Phosphorous Conversion" button.



2. The "Phosphorous Conversion" window will open.
3. Select the existing Soil Phosphorous column from the dropdown.
4. Select "<Create New>" for the soil test value that needs to be converted.
5. Click "Run Conversion."



6. After the phosphorous conversion has run it will create a new column of the converted soil test values. And can be merged with the sample points.

7. Nutrient layers can be built off of these the same as any other column.

☐ Zone2 Salt	
☒ PBray1Conv	

PBray1Conv
14
10
9

8. Click "Merge Tables" to merge with the sample points.



Grid Sampling—Creating Nutrient Layers

- The soil test results will now merge with the grid sample points file.

Soil Test Results				View Nutrient Maps							
Grid Sample Points											
GridID	Latitude	Longitude	PointID	GKT_IDX	pH	OM	P-O ppm	K ppm	Zn ppm	Salt1	
1-1	45.716419	-96.45787	1	1	6.3	4	20	234	1.39	1.3	
2-1	45.716419	-96.45658	2	2	5.9	3.5	21	257	1.4	0.41	
3-1	45.716419	-96.45528	3	3	5.7	4.5	12	225	1.3	1.09	
4-1	45.716419	-96.45398	4	4	6.3	3.6	15	194	1.42	0.76	
5-1	45.716419	-96.45269	5	5	6	3.2	24	229	1.1	0.35	
6-1	45.716419	-96.45139	6	6	5.7	3	16	197	1.51	0.73	
7-1	45.716419	-96.45009	7	7	6.3	3.7	25	253	1.42	0.35	
8-1	45.716419	-96.44879	8	8	7.2	3	40	1012	1.62	1.95	
1-2	45.717323	-96.45787	9	9	5.9	4	20	266	1.45	0.57	
2-2	45.717323	-96.45658	10	10	6	4.5	12	325	1.69	0.19	
3-2	45.717323	-96.45528	11	11	5.9	4.1	9	258	1.53	0.73	
4-2	45.717323	-96.45398	12	12	6.5	4	9	290	1.18	0.26	
5-2	45.717323	-96.45269	13	13	5.8	4.2	11	302	1.3	0.13	
6-2	45.717323	-96.45139	14	14	6.1	3.8	11	254	1.59	0.42	
7-2	45.717323	-96.45009	15	15	6.5	3.7	11	241	1.41	0.24	
8-2	45.717323	-96.44879	16	16	6	3.6	15	238	1.72	0.51	
Soil Test Results											
Ref No	GrowerID(	Fld ID(1st	Sample ID	County	Twp	Qtr(11)	Sect No	Acres	pH	BpH	OM

9. After the two tables are merged, you can choose to "Grid with Surfer Kriging" (**This is optional.** If you are going to use Kriging, you must have the demo version of Surfer 8 installed)

The software by default will use inverse distance if you leave the box unchecked, you DO NOT need surfer to do this.

Phosphorus Conversion

Merge Tables

☒ Grid with Surfer Kriging

Build Maps

10. Select "Build Maps"

Grid Sampling—Creating Nutrient Layers (Common Name Mapping)

- If this is the first time you have done this, you will be asked to assign a name to your nutrient. This is so that all nutrient output maps share a common name among all of the fields you load test results for.
- DO NOT use the field name as part of your name
- Make sure and fill in all the boxes (Full Name, Units, and Decimal Precision)
- These names will stay this way. This keeps them the same when you are using scripting to write the prescription

Data for Column Name

The information below will be used to create new layers when data with this short name is used to create data in the future.

It will help to provide consistent naming of output layers.

Short Name: pH

Full Name:

Units:

Decimal Precision:

Color Theme: None

OK Cancel

- A default color theme may also be applied. Refer to that section of the book for more explanation.

Data for Column Name

The information below will be used to create new layers when data with this short name is used to create data in the future.

It will help to provide consistent naming of output layers.

Short Name: pH

Full Name: Soil pH

Units: units/acre

Decimal Precision: 1

Color Theme: None

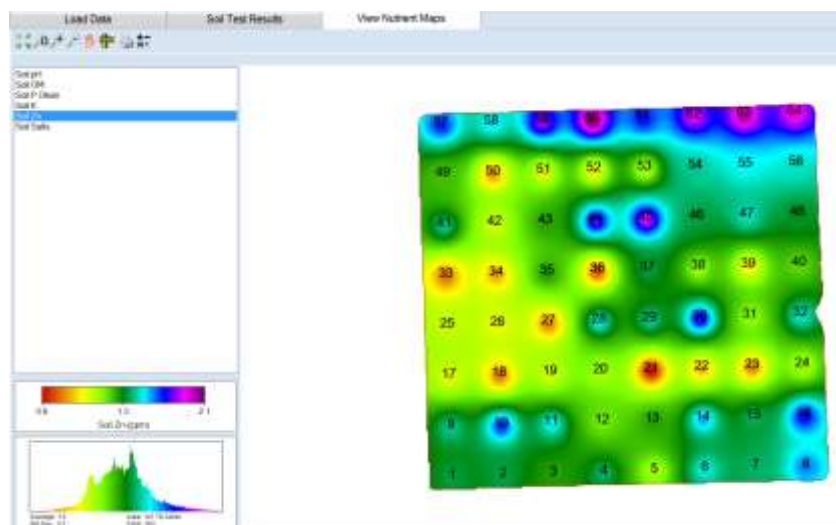
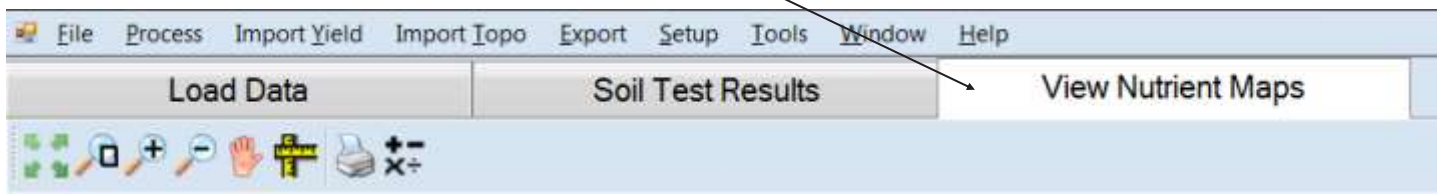
OK Cancel

11. Once you have a name, units, and decimal precision assigned, click "OK" and go on to the next one.

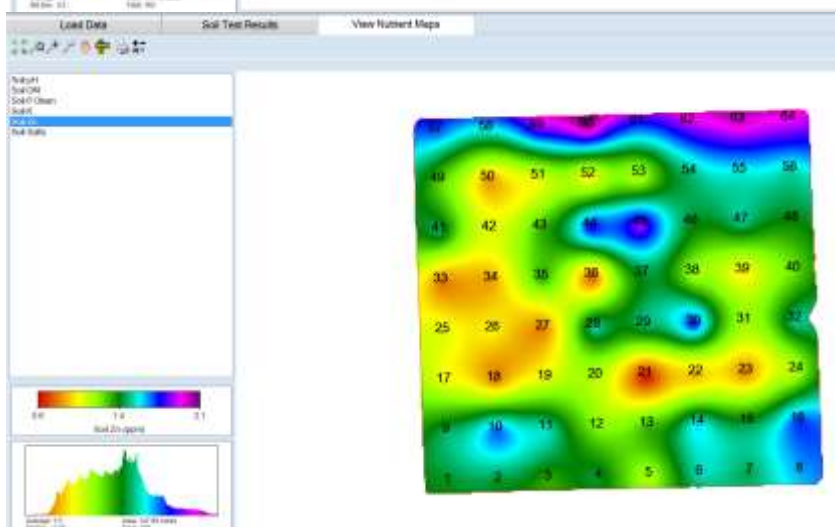
- Do this until the Data for Column Name boxes stop appearing.

Grid Sampling—Creating Nutrient Layers (Inverse Distance & Kriging)

12. Select the "View Nutrient Maps" Tab on the top of the screen. You can now view your created nutrient maps for the field.

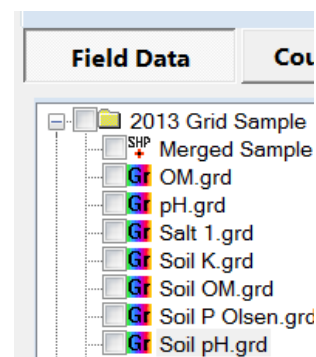


- Created With ADMS Inverse Distance



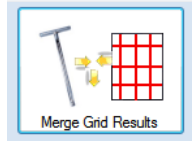
- Created With Surfer Kriging

- The newly created nutrient layers will be stored under "**The Year**" **Grid Sample** folder under "Field Data"
- You can change the year of the output folder: Go to Tools/Settings/User Interface 2 and change the current season



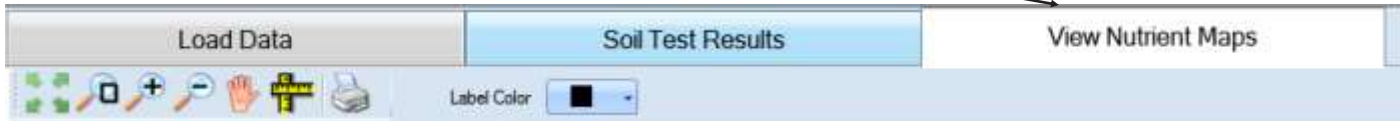
Grid Sampling—Printing Grid Nutrient Layers

Starting at version 6.4.1, there is an option within the software that allows printing of the nutrient surfaces while automatically changing the labels on the sample points to correspond with the nutrient maps.



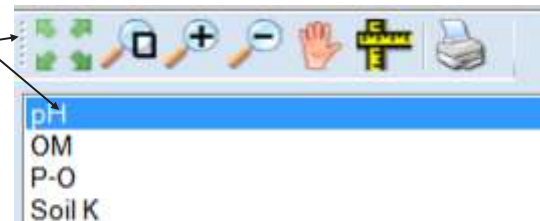
After following the steps to build nutrient maps, stay in the Merge Grid Results window.

1. Go to the "View Nutrient Maps" tab.



2. The nutrient maps will be displayed in the window. The labels will be automatically turned on to correspond with the correct nutrients. If they are not visible, click on one of the nutrient maps on the left side of the window.

3. If the map does not fill the entire window click:
"Zoom to Extents."

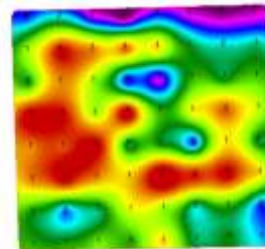
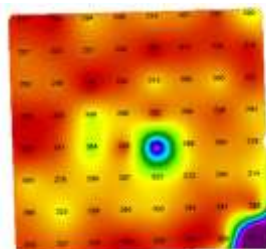
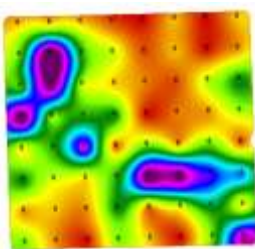


4. Before printing, there is an option to change the label colors if desired.

**Note this will change all of the labels to the selected color*

5. After the desired label color has been selected click the print button on the top toolbar.

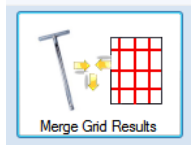
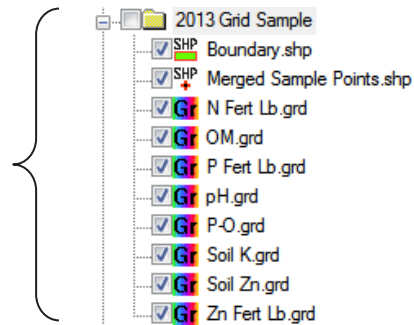
The maps will print with the correct labels for each nutrient.



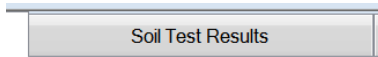
Grid Sampling—Printing Grid Nutrient Layers

If existing nutrient maps exist with a merged sample points file, this same printing function can be used.

1. Open "Merge Grid Results."
2. Under the "Load Data" tab select:
 - Boundary
 - Merged Sample Points
 - Nutrient layers that will be printed



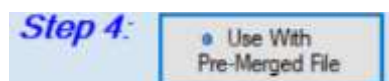
3. After these layers are all turned on, go to the "Soil Test Results" tab.



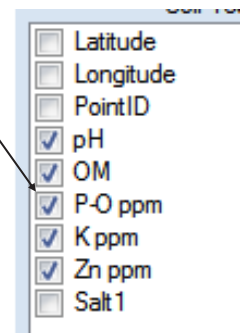
4. The merged sample points will automatically be visible at the top of the window under "Grid Sample Points". The nutrient columns should be visible.

Grid Sample Points											
GridID	Latitude	Longitude	PointID	pH	OM	P-O ppm	K ppm	Zn ppm	Salt1	GKT_IDX	
1-1	45.71641922	-96.45787048	1	6.30000019	4	20	234	1.38999999	1.29999995	1	
2-1	45.71641922	-96.45658112	2	5.90000001	3.5	21	257	1.39999998	0.41	2	
3-1	45.71641922	-96.45528412	3	5.69999981	4.5	12	225	1.29999995	1.09000003	3	
4-1	45.71641922	-96.45398712	4	6.30000019	3.59999999	15	194	1.41999996	0.75999999	4	

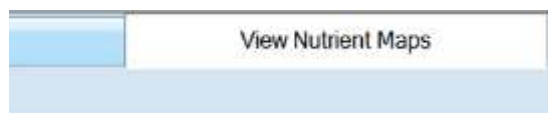
5. Proceed to **Step 4:**
 - Click "Use With Pre-Merged File."



6. Under Soil Test layers, the nutrient maps that were turned on will automatically have a check mark in front of them.



7. Select "View Nutrient Maps."



8. The maps will now be visible with the correct sample points turned on.

9. Change the label color if desired.



10. Select the print icon at the top toolbar to batch print all the surfaces turned on.



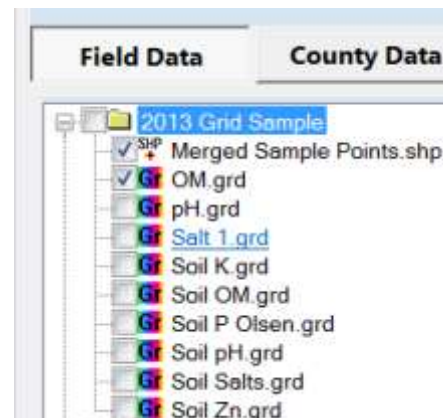
Grid Sampling—Printing Grid Nutrient Layers

You should now have all the components you need from your soil test results; your nutrient maps, your boundaries, and depending on the prescription you are going to be using, you may want to have a yield goal map. Refer to that section in the book on how to create that map. You can now print your maps, be ready for the prescription writing process.



Printing Soil Test Result Maps

- Nutrient maps can be printed and overlaid with the corresponding grid points and the soil test results
- This has to be done individually for each nutrient map



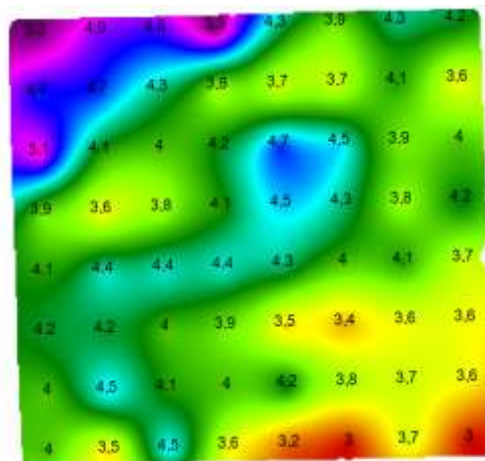
- Go to the Grid Sample File
- Check the nutrient *.grd file (ex: OM)
- Select "Merged Sample Points"

- Select the "Layer Display Properties" button on the bottom toolbar



- Make sure labels are visible
- Select the corresponding nutrient out of "Label Expression" tab, Change "Label Appearance" to fit and "Label Placement"
- Click "OK"
- For further detail, refer to "Layer Display Properties" section on how to change and save as template

- The point labels should now be the same as the test results.
- This can now be printed.
- Repeat from the top of the page as needed for the desired nutrients



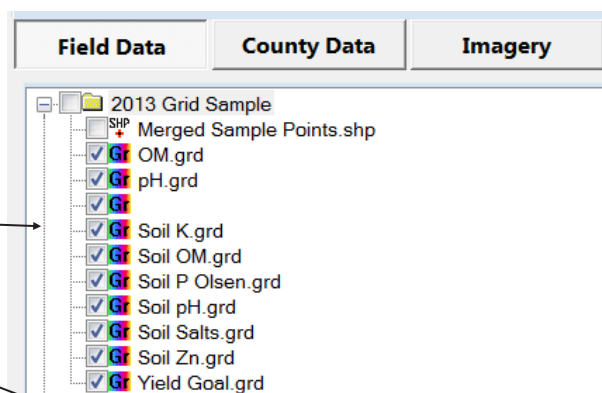
Grid Sampling—Using Scripting To Write Prescriptions

Writing a Prescription From Nutrient Maps Using Scripting

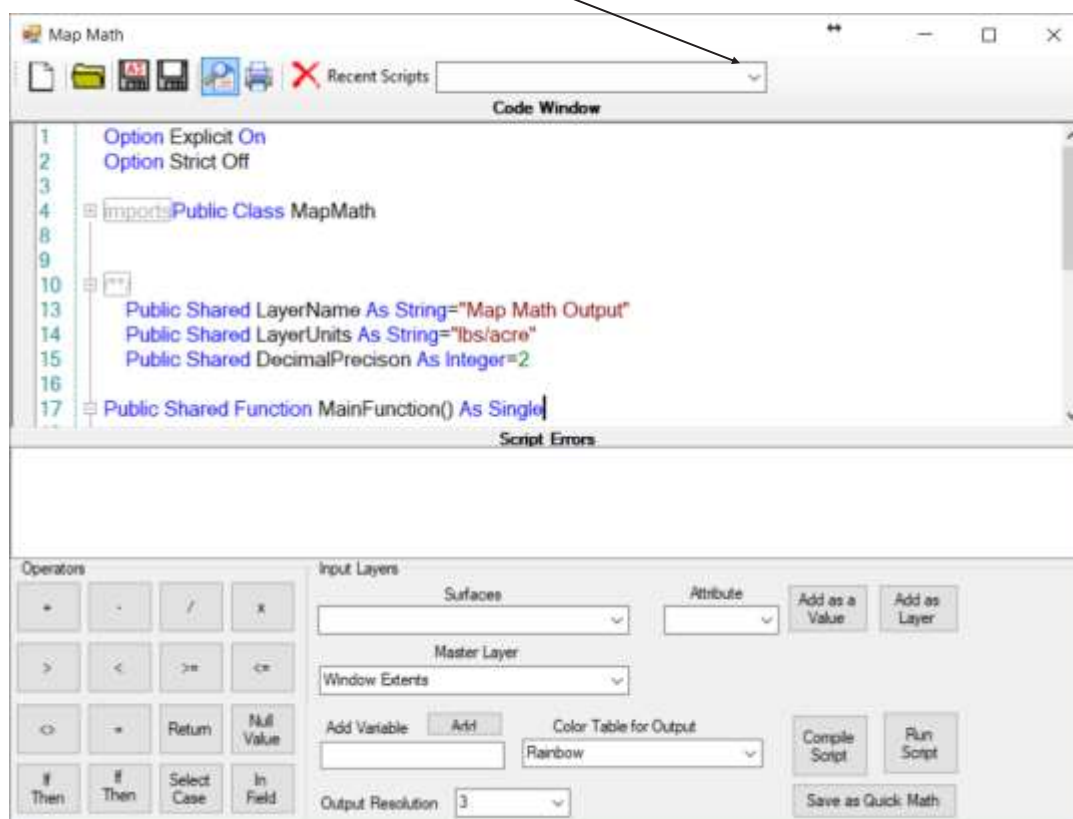
Once you have all of the desired nutrient maps created, you are ready to create the fertilizer prescription using the scripting method. You can use an existing prescription or create your own by following the instructions in the **Getting Started With Map Math** Section.



1. Under Layer Info, select Clear Map so there are no loaded layers in the map window.
2. Select all the input layers that will be used to create the prescription.
3. On the top toolbar, select "Multi Layer Map Math" button

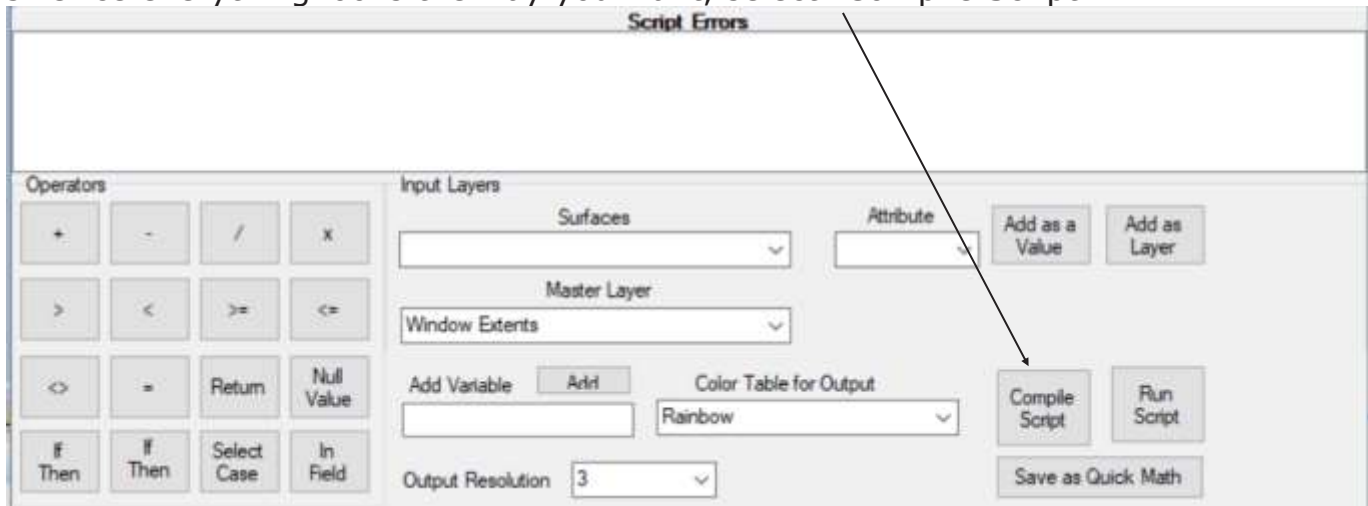


4. Load the script that you wish to use. If you have used some recently, they will be in the "Recent Scripts" dropdown.
5. If you are going to load a new script, select the folder icon



Grid Sampling—Using Scripts To Write Prescriptions

13. Once everything looks the way you want, select “Compile Script”



14. If there are errors in the script, it will show under script errors, fix any errors, and compile again

Script Errors
Line 98, Col 0: Error ' Statements and labels are not valid between 'Select Case' and first 'Case'. '

15. Once you see there are no errors in the script, click “Run Script”

The Script Compiled without errors! :-)

Run
Script

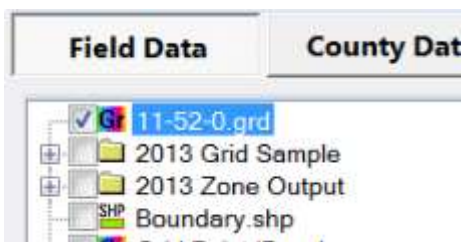
16. You should now have a layer called “Map Math Output”. This is the 11-52-0 product map

17. Click “Save As” on the bottom toolbar



18. Save this map as 11-52-0

19. Make sure and rename each product map. If you leave it as “Map Math Output” it will be replaced each time you run the script and create a new product.



20. This process can now be repeated for all of the products you wish to apply.

21. After the maps are built, follow the instructions on the *Exporting Prescriptions* Section. This gives you step-by-step instructions for each type of controller.

Grid Sampling—Sampling Methods

Grid Sampling Methods

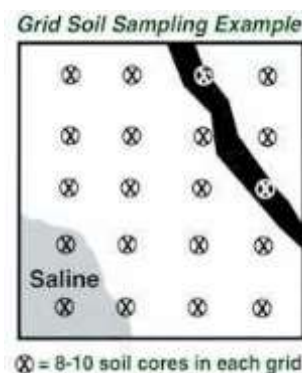
When soil sampling, it is important to make sure you take an accurate representation of the field. Here are some general guidelines to follow when out sampling.

Credit for this information is from Agvise Laboratories: <http://www.agviselabs.com/soil2.php>, and The University of Nebraska Lincoln (UNL): <http://cropwatch.unl.edu/web/ssm/soilsampling>

Grid Soil Sampling: Grid soil sampling involves dividing whole fields into small equal sized areas or grids (1-5 acres) (see example). The soil cores from each grid are collected either from the center point of the grid or from random cores within the grid. A minimum of 8-10 cores from each grid is required to provide enough soil for all laboratory analysis to be completed.

Sample Handling - Soil Fertility Analysis

Proper soil sample handling procedures depend on which nutrient analysis is requested. Soil samples that will be analyzed for nitrate-N should be kept cool or shipped to the laboratory immediately. If samples are stored in a warm area for extended periods of time, the nitrate level in the sample will increase. Warm temperatures during shipping or storage increase the activity of microbes in the soil sample. This microbial activity causes the release of additional nitrate-N in the soil sample bag. If this happens, the laboratory analysis for nitrogen will be incorrectly high, due to improper sample handling.



Soil samples that will be analyzed for all other nutrients are not affected by temperature and do not need special handling.

Credit for the above information is given to Agvise Laboratories: <https://www.agvise.com/wp-content/uploads/2012/12/Soil-Sampling-Guide.pdf>

Grid Sampling

A well-done nutrient map derived from a grid sample can be a valuable resource for many years. Consequently, the density should be adequate to provide confidence in the accuracy of the maps developed from the data. We suggest analyzing one sample per acre, which is composited from five cores collected in a tight radius about the sample point (Figure 3). This density will result in a map that will be good for many years —10 to 20 years for soil organic matter and cation exchange capacity; five to ten years for pH; and four to five years for phosphorus, potassium and zinc. On fields in which variability is expected to be low, a sampling density of two to two-and-one-half acres per sample may be acceptable. Grid sampling at densities coarser than one sample for every 2.5 acres is not recommended, if the goal is to develop a resource of nutrient maps that can be used with confidence over several years.

Credit for the above information is given to UNL: <http://extensionpublications.unl.edu/assets/pdf/>

Grid Sampling—Sampling Methods

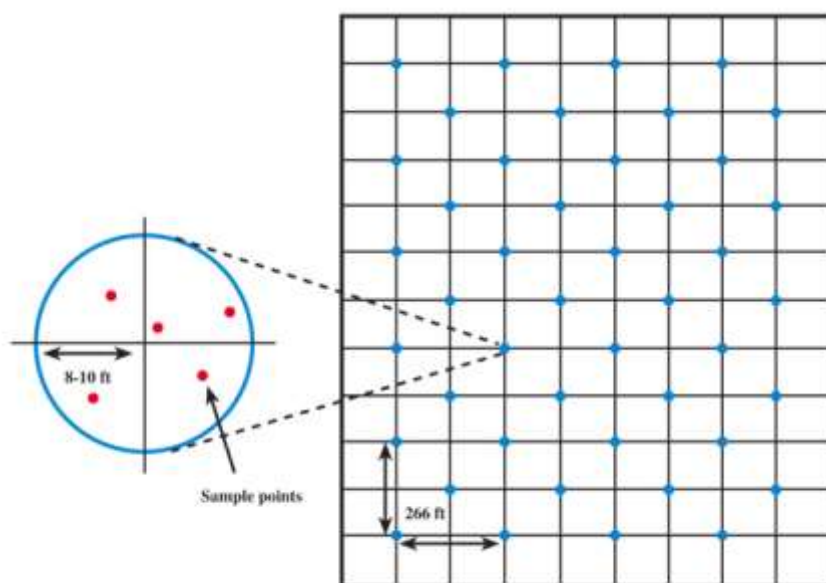
Sampling Pattern and Depth

An offset grid pattern is recommended as shown in the figure below. This will provide more information at a lower cost than a regular grid pattern. Individual cores should be collected in a radius of 8-10 feet of the grid point, to a depth of 8 inches. The grid point should represent the central position of a composited sample. Collect samples within the 8-10 foot radius randomly, in order to avoid systematic patterns such as starter or pre-plant bands. Conduct a general fertility analysis on the samples, including soil organic matter, pH, phosphorus, potassium and other nutrients of interest.

Frequency

As already mentioned, a nutrient map derived from a grid-sampled field can last a long time. If variable rate application of fertilizer or lime occurs, this will have the potential to change nutrient levels or soil pH over time. Soil phosphorus levels will not change drastically with single variable rate applications. We suggest that grid samples be collected every five years for phosphorus. Lime application according to recommendations should amend soil pH for 8-10 years. Even if variable rate lime application has occurred according to a grid-sampled map of pH, it should not be necessary to grid sample for soil pH for 8-10 years after application.

Residual Nitrate Sampling. Grid sampling for nitrate-N is not recommended because annual fluctuations in nitrate levels would require annual grid sampling, which is not cost effective for most crops with current fertilizer prices. Instead, residual nitrate sampling (to a depth of 3 feet) should be done on a directed sampling basis.



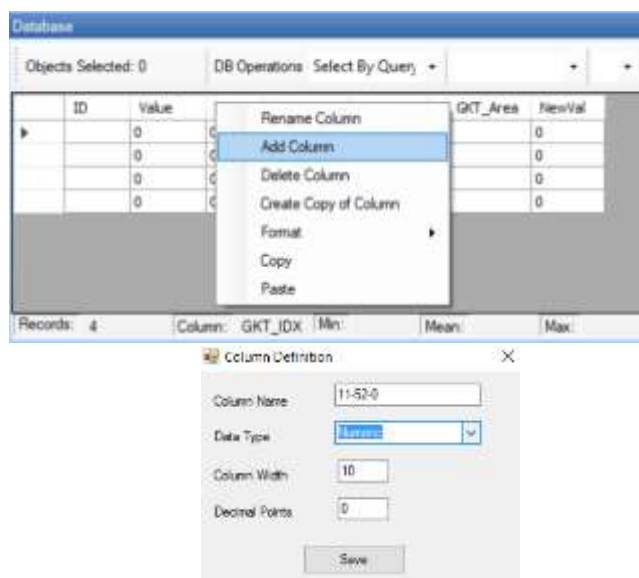
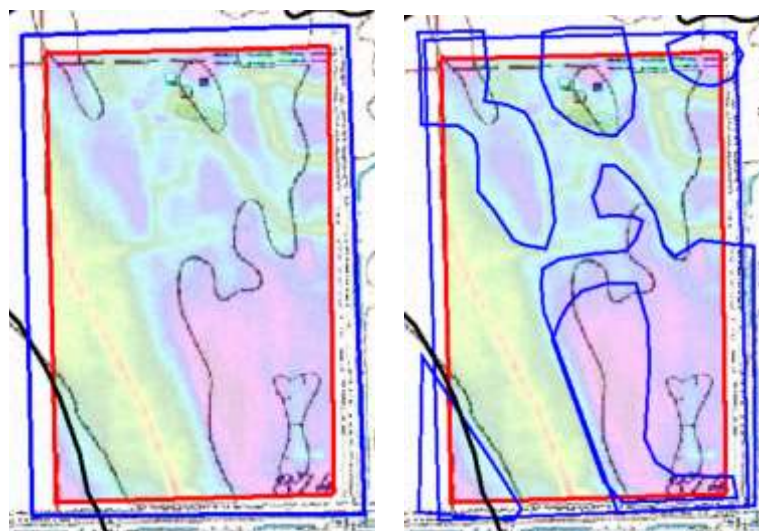
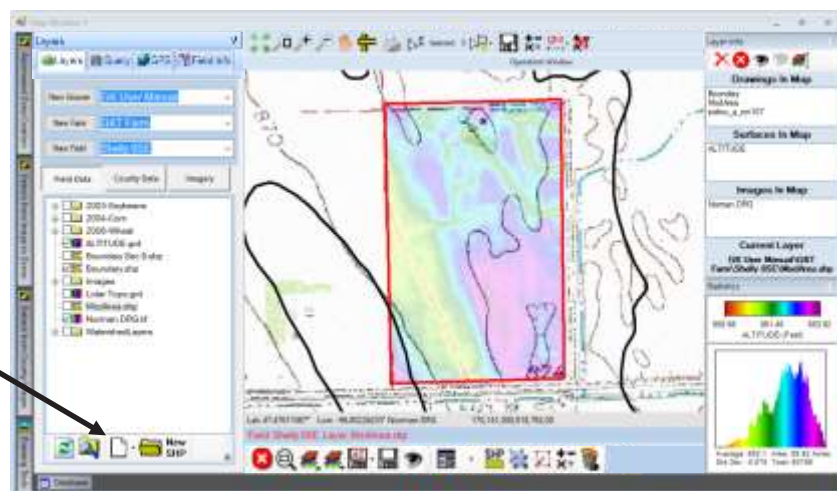
Credit for the above information is given to UNL: <http://extensionpublications.unl.edu/assets/pdf/g1740.pdf>

My Notes

VRT Map from Hand Drawn Polygons

To create simple manual zones based on Images, Elevation, Soil types, Data Points or what ever criteria you want to use.

1. Open any layers of data you feel useful for defining your VRT application areas.
2. Select "**ModArea**" from Template
3. Make sure "ModArea" is checked ON and set as **Active Layer**.
4. Select "**Draw A New Object**" SHP 
5. Draw your primary boundary for VRT area, it should drawn larger than the field or original boundary and it will be trimmed later.
6. Draw in all the areas of "different rates". *Order of Drawing is VERY IMPORTANT the last object drawn is on "TOP"*
7. Each area will have it's own line in the database.
8. The "ModArea" Template does NOT have the columns for the VRT maps that are being created.
9. Go to the lower left hand corner of the screen and click "Database"
10. Right click any header & "Add Column"
11. Name the new "Column" note you are limited to 10 characters
12. Set the settings like picture to the Right. <<**Data Type = NUMERIC**>>



VRT Map from Hand Drawn Polygons

13. Click the **"Database"** tab at the bottom left of screen. Apply a Rate to each zone.

14. Once rates have been entered. **"Save"** the ModArea.shp. (consider **"Save As"** and renaming to a more fitting name)



Database

Objects Selected: 0 DB Operations: Select By Query

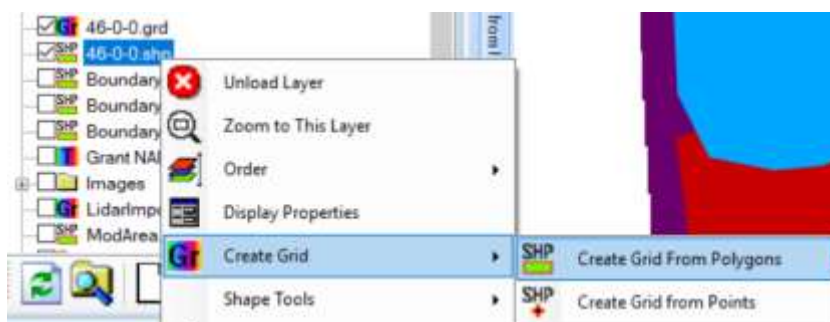
NewVal	ID	GKT_IDX	GKT_Length	GKT_Area	46-0-0	11-52-0
0		1	7173.1	70.538	250	50
0		2	2817.7	6.871	200	100
0		3	1567	3.959	150	0
0		4	931.7	1.433	300	50
0		5	4926.2	23.866	275	50
0		6	2028.5	4.1	225	100
0		7	3044.5	7.592	325	75

Record Count: 7 ColumnID: NewVal Min: 0 Mean: 0 Max: 0

Database

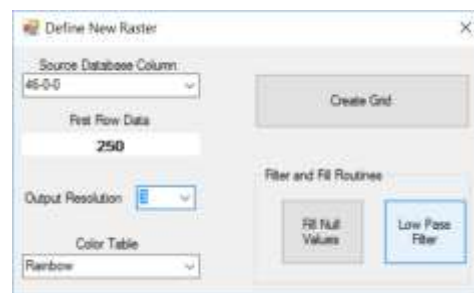
18. Right click ModArea.shp, select **"Create Grid"** & **"Create Grid from Polygons"**

19. **"Source Database Column"** - 46-0-0 **"Output Resolution"** - "3"
"Color Table" - "Rainbow"
 Select **"Create Grid"**
Consider clicking the "Low Pass Filters" 5 to 10 times if you want smoother rate changes.



20. Crop / Trim xxx.grd to the Boundary. Check on Boundary.shp should be the **active layer** and Click inside the boundary in the map window making it **Lime Green**

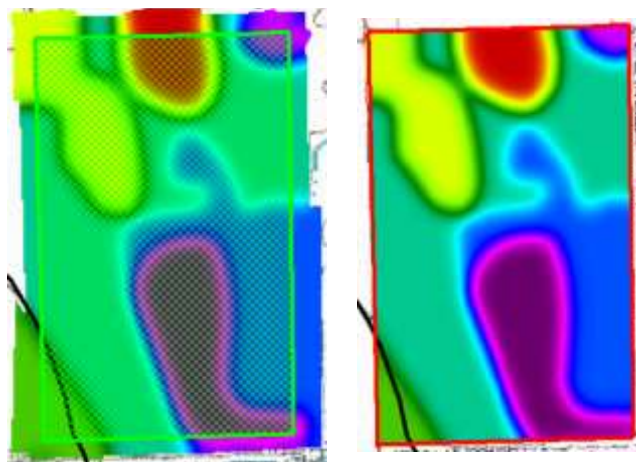
21. Select 46-0-0.grd it is now the **active layer**



22. Click the **"Crop Raster to Selected Polygons"** & **"Just this Layer"**

23. **"Save"** the xxx.grd

24. xxx.grd VRT map is ready to Export.

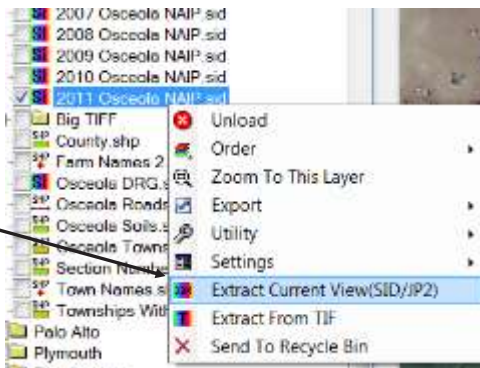


Making A Test Prescription

If you are creating prescription maps that are for seeding or fertilizer, it is always a good idea to create a test map. This will allow you to make sure that everything is working properly before it is time to be in the field. Often the best place to do this is right in your farmyard or by your shop where the equipment is located.



1. Locate your farm on a county NAIP image.
2. Right click on the .sid file you have turned on.
3. Select "Extract Current View (SID/JP2)"
4. Select "Save" this will save it to "Field Data" and will be in "Images\NAIP."



5. Draw a boundary around the test area. (Refer to: *Creating Zones From Boundaries*)

6. Once the boundary is drawn, "Save Changes" 

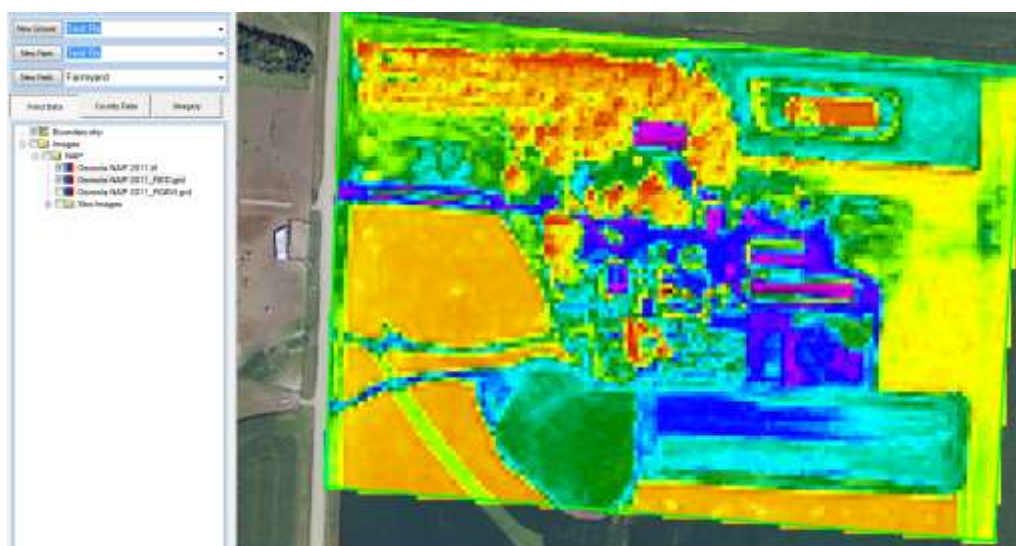
7. With boundary as the active layer, select inside so the green hatching appears.

8. Under "Field Data", make the NAIP image the active layer.

Field: Farmyard Layer: Boundary.shp

9. The bottom toolbar will change to display the "SNG" and "VI" buttons. 

10. For most NAIP images select the "RED" under SNG or "RGB VI" under the VI button. If the image has an NIR band it can be selected instead under the SNG button.



11. This map will now be used as the test prescription.

- Rates will be imputed into it to represent the product that is going to be applied.
- This will be exported as a prescription to the controller that will be applying the product.

Making A Test Prescription

To quickly modify the values of the test prescription, a function called Intra-Layer Math can be utilized with the extracted NAIP (*.grd file) that will be used as the test prescription; it is found on the bottom toolbar.



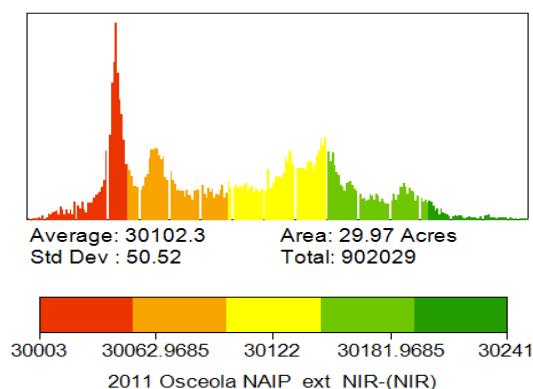
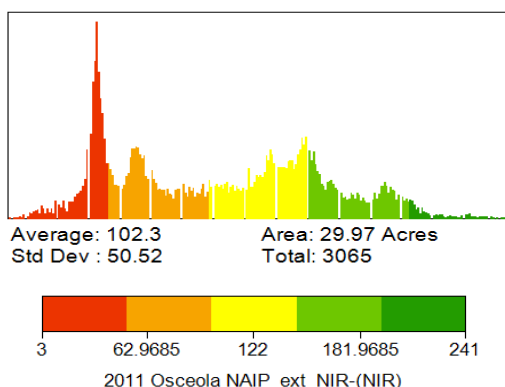
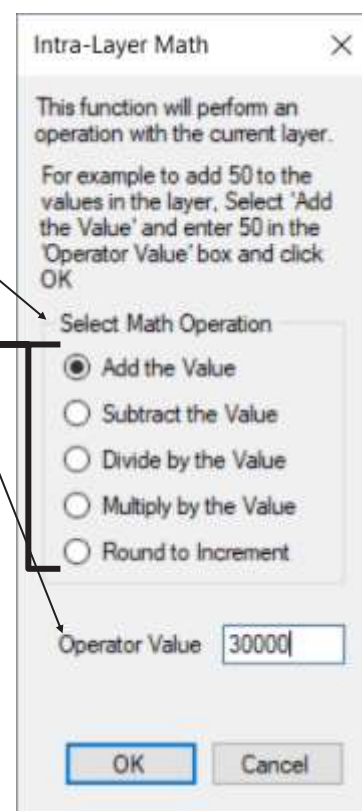
This function can be used to quickly add, subtract, multiply, or divide all of the values in the map. This allows for quick value changes to get as close as possible to represent the actual rates that will be applied in the field.

This example will be for a corn seed prescription map.

1. With the *.grd file as the active layer, select the Intra-Layer Math button on the bottom toolbar. 
2. A window will appear to:
 - Select A Math Operation
 - Choose the value you will be using for the math operation.
3. This example will add the value of 30,000 to every pixel in the map.
4. Click "OK"

All of the map values will change with the statistics and the histogram remaining the same.

Since this is not an in-field situation, it is only important to get close to the rates that are going to be applied. The goal here is to get something you can test the controller with to make sure everything is working properly before heading to the field.



- There are other ways of creating test prescription maps. Refer to the Nutrient Layers section of the book and Creating Prescription Maps—Manually. These outline how to enter in target rates based on each zone.

Making A Test Prescription

Using a mod area to add a zero rate.

A mod area can be used to add additional rates into the map such as a zero rate. This will give you more control to see what is happening at a specific location in the yard. It is done the same as a test strip.

1. Create a new layer from template. This is located at the bottom of the "Field Data" tab.
2. Once ModArea is selected, make sure it is checked on and it is the active layer.

Field: Farmyard Layer: ModArea.shp

3. On the bottom toolbar, select the "Draw a New Object" icon.

4. On the map, draw the area where the new rate is going to be.

- Left click to drop a point, right click to close the polygon.

5. When ModArea is completed, "Save Changes."

6. With the ModArea as the active layer, click inside the polygon on the map window so it turns green.

7. Select the test.grd map in "Field Data" to make it the new active layer.

Field: Farmyard Layer: Seed.grd

8. Click "Apply Mod to Selected Polygon" on the bottom toolbar. Select it.

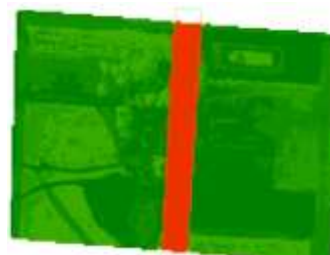
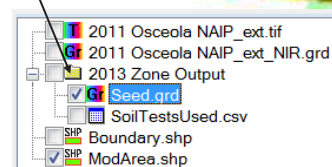
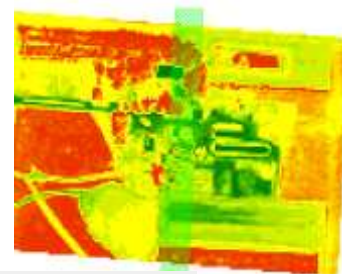
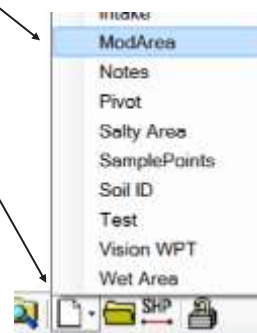
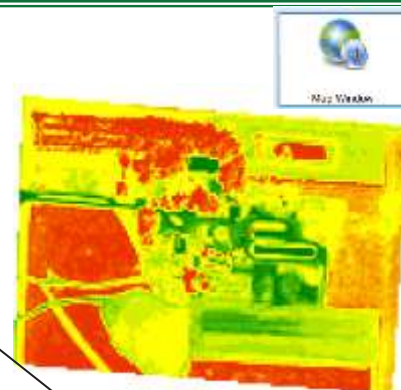
9. A window will appear that gives you math operations that can be performed on the area under the polygon. Choose "Replace with this Value." Enter in the new rate that will be under the Mod Area. Click OK.

10. Make sure the test.grd is the active layer and "Save Changes."

- Note the color table has changed due to the zero rate. The other areas will have the same rates that were entered earlier.

Export the test map

- Follow the instructions in the *Export Prescription Maps* section to bring it to the controller that will be used for testing.



Export Prescription Maps—Shape Grids

Exporting to a Shape Grid

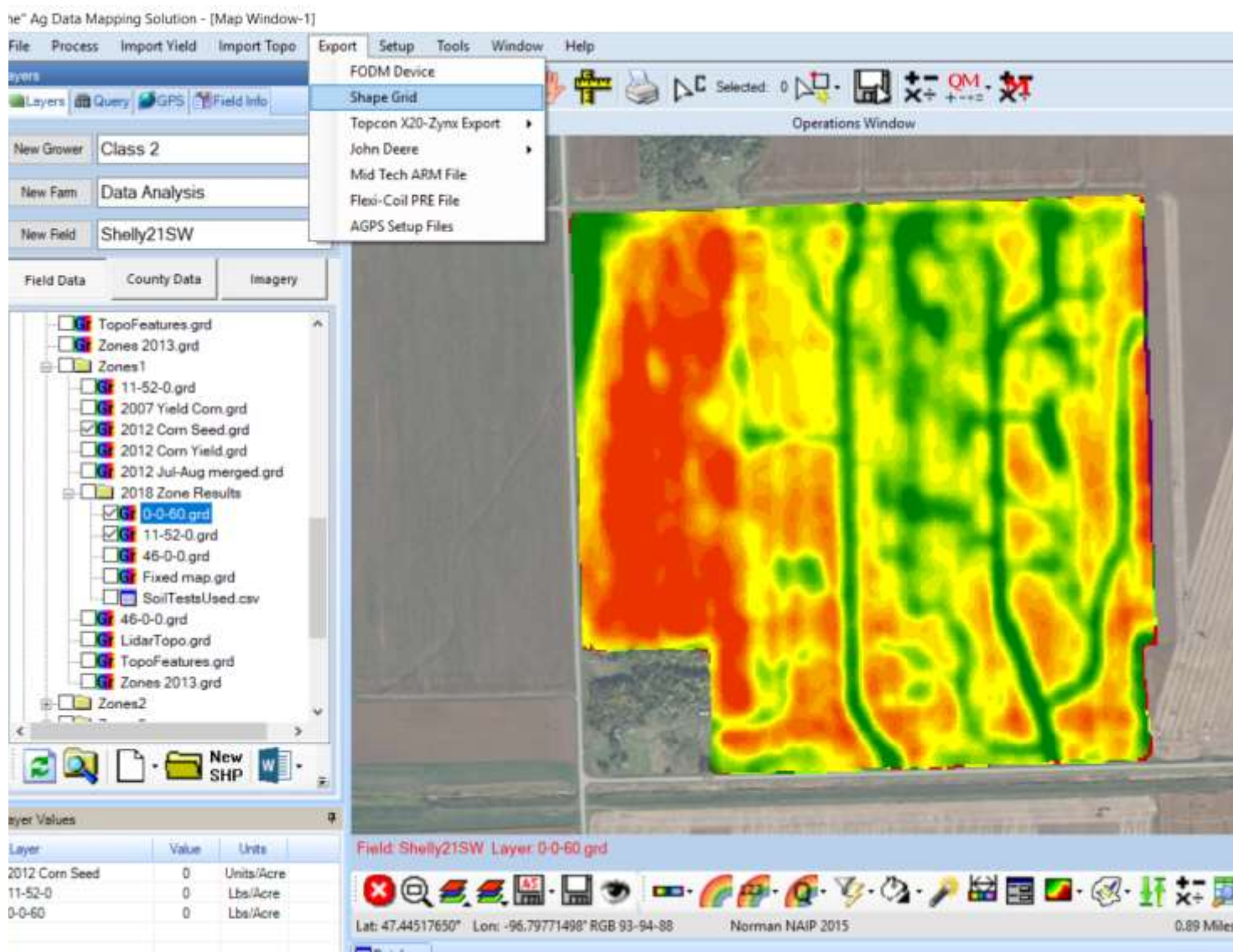
Exporting Shape File Notes:

Exporting files as shape grids is used for sending files directly to some controllers. It is also used to export maps to other software for map creation or for data transfer. Keep in mind, these output settings can cause controller problems even if you are going through other software. So be aware of the limitations and capabilities of your controllers and software.

1. Turn on only the VRT Surface maps you want to export. NO OTHER SURFACES.

- Background “Images” turned on will not cause any problems.
- This is a good time to do your Printing

2. On the Top Toolbar—Choose “Export” & “Shape Grid”

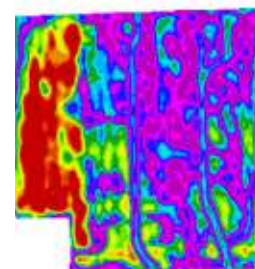
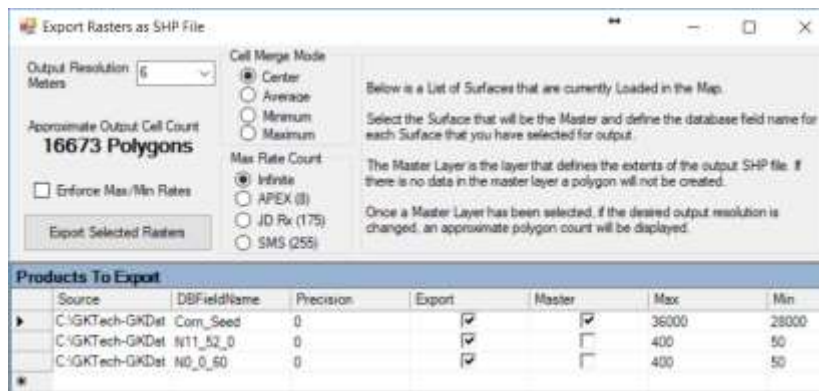


Export Prescription Maps—Shape Grids

Exporting to a Shape Grid (cont.)

Note: in this example there are 3 maps turned on to show different functions.

Output Resolution—
is in Meters, as you change values the Est. Polygon Count will change. This is important for controller limitations.

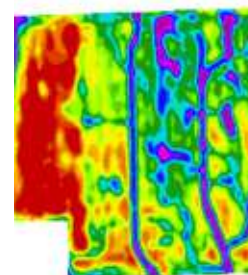


60 193 335
46-0-0-(lb)

Enforce Max/Min Rates—

This function is designed for the concept of controller limitations on low application rates. Example— Controller can go to "0" but can't spread below 50 lbs rate. Min Rate of 50, all values less than 25 will go to "0" values from 25-50 will be 50 and Variable Rate from 50 to the Max Rate as required.

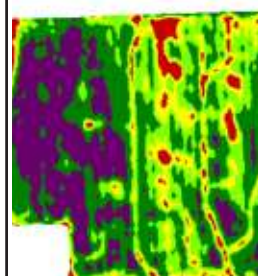
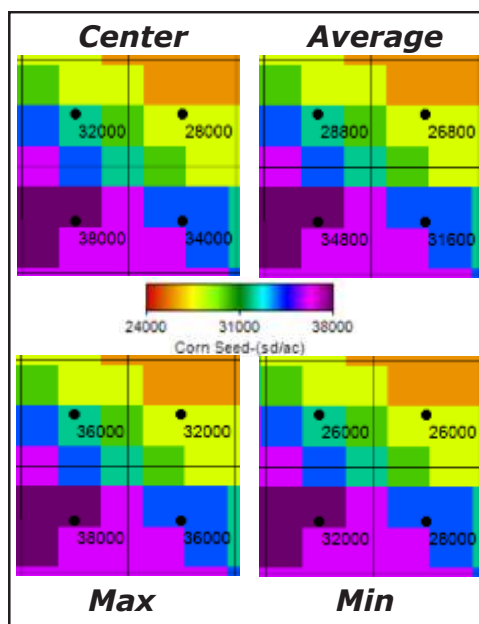
- If the xxx.grd matches a Product ID from the Fertilizer Database it will automatically populate the Max / Min Column Values in the database.
- If the xxx.grd does not match a Product ID from the Fertilizer Database it will assign the Max / Min Column Values from the xxx.grd Surface.



0 56 112
12-40-0-(lbs/Acre)

Cell Merge Mode—

- **Center**—returns the pixel value at the "Center" of the SHP Grid
- **Average**—returns the "Average" of the pixels under the SHP Grid (Will result in rates not in the .grd map)
- **Minimum**—returns the "Min" pixel value under the SHP Grid
- **Maximum**—returns the "Max" pixel value under the SHP Grid



24000 31000 38000
Corn Seed-(sd/ac)

Export Prescription Maps—Shape Grids

Exporting to a Shape Grid (cont.)

Note: in this example there are 3 maps turned on to show different functions.

Max Rate Count—

- **Infinite**— An infinite number of numeric values could be created by the "Cell Merging" routines, limited by "Rate Range" of the Prescription & "Precision" Ex. 0-120—with a precision of 0—could have 121 unique values. Same 0-120 with a precision of 1 could have 1,201
- **Apex (8)**—Will break up the rates into 8 "equal interval" rates.
- **JD Rx (175)**—Will break up the rates into 175 "equal interval" rates.
- **SMS (255)**—Will break up the rates into 255 "equal interval" rates.

NOTE: Equal Interval example using APEX 8, rates 0-120, rates will be 0,16,32,48,64,80,96,112. This tool only does "equal interval" creates rates that may not exist.

Source-

Location of the xxx.grd layer DO NOT edit this data.

DBFieldName-

Is generated by the NAME of the xxx.grd. If the .grd name starts with a # the software adds a "N" to the beginning of the name. These names can be edited, limit your names to abc123_ - characters and less than 10 digits. (NO . / , " \ ! ~ ` () * % # + = < > characters).

Precision—

Is the # of decimal points. If set to 2, the output number would be 36000.00 seeds/acre. In most cases set your "Precision" to "0".

Export-

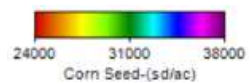
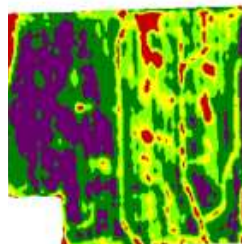
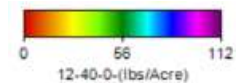
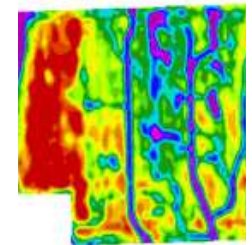
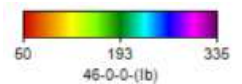
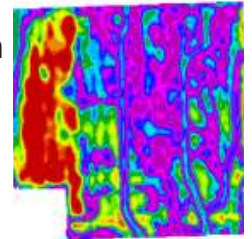
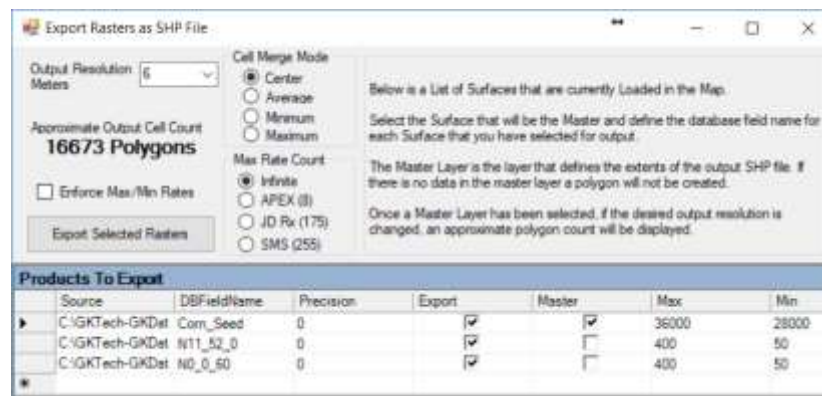
If checked, the layer is set for export. It will only export if it is in the "Extents" or "Area" of the "MASTER"

Master-

Sets the area of the maps to be exported. If the Master is 80ac of a 160ac field. No outputted map will be greater than the 80 acres that is the Master

Max & Min-

These values can be edited. See comments on the "Enforce Max/Min Rates" on the previous page. Checking- ON if there are no values beyond the Max/Min range will not cause harm in most cases.



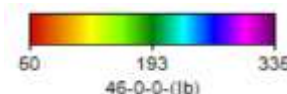
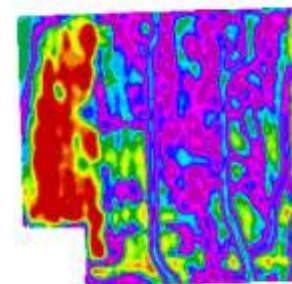
Export Prescription Maps—Shape Grids

Exporting to a Shape Grid (cont.)

Note: in this example there are 3 maps turned on to show different functions.

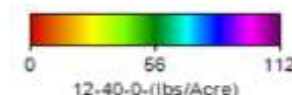
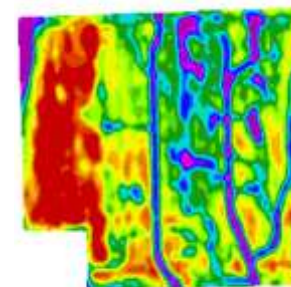
Most VRT Fertilizer maps (No zero rates or Max/Min)

Export Setting	Resolution 6 or 8 meter for most
Enforce Max/Min Rate	Do not check
Cell Merge Mode	Average
Max Rate Count	Infinite—normally (see controller notes)
Precision	"0"



VRT Maps built with "MAX/MIN" and Zero rates

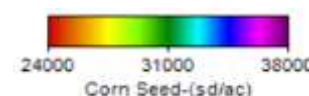
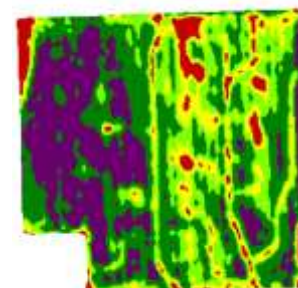
Export Setting	Resolution 6 or 8 meter for most
Enforce Max/Min Rate	Checked "ON"
Cell Merge Mode	Center
Max Rate Count	Infinite—normally (see controller notes)
Precision	"0"



VRT Maps built for Corn Seed or NOT Interpolated maps

—(hard zone breaks)—

Export Setting	Resolution 6 or 8 meter for most
Enforce Max/Min Rate	Do not check
Cell Merge Mode	Center
Max Rate Count	Infinite (always)
Precision	"0"



See individual CONTROLLER NOTES on the next pages.

Export Prescription Maps—Shape Grids

Ag Leader Insight & Integra—Controller Notes

VRT maps going to SMS or FarmWorks

Boundary – not required

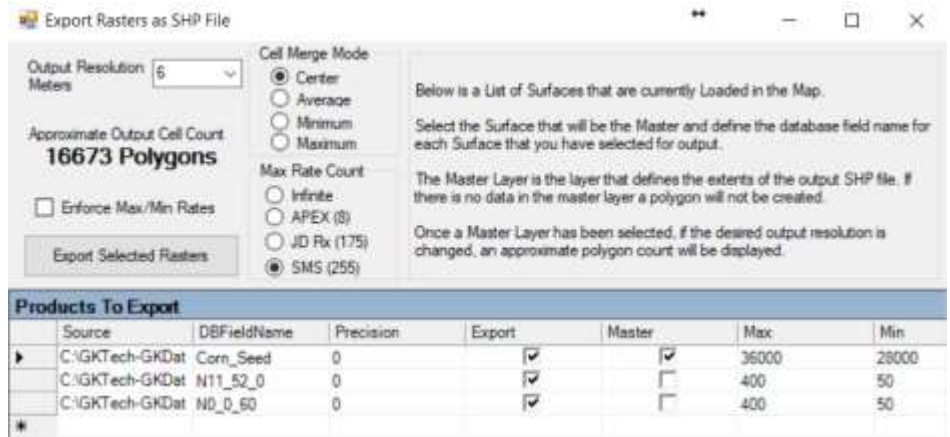
Output Resolution—

Recommend - 6 or 8 meter

Max Polygon count 50,000 -
(suggest 10,000 or less)

Cell Merge Mode –

“Center” for most maps



- Note: Multi-Product all 3 files can be sent out as “one shp” with 3 database columns.

Max Count Rate –

“SMS (255)” if using “Interpolated Maps”

“Infinite” if using “Hard Zone Breaks”

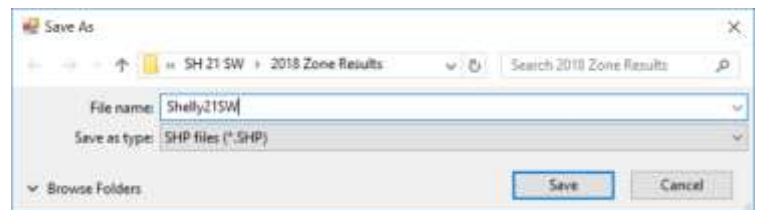
Note: Controller can NOT have more than 255 rates in the SHP file database

Note: **Corn Seed Maps**—Your CornSeed.grd map may need to be written K-Seed/Acre.

Meaning if you want 32,000 sds, your xxx.grd map should read a value of 32 k/sds

Precision -

Set to “0” (This is # of Decimal Points)



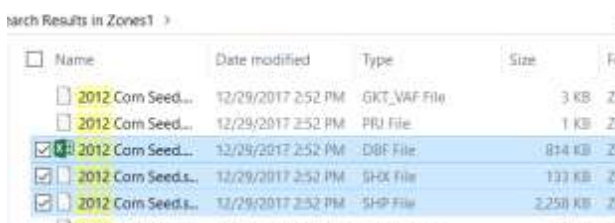
Click - “**Export Selected Rasters**”

In the Save As window “File Name” use the Field Name

Note: the location will default to the folder location of the xxx.grd map that is set as “MASTER”

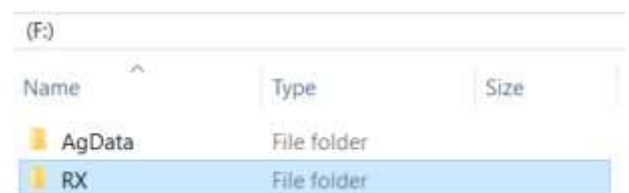
-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF files into folder named “**RX**” on the root of the CF data card or USB drive.



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Export Prescription Maps—Shape Grids

John Deer 2600 & 2630—Controller Notes

-Boundary – not required

Output Resolution—

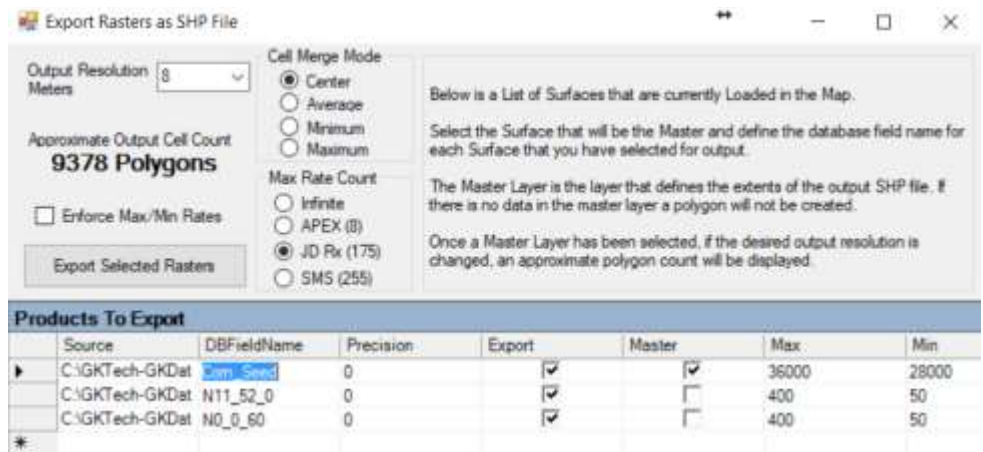
Recommend - 6 or 8 meter

Max Polygon count 10,000

Deere Suggests: 15 meter

Cell Merge Mode –

“Center” for most maps



- Note: Multi-Product all 3 files can be sent out as "one SHP" with 3 database columns. Doing "separate" SHP for each will work with 2600 & 2630 & 4600

Max Count Rate –

“JD Rx (175)” if using “Interpolated Maps”

“Infinite” if using “Hard Zone Breaks”

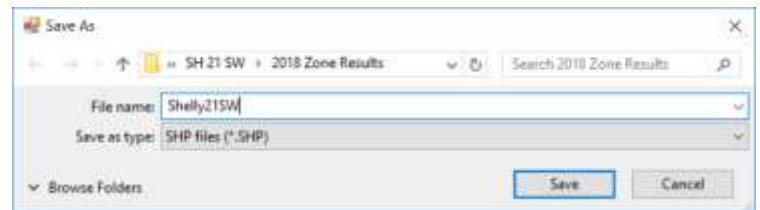
Note: Controller may have problems with more than 175 rates in the SHP file database

Precision -

Set to “0” (This is # of Decimal Points)

Click - “**Export Selected Rasters**”

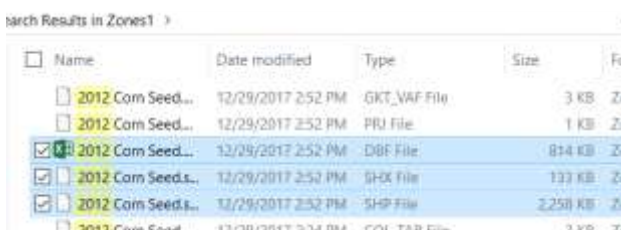
In the Save As window “File Name” use the Field Name



Note: the location will default to the folder location of the xxx.grd map that is set as “MASTER”

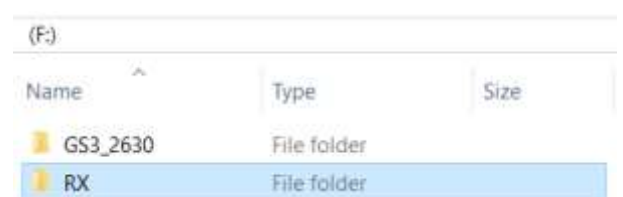
-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF inside of a folder named “**RX**” on the root of the CF data card or USB drive.



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Export Prescription Maps—Shape Grids

John Deere 4600—Controller Notes My John Deere—Command Center Rx files

Boundary – not required

**** NOTE: Each Product needs a separate export (separate Shapefile for each Product)**

Output Resolution—

Recommend - 6 to 15 meter

Max Polygon count 10,000

NOTE: Use same resolution for each Product.

Deere Suggests: 15 meter

- Note: Multi-Product all 3 files must be sent out as "separate SHP" for each product, 1 database/Rx.

Cell Merge Mode –

"Center" for most maps

Max Count Rate –

"JD Rx (175)" if using "Interpolated Maps"

Note: Controller may have problems with more than 175 rates.

"Infinite" if using "Hard Zone Breaks"

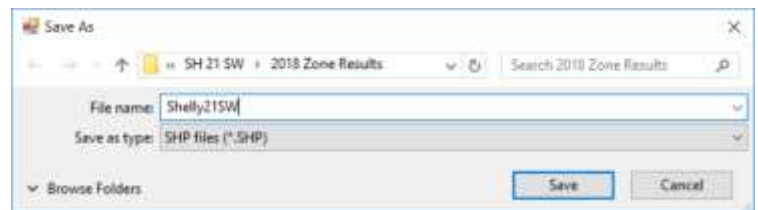
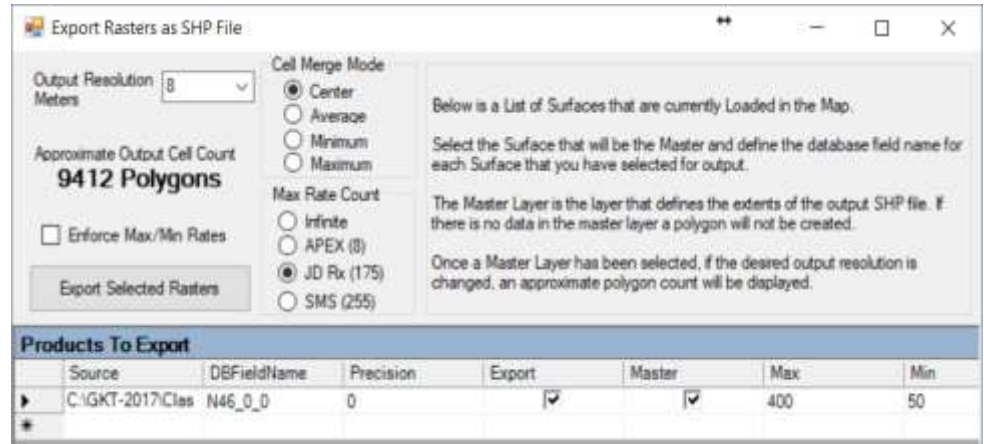
Precision -

Set to "0" (This is # of Decimal Points)

Click - **"Export Selected Rasters"**

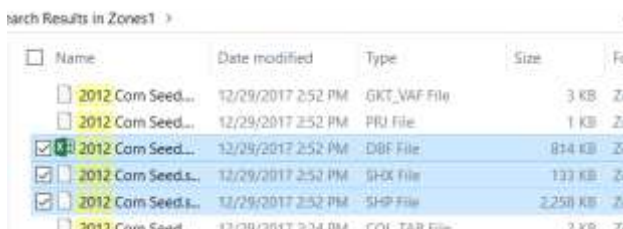
In the Save As window "File Name" use the Field Name

Note: the location will default to the folder location of the xxx.grd map that is set as "MASTER"



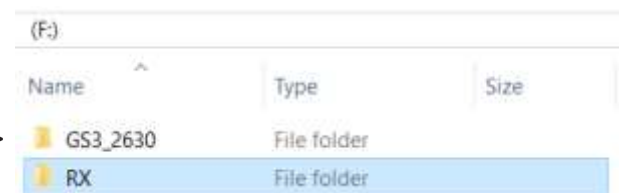
-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF inside of a folder named **"RX"** on the root of the CF data card or USB drive.



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Export Prescription Maps—Shape Grids

Precision Planting 20/20—Controller Notes

Boundary – Needed on data card.

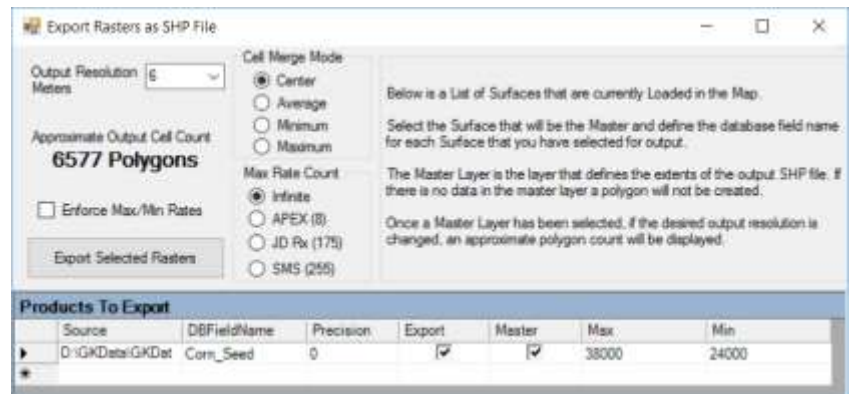
SUGGEST USING SHP Contour for this VRT map if “Hard Breaks”

Output Resolution—

Recommend - 6 to 10 meter

Max Polygon count 10,000

(20/20 suggests 15 meter)



- Note: Multi-Product all 3 files must be sent out as "one SHP" with 3 database columns.

Cell Merge Mode –

“Center” on all maps

Max Count Rate –

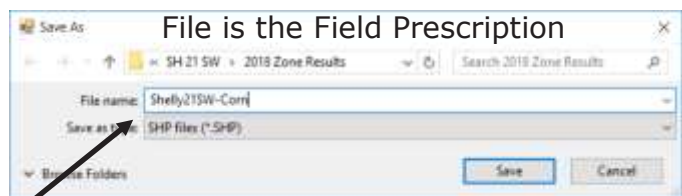
“Infinite”

Precision –

Set to “0” (This is # of Decimal Points)

Click - “Export Selected Rasters”

In the Save As window “File Name” use the “Field Name-Seed”



REPEAT previous steps. Save the second file using just the “Field name” (If controller has field boundaries, no need for this step, or you can export the “Actual Field Boundary.shp”)

Note: the location will default to the folder location of the xxx.grd map that is set by “MASTER”

-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF files on the ROOT of the USB Drive.

Make sure you move both the “field name” and the “field name-seed”

GKData > GK User Manual > GKT Farm > SH 8 SE > 2015 Zone Results >		
Name	Type	Size
SH8SE	DBF File	139 KB
SH8SE.shp	SHP File	895 KB
SH8SE.shx	SHX File	53 KB
SH8SE-Corn	DBF File	136 KB
SH8SE-Corn.shp	SHP File	876 KB
SH8SE-Corn.shx	SHX File	52 KB

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(F:)		
Name	Type	Size
2020 SeedSense	File folder	
SH8SE	DBF File	139 KB
SH8SE.shp	SHP File	895 KB
SH8SE.shx	SHX File	53 KB
SH8SE-Corn	DBF File	136 KB
SH8SE-Corn.shp	SHP File	876 KB
SH8SE-Corn.shx	SHX File	52 KB

Export Prescription Maps—Shape Grids

Raven Viper & Envizio - Controller Notes

-Boundary – not required

Output Resolution—

Recommend - 6 or 8 meter

Viper Pro & Viper 4 -Max Polygon count 50,000

Suggest 15,000 or less

Envizio Pro—Max Poly count 1,500

Viper Original—Max Poly count 4,000

Suggest using Shape Contour for Envizio Pro & Viper Original

- Note: Multi-Product all 3 files can be sent out as "one SHP" with 3 database columns.

Cell Merge Mode –

"Center" for most maps

Max Count Rate –

"Infinite" for all maps

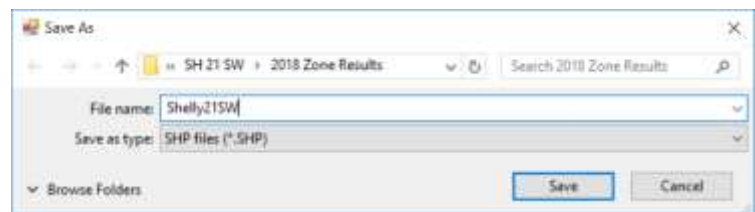
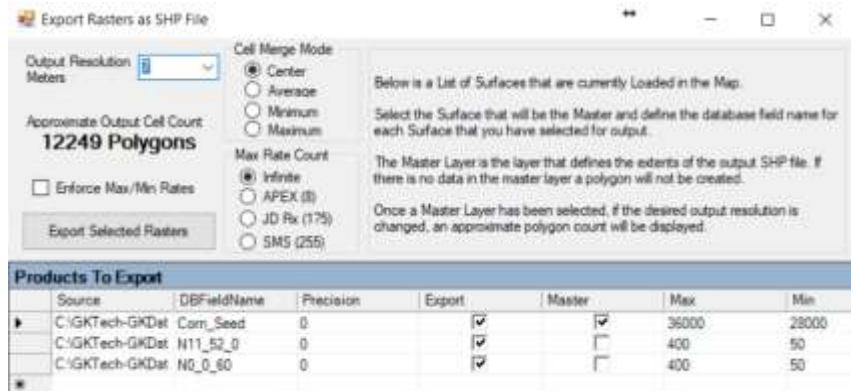
Precision -

Set to "0" (This is # of Decimal Points)

Click - **"Export Selected Rasters"**

In the Save As window "File Name" use the "Field Name"

Note: the location will default to the folder location of the xxx.grd map that is set as "MASTER"



-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF inside of the folder structure **"viper/misc/rxMaps"** on the root of the USB drive like show below on the right.

GKData > GK User Manual > GKT Farm > SH 8 SE > 2015 Zone Results		
Name	Type	Size
SH8SE60ac	DBF File	264 KB
SH8SE60ac	GKT_VAF File	2 KB
SH8SE60ac.shp	SHP File	876 KB
SH8SE60ac.shx	SHX File	52 KB

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(F:) > viper > misc > rxMaps		
Name	Type	Size
SH8SE60ac	DBF File	2,491 KB
SH8SE60ac.shp	SHP File	340 KB
SH8SE60ac.shx	SHX File	20 KB

Export Prescription Maps—Shape Grids

Topcon X30-C-3000—Controller Notes

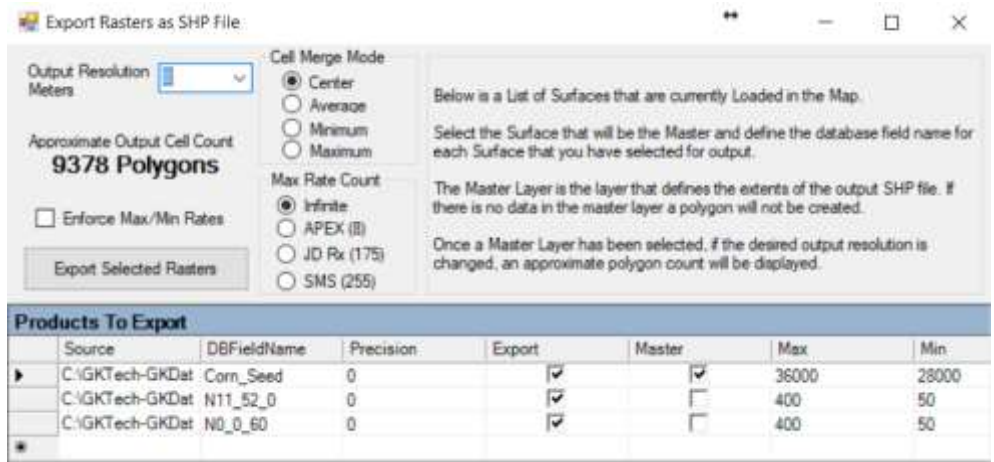
Boundary – not required

Output Resolution—

Recommend - 6 or 8 meter

Max Polygon count 30,000

Suggest 10,000 or less



-Note: Multi-Product all 3 files can be sent out as "one SHP" with 3 database columns.

Cell Merge Mode –

"Center" for all exports

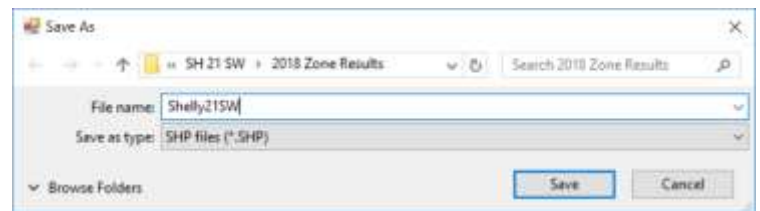
Max Count Rate –

"Infinite" for all exports

Precision -

Set to "0" (This is # of Decimal Points)

Click - "**Export Selected Rasters**"



In the Save As window "File Name" use the Field Name

Note: the location will default to the folder location of the xxx.grd map that is set as "MASTER"

-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF inside of the "**VRC**" folder on the root of the USB drive like show below on the right.

GKData > GK User Manual > GKT Farm > SH 8 SE > 2015 Zone Results		
Name	Type	Size
SH8SE60ac	DBF File	264 KB
SH8SE60ac	GKT_VAF File	2 KB
SH8SE60ac.shp	SHP File	876 KB
SH8SE60ac.shx	SHX File	52 KB

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(F:) >		
Name	Type	Size
VRC	File folder	

Export Prescription Maps—Shape Grids

Trimble EZGuide-FMD-FMX-2050-Controller Notes

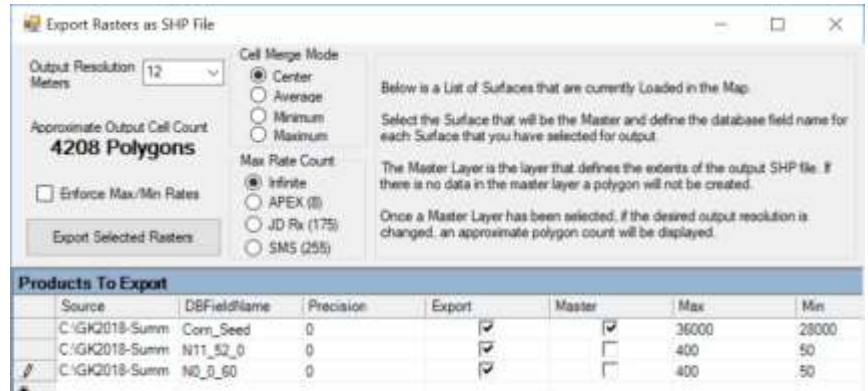
Boundary – not required

Output Resolution— count or less
FMD/FMX-Max Polygon count 5,000

2050 -Max Polygon count 5,000

EZGuide 500-Max Poly count 1,500

EZGuide 750-Max Poly count 1,500



**** Single Products—suggest Shape Contour or Dissolved SHP****

****Multiple Products NO Dissolve SHP and NO SHP Contours - Use Shape Grid****

- Note: Multi-Product all 3 files must be sent out as "one SHP" with 3 database columns.

Cell Merge Mode –

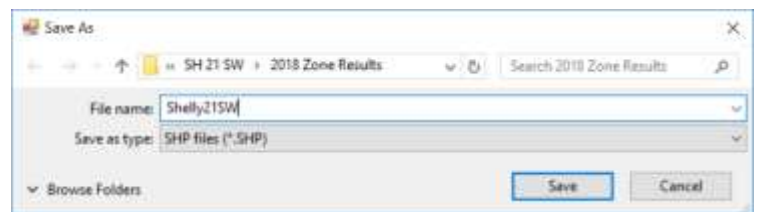
"Center" for all maps

Max Count Rate –

"Infinite" for all exports

Precision -

Set to "0" (This is # of Decimal Points)



Click - **"Export Selected Rasters"**

In the Save As window "File Name" use the Field Name

Note: the location will default to the folder location of the xxx.grd map that is set as "MASTER"

-Export will create a Shape file which exists as a xxx.shp / xxx.shx / xxx.dbf files)

Move the SHP/SHX/DBF inside of the folder structure **"AgGPS / Prescriptions"** on the root of the USB drive like show below on the right.

GKData > GK User Manual > GKT Farm > SH 8 SE > 2015 Zone Results

Name	Type	Size
SH8SE60ac	DBF File	264 KB
SH8SE60ac	GKT_VAF File	2 KB
SH8SE60ac.shp	SHP File	876 KB
SH8SE60ac.shx	SHX File	52 KB

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(F:) > AgGPS > Prescriptions

Name	Type	Size
SH8SE60ac	DBF File	2,491 KB
SH8SE60ac.shp	SHP File	340 KB
SH8SE60ac.shx	SHX File	20 KB

Export Prescription Maps—Round to Increment

Round to Increment—Surface.grd

There are many uses for this tool. A common example would be working with a controller that has a limit to the number of Polygons or Rates or BOTH. Below is a 46-0-0 map that is going out to a Trimble Easy Guide 500. Controller is limited to 1,500 polygons and 255 rates. Example uses (20)-shows how the rates will become 160-180-200-220 and so on.

1. Turn on the Rx.grd map to be Rounded.

2. Click on the "Intra-Layer Math" button on bottom toolbar.

3. Check the "Round to Increment" option

4. Type in the "Increment Interval" you want on the map.

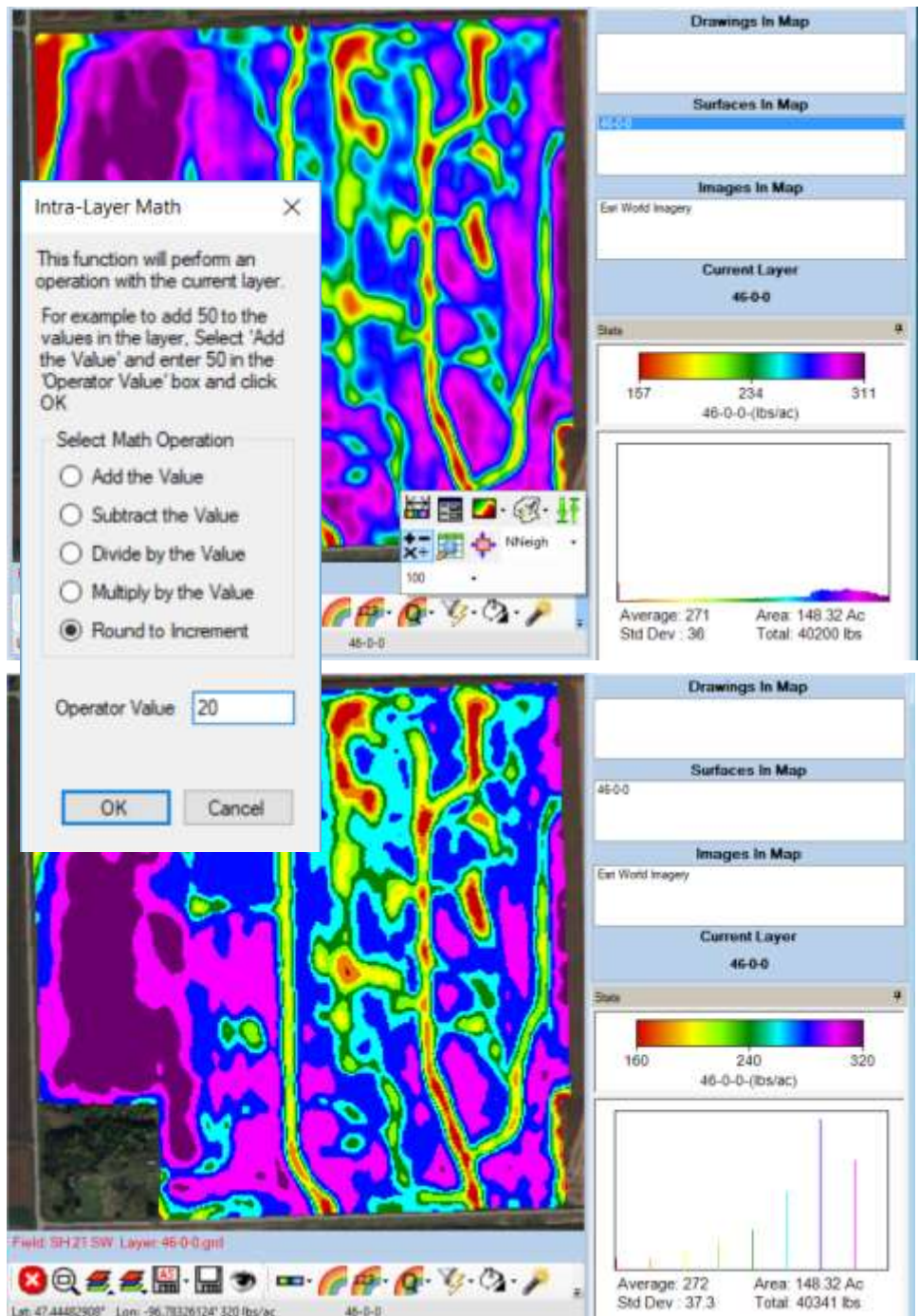
5. Click "OK"

Note: the Average & Totals will change slightly.

6. If maps look good, Click the "Save" or "Save As" button.

Highly Suggested: use as a SURFACE round to Increment User can PRINT the surface maps getting all the rates, breaks and totals.

7. Now maps can be exported using whatever method you choose. (contour/grid/fodd) SHP with Dissolve is suggested



Export Prescription Maps—Round to Increment

Round to Increment—SHP Files

There are many uses for this tool. A common example would be working with a controller that has a limit to the number of Polygons or Rates or BOTH. Below is a 46-0-0 map that is going out to a Trimble Easy Guide 500. Controller is limited to 1,500 polygons and 255 rates. Example uses (20)-shows how the rates will become 160-180-200-220 and so on.

1. Turn on the Rx.SHP map to be Rounded.
2. Click on the "Perform a Math Operation on a Column" button on bottom toolbar.
3. Choose Column to Modify.
4. Check the "Round to Increment" option
5. Type in the "Operator Value" & Click "OK"
6. If Values in Database look good, Click the "Save" or "Save As" button.

Prefer doing Round to Increment on Surfaces so they can be printed. Then Exported as a SHP.

7. Now maps can be handed off to most controllers that support SHP.

NOTE: Look at using "Dissolve" drawing tool

Reminder: Color bar in lower Right is for SURFACE not SHP.

The screenshot displays the ADMS software interface. The main map area shows a color-coded prescription map. A 'Column Math' dialog box is open, showing the 'Database Column to Modify' as 'N46_0_0'. The 'Operator Value' is set to 20, and the 'Round to Increment' option is selected. The 'Database' table at the bottom shows the results of the operation, with columns for 'N46_0_0', 'N11_52_0', 'GKT_IDX', 'GKT_Length', and 'GKT_Area'. The 'GKT_Area' column shows values ranging from 160 to 320. The 'Database' table also shows a 'Records' count of 16686.

N46_0_0	N11_52_0	GKT_IDX	GKT_Length	GKT_Area
260	120	1	78.74	0.009
240	120	2	78.74	0.009
240	120	3	78.74	0.009
240	120	4	78.74	0.009
240	120	5	78.74	0.009
240	120	6	78.74	0.009
240	120	7	78.74	0.009

Export Prescription Maps—Dissolve

Drawing Tools—Dissolve an Rx Map

The Dissolve tool is a “Drawing Tool” feature that will group unique values from a Column in the Database of the SHP file. Example below will show a 46-0-0 map that is in 20 lbs increments as a SHP Grid at 6 meter resolution with 16,686 polygons and 9 rates. The Finished 46-0-0 map will have 9 polygons and 9 rates.

1. Turn on your Rx.shp File (Example 46-0-0.shp)

2. Either go to the “Drawing Tools” tab on the Left side or Right Click on the Rx.shp and choose “Shape Tools”. Both get the same options.

3. Choose “Dissolve”

4. Make sure the “Use Selected Only” is NOT checked on.

5. Click the Dropdown for “Field to Aggregate” Choose correct column. (Ex-N46-0-0)

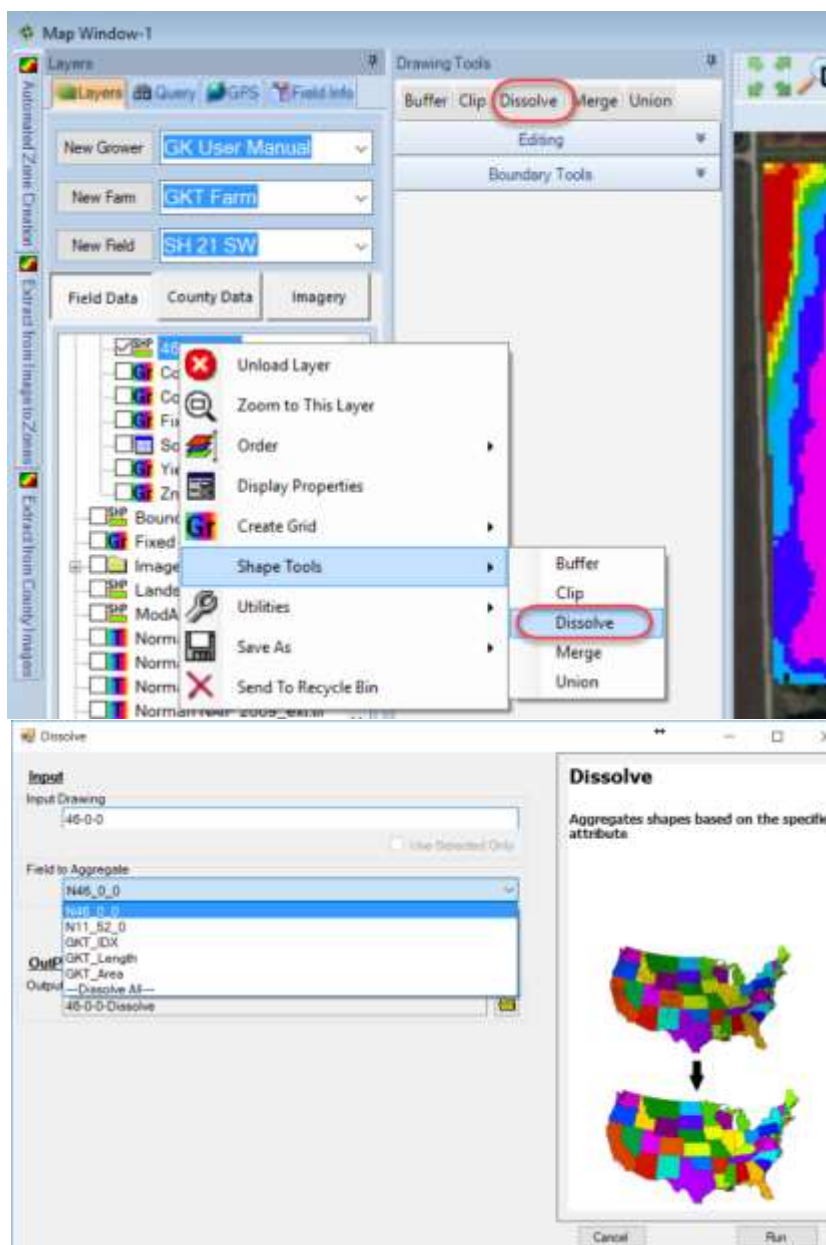
6. Set your output name. Cannot be the same as any SHP already in the folder with Rx.shp

Suggestion: Use Default name and renaming later.

7. Click “Run”

Rx-Dissolve.shp is created. It only has 46-0-0 in the Database. There is no 11-52-0 in the new SHP file.

Function can be done on SHP Grid or SHP Contours.



N46_0_0	GKT_IDX	GKT_Length	GKT_Area
260	1	76417.32	20.958
240	2	57834.65	12.205
280	3	79015.75	45.787
300	4	45708.66	30.21
220	5	40314.96	7.553
160	6	8149.61	3.478
200	7	28385.83	6.031
180	8	15000	2.873
320	9	13543.31	19.339

Export Prescription Maps—Shape Contour

Shape Contours to All Controllers Interpolated VRT Maps

Below are instructions for exporting Shape files as "Contoured" Polygons. This function only processes 1 product.grd per SHP file export. These instructions are for "Interpolated" xxx.grd maps.

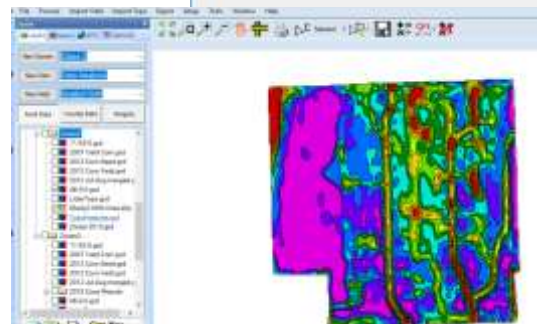
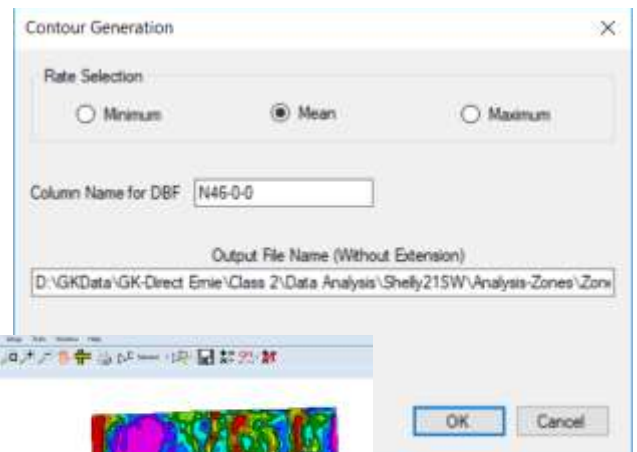
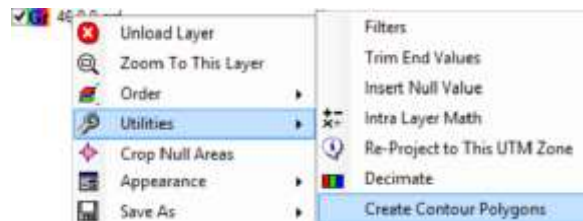
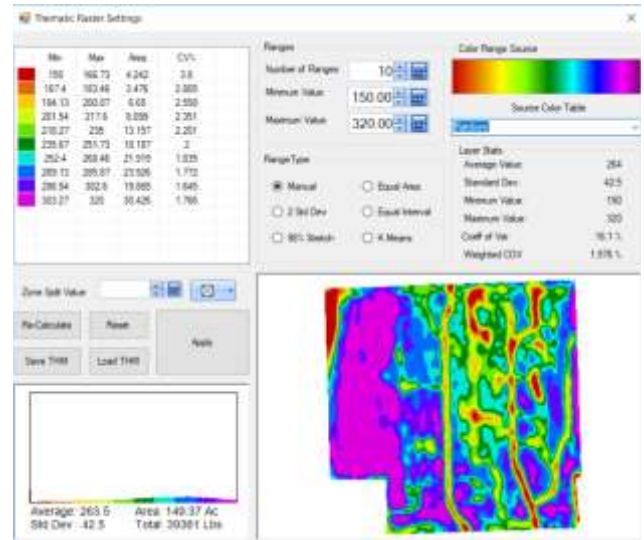
-Boundary – not required

1. Check on the "Product.grd" to export
(only export 1 at a time, Ex.- 46-0-0)
2. Click on the **"Thematic Color"** button 
3. Number of Ranges 5 to 12 for "Interpolated Maps"
4. Range Type = Usually "Equal Interval"
5. Source Color table ="Rainbow"
6. Click **"Apply"**
7. Right Click on the File name "46-0-0.grd"
Click—"Utilities" & **"Create Contour Polygons"**
8. This will open the "Contour Generation" Window
9. Choose your "Rate Selection" (suggest "Mean")
10. Leave the settings as they auto-populate.
DO NOT—Rename
11. Click **"OK"**
12. Created a SHP—46-0-0.shp
-Check "Database" if controller is limited polygons.
13. Re-Name to Field ID-Product.shp
(Ex. - SH8SE-Urea.shp)

SHP files are now ready to move to Controller. See the previous pages for export notes on file structure.

Note: using this process on "interpolated" maps the total LBS of product may change a significantly.

You may want to do a "Create Grid from Polygons" to create a new application.grd to print for LBS of product.



Export Prescription Maps—Shape Contour

Shape Contours to All Controllers Not Interpolated VRT Maps

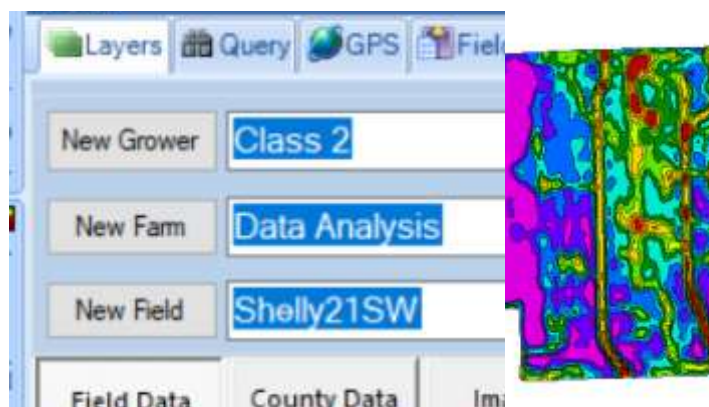
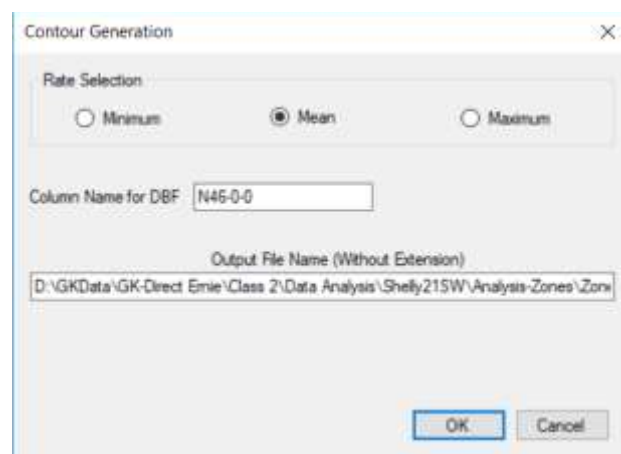
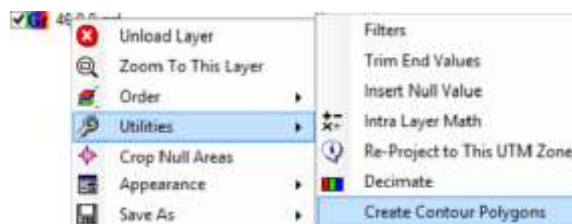
Below are instructions for exporting Shape files as “Contoured” Polygons. This function only processes 1 product.grd per SHP file export. These instructions are for “No Interpolation” xxx.grd maps. It is recommend that the Non-Interpolated map, suggest that you have 5 to 12 ranges of application rates.

-Boundary – not required

1. Check on the “Product.grd” to export
(only export 1 at a time, Ex.– 46-0-0)
2. Set your color to “Rainbow”
3. Right Click on the File name “46-0-0.grd”
Click—“**Utilities**” & “**Create Contour Polygons**”
4. This will open the “Contour Generation” Window
5. Choose your “Rate Selection” (suggest “Mean”)
6. Leave the settings as they auto-populate.
DO NOT—Rename
7. Click “**OK**”
8. Created a SHP—46-0-0.shp
-Check “Database” if controller is limited polygons.

9. Re-Name to Field ID-Product.shp
(Ex. - SH8SE-Urea.shp)

SHP files are now ready to move to Controller. See the previous pages for export notes on file structure.



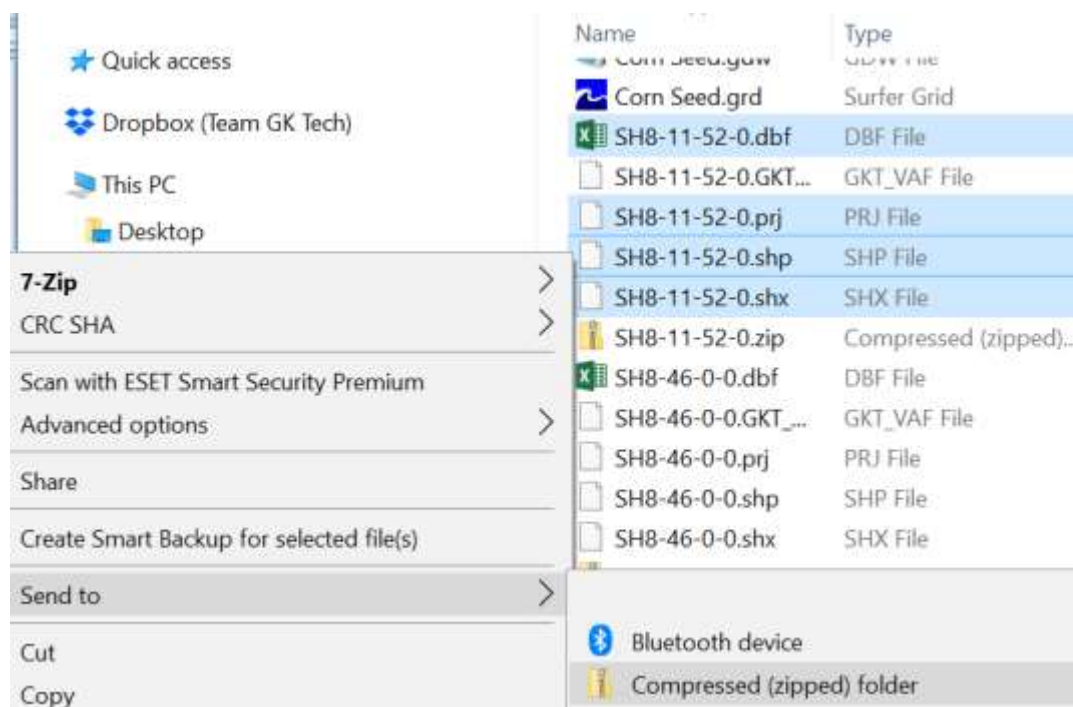
Exporting Prescription Maps

SHP Files to JD Operations Center

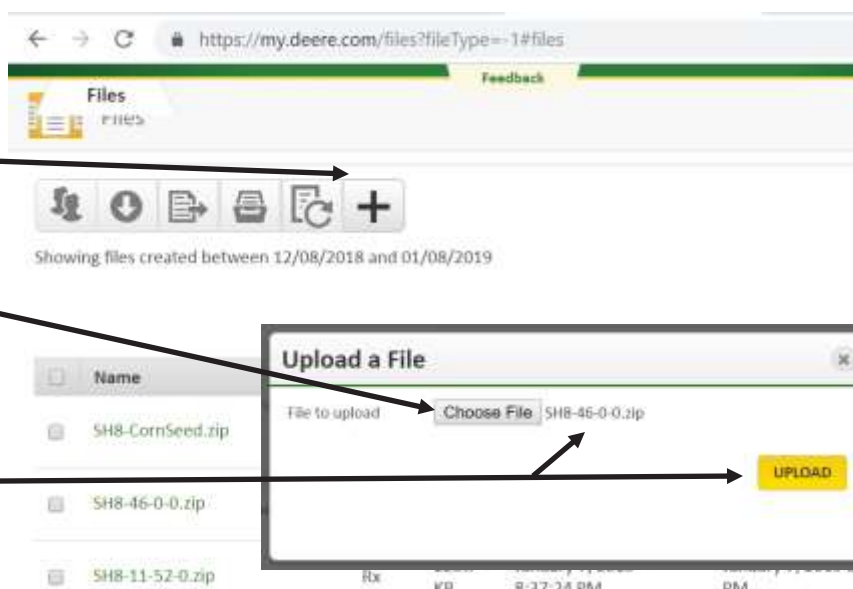


1. This function is done in "File Explorer"
2. Files have been exported as SHP file Rx maps (SHP Grid or SHP Contours).
3. Open the file "Folder" with the Shape files.
4. Highlight or Select the "SHP / SHX / DBF / PRJ" files for 1 field and 1 product
5. Right Click on highlighted file and choose "Send to" and "Compressed (zipped) folder"
6. Repeat for each product.

NOTE: Multiple Shape files in one xxx.zip will not load into "my.JD"



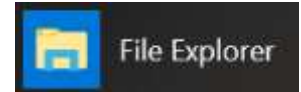
7. Go to "my.deere.com"
8. Browse to Operation Center / Tools / Files /
9. In "Files" window Click the " + "
10. "Upload a File" window will open. Click "Choose File"
11. In File Explorer find the xxx.zip files. (only 1 at a time)
12. You will now see the "xxx.zip" file name and Click "Upload"



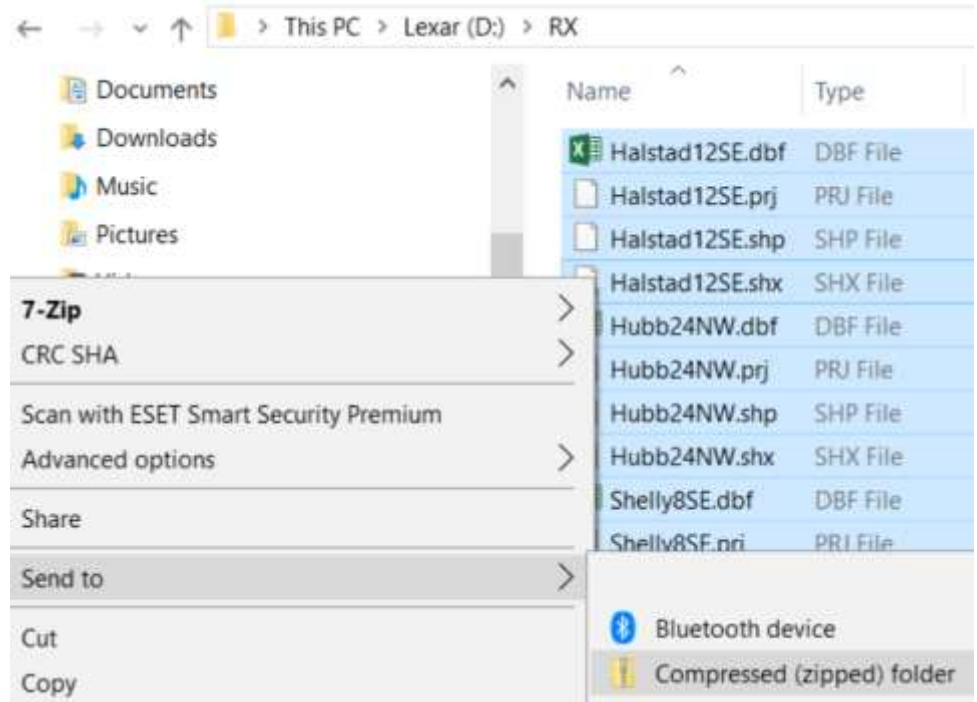
Repeat 7-12

Exporting Prescription Maps

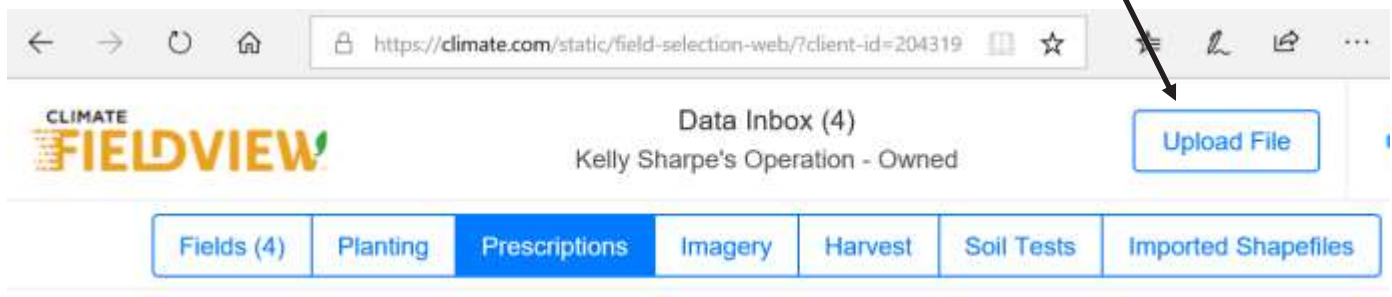
SHP Files to Climate Field View



1. This function is done in "File Explorer"
2. Files have been exported as SHP file Rx maps (SHP Grid or SHP Contours).
3. Save all you files back to 1 location as you were sending them to USB.
4. Once all the files are in one location, "Highlight or Select" all the files.
5. Right Click on the files, choose "Send to" and "Compressed (zipped) folder"
6. Repeat for other Farms



7. Go to your preferred "FieldView" account.
8. Browse to Import and highlight "Prescriptions", then click "Upload File".
10. In File Explorer find the xxx.zip file you created.
12. Once you click "Open" the system unzips and stores files in their system. May take a while for maps to be viewable in the system.



Exporting Prescription Maps

Rx Map to a John Deere GS2—GS3 (2600—2630) as GRX

Note: 4600 does NOT support GRX files!

Layers:

Check the layers to be exported to the rate controller card.

Grid Res (meters):

We recommend leaving the "Grid Res (meters)" at "3". This should work with almost all field sizes.

(Reducing this down to 1 meter is recommended if you are doing test strips in the field.)

Rate Count:

This is the number of "Rates" that will be written into the map. For seeding, drop the "Rate Count" to the number of different seeding rates in the field. (You may want to reduce this if you are exporting a Corn seed map that only has 8 rates).

Field ID:

This will automatically populate. You may need to shorten the name due to the fact that the finished product will pull its name from this column.

Export Path:

Always write the GRX files out to the root of a jump drive or a data card. Also, you can only have 30 prescriptions in the GRX folder per data card. Do NOT save a GRX folder within an existing GRX folder!

The maps will NOT work if you do!!

Product Name:

Select the type of product to be applied. (These can be modified & added in the Database tab.) If your product does not show up in the list, go to "Database" and "Products".

Out Of Field Rate:

This is the rate used when traveling outside of the field boundary.

Lost GPS Rate:

This is the rate used when the GPS signal is lost.

Unit of Measure:

This is the unit of measure for the desired application. Match this to the prescription map.

Rx Type:

- **Liquid applicators** get "Application By Volume"
- **Dry Fert** gets "Application By Mass"
- **Row crop planters** get "Seeding By Count"
- **Air seeders with seed** get "Seeding By Mass"

Final Step: Click "Export"

NOTE: Seeding / Planting & Liquid products - must re-select the "Rx Type" & "Units of Measure" before "Export"

Export Prescription Maps - FODM Device

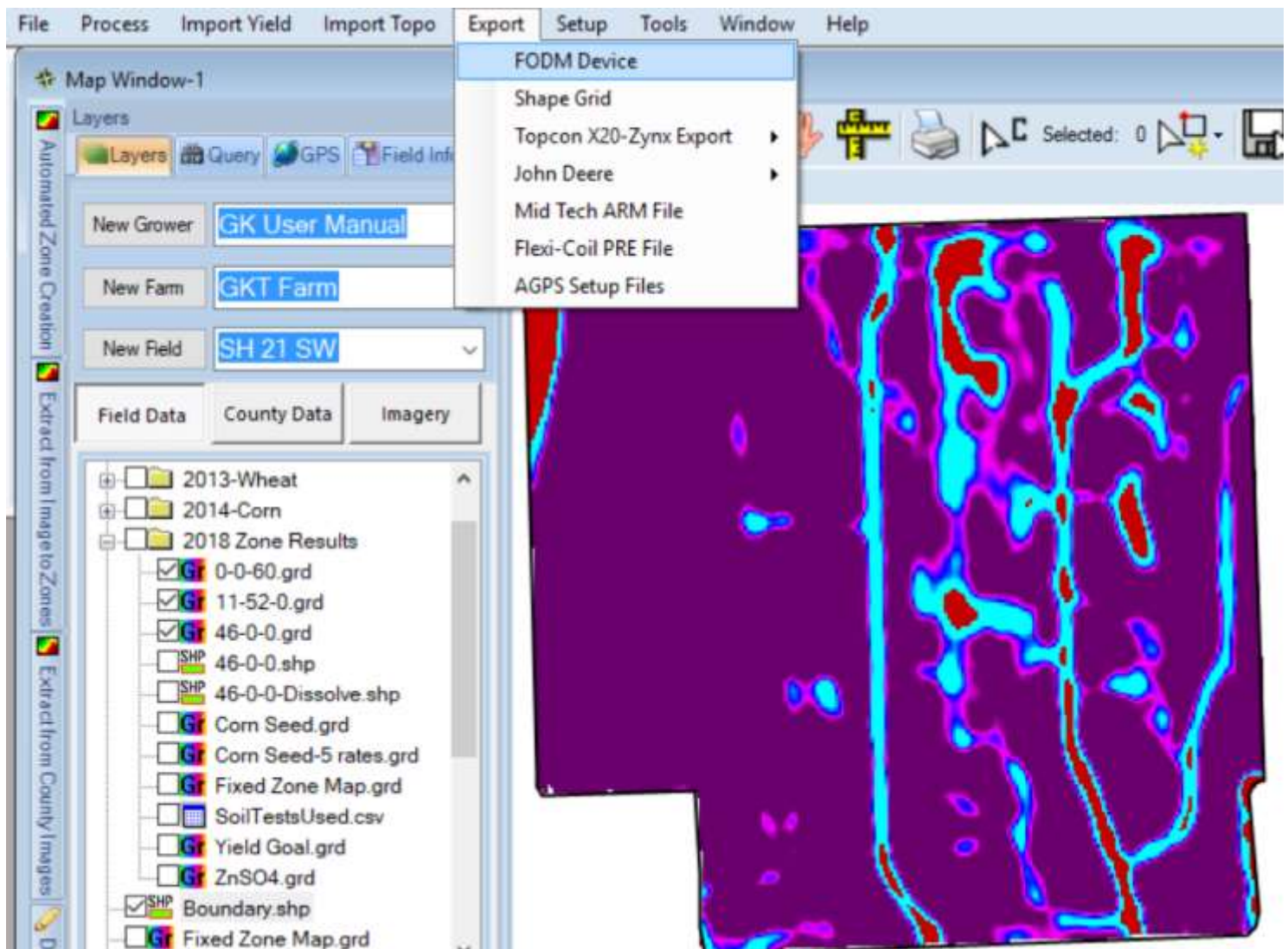
Exporting to a FODM Device

Exporting Fertilizer Prescriptions is recommended only in “**Map Window**”. You will need to go to this window to print out your maps.

Make sure the “Field Boundary.shp” is turned on and the Surface Maps to export. Nothing else should be turned on at this time.

NOTE: Export 1 FIELD at a time with multiple products per FIELD.

See the Following Pages for Instructions for YOUR Controller.



Export Prescription Maps—FODM Device

Exporting Prescription Maps

1. **"Export Rasters to FODM Device"** window and under the Field Info make sure the Grower, Farm, and Field are correct

2. Select the field boundary.

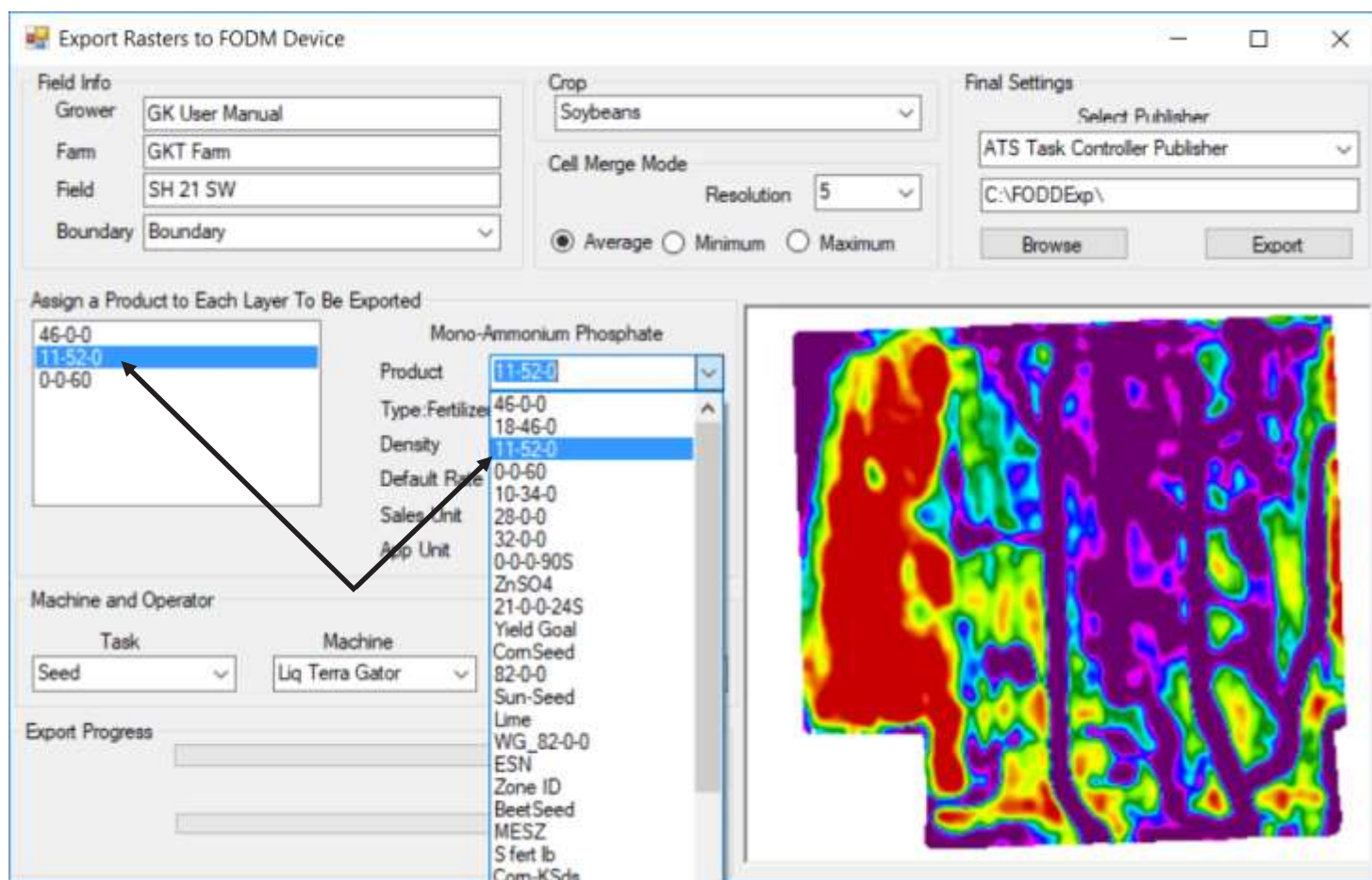
Note: Poly-Polygons may cause problems?



3. Next, **"Assign - Product To Each Layer To Be Exported"**. This is done by "Selecting" or "Highlighting" the Prescription name and choosing the correct "Product" from the drop down list.

NOTE: Default rate must be set in the "Setup" & "Fertilizers" buttons.

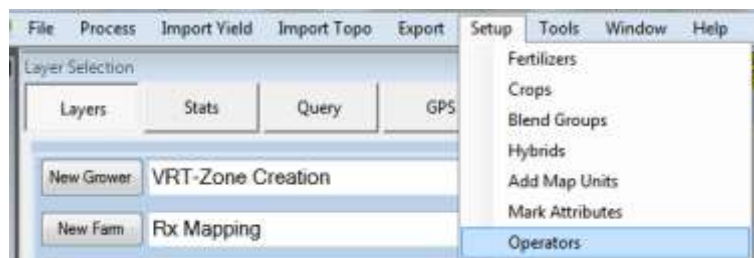
4. Choose your "Task"



Export Prescription Maps—FODM Device

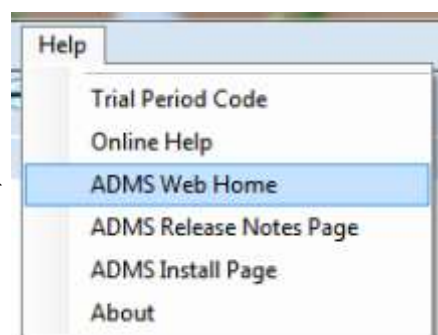
Exporting Prescription Maps

- Choose the Task, Machine and Operator for the application. If you would like to add a Task, Machine, or Operator, this can be done by Going to "Setup" >> Tasks, or "Setup">> Operators.

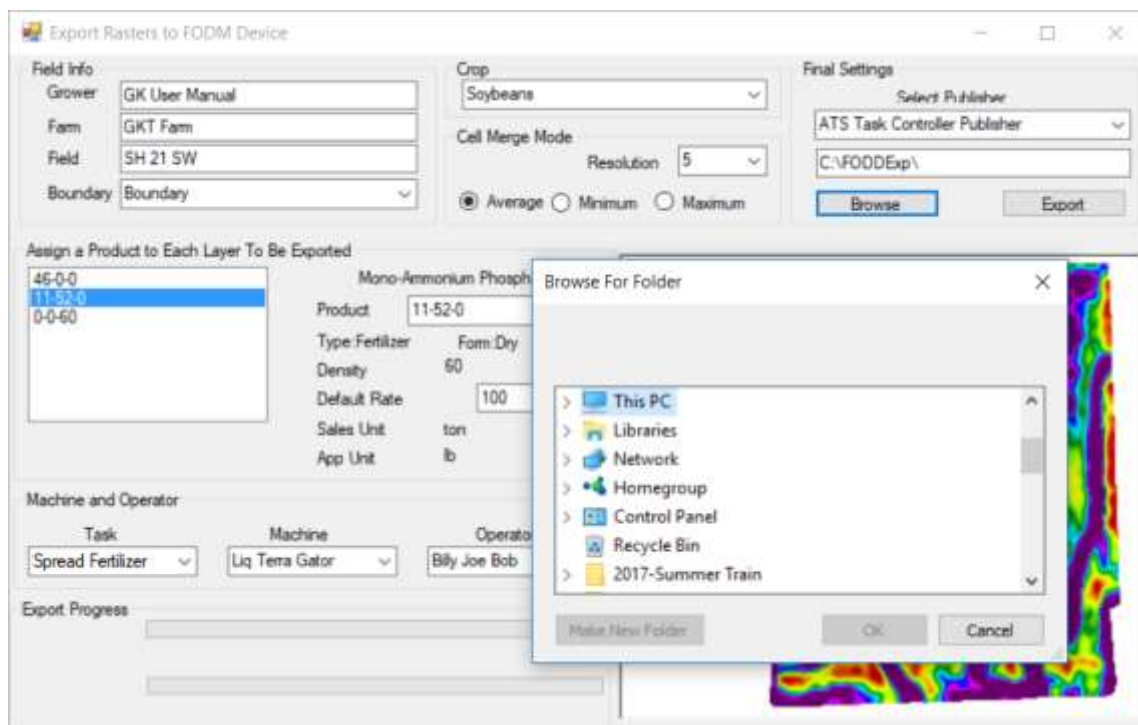


- Now you need to select the controller you will be using. Under the "Final Settings", use the "Select Publisher" pull-down menu to find the controller you are using for application.

Note: Missing Publisher" (Controller) go to the "Help" button.



- Use the "**Browse**" Button to select where you want the file exported. Usually save to the C:\FODDExp\
- Now, you are ready to export files. Select the "**Export**" Button. This may take several minutes. When the Export is complete, copy the files to the appropriate media and take the files to the controller or applicator.



Export Prescription Maps—FODM Device

Falcon 2 Controllers

- Extension Created– xxxx.tif
- Boundary – not required to be turned on or selected from drop down
- Assign each map to its appropriate product
- Output resolution – normally set to 6 meters (Good for fields up to 1.25 miles long)
Note-this is raster based and cannot exceed 350 x 350 pixels
- Select Publisher – ATS Falcon Publisher
- Browse – Save the file back into the “Field” folder location
- Filename Template - %FarmName%\%FieldName%\%CropName%\%TaskName%\%ProductName%
- Cell Size – 6 meters (Value same as previous screen)
- Cell Rate Method - Weight Average
- Requires Dealer ID – 6 digit spreader ID
 - Note: Multiple maps for the same field MUST be exported at the same time. If they are not, you will get an error while trying to load maps in the spreader (Fields are not the same size).

The screenshot shows the 'Export Rasters to FODM Device' dialog box. The 'Field Info' section includes fields for Grower (GK User Manual), Farm (GKT Farm), Field (SH 21 SW), and Boundary (Boundary). The 'Crop' dropdown is set to 'Corn (Wet)'. The 'Cell Memo Mode' is set to 'Average'. The 'Final Settings' section shows 'Select Publisher' as 'ATS Falcon Publisher'. The 'Assign a Product to Each Layer To Be Exported' section shows a list of products with '11-52-0' selected. The 'Machine and Operator' section shows 'Task' as 'Spread Fertilizer', 'Machine' as 'Liq Terra Gator', and 'Operator' as 'Billy Joe Bo'. The 'Export Progress' bar is green and labeled 'FODD Summary Completed'. The 'Publisher Properties Editor' sub-dialog is open, showing the 'Filename Template' as '%FarmName%\%FieldName%\%CropName%\%TaskName%\%ProductName%', 'Cell Size' as '6 meters', and 'Cell Rate Method' as 'Value at Cell Centroid'. The 'Dealer ID' is set to '123456'.

Setting	Value
Dealer ID	123456

Export Prescription Maps—FODM Device

Falcon VT-AGCO GTA-Amity—ISO

- Extension Created- Multi File system, creates "TaskData" folder Unique for each field containing a GRD00000.bin / TaskData.xml / tc.xls files
- Boundary - is required to be turned on and selected from the drop down list
- Assign each map to its appropriate product
- Output resolution - normally set to 8 meters
 - Note-this is raster based prescription map
- Select Publisher - ATS Task Controller Publisher
- Browse - Save the file back into the "Field" folder location
- Cell Size - 8 meters (Value same as previous screen)
- Cell Merge Mode - Average
 - Note: Multiple maps for the same field MUST be exported at the same time.
- Cell Rate Method - Value at Cell Centroid
- Task Controller Version—Final Draft - Version 1
- Merge—No on first export (Yes if you want to send more fields to same card)
- ISO Compliant—No

The "TaskData" folder must go on the ROOT of the USB drive, not inside any other folders.

The screenshot shows the 'Export Rasters to FODM Device' dialog box. The 'Field Info' section includes: Grower (GK User Manual), Farm (GKT Farm), Field (SH 21 SW), and Boundary (Boundary). The 'Crop' is set to 'Corn (Wet)'. The 'Cell Merge Mode' is set to 'Average'. The 'Final Settings' section shows 'Select Publisher' as 'ATS Task Controller Publisher'. The 'Assign a Product to Each Layer To Be Exported' section shows a list of products with '11-52-0' selected. The 'Machine and Operator' section shows 'Task' as 'Spread Fertilizer', 'Machine' as 'Liq Terra Gator', and 'Operator' as 'Billy Joe Bo'. The 'Export Progress' bar is green and labeled 'FODD Summary Completed'. The 'Publisher Properties Editor' sub-dialog is open, showing 'Filename Template' as an empty field, 'Cell Size' as '8 meters', and 'Cell Rate Method' as 'Value at Cell Centroid'. The 'Publisher Properties Editor' also contains a table with the following data:

Setting	Value
Task Controller Vers...	Final Draft - Version 1
Merge	No
ISO Compliant	No

The 'Export' and 'Cancel' buttons are at the bottom of the 'Publisher Properties Editor'.

Export Prescription Maps—FODM Device

Topcon X30 / Massey Ferguson C-3000—ISO

- Extension Created- Multi File system, creates "TaskData" folder Unique for each field containing a GRD00000.bin / TaskData.xml / tc.xls files
- Boundary - is required to be turned on and selected from the drop down list
- Assign each map to its appropriate product
- Output resolution - normally set to 8 meters
 - Note-this is raster based prescription map
- Select Publisher - ATS Task Controller Publisher
- Browse - Save the file back into the "Field" folder location
- Cell Size - 8 meters (Value same as previous screen)
- Cell Merge Mode - Average
 - Note: Multiple maps for the same field MUST be exported at the same time.
- Cell Rate Method - Value at Cell Centroid
- Task Controller Version—Final Draft - Version 1
- Merge—No on first export (Yes if you want to send more fields to same card)
- ISO Compliant—No

The "TaskData" folder must go inside a "VRCXML" folder on the ROOT of the USB drive.

The screenshot shows the 'Export Rasters to FODM Device' window. The 'Field Info' section includes: Grower (GK User Manual), Fam (GKT Fam), Field (SH 21 SW), and Boundary (Boundary). The 'Crop' is set to 'Corn (Wet)'. The 'Final Settings' section shows 'Select Publisher' as 'ATS Task Controller Publisher'. The 'Assign a Product to Each Layer To Be Exported' section lists layers: 46-0-0, 11-52-0 (selected), and 0-0-60. The 'Machine and Operator' section shows 'Task' as 'Spread Fertilizer', 'Machine' as 'Liq Terra Gator', and 'Operator' as 'Billy Joe Bo'. The 'Export Progress' bar is green, and the status is 'FODD Summary Completed'. The 'Publisher Properties Editor' sub-dialog is open, showing 'Filename Template' (empty), 'Cell Size' (8 meters), and 'Cell Rate Method' (Value at Cell Centroid). A table in the sub-dialog lists settings: Task Controller Vers... (Final Draft - Version 1), Merge (No), and ISO Compliant (No). The 'Export' and 'Cancel' buttons are at the bottom.

Setting	Value
Task Controller Vers...	Final Draft - Version 1
Merge	No
ISO Compliant	No

Export Prescription Maps—FODM Device

Pro 700 / IntelliView Plus II—ISO Compliant (v2.0)

-Extension Created – Multi File system, creates “TaskData” folder Unique for each field containing a GRD00000.bin / TaskData.xml / tc.xls files

-Boundary – is required to be turned on and selected from the drop down list

-Assign each map to its appropriate product

-Output resolution – normally set to 8 meters

Note-this is raster based prescription map

-Select Publisher – ATS Task Controller Publisher

-Browse – Save the file back into the “Field” folder location for single field export

Save back to “FODDExp” folder for multiple field export

-Cell Size – 8 meters (Value same as previous screen)

-Cell Merge Mode - Average

-Choose the appropriate device

Note: Multiple maps for the same field MUST be exported at the same time.

-Cell Rate Method - Value at Cell Centroid

-Task Controller Version—Final Draft - Version 2

-Merge—No on first export (Yes if you want to send more fields to same card or location)

-ISO Compliant—Yes

The “TaskData” folder must go on the ROOT of the USB drive, not inside any other folders.

Export Rasters to FODM Device

Field Info

Grower: GK User Manual

Farm: GKT Farm

Field: SH 21 SW

Boundary: Boundary

Crop

Corn (Wet)

Cell Merge Mode

Average

Final Settings

Select Publisher: ATS Task Controller Publisher

Assign a Product to Each Layer To Be Exported

46-0-0

11-52-0

0-0-60

Product: 11-52-0

Type: Fertilizer

Density: 60

Default Rate: 100

Sales Unit: ton

App Unit: lb

Machine and Operator

Task: Spread Fertilizer

Machine: Liq Terra Gator

Operator: Billy Joe Bo

Export Progress

FODD Summary Completed

Publisher Properties Editor

Filename Template

Cell Size: 8 meters

Cell Rate Method: Value at Cell Centroid

Setting	Value
Task Controller Vers...	Standard - Version 2
Merge	No
ISO Compliant	Yes

Export Cancel

Export Prescription Maps—FODM Device

Ag Leader PF3000 - Insight & New Leader

- Extension Created – xxxx.tgt
- Boundary – is required to be turned on and selected from the drop down list
- Assign each map to its appropriate product
- Output resolution – normally set to 8 meters
Note-this is raster based prescription map
- Select Publisher – Ag Leader TGT Publisher
- Browse – Save the file back into the “Field” folder location

Note: Corn Seed Maps—Your *CornSeed.grd* map may need to be written K-Seed/Acre.

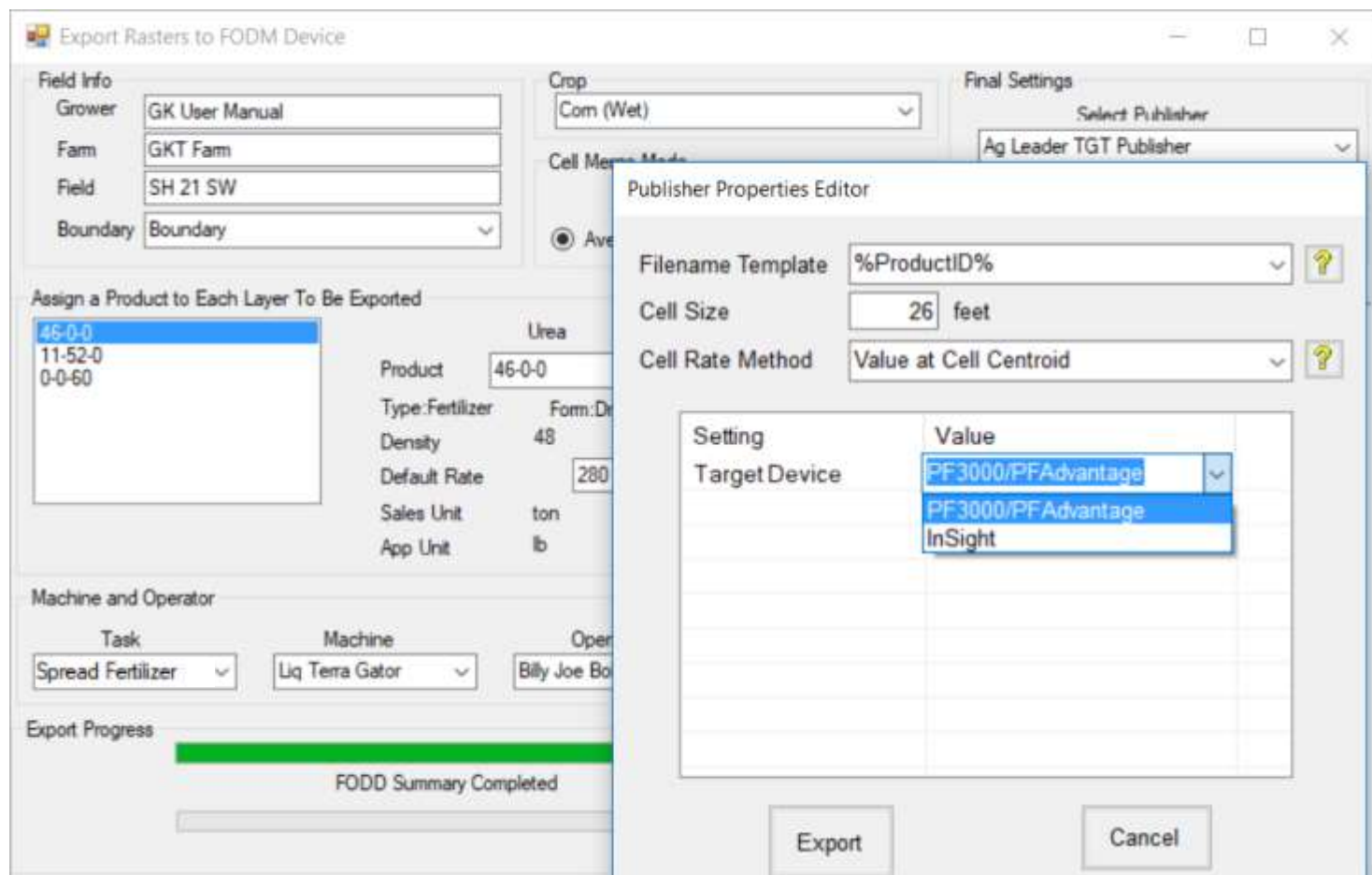
Meaning if you want 32,000 sds your map should be 32

- Filename Template - %Product Name%
- Cell Size – 26 FEET (Note the meters to feet change)
- Cell Rate Method - Weight Average
- Choose the appropriate device (New Leader use the PF3000)

- Note: Multiple maps for the same field should be exported at the same time.

- This may be a slow export depending on field size.....

- Move xxxx.tgt files to the ROOT of the Data card for application

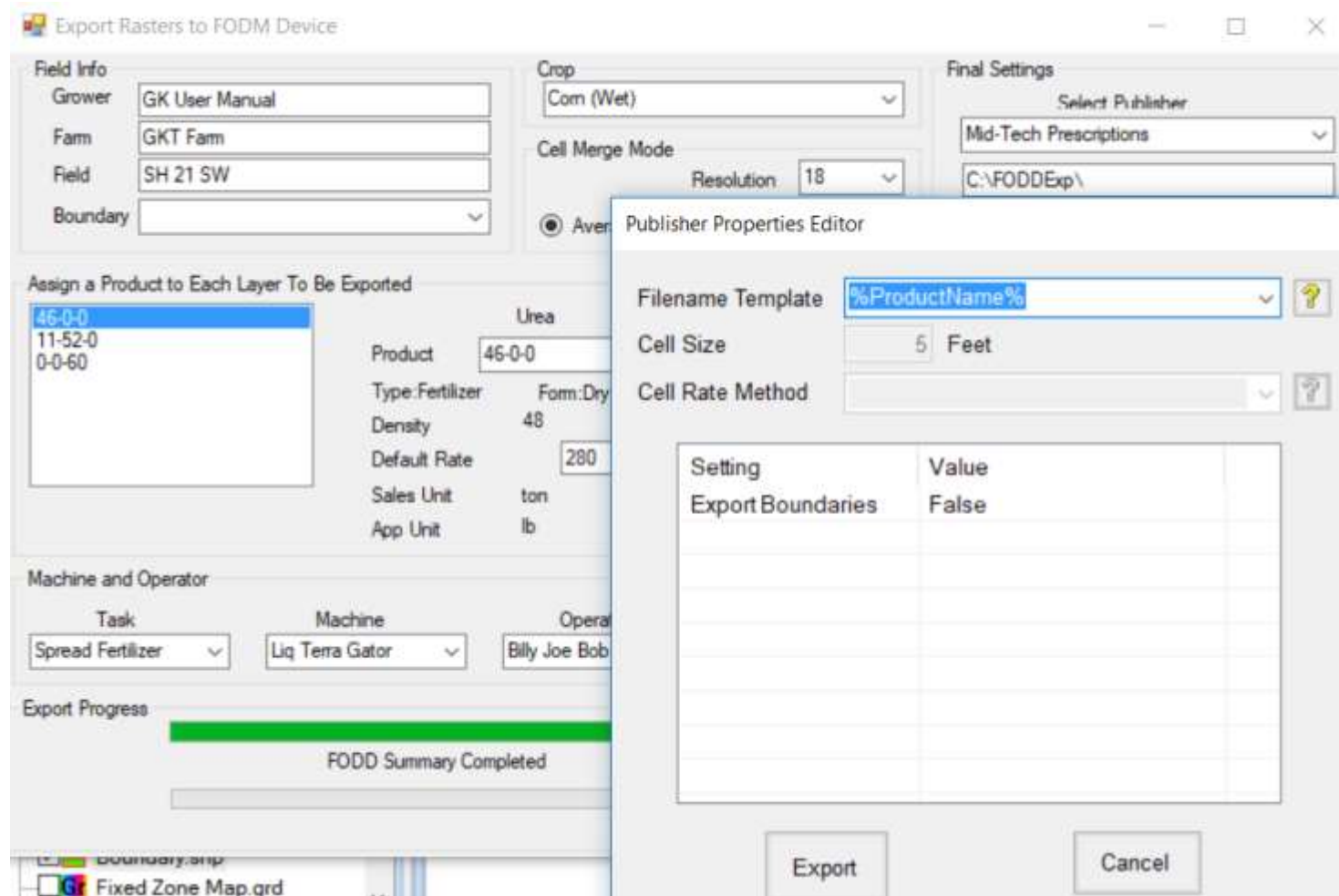


Export Prescription Maps—FODM Device

Mid Tech

- Extension – xxxx.arm
- Boundary – is required to be turned on and selected from the drop down list
- Assign each map to its appropriate product
- Output resolution – normally Set to 18 meters (up to 200 acres)
Set to 20 meters (up to 300 acres)
Set to 30 meters (up to 600 acres)
- Note-this is vector based prescription map
- Select Publisher – Mid Tech Publisher
- Browse – Save the file back into the "Field" folder location
- Filename Template - %Product Name%
- Export Boundaries - False

XXX.arm files go on the ROOT of the Data Card.



Exporting Prescription Maps

Export a Prescription to a Topcon X20 / Zynx

1. **Rates** - The Zynx export uses the values in the "Thematic color" table for rate definitions.

If you set your map to rainbow with 255 colors and you have "10 rates" in the field, you will still get 255 actual rates. If you open the object and edit with the thematic color tool and take it down to 5 zones, you will get 5 rates. It doesn't matter if you "interpolated" the map or not. (Pay attention to the color table in the lower right hand corner of the Zynx Export Window.)

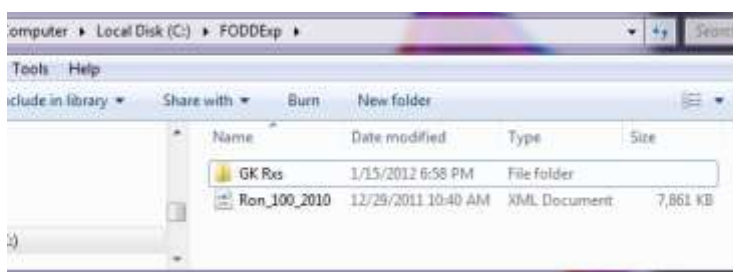
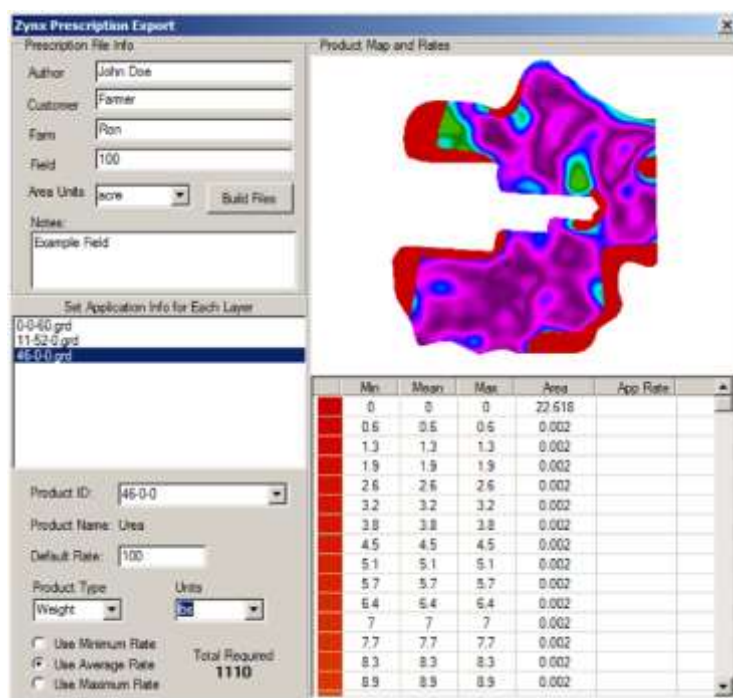
2. Start ADMS Map Window and then turn on the prescription files (i.e. 82-0-0.grd) in the order that the machine (air seeder/spreader) tanks/hoppers are arranged. The order that the layers are turned on is the tank the product goes to. (You can't change them out in the field either!!). So if the air seeder is a 2 bin and has seed in the 1st tank and 11-52-00 in the second, turn on the seed.grd file 1st, then turn on the 11-52-00.grd 2nd.

- Unused Tanks - If the machine has a tank or a "channel" that is not being used, you need to assign a blank map to that channel / tank.

3. Now to export, on the Menu toolbar, click "Export" & "Zynx" & "Variable Rate Map".

- A Zynx Prescription Export window should appear (see upper right).

4. Start working on the top left of the window and move your way down.



5. Fill in your name as the "Author". (This is optional).
6. Verify the "Customer", "Farm", & "Field" cells are correct (this should be filled automatically).
7. Select your "Area Units" (i.e. "acre").
8. Type in any desired notes (optional).
9. Next, set the application info for each layer. This has to be done for each product and follow this process through for each product/tank before moving on to the next product!
 - a. Set "Product ID".

Exporting Prescription Maps

Export a Prescription to a Topcon X20 / Zynx

- Type in the Default Rate (numbers only).
- Choose the "Product Type".
- Select the "Units".
- Then click the desired rate (radio button).
 - Use Minimum Rate – Drops the App Rate to the min value of that zone.
 - Use Average Rate – Makes the App Rate the mean of that zone (Most common).
 - Use Maximum Rate – Increases the App Rate to the max value of that zone.

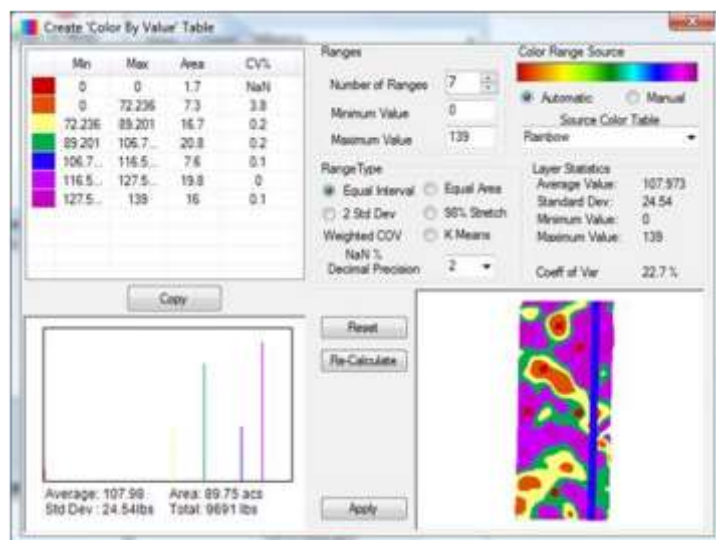
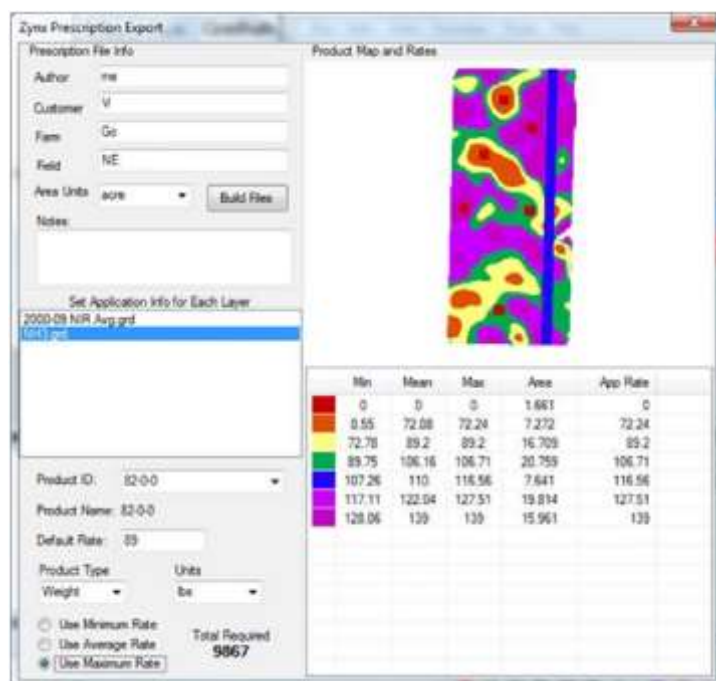
NOTE: Pay attention to "App Rate" on the color table in the lower right of the export window! You will see the "App Rate" column does not populate until you click "Use Average Rate". (Some Rx maps will NOT get rates on a tank as a result!)

- THEN** go back to the next layer and start this process over for each layer. Problems have occurred by not checking the ID, Rate, Type, Units and etc. in the correct sequence!

- Click "Build Files". (It will create an ".xml" file with the Farm, Field, & Year in it (see below)).
- That should do it. Now place that xxxx.xml file on the hard drive of the controller under the "C:\Lynx" folder.

Example

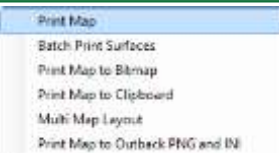
Look at the "ZERO" rate on this map. The Red area was set in the thematic color to min of 0 and a max 0.00001.



My Notes

Printing

Print—Tools and Tips

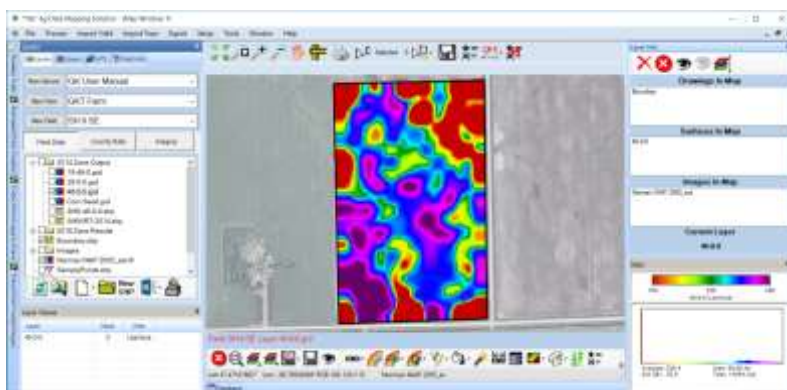


Printed maps are used to convey or transfer data to customers and co-workers. Whatever you see in the window is what will show on the "Printed Map".

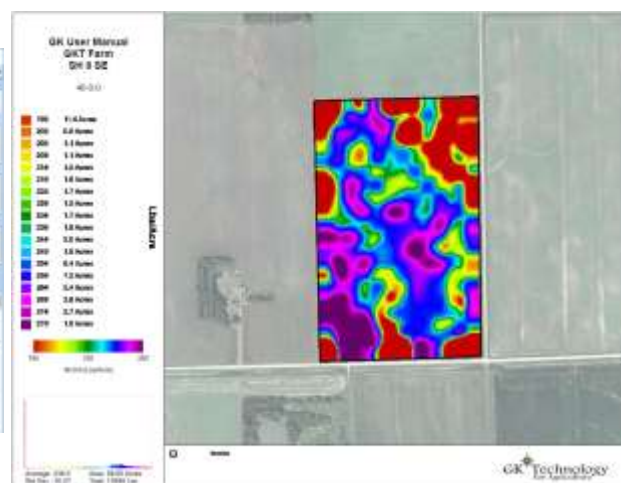
If you want a logo on the bottom of the map, you must add it by going to "Tools" and "Set Current Logo" (logo must be an image format of jpg / bmp / png / gif).

When printing any maps, take note of the shape of the "Map Viewing" area. If you have a "wide screen" monitor, your viewing area is a wide rectangle. This will make for a Printed map that will get sized down. Simply pinning open the "Drawing Tools" will resize the map window. Basically make the Map window viewing area something near a "Square" viewing area.

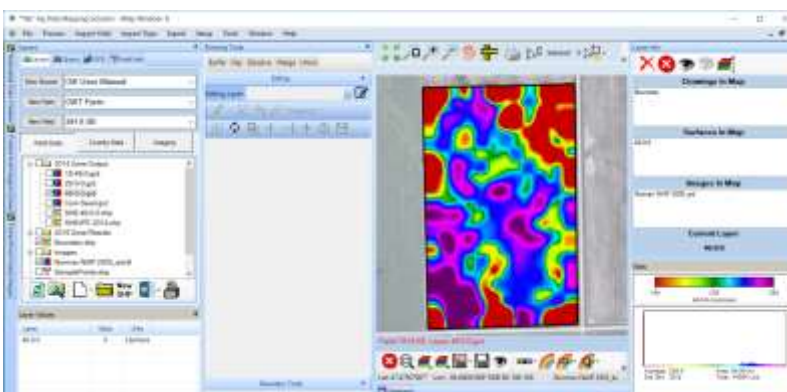
Note the shape of the Map window on the "Left". Now look at the Print out on the "Right"



Resized Map window



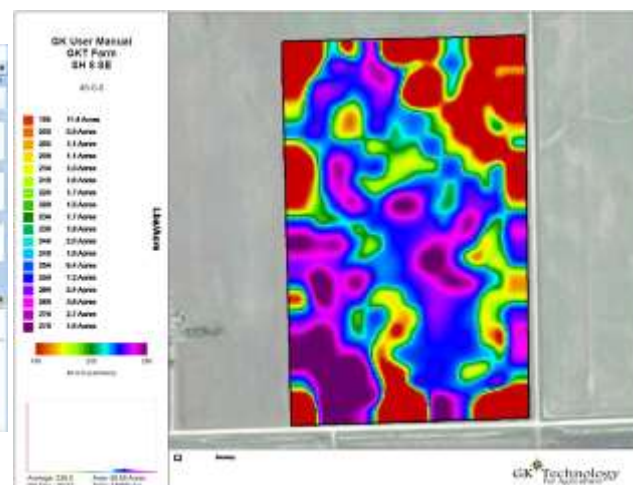
Printed map



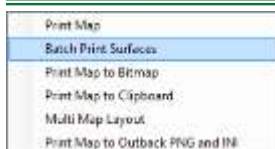
Color Bar—Shows Min & Max values of the surface

The Acres on the Color Chips MAY NOT add to field total acres (more Colors than Chips)

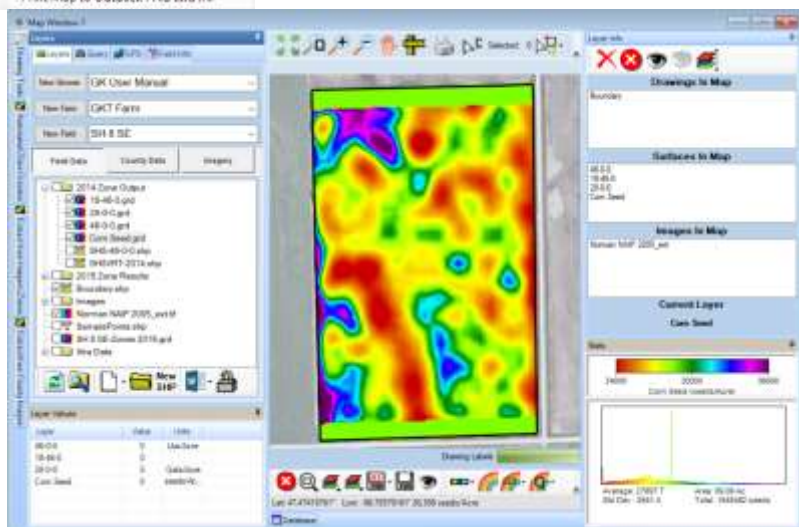
Statistics—Shows the Average—Acres—Standard Deviation—Total Product/Units



Printing



Print—Batch Print Surfaces

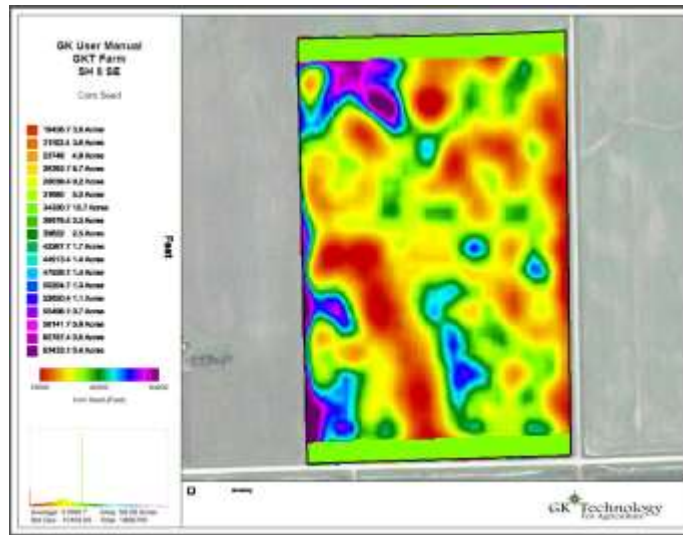
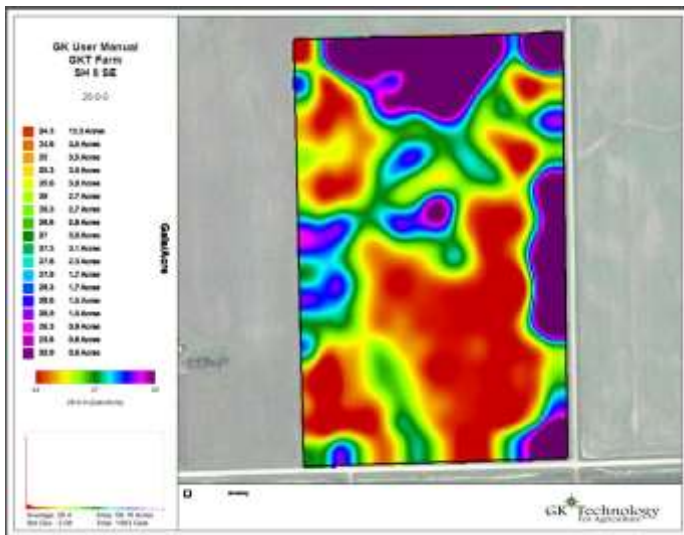
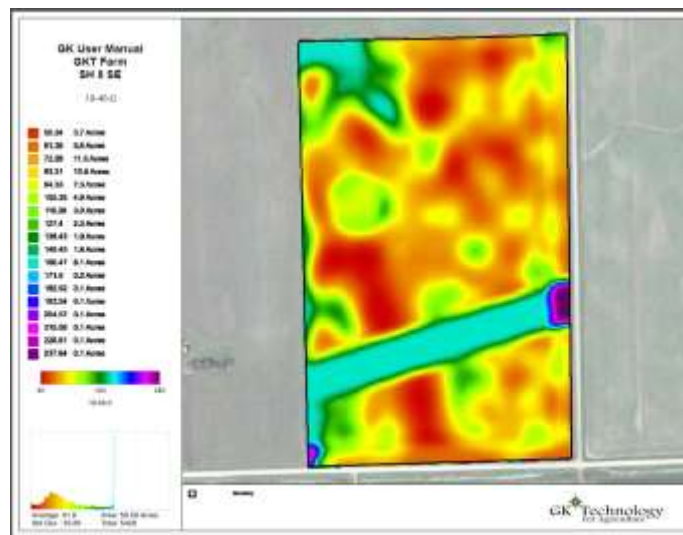
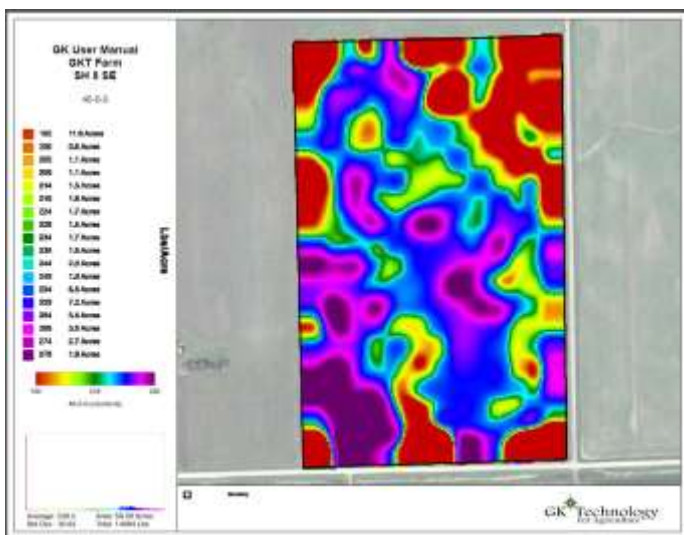


If you have Multiple Surface Maps to print out, turn them on in the order you want them to be printed.

Go to Print & Batch Print Surfaces

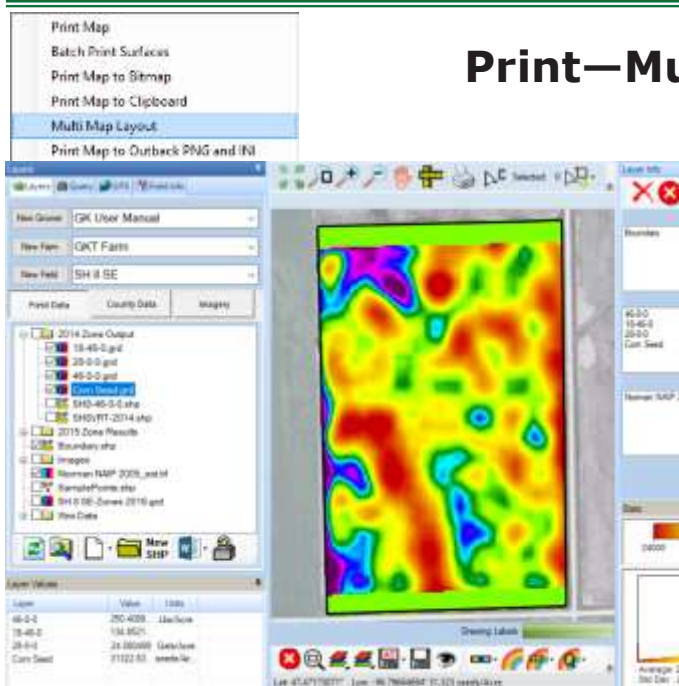
Option: to print a "Summary Page" that gives Acres, Investment, Average and Total amount of product to apply for all products on an additional page.

Note: Investment is calculated from values under "Setup" & "Fertilizers".



Printing

Print—Multi Map Layout

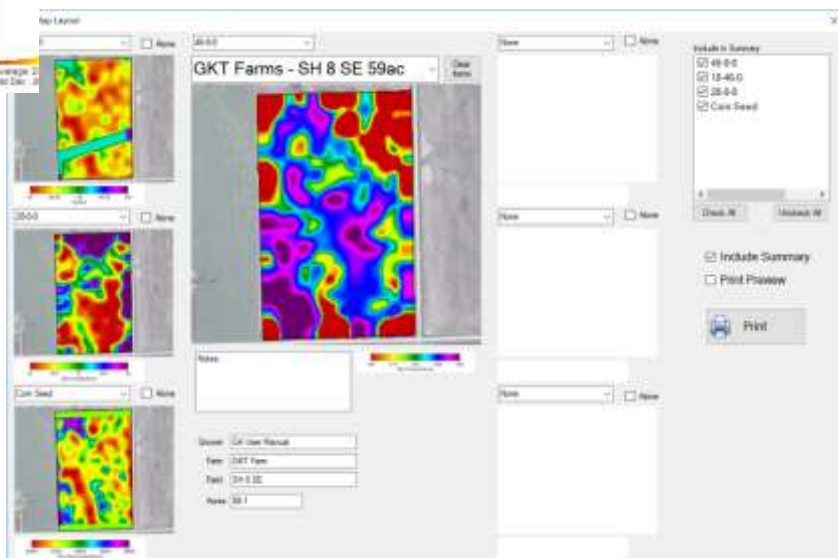


This function will print 7 maps on 1 page.

If you have Multiple Surface Maps to print out, turn them on in the order you want them to be printed.

First map turned on goes to the middle. Then top to bottom & top to bottom

Go to Print & Multi Map Layout



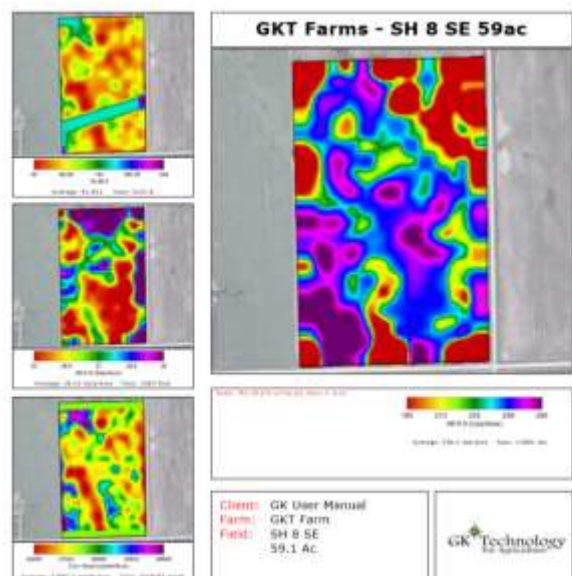
Type the "Custom Header"

Re-order or re-locate maps by click the drop downs above the images.

Type any "NOTES" you want in the middle box. (limited to roughly 15 lines of text)

OPTION: Summary – creates a second page with Product Summary's

OPTION: Print Preview



Grower: GK User Manual Farm: GKT Farms Field: SH 8 SE	Notes: The 28-0-0 will be put down in June.	Layer Summary 2014 Zone Output Print Date: 1/6/2018		
Product	Rate Range	Average Rate	Investment	Required
46-0-0	 46-0-0 (lb/acre)	238	\$2,182	14,084
18-46-0	 46-0-0 (lb/acre)	92	\$1,031	5,428
28-0-0	 28-0-0 (lb/acre)	26	\$	1,565
Corn Seed	 Corn Seed (lb/acre)	27898	\$	1,648,482
Acres: 59.1 Total Investment: \$3,214 Investment Per Acre: \$54.38				

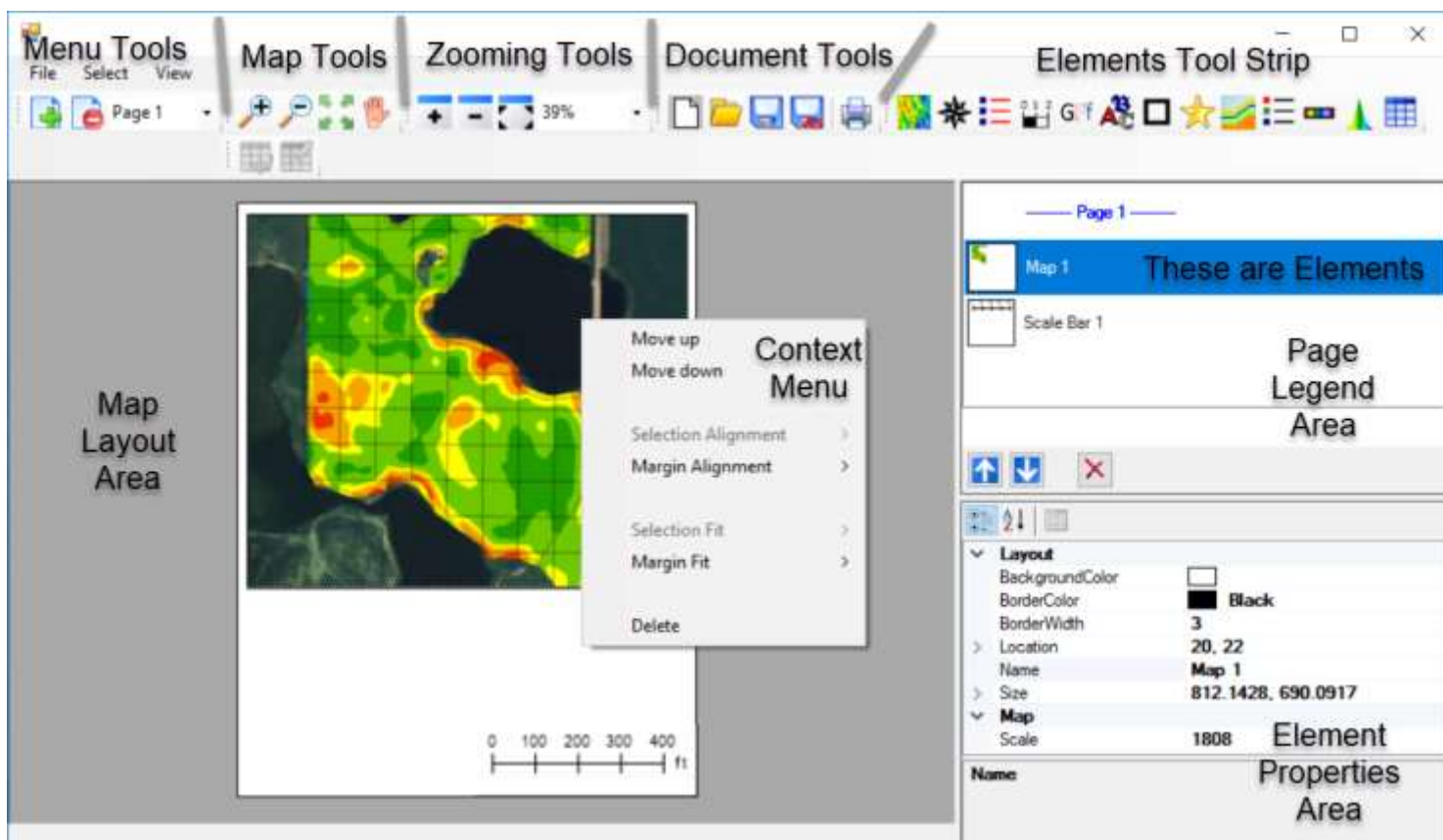
GK Technology
For Agriculture™

Printing

Creating Print Templates

These instructions will give you a general guide of how to use the "Print Templates". You will need to play around and explore the full extents of the functions in this tool.

1. Tool is designed or "Map Window" in ADMS
2. Turn on layers so they show as you want.
3. Choose "File" / "Print" / "Print Layout"
4. The "Print Layout" window will open (note names below)
Note: under "File" and
5. By Default it will have a "Map 1" - ADMS Map Window
- Note: going to edge or corner and resize. Also click-hold-slide objects around
Right clicking on objects will open the "Context Menu" (play with these tools)
After resizing the "Map 1" view box—Click on Zoom button in "Map Tools"
6. Adding more "Elements" by Clicking on them in the "Elements Tool Strip" and dragging



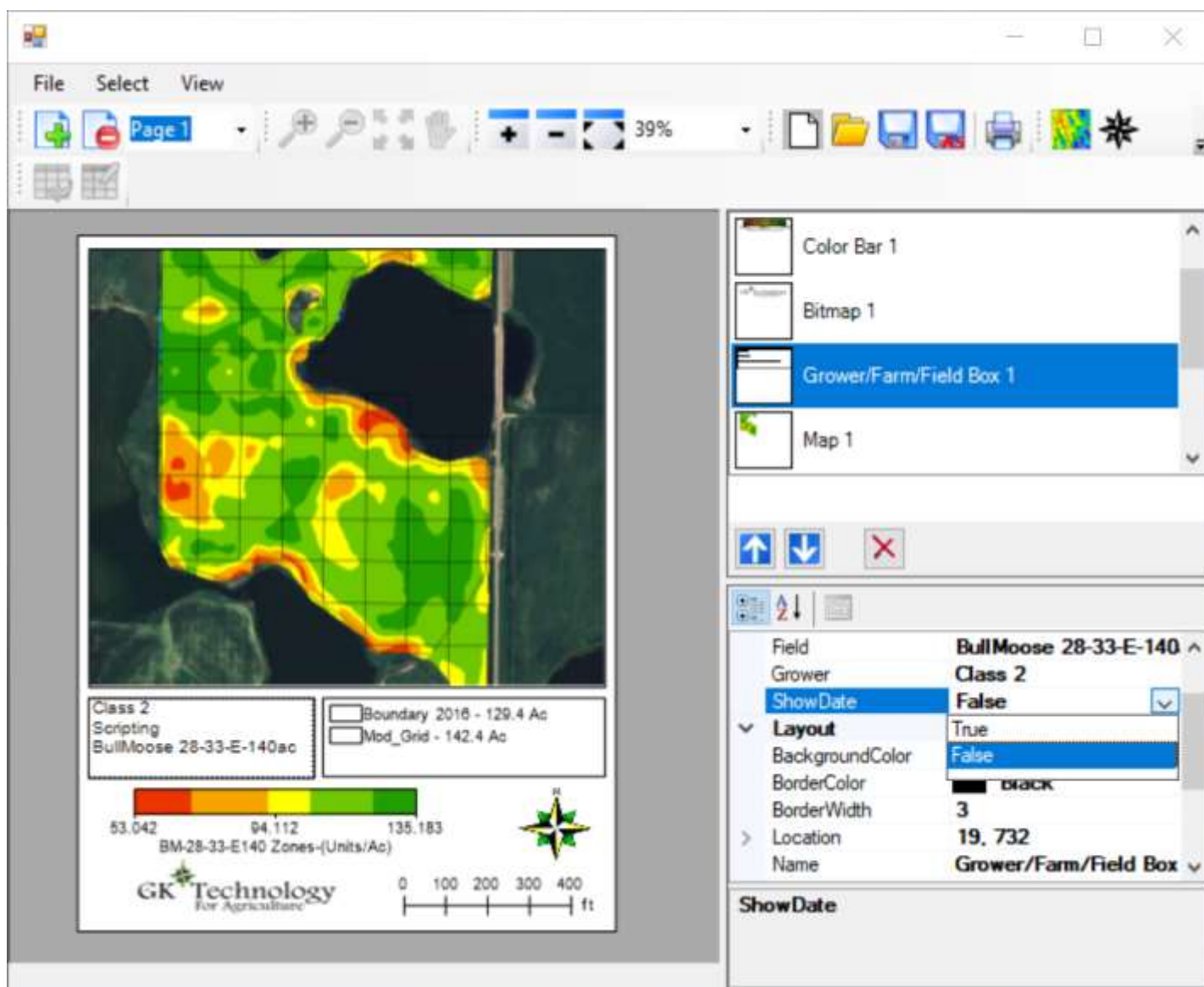
a rectangle where you want them placed. (drag-size-move till your happy)

7. Add more elements to get the look you are looking for.

Printing

Creating Print Templates

8. This is close to a view I would like to save
9. There are some items I would like to highlight in the "Elements Properties"
10. Some boxes have "Drop Downs" - ex-switching "ShowDate to False"
11. Clicking on "BorderColor" will open a color chart to change colors
12. Beside "BorderWidth" just type the width of border—switched from 0 to 3 pixels
13. "Elements Properties" is again a play around area, lots of functions here.
14. Work through each "Element" and get them how you would like them.



15. Finally go to the "File" and "Save As".
16. Suggest "Printing" a test page on PAPER or PDF to confirm your final product.

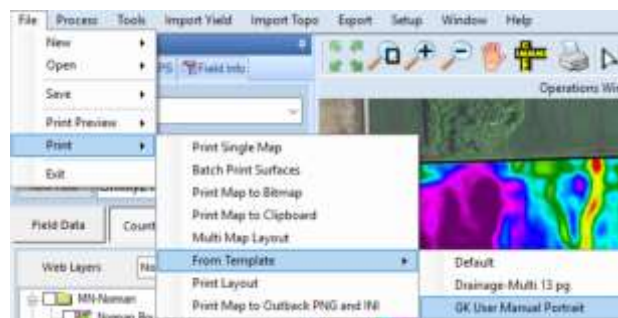
NOTE: If you do more edits, make sure you "SAVE" it may not auto ask if you close.

Printing

Using Print Templates

Turn on your Map Window so it is ready to Print.

Once the templates have been created they can easily be used by going to "File" / "Print" / "From Template" and choose your template.



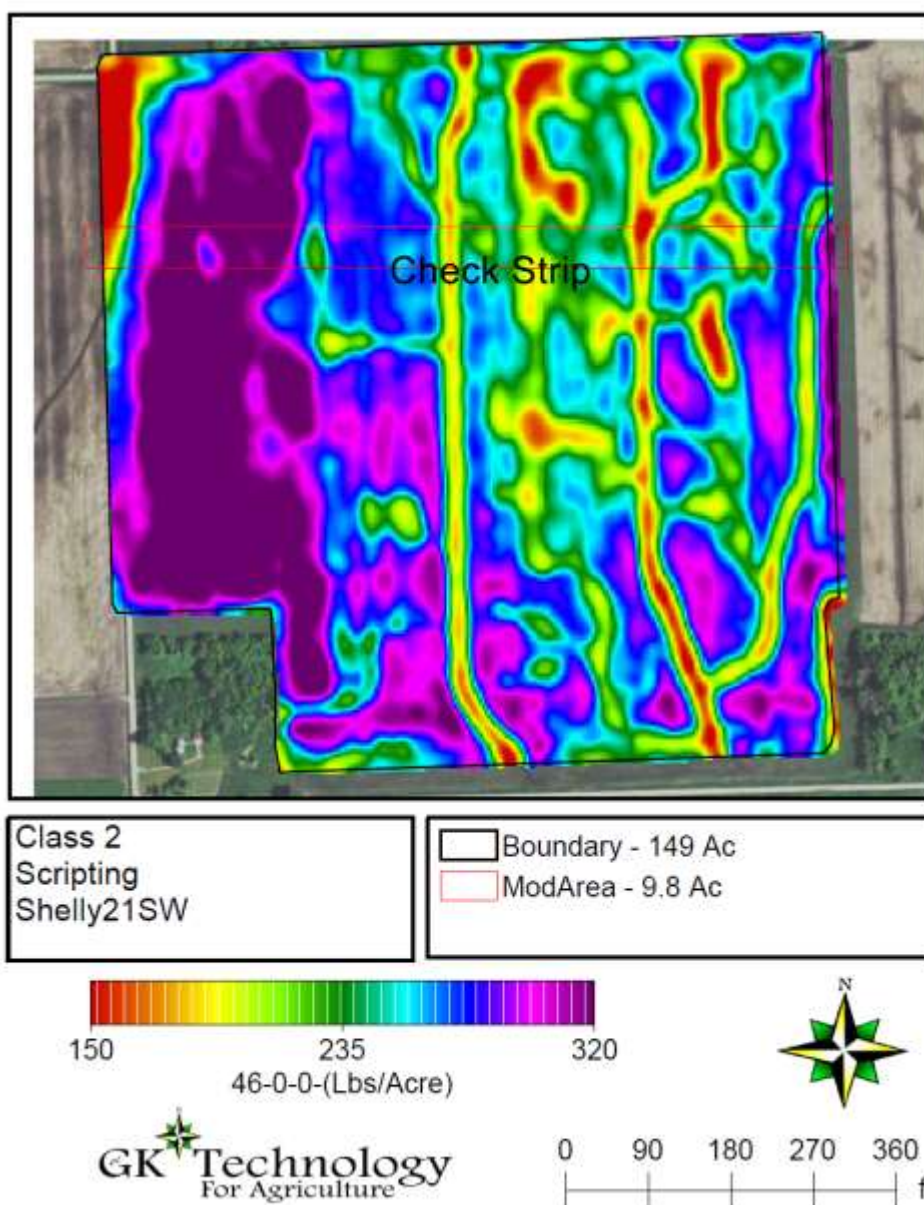
A Print Dialog window will open and click "Print"

Note: My maps on the next field using different layers is getting some minor issues. This is because I did not do a "Test Print" and work out the issues.

Issue 1 Font Size in the "Color Bar" not showing all the values below.

Issue 2-"Scale Bar" too far to the right missing the "Foot"

Create your own templates and "CUSTOMIZE" your business.



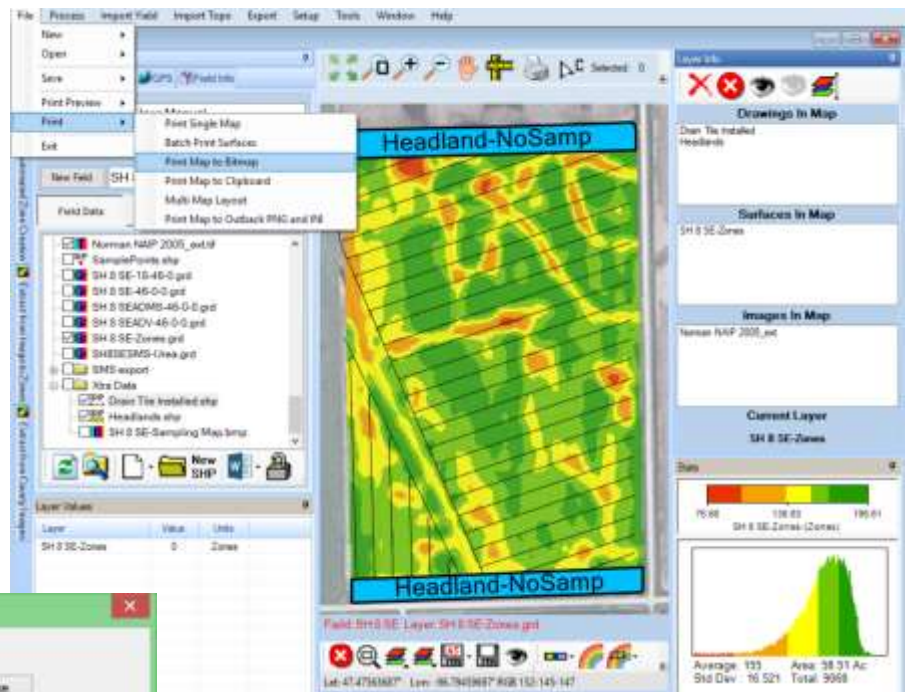
Printing

Print—Print Map to Bitmap



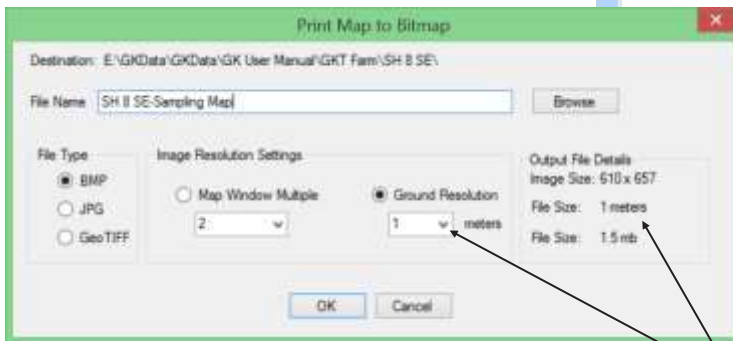
Print Map to Bitmap takes a "Geo-Referenced" screen shot of the map window. These maps can be taken to other software packages and allow you to have 1 map to show many pieces of data. This function is designed for "FIELD DATA", NOT FOR Township or County viewing. This does not work well on data AREAS larger than 2 or 3 miles square.

1. Turn on all the data you want to see in final map
2. Layer the data in the correct order (transparencies may be helpful).
3. Zoom in tightly on the data you want to Print.
4. If you are using labels, make sure they are large enough to read.
5. Go to "File" "Print" "Print Map to Bitmap"
6. Assign a "File Name".
Typically Field-Event
Ex. -SH 8 SE-Sampling Map
7. Choose "File Type"
Depends on what software you are going to? Most support BMP.



8. Choose "Image Resolution Settings"

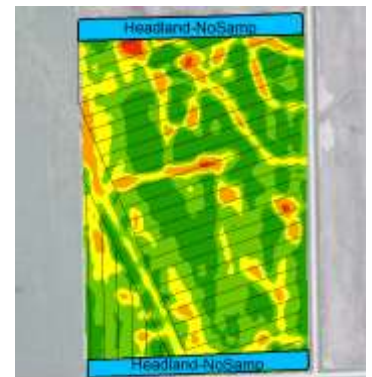
Suggest trying to keep your Resolutions in that 1 to 2 Meter range no greater than 5.0mb in size. Some software & Controllers are limited on what file size you can send them.



Adjust values by moving between "Map Window Multiple" & "Ground Resolution"

9. Click "OK"

10. For these files to work you will have to move both the image file and the world file.
(bmp & bpw or jpg & jgw or tif & tfw)

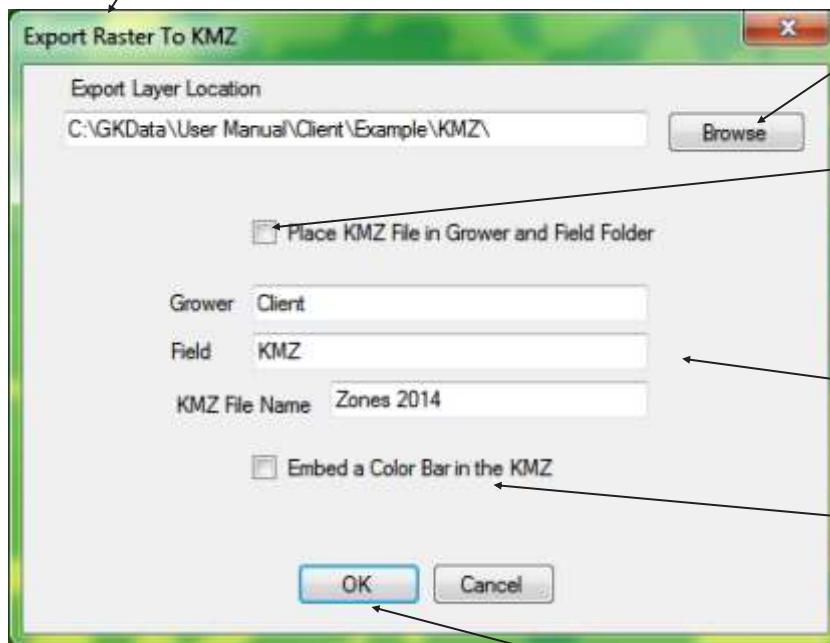
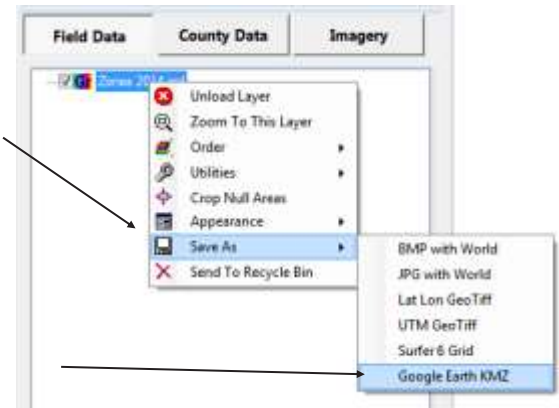


Exporting Files As KMZ For Google Earth™



Google Earth™ allows images to be opened within the desktop software or on a mobile version such as Android or iOS. This file is called a KMZ file (Zipped Keyhole Markup Language). The single file contains both the geo-referencing file and the image which will be displayed as an image overlay in Google Earth™. Once exported the KMZ file can simply be opened and Google Earth™ will zoom to its location. Only images and surfaces are supported in this export.

1. Turn on the layer that will be exported.
2. Right click on the file select: Save As => Google Earth™ KMZ
3. The "Export Raster To KMZ" options will open.



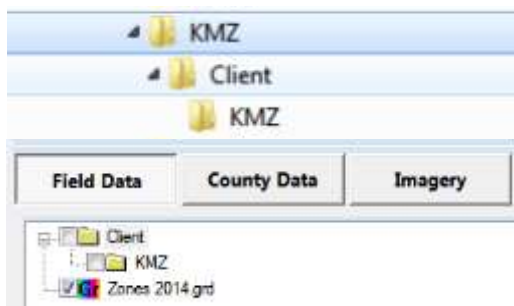
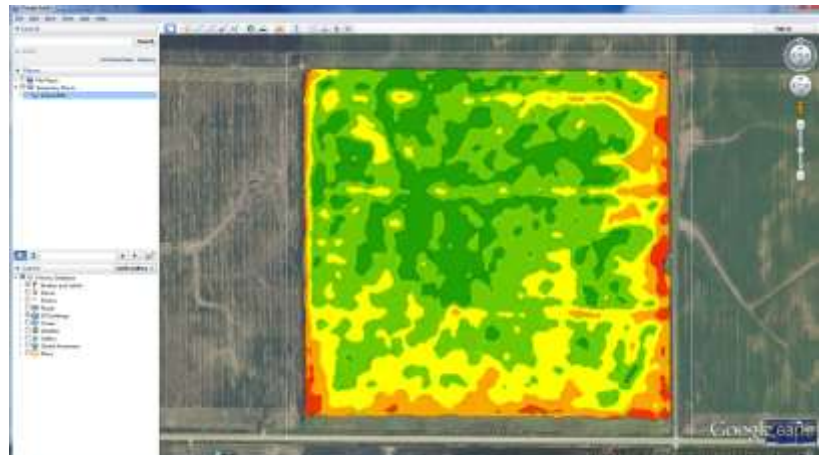
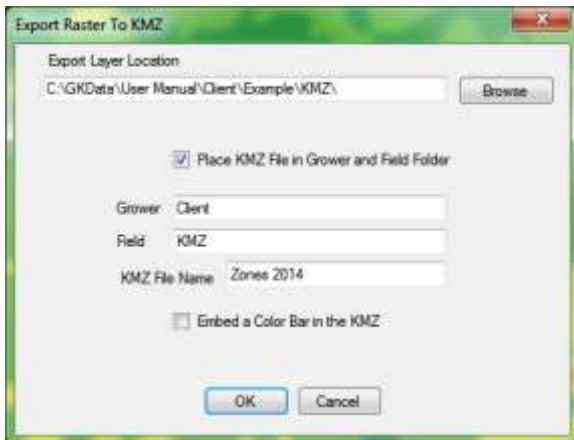
4. Browse to the desired export location
5. *Optional:* Place KMZ in Grower and Field folder. This will export to the selected location, but will place the file in a Grower & Field folder structure.
6. *Optional:* Edit the Grower, Field, and KMZ File Name if desired.
7. *Optional:* Embed a Color Bar in the KMZ. This will show the statistical color bar on Google Earth™ giving the ranges of the map. (This can only be done with "Surfaces")

8. When all of the desired options are selected click "OK." The file will be exported to the selected directory with the options that were selected.
9. A program will have to be installed on the device you are using (Windows, Android, iOS) to read the KMZ file (Google Earth).

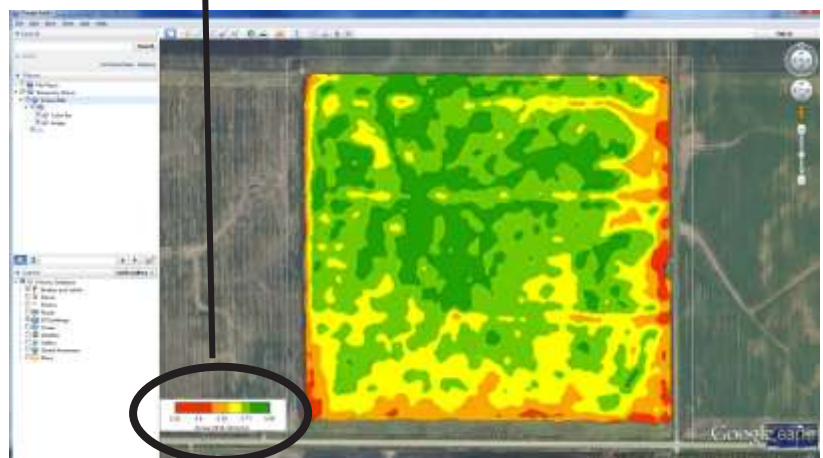
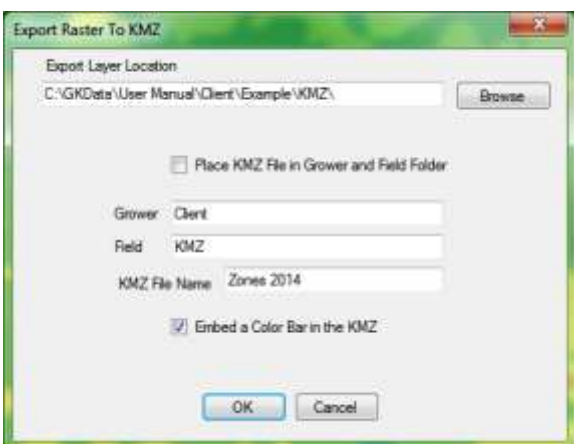
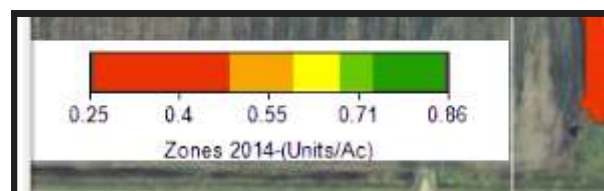
Exporting Files As KMZ For Google Earth™ - Examples



This is an example of the file structure that will be created when the option to "Place KMZ in Grower and Field Folder" is selected. The KMZ file WILL NOT be recognized in ADMS.



This example will show the statistical color bar if "Embed a Color Bar in the KMZ" is checked on.



Exporting KML Files For Google Earth™

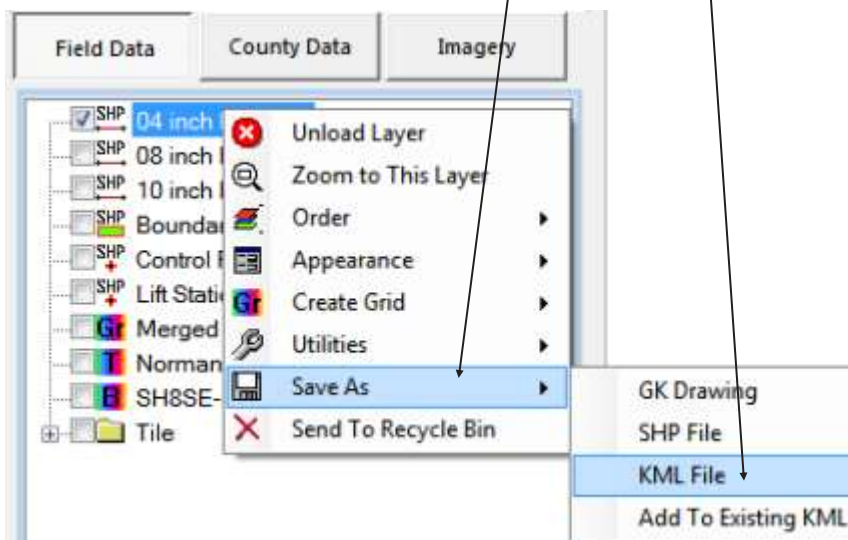


Google Earth along with some other software packages will allow vector files to be opened within different desktop and mobile applications. The file type that is used has the extension *.KML which stands for keyhole markup language. Vector files such as points, lines, and polygons can be saved to one or multiple KML files for viewing in these applications.

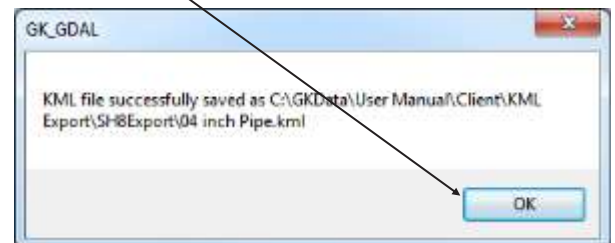
Saving Vector Files As KML Files

This example will use a tile plan as an example.

1. Turn on the SHP file that you wish to save as a KML.
2. Right click on the file select **"Save As"** & **"KML File"**



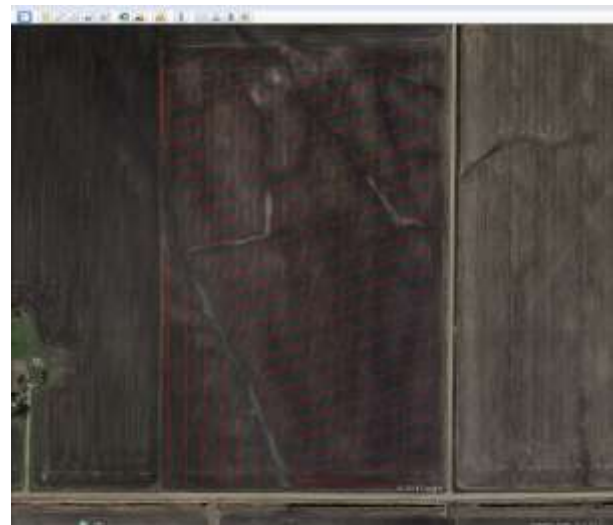
3. After selecting "KML File" a window will appear saying that it has been successfully saved and the path where it was saved to. These files will get saved to the same location as the SHP file they were saved from.
4. Click **"OK."**



The KML file can now be opened in Google Earth & Google Maps or other applications.

NOTE: ADMS does not save out any size / label / color pallets for GOOGLE.

Example of 4 inch Pipe.kml in Google Earth >>>



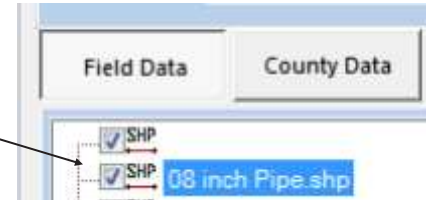
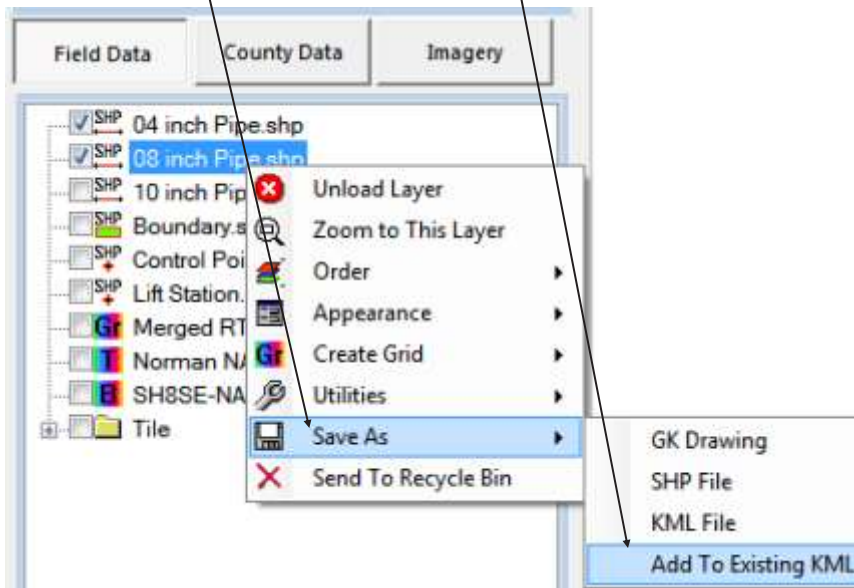
Exporting KML Files For Google Earth™



Adding to KML files

There are times when you may want to add additional types of vectors to an existing KML file. These could include boundaries, different pipe sizes, or any other shapefile. This can be done using a similar process as saving them individually.

1. Turn on the SHP file to add to the existing KML file.
2. Right click on the file to add and select:
 - **"Save As" & "Add To Existing KML"**



3. Browse to the location of the existing KML file.
4. Click **"Open."**
5. The file is now saved to the existing KML and can be opened in Google Earth.



This processes can be repeated as many times as necessary to combine all of the files.

Notice the mains have been added into this file.



Quick Notes For Topography—RTK

Importing Topography Data - RTK

1. Open into **"Map Window"**.
2. **"Import"** – (Select the file type you want to import (ex-JD-GS2)
3. Select the folder location - **"Select Card Path"**
4. Check all the files to "Import"
5. Click **"Process Selected Files"**.
6. All the files will go to the "Grower" "Farm" "Field" structure just like you had them in the GS2 Display



Creating Boundary

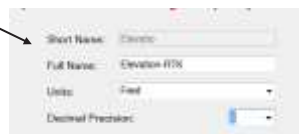
1. Select the desired Client, Farm and Field.
2. Turn on the elevation points first, then the county NAIP.
3. **To Create Boundary from CLU** – turn on the "County CLU.shp" and make sure it's the **active layer**.
4. Click on the **"Area Replace"** button and click inside of the correct CLU boundary or drag a rectangle (select multiple, hold down "Ctrl").
5. The boundary will appear **Lime Green**
6. Click **"Save Selected Objects"** top toolbar, Name, Save.
----- OR -----
3. **To Hand Draw a Boundary** - Click the **"Create New Layer from Template"** button and select **"Boundary"** from the list.
4. Check the **"Boundary.SHP"** ☒ **Boundary.SHP** file to turn it ON & make sure it is the **active layer on the bottom toolbar**.
5. Select **"Draw New Object"** button on the bottom toolbar.
6. Draw the boundary by "Left Clicking" around the field (hold the "Alt" or "Shift" key & "Left Click" to undo points) & "Right Click" to finish.
7. Click **"Save"** on the bottom toolbar.

Cleaning Up Elevations

1. Turn on the Elevation Points (CSV or SHP)
2. Click on the **"Database"** - Bottom Left Corner.
3. Click on "GPS Status" Header descending (Click again-ascending)
4. Look at the Data and select points to delete – if needed – (delete VDOP & HDOP greater than 3 / GPSAccV greater than 13)
5. Click on the **"Delete Selected Objects"** on the bottom toolbar.
6. Click **"Save"** or **"Save As"** on the bottom toolbar (If "Save As" rename EX.-Topo-Cleaned-2008.shp).
7. Go to "Layer Info" & **"CLEAR MAP"**

Create Grid Map

1. Check on the "Elevation.shp" Point file.
2. "Right Click" the name "Elevation.shp".
3. Select **"Create Grid"**
And **"Create Grid from Points"**
Adjust your settings like this
4. "Column Name Mapping"
5. Click **"Create Grid"**
6. Go to "Layer Info" & **"CLEAR MAP"**



Crop to Raster

1. Turn on Boundary and select **"Area Replace"** off of the top toolbar.
2. Click inside the Boundary polygon making it **Lime Green**
3. Turn on "ElevationRTK.grd" and select **"Crop Raster to Selected Polygon"**
4. Click "Save" on the bottom toolbar
5. Clear Map

Create Watersheds

1. Make sure **"Elevation-RTK.grd"** is checked on.
2. On the Top Toolbar select **"Process"** & **"Watershed Modeling"**
3. In the "Create Watershed Layers" Topo Source "Elevation-RTK" Units in "Feet" Flow Density 40 (usually)
4. Click "Create Watershed Layers" (auto saved)

Create Contours

1. Create Contour Layers – set "Break Points" to "1.0"
2. Click "Create Contour Layers"
3. FINISHED.....

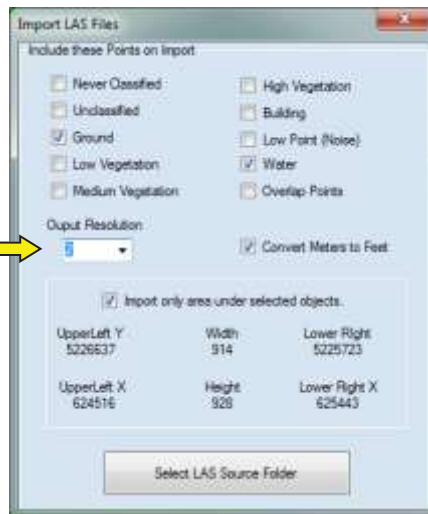
Quick Notes For Topography—LiDAR

Creating Project Boundary

1. Select the desired Grower, Farm and Field.
2. Turn on your County Data
3. **To Create Boundary from Sections** – turn on the "County Sections.shp" and make sure it's the **active layer**. 
4. Click on the **"Area Replace"**  button and click inside of the correct Section boundary (to select multiple, hold down "Ctrl").
5. The Section will appear **Lime Green**
6. Click **"Save Selected Objects"**  top toolbar, Name, Save.
----- OR -----
3. **To Hand Draw a Boundary** - Click the **"Create New Layer from Template"**  button and select **"Boundary"** from the list.
4. Check the **"Boundary.SHP"**  ☒ Boundary.SHP file to turn it ON & making it the **active layer on the bottom toolbar**.
5. Select **"Draw New Object"**  button on the bottom toolbar.
6. Draw the boundary by "Left Clicking" around the field (hold down the "Alt" key and "Left Click" to undo points) and "Right Click" to finish.
7. Click **"Save"** on the bottom toolbar. 

Importing LiDAR

1. Turn on "Boundary.shp" **active layer on the bottom toolbar**.
2. Click on **"Area Replace"**  button and click inside the Polygon. (Polygon will appear **Lime Green**)
3. Go to "Import Topo" and select "LIDAR LAS Import"
4. Make sure you are checked on
 - Ground
 - Water
 - Convert Meters to Feet
 - Import only area under selected objects.
5. Output Resolutions = **2** meter
6. Click "Select LAS Source Folder"
7. Choose the Correct Folder
8. Click "OK"



Crop to Raster

1. Turn on Boundary and select **"Area Replace"**  off of the top toolbar.
2. Click inside the Boundary polygon making it **Lime Green**
3. Turn on the "LidarImport.grd" and select **"Crop Raster to Selected Polygon"** .
4. Click "Save As" on the bottom toolbar .
5. Name "LidarTopo.grd"
6. Unload & Reload "LidarTopo"
7. "Crop Null Values" 

Create Watersheds

1. Make sure **"LidarTopo.grd"** is checked on.
2. On the Top Toolbar select **"Process" & "Watershed Modeling"**
3. In the "Create Watershed Layers"
 - Topo Source "LidarTopo"
 - Units in "Feet"
 - Flow Density 40 (usually)
4. Click "Create Watershed Layers" (auto saved)

Create Contours

1. Create Contour Layers – set "Break Points" to "1.0"
2. Click "Create Contour Layers"

Create Field Boundary

1. Turn on the "LidarImport.grd"
2. Zoom to the field.
3. Click on "Create New Layer from Templates"  Choose "Boundary"
4. Select "Draw New Object"  from the bottom toolbar.
5. Draw a new field boundary to represent the "Drainage" of this field.

Note: This boundary is usually "Smaller" than the fields tillable acres.

6. Save the "Boundary.shp"  on the bottom toolbar.
7. Go to "Layer Info" & "CLEAR MAP" 

Creating Topography & Watersheds

This section of the help guide we will be looking at extracting topography data, cleaning, merging and turning the point files into surfaces. Once the topography surfaces are created, it will be processed in the Watershed Modeling, creating a series of water management layers.

Start up Ag Data Mapping Solution and select the **"Map Window"** button.

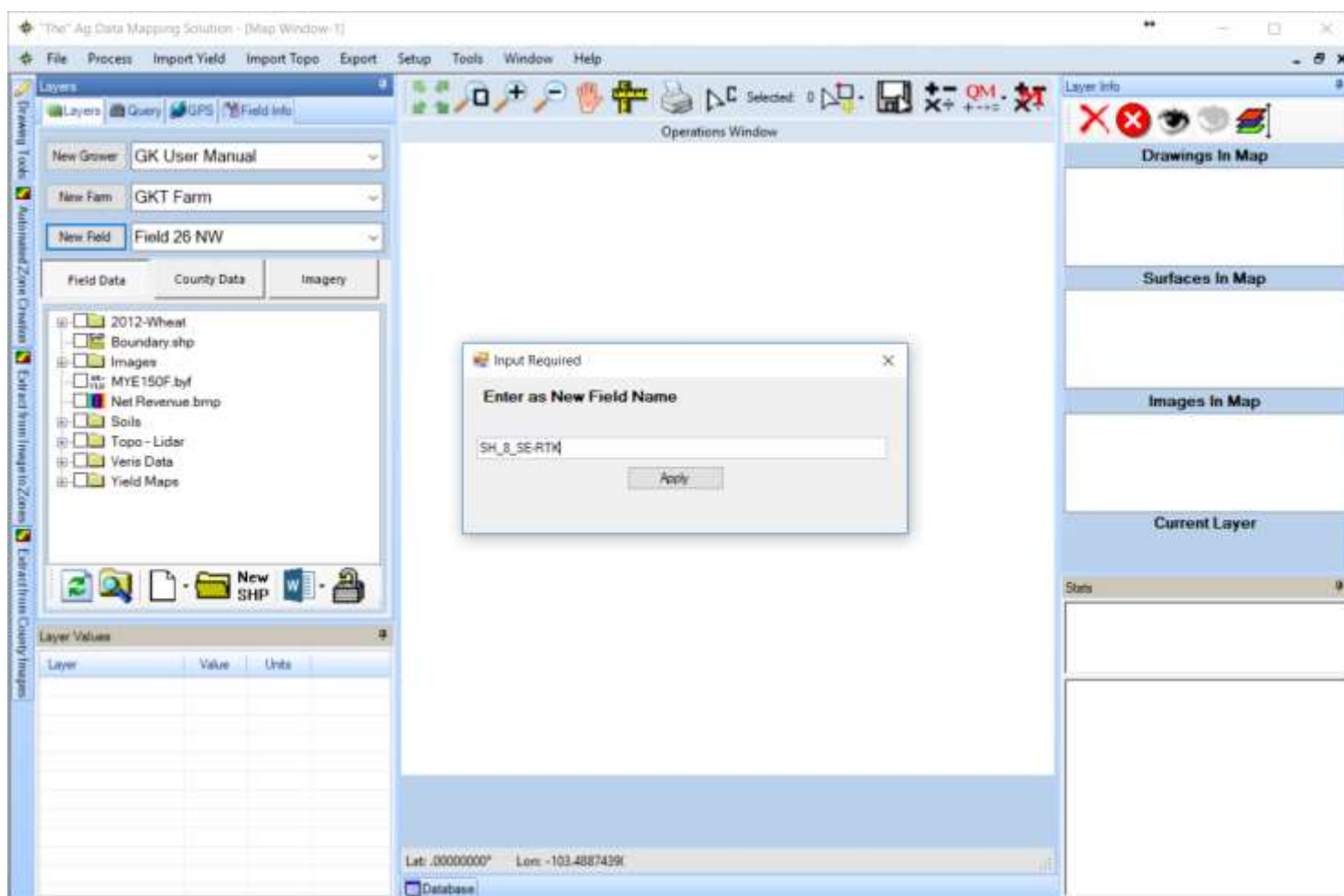


1. When the **"Map Window"** opens up, select the desired "Grower", "Farm" and "Field".

Creating: GROWER - FARM - FIELD

If they do not exist, click on the **"New"** buttons to the left of the name. An **"Input Required"** window will open up in the middle of the screen to enter the new name, do so and click **"Apply"**. Now the desired field is selected.

2. When selecting "Grower" make sure to select the "Farm" & "Field" also.



Creating Topography & Watersheds

Importing Data

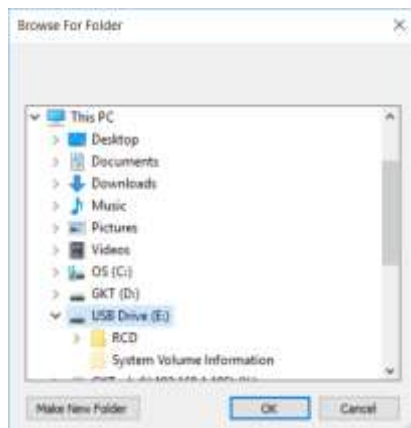
Once selected to the desired "Field", select **"Import Topo"** from the menu and choose the source where the Topo Data is coming from.

Example—John Deere 2600 (GS2 Data) combine data



Next, "Browse" to the desired files or select where the data is stored.

Example—Select RCD Folder

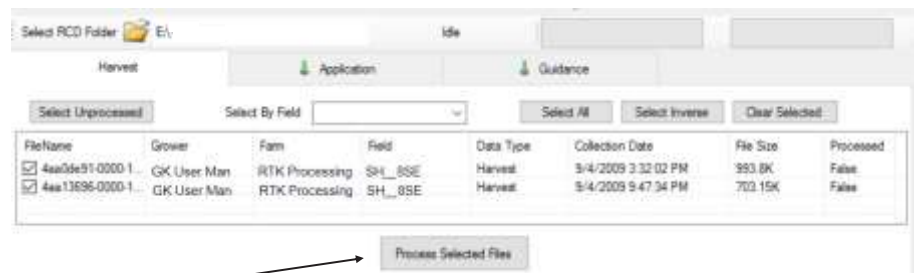


Select the location of the data.

Example — USB E:



Select the desired import files.



Click the **"Process Selected Files"** button.

NOTE: Import will create the Grower / Farm / Field names in the data tree as shown in the data list on the import for the GS2 & GS3 imports.

Creating Topography & Watersheds

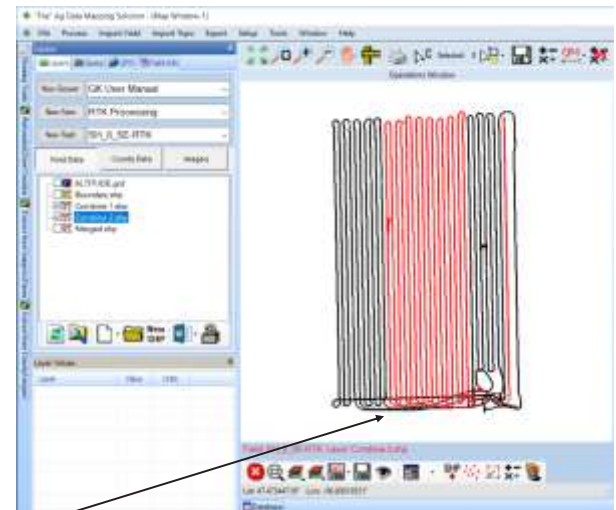
Adjusting levels between multiple "Point" SHP files

Many times there is a need to combine data from multiple SHP files to make one dataset for surfacing.

In Ex.—Combine 1 = Black Pts
Combine 2 = Red Pts.

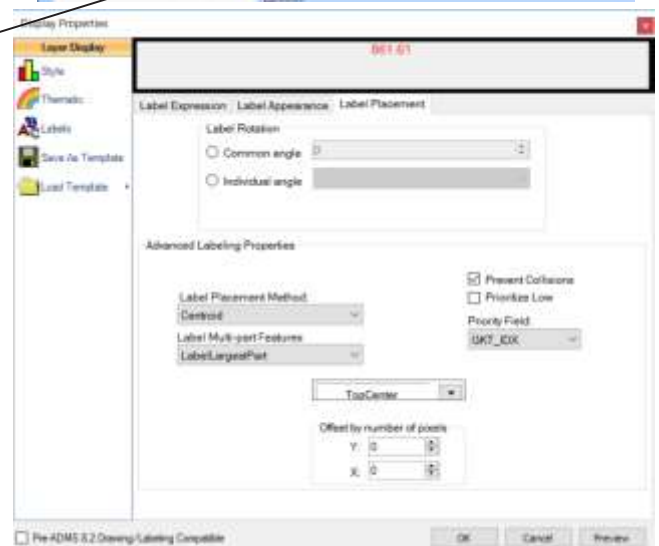
If the two files were collected by different machinery, or different base stations setups, there may be a need to adjust one of the Elevations to get them to match. And there may also be some bad points to filter out of the data.

Essentially, what we are looking to do is find areas where the point files overlap each other. Then find points very close in elevation to each other and check the elevation values between them. The arrow points to the areas that overlap between these two shapefiles.



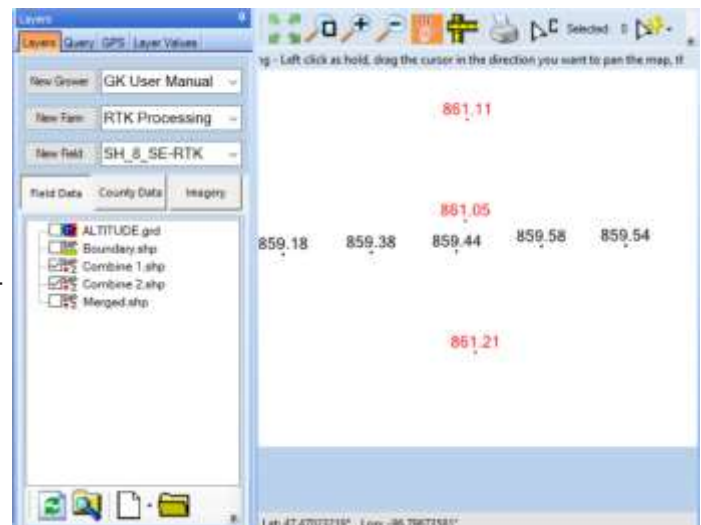
To add Labels and change color of Points:

- Select "Combine2.shp" = **Active Layer**.
- Bottom toolbar, click **"Display Properties"**
- **"Style"** Button
 - Point Scale = Fixed
 - Point Size = 2 pixels
 - Point Color = Red
 - Point Outline = Red
- **"Labels"** Button
 - "Label Expression" - select "Altitude"
 - "Label Appearance" - Pixel Scale = 12
 - Color = Red
 - Precision = 2
 - "Label Placement" - TopCenter
 - Check Prevent Collisions
- Click Preview
- If it looks correct Suggest "Save as Template"
- Click OK



After applying labels to each of the SHP files, zoom in on the overlap areas and find points close to each other and check the elevations between the points. Look for any large differences. Keep in mind not to get too picky, standard error of an RTK receiver is 0.16 feet.

We suggest taking five or more readings and use an average difference. (Consider putting #'s into Excel) Ex. **860.59** - 858.46 = **2.13'** difference



Creating Topography & Watersheds

Merge SHP Files with Z Adjust

When you have two layers of different elevations that need to be put together, the **"Merge SHP files with Z Adjust"** will take care of the problem. (*Do Not use on Yield Data*)

1. Make sure that both the layers are turned on and you have done the math to know how much you will have to move the given layer up or down.

2. "Right click" on the file name in the data tree, and select **"Utilities"** and **"Merge SHP Files with Z Adjust"**.

3. The **"Merge and Create Z SHP File"** window is now open. Select the two input layers using the dropdown arrows on Drawing Layer #1 and #2.

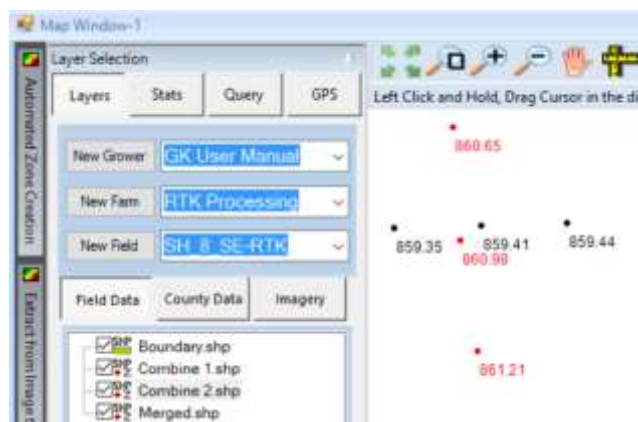
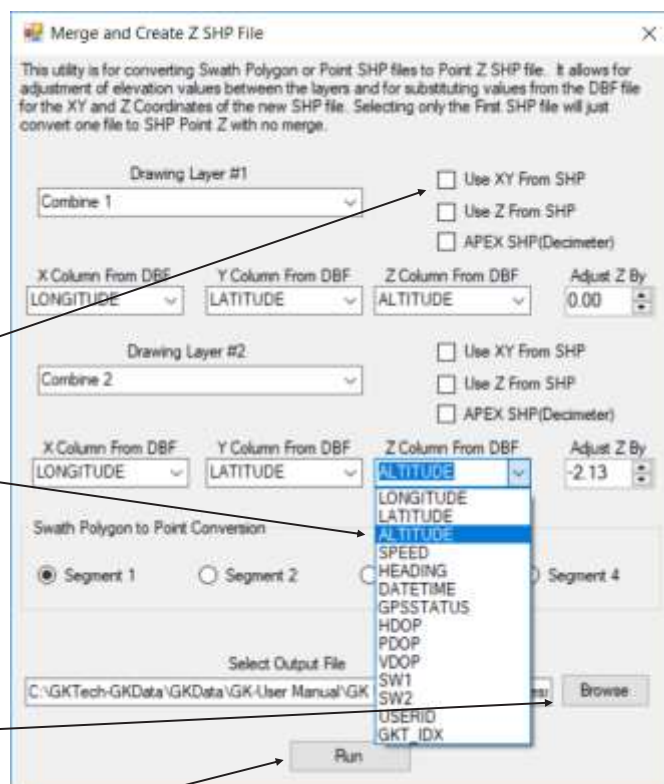
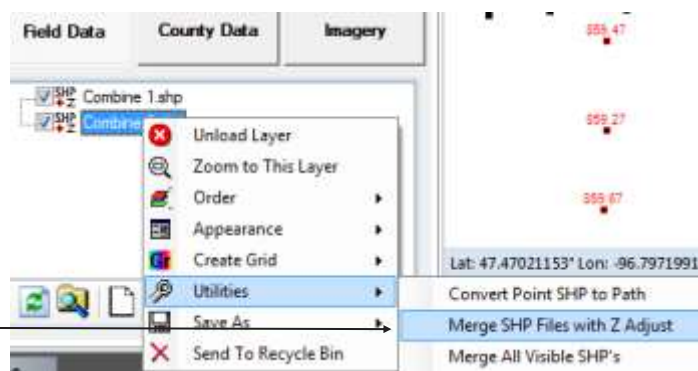
4. Once you have selected the input layer, the "X Column From DBF" should say LONGITUDE and the "Y Column From DBF" should say LATITUDE. If the "X" and "Y" are empty and you do not find these pieces of information under the dropdown arrows, select the **"Use XY From SHP"** box. This will apply the Lat/Lon from the given object (imbedded into the code of the object).

5. Next select the dropdown arrow under the **"Z Column From DBF"**. There should be a piece of data about Elevation or Altitude.

6. Next, in the **"Adjust Z By"** box, enter the value for the object you want to adjust up or down. You should only enter a value for one object (either Drawing 1 or 2).

7. **"Browse"** to the desired output location, and save the file as a new and identifying name, such as **"Merged_Topo"**.

8. Click the **"Run"** button and this will merge these two SHP files together.



Continue to "creating the topo map".

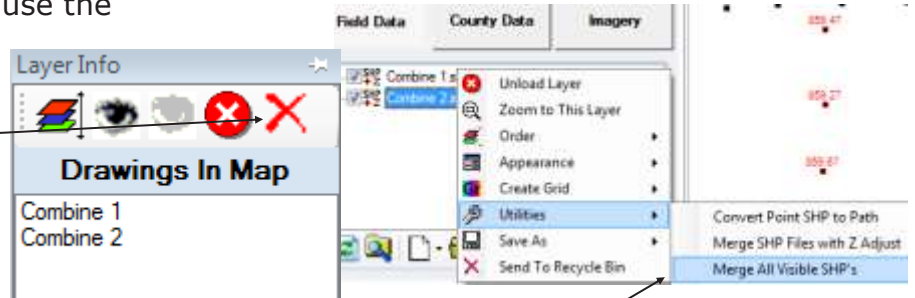
Creating Topography & Watersheds

Merge All Visible SHPs

When multiple layers of SIMILAR elevations or SIMILAR yields need to be combined, use the **"Merge All Visible .shp's"**

1. Start by going to **"Layer Info"** & **"Clear Map"**.

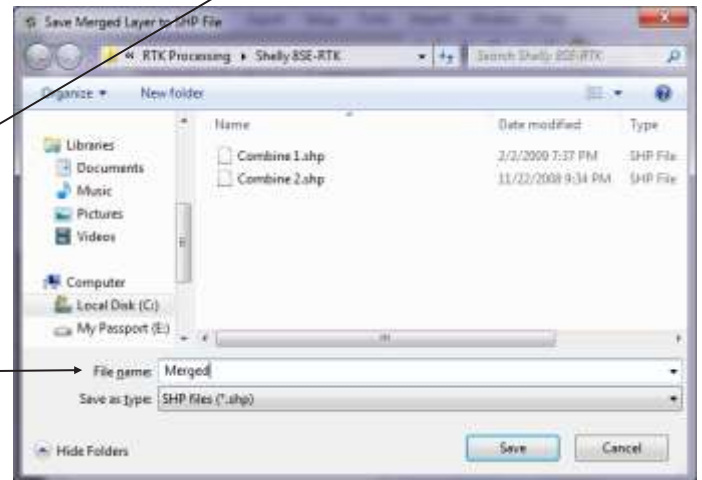
(This is to verify that only the desired layers are selected since multiple layers can be merged at one time with this tool).



2. Next, turn on all layers to be merged (**word of warning:** do not turn on any back-ground "drawings" such as roads, sections and etc. They are shapefiles and will cause an error on the file merge).

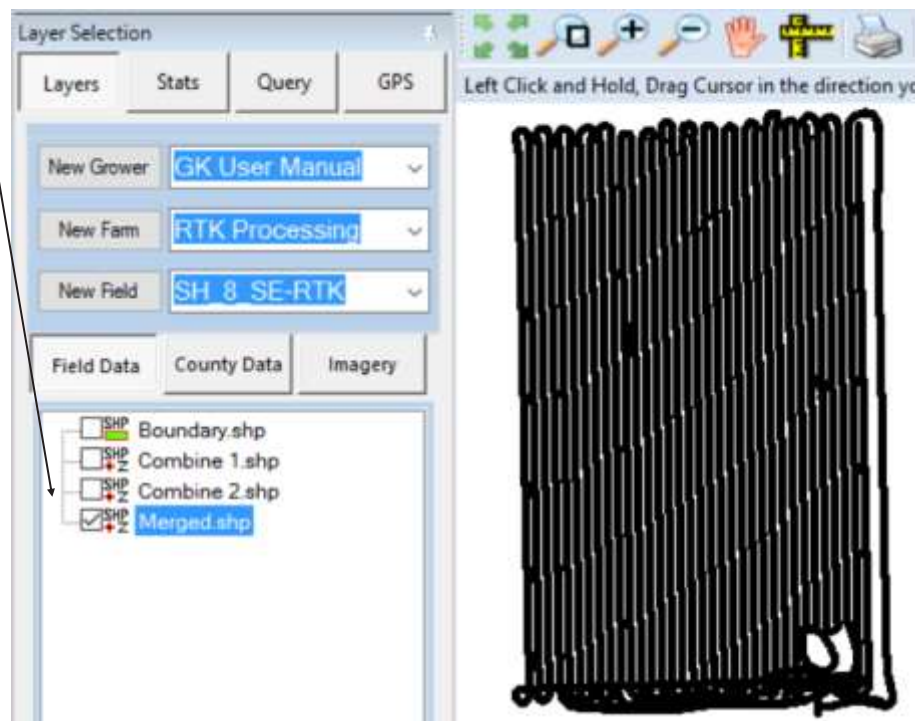
3. "Right click" on any of the files to be merged and select **"Utilities"** → **"Merge All Visible.shp's"**.

4. This will bring up a **"Save As"** window. Make sure to create a new & identifying name for this object such as **"Merged"**.



5. There will now be a new file in the Data Tree named **"Merged"**.

Continue **"creating the topo map"**.



Creating Topography & Watersheds

Cleaning Elevation Data—Database Tab

In most cases I wait till all my data sets are merged before cleaning, it makes for only 1/2 the work. In some cases, you may need to clean the data up before merging, but this is rare.

Before getting going, understand that not all RTK Data collection equipment collects data the same way. Some will “log” Quality information and some will just log Lat/Lon/Elevation. A good system will log additional Quality information.

Turn on your complete data collection for the field (again all the data should be in 1 SHP file).

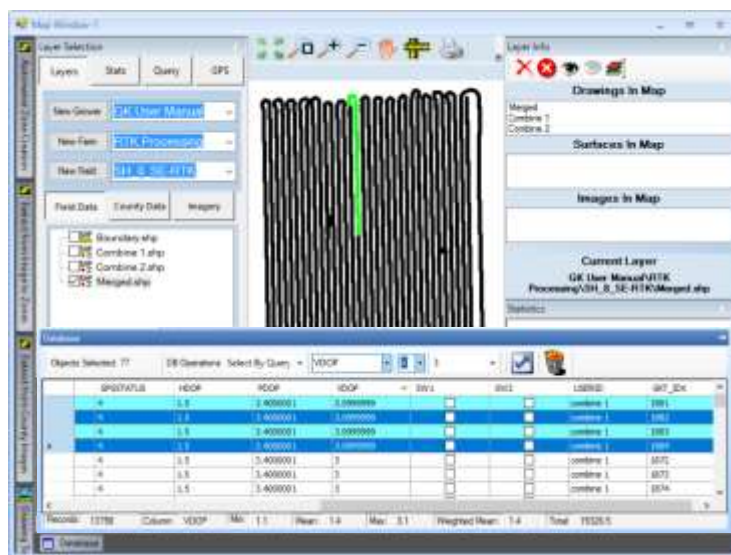
2. Click on the “**Database**” tab Bottom Left, the data table will open up.

3. By clicking on the column “names”, you will be able to sort the data ascending or descending. This is very useful for “deleting” unwanted data. By clicking on the gray area to the left side of the rows, you will be able to select objects within the active layer. By using the “Shift” key you can select multiple rows of data. You can also use the “Ctrl” key to select multiple points.

4. When working with Topography data, there are usually columns for signal correction or signal quality. You need to find out what values are acceptable for your application and use this “Table” to delete unwanted or invalid points.

5. There is also a “**DB Operations—Select By Query**” function. By using this, you can choose <>= functions to help select values to delete. Choose or type in a value to query & Click “**Run**”.  Delete unwanted Points 

6. Save the edited layers. You can either save them as the same name you imported them and you will have to re-import them if you want to see or use any of the deleted data, or name the file with a “New File Name”. This allows the user to come back and look at the “original” data again at any time.



Columns to Cleanup & Suggestions

HDOP	Delete anything greater than 3.0
VDOP	Delete anything greater than 3.0
RTK	Use ONLY RTK FIXED Data RTK Extend or Float = DELETE
GPSAccV	Delete anything greater than 13

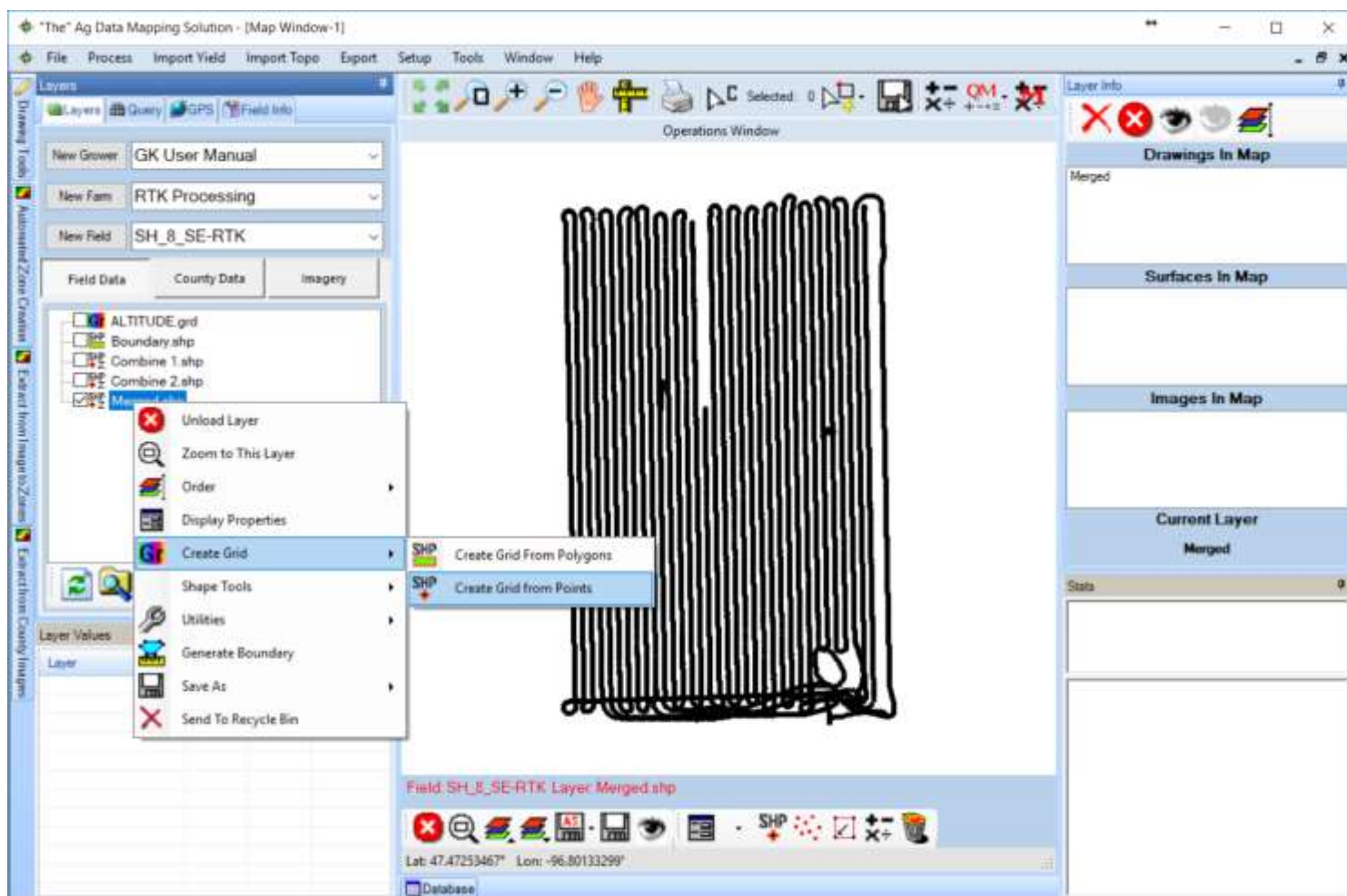
There are many more column names and values. Generally delete out data that indicates the potential for vertical error over...

0.4 foot
5.0 inches
0.13 meters

Creating Topography & Watersheds

Creating the Topography Map

- Once the SHP file data is cleaned up and merged, it is ready to be converted from Vector (.shp) to Raster (.grd).
- ADMS uses a function of "Triangulation" to create the .grd Surface.
- Turn on the "Elevation.shp" (shp/csv/dbf or any Vector points file)
- Right click on the layer name
- Choose "Create Grid" & "Create Grid from Points"



Creating Topography & Watersheds

Creating the Topography Map

Grid the Points

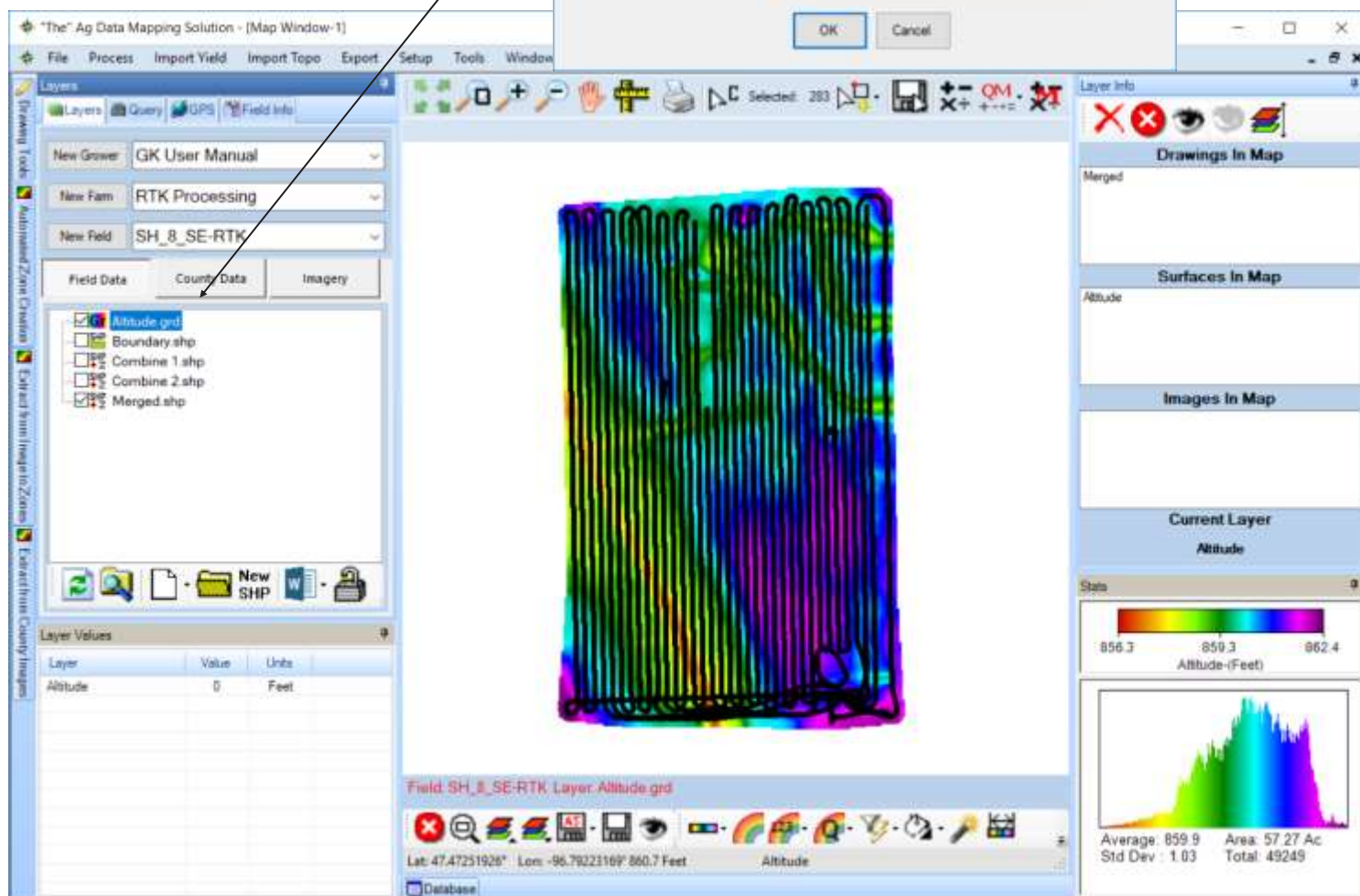
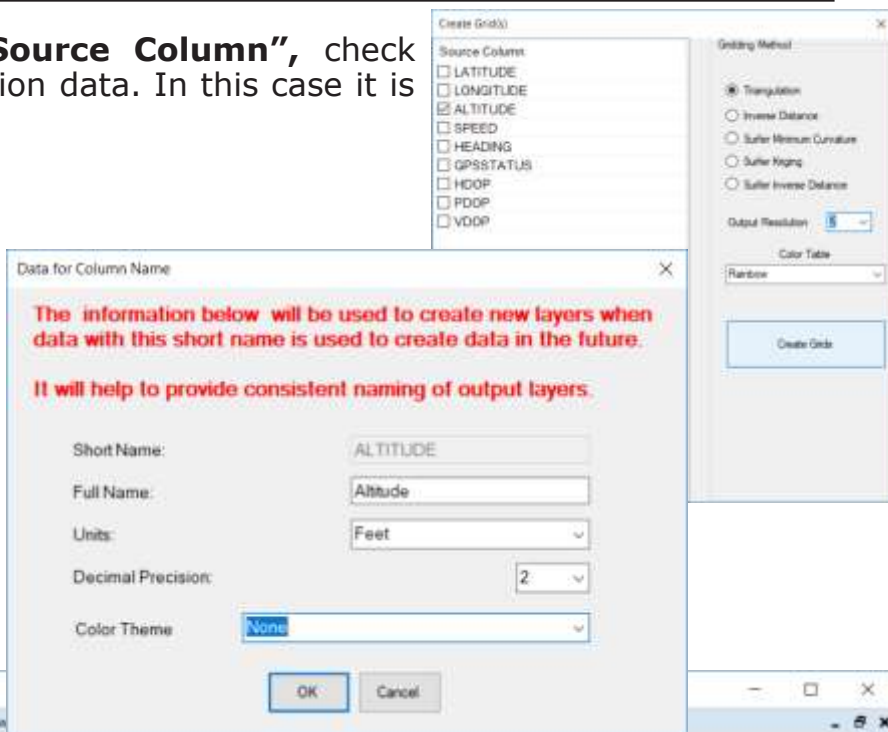
In the dropdown box labeled **"Source Column"**, check the column that contains the elevation data. In this case it is labeled **"Altitude"**.

Click **"Create Grid"**

First time creating a new Column Name. The **"Data for Column Name"** window will open. Fill in all the boxes. Once done this window will not open again.

To edit names & values go to Setup & Common Name Mapping.

Refresh the tree and check the box to display the new grid.



Creating Topography & Watersheds

Creating the Topography Map

Select the Boundary

Check the box next to the field boundary to turn it on. Then using the selection tools on the main menu, select the boundary to be used to crop the image.

Field Boundary Not Selected

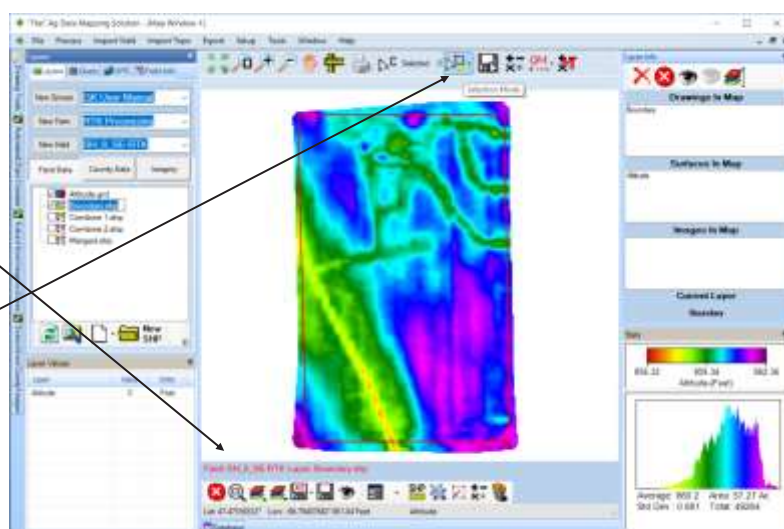
1 – Check the **"Boundary"** button in the data tree.

2 – Make sure the **"Active Layer"** address line say **"Boundary.shp"**.

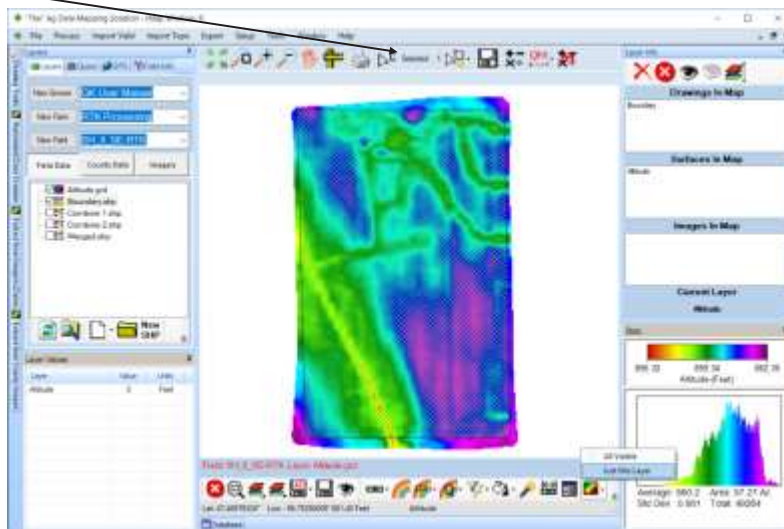
3 – Make sure the **"Area Replace"** button is selected.

4 – Place the mouse cursor inside the field boundary and "left click".

5 – Take note of the **lime green** cross hatching (indicates that the boundary has been selected). Also, the "Selected 1" on the top tool bar



Field Boundary Selected



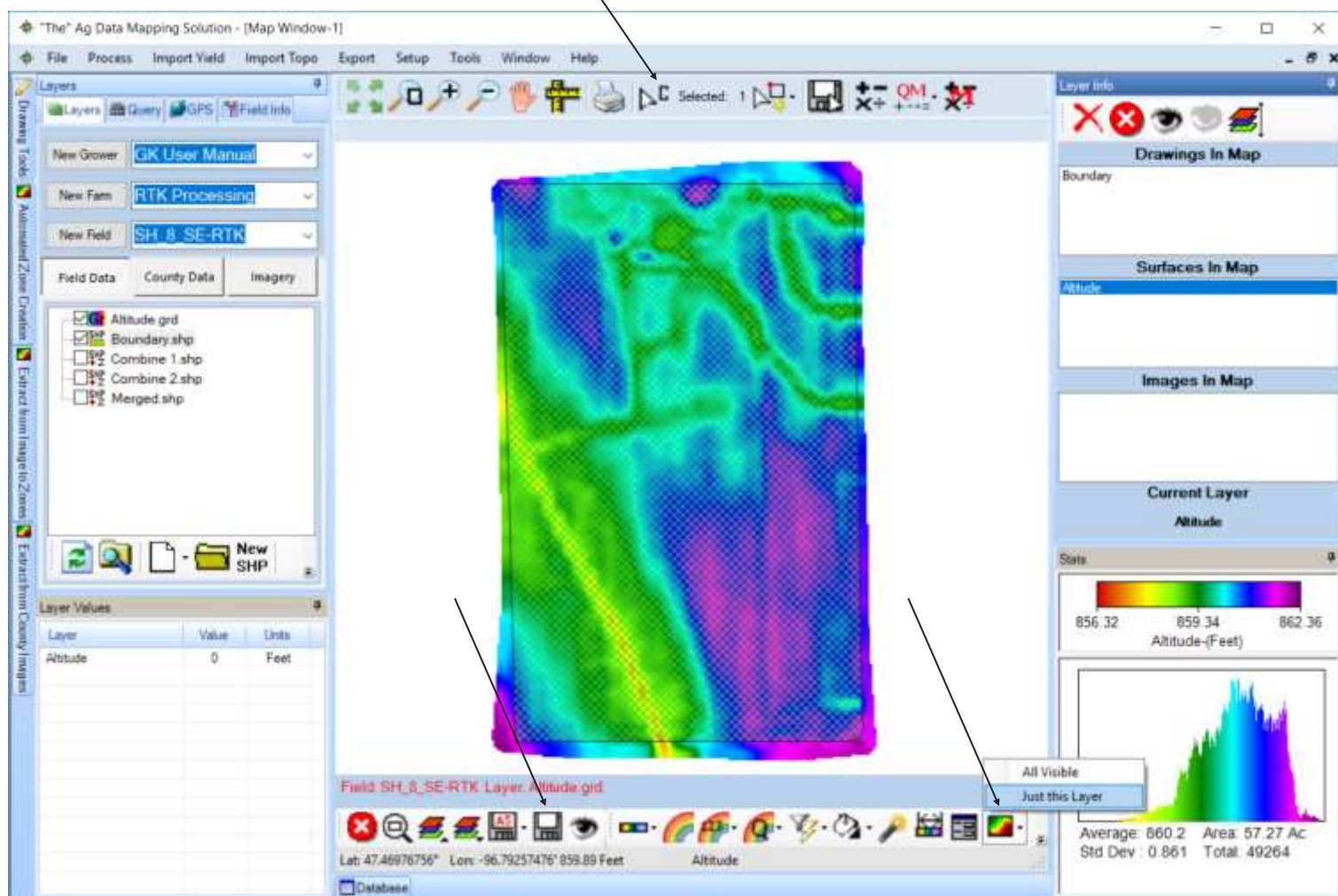
Creating Topography & Watersheds

Creating the Topography Map

Cropping the Grid to a Boundary

- Set your **"Active Layer"** to the Elevation.grd or Altitude.grd
- Go to the **"Bottom Toolbar"**
- Click on the **"Crop Raster to Selected Polygons"** button.
- Click the **"Save"** button on the **"Bottom Toolbar"**.
- Click the **"Clear Selection"** button OR Click anywhere in the map window outside the field boundary to remove the or **lime green** selected boundary.

Next Step "Watershed Modeling"



LiDAR—General Info

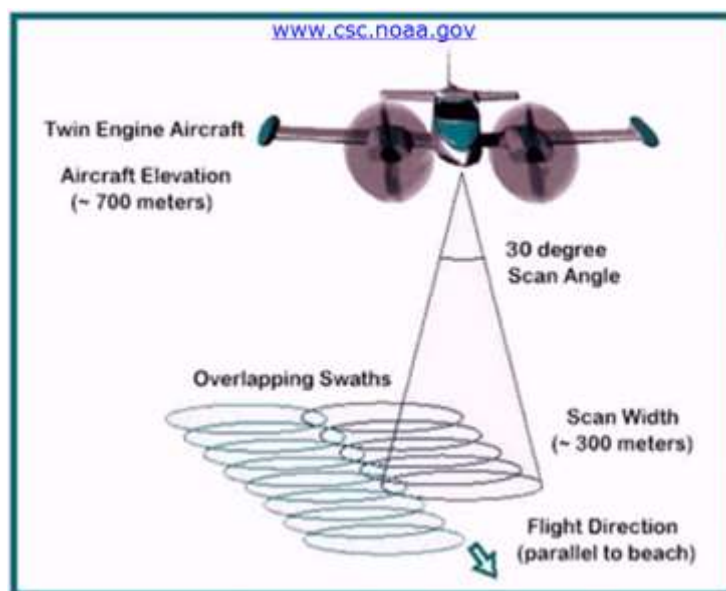
LiDAR = Light Detection And Ranging

LiDAR is collected by a plane shooting a NIR (Near Infra-Red) laser at the earth and measuring the re-reflectance time back to the plane.

Flight Info—

- Plane is equip with RTK & Data collection PC
- Equip with special LiDAR sensing tools
- High winds & gusts cause inaccurate readings
- Flight Elevation (approx.) ~ 2,300'
- Pass Width (approx.) ~ 985'
- Flight Speed (approx.) ~ 100-200 mph

LiDAR may be an excellent topography data source in many cases. Typically it is going to be a 1 time collection event in most areas, and it has some limitations we need to understand. It is important to have a good idea of when (year) the data was flown. LiDAR is typically collected at times of minimum vegetation (Fall—Winter—Spring)

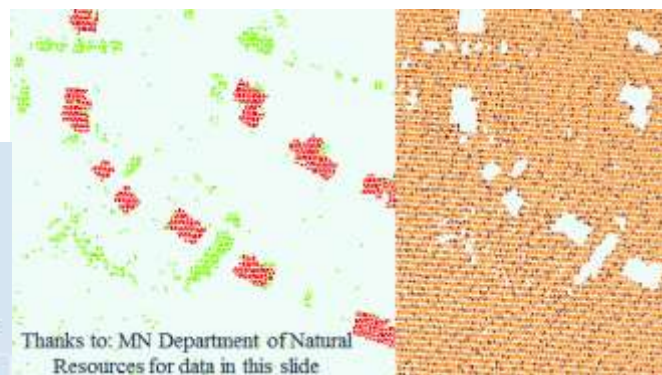


LiDAR Facts—

- Elevations at the top of dense vegetation (cattails, heavy grass & weed patches)
- Reads the tops of buildings and structures
- Reads the elevation of the surface of water or snow
- Accuracy in tree covered areas are always questionable (density of trees & organic matter on the ground)
- Road ditch bottoms are always questionable due to the previous points
- Know the year of LiDAR collection (useful for surface drainage changes or standing water)
- Know the "accuracy" rating for your LiDAR data. MN, ND, SD, rated at 8" accuracy and the Red River Valley MN-ND at 6" accuracy.
- Every LiDAR reading gets classified (suggest using Ground & Water for drainage in ADMS)

GK Technology's preferred LiDAR data type is LAS or LAZ file

- UTM coordinate
- X&Y units = METERS
- Z units = Feet or Meter



Processing LiDAR LAS Files

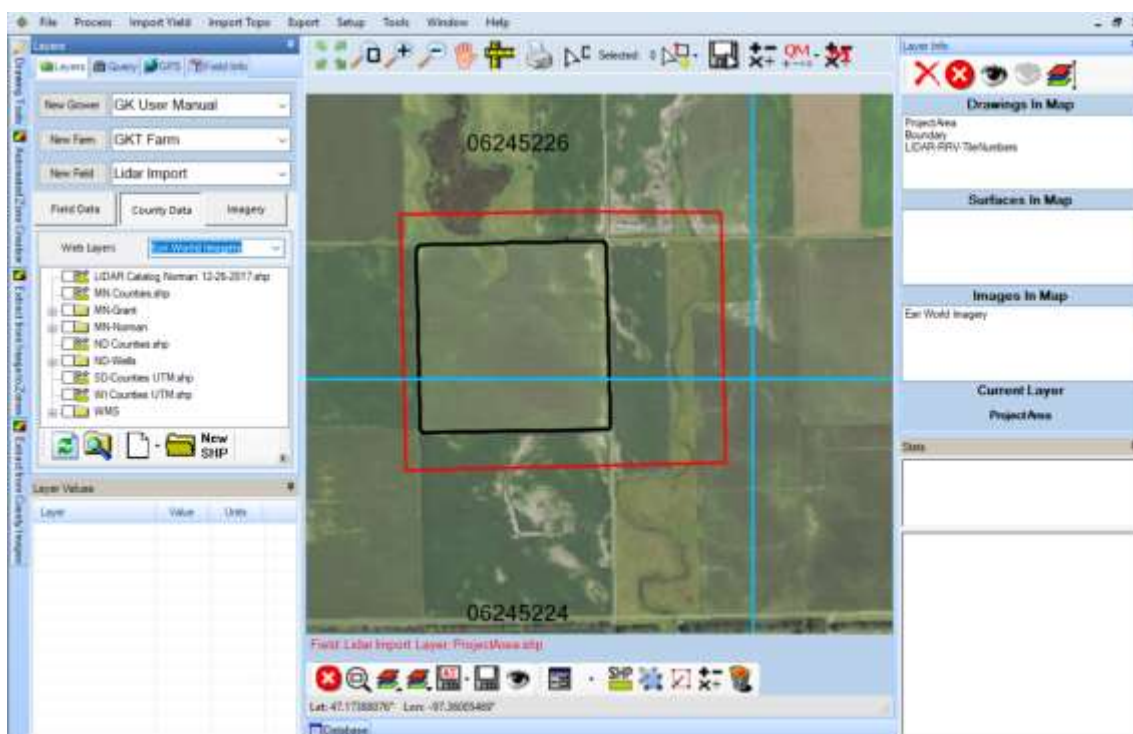
To utilize the "LiDAR" data you have downloaded. (See Downloading LiDAR)

1. Draw boundaries to define the areas you want to process.
You may want to have two boundaries created.



Boundary —Field Boundary—This polygon will define the field (or section) and will be used for running your watershed modeling. Keep in mind the accuracy of this boundary will affect the "Flow Accumulations", "Depressions" and "Watersheds".

Project Area —Tile Area—This polygon will encompass the whole field area and also the potential tile "Outlet" area. This object will NOT be used for watershed modeling.



Field Boundary in Black

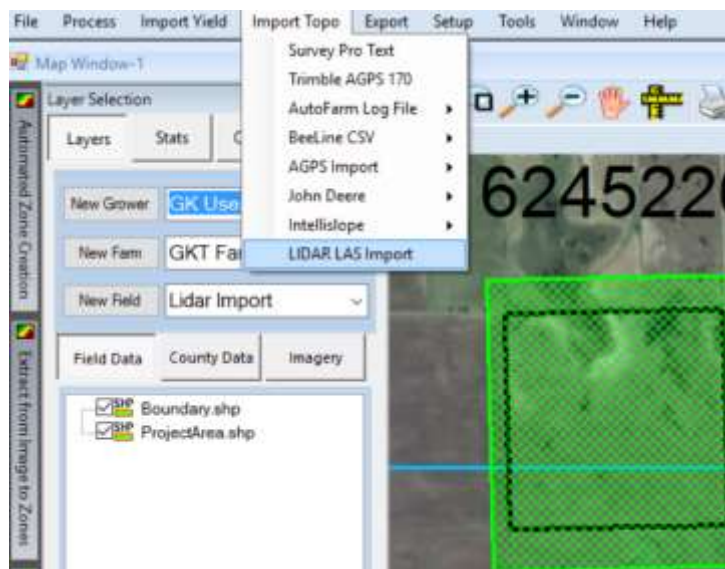
Project Area Boundary in Red

Lidar Tile Boundary in Blue

For this example we have only downloaded LiDAR tiles 6245226 & 6245224

2. To "Import LiDAR" you must turn on the "Boundary" and "SELECT" it.
The Boundary will become **LIME GREEN**

3. Go to the "Menu Bar" & click on "Import"
Select "Lidar LAS File"



Processing LiDAR LAS Files

4. Import LAS Files—Adjust your settings to...

Default should be correct
 Check—Ground
 Check—Water
 Check—Convert Meters to Feet
 Check—Import only area under selected objects.

Default is 1 meter should adjust
Output Resolution = 2 meters

Resolution settings

Less than 40ac— 1 meter

40ac to 2500ac—2 meter

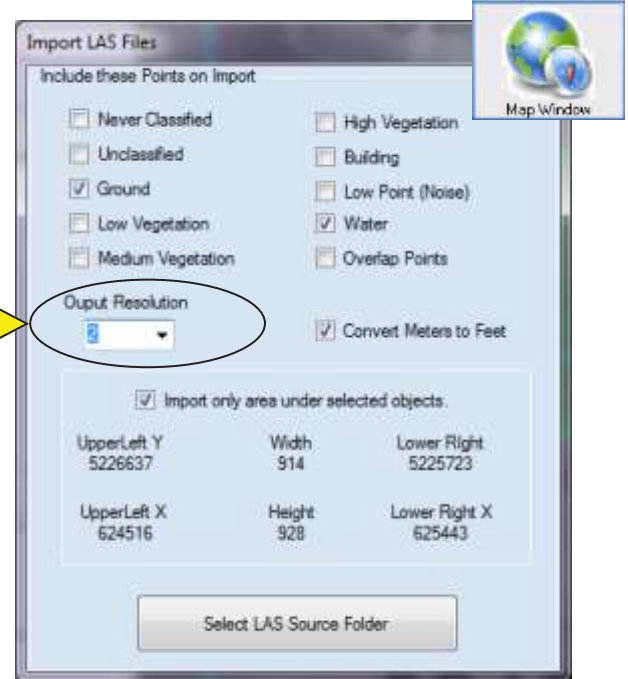
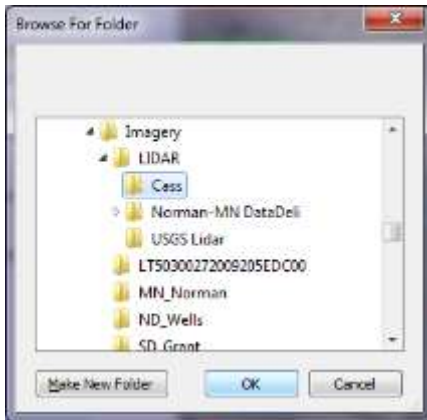
2501ac to 9000ac—3 meter

5. Click on the "Select LAS Source Folder"

Browse to "Folder" containing the "LAS or LAZ" files

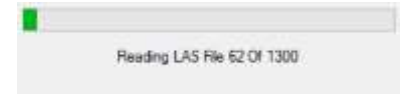
Should be in C:/GKData/Imagery/LIDAR

OR C:/GKData/Imagery/LIDAR/countyname



6. Click "OK" and the LiDAR tiles will be processed to the "Selected Boundary" Larger "Project Boundary".

Note: ADMS will find the "LiDAR tiles" bases on "Selected Boundary"



7. Go to "Layer Info" & "Clear Map" ❌

8. Turn on the Field "Boundary.shp" (you may want to re-draw at this time)

9. Left Click inside Field Boundary — it will turn **Lime Green**

10. Turn on "LidarImport.grd"

11. Click "Crop Raster to Selected Polygon" on the Bottom Toolbar "Just this Layer" 🗂️

12. Click "Save As" on the Bottom Toolbar 📁

13. Rename and click "Save" Suggest renaming to "LidarTopo"

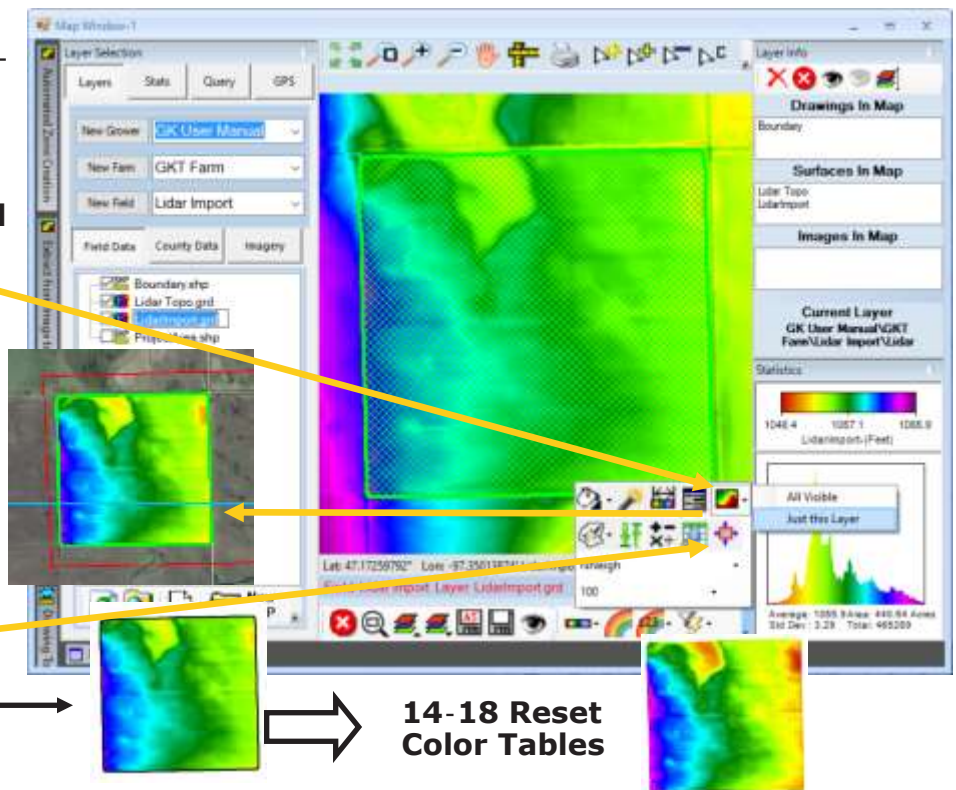
14. "Clear Map" ❌

15. Turn on "Lidar Topo"

16. Click on "Crop Null Values"

17. "Clear Map" ➡️

18. Turn on "Lidar Topo.grd"



14-18 Reset Color Tables

Creating Topography & Watersheds

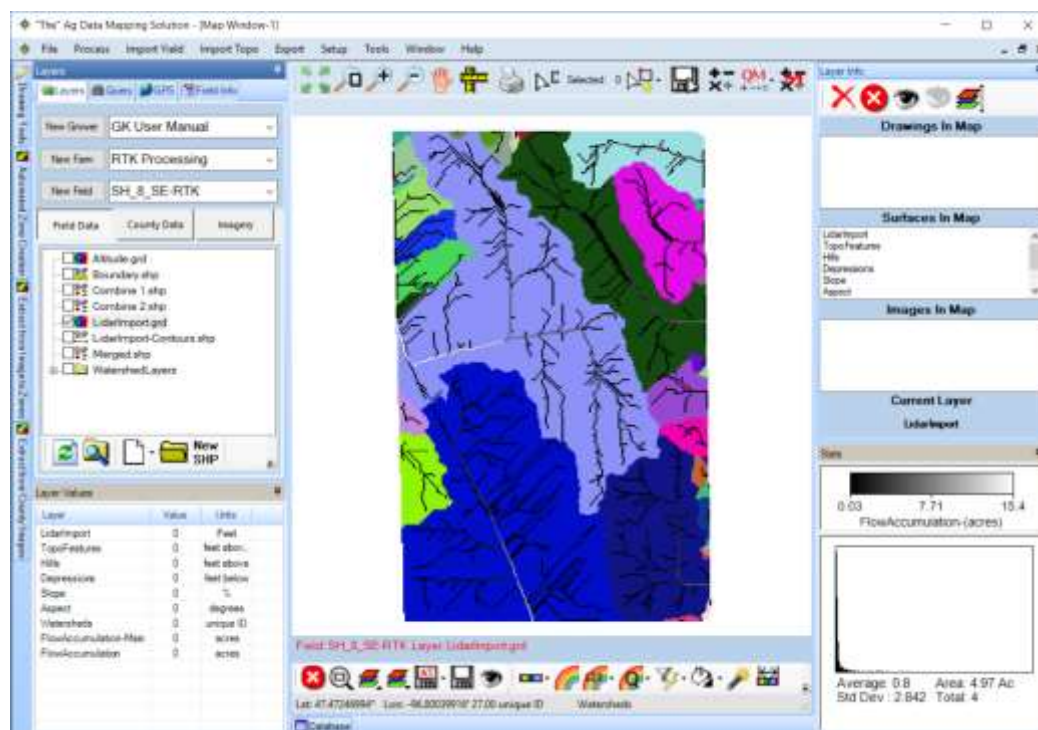
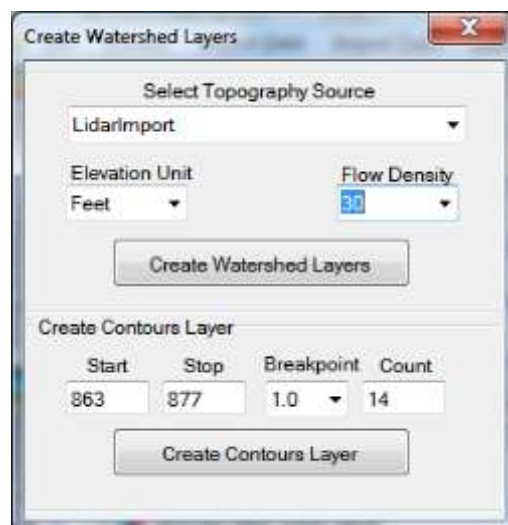
Creating the Topography Map

Running the Watershed Modeling Routine



Open into the "Map Window"

- Select the desired "Grower", "Farm" and "Field".
 - Turn on the "Altitude.grd" or "Lidar Topo.grd" for the field
 - Top Menu Bar select "Process" and "Watershed Modeling"
1. In the **"Select Topography Source"** drop down, select the layer that was created in the "Grid Points" method on the previous page.
 2. In the **"Elevation Unit"** drop down box, select the Units of elevation surface feet or meters. This setting is necessary for computing the slope of each cell in the field. The horizontal units are in meters, by defining whether the units are in feet or meters, the % slope is calculated correctly.
 3. For a starting point, leave the "Flow Density" set at 40. This number can be raised or lowered, to provide more or less detail in the flow accumulation layer. Raising this number provides more detailed flow paths.
 4. Click **"Create Watershed Layers"** button
 5. When the progress bars disappear, a view like the one below will be displayed. That view is the flow accumulation layer over the top of the watershed's layer.
 6. The flow paths should make sense to you when you look at them. If they do not, there may be some false data in the topography layer that is not representative of what is happening in the real world. Looking at the depressions layer to see if the areas defined as concave "bowl" shaped areas in the field are correct will help to determine if the data is correct. Excessive area showing up in the depressions layer may indicate that an outlet for water was not represented correctly in the topography map.



Creating Topography & Watersheds

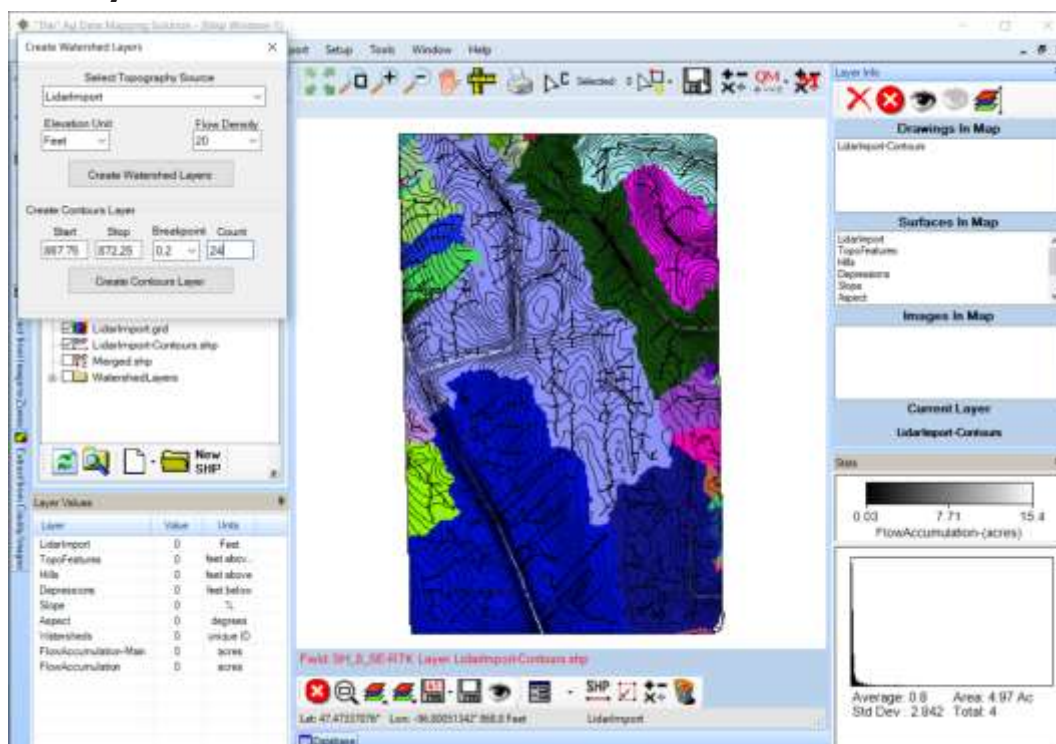
Creating the Contour Map



Running the Contour Routine

Open into the "Map Window"

- Select the desired "Grower", "Farm" and "Field".
 - Turn on the "Altitude.grd" or "Lidar Topo.grd" for the field
 - Top Menu Bar select "Process" and "Watershed Modeling"
1. In the "**Select Topography Source**" drop down, select the layer that was created in the "Grid Points" method on the previous page.
 2. In the "**Elevation Unit**" drop down box, select the Units of elevation surface feet or meters.
 3. The "**Start**" / "**Stop**" are the lowest / highest elevations of the Topography map.
 4. The "**Breakpoint**" is how many "**Feet or Meters**" between the Contour Lines to be created, if you use the dropdown values the "**Count**" will automatically update.
- NOTE: "**Breakpoint**" can be Manually entered, but the "**Count**" will not update automatically. The "**Count**" must be manually calculated and updated.
5. The "**Count**" is how many Contour Lines will be created starting at the "**Start**" creating a Contour Line and moving up a "**Breakpoint**" creating a contour and moving up a "**Breakpoint**" until it reaches the "**Stop**".
 6. Click the "**Create Contours Layer**"



Using the Point Offset Routines to Adjust for Better Topography Maps

Some GPS data logging packages use an offset while collecting data. This is visible in planting data from both Deere and Ag Leader.

While it makes sense for the planting data, the altitude attribute that is written to the file is for the altitude at the GPS receiver, not at the planter. And a topography map with the appearance of the one to the right is the result. Note the zippered appearance of the edges of all of the features of the maps.

To correct for this problem and to make better topography maps, we need to try to correct the data using some data in the log file.

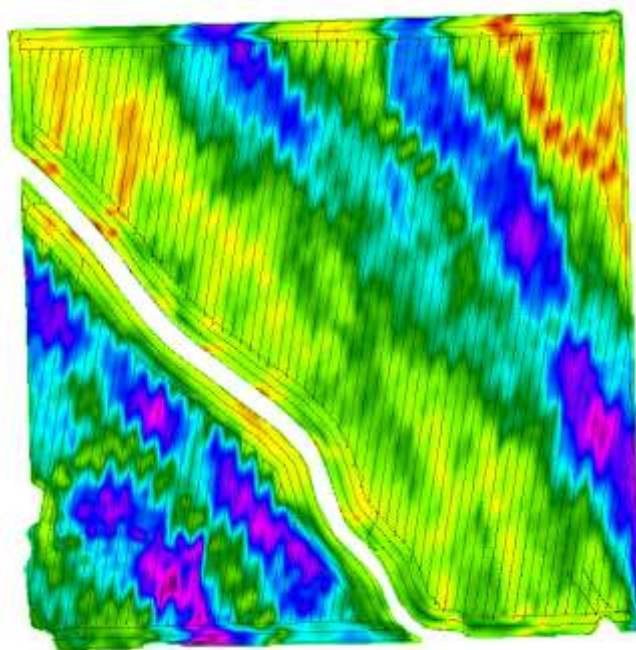
In order for this to work, there has to be an attribute in the database for the direction of travel or 'Heading'.

Below right is a Deere GS2 collected database, imported using the 'Import Topo' menu in Ag Data Mapping Solution. It is imperative that there be a heading column to make this work.

In order to fix this, we need to figure out how far the offset is from the GPS to the planter. If you are the grower, you probably know this number, if not, we will have to figure it out by zooming in on a zippered area and measure the peak to trough of the wave made by the zipper.



Peak
Trough
And distance from
peak to trough of
80 ft.



Database					
Objects Selected: 2		DB Operations: Select By Query			
LONGITUDE	LATITUDE	ELEVATION	DISTANCE	HEADING	GKCT_IDX
-97.22722117	49.18292236	809.02001953	66.90000153	188.3999939	1
-97.22771454	49.18293381	808.9899023	124.40000153	188.6999965	2
-97.22771454	49.18294144	809.01000977	90.19999695	188.6999965	3
-97.22771454	49.1829567	809.04998779	138.69999695	188.6999965	4
-97.22774506	49.18279266	809.04998779	1828.19995117	8.5	5
-97.22774506	49.18281174	809.07000732	232.19999695	8.39999962	6
-97.22773743	49.18283463	809.15002441	242.30000305	8.39999962	7
-97.2277298	49.18285751	809.25	273.3999939	9.19999981	8
-97.2277298	49.18288422	809.28997803	281.20001221	9.80000019	9
-97.22772217	49.18291092	809.30999756	280.79998779	10.69999981	10
-97.22771454	49.18293381	809.32000732	280.7999939	11.19999981	11
-97.22770691	49.1829567	809.41998291	277.20001221	11.19999981	12
-97.22769928	49.1829834	809.57000732	277.70001221	10.69999981	13
-97.22769165	49.18300629	809.69000244	278	10.19999981	14
-97.22768402	49.18303299	809.72988047	382.29998779	10	15
-97.22767639	49.18305588	809.88000488	278.5	9.69999981	16
-97.22766876	49.18308258	809.90997314	278.3999939	9.39999962	17

In this case, that peak to trough measurement is about 80 feet. So an offset of 40 feet would be about right.

Applying The Offset

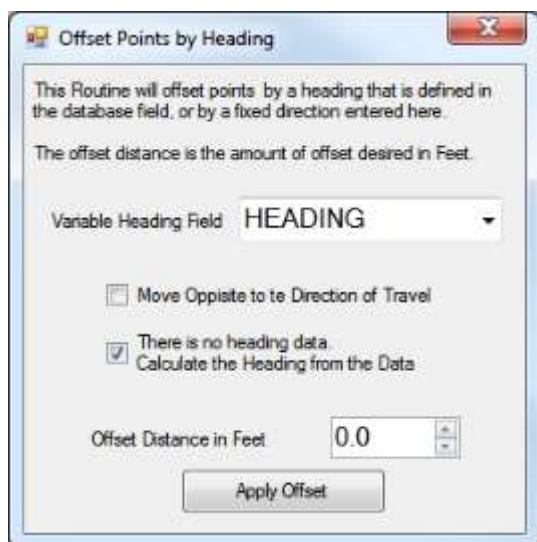
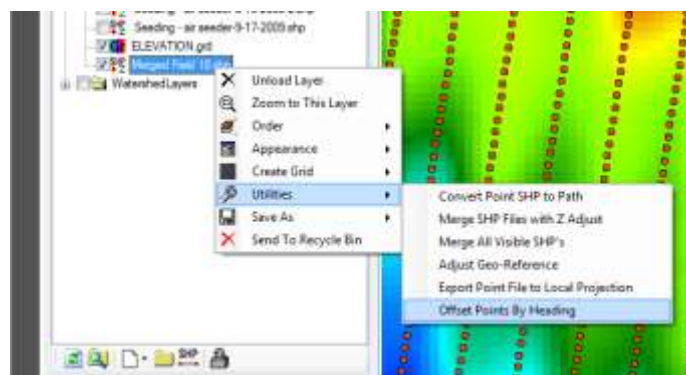
The tool to adjust for this is called 'Offset Points by Heading', and it is on the 'Utility' menu on the right click of a shapefile in the data tree.

After clicking on 'Offset Points by Heading' the dialog below appears.

In the Variable Heading Field box, select '**Heading**'. Change the offset distance to feet. Since the direction we want to offset the distance is in the direction of travel, leave the box labeled 'Invert the Heading Value' unchecked.

Then click '**Apply Offset**'.

View the results and see if the offset looks

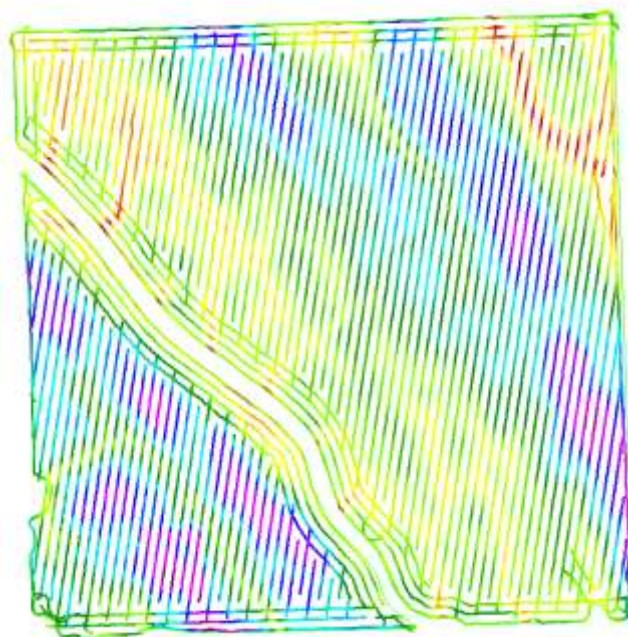
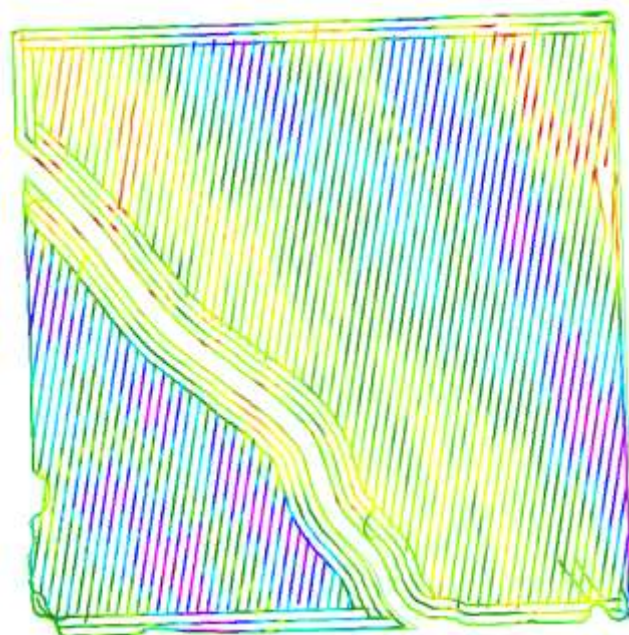


right. If not, unload the shape points file, do not save the changes. Reload it and try again with a slightly different number.

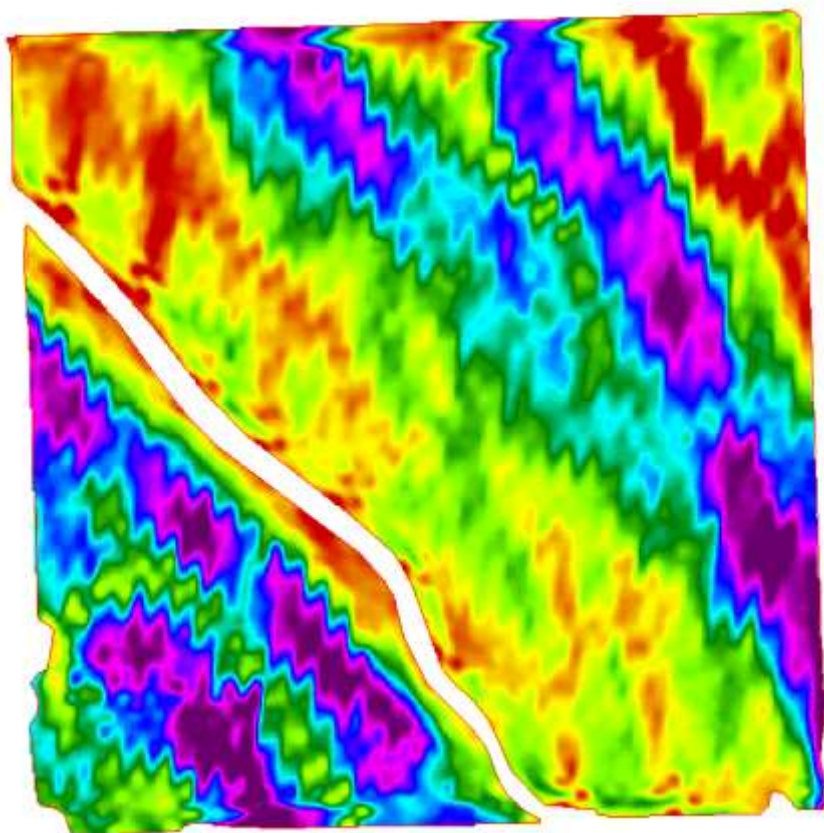
When you have the result you want, save the SHP points file to a new layer, and grid it.

You can already see in the point map to the right that it is a much better map.

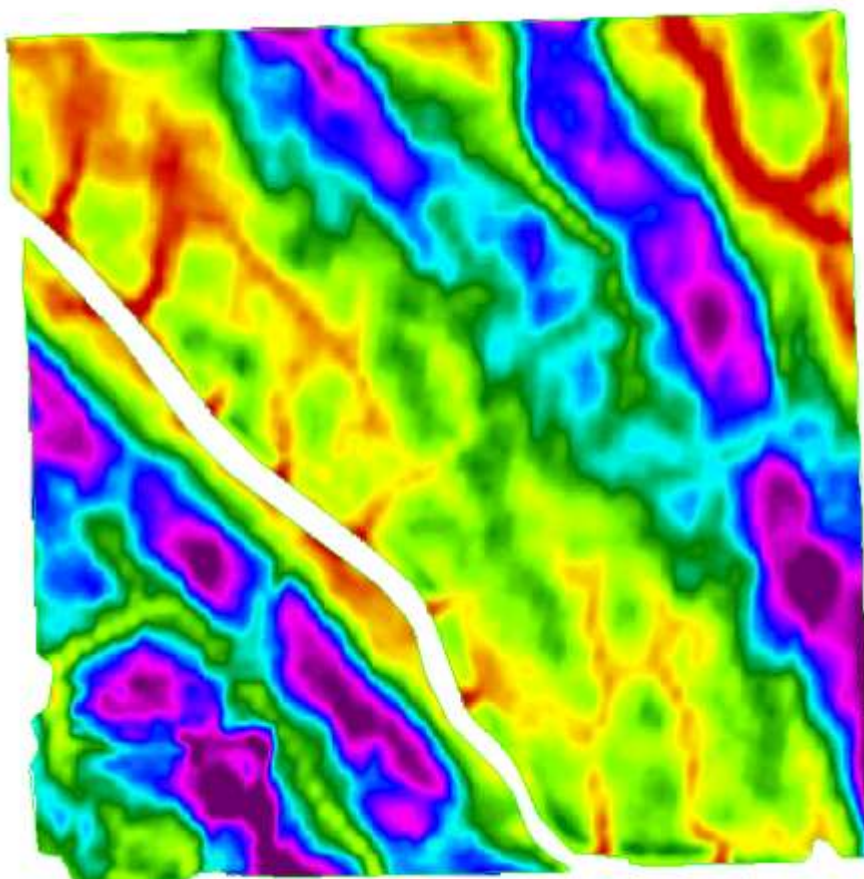
Check out the next page for before and after maps.



Before and After Offset Heading Correction



***Before
Offset
Points
By
Heading***



***After
Offset
Points
By
Heading***

Surface Re-projection

Re-Project the Raster

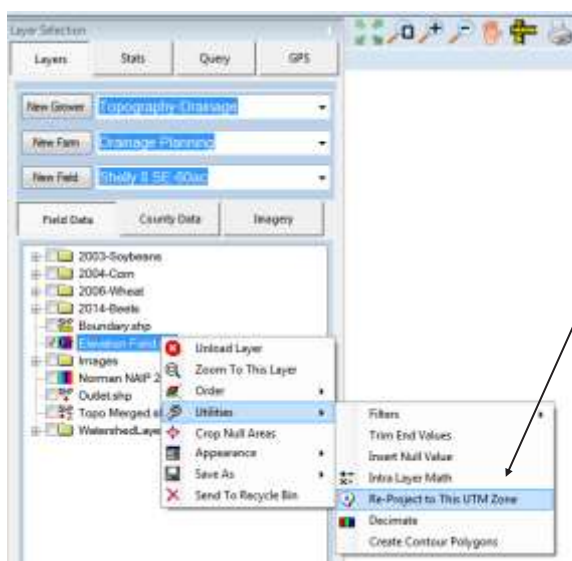


The data is projected in UTM Zone 15, lines up with boundaries and has the correct coordinates in UTM 15. If you are displaying the rest of the data for this farm in Zone 14, you will need to re-project this data to display it with NAIP data, or other raster data.

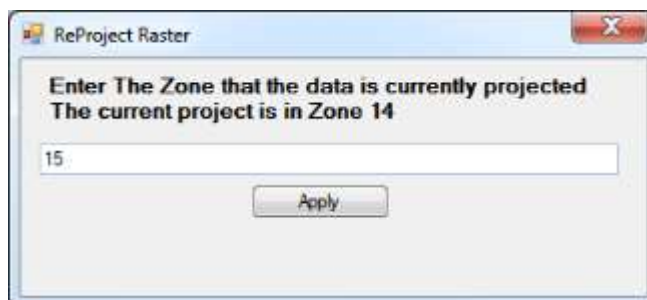
Close "Map Window" and set yourself to the correct UTM. In this example that is Zone 14.

Turn on the Raster to Re-project, and right click

Utilities —> Re-Project to This UTM Zone.

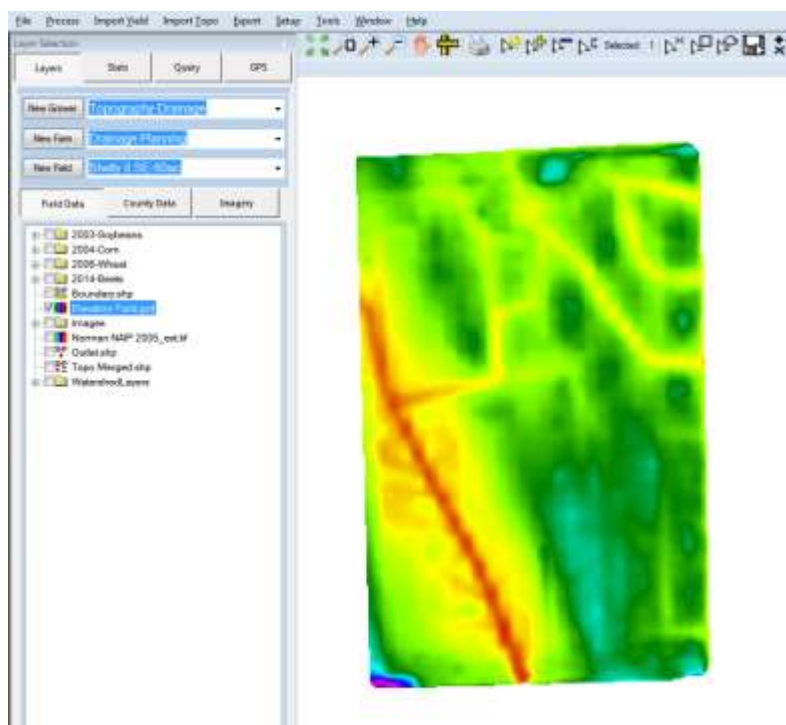


The dialog box below will appear. The data is currently in Zone 15, so enter 15 in the box and click 'Apply'.



The resulting image will now be rotated and scaled to fit in Zone 14.

Then make sure the re-project surface is the active layer, and "Save" the layer.



LiDAR-RTK Merge—Collecting RTK Data to use with LiDAR

We are going to use an example where LiDAR topography is 5 years old and the field has had some surface drainage done on it. This brings up a very important questions. Does that make it any LESS ACCURATE? In this case YES. There are surface drains that have been cleaned. Other examples where this would work well—CRP—Lidar collected in a wet cycle with standing water and many others.



The end use for this data is "SURFACE DRAINAGE". Because it is only being used for surface drainage, only the "Field Ditches" and "Road Intersection" were collected using RTK. If this data would have been for tile, we may have wanted to drive the "Ridges or High spots".

Good RTK collection for this process would include (highs, lows, outlets & road centers).

- driving field ditch bottoms
 - road ditch bottoms
 - low areas
 - outlet & inlet areas
 - ridges
 - most importantly county road centers north and south
- The road centers will be used for adjusting "X,Y,Z" on the data set
- if the RTK is going to be used for the "Control Point" collect it.

At the point that you are collecting data in field. We suggest that you use your NAIP and LiDAR data for collecting the in field data with ADMS. It will save time and assure you get all the data collected without having to a make multiple collections. Also, you will see these "LARGE" deviations in data collection geo-referencing (shown below).

Note: This method works well in scenario's where you are updating small areas or specific passes within the field. This method does not work as well with "Whole" field RTK data collections.

Red Points = LiDAR Control Points (not RTK)

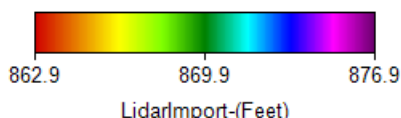
- This Red Point is at the "Road Intersection"
- Points set by hand off the LiDAR map

Black Points = RTK collected using "Mobile Base"

- Note the "Geo-Reference"
- CROSS (+) should be at "Road Intersection"

Collected by driving the center or the road east—west & north—south

Colored map = LiDAR Topography Map



LiDAR-RTK Merge—Adjusting Geo-Reference—Moving RTK

Need to decide which data set is the "control" for setting your "Control Point".

**** In this case we are using the "LiDAR" as the "MASTER"**

**** Moving the RTK DATA.shp**



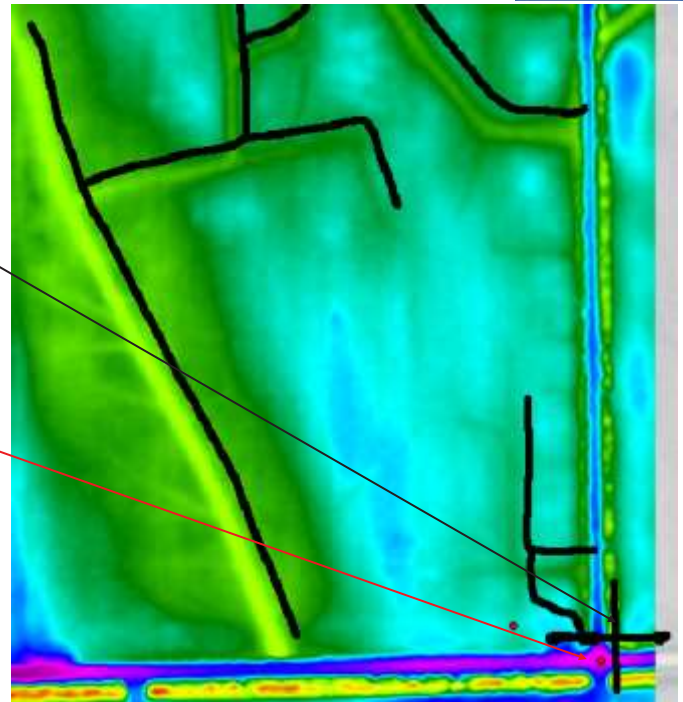
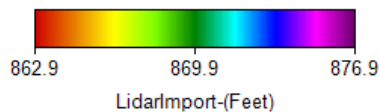
Turn on data in this order

1. Black Points = Ditch Bottoms.shp RTK Data collected with Mobile Base
 - Note the "Geo-Referencing"
 - CROSS (+) should be at "Road Intersection"

Collected by driving the center of the road east—west & north—south

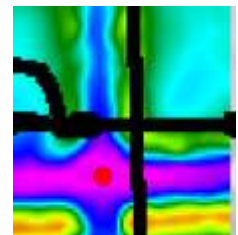
2. Red Points = LiDAR Control Points (not RTK)
 - This Red Point is at the "Road Intersection"
 - Points set by hand off the LiDAR map

3. Colored map = LiDAR Topography Map



4. Zoom into the Road intersection area (Area for geo-referencing)

5. Use the "Measure" tool to get some close estimates for how much to move the .shp (est. 50' south and 30' west)



6. Right Click—RTK Points (Ditch Bottoms.shp)
 - choose—Utilities
 - Adjust Geo-Reference

7. Use the "Arrows" or type in the values to move the data. Click "Apply"

8. Repeat step 7 till the data lines up perfectly. Then pan around the field to confirm.

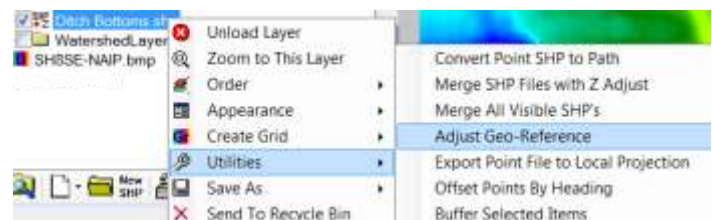
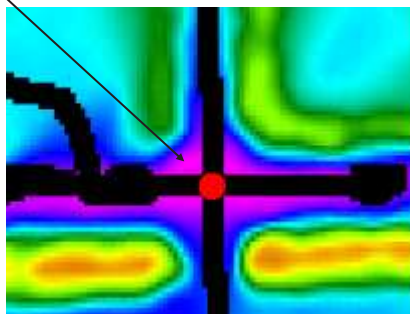
*Example Adjustment:
Ended up 33' West
51' South*

9. Suggest clicking "Save As" "Ditch Bottom-Adj.shp" or something to identify the changes done.

Or

Just "Save"

(original data location — GONE)



LiDAR-RTK Merge—Adjusting Geo-Reference—Moving LiDAR

Need to decide which data set is the "control" for setting your "Control Point".

**** In this case we are using the "RTK" as the "MASTER"**

**** Moving the LiDAR DATA.grd**



Turn on data in this order

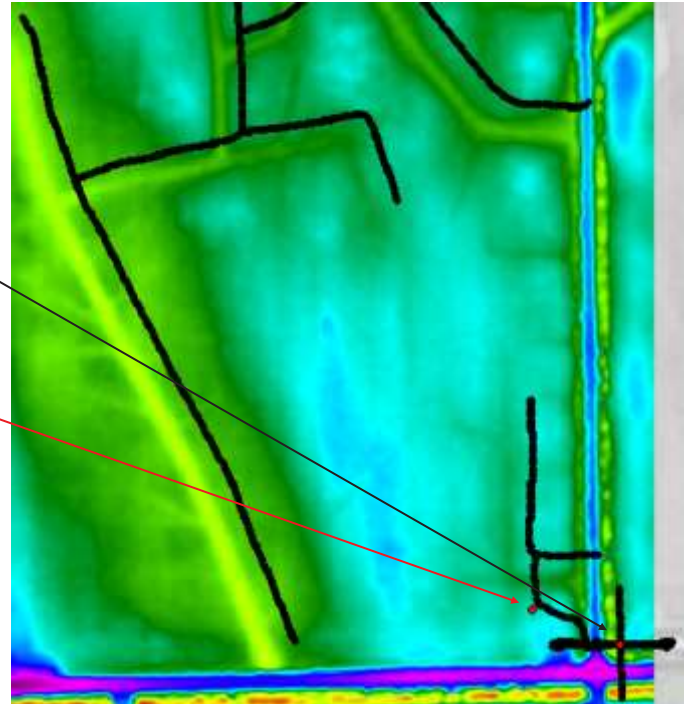
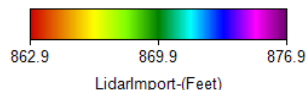
1. Black Points = Ditch Bottom.shp "RTK Mobile Base"

- Note the "Geo-Reference"
- CROSS (+) is at "Road Intersection"

Collected by driving the center of the road east—west & north—south

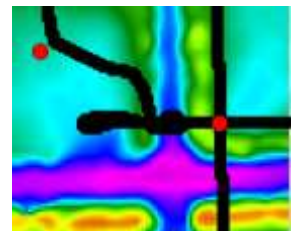
2. Red Points = RTK Control Points (not LiDAR)
 - This Red Point is at the "Road Intersection"
 - Second point set at a "Physical" mark, a "stake" driven in the ground in this example.

3. Colored map = LiDAR Topography Map
 - Road Intersection needs to be aligned with RTK CROSS.



4. Zoom into the Road intersection area (Area of geo-referencing)

5. Use the "Measure" tool to get some close estimates for how much to move the .shp (est. 50' north and 30' east)



The movement will be made in "METERS" so divide the values by 3.2808 (est. 15.24 meters north and 9.14 meters east)

6. Make "LidarImport.grd" your active layer

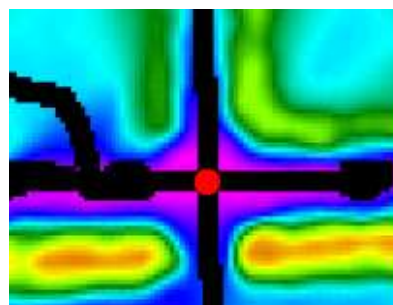


7. Click the "Surface Properties" button on the bottom toolbar.

8. Write down the Northing—Easting values so you know your starting point

9. Use the Arrows to "Adjust Geo-Reference" till the data lines up perfectly. Then pan around the field to confirm alignment.
 - Confirm Units = Feet
 - Confirm Decimal Precision = 1

10. Click "Save"



Set Raster Attributes

Adjust Geo-Reference

Rows: 717 Columns: 506

Northing: 5260385.725

Easting: 665753.692

X Resolution: 1

Y Resolution: 1

Update Position

Data:

Minimum Data Value: 862.99196777

Maximum Data Value: 876.90112304

Units: Feet

Decimal Precision: 1

Apply

LiDAR-RTK Merge—Adjusting Elevation & Merging Rasters

The LiDAR and RTK are “aligned” on a X-Y axis. We need to adjust the Z axis. You must have data in areas where the elevation that has NOT changed over time. In this example we are using the road and the field entrance.

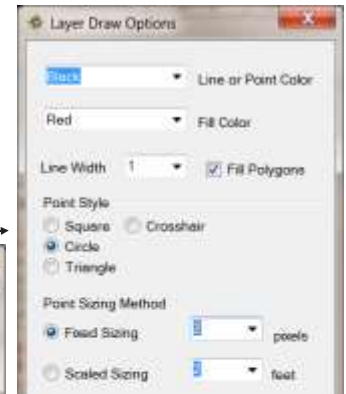


1. Turn on “LidarImport.grd” and “Ditch Bottom.shp”

2. Make **Ditch Bottom.shp** the Active Layer

3. Click on the “Change Draw Style” 

- Change settings like this
- Click “Apply”



4. Click on the “Change Label Settings” 

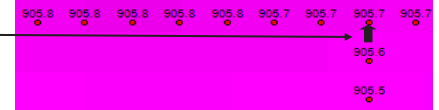
- Change settings like this
- Click “Apply”



5. Zoom to the area of the data to take elevation readings

6. Scroll your mouse over the SHP point

Take readings RTK 905.7'
 - LiDAR 875.3'
 Difference 30.4'



Lat: 47.469827 Lon: -96.79395 875.3 Feet

7. Repeat this function several times (5 to 10 suggested).

Average all the “Difference” values. This will be the amount you adjust the “Elevation Data”
For this example the average was 30.43’

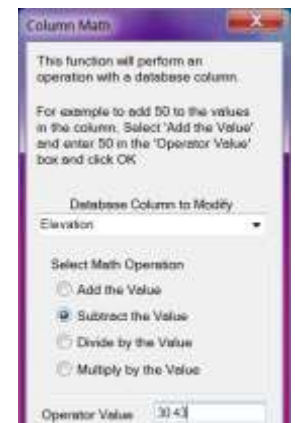
To Adjust the SHP RTK Data

1. Make **Ditch Bottom.shp** the Active Layer

2. Click the “Perform Math operation on a Column” on the bottom toolbar. 

3. Choose column to amend & “Add” or “Subtract” & enter “Value”
This example “Elevation” & Subtract & 30.43

4. Click “Apply” and “Save”



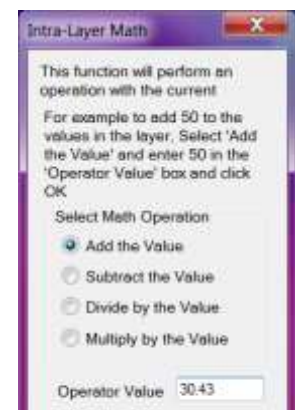
To Adjust the GRD LiDAR Data

1. Make **LidarImport.grd** the Active Layer

2. Click the “Intra-Layer Math” on the bottom toolbar. 

3. Choose column to amend & “Add” or “Subtract” & enter “Value”
This example “Elevation” & Subtract & 30.43

4. Click “OK” and “Save”



LiDAR-RTK Merge—Adjusting Elevation & Merging Rasters

Both the LiDAR & RTK are adjusted to match on the X / Y / Z axis. The final step is going to be "Merging" the data sets. There are two methods of merging that could be used in ADMS, merge as "Rasters" or merge as "Vectors". This example will show you the "Raster" method.



Start by "Clearing" the map.

1. Turn on **Ditch Bottom.shp** & make it the Active Layer

2. Right Click on the Ditch Bottom.shp
*Note: "Point Size" will effect the next step.
 Generally use 10' - "World Size"*



3. Select "Create Grid" & "From Polygons"
 - Select Column—Ex. = "Elevation"
 - Output Resolution = 2
 - Color Table = Rainbow
 - Click "Create Grid"



You may be prompted "Data for Column Name" Window. Fill in like below & click "OK"

NOTE: DO NOT use "field names" - use "Event names"

- "Fill Null Values" - click 1 time (data in pass should touch)
- "Low Pass Filter" - click 1 time

4. Turn off Ditch Bottoms.shp

5. Turn on the LidarImport.grd & Elevation.grd
 - May want to toggle Front to Back to compare.



6. Layer sequence is very IMPORTANT.
 - The first surface turned on (Back/Bottom) will be on top after the "MERGE"
 - Only turn on surfaces to "Merge" (no extras)

7. Click "Multi-Layer Map Math"  button top toolbar

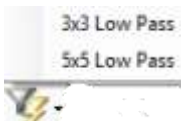
8. Go to the "Open Existing Script" button 

10. Choose "Merge All Visible—Feet"

11. "Compile" & "Run Script"

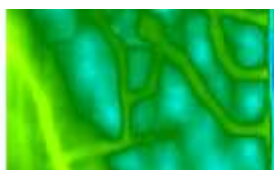
12. Close "Map Math" window

13. Typically do a 3x3 Smooth Filter



14. "Save" the "Merged Layers.grd"
 - Suggest re-naming "Merged RTK-Lidar.grd"

15. Ready for Watershed or Drainage Planning.



My Notes

Quick Notes For Drainage Planning—Map Window

Adjust Depressions—Main Depressions



1. "Map Window"
2. Open "Depressions" set as the **active layer**, select  "Trim End Values".
3. "Apply Threshold", select "Lower" & "Delete Cells", we suggest starting "Threshold Value" at 0.05'
4. Click "Apply".
5. Look at new "Depressions", inspect the map, if satisfied go to 7
6. *If you want to trim more repeat 3 & 4. If you went too far, "Clear Map" and DO NOT SAVE CHANGES to Depressions.grd.*
7. Click on the "Save AS"  icon on the bottom tool bar. Rename to "Depressions-Main" & click Save (if you do not do this, you will lose the original Depressions layer).
8. Under the "Layer Info" tab, click on "Clear Map". 



Creating Dump Areas

1. Turn on all the maps required to help define the dump areas.
2. Click "New"  and select "Dump Areas".
3. Click on the newly created "Dump Areas.SHP"  Dump Areas.SHP file to turn it on and make it the **active layer**.
4. Select the "Draw New Object"  from the bottom toolbar - Left click around your
5. Dump Area - Right Click to close Polygon.
5. Repeat step 4 to create all your Dump Areas for this field.
6. When finished, "Save"  from the bottom toolbar - Dump Areas.shp

Saving Images for Ditching

1. Turn on your desired layers to view while ditching (combination listed below)
 - A. County NAIP, Flow Accumulations, Main Ditches, Hills, Dump Areas
 - B. Watersheds, Flow Accumulations, Main Ditches, Depressions, Dump Areas
 - C. Topo Features, Flow Accumulations, Main Ditches,
 - D. May want to use the "Transparency" settings.
2. Go to "File" - "Print" - "Print Map to Bit-map" (this function only works in the "Map Window")
3. Location, save this file into the same field folder you were working in.
4. Name the file something simple that captures the field location ex - sec32sw
5. Save this file as a BMP for most applications
6. Click "Save"

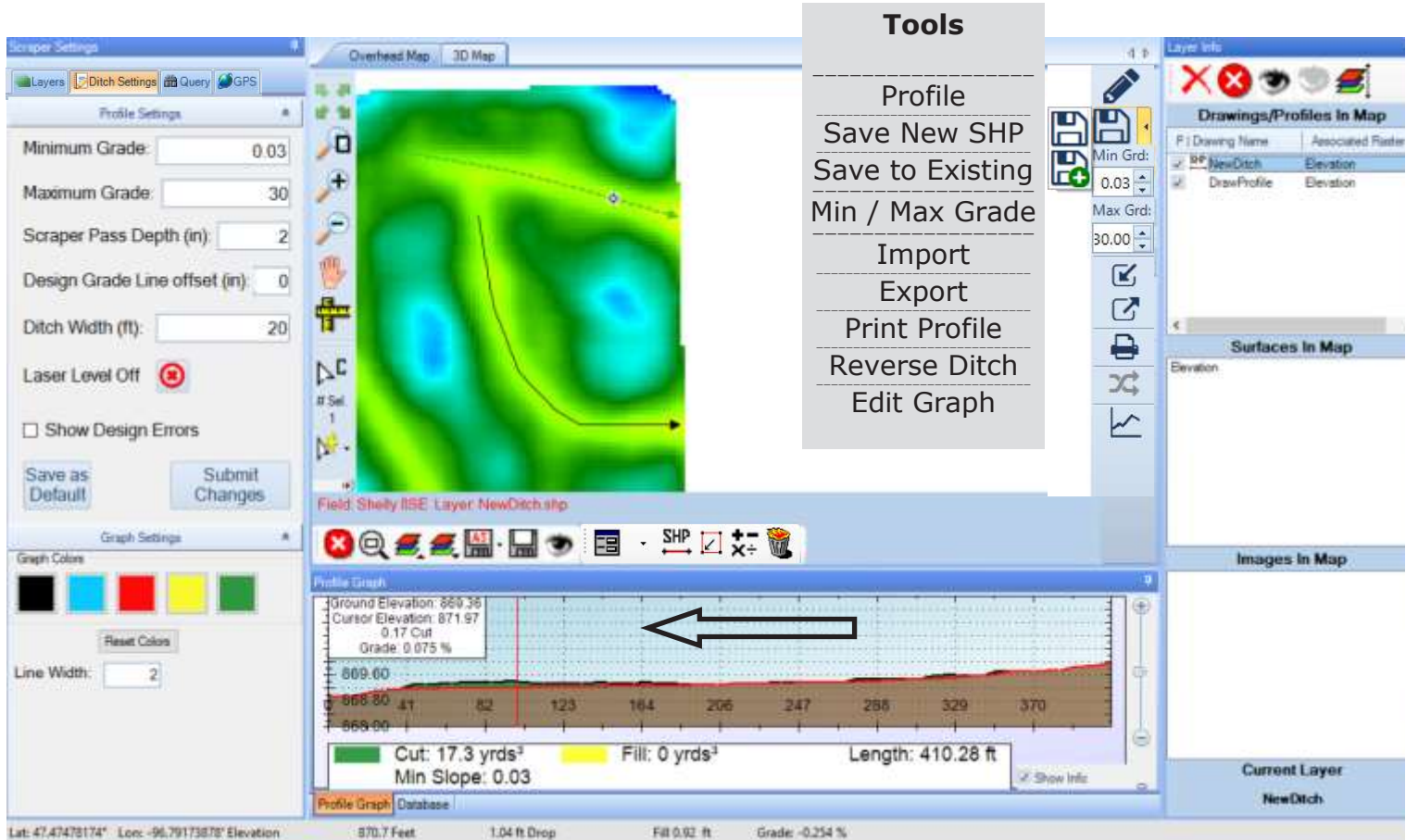
Moving BMP Files to Other Devices

1. In most cases, you will be moving files with removable storage drives.
2. In ADMS, click "Explore this Folder" icon. 
3. You are now looking inside the "Field Folder" in Windows File Explorer.
4. Using our example, highlight both **sec32sw.bmp** and **sec32sw.bpw**.
5. "Copy" these two items (select "Edit" - "Copy" from the toolbar).
6. "Paste" them onto a removable storage & take them to other devices (AMW/ APEX/ SMS/ Farmworks)
7. Now ready to take the removable storage to other PC or device.

Quick Notes - Surface Drainage

Before opening up "Surface Drainage" window, have all the Surfaces & Background images built.

1. Click on the "Profile" button. 
2. Assign the "Elevation.grd" to be the "Select a Raster".
3. Left Click out the path where you want water to flow off the field (draw towards the outlet recommended).
4. Right Click to finish Profile.
5. DrawProfile.shp in the Map Window has "arrow" for "flow direction".



Profile Window— "Show Info" Not Checked on, no cursor, no Cut/Fill & no Map location icon.

"Show Info" Checked on, move cursor in Profile, see Red Line & see the Cut/Fill/Depth/Grade and the location icon in Map Window.

Optional—"Save Profile to existing SHP". *NOTE: Active layer = NewDitch.shp in example.*

Repeat Steps to preview & confirm ditch locations and directions.

Print profiles to have a hard copy & have estimated yards of CUT.

Export maps for use in SD Drain—Ditch.



Surface Drainage - Buttons & Tools

Below are basic functions of the surface drainage window.

To the right side of the page are the buttons of the "Right Side" of the Drainage Window.

Draw Single Ditch - This is used to draw in the location of an existing or proposed ditch; drawing from top to bottom, in the direction of water flow.

Tool draws 1 line & must be reselected for next line (left click draw & right finish).

Save Drawing to New SHP File - Saves unsaved "Draw Ditch" to new SHP file.

Save Drawn Ditch Layer to the current 'active' ditch layer - Saves unsaved "Draw Ditch" to the "Set Ditch Layer".

Min: - Minimum Grade (Rise / Run * 100) Ex—0.05 = 0.5' rise / 1,000' run. By clicking up and down, you will click the grade by 0.01 per click, changing the profile, or you can type in this box.

Max: - Maximum Grade (Rise / Run * 100) Ex—10.00 = 100' rise / 1,000' run. By clicking up and down, you will click the grade by 0.01 per click, changing the profile, or you can type in this box.

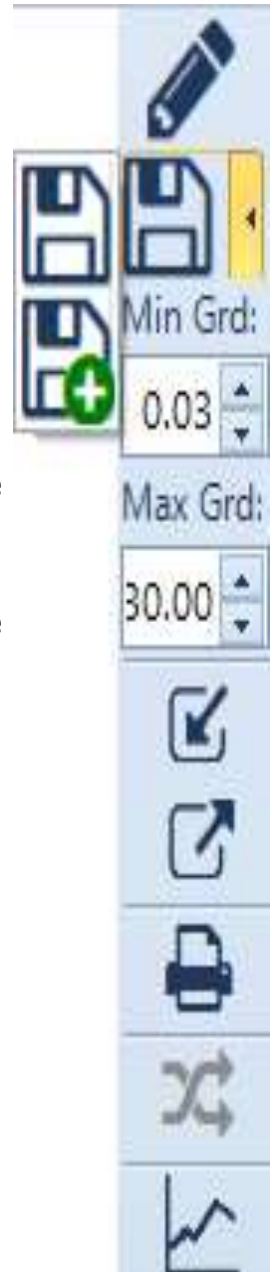
Import Projects - will import projects from data collected in SD Drain—Ditch.

Export Projects - will export the data that is turned on as a "project" for SD-Drain—Ditch

Print - This button will print the overhead map view with the "Profile" blow along with the "Cut & Fill" yards values.

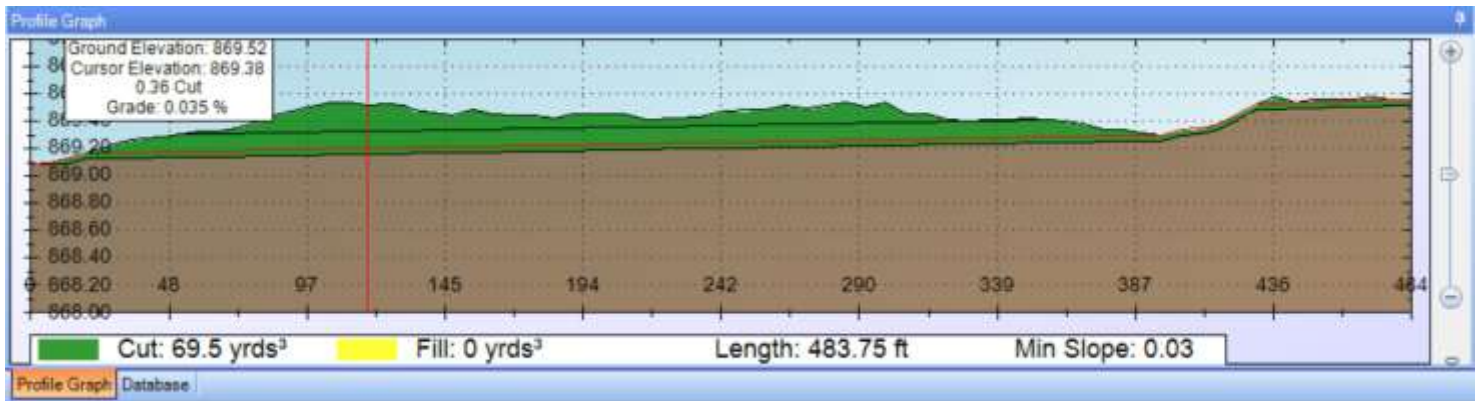
Reverse Ditch Direction - Change the direction of the "ditch" that is showing in the profile.

Edit Graph - Clicking will open the "Edit Profile" window. See info on the following pages.



Surface Drainage - Scraper Settings

As we draw in Ditch profiles, you will see the "side profile" or the "cut profile" of the proposed ditch. ADMS has calculations for "Best Fit Grade Control" or "Stepped Grade Control" to allow the user to move as little soil as possible. See the Red horizontal line below.



Ditch Settings

Layers | **Ditch Settings** | Query | GPS

Profile Settings

Minimum Grade:

Maximum Grade:

Scraper Pass Depth (in):

Design Grade Line offset (in):

Ditch Width (ft):

Laser Level Off ☒

☐ Show Design Errors

Graph Settings

Graph Colors

Line Width:

On the Left side of the screen is the Layers tab. The "Ditch Settings" allow you to change the behavior of the "Profile" calculations. All Grade values are calculated using fall / length. **Example 0.05 grade= 0.5' fall / 1,000' run.**

Minimum Grade—is the least amount of grade given to the "best fit grade control" profile line calculation.

Maximum Grade—is the largest amount of grade given to the "best fit grade control" profile line calculation.

Scraper Pass Depth—is the amount of cut your scraper can take per pass in inches (0 = No Pass Depth Lines).

Design Grade Line offset—will automatically add "0.5" to each "Profile Cut" as ditch maintenance (suggest 0).

Ditch Width—How wide to cut the ditch, used to calculate the Yards of removal (suggest 2x scraper width).

Laser Level—Off/On—"Off" mode uses "Best Fit Grade Control"; "On" mode uses just a single grade.

Show Design Errors—will pop up errors as you select or draw Profile Lines similar to in-field machine controls.

Save as Default—Saves Scraper Setting for all future use and will be this way on re-open of the window.

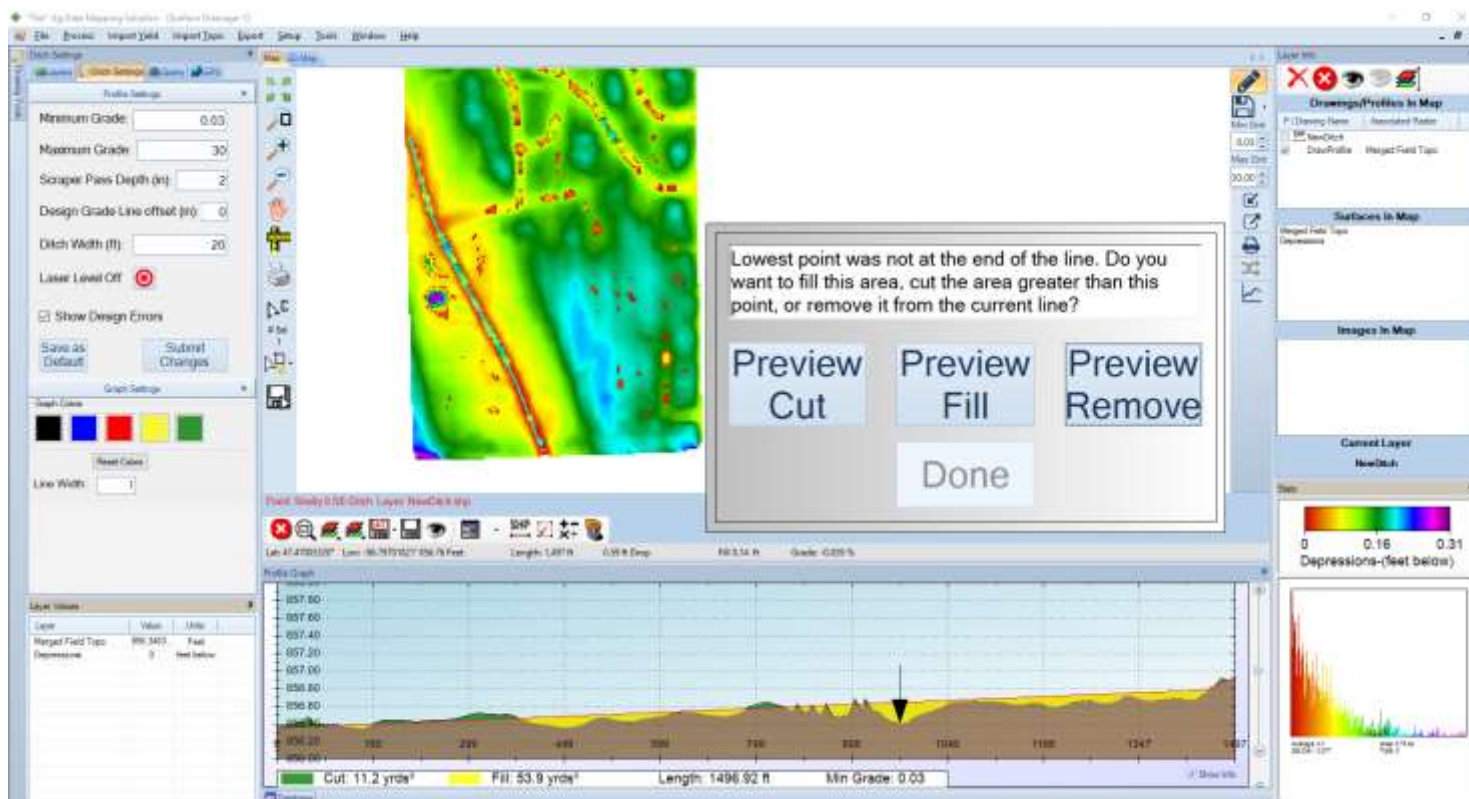
Submit Changes—Sets updated values to existing line in Map Window.

Graph Colors—allows user to choose line and fill colors of the "Profile Graph" (more information in "Profile Graph Window" section).

Surface Drainage - Show Design Errors

In the Ditch Settings tab, there is an option to "Show Design Errors". The concept here is that the design grade line is always trying to flow water to an outlet at the end point of the line. "Design Errors" will warn you when it cannot do this at the end point or any other areas in the profile line.

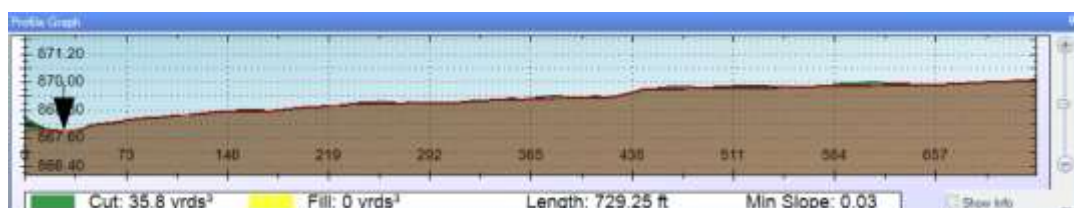
This is a very important function in our SD Drain-Ditch software. It may or may not be as helpful in ADMS. This example will show you what it can do.



Black Arrow = Point of error /edit.

Preview Cut - >

Notice the Green area of Cut on the Left of the Black Arrow.



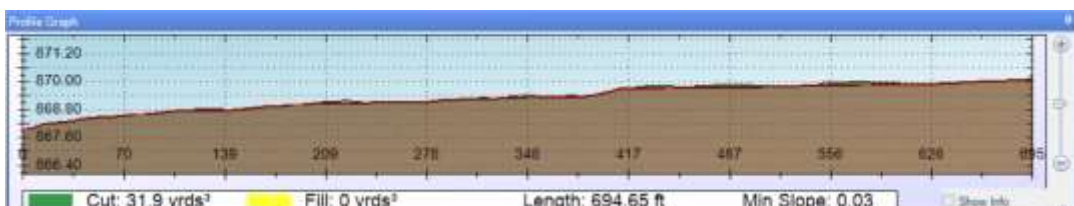
Preview Fill - >

Notice the Yellow area of Fill under the Black Arrow.



Preview Remove - >

The area to the Left of the Black arrow is Removed.



Surface Drainage - Setting Raster Source—Profile

Layer Info-Tab on the right side of the window allows you to see all the layers you have or had turned on.

In the "Drawings/Profiles In Map", take note that the "Drawing Name" and "Associated Raster" will allow users to see what "Surface" is being used to Calculate the "Profile Line".

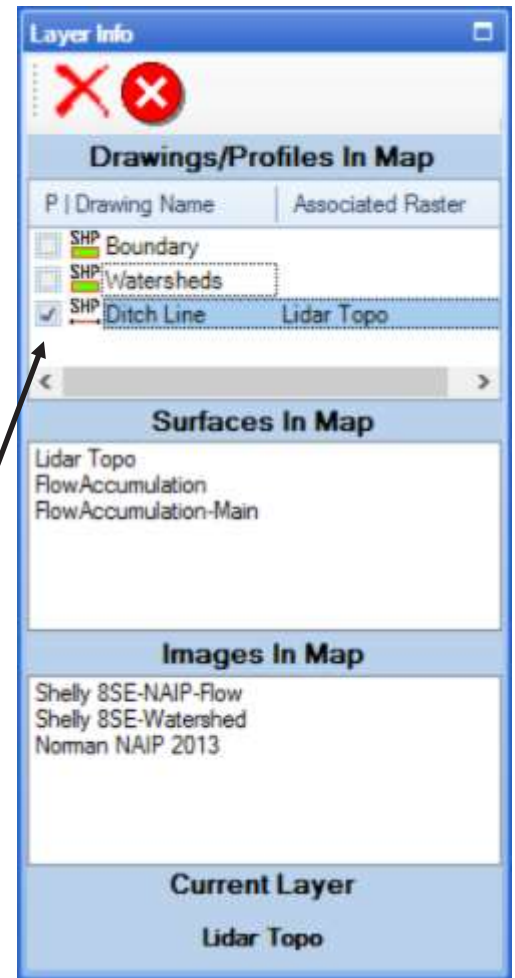
The "P" (Profile) check box will set that layer to be used as a "Profile Line", gathering it's attributes from a Surface Raster layer.

ADMS can only associate Surface Raster to Line files.

"CHECKING" the "P" box will allow you to make the association for the line to the Surface Raster.

Once that data is "Associated" to a line, that Line becomes a "poly Z" Line.shp file. This means that the line has x,y,z properties at each location in the line where it intersects a raster pixel. This process will ADD many more vertices to your lines.

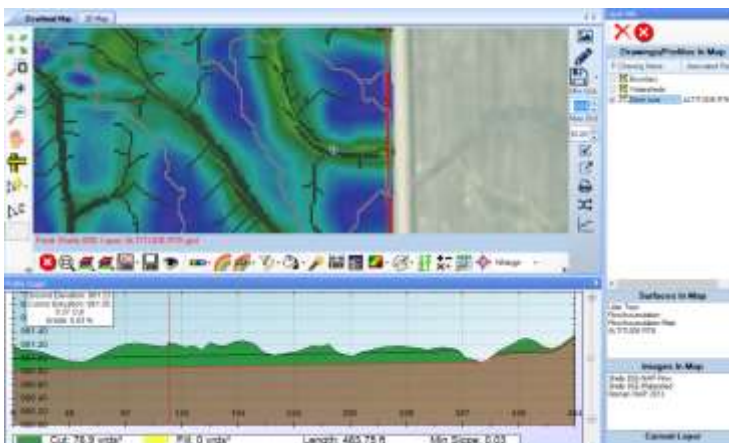
These are the lines that will show in the 3D window.



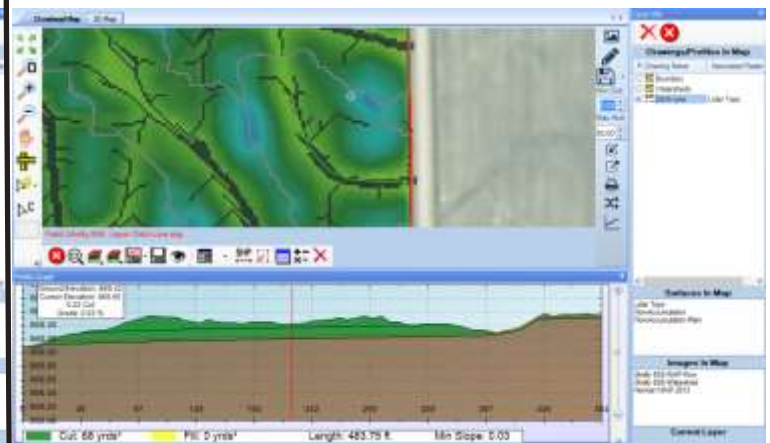
Example of "Switching Surface Raster Layers" - below on the LEFT is RTK data collected by Combine, 34 foot passes. Below to the Right is Lidar data collected at 1 meter (3.3') resolution.

Notice on the "Profile", the Left end of the line is always OUTLET SIDE. The RTK did not drive in the road ditch so we do not have elevations there; Lidar does in this example so it calculates a slightly different Profile cut for the exact same Line location.

RTK Data 1/sec at 34' passes

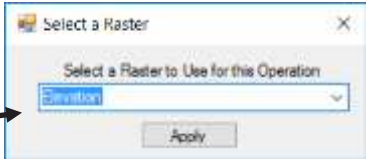


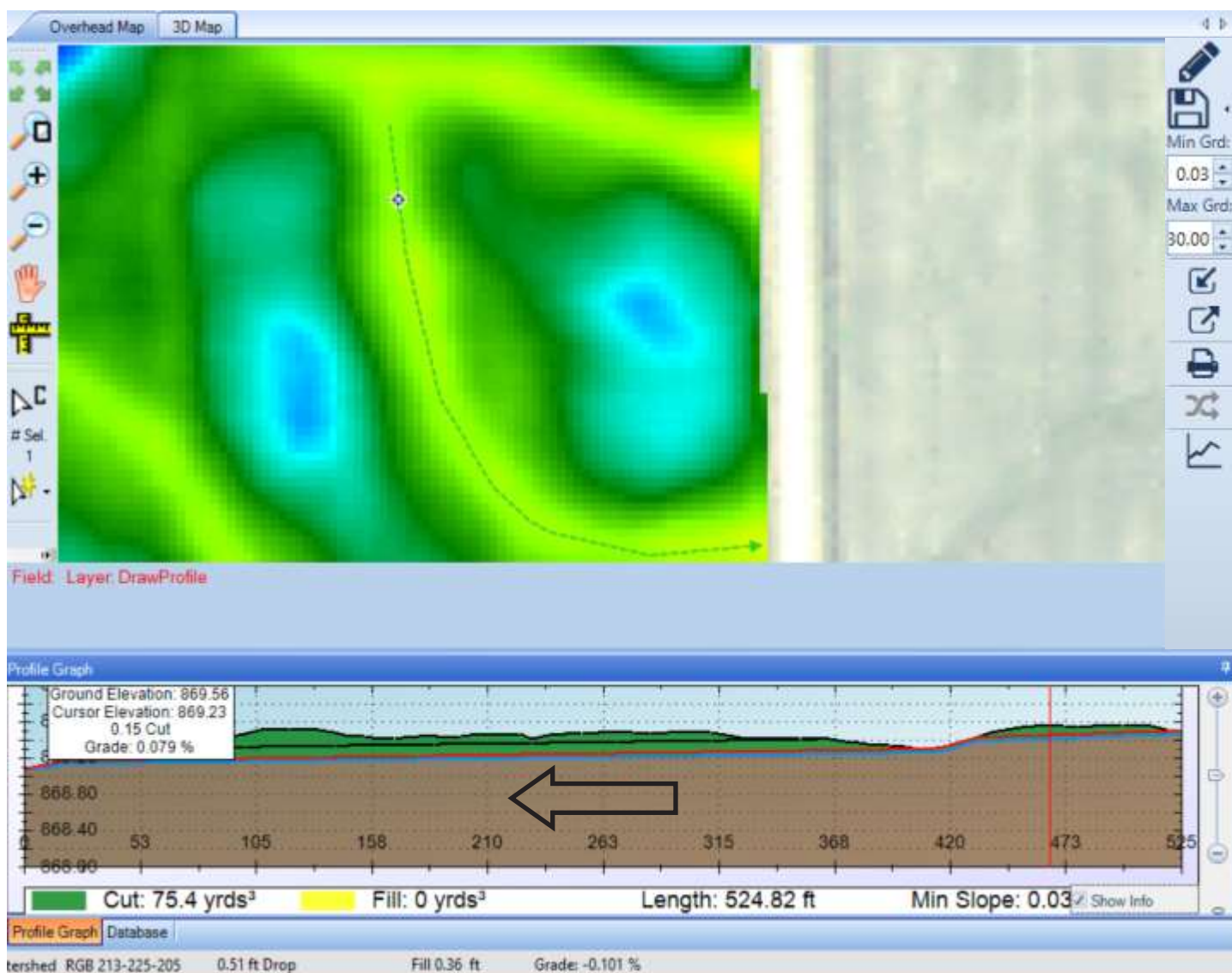
LiDAR data at 3.3' resolution



Surface Drainage - Profile Button

With the "Profile" button, users can quickly calculate the best method / direction to drain fields.

1. Check On the "Elevation.grd" in the "Layers" tab.
2. Check On all the layers you may want to use.
3. Zoom to the area of the field to be drained.
4. Click on the "Profile" button 
5. Assign the "Elevation.grd" to be the "Select a Raster". 
6. Left Click out the path where you want water to flow off the field (draw towards the outlet recommended).
7. Right Click to finish Profile.
8. DrawProfile.shp in the Map Window has an "arrow" for "flow direction"



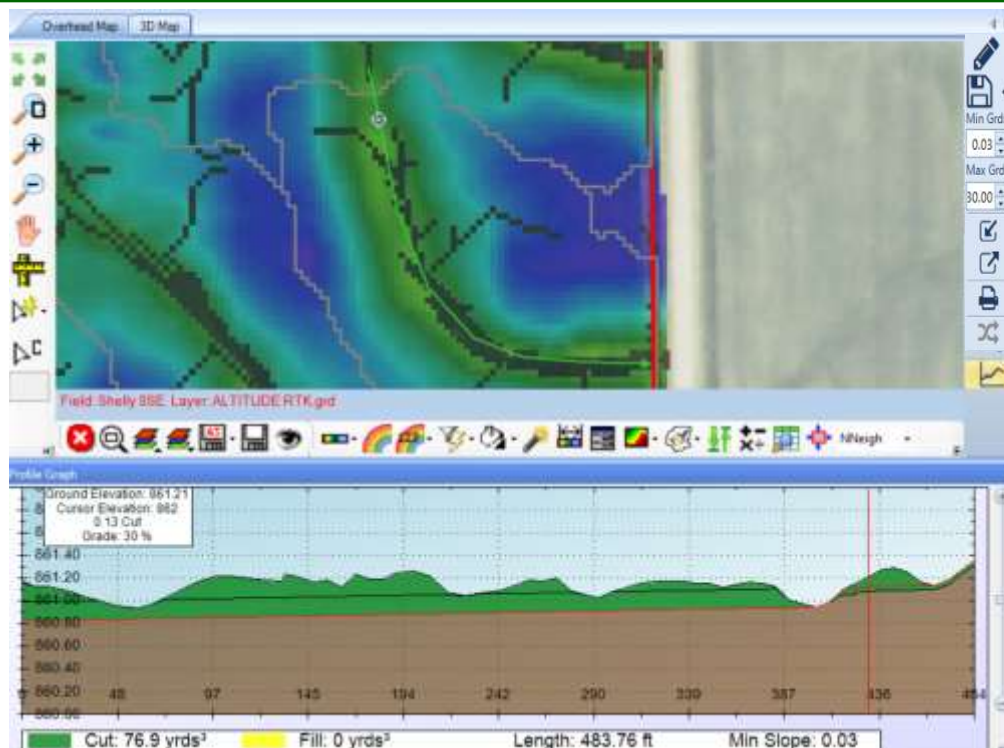
Note: As the Profile is being drawn at the bottom of the screen, it shows "Drop/Rise" & "Cut/Fill" based off minimum grade & "Grade". These values are from starting point to cursor or last point on the Profile Line.

Surface Drainage—Edit Graph

The function of the BFGC, “Best Fit Grade Control”, is an awesome feature, but it has it’s drawbacks.

If the profile comes across an area that is Falsely Low or an area that would be a FILL, the BFGC is always cutting.

Edit Graph function to correct these issues.



Click the “Edit Graph” button and the edit window will appear.

Edit Graph - works on a 2 point select system, deleting all the surface values between the 2 points.

As shown to the Right:

- Selected 2 points
- Point marks on soil surface
- Click “Preview”

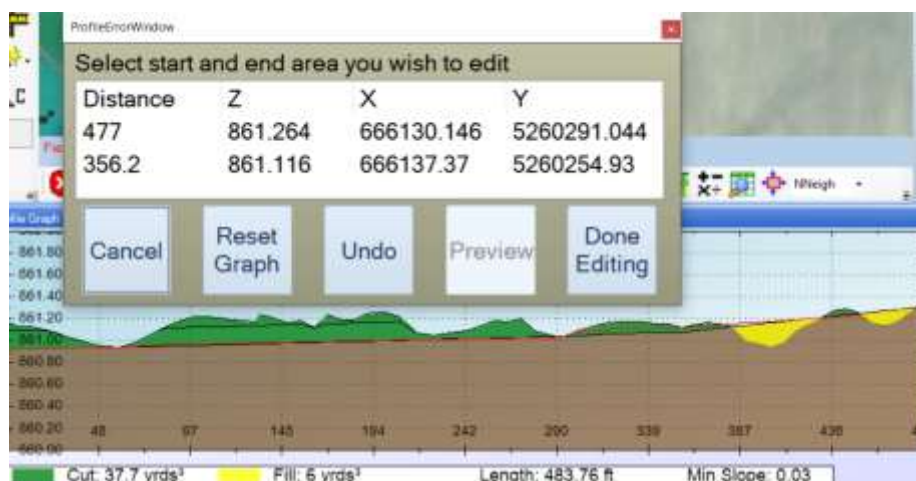
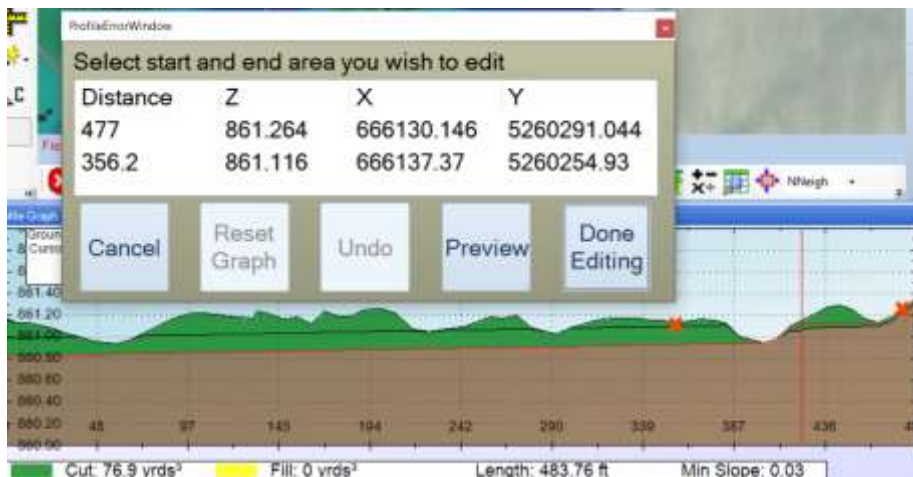
Note: the Cut / Fill #'s updated.

If you want to edit more click 2 more points & Preview.

“Undo” will undo the last edited area.

“Reset Graph” removes all edits and starts over.

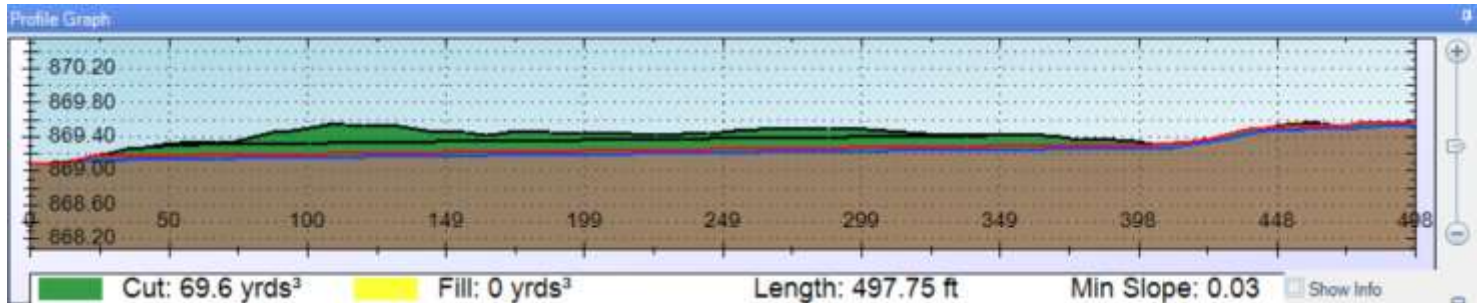
If Edits look good, “Done Editing”.



Surface Drainage - Profile Graph Window

In the Drainage Window as you draw profiles or recall SHP lines ("P" checked on in Layer Info- "Select Raster Source"); there's data that shows at the bottom of the screen in the "Profile Graph". This will explain how to navigate this window.

On the map window area, the line that is being used as the profile will appear as a Lime Green color with an "Arrow Head" at the outlet end. In the Profile Graph, flow is always right to left.



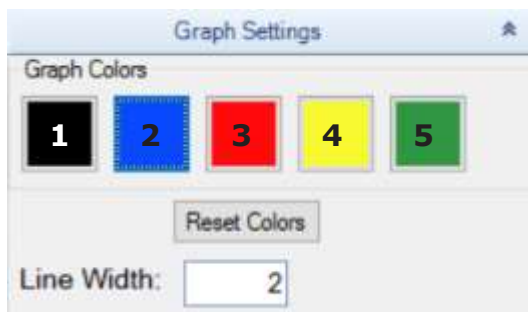
Cut Value—is estimated cubic yards of soil moved based off "Ditch Width".

Fill Value—is estimated cubic yards of soil moved based off "Ditch Width".

Length—total length of the profile.

Min Slope—is the Minimum Slope set in the above settings.

NOTE: These values show up on the "Print Profile" function.



Graph Colors (info shows up on mouse hover of color).

1. Ground Line Color & Scraper Pass
2. Grade Line Color
3. Design Grade Line Color
4. Fill Color
5. Cut Color

Reset Colors - rests to original defaults.

NOTES: with your CURSOR in the Profile area.

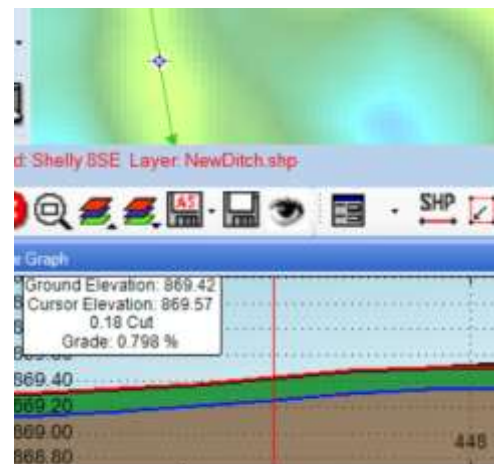
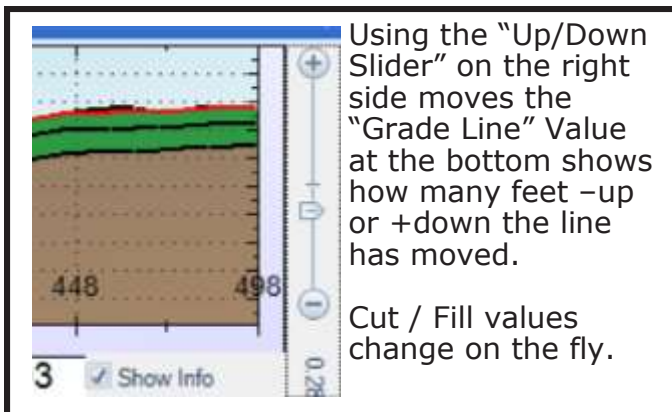
Mouse Scroll Wheel = Zoom in on the graph.

Left Click, hold & drag = Pan the graph left / right / up / down.

Double Click = Reset the graph to full view.

"Show Info" box:

- Checked = you will see a "Red" vertical line in profile, stats and cursor location on map.
- Not Check = no location or stats.



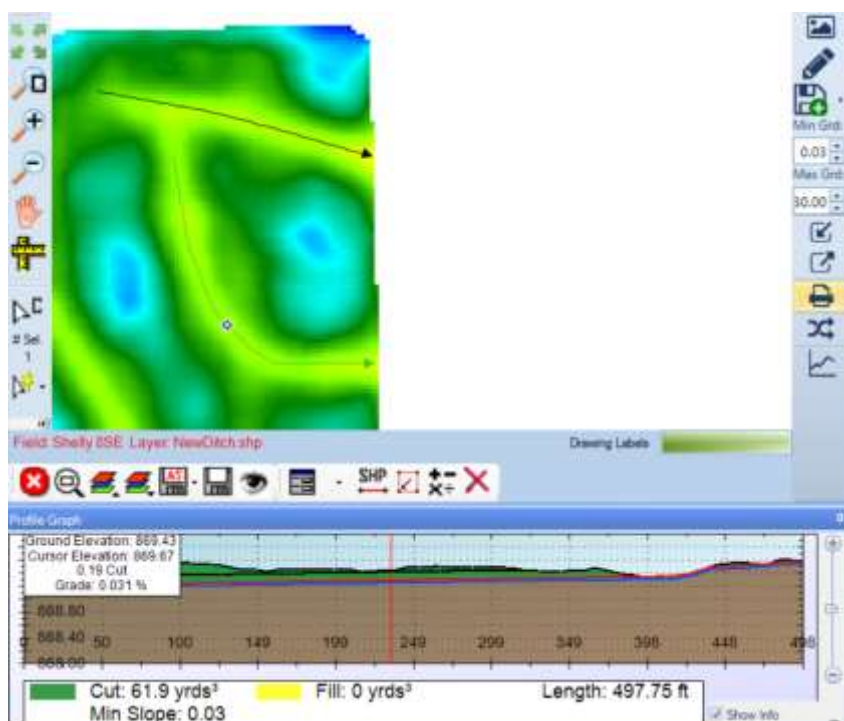
Surface Drainage - Printing

Printing can be done of any profile line, Saved or not Saved.

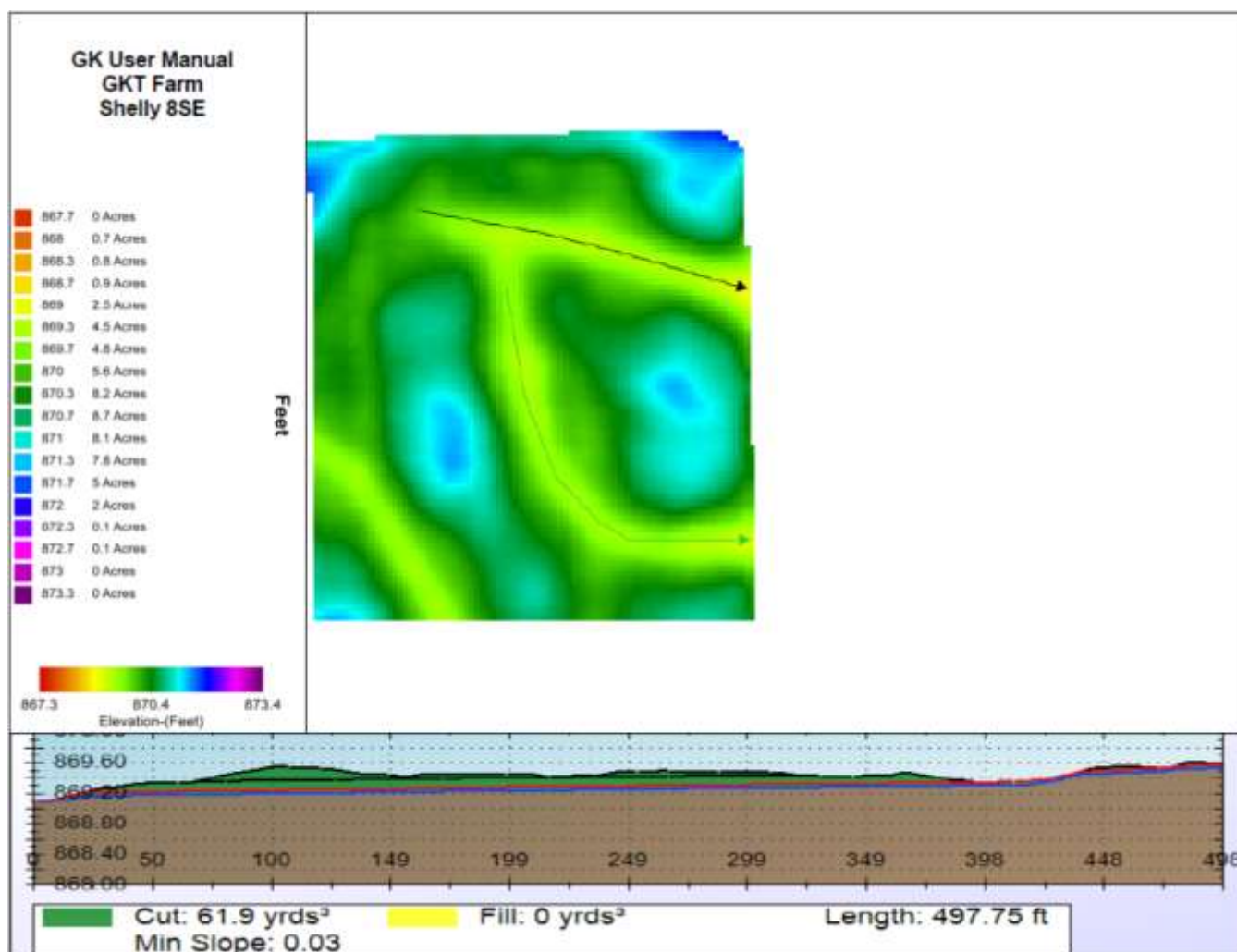
It is suggested to "Save" the Profiles.

To Print Profile—

- Zoom to Ditch Line to be printed.
- Turn on maps so they show up how you want it printed.
- Make sure your active layer = layer to be printed.
- Select the Ditch Line in Map Window.
- Adjust Grades and Slides on Profile.
- Click on the "Print Profile" button.



Example of a Print—Below



My Notes

Creating Tile Plan

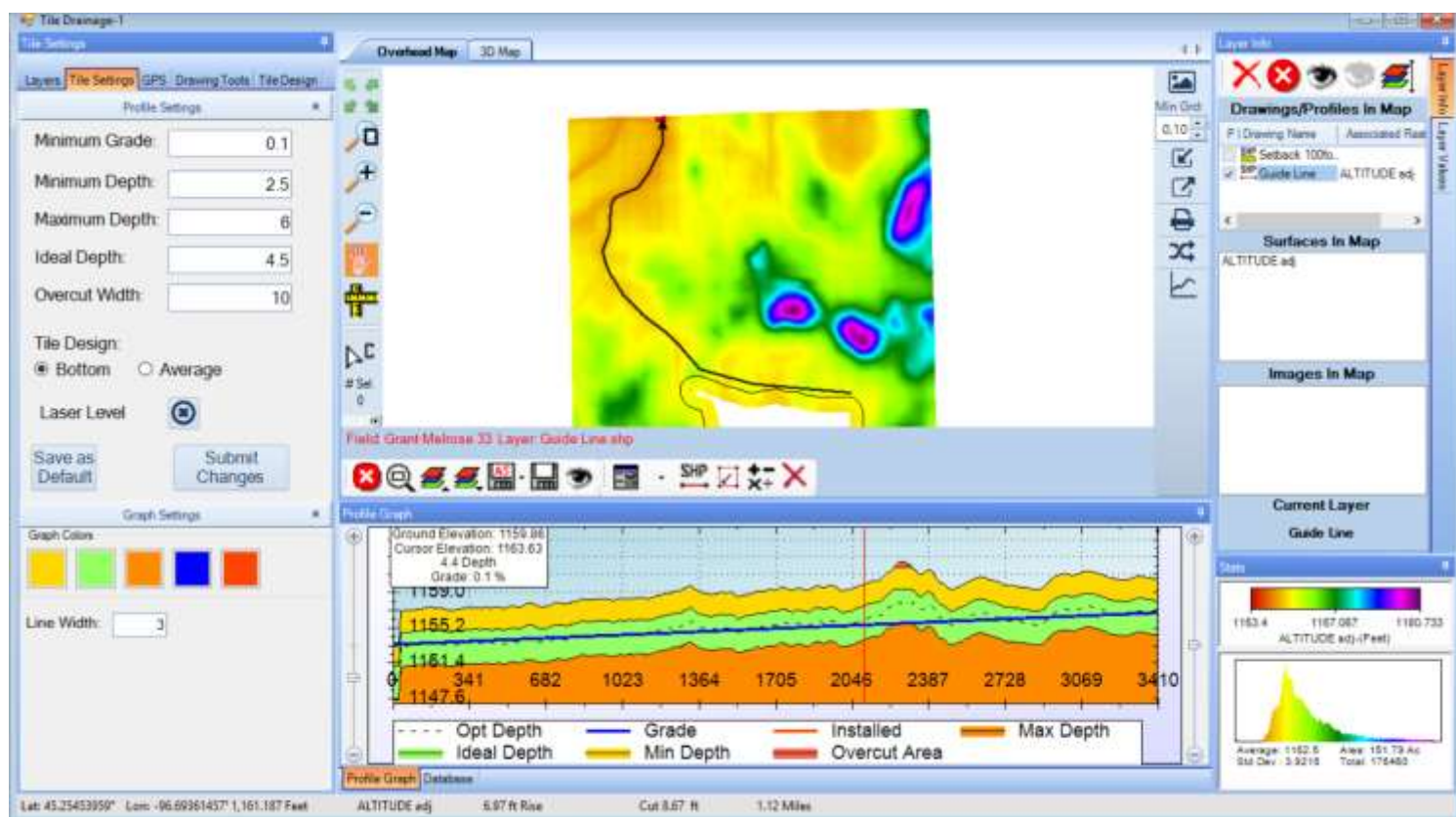
Tile Design

The idea of tile design can be as simple, or complex, as you want it to be. Tile plans have many factors that can influence the decision-making process. At this point in time, our software can calculate the number of acres within a watershed. We do **not** calculate drainage co-efficient and pipe size. Users need to use a pipe size calculator for this determination. Always remember the most important part of the whole project is your outlet elevation reading.

Components that should be completed **before** starting a tile design.

1. Collection of RTK, or LiDAR, topography data.
2. Outlet elevations have been determined (data collected).
3. Data has been processed into ADMS through Watershed Modeling & Contours (1 foot).
4. Tile "Templates" have been built in ADMS.
5. Wetland and utility locations have been defined, (final verification required).
6. Permission: Project permitting and the ability to do the project has been verified.

The following "Tile Planning" example will require the data sets shown below.

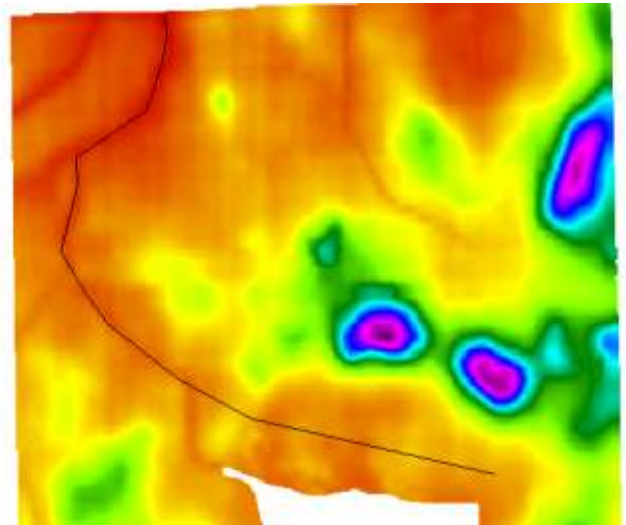


Creating Tile Plan

Directions for the Project

Land Owner wants to

- Pattern Tile : Red & Orange areas of the field
- Spacing : 100'
- Drainage Coefficient : 1/4"
- Soil Types : Sandy Clay Loam
- Wetland Setbacks : Yes
- Buffer : 200' set back on the 15ac wetland on south end
- Minimum Grade : 0.1% (1' drop per 1,000')
- Minimum Install Depth : 2'.
- Optimum Install Depth : 4'.
- Maximum Install Depth : 6'.



Steps:

1. Create outlet points.grd (if required).
2. Merge with Topography.grd (if required).
3. Create set back for wetland & utilities.
4. Determine the locations of the "Mains".
5. Choose "Pattern" design & guide lines.
6. Use Tile Calculator - Determine "Tile Size".
7. Draw in "Sized Tile Plan".

Here is the ROUGH plan sketched out on a FSA map.



Creating Tile Plan—Outlet Points

Data Collection - GPS Example

We suggest using a pickup or an ATV for collecting field data. However, many times in topography data collection, you cannot get to a location to collect a point with a tractor, pickup or an ATV. Have a grade rod with a mount for the GPS at the exact same height as the pickup mount. GPS must have at least 25' of cable to get to ditch bottoms or culverts. Use Quick Marks in ADMS since other marking devices may, or may not, log elevation values.

Data Collection - Laser Example

Get a survey rod and setup Laser at a 0 grade.

Mark a GPS point in the field

Take a Grade Rod reading (on paper)
Reading 4.3'

Mark a GPS point near your Culvert or Ditch bottom reading

Take a Grade Rod reading (on paper)
Reading 7.8'

Subtract the two values $7.8 - 4.3 = 3.5$ Drop

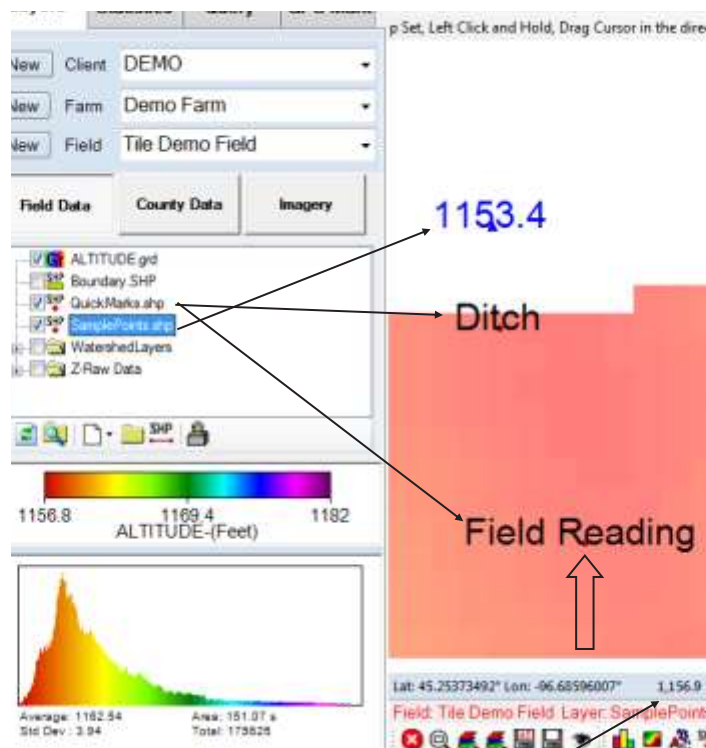
Create a New SHP file "Create Layer from Template" - "Sample Point"

Check on Sample Point.shp and Click "Draw New Object" "SHP" button

Mark a point in the bottom of the ditch just in from your GPS Mark Point.

Get the Value from the "Field Reading" off the "Cursor" value = 1156.9

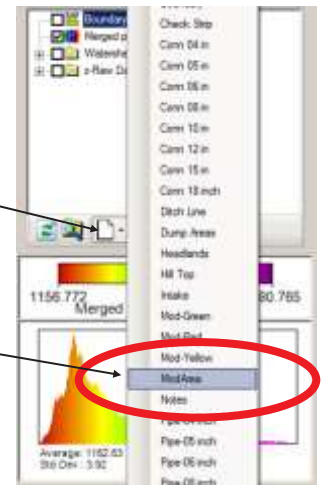
Go to the "Database" tab and enter 1153.4 in the Elevation column ($1156.9 - 3.5$ Drop)



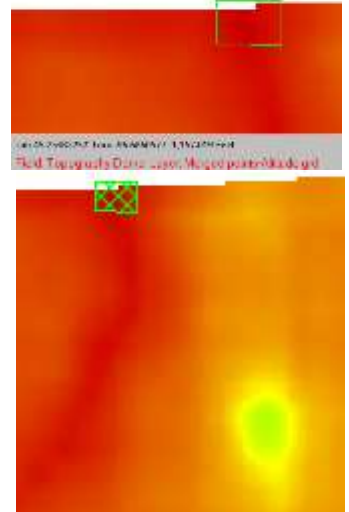
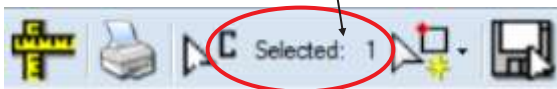
Surfaces In Map				
ALTITUDE				
Database				
Objects Selected: 0		DB Operations Select By Query		
PointID	Latitude	Longitude	Elevation	
▶	45.25393677	-96.68603516	1153.4	

Creating Tile Plan—Modify Topography Maps using ModArea

1. Turn on the topo file that is to be modified, i.e. **"Merged points-Altitude.grd"**.
2. Click the "Create New Layer from Template" button.
3. Choose the "ModArea" template.
4. Check it in the data tree. (It should now be the **Active Layer**).
5. Zoom in to the area that needs to be modified.
6. Select the "Draw New Object" button.



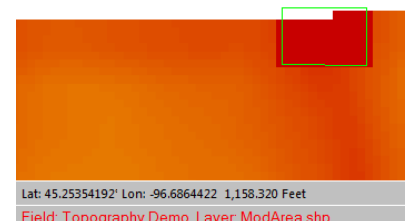
7. Draw a polygon around the outlet area (this will normally be a culvert or ditch bottom with a **KNOWN** elevation).
8. Use the selection tools on the top toolbar to select the ModArea (Again, this is indicated by the green crosshatch making sure only one polygon is selected.)



9. Now, make the **"Merged points-Altitude.grd"** the **Active Layer**.



10. Check the "Apply Mod to Selected Polygons" Magic Wand button.
11. In the popup "Modify Pixels Under Drawn Area" box, check the "Replace with this Value" radio button and type in the **KNOWN** elevation.
12. Click OK and save. You have now successfully adjusted your topography map to reflect the correct outlet elevation.



Creating Tile Plan—Merging Topography

Our OUTLET (Sample Point.shp) is not in the correct format (needs to be a .grd surface)

Check on the Sample Point.shp

Right Click Sample Point.shp
Create Grid - From Polygon

Click on "Create Grid"

Click the "Fill Null Values" button 3 times
-Or until you get to the size you want

Turn both "Altitude.grd" and "Sample Points.grd" (must be able to see both maps)

Click on the "Multi-Layer Map Math" on the top toolbar.

Open the "2 Layer Merge" Script

Change Line 7 from "lbs/ac" to "Feet" for topography maps.

Line 20—Highlight everything behind "In1 ="

Select "Altitude" under "Surfaces" and Click "Add as Value"

Line 22—Repeat previous 2 steps assigning the "Sample Points" layer

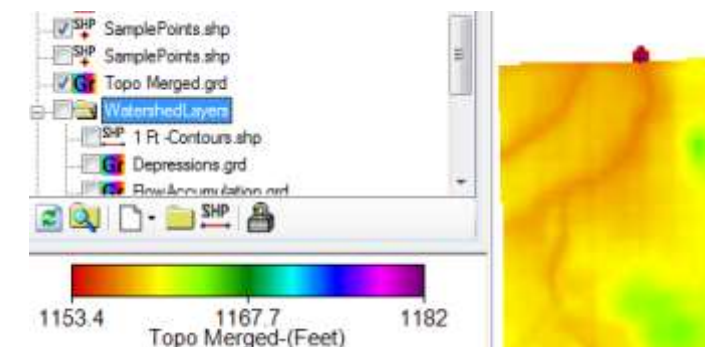
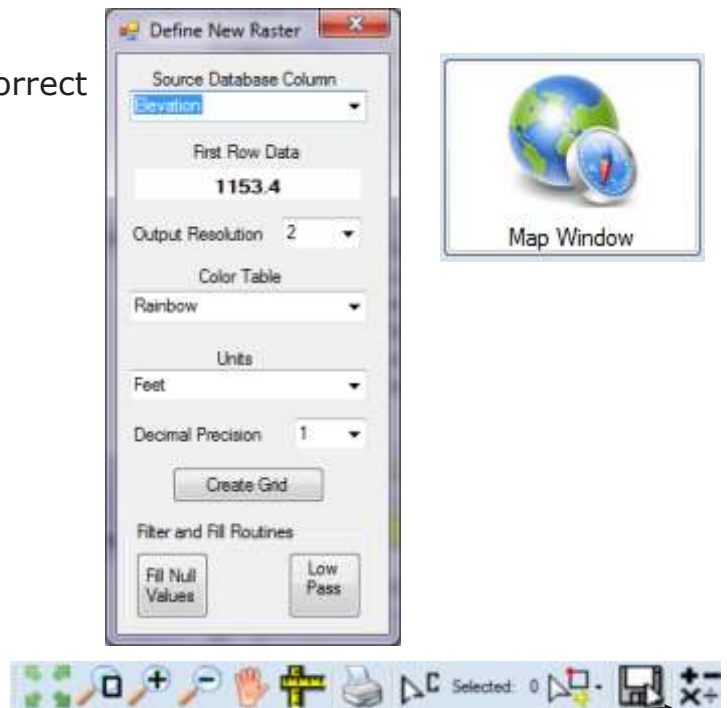
Click "Compile Script"

"Run Script"

Click back to "Map Window" & "Layer Info"

Click on "Map Math Output"

"Save As" - Topo Merged.grd

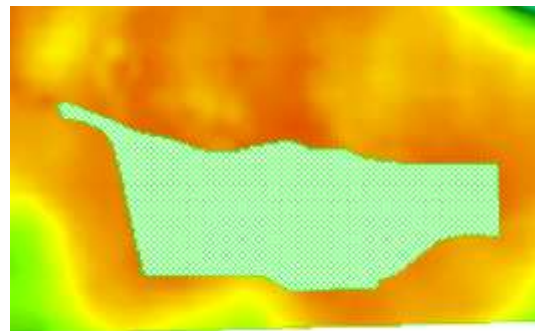


Creating Tile Plan—Setbacks (Buffer Selected Items)

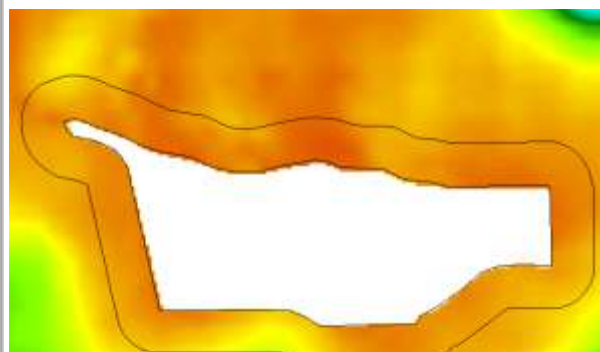
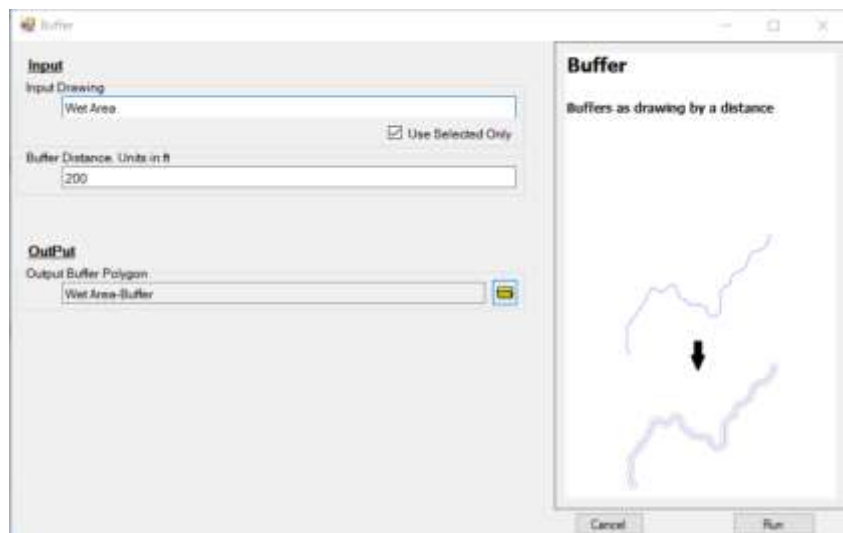
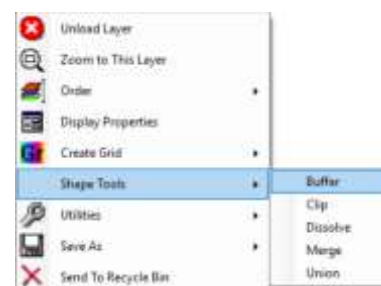
To create wetland or utility setbacks", you must first draw a boundary around the "Wetland"



1. Turn on the "Field Data" layers needed to define a wetland or utility.
2. Select "Wet Area" from the "Create Layer from Template" list.
3. Zoom in to the area of interest.
4. Check on Wet Area.shp.
5. Bottom Toolbar, click "Draw New Object" - "SHP" button.
6. Draw a boundary around the Wetland
7. Once Finished "Save"
8. Clear Map



1. Check on Wet Area.shp.
2. Click inside the "Polygon" making it **"1 Selected Object"**.
3. Right Click on the "Wet Area.shp" then "Shape Tools" then "Buffer"
4. Name the file to be created by clicking on the File button — example "Setback 100foot.shp"
5. Adjust the "Buffer Distance" ex—100 feet
6. Click "Run"



Creating Tile Plan—Calculating Tile Size

You will need a Drainage Slide Rule for this part. Slope & drainage coefficients (how much water is drained in a 24 hour period) & soil types play a large role here.

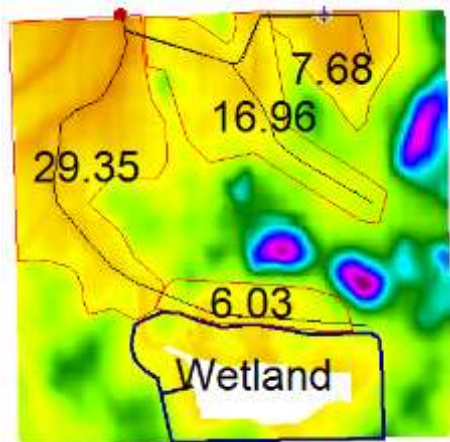
Using the Flow Accumulations, Main Ditches, Boundary templates and any custom Tile Worksheets you may have.

For this project, a 1/4" drainage coefficient and using the idea that the pipe will always be at a minimum grade of 0.10%, we are going to write down a few numbers so we are not jumping back and forth to the calculator.

At this point, you may want to use a combination of paper and software for taking notes.

In this example, we are draining about 65 acres total

NE—Hole is 11 acres—From flow accumulations & 7.68 acres from boundary



>>>> THANKS <<<<<

The values in this chart are copied for the "Pipe Size & Acres Drained Calculator" produced by Prinsco & University of Minnesota Extension

Acre Capacity @ 0.10% Grade			
Tile Size	Draingae Coefficient		
	1/4	3/8	1/2
3	2.3	1.5	1.2
4	5	3.2	2.5
5	9	6	4.2
6	15	10	7.4
8	32	21	16
8 dw	48	32	24
10	50	34	25
12	83	57	42
10 dw	85	58	43
15	130	85	64
12 dw	140	94	70
18	210	140	100
15 dw	250	170	130
18 dw	410	275	210
24	420	295	220
24 dw	900	600	420
dw = Dual Wall Pipe			

Creating Tile Plan—Drawing In Sized Tile

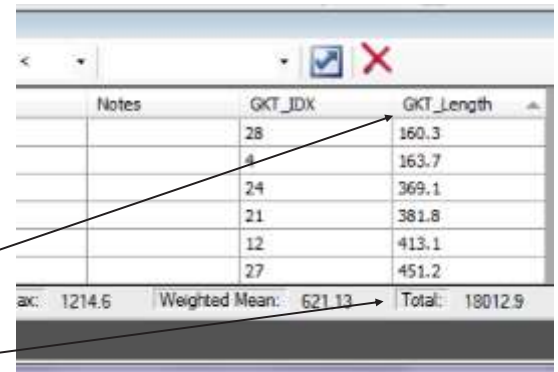
You should now have all the pieces of the puzzle and be able to draw out your tile plan.

We recommend drawing in the "Proposed Main" first. This helps provide direction on where to more appropriately place the laterals on the plan and allows clipping to the main. More detailed instructions are on the following pages. Also, calculate a "Distance" value i.e. 4" tile @ 1/4" Drain Coefficient & 0.1% grade.

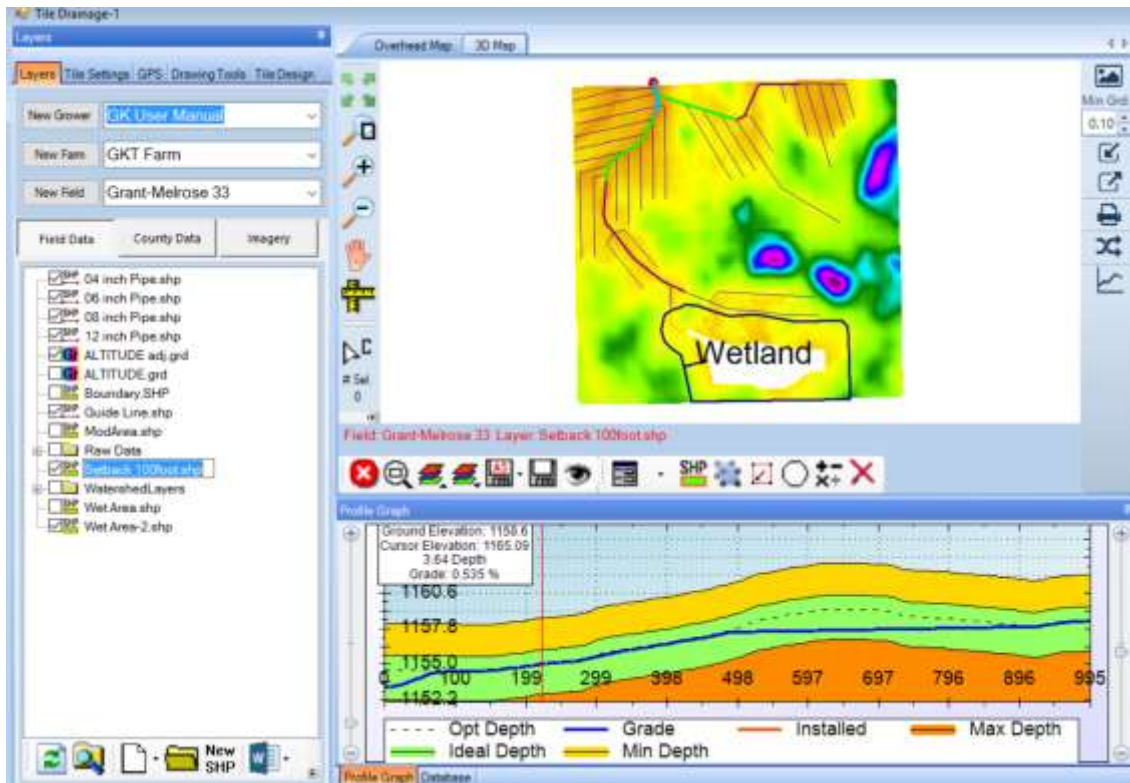
$$5 \text{ ac} \times 43,560 \text{ (sq ft/ac)} = 217,800 / 100 \text{ (tile spacing)} = 2,178 \text{ (Max footage for 4")}$$

1. Turn on all the layers you need to draw in your tile lines & zoom to the desired area.
2. Draw in "Proposed Mains" and all "Laterals"
3. Click on the "Create Layer for Templates" button.
4. Choose the correct tile size.
5. Check the tile size in the field data.
6. Click on the "Draw Layer".
7. Draw in a tile line over the "Proposed Main". Suggest using the "Trace and Snapping" functions in Drawing Tools.
8. Repeat 5 & 6 until done with this tile size & "save".
9. Go to step 3 for the next tile size.

Click on the "Database" tab.
Click on column header "GKT Length".
Bottom of the window, "Total" Feet of Pipe.



Notes	GKT_IDX	GKT_Length
	28	160.3
	4	163.7
	24	369.1
	21	381.8
	12	413.1
	27	451.2
ax: 1214.6	Weighted Mean: 621.13	Total: 18012.9



Tile Design—Right Side Buttons

Below are basic functions of the Tile Drainage window. There are some buttons that are unique to the "Tile Window". On the Right side of the window are the buttons only found in this window.

Set Elevation Layer - the "surface" layer that will be used to calculate the "3-D" tab.

Min: - Minimum Grade (Rise / Run * 100) Ex—0.05 = 0.5' rise / 1,000' run. By clicking up and down, you will click the grade by 0.01 per click, changing the tile profile.

Import Projects - will import projects from data collected in SD Drain—Tile.

Export Projects - will export the data that is turned on as a "project" for SD-Drain Tile.

Print - This button will print the overhead map view with the "Tile Profile" below along with the "Tile Length" & "Overcut" cubic yards values.

Reverse Tile Direction - Change the direction of the "Tile" that is showing in the profile.

Edit Graph - Clicking will open the "Edit Profile" window. See info on the following pages.



Please NOTE, there is no "Profile" button like the drainage window. At this time, we feel the function of drawing SHP lines and getting "Tile Profiles" from this source will get users the data required.

Tile Design-Tile Settings

"Tile Settings" allows user to change multiple factors about the way tile lines are calculated. These changes can be made to the line being worked on or to all lines in the future.

Below is a description of each parameter setting.

Profile Settings

Minimum Grade—is the least amount of grade that will be used to calculate the line. Greater Grade is expectable

Minimum Depth—the Shallowest depth a tile line will be installed. Measured to the Bottom of the tile line.

Maximum Depth—the Deepest depth a tile line will be installed. Measured to the Bottom of the tile line.

Ideal Depth—is the most Effective Depth to install tile for a given area of the field or soil type. ADMS will do what it can to keep as much of the tile line at or near this depth.

Overcut Width—the width of soil removal if the tile depth goes deeper than Max Depth. Giving the Estimated Cubic Yards of soil to move allowing the tile plow to go through.

Tile Design: Bottom / Average—will move the "Design" method to follow to the bottom / average of the "Ideal Depth".

Laser Level—sets the Grade value to a FIXED grade.

Tile Flex: Low/Medium/High/Custom—Controls the maximum rate of grade change from point to point. How fast the tile comes up to Ideal depth from a deep main/outlet or major grade transition.

Default Graph Color-Chips—

Yellow = Minimum Depth

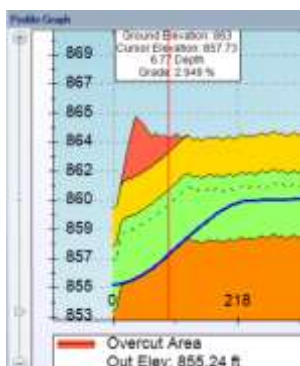
Lime Green = Acceptable Depth

Orange = Maximum Depth

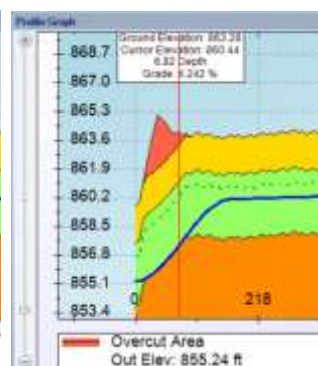
Blue = Grade Line

Red = Installed Tile Line

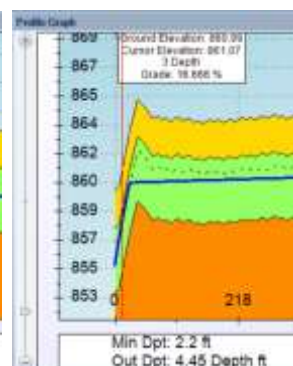
Low



Medium



Custom 15



Suggested settings:

Dual Wall trenchbox boots **Low**

Standard boots **Medium**

Tile Design-Tile Settings

"Tile Settings" allows user to change multiple factors about the way tile lines are calculated. These changes can be made to the line being worked on or to all lines in the future.

Below is a description of each parameter setting.

Default Graph Color-Chips—

Yellow = Minimum Depth
 Lime Green = Acceptable Depth
 Orange = Maximum Depth
 Blue = Grade Line
 Red = Installed Tile Line

Profile Settings

Save as Default—will save all the settings for future lines to these settings. Note, this will not update lines that have already been "set or adjusted" and saved to the database.

Submit Changes—will update the "Active Profile" only, if user wants to use for future lines "Save as Default".

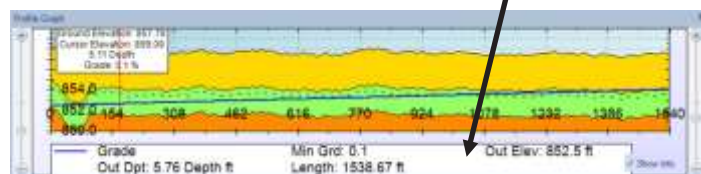
Graph Settings

Graph Colors—allows user to change the line colors in the "Profile Graph". Click on the color chip & choose a color from the color table. Default colors listed to the left.

Reset Colors— button resets colors to default settings

Line Width—will adjust the line width (# of pixels) of the "Grade Line".

Graph Legend Options— Select the items to be displayed at the bottom of the Profile Graph.



Tile Drainage—Setting Raster Source—Tile Profile

Layer Info-Tab on the Right side of the window allows you to see all the layers you have or had turned on.

In "Drawings/Profiles In Map", take note that the "Drawing Name" and "Associated Raster" will allow users to see what "Surface" is being used to Calculate the "Tile Profile Line".

The "P" (Profile) check box will set that layer to be used as a "Tile Profile Line", gathering it's attributes from a Surface Raster layer.

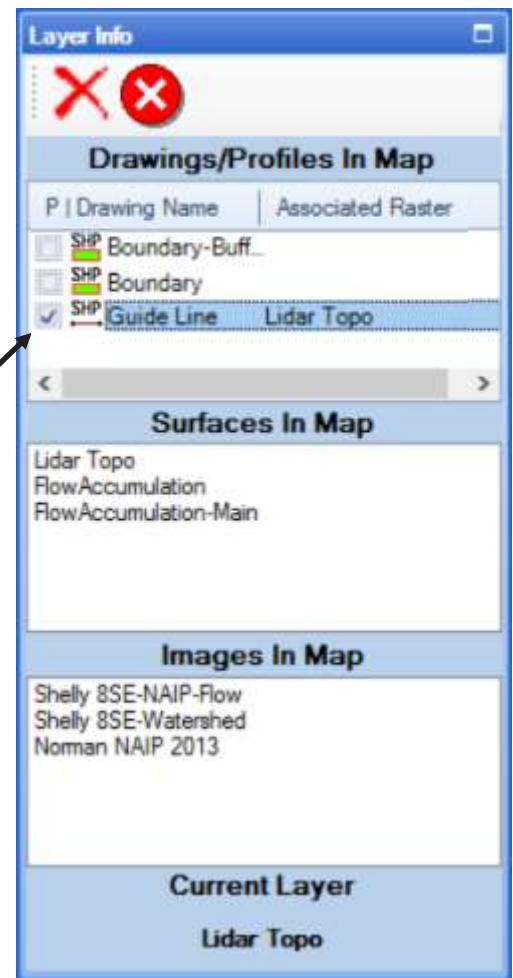
ADMS can only associate Surface Raster to Line files.

"CHECKING" the "P" box will allow you to make the association for the Guidance Line.shp to "Surface Raster".

Once that data is "Associated" to a line, that Line becomes a "poly Z" Line.shp file. This means that the line has x,y,z properties at each location in the line where it intersects a raster pixel. This process will ADD many more vertices to tile lines.



These are the lines that will show in the 3D window.
Note: the "Set Elevation Button" will set which "Raster" will be used to drive the 3D window.

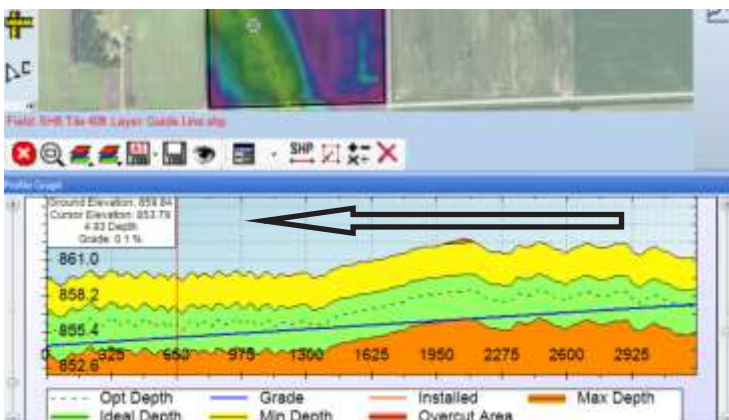


Example - "Switching Surface Raster Layers" - below on the LEFT is RTK data collected by Combine, 34 foot passes. Below to the Right is Lidar data collected at 1 meter (3.3') resolution.

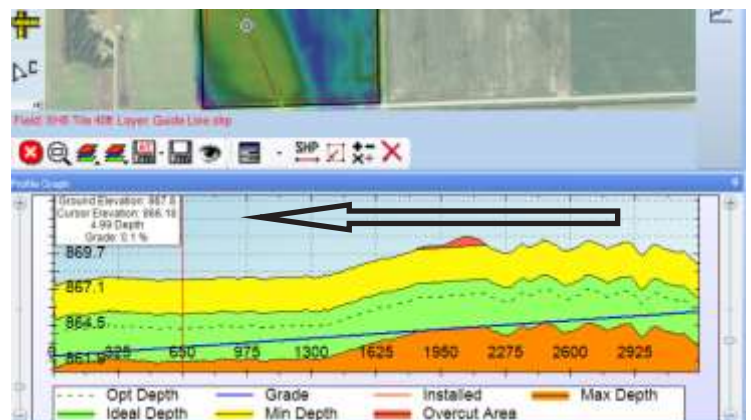
Notice on the "Tile Profile", the Left end of the line is always OUTLET SIDE. Also, end of the lines & waviness of the RTK, no ditch bottoms driven in RTK, LiDAR looks smoother in this example.

The SHP line is the exact same line, just using different Raster to show Tile Profile.

RTK Data 1/sec at 34' passes



LiDAR data at 3.3' resolution



Tile Design-Creating Tile Profile

In the Tile Design Window there is no "Profile" button. So to draw a "Tile Profile", you will draw an actual "Line.shp". There are a couple options where to start. Either use -

- "Guidance Line.shp" which will not be used for anything but checking & testing tile locations. This file will end up in "Xtra Data" folder later or get "Deleted".

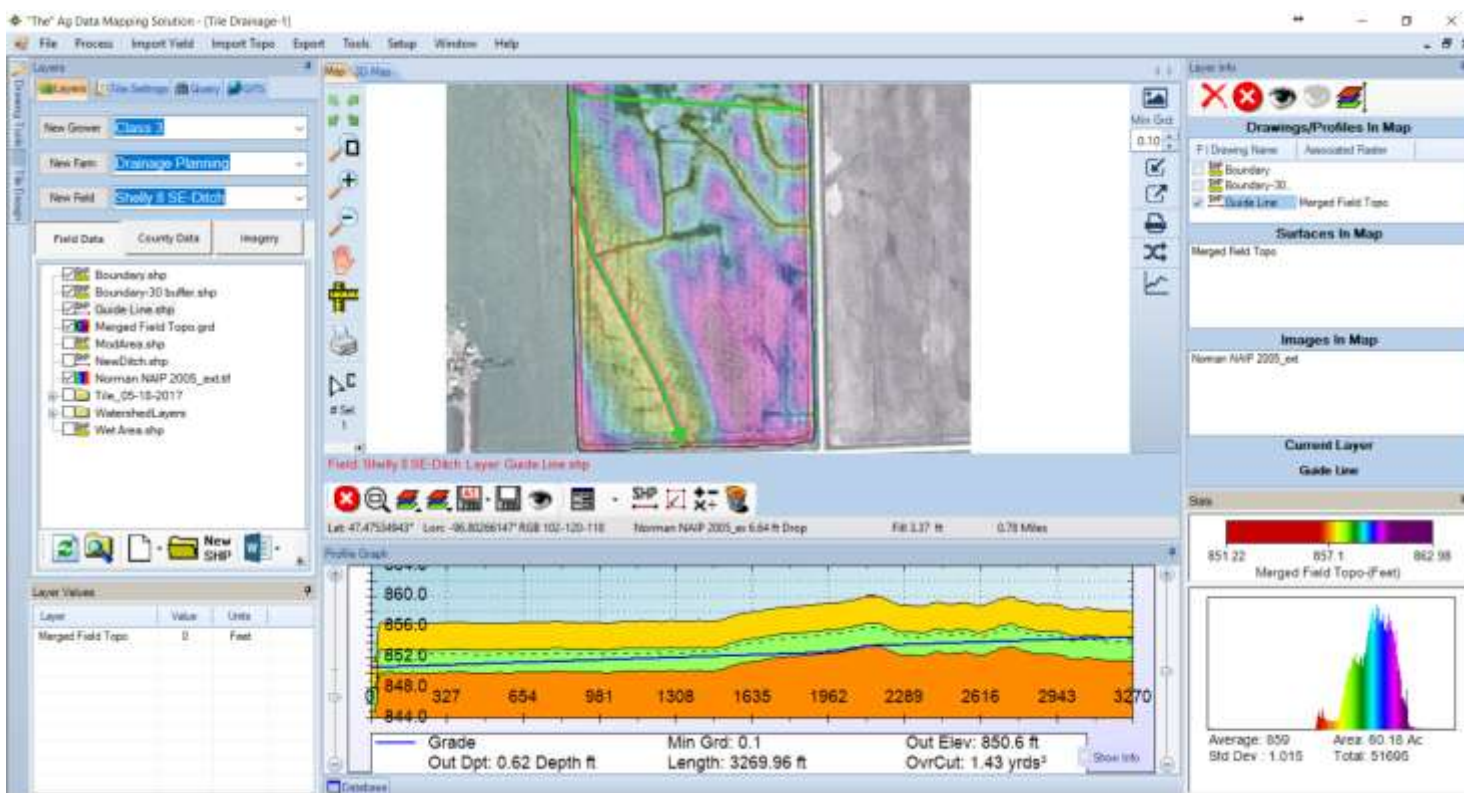
Or

- "04 inch Pipe.shp" this will be used for final tile map. Test & Check tile lines are deleted later.

Example below will use the idea of a "Guidance Line.shp"

Create a Tile Profile

1. Turn on an Elevation.grd (Lidar.grd).
2. Turn on any other helpful layers.
3. Click "Create New Layer from Template" and choose "Guidance Line".
4. "Layer Info" Check "P" Box for Guidance Line".
5. Assign "Lidar.grd" for Associated Raster.
6. Click on "SHP" - "Draw a New Object" .
7. Draw Proposed Tile line in direction of water flow. (Right Click= finish).
8. Note "Arrow" on outlet end of line in over head view (if wrong "Reverse Tile Direction").



Profile Graph (Tile)

Left Side Slider—will Set or Adjust the "Out Depth" in both "Best Fit" or "Laser Level On".

Right Side Slider—will Set or Adjust the "Ideal Depth" when using the "Best Fit" method. In "Laser Level On, this slider does nothing.

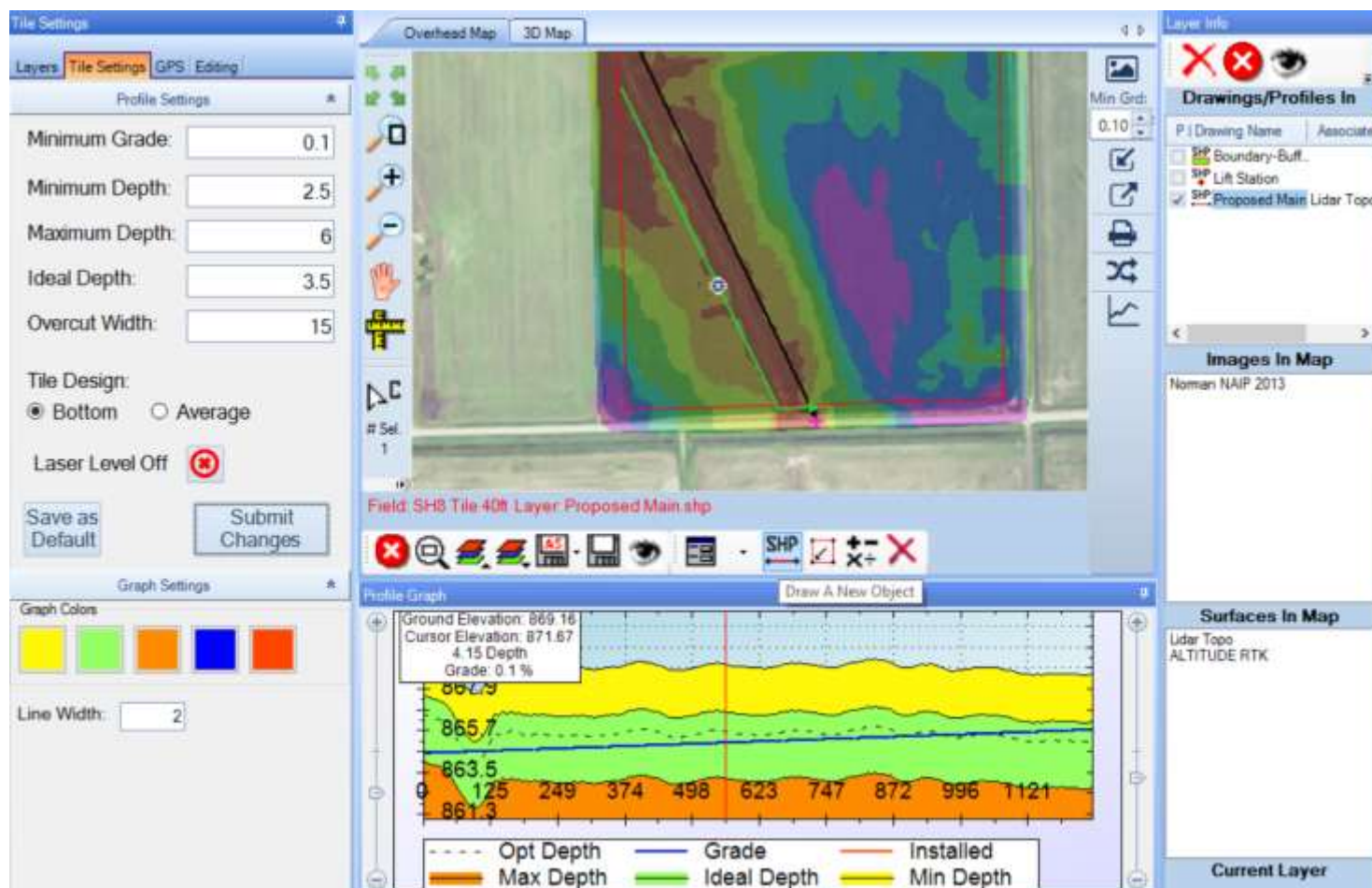
NOTE : These first Tile Lines should be drawn over longest runs hitting lowest areas ending at the proposed outlet location. This will confirm the project will work. Like shown above.

Tile Design—Creating Proposed Main

This function of a "Proposed Main" is a KEY concept for "Tile Design". This line will become the "Outlet End" for all the lines to be drawn in using the Tile Drawing tools. Take time to make sure these lines are drawn accurately.

To create a Proposed Main

1. Turn on an Elevation.grd (Lidar.grd).
2. Turn on any other helpful layers.
3. Click "Create New Layer from Template" button and choose "Proposed Main".
4. "Layer Info" Check "P" Box for "Proposed Main".
5. Assign "Lidar.grd" for Associated Raster.
6. Click on "SHP" - "Draw a New Object".
7. Draw Proposed Tile line (Right Click= finish).
8. Note "Arrow" on outlet end of line in over head view (if wrong "Reverse Tile Direction").



In this example, take note:

There are 2 Tile Lines in the Proposed Main.shp.

Add as many "Tile Lines" as needed in this Proposed Main. Shp.

Remember this will be the outlet point of all your Lateral Tile lines.

Make sure the whole system works before drawing in the Mains!

Tile Design– Ancillary Layers

The Ancillary Layers function creates depth and/or grade points along the Proposed Main at regular intervals. Would recommend setting Outlet Depth and other Tile settings before creating.

To create Ancillary Layers

1. Turn on an Elevation.grd (Lidar.grd)
2. Turn on "Proposed Main"
3. "Layer Info" Check "P" Box for Proposed Main
4. Select "Tile Design" Tab.
5. Select Editing Layer and "Proposed Main"
6. Set the desired distance between points
7. Click "Create"

Ancillary Layers will show up in the data tree as "Proposed Main-Points"

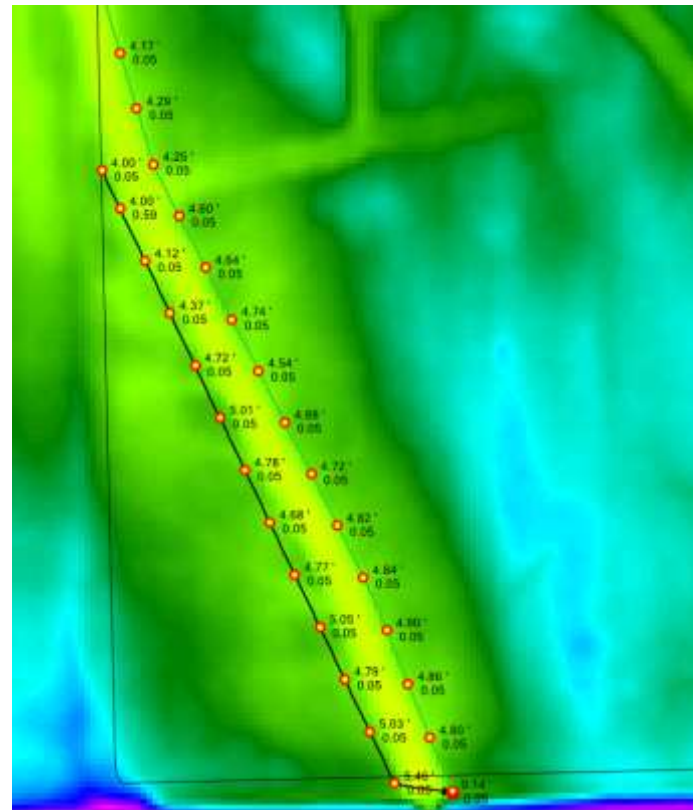
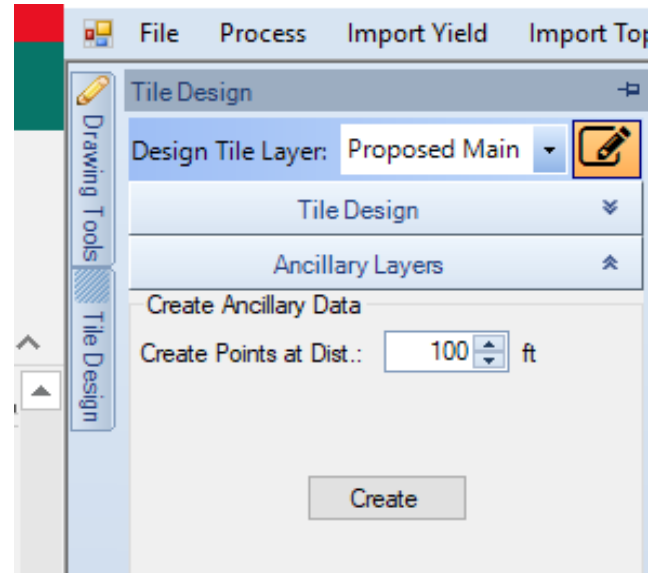
To turn on labels click on "Layer Display Properties"



In this example Main Depth and Main Grade are Displayed for each point.

Would recommend saving a template for these points for future use.

"Layer Display Properties" section of the manual has detailed instructions for creating and saving labels and templates.



Tile Design—Drawing Laterals “Tile Design” Tab

In Drawing the laterals (ex 04 inch Pipe.shp), use the “Tile Design” tab to do all the hard work. Draw one line per drainage area; let the Tile Design draw the rest.

To Create Laterals

1. Turn on an “Elevation.grd” Layer
2. Turn on “Proposed Main”. Check “P” box in Drawings/Profiles in Map.
3. Turn on a Clip layer for top end of tile. Line.shp or Polygon.shp
4. Turn on any other helpful layers.
5. Click “Create New Layer from Template” button & choose “04 inch Pipe”.
6. Click on the “SHP” on bottom tool bar and draw in a 04 inch pipe.shp, make sure it crosses top end clip and the Proposed Main.
7. Go to the “Tile Design” tab.
8. Set “04 inch pipe” as “Tile Design Layer”.
9. Click “Save Changes” if prompted.
10. Select the line to use.
11. Set “Proposed Main” as “Tile Main Layer”.
12. Set “Boundary -30 Buffer” as “Outer Clipping Layer”.
13. Type in desired Tile Spacing—Ex. 40’.
14. Click “Layout Design”.
15. If any lines show wrong flow direction, select and reverse at this time.
16. **Rotate Tile**—Will allow 15 degrees of rotation from the original drawn angle. Click on the “Rotate” Button and move mouse over the map area, Left Click, hold and move mouse, angle will change or type in values.
17. **Shift Tile**—will move tile lines relative to the Tile Main Layer. Click Arrows to move or type a value. Can only move lines one “Tile Spacing”.

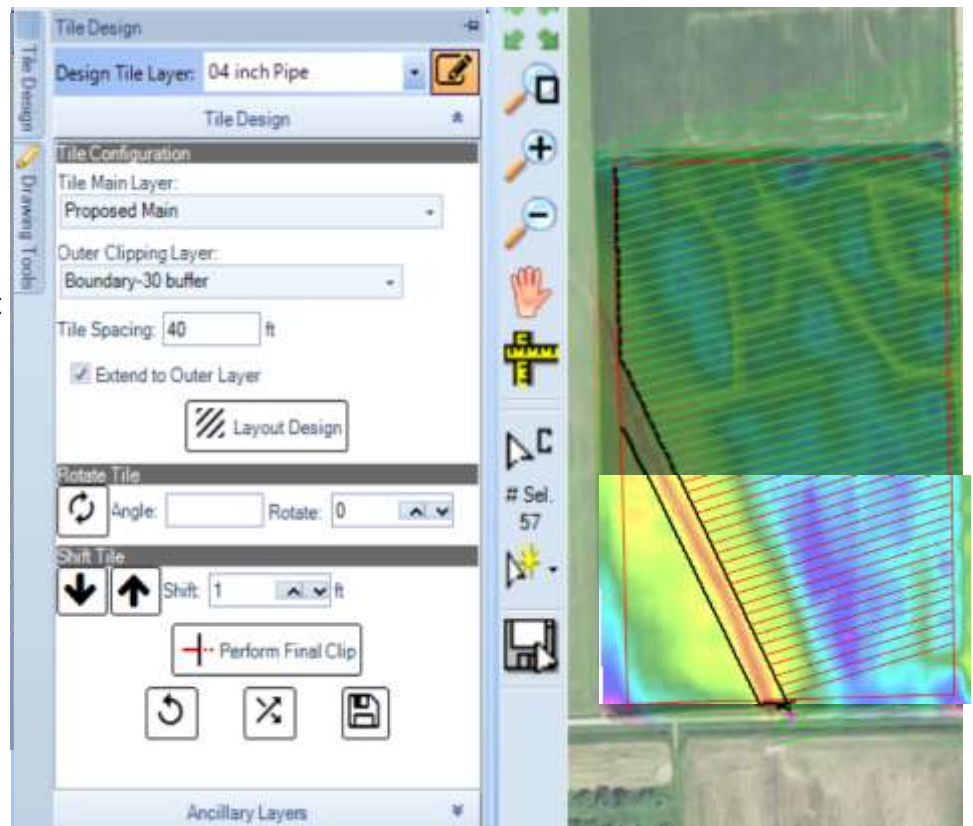
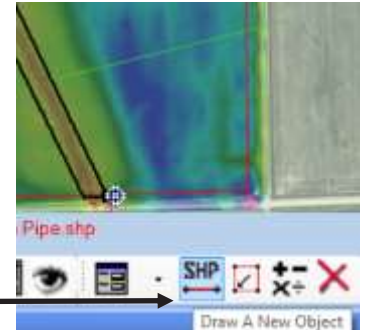
Note: If you are not satisfied at any step click the Reset Design Button



18. Click “Perform Final Clip”.

19. If happy with “Clip” - click the “Save” button. Lines will be saved / added to the “Edit Layer”.

Repeat this page for all the areas of Parallel Lateral Tile.



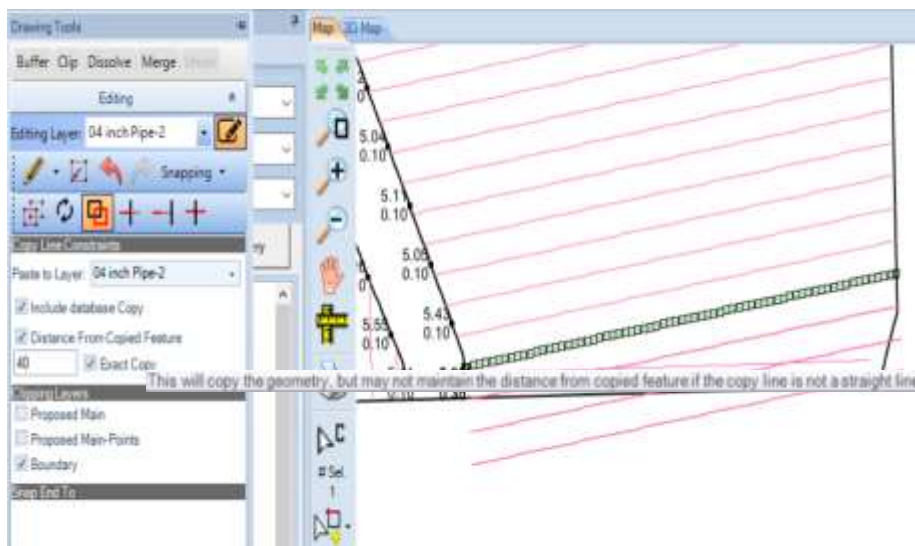
Tile Design—Adding in Random Laterals

As Tile plan gets developed, there will be times that Lines need to be drawn in at random. If “Truly” random and independent of anything else, just freehand draw.

Often these random / additional lines should “Parallel” other lines. Below are a couple tools to help do this function.

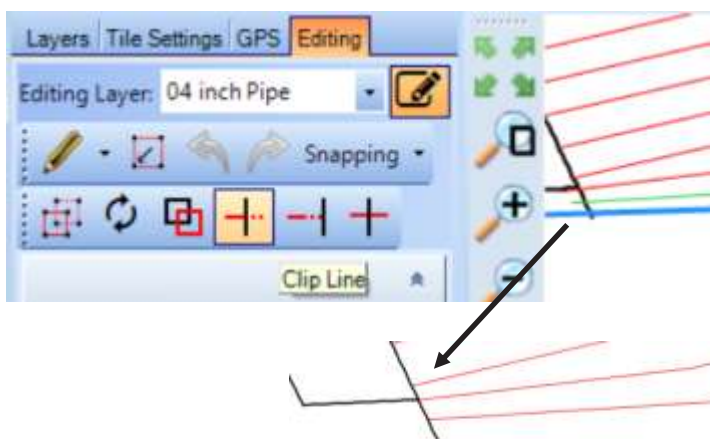
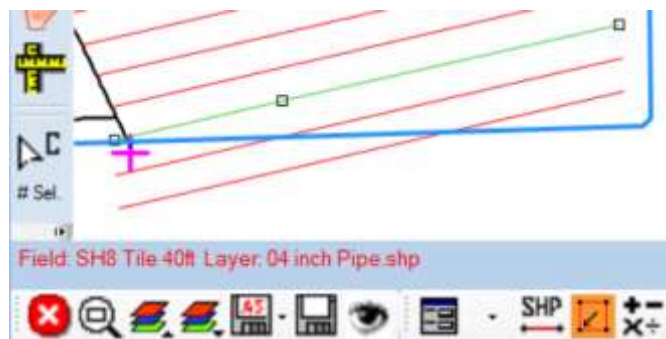
Copy Feature—(Drawing Tools)

1. Edit Layer = layer with line to copy.
2. Click “Copy Feature” button.
3. Set Values like image to Right—correct “Distance”.
4. Left Click on line to copy in Map Window area.
5. Drag your mouse away from the selected line.
6. When correct, Right Click.
7. Lines may need some more editing.



Move Vertices— (Bottom Toolbar & Drawing Tools)

1. Active Layer = layer with line to edit.
2. Click the “Move Vertices” button.
3. Place Cursor over Vertices to move—Left Click, hold and Drag to new location.
4. **Add a vertices**—place Cursor over new location, hold down “Control” key & “Left Click”.
5. **Remove vertices**— place Cursor over existing vertices, hold down “Shift” key & “Left Click”.



Clip Lines— (Drawing Tools)

1. Edit Layer = layer with line to edit.
2. Click the “Clip Line” button.
3. In Map Window—Click on Line to Clip—Line will turn Lime Green & show all Vertices.
4. In Map Window—Click on the Line or Polygon to Clip line “to” (object should turn Pink).
5. Repeat as needed.

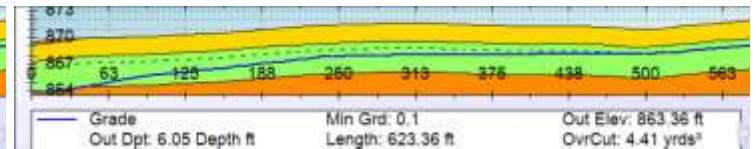
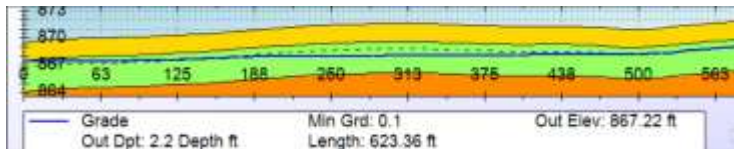
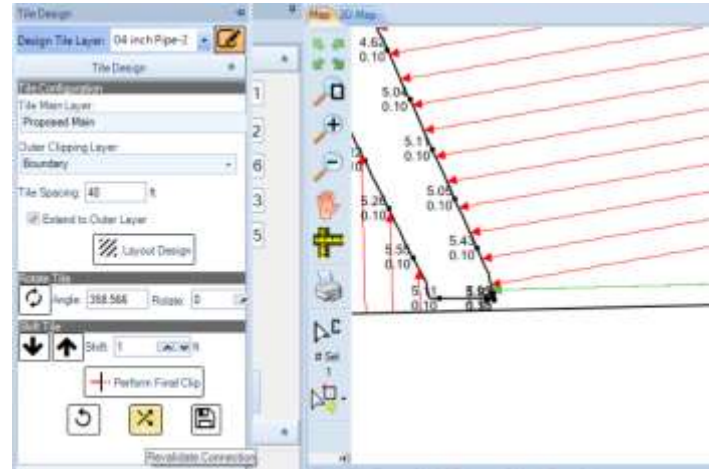
See Drawing Tools Section for more TIPS

Tile Design—Revalidate Connections & Reverse Tile Direction

After adding random laterals to the design the depth of the main can be used as the starting depth of the lateral.

1. Open Tile Design tab
2. Set Design Tile Layer— "04 inch Pipe"
3. Select the line or lines to revalidate
4. Set Tile Main Layer— "Proposed Main"
5. Click the "Revalidate Connection" button

In the example below the outlet depth changed from the "Minimum Depth" 2.2 ft to the depth of the "Proposed Main" 6.05 ft.



In drawing in Tile Lines.shp, we recommend drawing in direction of water flow.

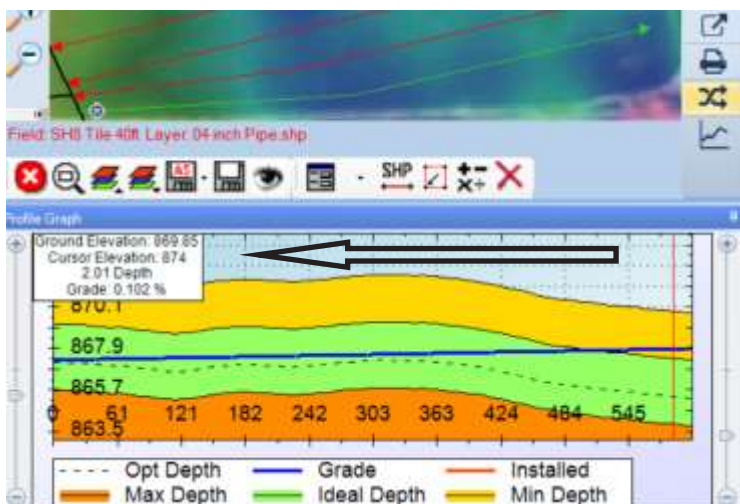


If drawn against the direction of flow, the cut calculations will be off. By clicking the "Reverse Tile Direction" the problem is gone.

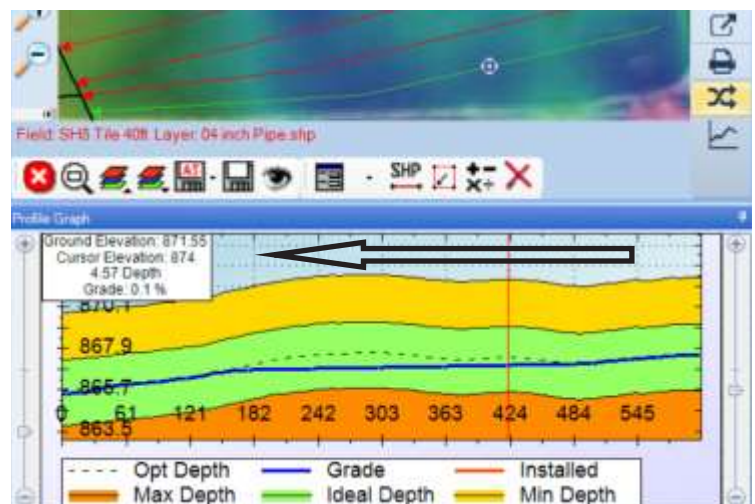
In the Profile Graph, the LEFT side is always the OUTLET. Water is always moving right to left in the "Profile Graph" window.

On the "Overhead Map", you will see an Arrow at the outlet end of the line/profile to show which way the water is trying to flow, based on the line directionality.

Drawn from Outlet to High Spot



Reverse Tile Direction button used

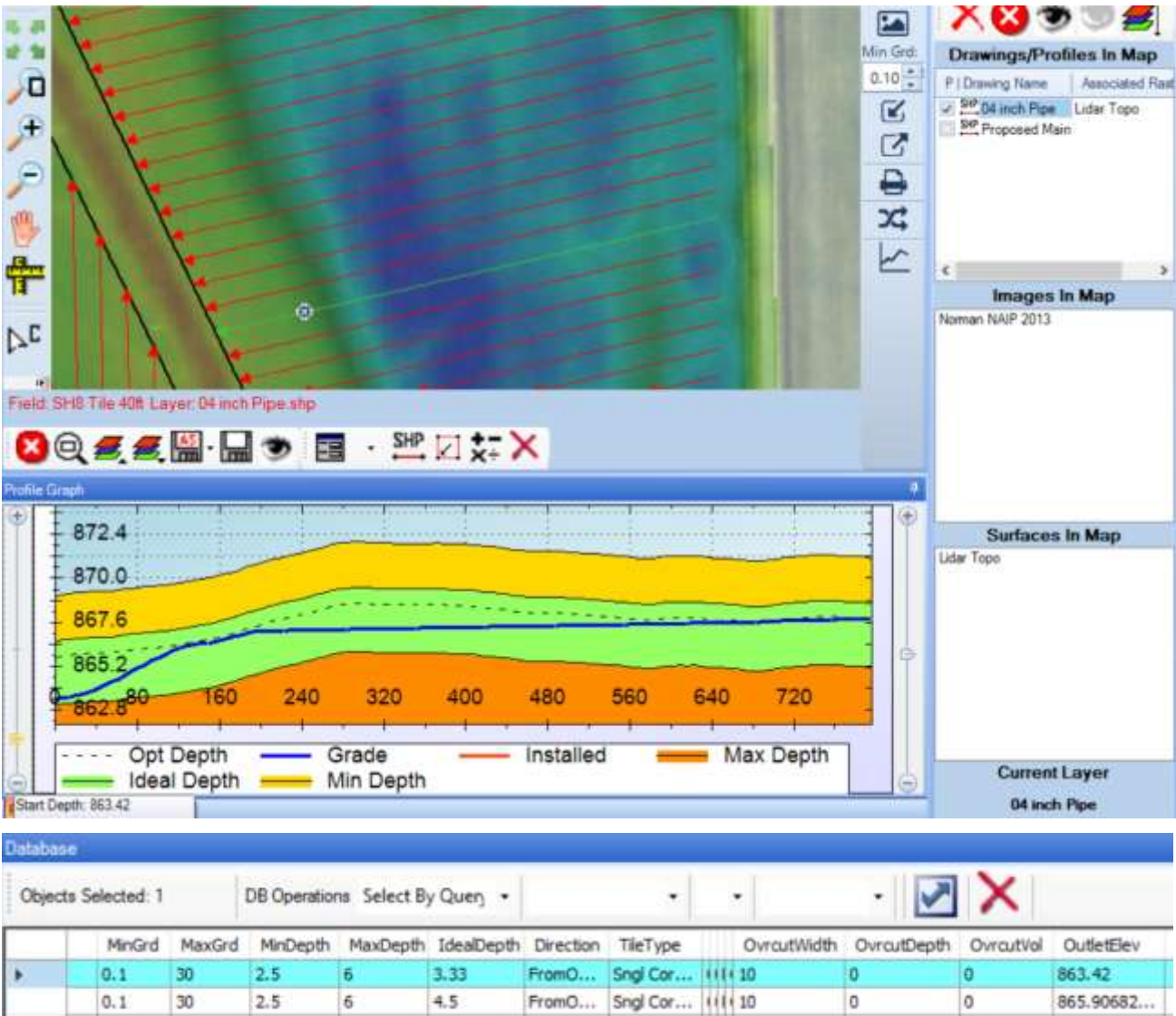


Tile Design—Reviewing Tile Plan

Once you have Lines laid out in the Map Window area of the screen, review the Profile or the proposed install depth / design. Users can quickly click through "Tile Plans" to confirm the plan functionality.

For Tile Design—Turn on or Create a SHP Line & Turn on an Elevation.grd, we suggest turning on any other layers that may be helpful, user preference.

1. Check the "P" Box on Tile Line.shp to calculate Profile.
2. Assign Raster to calculate Profile.
3. Left Click on the Tile Line to review.
4. Profile shows in "Profile Graph".
5. "Left Slider" will adjust the "Start Depth" (outlet).
6. "Right Slider" will adjust the Ideal Depth.
7. Once the adjustments are made, values update in the Database. These values will carry over to SD Drain-Tile as "Guidance Lines".
8. Note: manually changing values in Database will change how lines load.



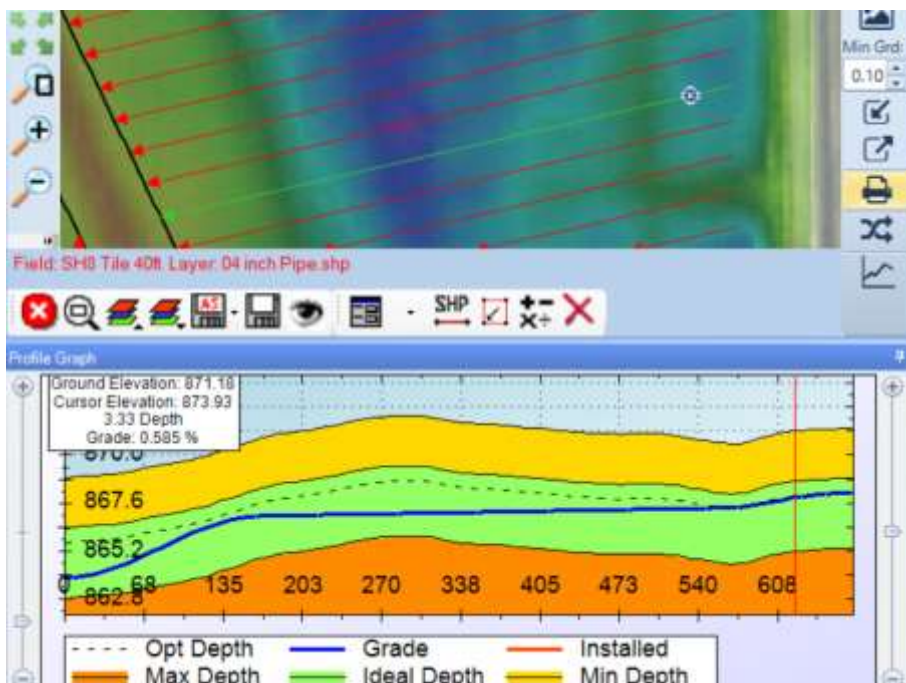
Tile Design—Printing Profile

Printing can be done of any Tile Line.

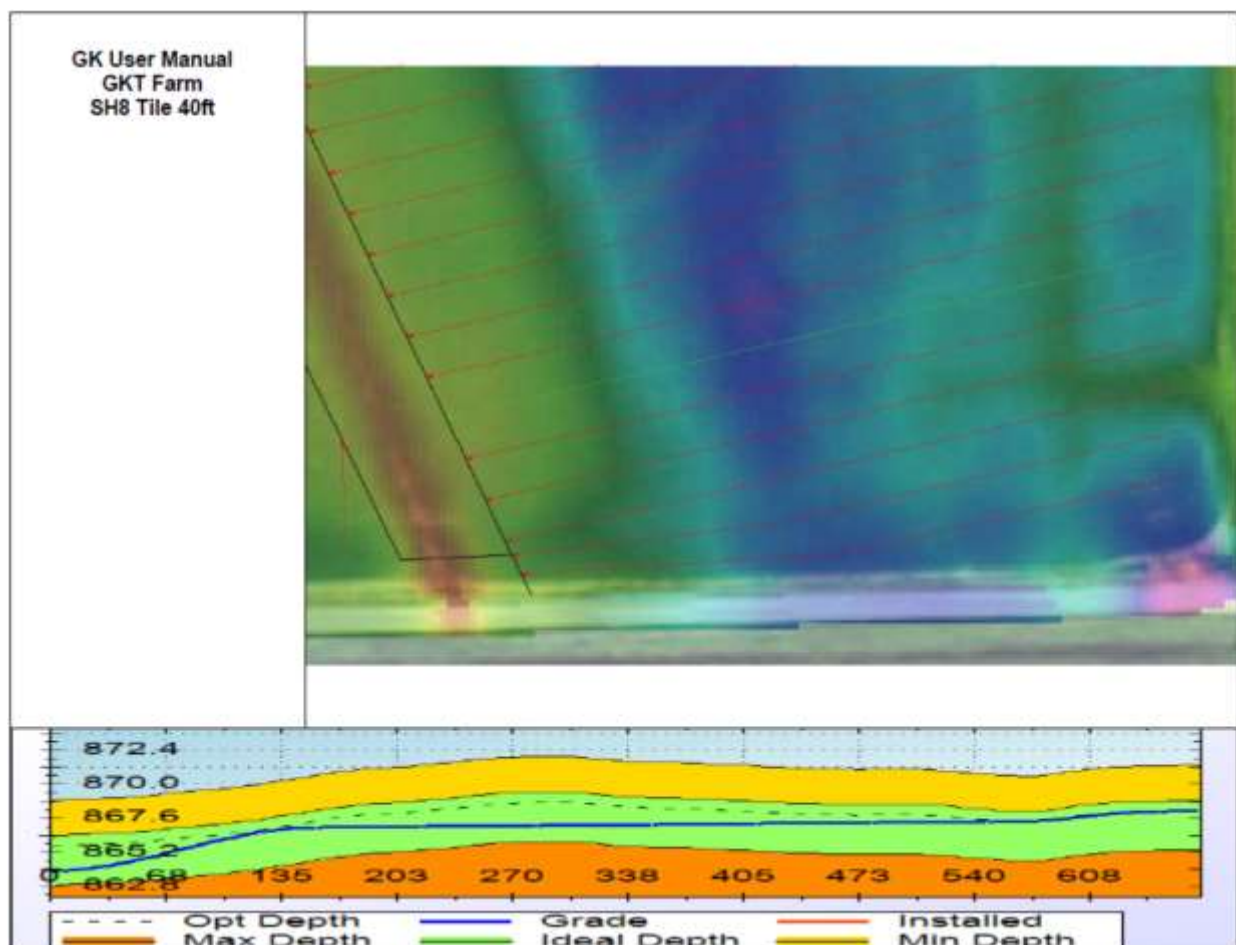
Suggested to "Save" Lines before Printing.

To Print Profile—

- Zoom to Tile Line to be printed.
- Turn on maps so they show up how you want it printed.
- Make sure your active layer = layer to be printed.
- Select the Tile Line in Map Window.
- Adjust Grades and Slides on Profile making the profile show as you want.
- Click on the "Print Profile" button.



Example of a Print—Below



My Notes

3D Map Window

The 3D Map function adds great perspective to visualize fields, overlay other maps and data. 3D is only a visualization function, this is not where you will do drawing and mapping. The main use is a helpful decision tool.

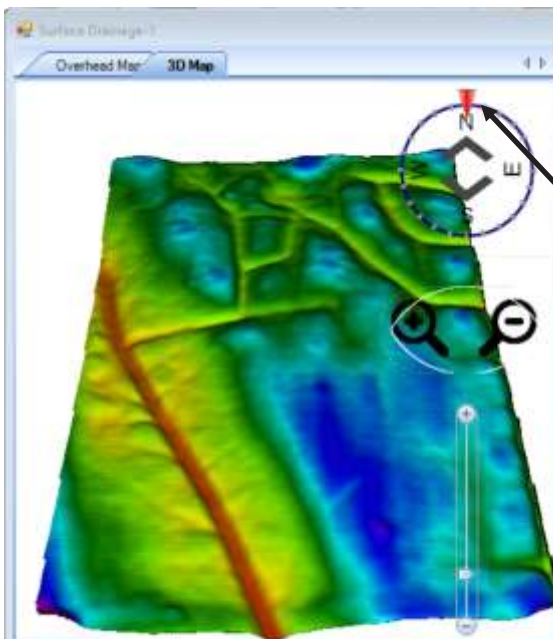
Map Window—Right Click on the “Elevation.grd” and choose “Open in 3D Window”.



Surface / Tile Drainage Windows—“Set Elevation Layer” in the “Overhead Map” tab.

1. Turn on all images or surfaces that may be helpful.
2. Turn on any “line.shp” or “line.json” files to see in 3D. If using “line.shp”, you must check “P” box to make them visible in the 3D window.
3. NOTE: Polygons and Points will not show up in the 3D window.
4. Click on to the “3D Map” tab

In the 3D window, you cannot switch profile lines to see selections or select in the 3D map area.



Tools for navigating 3D.

Pan Map—

“Left Click & Hold” over the 3D map window area, slide the map where you want to be.

“Sliding” the “Height Exaggeration” will re-center the map and view extents.

Rotation—

Rotate by “Right Click & Hold” over the 3D map area.

Rotate by “Left Click & Hold” over the Red Arrow on the “N-S Compass”.

View Angle—

Angle change by “Left Click” on the Gray up/down arrows in the “N-S Compass”.

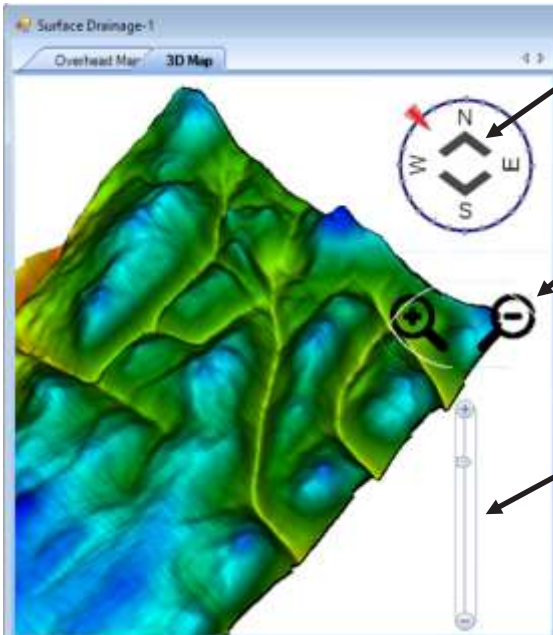
Zoom In/Out—

Zooming can be done using your “Scroll Wheel” with mouse in the 3D Map area.

Zooming can also be done by clicking the “Magnifying Glass + / -” button.

Height Exaggeration—

Map Exaggeration can be made by moving the “+ - Slider” Up / Down.



3D Map Window

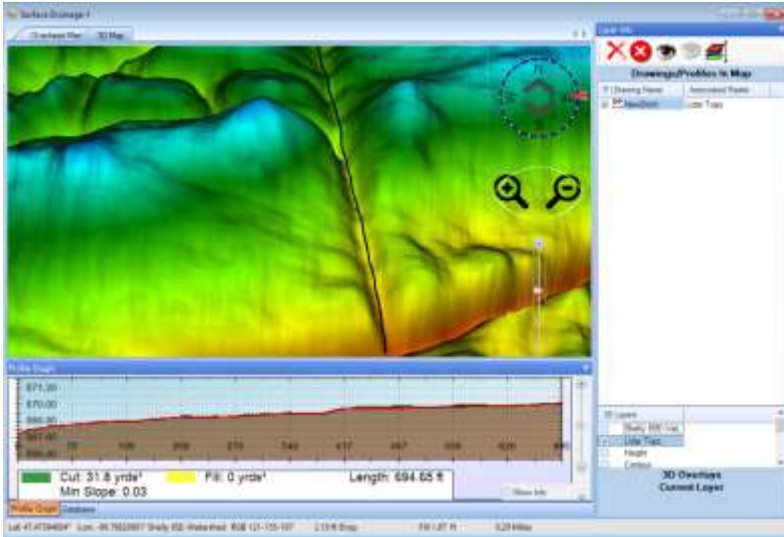
Drainage/Tile Windows "Set Elevation Layer" in the "Overhead Map" tab.



In Map Window, access the 3D window by "Right Click" on the Elevation layer in the "Field Data" tab.

Only the "Last" checked "P" Box will show, draped over the top of the 3D layer.

Note: There is no "side profile window in the Map Window. Views may be slightly different.



Tools on the right side of the map window: by clicking on different "3D Layers", you can switch the view of the 3D Map area.

Data will always be draped over the "Elevation Layer.grd" selected.

Switching the view can show many different features of a field. Turning on many layers will give a real feel for the field.

There are some Fixed items that are always in the "3D Layers" window.

-Height—uses a Rainbow color table applied to elevation.

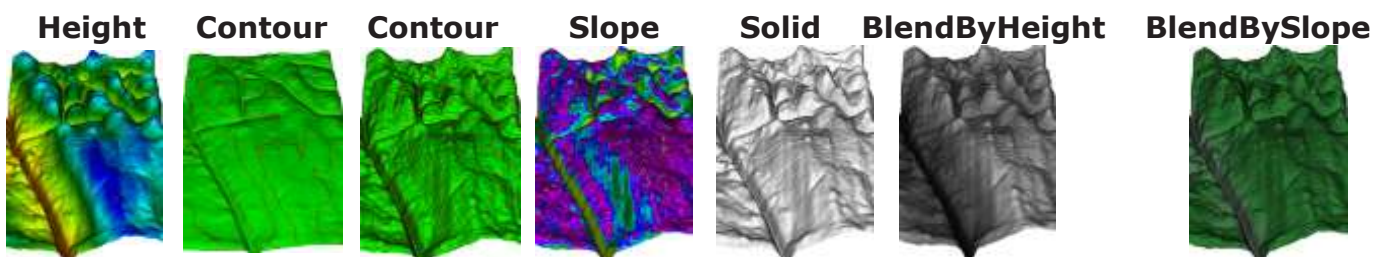
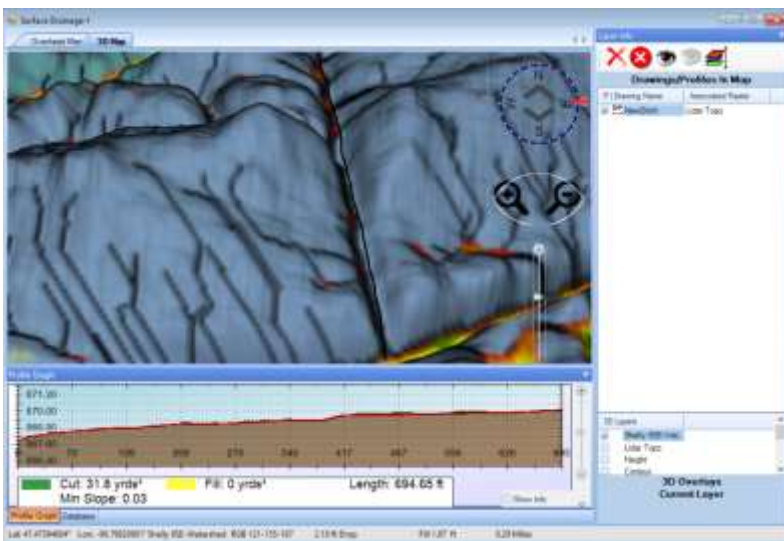
-Contour—uses a Solid green color table with red lines at a fixed spacing relative to how exaggerated the "Elevation Slider" is set.

-Slope—applies a Rainbow color table to the Slope.

-Solid—applies a Light Gray color table to the Elevation.

-BlendRampByHeight—uses a Grayscale color table on elevation

-BlendRampBySlope—uses a green to gray textured color applied to slope.



Surface Drainage - Import from SDDrain

Importing data from SD Drain—Simply click the “Import” button on the Right side of the screen.

Click the “Import” button on the right menu bar



In the “Export” from SD Drain, it will have a “GKData” folder on your USB drive.

Example - “G” Drive.

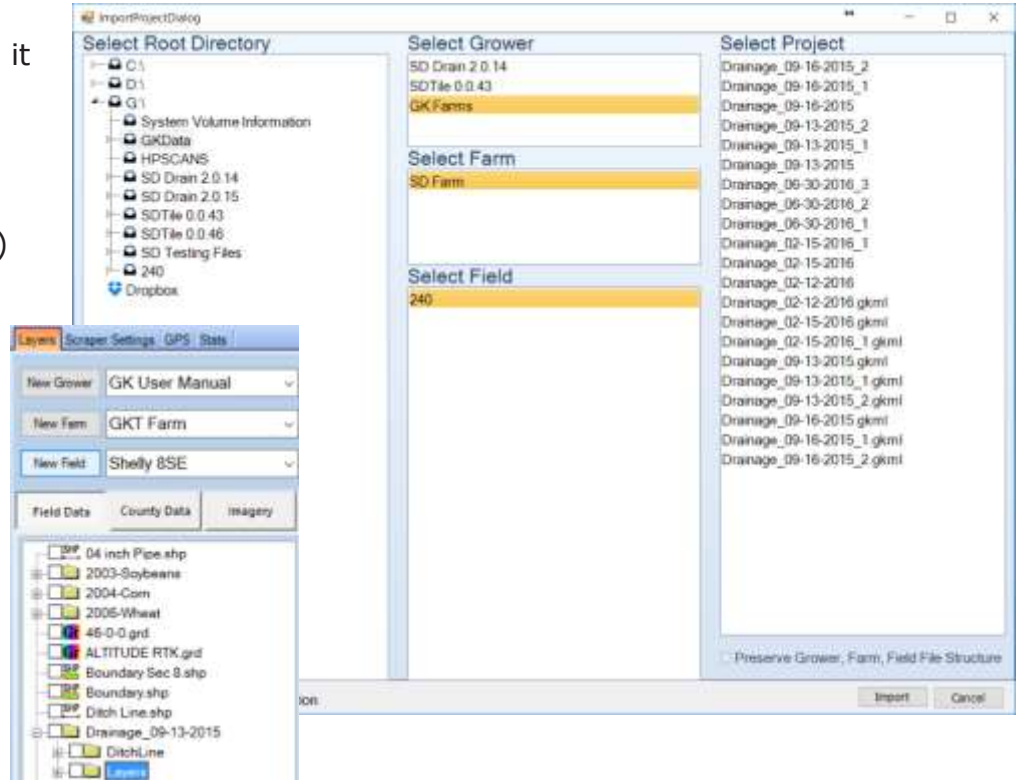
Select GKData (Root Directory)

In the Middle set of windows area, you can select the Grower / Farm / Field to import.

On the Right, select the “Project”.

Files will go into the “Field” being used in ADMS.

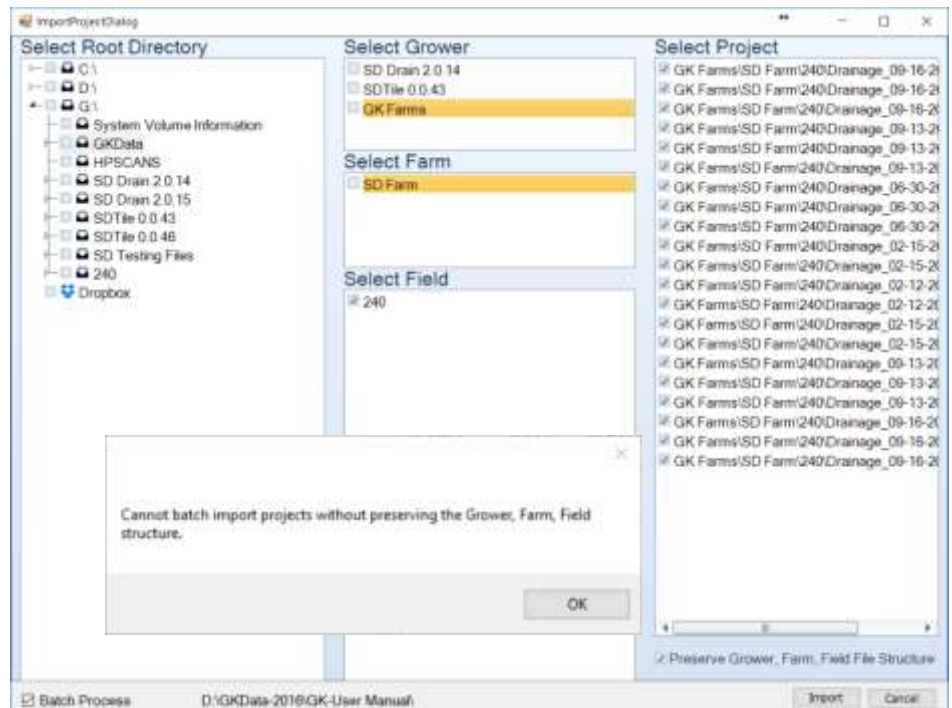
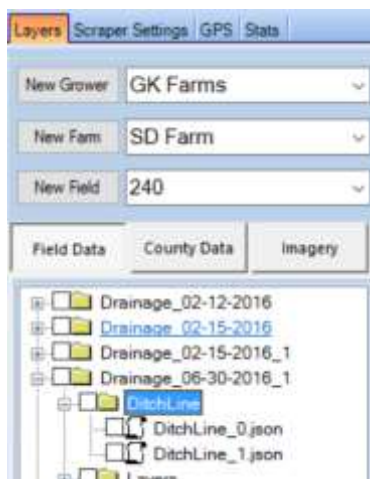
By Checking the “Preserve Grower, Farm, Field Structure”, the data will go to this location, creating this structure in ADMS.



To bring in multiple Grower, Farm, Fields or Projects, check “Batch Process”.

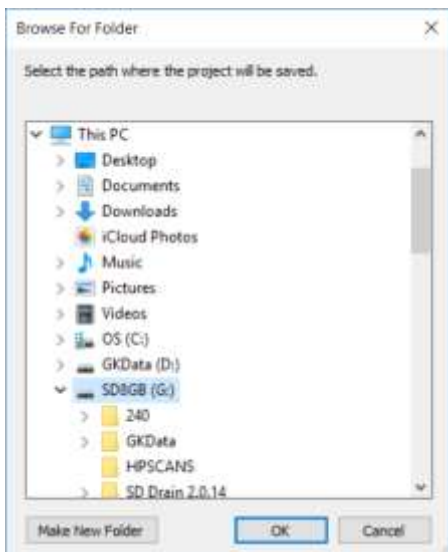
It will automatically choose to Preserve Grower, Farm, Field Structure.

Check on the data to import.



SD Drain-Ditch Export—Single Field

When all the maps are ready for use in the field and SD Drain, click the “Export” button.



“Browse” window will open.

Set the location of the USB drive or folder where the GKData structure will be created.

For single field exports, file must be turned on in ADMS to be exported.

SD Drain can support:

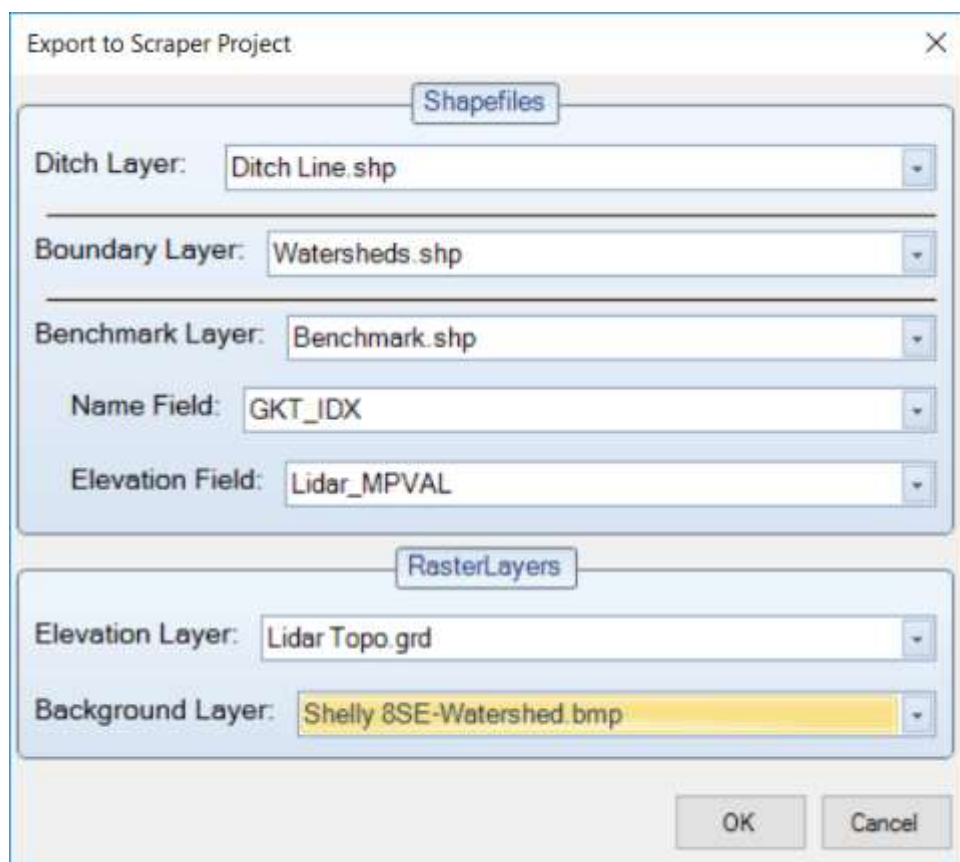
- Line.shp (ditch)
- polygon.shp (boundary)
- point.shp (benchmark)
- surface.grd (elevation)
- image.bmp (background)

In SD Drain, you can only use one of any of these objects at a time.

Click OK, and the Grower, Farm, Field, Project structure will be created at selected location.

Coming soon:

Batch Export
Self-Extracting Zip





SDDrain Export-Copy/Paste

Within ADMS there is a specific folder hierarchy that allows users to organize and access the data easily and efficiently. To send data to SDDrain this folder structure will be kept the same for the software to read the data properly. This allows ADMS users a smooth transition when sending data to SDDrain.

Below is a summary of how the data is structured in SDDrain & ADMS.

1. Root Data Folder—This is where all the data is stored.
2. Grower Folder—Within the root data folder, contains farm and field folder.
3. Farm Folder—Within the grower folder, contains field folder.
4. Field Folder—Within the farm folder, contains all GIS field data.



Data Path UTM Zone: 14 - +

Grower: SD_Drain +

Farm: GKT Grower +

Field: SH8Export +

Data Structure: SDDrain

New Grower SD_Drain v

New Farm GKT Grower v

New Field SH8Export v

Data Structure: ADMS

Even though SDDrain will be able to read many of the same files that are used in ADMS there are certain "in-field" limitations and certain files should not be sent to controllers and field computers. Knowing which files to send to the field will make the transfer of data and operation of SDDrain much smoother.

*Note: One difference between ADMS and SDDrain is how each program deals with subfolders within the field folder.

- ADMS has a data tree that allows users to create subfolders for organizing their data in the field folder. For example: In ADMS ditching projects for each year could have their own folder containing each project (Ditching 2015, Ditching 2016, etc...). The data will stay organized avoiding clutter and confusion in the data tree with multiple projects.
- SDDrain is an in-field program and the data tree is not needed. Therefore, when importing data into SDDrain the software will look in all subfolders within the field folder and read the data. For example: When importing the same files SDDrain would read all of the files in the 2015 Ditching and 2016 Ditching folder. This could cause confusion if files were named the same in each folder and potentially cause the operator to use the incorrect file for the required project.

These are small but important differences. It means that data can not just be moved into subfolders in ADMS and expect not to be seen in SDDrain. To avoid confusion for the person operating the scraper only send data that will be used for a particular project to SD Drain

There are two different ways the data can be exported to SDDrain.

Create a new Grower-Farm-Field hierarchy on the root data folder going to SDDrain.

1. After the folder structure is created use the Save-As functions in ADMS to send the data to the appropriate folder. This way only the correct files will be transferred to the field computer.
2. Copy and paste the required files to the new field folder going to SDDrain.

SDDrain Export—Copy/Paste

Copying Data For SDDrain



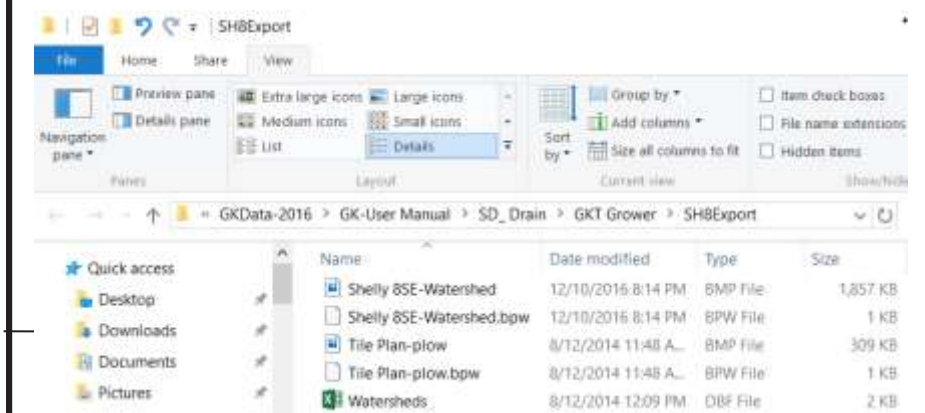
The three required file types are:

- **Background Map—(BMP or TIF Files):** Layer created using the print map to bitmap function or NAIP extracts in ADMS
NOTE: Background Maps, can only use one at a time in SD.
⇒ **Copy .bmp & .bpw**
⇒ **Copy .tif & .tfw**
- **3D Layer—(GRD Files):** Files coming from ADMS are RTK.grd or LIDAR.grd .
⇒ Recommend to clip the elevation layer to the field and not import a larger area into SDDrain and "Crop NULL Value" in ADMS before exporting or moving
⇒ **Copy .grd & .gdw & .COL_TAB**
- **SHP Files:** This file will be items like ditch lines, tile lines, boundary, watershed polygons, lift station point & benchmark points.
⇒ **Copy .shp & .shx & .dbf & .GKT_VAF**

Stay below 5 MB for maximum efficiency, and do not ever exceed 10 MB. For any of the file types.

To view the files size:

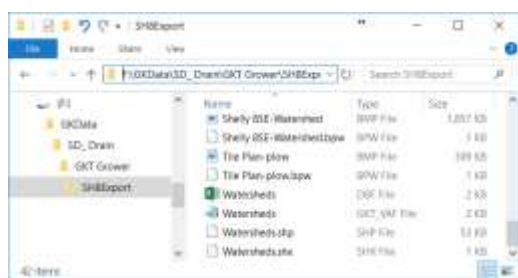
- ADMS—Bottom of the Data Tree. "Explore this Folder"
- In File Explorer set "View" tab to "Details"



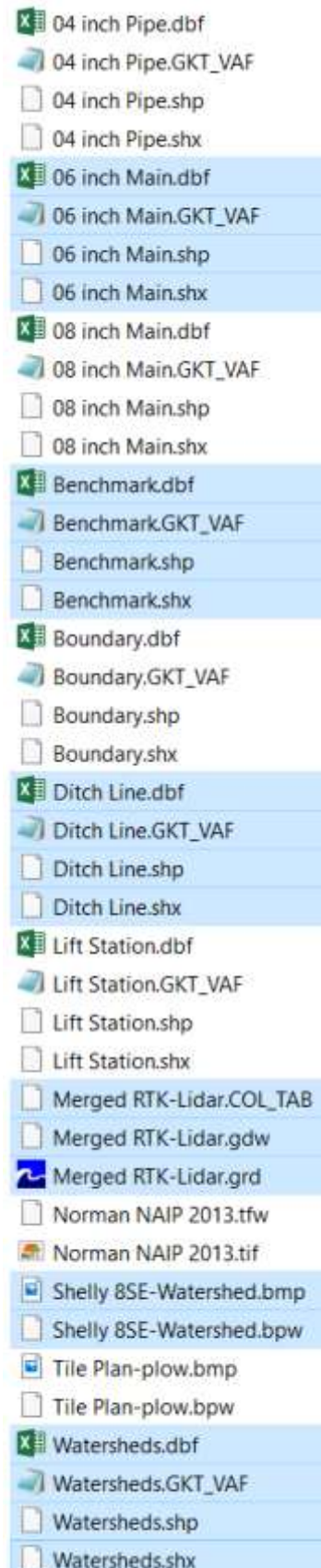
File Structure.—Should have FULL Grower/Farm/Field folder structure.
- Suggest moving across only files needed.

C:\GKData

USB GKData



Example Files to Move

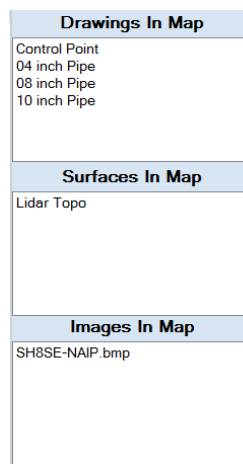
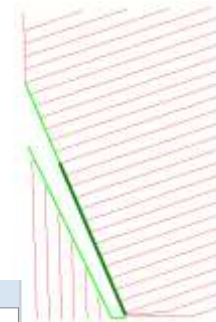
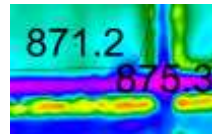


ADMS—AGPS Export

Introduction: These instructions will walk you through sending complete plans out to AGPS controller. These files will allow you to utilize Control Points, Background Images, Steering & "PTL". The information below requires that you have collected / created the following.

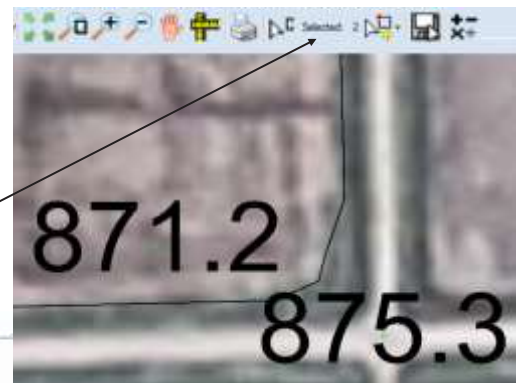


- Control Points or Points file that contains Control Points.
- Tile plan (4"-8"-10" & so on) created that is projected to match Control Points
- Lidar.grd or RTK Topo.grd used to create the Tile Plan projected to match Control Points
- "Print Map to Bitmap" - BMP / BPW created to work with plan



Exporting data to AGPS:

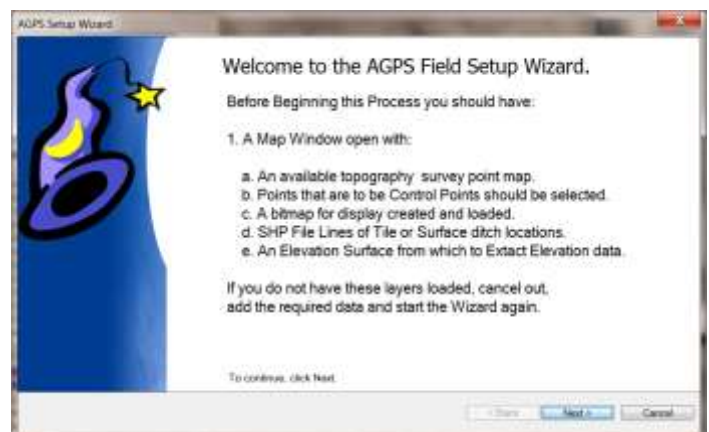
1. Open "Map Window"
 2. Turn on all "Drawing / Surfaces / Images" to be exported, this would include the "Topography.grd" that was used for design
 3. Open the "Points.shp" that CONTAINS the Control Points
 4. "Select" all the "Control Points" for this field / project (example —2 control points)
 5. Menu Bar—Export—"AGPS Setup Files"
- This will open the "AGPS Setup Wizard"



Instructions on this page will tell you what to do.

The next couple pages of the book are "step by step" instructions with "Notes" & "Suggestions"

Click "Next"



ADMS—AGPS Export

6. Choose the "Drawing Layer" that contains "Control Point"

- Assign the Database Column
 - Latitude
 - Longitude
 - Altitude
- Choose the Coordinate System of the "Tile Plow" AGPS PC

Click "Next"

7. Under the "Description", Name or Describe each Control Point. Make it something meaningful to the Tile Plow Operator.

Note: these were your "Selected Points"

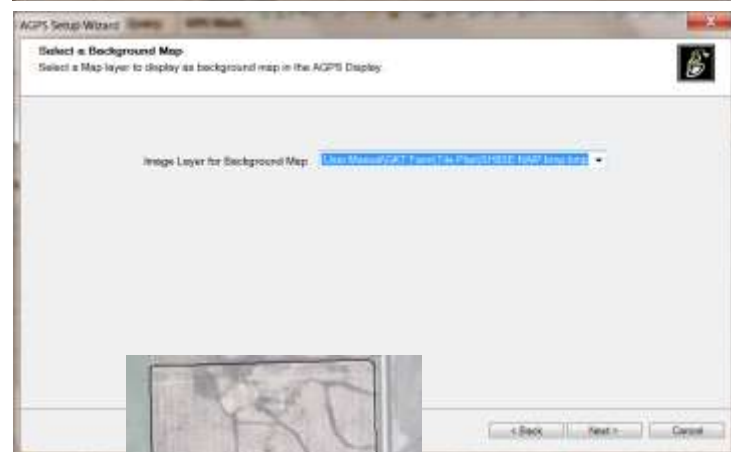
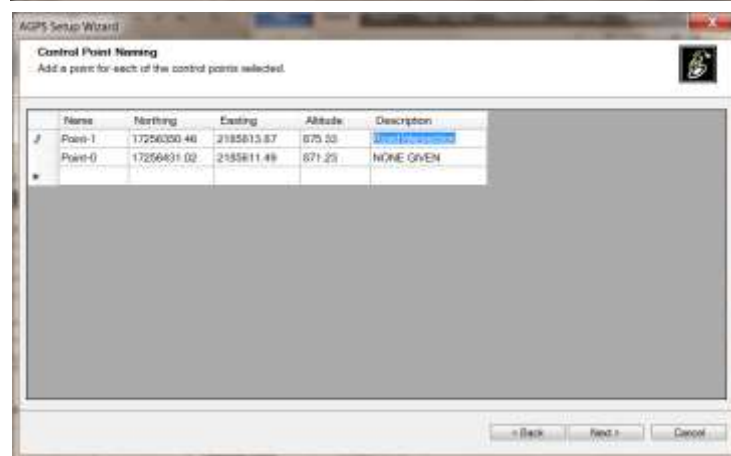
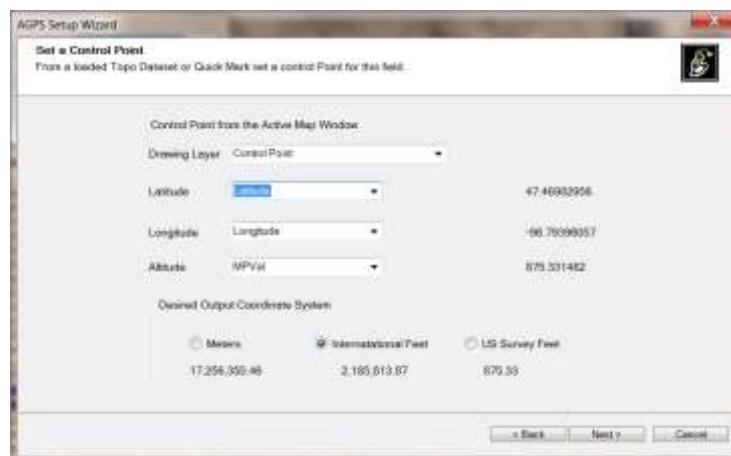
Click "Next"

8. From the drop down list select the "Print Map to Bitmap" background image.

Suggestion : If you are using "Steering Lines" or loading all the "Tile Lines" - DO NOT do a BMP with tile lines on it. Suggest using BMP WITH Control Points and Labels as shown.

Click "Next"

NOTE: if the tile line are drawn beyond the edge of xxx.grd layer the export will error out.



ADMS—AGPS Export

9. Check on the tile lines you want exported and assign color for the "Tile"

Suggest: Looking at your tile lines in the software and matching colors as close as possible. May be slightly different due to limited color "Names".

Click "Next"

10. Choose the Surface.grd that you used in the "Drainage Planning" window to create your "Profile Lines" and tile design.

- Checking the "Create an FBG File" will create a file for AGPS which will allow PTL.

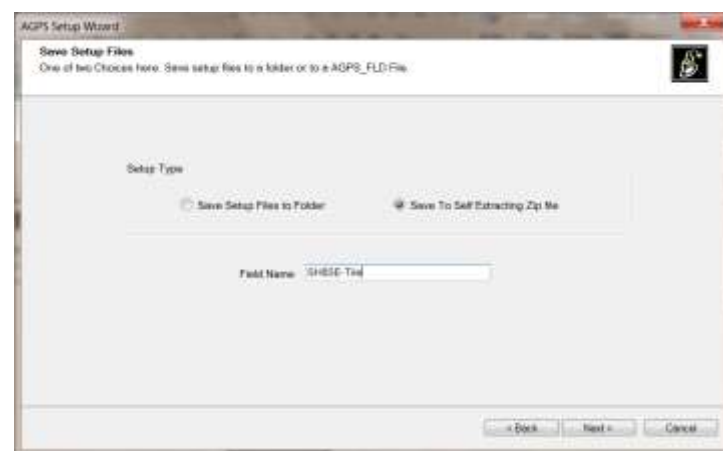
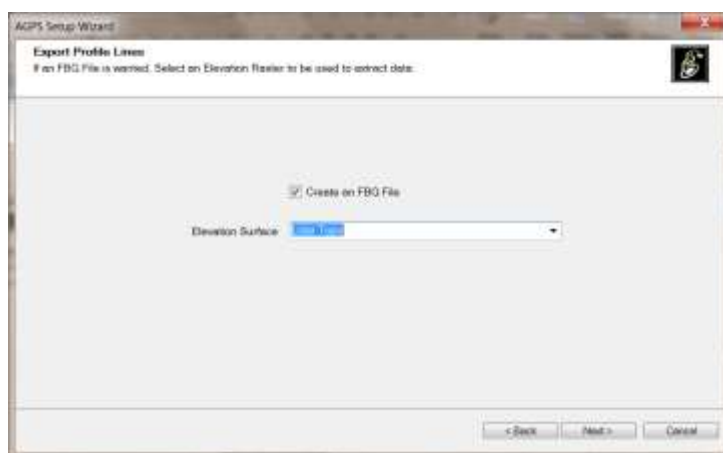
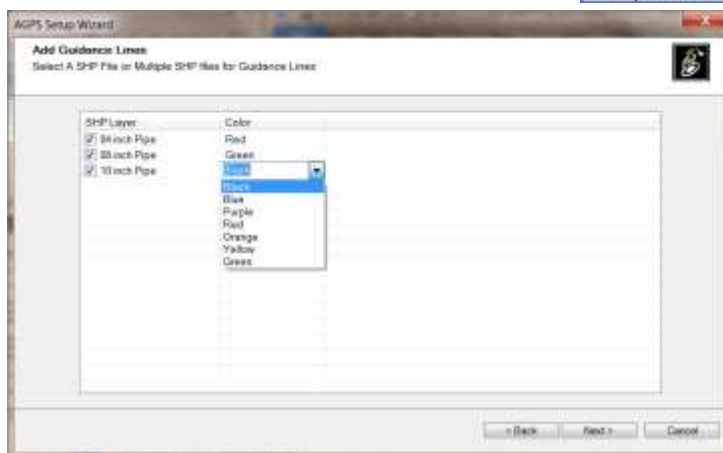
Note: These elevations will be created based off the intersection of the tile.shp with the xxx.grd no other elevations will be exported.

Click "Next"

11. Choose "HOW" you want the files saved and assign "Field Name" (Name they will see on AGPS)

- Choosing "Save Setup Files to Folder" will put all the AGPS compatible files into a folder at your set location.
- **SUGGESTED:** Choosing "Save To Self Extracting Zip file" will put all the files in an xxxx.exe file that will automatically put all the files into the C:/amw/data folder on AGPS-PC.

Click "Next"



ADMS—AGPS Export



12. Choose a folder to put these files into.

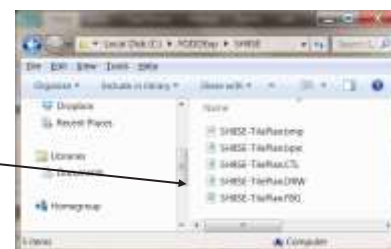
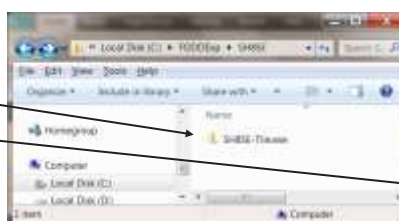
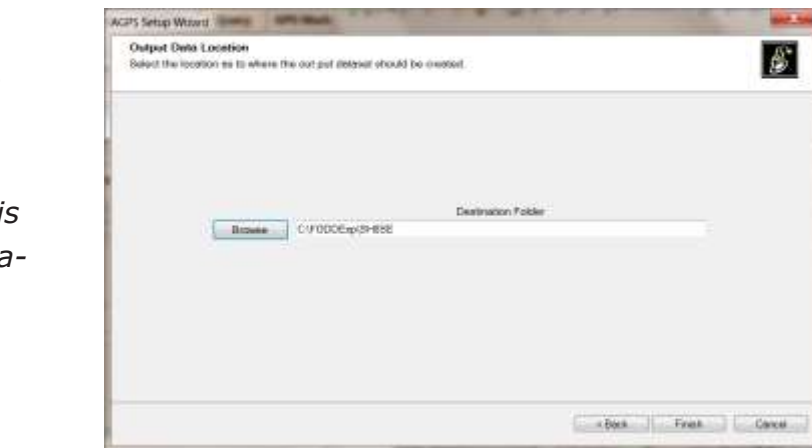
*Consider sending the files back to the Default C:FODDExp & create a "New Folder" named the "Field Name"
Note: This folder must be "EMPTY" this process will not work if there is any data in the folder.*

Click "Finish"

You will get files similar to **ONE** of these

Left = Self Extracting

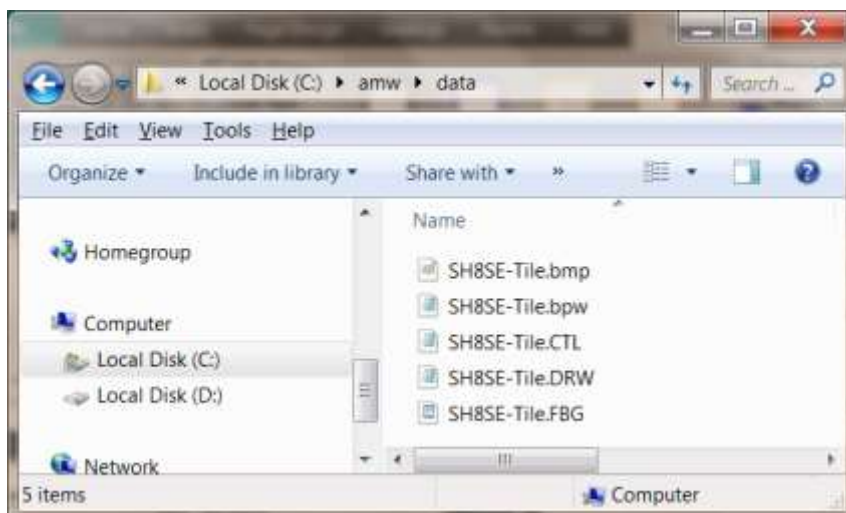
Right = Files to Folder



13. Copy the xxxx.exe or the files over to a USB device to take to the tile plow.

Using files in the Tile Plow:

1. Insert USB
2. Double Click on the xxxx.exe file
3. All the files are now created in the C:/amw/data folder



Processing Yield Data

As we make our transformation from a package specifically designed for drainage maps, we will be counting on help from some external tools to extract from proprietary data sources and filter data.

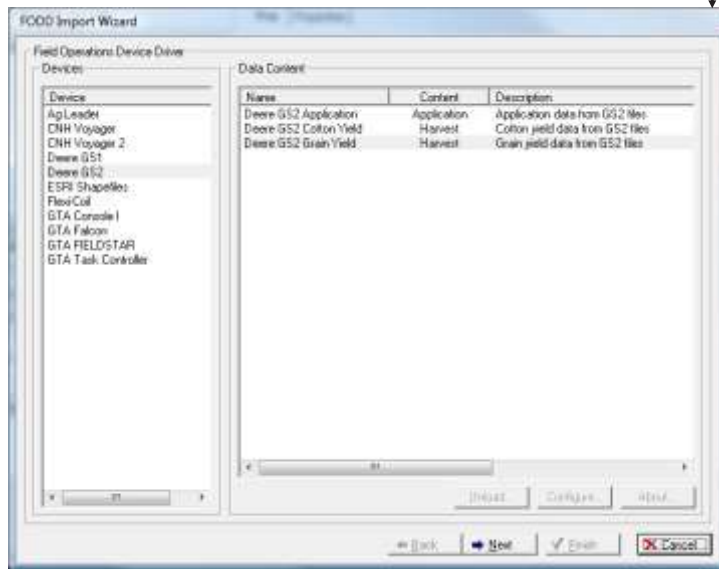
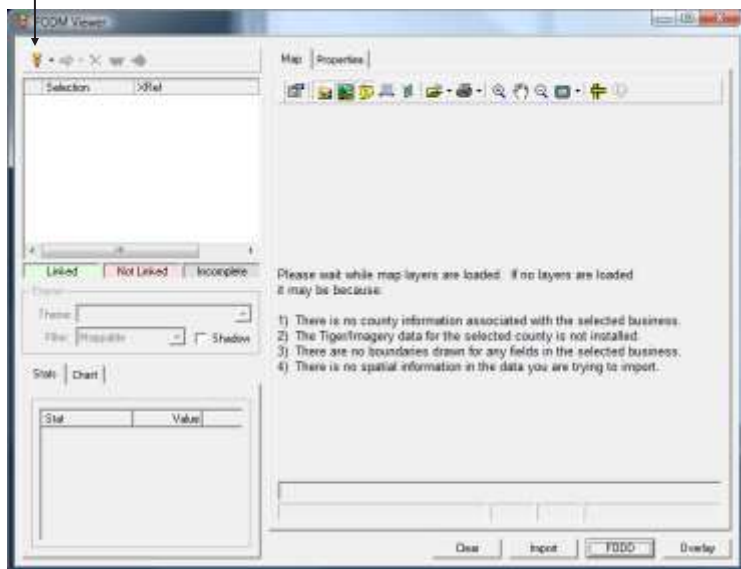
Though this arrangement may seem clumsy, it is the process we have used in house to create yield maps for quite some time.

The tools we will be using to access data from John Deere Greenstar 1&2 systems, the original **Ag Leader YLD** as well as Insight data, and Case Voyager data, is the **FO-Viewer** tool from **Mapshots** that is installed with the **FODD Runtime**.

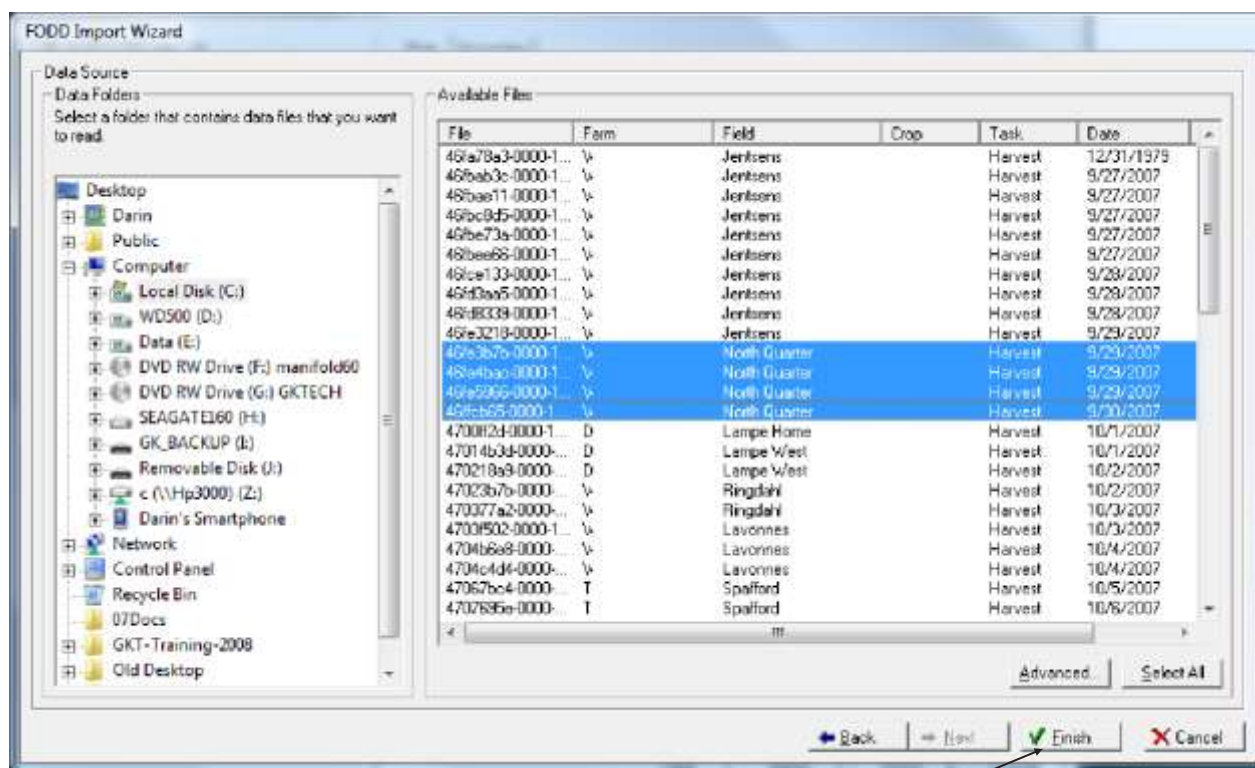
In **Ag Data Mapping Solution** you can start FOViewer if it is installed by clicking **Import Yield & Launch FOViewer**.

FOViewer will startup in the "Device Selection" menu ready to import data. That will bring up the box below right that will show a list of devices from which data can be read. Highlight the device type you wish to read from and the type of data you wish to read, for example Deere GS2 and Deere GS2 Grain Yield, then click **"Next"**.

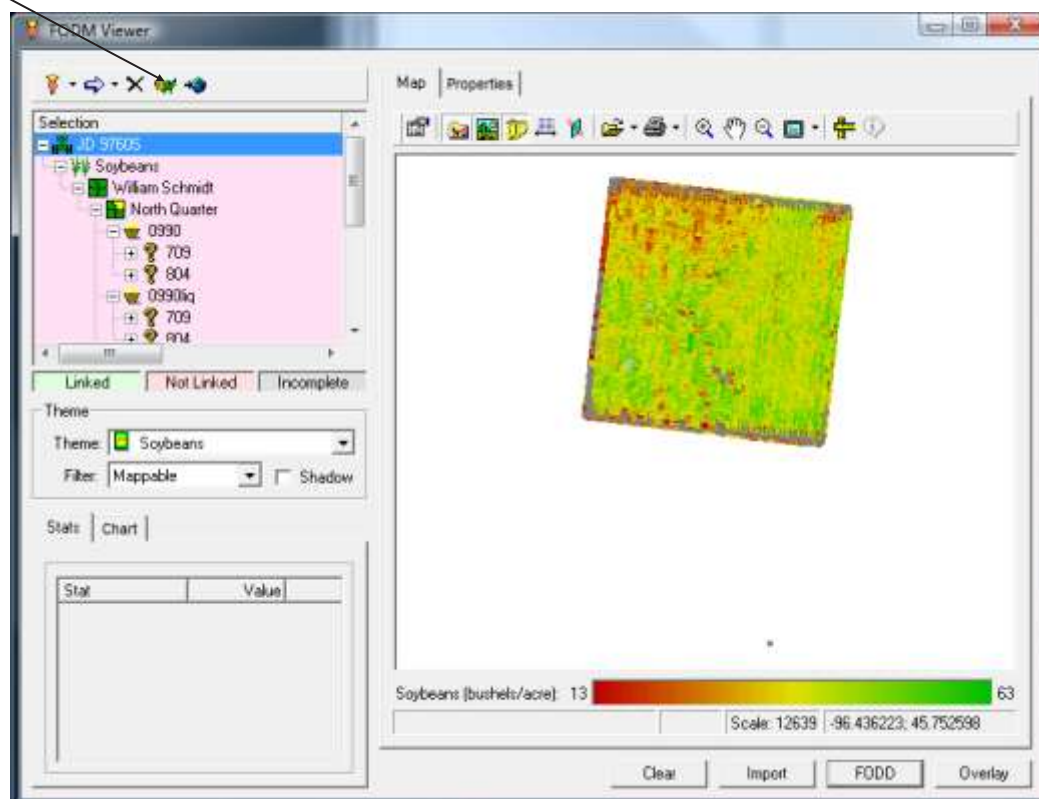
If you need to re-access the "Device Selection" menu, click the arrow to dropdown a menu.



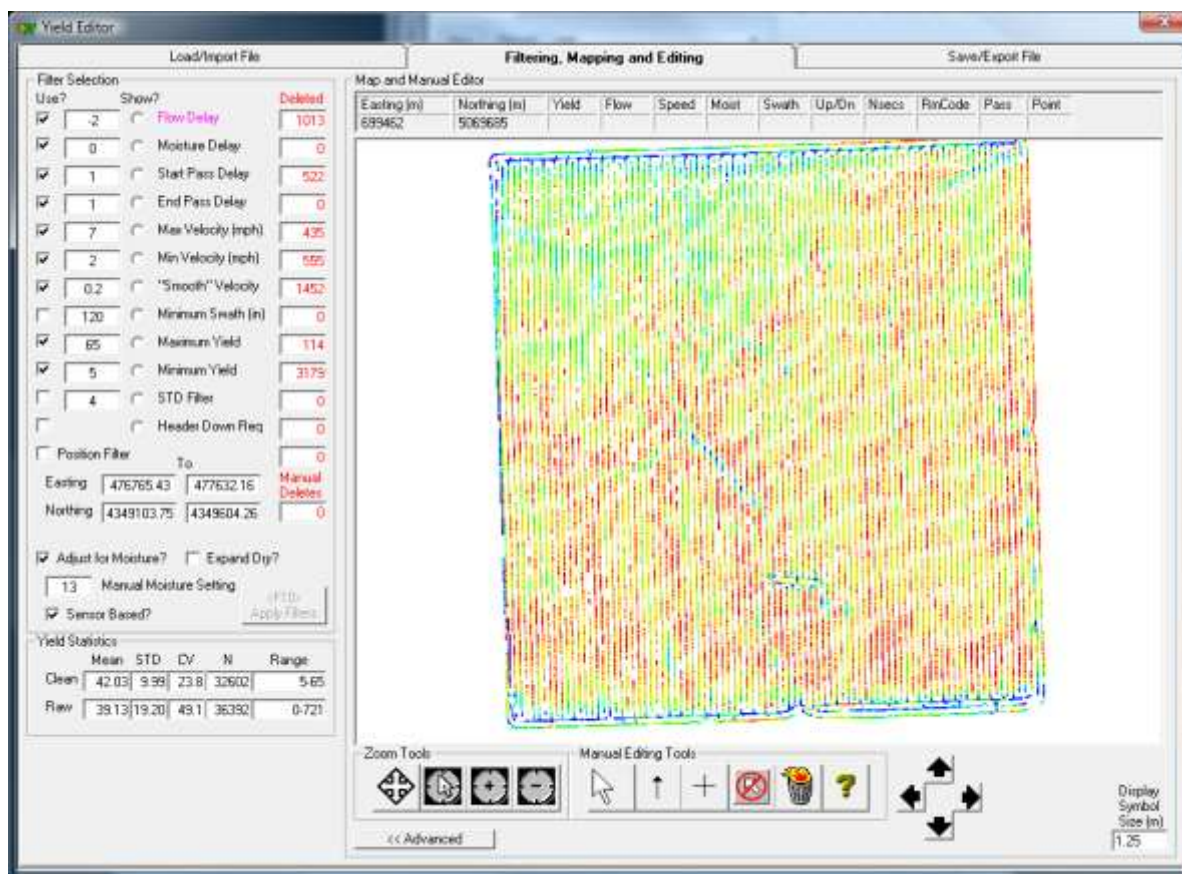
Processing Yield Data



The Farm has been intentionally blocked out, but you can see that a field called North Quarter has been selected for processing. Click **Finish** to bring up the data. Then click the **USA icon** to open the field in Yield Editor.

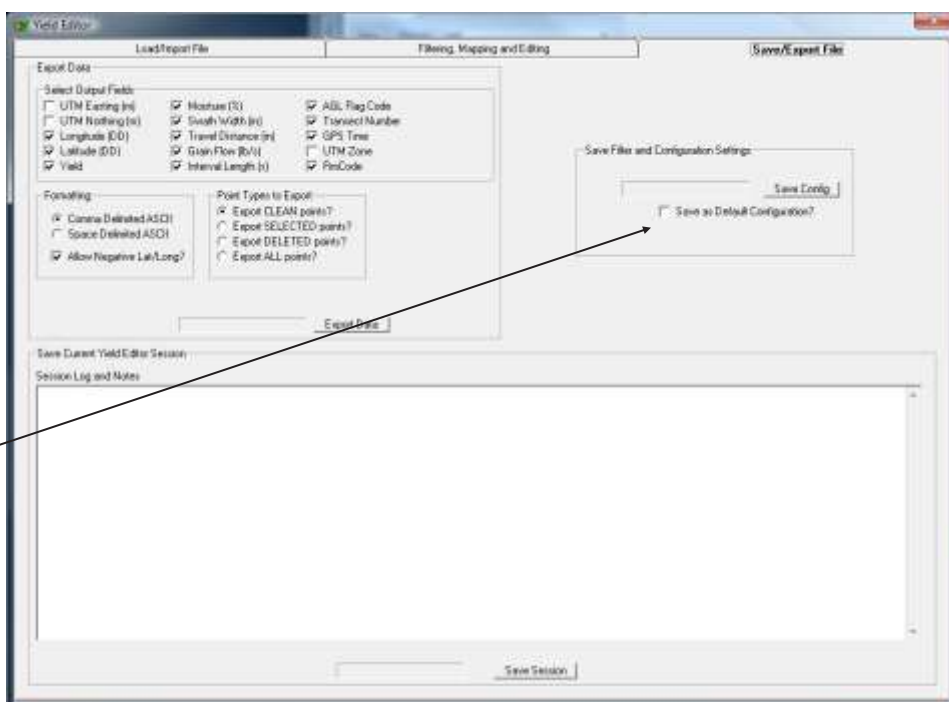


Processing Yield Data



You can see above we have used the Yield Editor Utilities to clean nearly 4000 errant points from the yield data set. And we have adjusted the flow delay by two seconds to precisely align a ditch crossing in the data.

The last step is to export the data to a field folder in Ag Data Mapping Solution. To the right are the proper settings to create the CSV that Ag Data Mapping Solution is expecting. All Output fields except the UTM fields should be selected. After setting the export options as they are shown to the right, check the box labeled **"Save as Default Configuration?"** and then click **"Save Config."**



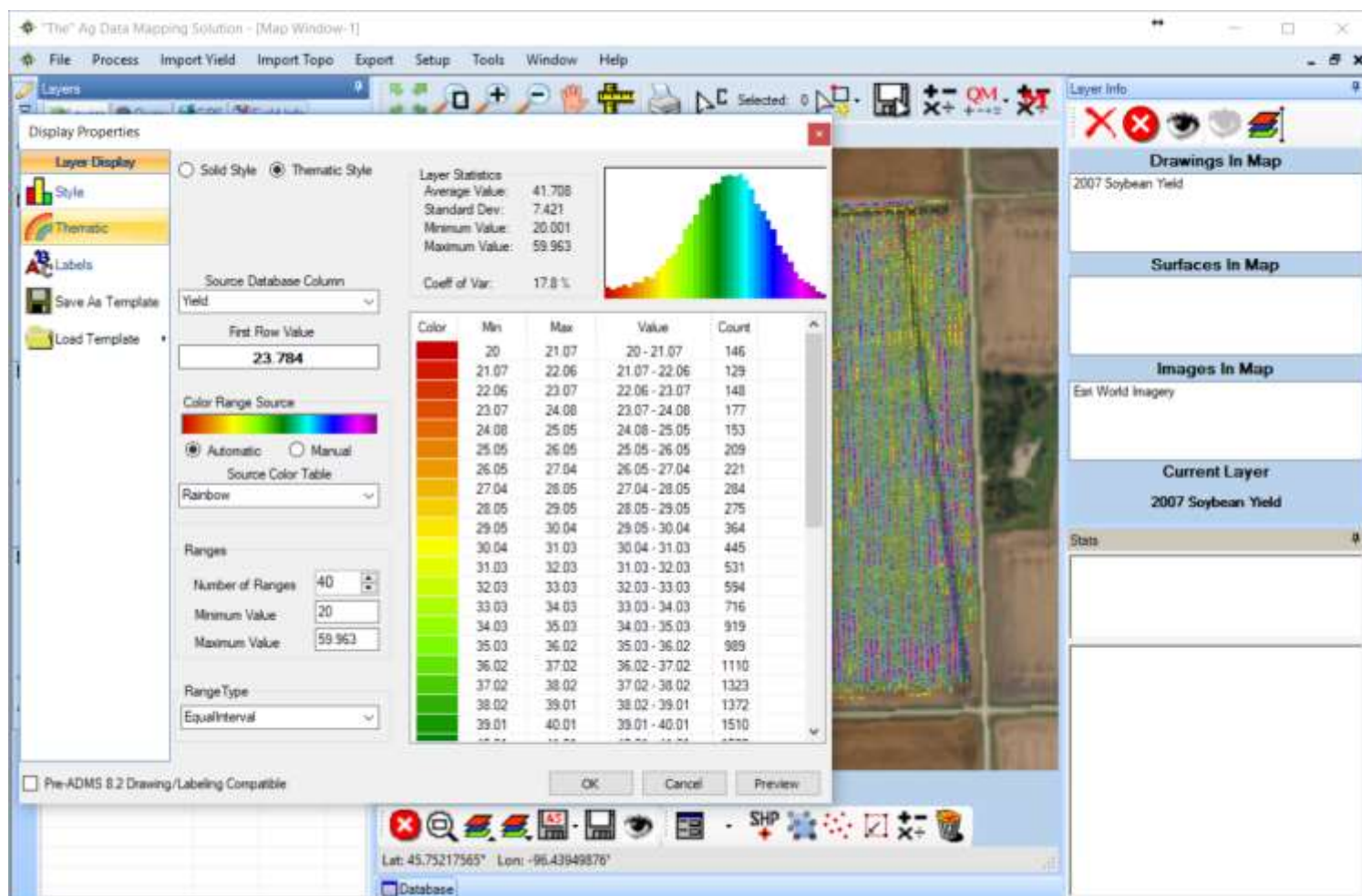
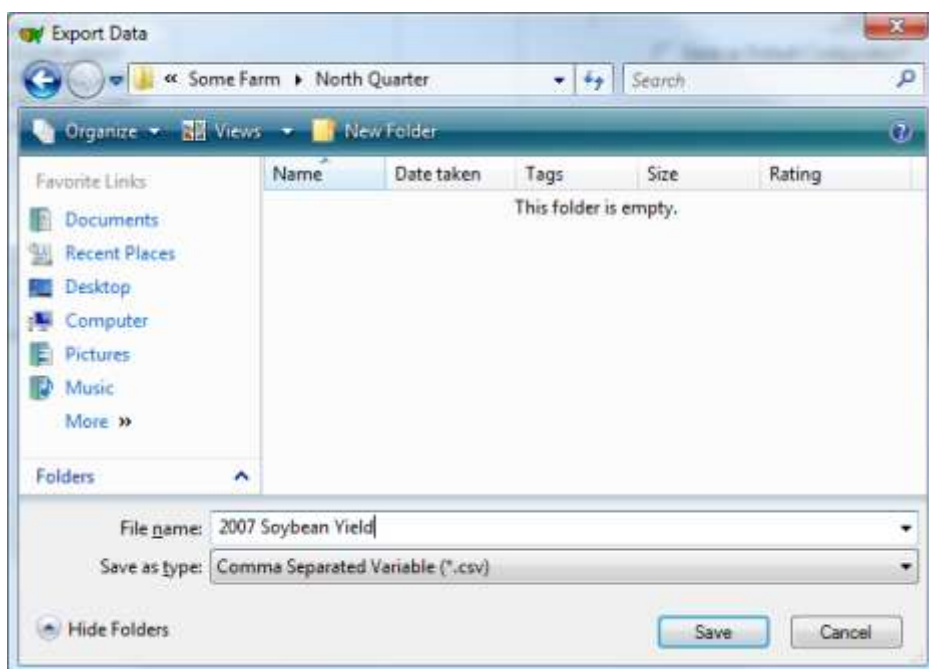
Processing Yield Data

Browse to the proper field folder for the data and click **"Save"**.

You now have a properly cleaned yield data set that you can use, bring up in Ag Data Mapping Solution and set a thematic color table for displaying points.

Go to "Display Properties"

Click on "Thematic"



Importing KB/GK Yield Data

First Step—Go to the Harvester Display with a USB drive.

Turn on the BYM PC and go to “**Windows File Explorer**” or “**My Computer**”

Go to the “**C:/**” drive

Right click on the “**GKYield**” folder & “**Copy**”

Go to your “**Removable Drive**” & “**Paste**”

Second Step—Go back to your Office PC

Open the GK desktop software **Ag Data Mapping Solutions (ADMS)**

In the processing of the Beet / Potato Yield data, we will be using 2 software packages. Though this arrangement may seem clumsy, the tools supplied in the Yield Editor will allow us to quickly process & clean up Beet & Potato Yield data.

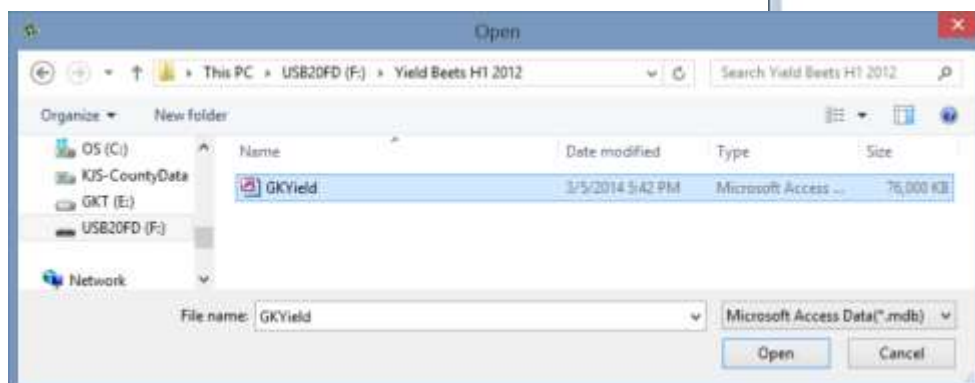
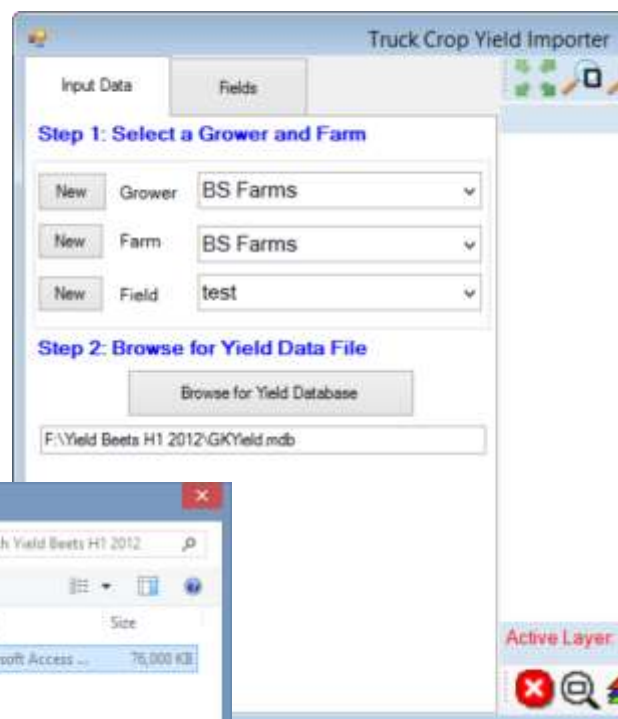
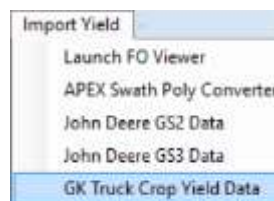
In **ADMS**, go to “**Import Yield**” & “**GK Truck Crop Yield Data**”

- Select the “**Grower**” & “**Farm**” to work with.

SUGGEST—Creating a NEW FARM “BeetYield-Year”

**** NOTE:** The “**Field**” does not matter, the software will create “**NEW**” field names, based off the names used in the Beet Yield Monitor PC.

- Click “**Browse for Yield Database**”
- Browse out to the “**Removable Drive**”
- Select the “**GKYield.mdb**”
- Click “**Open**”



Importing KB/GK Yield Data

Click on the **"Fields"** tab

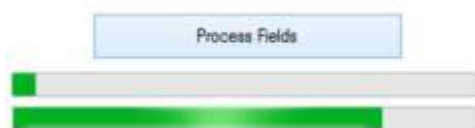
Left click and **"check"** to fields to be imported

Or

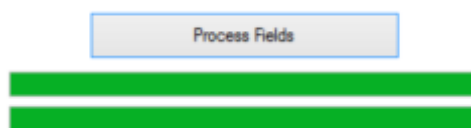
Right click for other section options

Once selected—Click **"Process Fields"**

While processing the **"Progress"** bars will show how far through the process the software is.



When **"Finished"** both bars will be **"GREEN"**

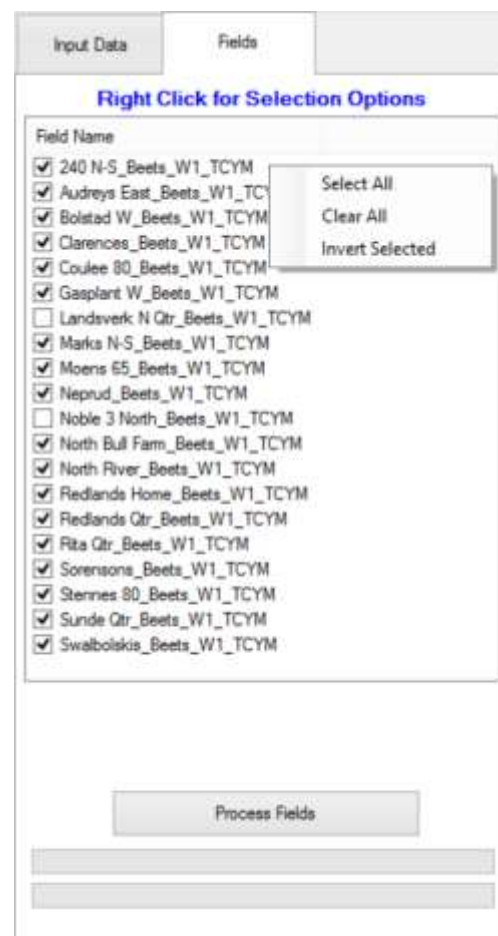


Now **"Close"** the **"Truck Crop Importer"** window.



Back at the **"Start Screen"** in **"ADMS"**

Click the **"Map Window"** button



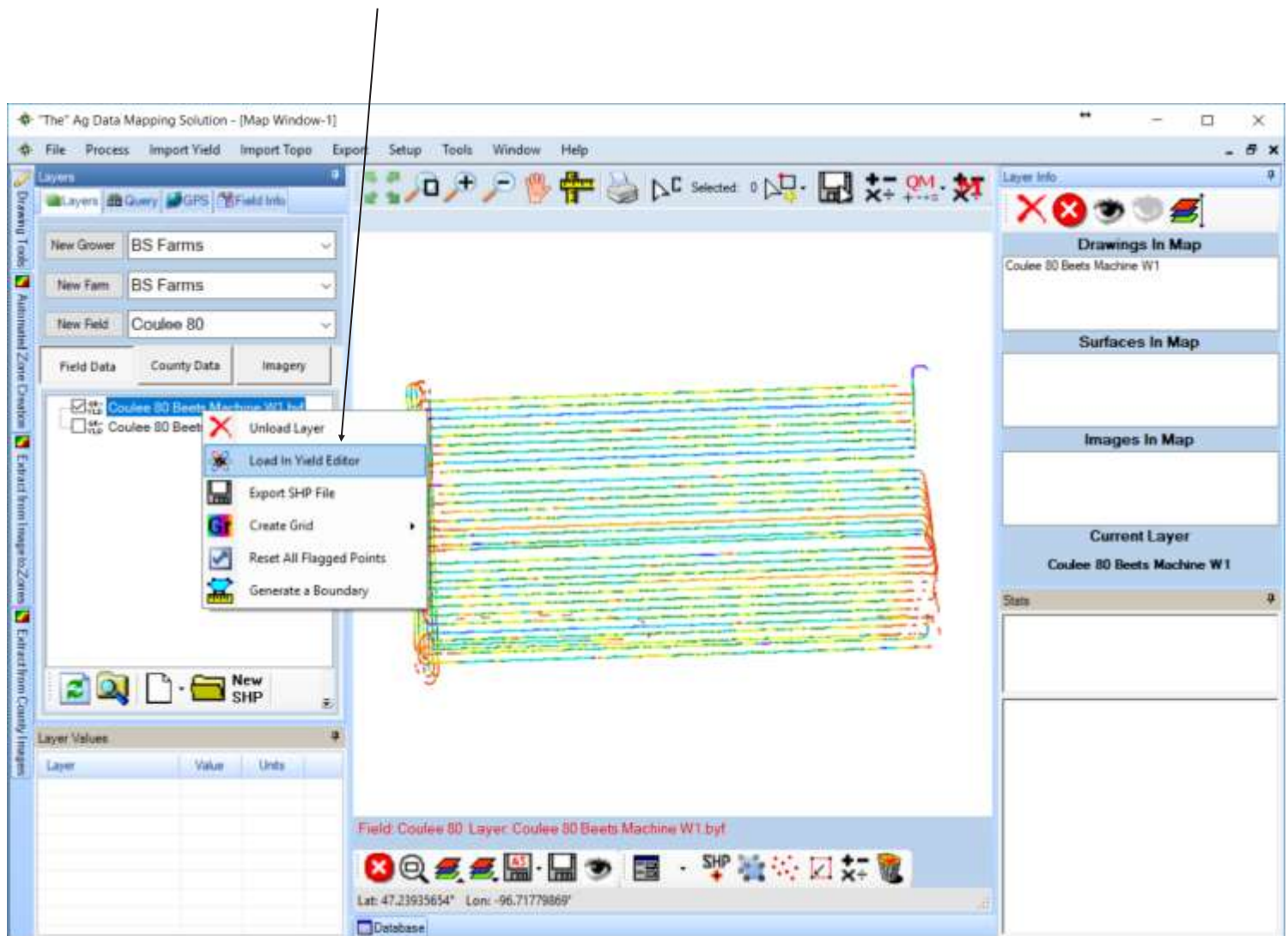
Importing KB/GK Yield Data

In "**Map Window**" select the "Grower / Farm / Field" to work with.

Check on the GK-YLD—.byf file

"Right" click on the "byf-File Name"

Choose Load in "Yield Editor"



Importing KB/GK Yield Data

This will open you into "Yield Editor"; an excellent tool for cleaning up yield data. Upon the first use, you may need to add "Beets" to the Crop list.

⇒ Under the "Load/Import Files" tab

⇒ Check the "Edit Table ?"

⇒ Fill in "Crop Type" = "Beets"

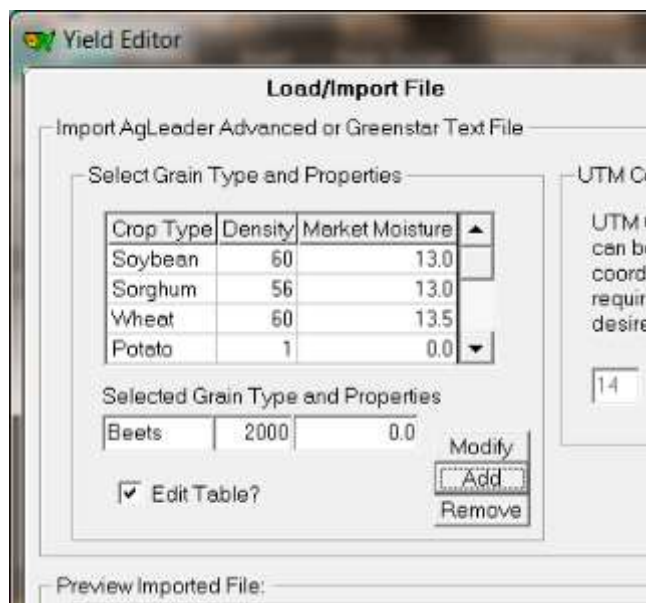
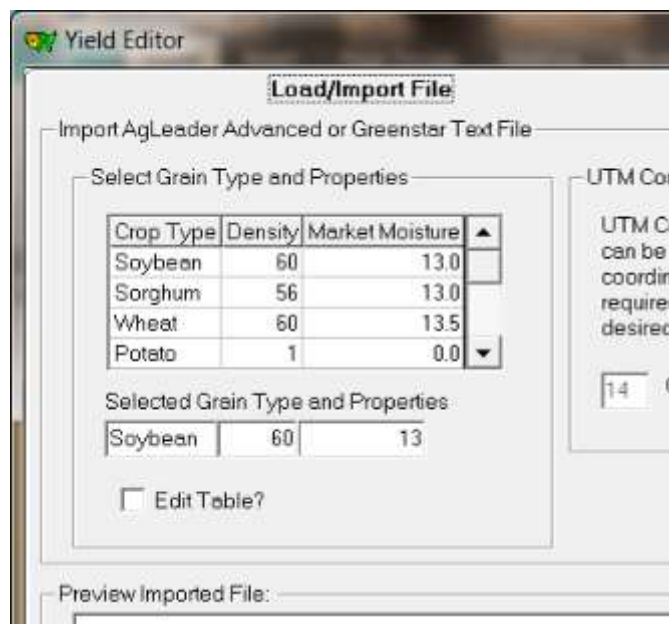
"Density" = "2000"

"Market Moisture" = "0"

Click "Add"

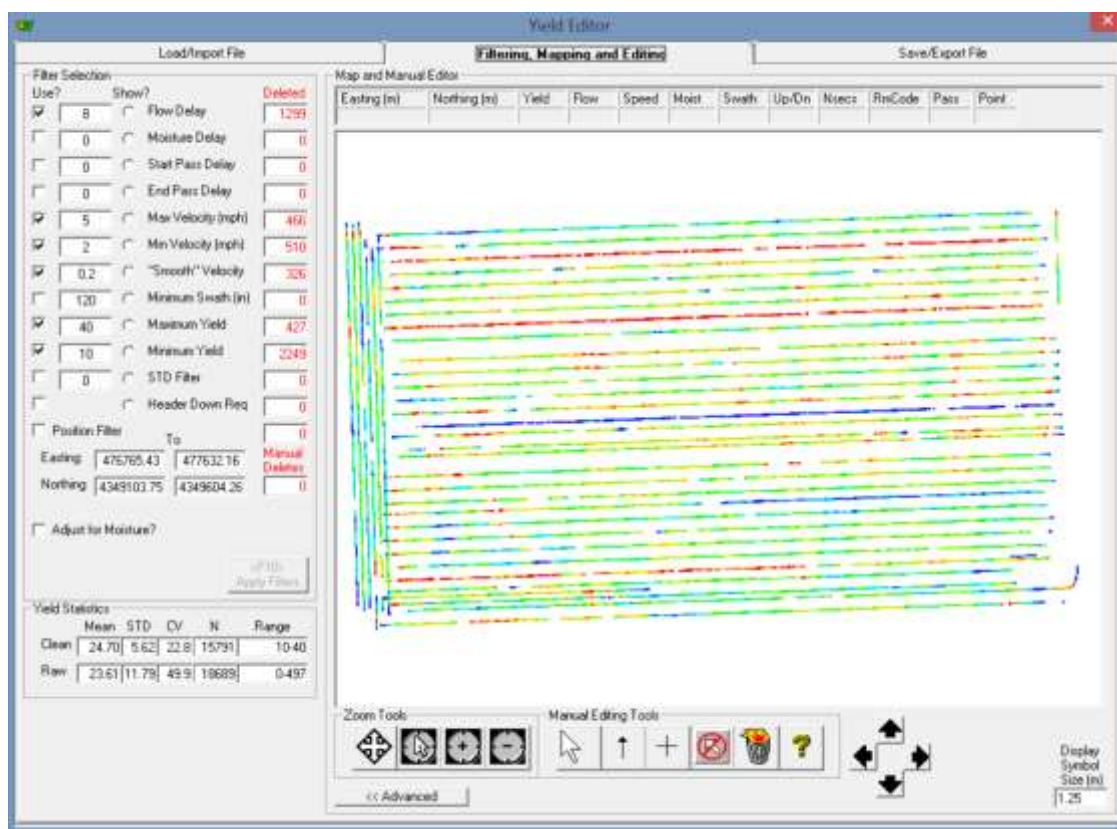
Scroll down the list and confirm that it was added.

Uncheck "Edit Table"



Otherwise, just select the correct crop type by "Double Clicking" on it in the list.

Importing KB/GK Yield Data



**Yield Editor
Color Table
V.1.0.2**

Red = High Yield

Blue = Low Yield

Color Table is not adjustable

You can see in this example we have used the Yield Editor Utilities to clean nearly 3000 errant points from the yield data set.

At this point and time, we suggest NOT using the "Moisture Delay", "Start Pass Delay", "End Pass Delay", "Minimum Swath", "STD Filter", "Header Down Req", "Position Filter" or "Adjust for Moisture?". The reason being these items are not logged. If you have a header up-down switch the "Start Pass" / "End Pass" MAY work well.

Please DO USE—

Flow Delay – Adjusts time from GPS to load cell weighing process.

Max Velocity—Speeds faster than this value will be deleted.

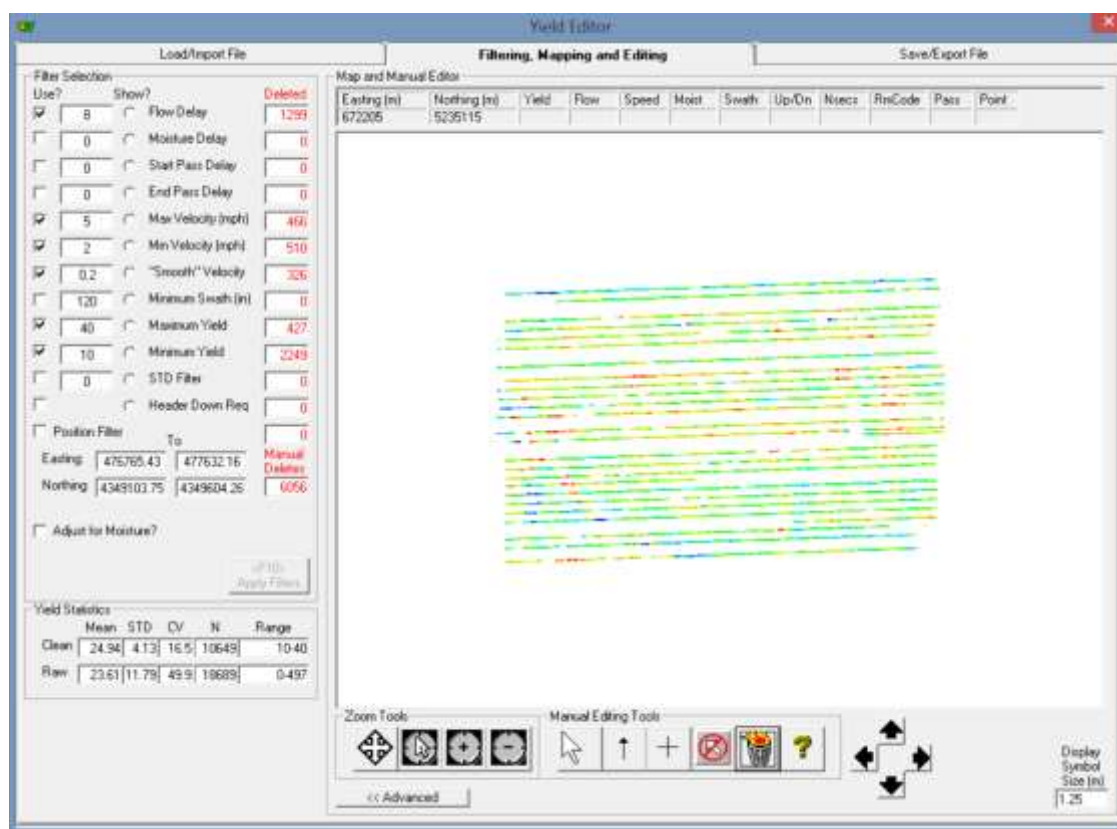
Min Velocity—Speeds slower than this value will be deleted.

"Smooth" Velocity—Used to help identify those regions where rapid velocity changes have taken place. A ratio of 0.2 means that points with velocity changes of more than 20% compared to its neighbors should be removed.

Maximum Yield—Yields greater than this value will be deleted.

Minimum Yield—Yield less than this value will be deleted.

Importing KB/GK Yield Data



Yield Editor Color Table V.1.0.2

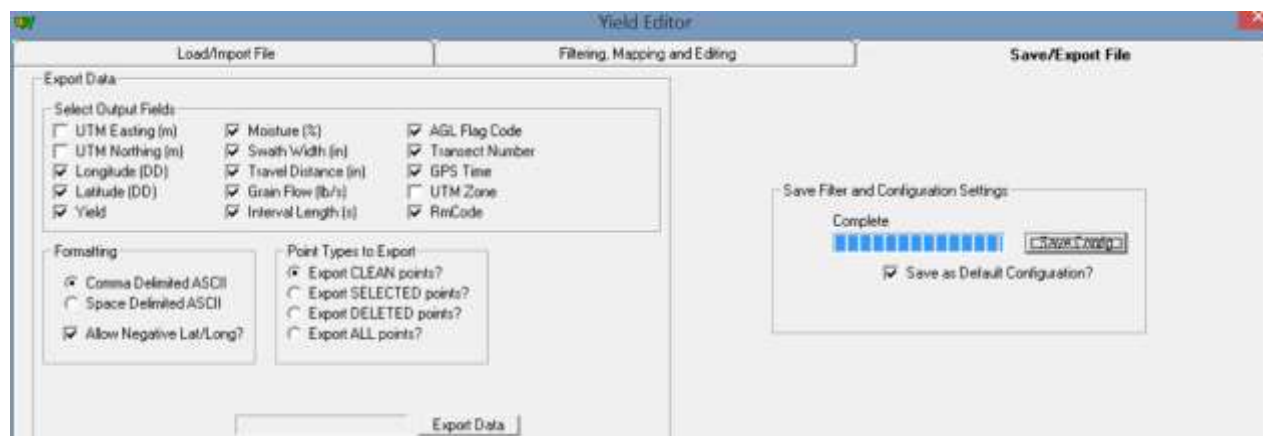
Red = High Yield

Blue = Low Yield

Color Table is not adjustable

Next you can use the “Manual Editing Tools” on the bottom toolbar. This will allow you select points and “Delete” or trash them. There is no “UNDO” button.

Once done cleaning data, it is suggested that you go to the “Save/Export File” tab and check the “Save as Default Configuration?” and click “Save Config”. This will save the settings for your next fields (max—min yield / flow delays).

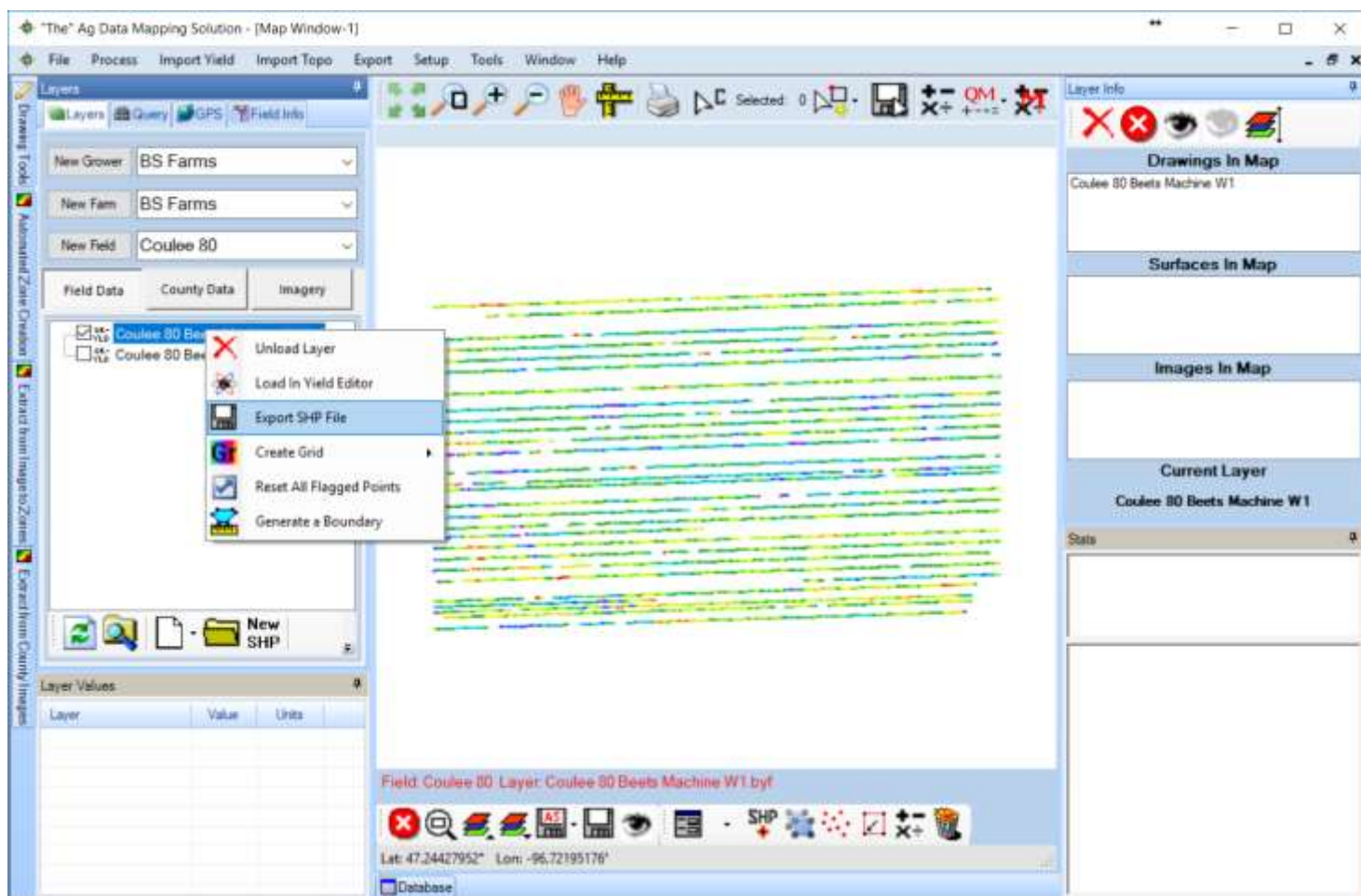


Upon clicking the “X” to close the window, all the settings & deleted points will apply to the data in ADMS.

Importing KB/GK Yield Data

Back in ADMS you can now

- Export as a SHP file to take the data to another software package.
- Merge the BYF with other "Visible" harvest data set for multiple harvesters
- Create a .GRD layer that can be used for VRT or data analysis



See sections of the manual on "Create Grid"

- Create Grid From Points for VRT Zones
- Create Grid From Polygons for Yield analysis

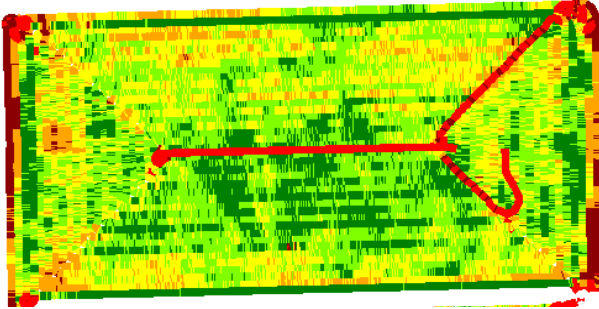
Cleaning Yield Data in Ag Data Mapping Solution

The best place to clean yield data is in "Yield Editor". Unfortunately, there are times that data will come to you in a SHP file or CSV file that can not be taken back to "Yield Editor". To clean up the data, you will have to use ADMS. We want the data in a "Points.shp" file format if you are exporting from another software package.



All of the following work will be done in "Map Window"

The file used in this example came out of APEX 2.7. Take note of the problems with this example.



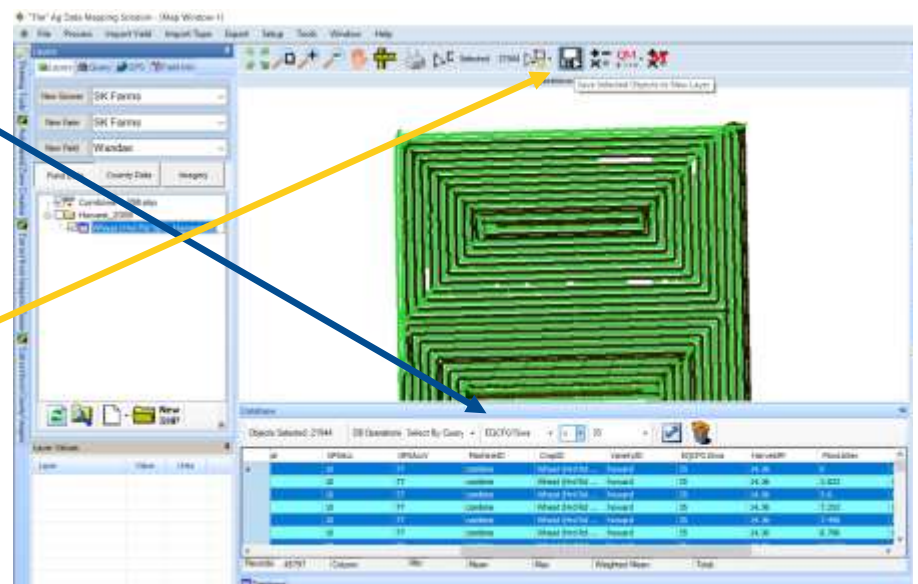
Problems—

1. When data came into APEX it automatically merged the data sets. Assuming that they were "Calibrated". You can see the "Stripes" between the 2 combines that were "Race Tracking" each other. APEX Default map to the Left.

2. Both combines have the same "Machine" & "Operator" names. This makes it almost impossible to separate the two machines. Luckily the "EQCFG1Swa" is different between the two machines (30 foot head and a 35 foot head).

Separating Data Sets-

1. Import or Save SHP or CSV files back into the ADMS—GKData/grower/farm/field structure.
Note: We prefer the SHP file format from most software. There are some exceptions.
2. Turn on the Yield File for the Field (SHP or CSV).
3. Go to the bottom left corner and open the "Database" tab. Look through the columns to find an item that will allow you to "Identify" each combine.
In most cases, "Machine" or "Unit ID" will work
4. In this example, the "EQCFG1Swa" column has several unique values but 30' and 35' are the two header sizes used
5. Use the "Select By Query" and select to "EQCFG1Swa" and "=" to and "35"
6. Click the "Blue Up Arrow" to Run Query
7. Click on the "Save Selected Objects to New Layer" top Toolbar (name Combine 1.shp)
8. Repeat 5-7 for Combine 2



Cleaning Yield Data in Ag Data Mapping Solution

Now we have two combines in separate SHP files. You may need to clean up data.

This Example—Combine 1 & Combine 2

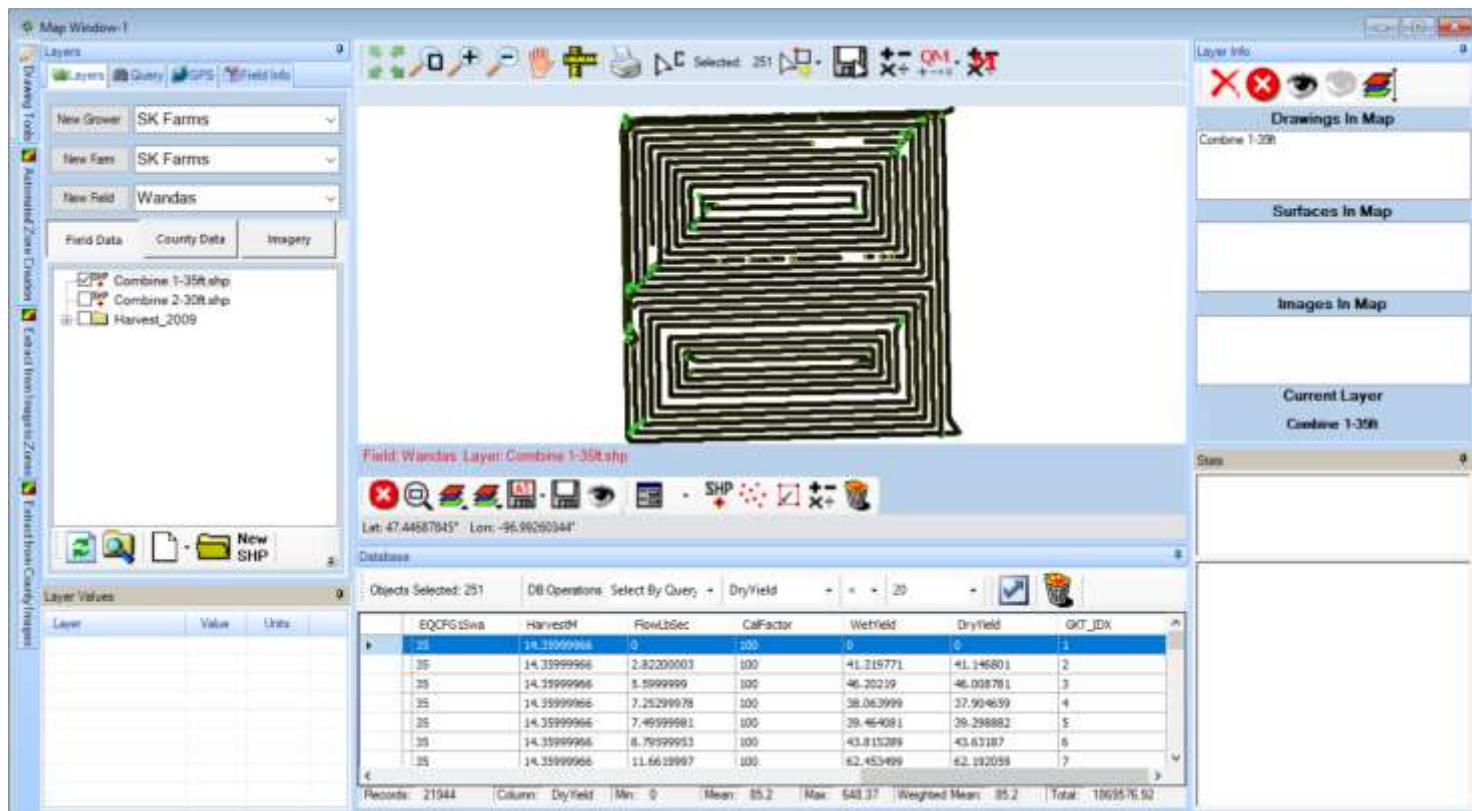


** If the data is cleaned up when it comes into ADMS, skip the "Cleaning Data" below.

Cleaning Data—Query Tools:

1. Turn on "Combine 1.shp"
2. Open the "Database" tab and select the "Yield" column (Dry Yield in this example)
3. You will notice the values on the bottom toolbar. 0 - 648 bu/ac—Avg 85.2 bu/ac. You will need to select the values to clean the data up to.
4. Use "Select By Query" and "Less Than <" and for this example using 20 bu/ac "Run Query"
- Click the "Delete Selected Objects"
5. Use "Select By Query" and "Greater Than >" and for this example using 120 bu/ac "Run Query"
- Click the "Delete Selected Objects"
6. Save the SHP file when finished. (Optional - "Save As" name it "Combine1Cleaned.shp" keeping original data)
7. Repeat steps 1-6 on "Combine 2" and "Combine 3" & 4 & so on.

*Make sure you use the same values or value range (will affect normalizing, merging and color tables)
(20-110 for this example or 30-120 be acceptable, value range of 90 for both)*



Cleaning Yield Data in Ag Data Mapping Solution

Now we have two combines in separate SHP files. You may need to clean up data.

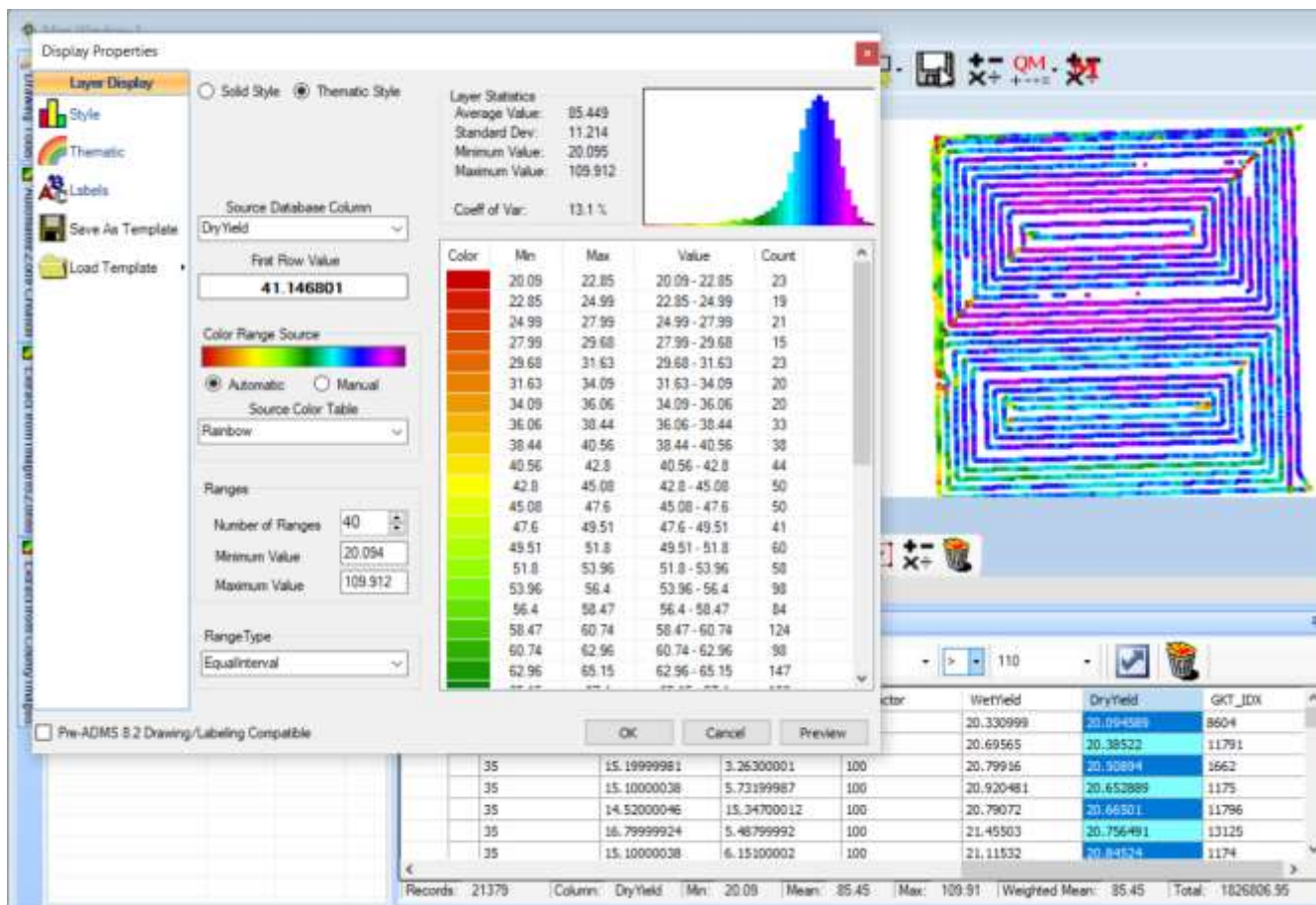
This Example—Combine 1 & Combine 2



** If the data is cleaned up when it comes into ADMS, skip the "Cleaning Data" below.

Cleaning Data—Selection Tools:

1. Turn on "Combine 1" (for this example)
2. Go to the bottom toolbar, Click "Layer Display Properties" - Adjust setting for the "Thematic" like below
 - *Thematic Style - Source=DryYield - Ranges 40- Rainbow
3. On the top tool bar, Click "Selection Mode" and "Area Add" or "Poly Add"
4. Draw around data to delete. (note: "Selected: #" of objects-top tool bar)
 Repeat step 4 to select more objects
5. Click the "Delete Selected Objects to Firey Can Of Death" button.
 Repeat 4 & 5 as needed for this SHP file
6. Save the SHP file when finished.
 (Optional - "Save As" name it "Combine1Cleaned.shp" keeping original data)
7. Repeat steps 1-6 on "Combine 2" and "Combine 3" & "4" & so on.



Normalizing Yield Data

In normalizing yield data, there are two concepts to keep in mind

1. Data Extents or Data Range—

GOOD—Combine 1 & Combine 2 cleaned up to 20 bu to 120 bu wheat

BAD—Combine 1 cleaned up to 5 bu to 120 bu wheat

Combine 2 cleaned up to 15 bu to 120 bu wheat

2. Data sets are coming from comparable or similar areas.

GOOD—2 combines "following" each other will normalize and merge very well in most cases.

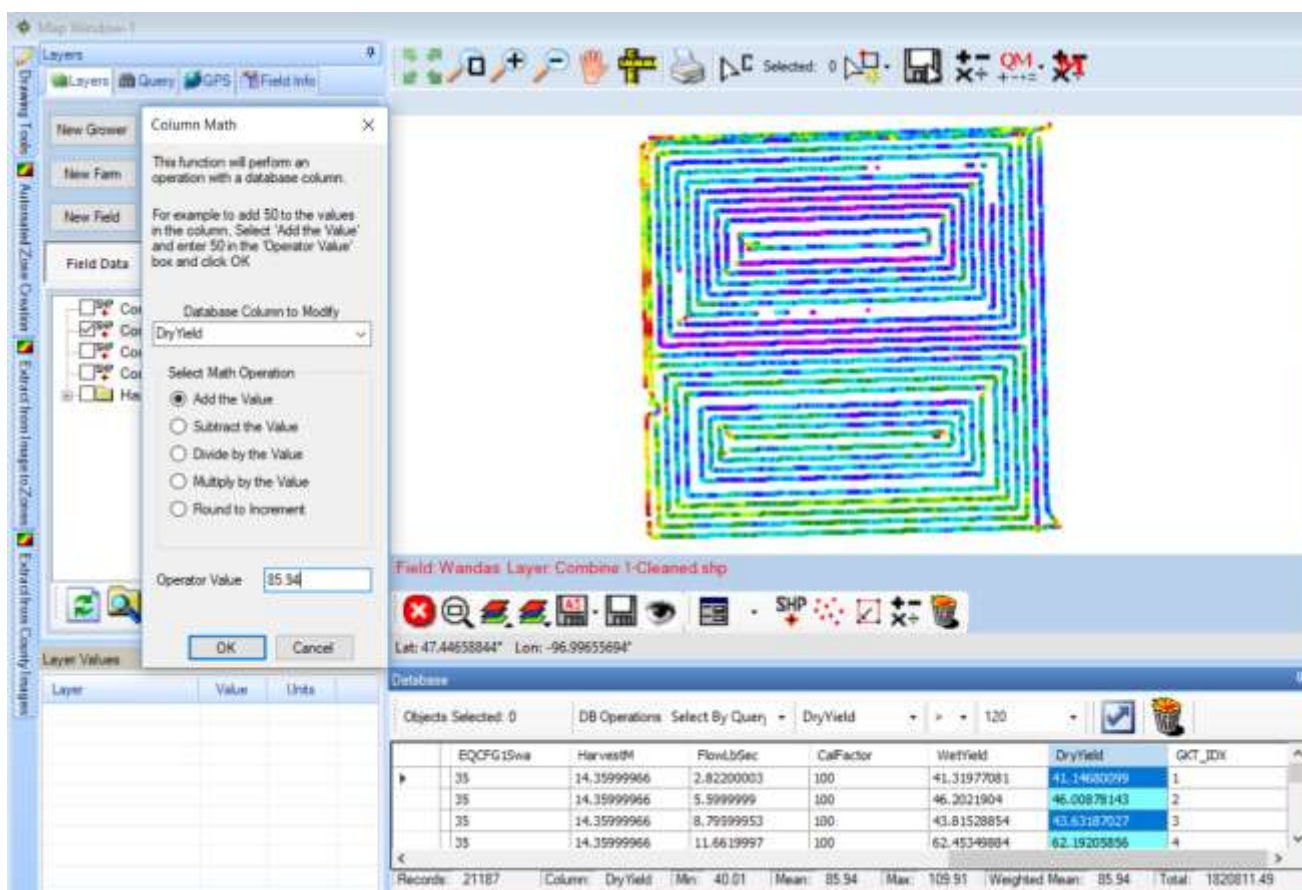
BAD—Combine 1 harvested the East 80 and Combine 2 harvested the West 80, cropping history, soil types and drainage all could be major issues.



We are going to be working with data that is cleaned to meet the above specifications.

This Example—Combine 1 & Combine 2

1. Turn on "Combine 1"
2. Go to your "Database" tab in the bottom left corner
3. Find your "Yield" column and Left Click on the header (Dry Yield for this example)
-Take note of the "Mean:" value on the bottom of the Database
4. Click on the "Perform Math Operation on a Column"
-Divide by the "Mean:" value (85.45 in this example)
5. Go back to the "Database" click on the "Yield" column header
-Take note of the "Mean" value now = 1 (if not 1, clear map and start over)
6. Click on "Save As" button & add "Normalized" to the name (Ex. Combine 1 Normalized.shp)
7. Repeat steps 1-6 on "Combine 2" and "Combine 3" & "4" & so on.

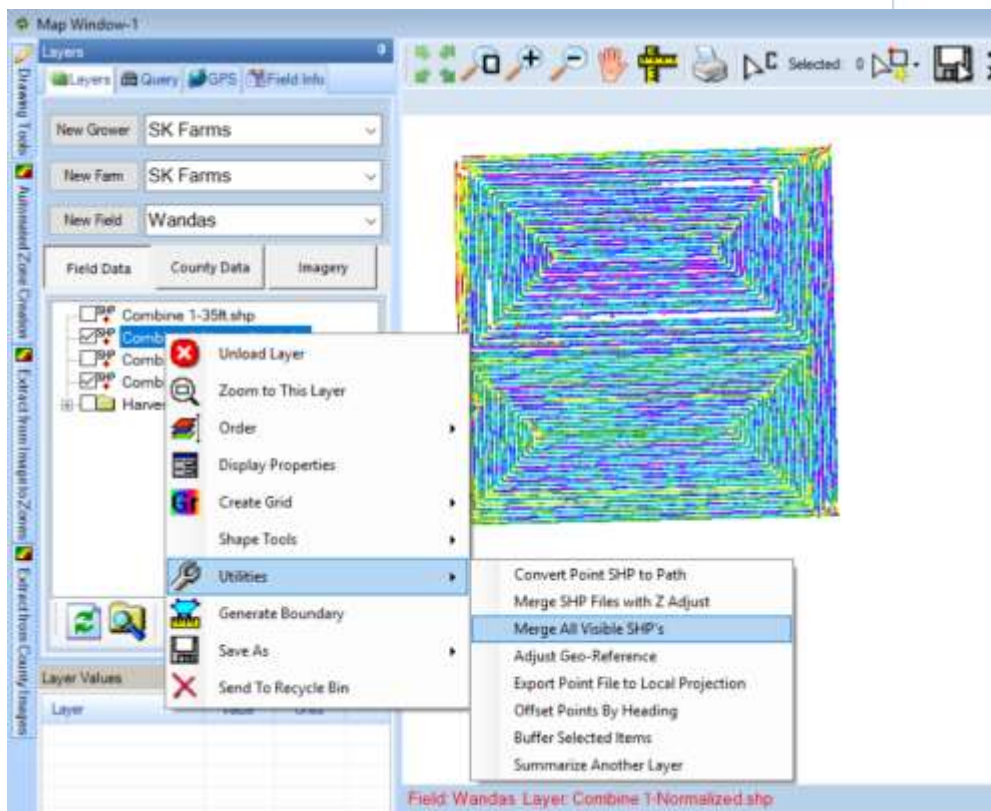
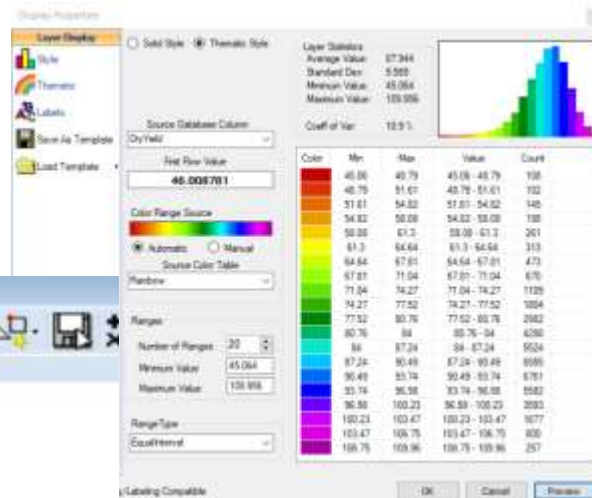
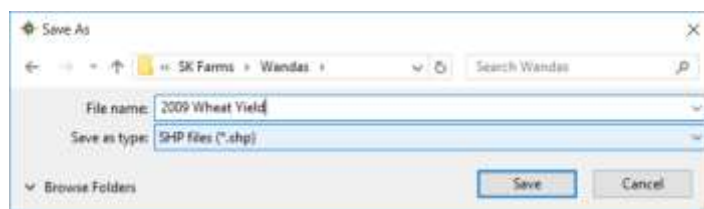


Normalizing Yield Data

The final step in Normalizing Yield Data is merging the data set & adjusting the data back to YIELD / ACRE



1. Start out by doing a "Clear Map" under the "Layer Info" tab
2. Turn on "Combine 1 Normalized.shp" & "Combine 2 Normalized.shp" & 3 & 4 and so on.
Only turn on the "Normalized Yield Data" to merge (NO boundaries or images)
3. Right Click on either "Combine # Normalized.shp" file
4. Choose "Utilities" and "Merge all Visible SHP files"
5. Set the "File Name" of the new layer to represent the "Year-Crop-Merged.shp".
In this example "2009 Wheat Merged.shp"
6. Turn on the New "2009 Wheat Merged.shp"
7. On the bottom Toolbar click the "Perform Math Operation on a Column"
-Multiply by the "Actual Yield" (Example 88 bu)
8. Go to the bottom toolbar Click "Thematic Draw Settings" - Adjust setting like "Thematic Mapping"
9. Click on the "Save" button on the bottom toolbar



Create Grid from Polygon—Yield Data

You have now cleaned up your Yield Data in either ADMS or Yield Editor, and perhaps merged multiple combines. The Yield data is either in a .SHP or .CSV file format. This format is NOT ready for making management zones or use in scripts. You must have all your Yield Data for the field merged into one Shape File or CSV.



For Analysis:

1. Turn on the Yield.shp or Yield.csv. (example will be using Yield.shp)

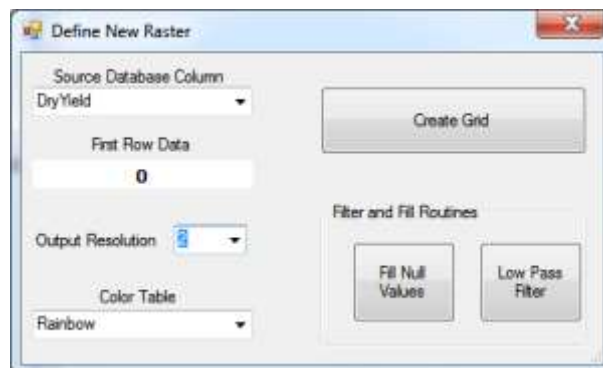
2. Right Click on the Yield.shp

3. Choose "Create Grid" and "Create Grid from Polygons"

4. Click "Create Grid" button - (stop at any step here for visual analysis)

Use the "Fill Null Values" button to fill in areas that don't have Yield Data

Use the "Low Pass" button to smooth out the data (Suggest 2 or 3 clicks)

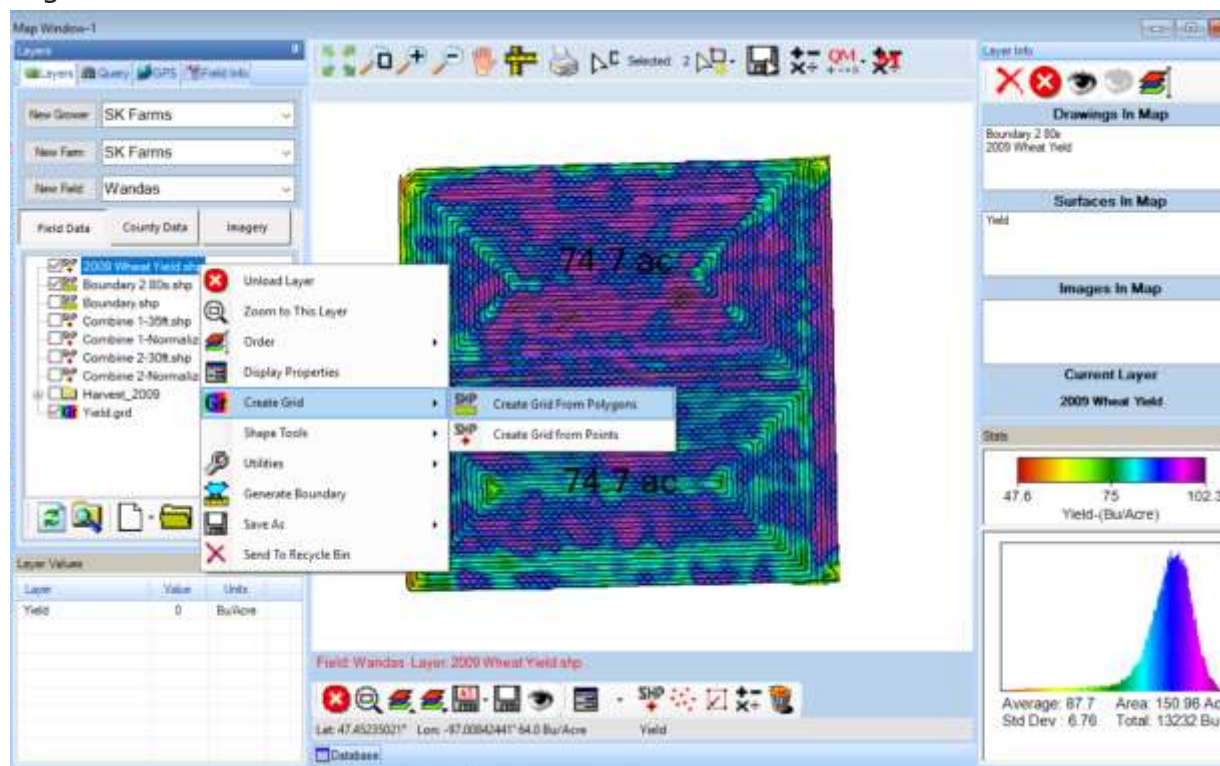


5. Once filled, Turn on the "Boundary.shp" - Left Click in map to "Select" it

6. Click on the "Yield.grd" file name to make it the active layer

7. On the bottom toolbar, click "Crop Raster to Selected Polygon"

8. Save the "Yield.grd" file



Create Grid from Points—Yield Data

This format is NOT ready for making management zones or use in scripts. You must have all your Yield Data for the field merged into one Shape File or CSV.

For Zones:

1. Turn on the Yield.shp or Yield.csv. (example will be using Yield.shp)

2. Right Click on the Yield.shp

3. Choose "Create Grid" and "Create Grid from Points"
Adjust settings similar to image to right

4. Click "Create Grid" button

At this point you can "Un-Check" the Yield.shp

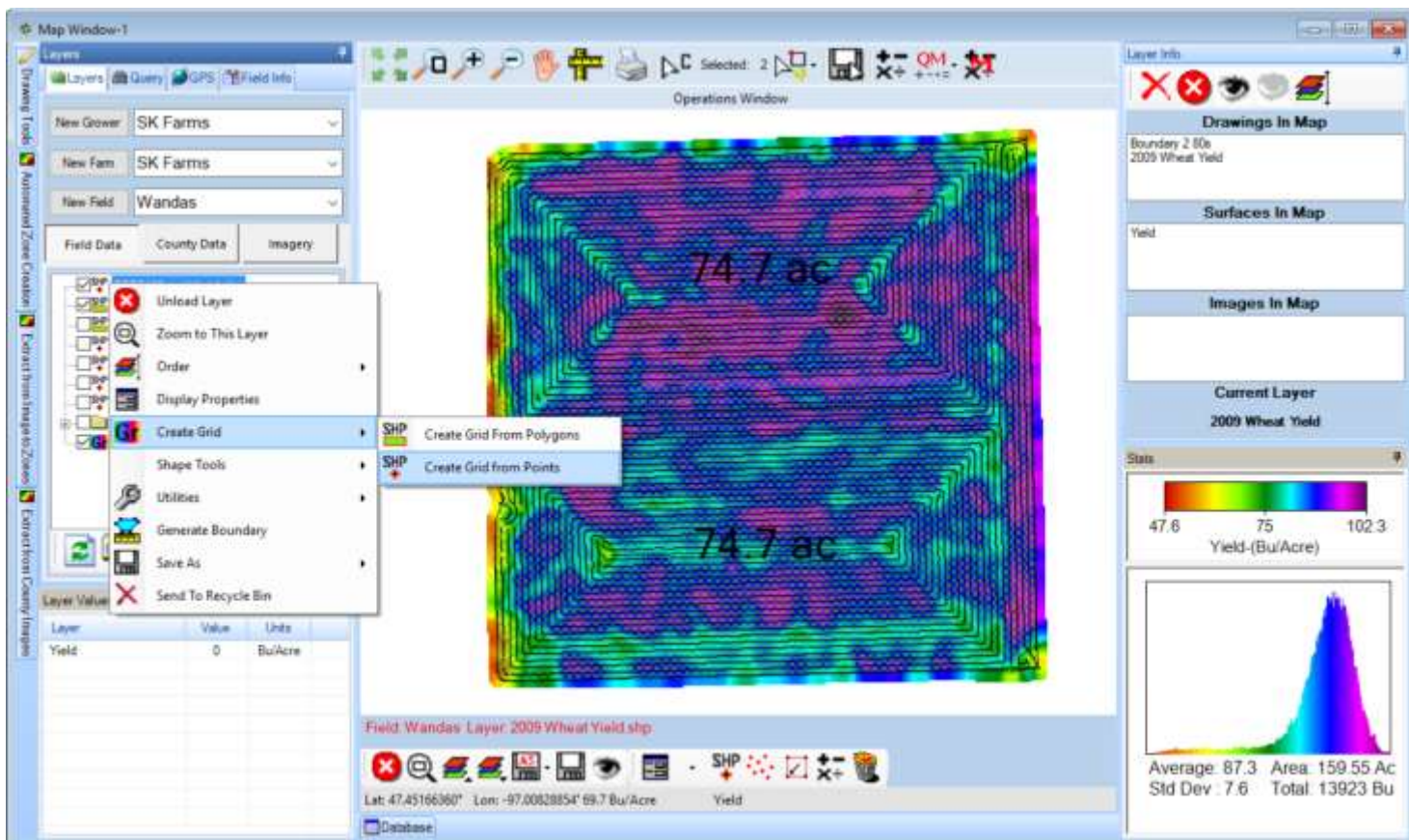
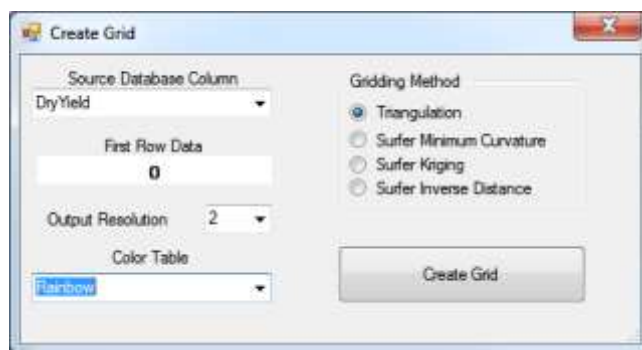
5. Turn on the "Boundary.shp" - Left Click in map to "Select" it

6. Click on the "Yield.grd" file name to make it the active layer

7. On the bottom toolbar click "Crop Raster to Selected Polygon"

8. Save the "Yield.grd" file

This file is now ready to be used for Management Zones or Scripting



Cleaning Yield Data for Zones – Raster Method

The Process shown and explained in the next four pages is done with the intent of using the data for "Management Zones". This process is designed to eliminate split variety issues & pass to pass issues. Also, this can be a very fast way to clean up yield data for Zones.

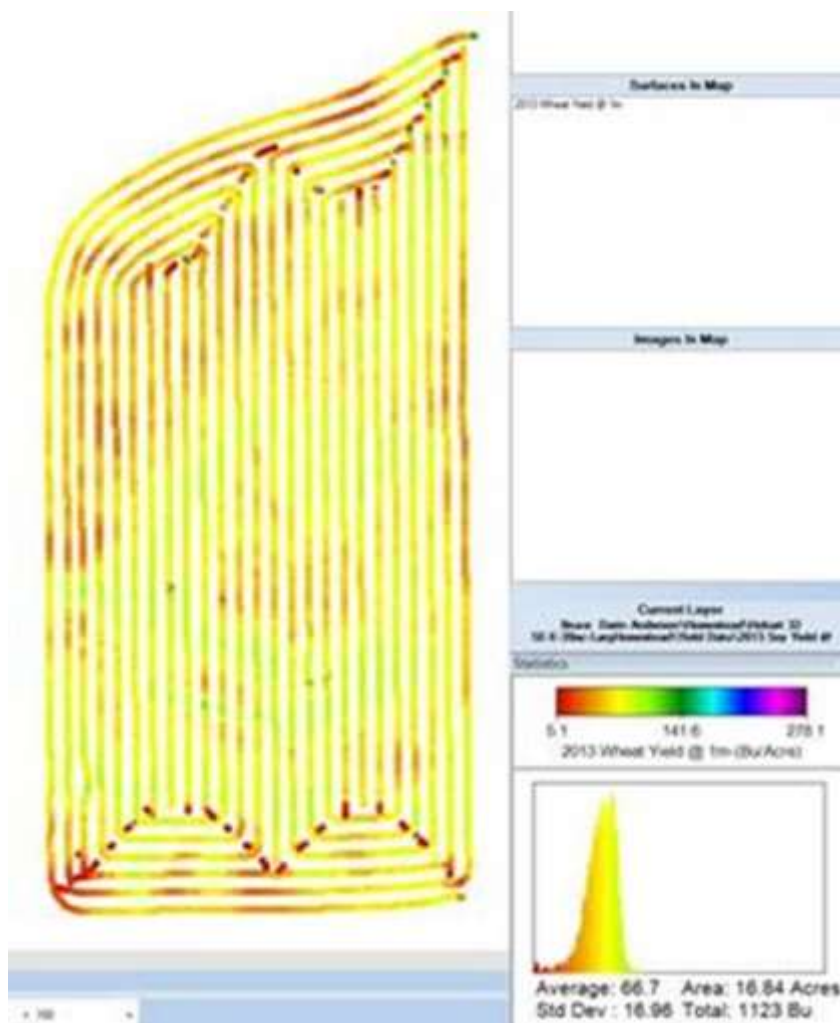
This is a summary of the process

- Set data point size to 5 feet (world scale) – Squares.
- Create Grid from polygons @ 1 meter – note suggest setting point size to 5 feet & Squares.
- Trim End values & Delete Cells from the data set (yield range).
- Fill in all the voids / holes of "Farmed Areas".
- Click "Save"
- 1— "Raster Tools" & "Pixelize" & Done
- OR —————Note There are two methods here —————
- 2— "Raster Tools" & "Resample"- decrease resolution to 5 meter or 10 meter.
- 2— A few - 5x5 Fills (great for filling large voids).
- 2— 1 - 5x5 Smooth.
- 2— "Raster Tools" & "Resample"- - increase resolution to 2 or 3 meter.
- 2— 1 - 5x5 Smooth.
- 2— Save the Yield Zone.grd. & Done

Below is a look at the process in visual & step by step method.

1. First set the data point.shp size to 5 feet (World Scaling) & (Squares).

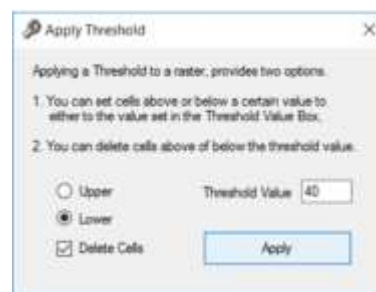
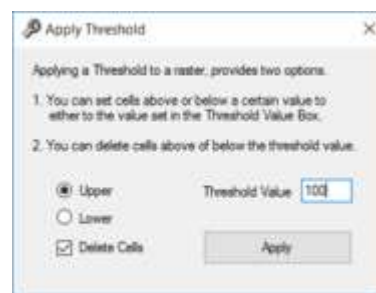
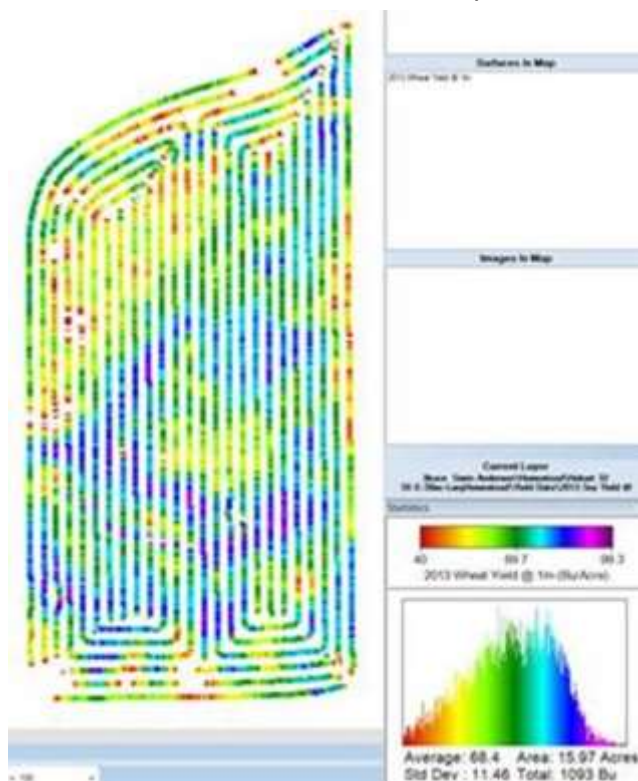
2. Create Grid from poly @ 1m (yield column).



Cleaning Yield Data for Zones – Raster Method

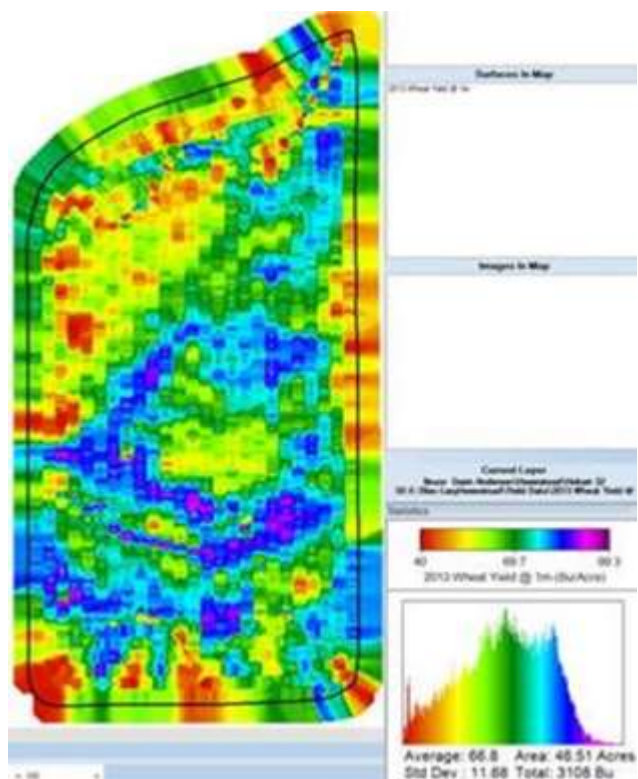
3. Trim end values top & bottom.

-Ex -Wheat Trimmed End Values to 40 & 100 bu/ac.



4. Next 5x5 fill (Bottom Toolbar) the 1m.grd till you fill all the farmed area.

NOTE:
Click—"SAVE"



At this point it is suggested to use to "Pixelize" if all the data is there for your field.

If you are missing large areas of the field follow the "Raster Method"

The two methods are basically the same, "Raster Method" is slower, but has more custom options.

Cleaning Yield Data for Zones – Raster Tools

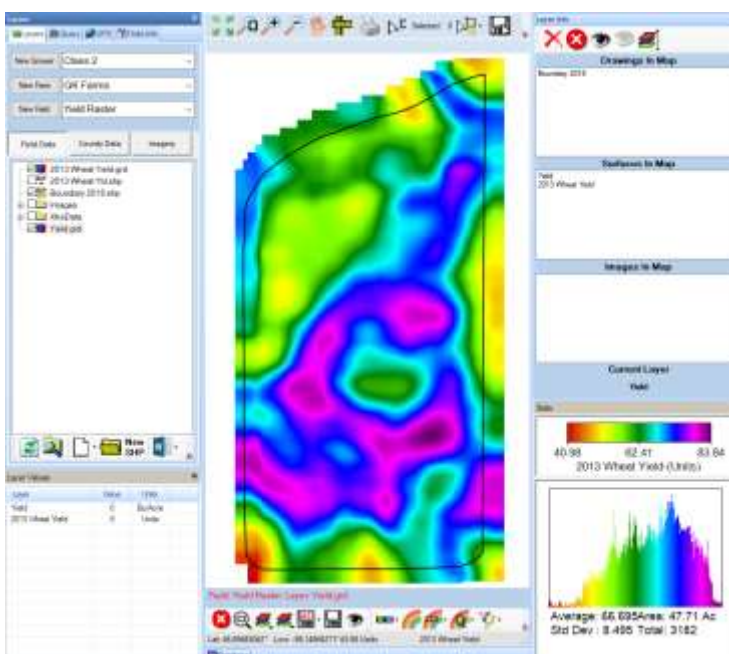
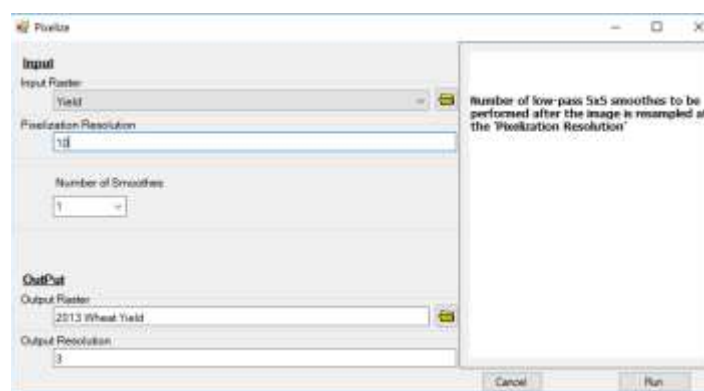
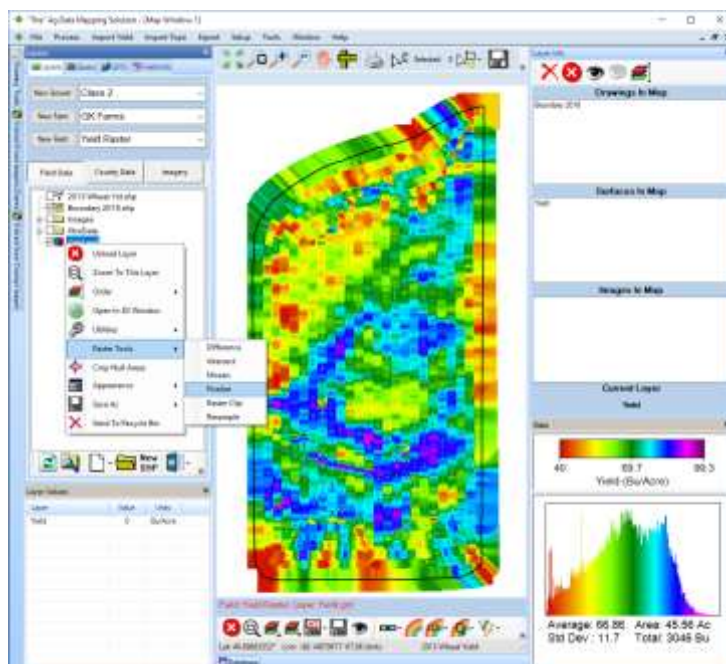
Pixelize

Smooths the raster by resampling the data to a lower resolution, smooths it, then resamples back to a higher resolution.

1. Turn on the raster "Yield.grd", make sure you have "Saved" any editing!
2. Right click on "Yield.grd" and select "Raster Tools", select "Pixelize".
3. Select "Input Raster"
4. Set the "Pixelization Resolution" for the raster. Set the resolution for the size of the event that is going to be smoothed out (Ex-Header width in meters).
5. Select "Number of Smooths" (5x5) to be run on the low resolution raster. (see notes on the "Yield Raster" settings)
6. In the "Output Raster" type in the name of the new Raster.grd, ADMS will auto-name, feel free to change.
7. Set "Output Resolution" value is in meters. (suggest 3 meter)
8. Click "Run".

New 2013 Wheat Yield.grd is now in the Field Data tree. Suggest "Cropping" the layer to the field boundary.

-DONE WITH YEILD RASTER CLEANUP-



Cleaning Yield Data for Zones – Raster Method

5. Right Click on the xxx.grd name in the data tree.
Choose - "Raster Tools" and "Resample"
Ex - Resampling @ 10 meter

Adjust "Output Resolution"

5 Meter = Fairly clean looking data

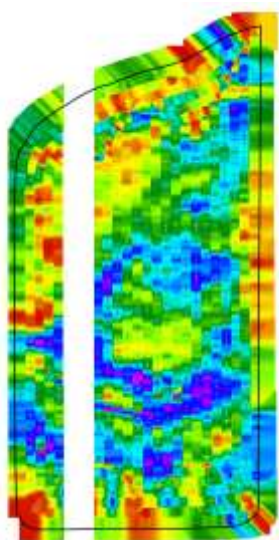
7 Meter = Normal Data small inclusions

10 Meter = Pass to Pass errors pretty ugly data

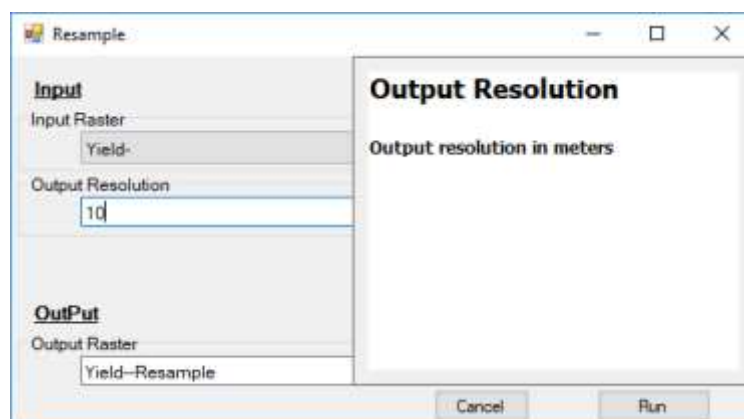
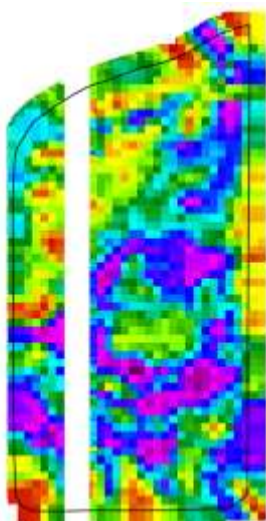
12 Meters = Borderline – horrible looking data

15 Meter = Last ditch effort to get something useable

1 meter
with Voids



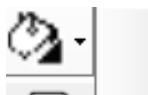
10 meter
with Voids



6. Using 5x5 "Fill Filter" to fill in the Voids.

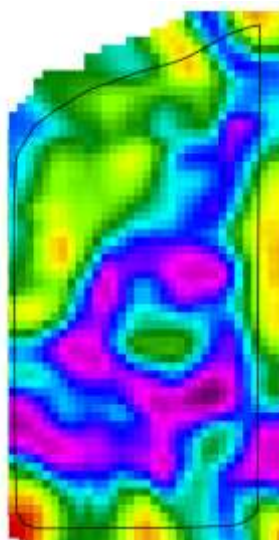
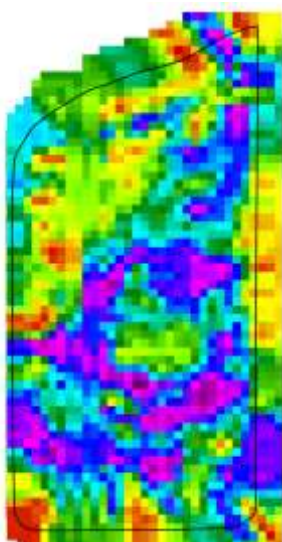
7. Do 1- 5x5 smooth on Bottom Toolbar (to the 10m .grd)

10 meter
Voids Filled



3x3 Fill
5x5 Fill

10 meter
1—5x5 Smooth



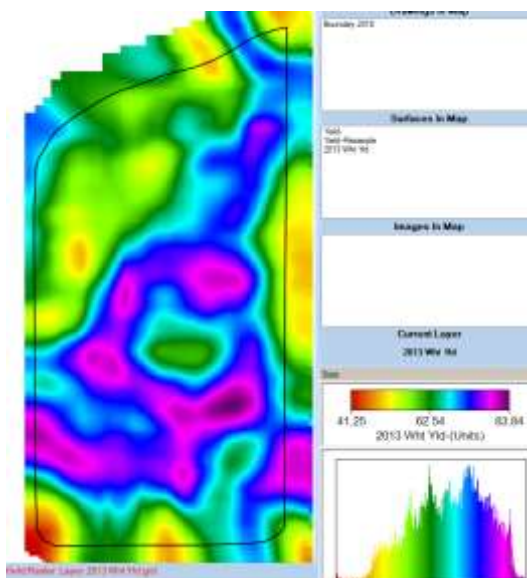
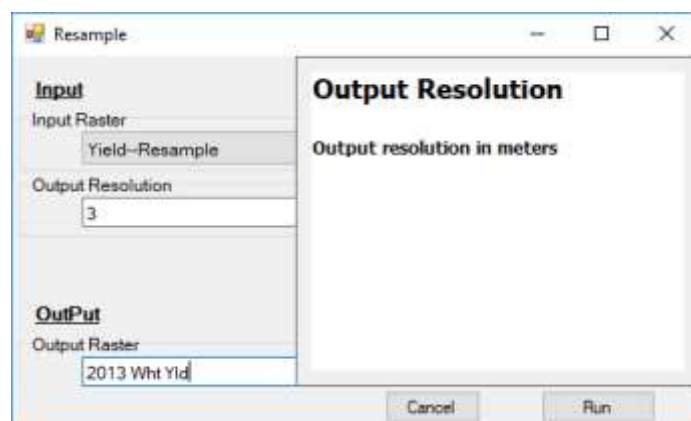
Using the "Fill Filter" at the Low Resolution gives a very nice finish. Final product is not so stretched in fill areas.

Keep in mind when you are missing HUGE areas, look at imagery!

8. "Save" the work on the "Yield-Resample.grd"

Cleaning Yield Data for Zones – Raster Method

9. Right Click on the "Yield-Resample.grd"
Choose - "Raster Tools" and "Resample"
Ex - Resampling @ 3 meter
-Note: Watch "Input Raster"
10. Set "Output Raster" name - "2013 Wht Yld"
Click "Run"



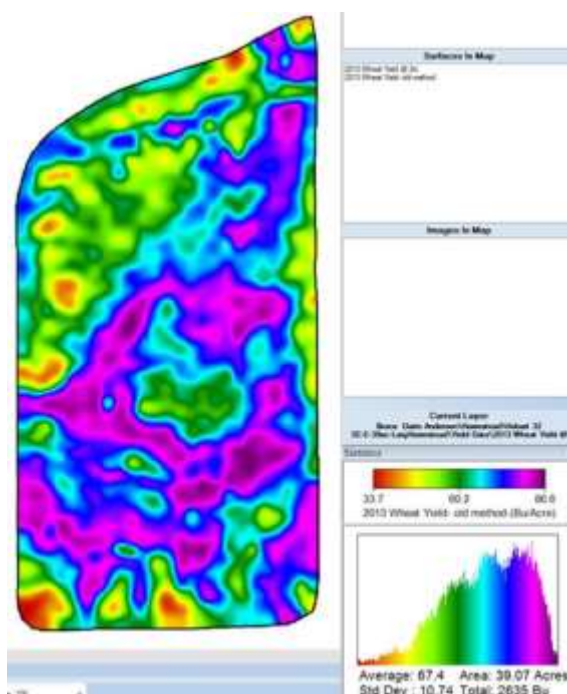
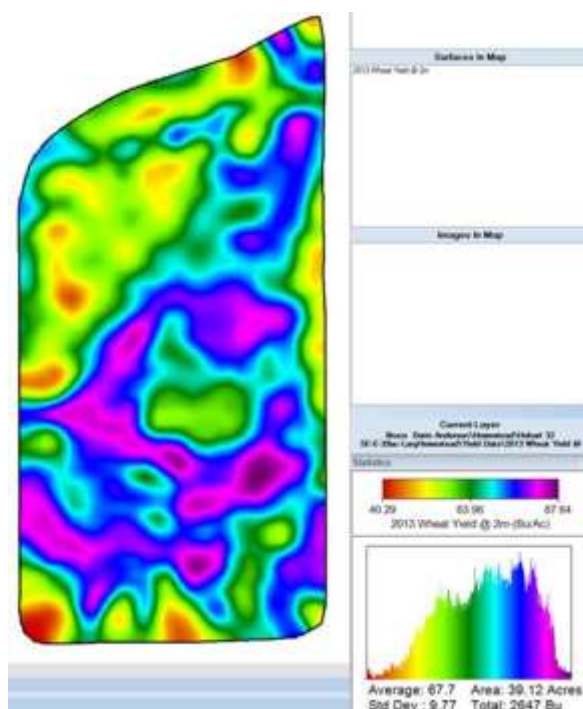
NOTE: Examples below the Black Line did not have "Voids" in them.

11. Suggest doing 1-5x5 low pass and Crop to boundary.



This is Raster Zones Method (7meter)

This is Yield Editor Points Cleaned



Processing Yield Data—Net Profit Map

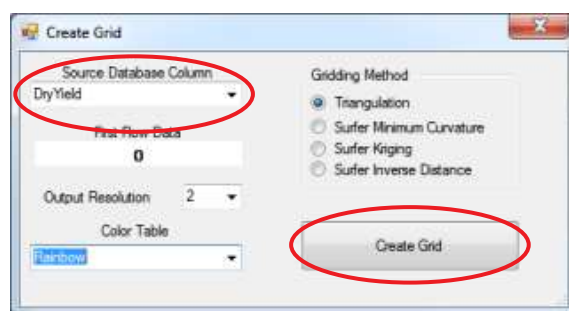
1. Turn on the **"2007 Soybean Yield.csv"** in ADMS.
2. Right click on it and click Save As ->SHP File and save it as **2007 Soybean Yield.shp**.



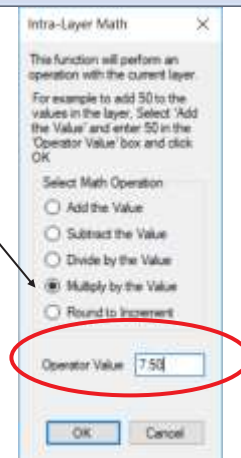
3. Turn on the **"2007 Soybean Yield.shp"**.
4. Right click and click Create Grid -> Create Grid from Points.
5. In the "Create Grid" popup window, select "Dry Yield" in the drop-down menu and click Create Grid.



6. Turn on the new **"2007 Soybean Yield.grd"**. (It should be the **Active Layer**).
7. Select the "Intra-Layer Math" button.



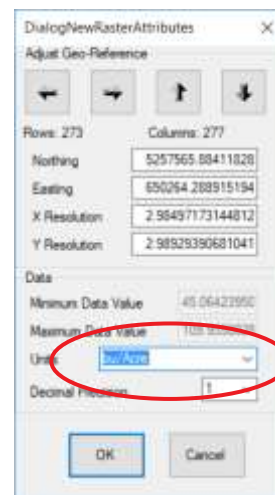
8. Click the "Multiply by the Value" radio button and enter the sale price of that crop/unit and click OK.
9. Now, make sure the **"2007 Soybean Yield.grd"** is still the **Active Layer**.



10. Select the "Intra-Layer Math" button again.
11. Click the "Subtract the Value" radio button and enter the input cost per acre, click OK.
12. Now click the "Surface Properties" button.



13. Select the proper Units for the crop and click OK.



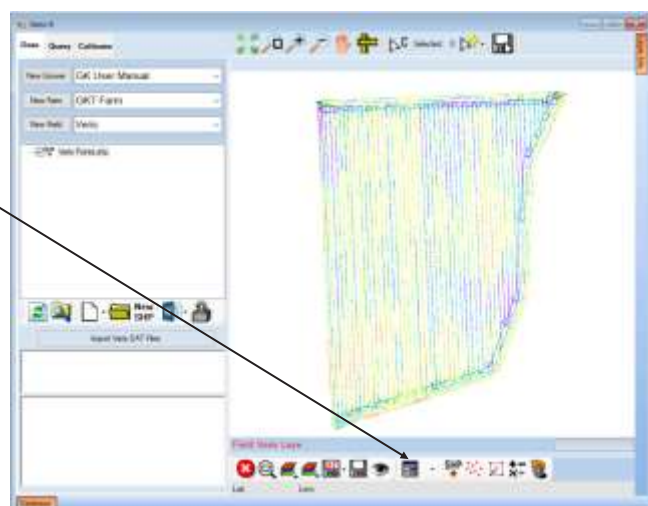
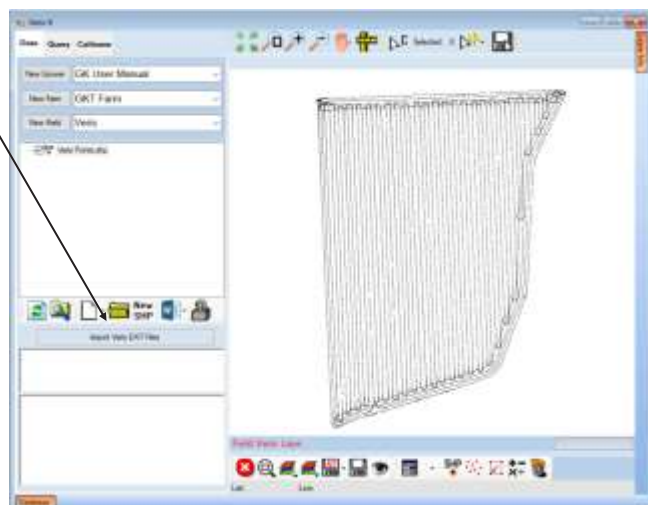
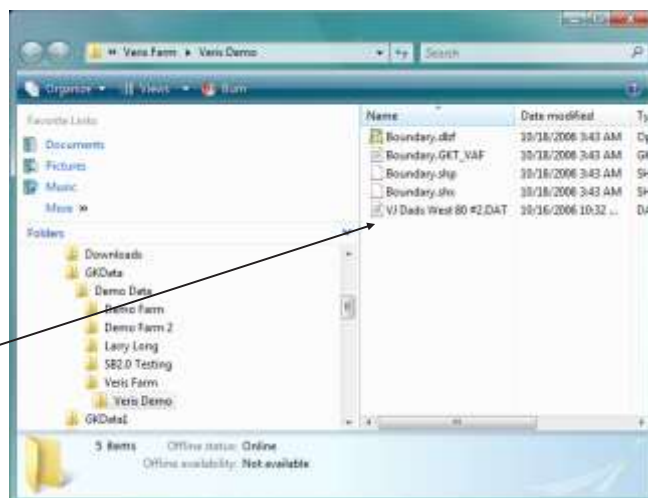
14. Click Save As on the bottom toolbar, name **"2007 Net Profit.grd"** You have now successfully turned a yield data map into a net profit map.

Processing Veris Data

Importing Veris DAT Files

In this section, you will be importing Veris DAT Files for a field and combining them into a single SHP file for surfacing.

1. Start Ag Data Mapping Solution and go to the top tool bar, select the **"Process"** item, then **"Veris Data"**.
2. Select the Correct "Grower", "Farm" and "Field" for the data you are importing.
3. After selecting, or creating, the proper Grower Farm and Field, click the "Explore This Folder" icon in the data tree. Paste in the Veris DAT file or files you wish to process. You may also want to add a Boundary file if you have one.
4. Click the "Import Veris DAT Files" button. Choose one or multiple DAT files to import. If you choose multiple DAT files, all files will be merged into one "Veris Points" shapefile. As the data is imported, bad data such as negative values are filtered out of the data.
5. Columns named 'NormSurf' and 'NormDeep' are added to the data. These values are the normalized values for the surface and deep data layers.
6. From there, you can use the 'Display Properties' and 'Thematic' to set the color for the points. This is just for appearance. The data created for creating zones will be in surfaces which we will describe on the next page.

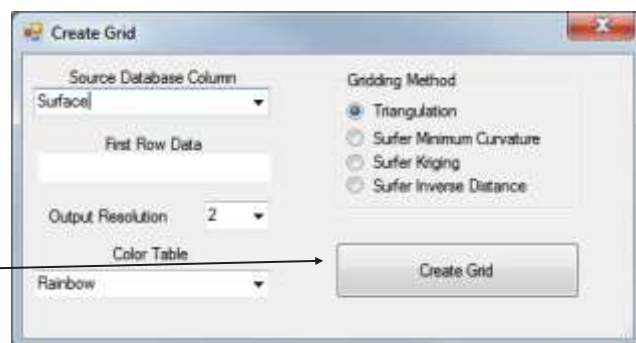


Processing Veris Data

Surfacing Veris DAT—SHP Files

In this section, you will be creating surfaces from shapefiles, and combining surfaces to create a single map for defining zones.

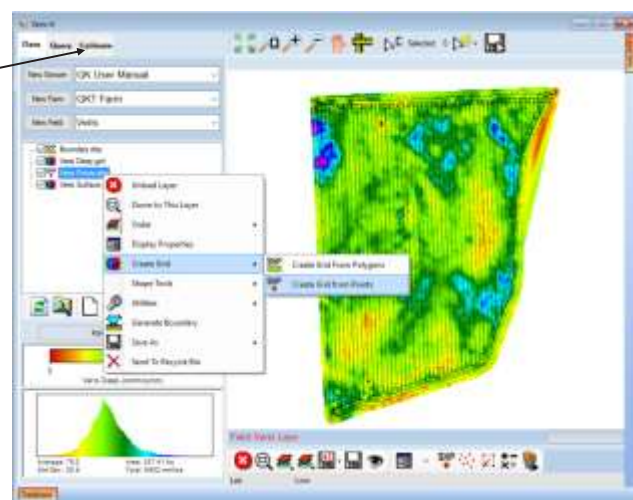
- Right click on the Veris Points shapefile in the data tree. Choose "Create Grid"- "Create Grid from Points". The dialog to the right will appear.



- Under "Source Database Column" select the "**Surface**" item. Then click "Create Grid".

- Once that process completes, change the "Source Database Column" to "**Deep**" and Click "Create Grid" again.

- Then switch to the "Calibrate" tab. Select the surface and Deep layers in the dialog boxes. Choose the weighting value for how much you would like each layer to influence the new output layer. By default the values are set at 60% Surface, 40% Deep. Click "Run Veris Calibration".

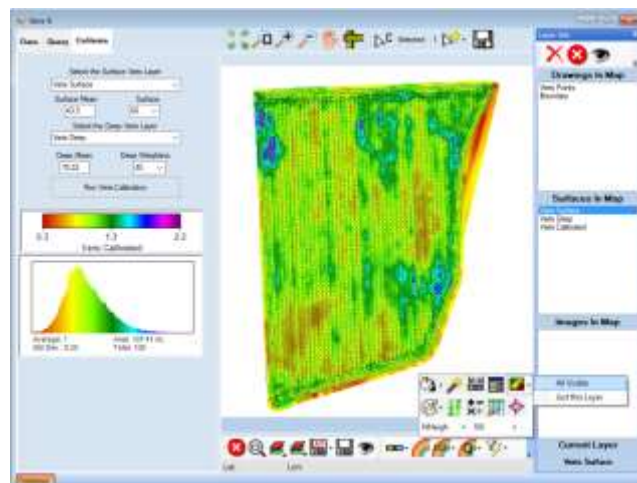


- Select the "Boundary" and click inside the Polygon in the map window, "Selecting" it.

- Choose any of the Veris.grd files, go to bottom tool bar and click "Crop Raster to Selected Polygon" & "All Visible"

Note: this will cut and save in one step.

- Set the zones using the Thematic Color tool. A good choice is a 5 zones using K-Means.



Query Tools

In **Query Tools**, we can select specific areas of a field surface and intersect or analyze that area with another surface. Examples of uses for the **Query Tool** are: select a Variety or Hybrid in field and intersect with yield, or select a specific range of Veris data and intersect it with a grid soil test to find a relationship between them. Query tools are only limited to your imagination and surfaces you have created.

We start by opening a **"Map Window"**



and selecting the desired Grower, Farm and Field.

Turn on the surfaces you are interested in analyzing. You need to have at least two, but you can turn on as many as you would like.

Next, select the **"Query"** tab.

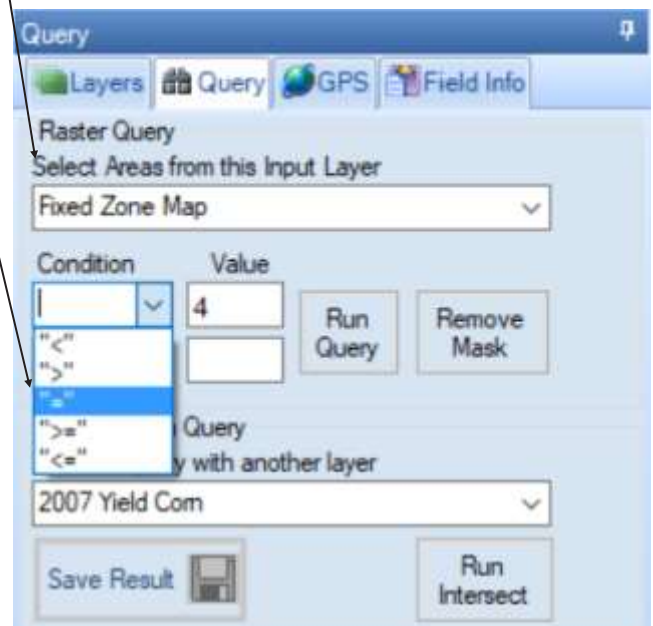
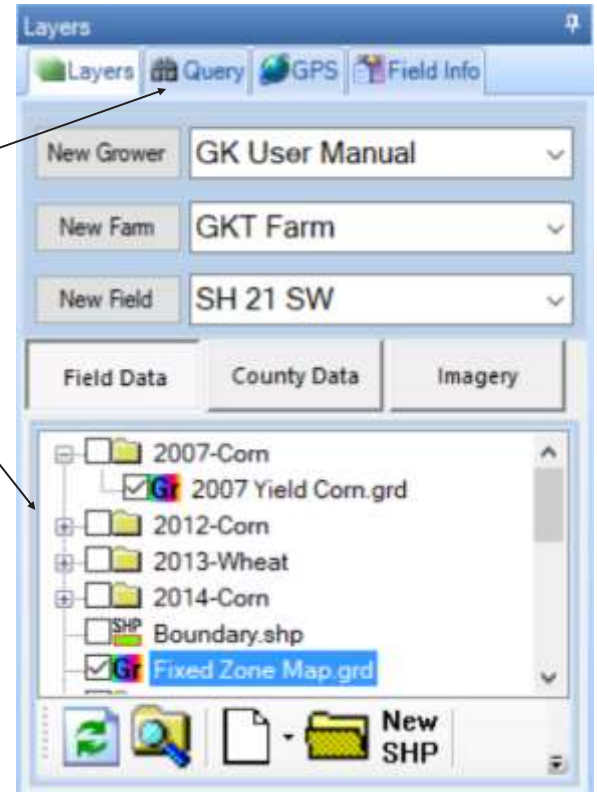
Under the **"Select Areas from the Input Layer"** drop down menu, select the layer you want to mask.

Next, select the area of the layer you want to analyze. In this example Zone layer has values from 1 to 5 - specific a number, use the **"Equal To ="** selection. If you are selecting a range of values (i.e. lbs of Fertilizer applied), use the **"Greater Than >"** **"Less Than <"** selections.

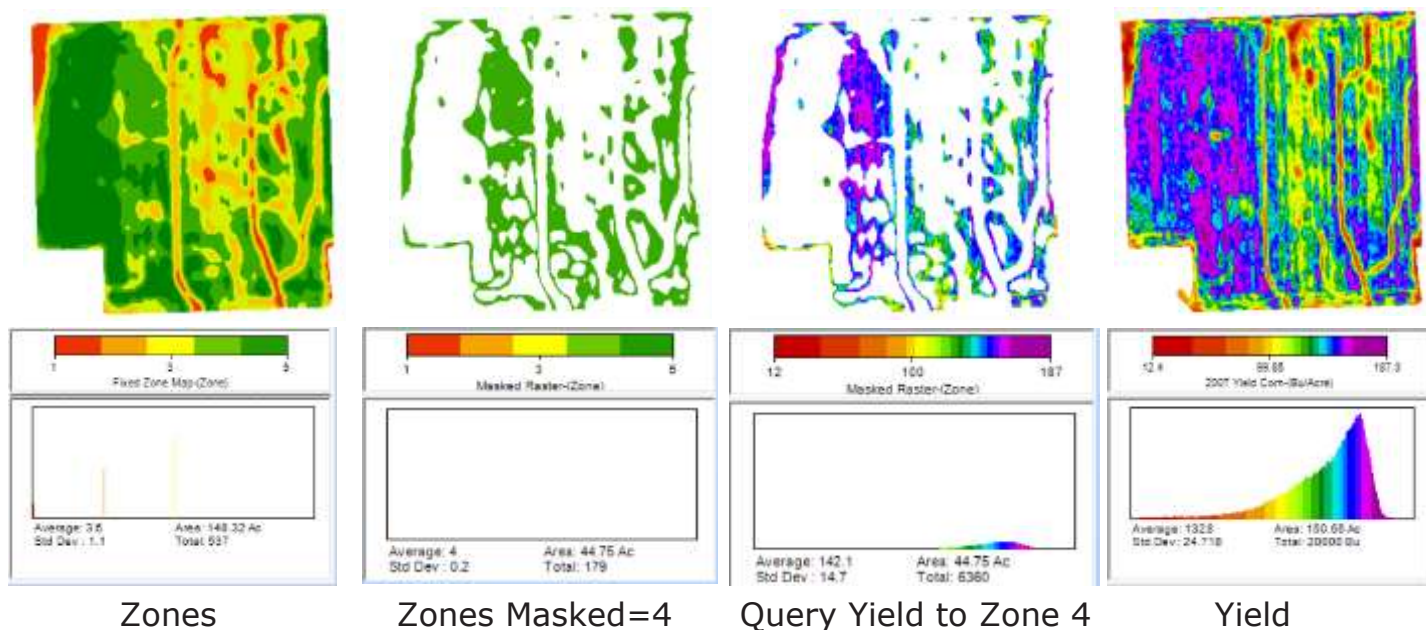
Click the **"Run Query"** button. This will "mask" all other values.

Choose **"Intersect query with another layer"** in this case it is 2007 Yield Corn.grd.

Click the **"Run Intersect"** button which will pull the "yield" for just the visible area.



Query Tools



Once the "Run Intersect" has been run

The Statistics on the Right Side have "Whole Field values / acres" the Statistics on the Left Side have "Query values / acres"

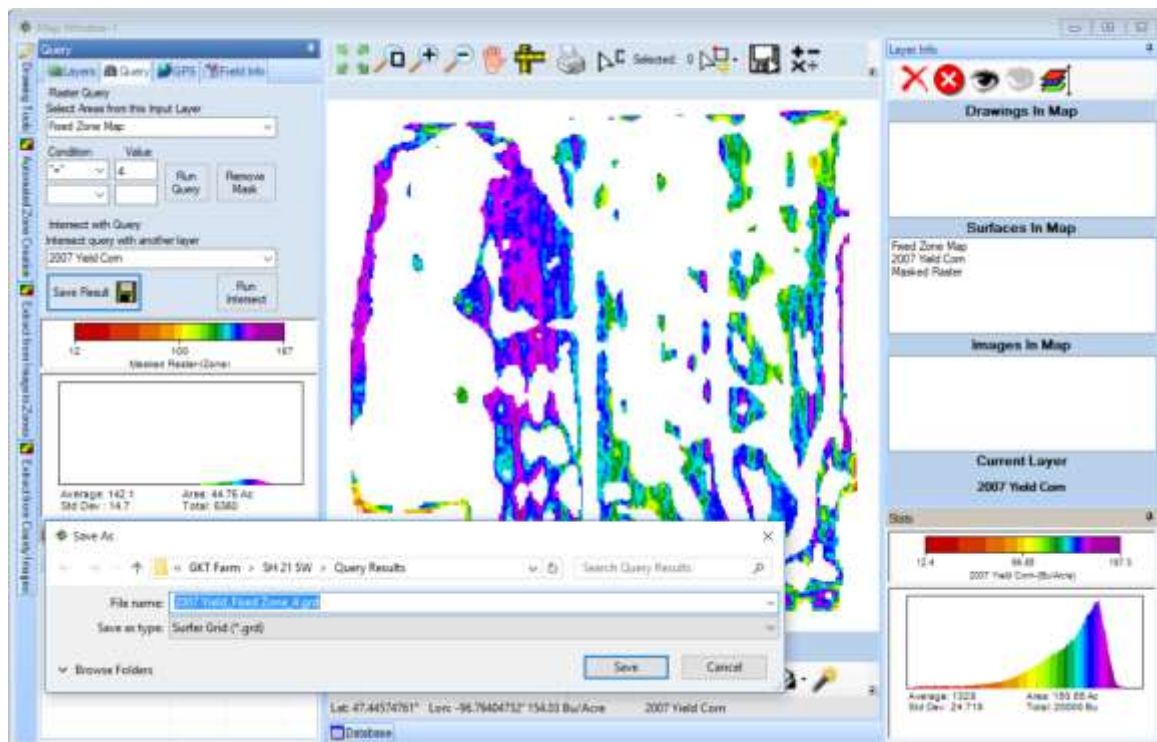
If the Query is something you want to Print or Save. Click the "Save Results" button

ADMS automatically creates a "Query" folder in the data tree and auto names it. Edit the "File Name" if needed and click "Save".

To finish or do another query, click **"Remove Mask"**.

^ **MUST DO** ^

Note: to print, Remove mask and "Clear Map" & turn on the layer.grd in the "Query" folder



Summarize Another Layer

As you work with multiple layers of data you may want to get a Summary of how those layers interact. ADMS has a function call "Summarize to Another Layer". This tool allows you to pull data from your Grid or Zone from your Yield or from your Soil Test Results. Many combinations of things you can pull together here.



These examples will start at the point that you have done Grid/Zones, Created Rx Maps and have Yield data back.

Summarize—Grids (First Product)

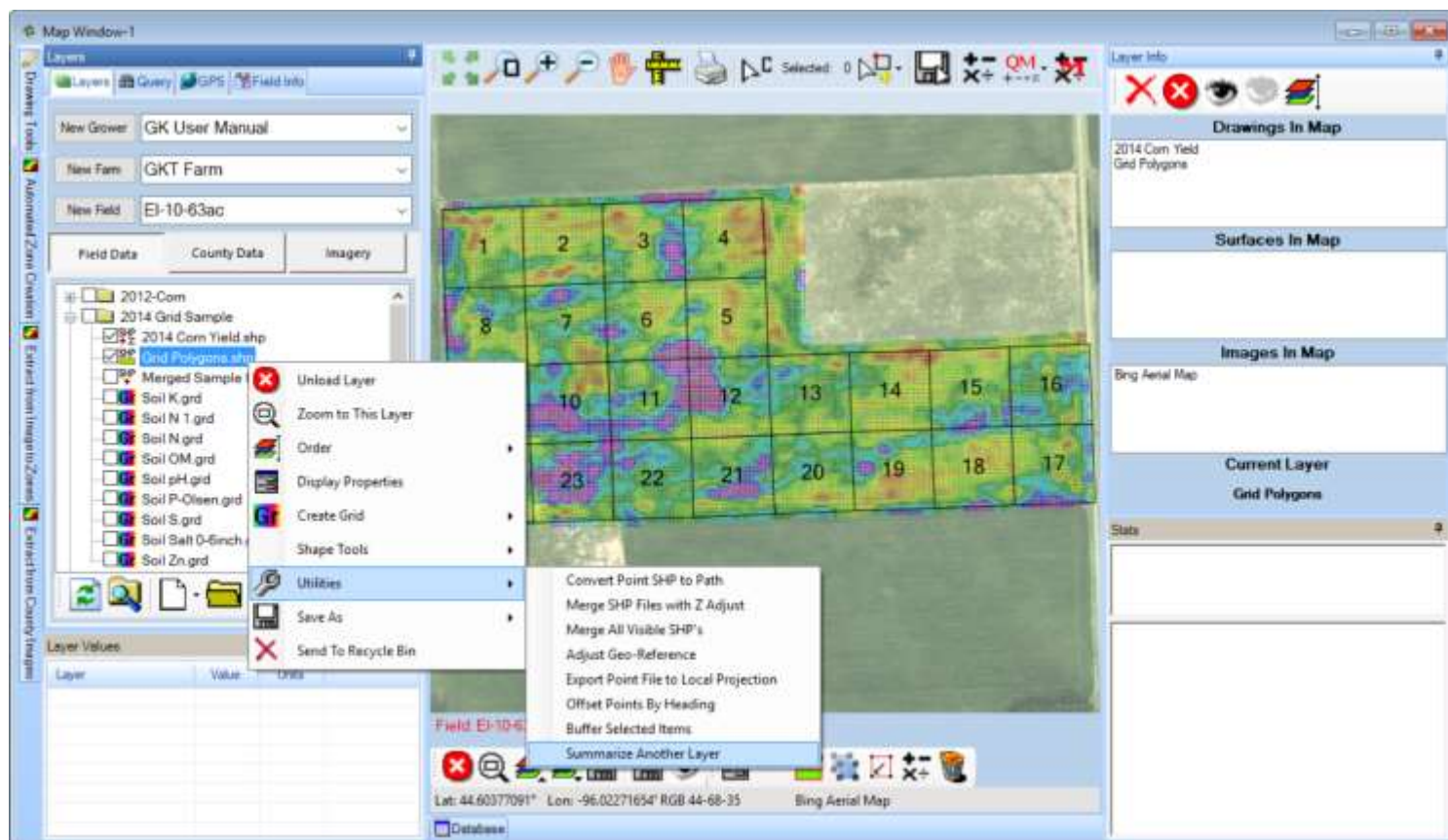
In this example we will run Grid Sample Results against Yield Data and 11-52-0. Each "summarized" product must be done as separate runs of this process.

NOTES: Suggest only turning on the "Drawing Layers" and "Surface Layers" you are working on. This will make things go smoother and cause less confusion.

Turn on your Grid (Polygons) and your Yield.shp for the first run (you could also use Yield.grd files also).

"Right Click" on the "Grid.shp" (polygons)

- Utilities
- Summarize Another Layer

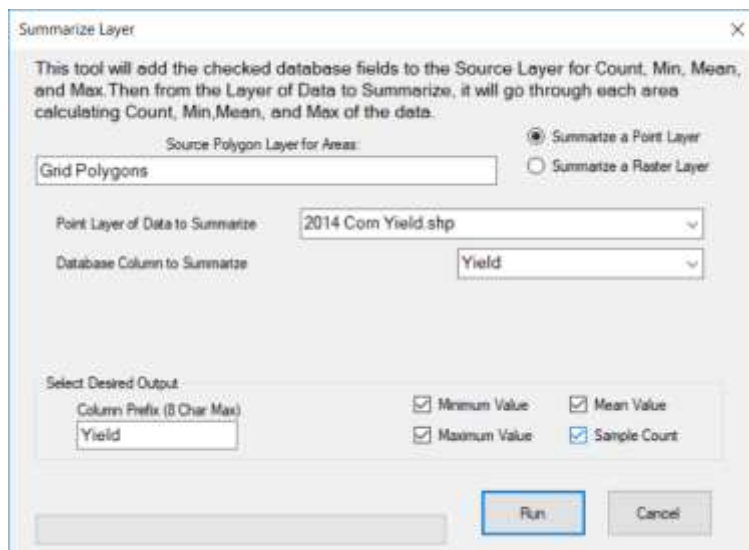


Summarize Another Layer

This will open the Summarize Layer window.

Since we are using a Yield.shp we need to choose "Use Drawing"

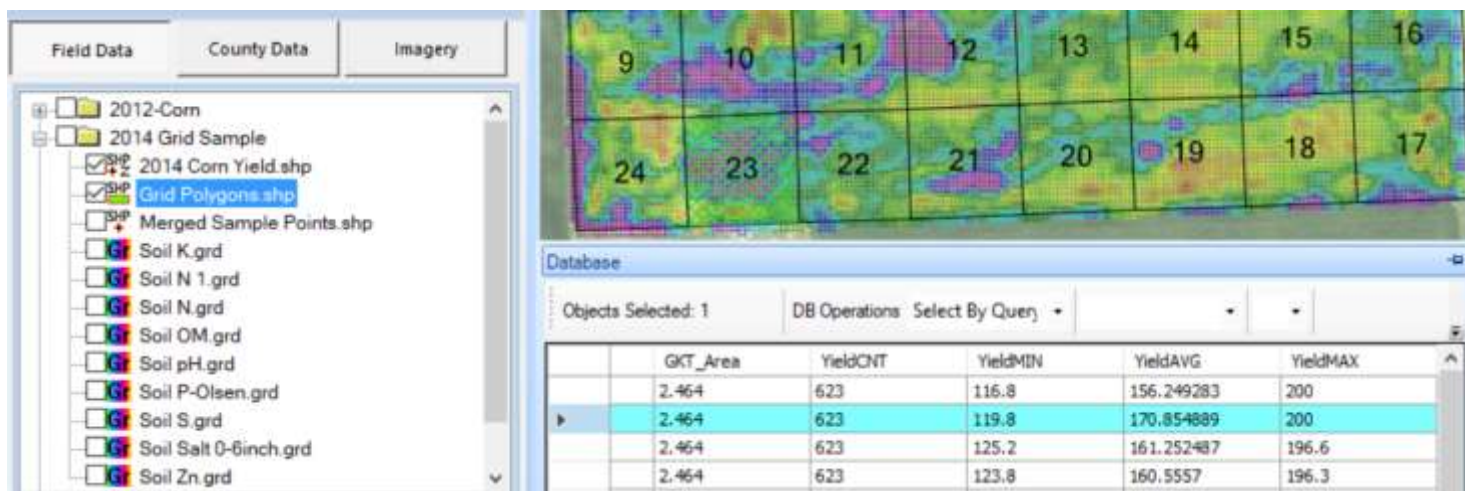
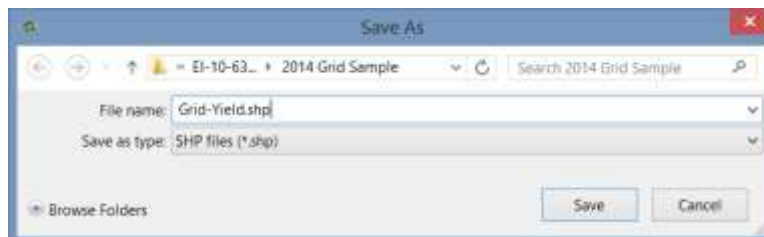
- * Go down to the "Drawing Layer of Data to Summarize" and choose the "2014 Corn Yield.shp"
- * Choose the "Database Column to Summarize" in this example it is "Yield"
- * Click "Run"



Once done running. Make sure your active layer is "Grid.shp" (layer that was the source of the summary).

Click "Save" or "Save As"

Example of Save As >>



The newly updated .shp file has 4 new columns in it. A column for RecordCount / Min / Avg / Max of the 2014 Corn Yield for each Sample Grid.

Summarize Another Layer

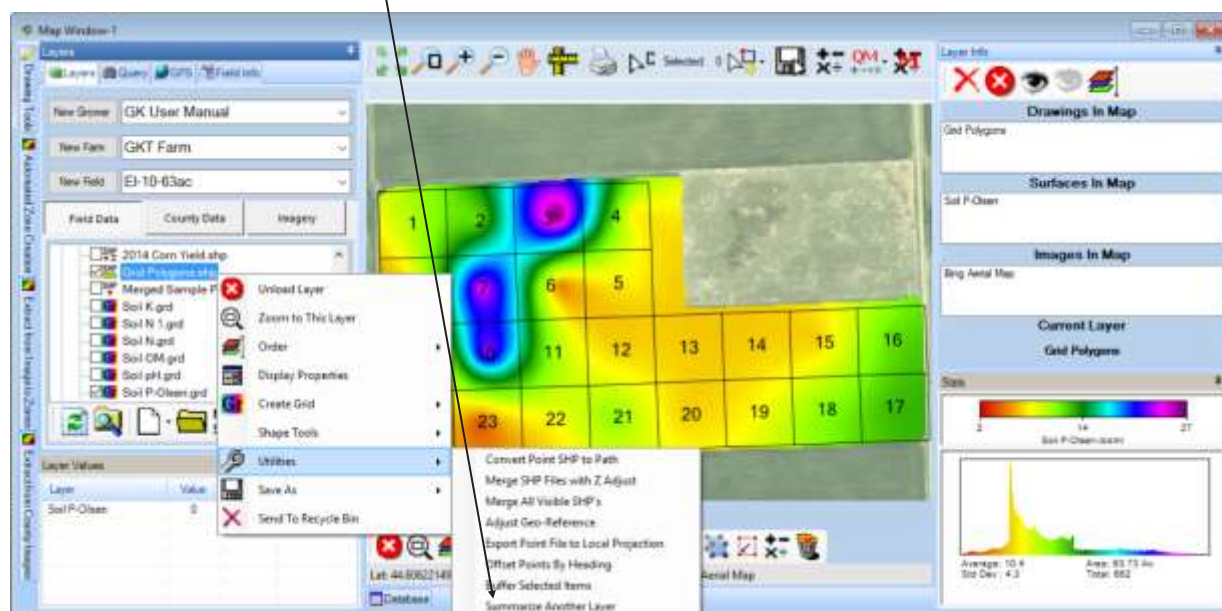
Summarize—Grids (Second Product)

Summary of our First product—"2014 Corn Yield.shp" is done, now doing Soil P-Olsen.grd

Turn on your Grid.shp (Polygons) and your Soil P-Olsen.grd for the second run.

"Right Click" on the "Grid.shp" (Polygon)

- Utilities
- Summarize Another Layer



This will open "Summarize Layer" Window

Choose "Use Raster"

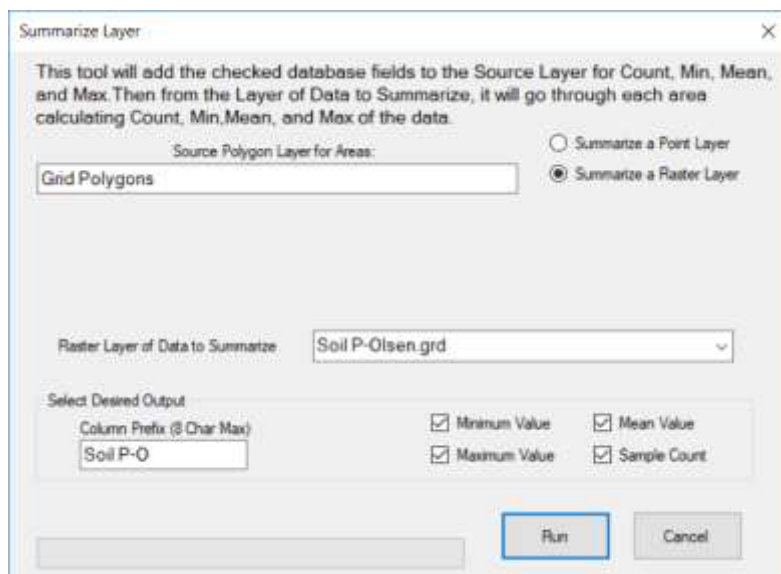
Under "Raster Layer of Data to Summarize" choose "Soil P-Olsen.grd" for this example

Click Run

Make sure the Grid.shp (polygon) is the active layer

Click "Save" or "Save As"

NOTE: In the "Database", selecting ALL and "Right Click" and "Copy". The data can be copied into Excel.



	Rename Column	Yield	GKT_Area	YieldCNT	YieldMIN	YieldAVG	YieldMAX	Soil P-OCNT	Soil P-OMIN	Soil P-OAVG	Soil P-OMAX
	Add Column	2.464	623	118.6	160.8139	200	1147	2.02276485	3.95258427	14.5385218	
	Delete Column	2.464	623	125.9	158.533875	200	1149	3.83034134	8.829892	16.02375	
	Create Copy of Column	2.464	623	119.8	170.854889	200	1145	4.08260345	6.80607	11.9796019	
	Format	2.464	623	127.6	155.047363	199.8	1132	5.056077	10.9523411	17.7924137	
		2.464	623	116.8	156.249283	200	1146	5.58611264	7.81599665	9.951082	
Records	Copy	Min: 2.02	Mean: 7.55	Max: 14.17	Weighted Mean: 7.55	Total: 446.23	Total Area: 59.13				

Getting Started With Map Math

This section begins a topic that seems to strike fear in the hearts of nearly every ADMS user. While it does expose you to new concepts, the use of scripting to create new layers is the most powerful feature of this package. Once you have an understanding of how to use this tool, there is almost nothing you can't do.

There are several topics that need to be covered for you to get an understanding of what Map Math does and how to use it.

- How to Declare and use variables.
- An explanation of the Map Layers, and the numbers behind them.
- An introduction to Object Based programming.
- An introduction to Visual Basic functions, enumerations, variables and a topic known as control flow functions.
- There are only about 5 different Visual Basic functions that are useful in Map Math.
 - The [If Then, Else, End If](#) statement.
 - The [Select Case, Case, Case Else, End Select](#) statement.
 - The [Enum, End Enum](#) Statement.
 - The [System.Math](#) functions.
 - Creating and using you own [Functions](#).

The code that you write will be used to go through every pixel in the map, using values from other maps, to create an output map.

There are several internal functions that will give you access to data from the maps that you have loaded.

Also map layers can be accessed as an object to use other features that describe the map layers.

Now that we've defined what we need to know let's dive in! Come on in the water is fine. And no matter what you might think now, no one has ever drowned learning to write code. :-)

What Is A Null Value?

If there is one point that trips up many scripts, it is the concept of a null value, or NullVal, which is how it is referred to in a script.

Simply put a data raster layer is a square, and if the raster layer has been trimmed to a field boundary, the cells that are not in the area of the raster that is inside the field boundary are set to a unique number known as a Null Value.

This number is the largest number that can be stored in a single (1.70141E+38) cell. In a script, you can test to see if the value of a certain cell is null by this test:

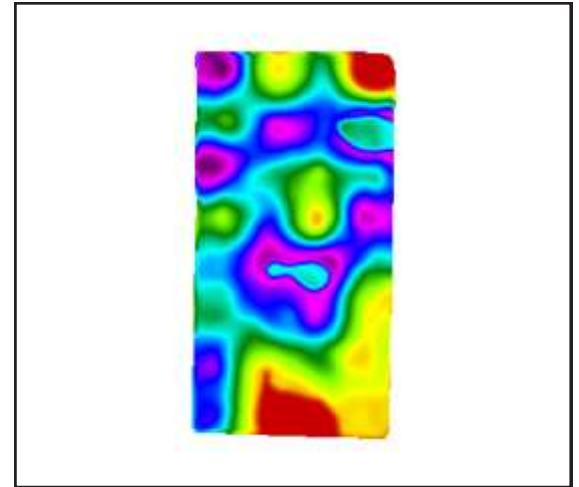
```
If A=NullVal then
    'The Input is Null Output a Null
    Return NullVal
Else
    'It isn't null so do the math
End If
```

In Ag Data Mapping Solution Version 3333 and later, there is also a check you can run that will test all layers, and if any are null, it will tell you.

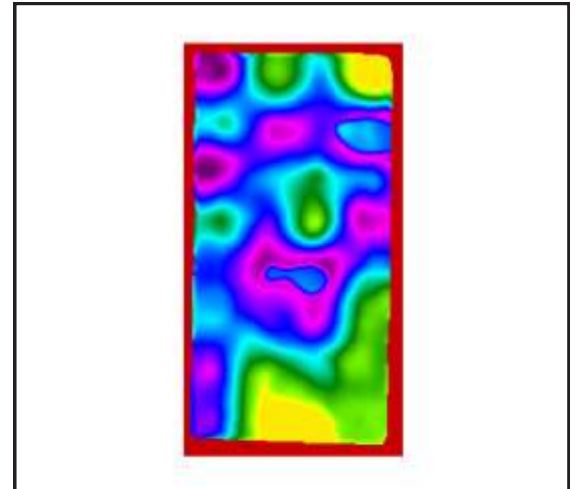
```
If InField=True then
    'All layers have data
Else
    'One or More Layers are Null
End If
```

To make the image on the lower right, this script was used.

```
If Infield Then
    Return Rasters("0-0-60").Value
Else
    Return 0
End If
```



A Normal Raster Layer Trimmed to Boundary



A Raster Layer with Null Values set to Zero (Red)

Side Note:

The "InField" call is a function in the script.

```
Public Shared Function InField() As Boolean
    Dim InF As Boolean = True
    For Each R As Raster In Rasters
        If R.Value = NullVal Then
            InF = False
            Return InF
        End If
    Next R
    Return InF
End Function
```

Declaring and Using Variables

When we write code, one of the most important features is a 'variable'. A variable is a name for an object that you are using in your script. A variable can contain a number, a group of letters, or a complex object that contains a whole map layer.

For Map Math the Variables you may want to use are:

- A variable that stores a number without decimal points known as an '**Integer**'.

Declaring an integer like this, tells the program that you are going to use an integer named 'A'

```
Dim A as Integer
```

Declaring an integer like this, tells the program that you are going to use an integer named 'A' and sets its value = 10

```
Dim A as Integer=10
```

- A variable that stores a number with decimal points known as a '**Single**'.

```
Dim A as Single  
Dim A as Single=0.46
```

Declaring like this creates a variable that stores a value from a map at a certain location.

```
Dim A as Single=Rasters("Yield Goal").Value
```

- A variable that allows you to access a map layer, known as a '**Raster**'.

```
Dim A as Raster
```

Declaring like this creates a variable that stores a reference to a layer. This is an object and allows you to access the Minimum, Maximum, Average, and the value at a location.

```
Dim A as Raster=Rasters("Yield Goal")
```

To access the various values you would use a period after the variable name.

A.Min, **A.Max**, **A.Mean**, **A.StandardDev**, and **A.Value** would all return numbers.

- A variable that stores a letter or a series of letters known as a '**String**'.

```
Dim A as String  
Dim A as String="Wheat Yield"
```

- A variable that stores True or False information known as a '**Boolean**'.

```
Dim A as Boolean  
Dim A as Boolean=False
```

Introduction to Functions

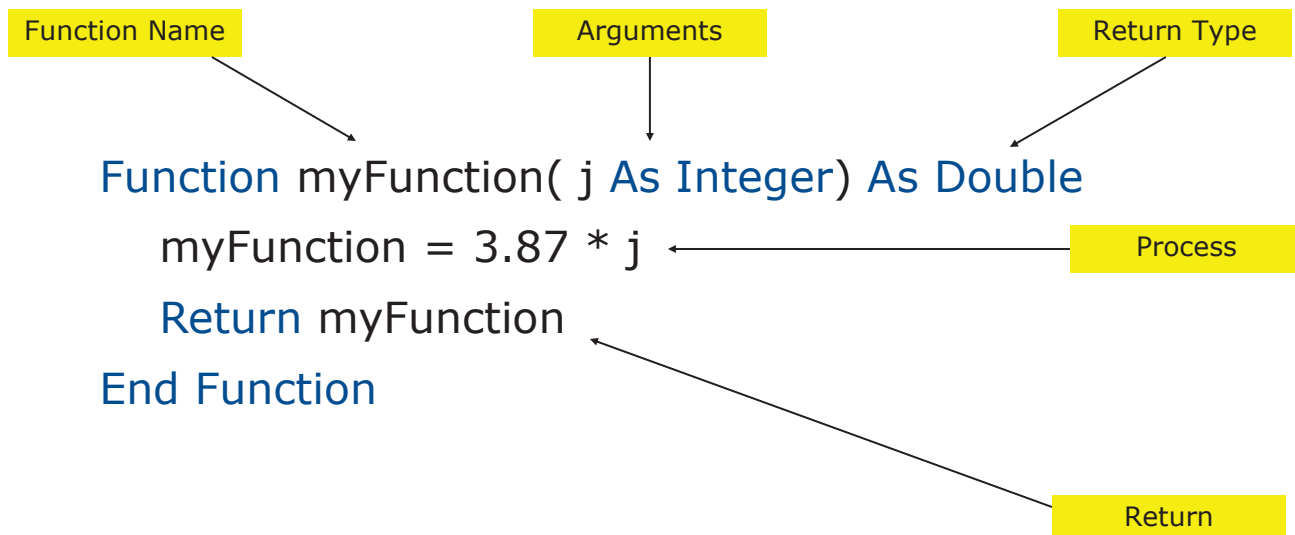
A function is a segment of code that takes input data as arguments, performs a specific “function” and returns a result.

In the example below, the portions of the function are defined. The function name is made by the person writing the function. Other than a few reserved key words that are used in Visual Basic, you can name the function whatever you like.

For the arguments, you can use as many different variables as you like. You should define what type of data the argument is (single, integer, string etc.)

For the return type, you should provide what type of data the number coming back will be (Single, Integer, Boolean).

Then write in the code you want to calculate your function, and finally use the ‘Return’ to return the value back to the code that called the function.



Introduction to Objects, Enumerations, and Collections

One of the most powerful tools in programming is the ability to create objects. We will start this section by creating a Vehicle Object. We will use properties of that object to describe different properties of a vehicle.

We will use Enumerations to provide input to the you about valid choices. So if we want to describe the type of engine in the vehicle, we create an Enumeration with valid choices:

```
Private Enum FuelType as Integer
    Gasoline=0
    Diesel=1
    Propane=2
End Enum
```

Now we can define an object to define the properties of the Vehicle and Functions that will return a calculated fuel required for a trip:

```
Private Class Vehicle
    Public VIN as String
    Public VehicleName as String
    Public NumberOfWheels as Integer
    Public FuelToUse as FuelType
    Public EngineSize as Single
    Public NeedsLicense as Boolean
    Public MilesPerGallon as Single

    Public Function HowMuchFuelDoINeed(MilesToTravel as Integer) as Single
        If MilesPerGallon <> 0 Then
            Return (MilesToTravel / MilesPerGallon) * 1.1
        Else
            Return 0
        End If
    End Function
End Class
```

To Use our new object:

```
Dim Veh As New Vehicle
Dim FuelNeeded As Single
Veh.VIN = "1Z4562538"
Veh.FuelToUse = FuelType.Diesel
Veh.EngineSize = 6.9
Veh.MilesPerGallon = 19
Veh.NeedsLicense = True
FuelNeeded = Veh.HowMuchFuelDoINeed(100)
```

Hundreds of objects could be filled out and added to a Collection of Vehicles that could describe anything from forklifts to tractors to semi-trucks to cars.

```
Dim VC as New Collection
VC.Add(Veh)
```

We don't see you needing to create collections, but you will be accessing one collection so we showed one.

Raster Object and the Raster Collection

So, now that you are an expert with objects after going through the vehicle example, how are objects and enumerations used for scripting within Ag Data Mapping Solution?

Below is a class called Raster:

```
Public Class Raster
    Public Name As String
    Public ShortName As String
    Public Value As Single
    Public Min As Single
    Public Max As Single
    Public Mean As Single
    Public StandardDev As Single
End Class
```

When the map math window opens, it adds a "Raster" object for each raster layer that is open in the map window. It adds those Raster objects to a collection called "Rasters".

Let's say that you have a layer loaded with a short name of "2005 Corn Yield". When you want to access that layer as an object, you can use the tools on the Map Math form to add it, but this is what is accomplished.

```
Dim YG As Raster
YG = Rasters("2005 Corn Yield")
    Or
Dim YG As Raster = Rasters("2005 Corn Yield")
```

Now that you have a variable called "YG", you can access the properties of that Raster in your script. If you wanted to use a normalized yield goal:

Normalized Yield=Yield at a Point Divided By Average Yield for the Field

The code would look like this :

```
If InField Then
    Dim NormYield as Single
    NormYield=YG.Value/YG.Mean
    Return NormYield
Else
    Return NullVal
End If
```

Example: Minnesota P and K Recommendations for Corn

Table 8. Phosphate suggestions for corn production in Minnesota.*

Expected Yield	Soil test P (ppm)									
	v. low		low		medium		high		v. high	
	Bray	Olsen	Bray	Olsen	Bray	Olsen	Bray	Olsen	Bray	Olsen
	0-5	0-3	6-10	4-7	11-15	8-11	16-20	12-15	21+	16+
	Bdcat	Band	Bdcat	Band	Bdcat	Band	Bdcat	Band	Bdcat	Band
lb/acre	P ₂ O ₅ (acre to apply (lb/acre))									
< 100	60	30	40	20	25	20	10	10-15	0	10-15
100 - 124	75	40	50	25	30	20	10	10-15	0	10-15
125 - 149	85	45	60	30	35	25	10	10-15	0	10-15
150 - 174	100	50	70	35	40	30	15	10-15	0	10-15
175 - 199	110	55	75	40	45	30	15	10-15	0	10-15
200 +	120	60	85	45	50	35	15	10-15	0	10-15

* Use one of the following equations if a P₂O₅ recommendation for a specific soil test value and a specific expected yield is desired.

$$P_{2O_5Rec} = [0.700 - (.035 \text{ (Bray P ppm)})] (\text{expected yield})$$

$$P_{2O_5Rec} = [0.700 - (.044 \text{ (Olsen P ppm)})] (\text{expected yield})$$

No phosphate fertilizer is recommended if the soil test for P is higher than 25 ppm (Bray) or 20 ppm (Olsen).

Table 9. Potash suggestions for corn production in Minnesota.*

		Soil test K (ppm)									
		v. low		low		medium		high		v. high	
Expected		0-40		41-80		81-120		121-160		160+	
Yield		Bdcat	Band	Bdcat	Band	Bdcat	Band	Bdcat	Band	Bdcat	Band
lb/acre		K ₂ O/acre to apply (lb/acre)									
< 100	100	50	75	40	45	30	15	10-15	0	10-15	
100 – 124	120	60	90	45	50	30	20	10-15	0	10-15	
125 – 149	145	75	105	55	60	40	20	10-15	0	10-15	
150 – 174	165	85	120	60	70	40	25	10-15	0	10-15	
175 – 199	185	90	135	70	80	50	25	10-15	0	10-15	
200 +	205	105	160	80	90	55	30	10-15	0	10-15	

* Use one of the following equations if a K₂O recommendation for a specific soil test value and a specific expected yield is desired.

$$K_{2ORec} = [1.166 - .0073 (\text{Soil Test K, ppm})] (\text{expected yield})$$

No potash fertilizer is recommended if the soil test for K is 175 ppm or higher.

Above are the tables from the University of Minnesota with their recommended rates for fertilizing corn. We will work our way through the process of converting this to a script for creating a fertilizer map from a P and K soil test value map, and a yield goal map.

Below the tables, you can see formulas that allow us to calculate P and K fertilizer rates for a specific yield goal and soil test value.

While these scripts calculate nutrient lbs, they aren't quite done. They need to have some traps for error conditions, and they also need to convert the nutrient pounds to product pounds.

$$P_{2O_5Rec} = [0.700 - (.044 \times (\text{Olsen P ppm}))] \times (\text{expected yield})$$

$$K_{2ORec} = [1.166 - .0073 \times (\text{Soil Test K, ppm})] \times (\text{expected yield})$$

Dim P2O5 As Single

Dim OLSENST As Single = Rasters("P_OLSEN").Value

Dim EXPYIELD As Single = Rasters("2005 Corn Yield").Value

If Infield Then

'Check to See if it is Less Than 20 ppm

If OLSENST < 20 Then

P2O5 = (0.7 - (.044 * OLSENST)) * EXPYIELD

Else

'It was over 20 ppm so apply 0

P2O5 = 0

End If

'Send the Value to the Map

Return P2O5

Else

'Wasn't In the Field Send a NullVal to the Map

Return NullVal

End If

Dim K2O As Single

Dim KST As Single = Rasters("K_UNSPEC").Value

Dim EXPYIELD As Single = Rasters("2005 Corn Yield").Value

If Infield Then

'Check to See if it is Less Than 175 ppm

If KST < 175 Then

K2O = (1.166 - (.0073 * KST)) * EXPYIELD

Else

'It was over 175 ppm so apply 0

K2O = 0

End If

'Send the Value to the Map

Return K2O

Else

'Wasn't In the Field Send a NullVal to the Map

Return NullVal

End If

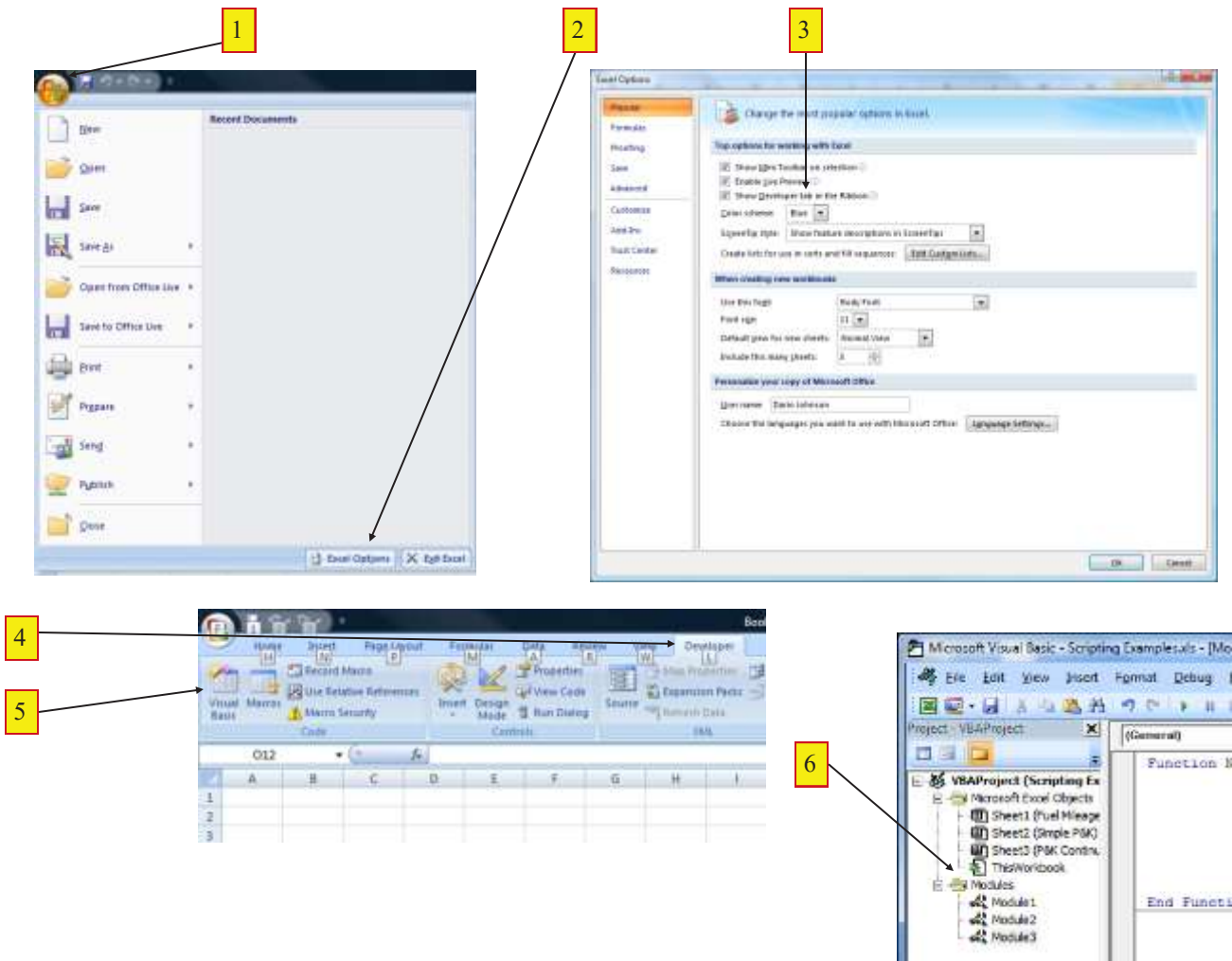
They could easily be modified to handle that chore, but along with combining the scripts, we will do that in a more robust fashion in the next pages. Later, we will build a Product object to help with those calculations.

Opening a Script Editor in Excel 2007

One really neat way to debug and develop functions for use in Map Math is to use Excel to develop that code. There are features like the ability to insert breakpoints and develop tests for viewing how a script works.

In Excel 2007, here is how to set up the scripting process.

1. Start with a blank "Book1" then click the 'Start Button'.
2. Click 'Excel Options'.
3. In the window that opens, click then 'Show Developer tab in the Ribbon'.
4. Click the 'Developer' tab.
5. Click 'Visual Basic'.
6. Right click on 'Modules' and Insert a Module.

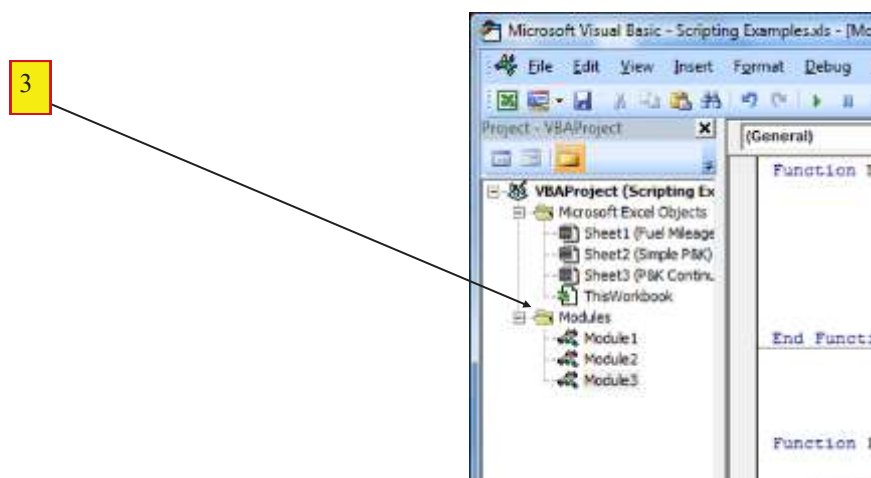
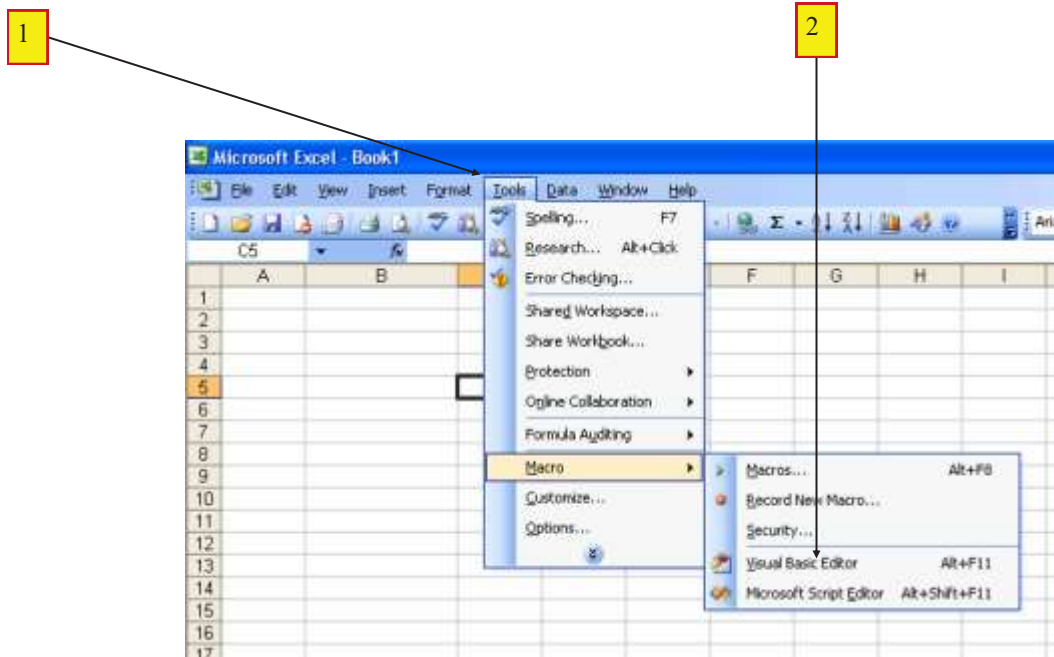


Opening a Script Editor in Excel 2003

One really neat way to debug and develop functions for use in Map Math is to use Excel to develop that code. There are features like the ability to insert breakpoints and develop tests for viewing how a script works.

In Excel 2003, here is how to set up the scripting process.

1. Start with a blank "Book1" then click the 'Start Button'.
2. Click Tools-Visual Basic Editor.
3. Right click on 'Modules' and Insert a Module.



P & K continued—Introducing—Select Case

Using Select Case is a way of re-directing which path the script will use when it runs.

A simple example of using Select Case is shown below with the InField function.

If you remember the InField function returns a **TRUE** if the current cell is in the field, and a **FALSE** if it isn't.

```
Select Case InField
    Case True
        'Do this if I am in the field

    Case False
        'Do this if I am not
End Select
```

An example to the right demonstrates using an Enumeration of the map to build in a Select Case statement.

In this case, it will determine which output map will be created.

It is a very powerful Tool that allows for compound tests like below. This example has nothing to do with Map Math but demonstrates a way to Divide by Ranges

```
Dim Number as Integer =8
```

```
Select Case Number
    Case 1 To 5
        Return 3
    Case 6 to 10
        Return 8
    Case 11 ,12
        Return 11
    Case 13 To 15
        Return 15
    Case Is > 20
        Return 20
    Case Else
        Return 15
End Select
```

```
Dim P205 As Single
Dim K20 As Single
Dim MakeMap As Output

Dim OlsenPST As Single = Rasters("P_OLSEN").Value
Dim ExpYield As Single = Rasters("2005 Corn Yield").Value
Dim KST As Single = Rasters("K_UNSPEC").Value

MakeMap = Output.P

If InField Then

    Select Case MakeMap
        Case Output.P

            'Check To See If it Is Less Than 20 ppm
            If OlsenPST < 20 Then
                P205 = (0.7 - (.044 * OlsenPST)) *
ExpYield
            Else
                P205 = 0
            End If

            'Send the Value to the Map
            Return P205

        Case Output.K

            'Check To See If it Is Less Than 175 ppm
            If KST < 175 Then
                K20 = (1.166 - (.0073 * KST)) * ExpYield
            Else
                'It was over 175 ppm so apply 0
                K20 = 0
            End If

            'Send the Value to the Map
            Return K20

    End Select

Else
    'Wasn't in the Map Return a Null Value
    Return NullVal
End If

'Outside of the Main Function these 3 lines need to be Added.
'This makes for the selection of P or K at the MakeMap variable.

Private Enum Output
    P
    K
End Enum
```

More Complex Functions

Wrap Up the P and K as Functions

Below we add some more necessary calculations, and wrap it into a Function.

```
Private Shared Function CalcNitrogenNDSURec (EXPYIELD As Single, NitrogenSoilTest As Single, OLSEN PST As Single, _
MinimumApp As Single, MaximumApp As Single, NProductNConc As Single, _
PProductNConc As Single, PProductPConc As Single, MinPApp As Single, _
MaxPApp As Single) As Single
```

```
Dim NFromP As Single
Dim P2App As Single
Dim NtoApply As Single
```

```
P2App = CalcPhosphateUofMRec (EXPYIELD, OLSEN PST, MinPApp, MaxPApp, PProductNConc, PProductPConc, NFromP)
```

```
NtoApply = (EXPYIELD * 1.2) - NitrogenSoilTest - NFromP
CalcNitrogenNDSURec = NtoApply / NProductNConc
```

```
End Function
```

```
Private Shared Function CalcPhosphateUofMRec (OlsenPST As Single, YieldGoal As Single, ProductPConc As Single, _
ProductNConc As Single, ByRef NFromP As Single) As Single
```

```
'The ByRef Keyword allows the function to Modify the NFromP value, in Effect Returning how
'much N is coming along with the Phosphate Product
```

```
Dim PProdPounds As Single
'Check To See If it Is Less Than 20 ppm
If OlsenPST < 20 Then
    P2O5 = (0.7 - (.044 * OlsenPST)) * YieldGoal
Else
    P2O5 = 0
End If
```

```
If P2O5<0 Then P2O5=0
```

```
'Calculate the Product Pounds
PProdPounds=P2O5 / ProductPConc
```

```
'Calculate how much N comes with the P
NFromP=PProdPounds * ProductPConc
```

```
'Send the Value to the Map
Return PProdPounds
```

```
End Function
```

```
Private Shared Function CalcPotashUofMRec (KST As Single, YieldGoal As Single, ProductKConc As Single) As Single
```

```
'Check To See If it Is Less Than 175 ppm
If KST < 175 Then
    K2O = (1.166 - (.0073 * KST)) * YieldGoal
Else
    'It was over 175 ppm so apply 0
    K2O = 0
End If
```

```
If K2O<0 then K2O=0
```

```
'Send the Value to the Map
Return K2O/ProductKConc
```

```
End Function
```

Script Written Using Functions

The main purpose of using functions is to break code into smaller, bite size modules that allow you to better follow what is going on in the script. You can see below that it does simplify the code greatly.

```
Dim P205 As Single
```

```
Dim K20 As Single
```

```
Dim MakeMap As Output
```

```
Dim NitrogenSoilTest as Single=40
```

```
Dim ExpYield As Single = Rasters("2005 Corn Yield").Value
```

```
Dim OlsenPST As Single = Rasters("P_OLSEN").Value
```

```
Dim KST As Single = Rasters("K_UNSPEC").Value
```

```
MakeMap = Output.N
```

```
If InField Then
```

```
    Select Case MakeMap
```

```
        Case Output.N
```

```
            Return CalcNitrogenNDSURec (EXPYIELD, NitrogenSoilTest, OLSEN PST,  
                MinimumApp, MaximumApp A, NProductNConc, PProductNConc ,  
                PProductPConc , MinPApp , MaxPApp )
```

```
        Case Output.P
```

```
            Return CalcPhospateUofMRec (OlsenPST, ExpYield, 0.52, 0.11, NFromP)
```

```
        Case Output.K
```

```
            Return CalcPotashUofMRec (KST, ExpYield, 0.6)
```

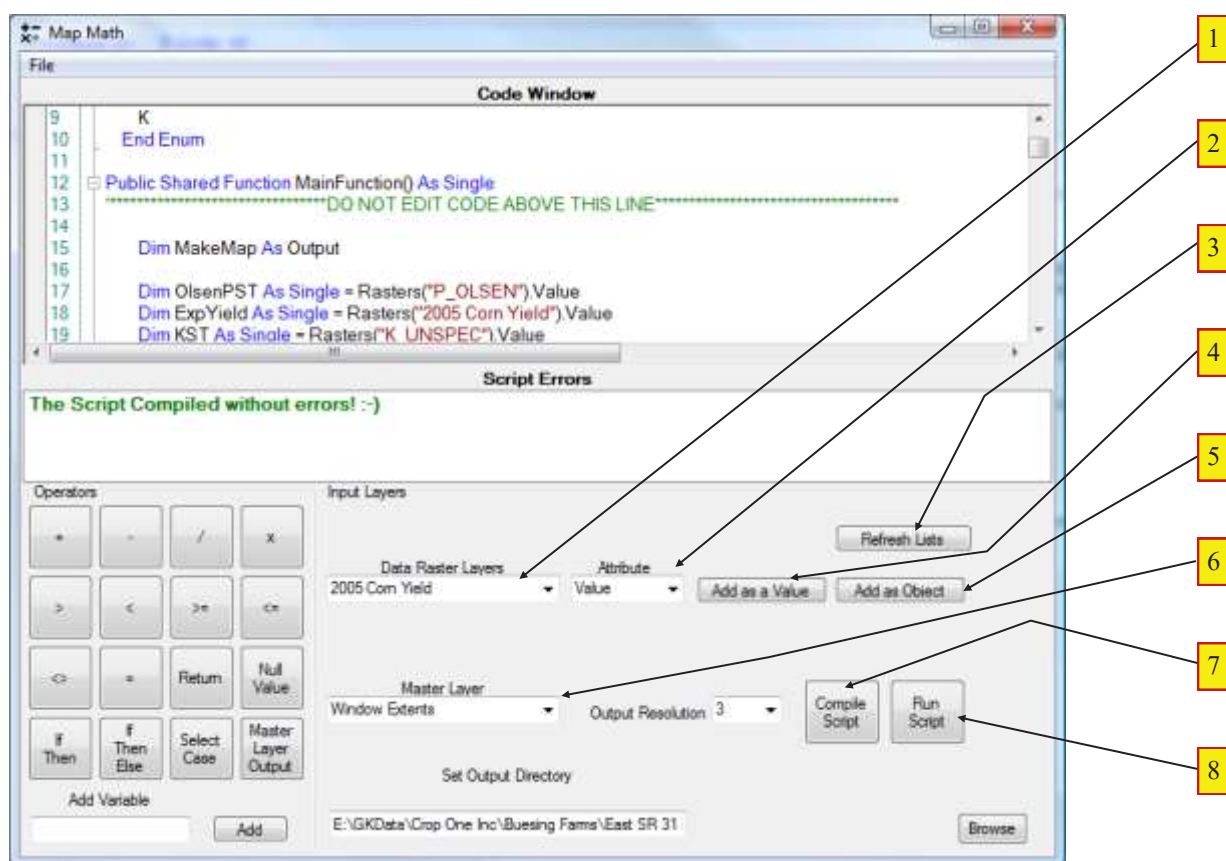
```
    End Select
```

```
Else
```

```
    Return NullVal
```

```
End If
```


Map Math Controls



1. A list of raster layers loaded in the map that can be used in the script.
2. An attribute for the layer, Min, Max, or Mean for that layer that can be accessed.
3. Click this button to add any new layers that have been turned on in the map since the Map Math window was opened.
4. Adds a string to the master script that provides access to the value in a map layer.
5. Adds a string to the script that provides access to the layer as a Raster "Object".
6. Selects how far the extents of the processing should go, the whole window or just a certain layer.
7. Compiles the script and displays errors and the line numbers of those errors.
8. Runs the script and creates a new raster layer called "Map Math Output".

System.Math Functions

Name	Description
Abs	Overloaded. Returns the absolute value of a specified number.
Acos	Returns the angle whose cosine is the specified number.
Asin	Returns the angle whose sine is the specified number.
Atan	Returns the angle whose tangent is the specified number.
Atan2	Returns the angle whose tangent is the quotient of two specified numbers.
BigMul	Produces the full product of two 32-bit numbers.
Ceiling	Overloaded. Returns the smallest integer greater than or equal to the specified number.
Cos	Returns the cosine of the specified angle.
Cosh	Returns the hyperbolic cosine of the specified angle.
DivRem	Overloaded. Calculates the quotient of two numbers and also returns the remainder in an output parameter.
Exp	Returns e raised to the specified power.
Floor	Overloaded. Returns the largest integer less than or equal to the specified number.
IEEERemainder	Returns the remainder resulting from the division of a specified number by another specified number.
Log	Overloaded. Returns the logarithm of a specified number.
Log10	Returns the base 10 logarithm of a specified number.
Max	Overloaded. Returns the larger of two specified numbers.
Min	Overloaded. Returns the smaller of two numbers.
Pow	Returns a specified number raised to the specified power.
Round	Overloaded. Rounds a value to the nearest integer or specified number of decimal places.
Sign	Overloaded. Returns a value indicating the sign of a number.
Sin	Returns the sine of the specified angle.
Sinh	Returns the hyperbolic sine of the specified angle.
Sqrt	Returns the square root of a specified number.
Tan	Returns the tangent of the specified angle.
Tanh	Returns the hyperbolic tangent of the specified angle.
Truncate	Overloaded. Calculates the integral part of a number.

Scripting—Using GK Created Scripts

The instructions in “Using GK Created Scripts” will walk you through some of the most common scripts used in Ag Data Mapping Solution. There are MANY more script that can be used or created. The idea below will tell you a little about the script and what it does and what data you have to enter.

Reminders – Here are some “Scripting Terms” to remember as you are reading through the scripting instructions below.

Null Value = essentially areas in a surface that have “Pixels” with no “Data Value”. This means it is not a 0 to 1,000,000,000 value, it is a NULL VALUE. See the scripting section on “What is a Null Value?” for further explanation.

If in Field = if there is a hole in one surface (no data in an area), then there is a hole in the output surface of that field. Because there is data missing in one map the math operation will NOT run on that area, returning a NULL VALUE (not zeros).

Upon creating your “MapMath” layers, we suggest “SAVE AS” and renaming your layer to represent your newly created map.

-Script Explanations-

2 Layer Add – Will Add 2 surfaces in the “Same Field”, using “If in Field” logic.

- To assign different “UNITS” on line 8 (default – lbs/ac)
- Assign Input Surface names on lines 16 & 17 (Add as a Value)
- The “Math” is done on line 22
- Useful for checking total seed in Soybean “Offensive-Defensive Soybean” Seeding maps
- Creates a new Surface named “MapMath-2LayerAdd.grd”

2 Layer Difference – Will Subtract 2 surfaces in the “Same Field”, using “If in Field” logic.

- To assign different “UNITS” on line 8 (default –Units/Ac)
- Assign Input Surface names on lines 19 & 20 (Add as a Value)
- The “Math” is done on line 23
- Useful for checking your “LIDAR vs RTK” Elevation maps
- Creates a new Surface named “MapMath-2LayerDiff.grd”

Scripting—Using GK Created Scripts

Apply Liner Values – Allows the user to enter an “AVERAGE” rate you would like applied on a field. Then assign a Low Rate % and a High Rate % indicating how much you want to go down & up from the Average rate. NOTE: Input layer should be a layer that represents “PRODUCTION or YIELD” of a field.

- Assign Input Surface name on line 21 (Add as Object)
- Line 22 = Average Rate to apply (example 120 lbs/acre wheat seed)
- Line 23 = Low Rate % (example 30 – create a low rate of 84 lbs/acre)
- Line 24 = High Rate % (example 20 – create a high rate of 144 lbs/acre)
- Example Note – VRT would go from 84 to 144 and the average would be “ROUGHLY” 120

The average is usually off a little, based on the math being done in a “linear” equation and the spatial data is not.

- The “Math” is done on line 37-50 (do not edit)
- To assign different “UNITS” on line 60 (default –lbs/acre)
- Useful for creating fertility maps and seeding maps
- ** GK Technology Inc. recommends Zone Soil Testing and assigning rates to zones **
- Creates a new Surface named “Map Math Output.grd”
- Consider renaming on line 9

Average All Layers-Equalized – Will Equalize all the layers turned on, Add them together, takes a count of how many surfaces are turned on and return an Average Equalized Layer, using “If in Field” logic.

- To assign different “UNITS” on line 8 (default –Units/Ac)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 21-26
- Useful for merging multiple years of data (Ex. Yield / Imagery / Topo / Veris)
- Creates a new Surface named “Layers Merged-Eq.grd”
- Consider renaming on line 7

Average All Layers-Equalized-wHoles – Will Equalize all the layers turned on, Add them together, takes a count of how many surfaces are turned on and return an Average Equalized Layer, using “Null Value” logic. This means that the areas of maps that have “Holes” (missing data) will calculate their own values.

- To assign different “UNITS” on line 8 (default –Units/Ac)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 22-31
- Useful for merging multiple years of data (Ex. Yield / Imagery / Topo / Veris)
- Creates a new Surface named “Layers Merged-EqH.grd”
- Consider renaming on line 7

Scripting—Using GK Created Scripts

Corn Seed-Max-Min – Will give you a “Corn Seeding Rate” based of a Divisor & Yield Map. Requires a Yield Map or a Yield Goal map to use this script. Useful for creating Corn Seeding Maps.

- Assign Input Surface name on line 28 (Add as a Value)
- Line 22 = Minimum Seed Rate
- Line 23 = Maximum Seed Rate
- Line 24 = Divisor value (X) (Example $-(\text{Yield Goal} / X) * 1000 = \text{Seeding Rate}$)
- Line 31 = Seeding Rate Increment (1000 will give seeding rates of 30,000 & 31,000 with no rates between)
- The “Math” is done on line 38-44
- Creates a new Surface named “Corn Seed.grd”

Merge All Visible-Lbs-Ac – Uses the “null values” function. This script will return the value at each pixel on each map. If the maps overlap, it will return the value of the first map turned on.

- To assign different “UNITS” on line 8 (default –LbsAc)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 19
- Useful for merging data from multiple adjacent fields.
- Creates a new Surface named “Merged Layers.grd”

Merge All Visible-Normalized - Uses the “null values” function. The script will “Normalize” all the surfaces that are turned on and visible. This script will return the value at each pixel on each map. If the maps overlap, it will return the value of the first map turned on.

- To assign different “UNITS” on line 8 (default –Units/Ac)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 20
- Useful for merging data from multiple adjacent fields.
- Creates a new Surface named “Merged Layer-Normalized.grd”

Min-Max Lbs-Ac - Uses the “null values” function. The script will take a “Prescription map.grd” and allow you to set the Max and Min rates you will use. So if you had a map that went from 0 - 330 lbs. of UREA with a rate at every pound 0,1,2,3....., and your “Spreader” could only spread 0 & 100-300 lbs. of Urea (rates from 1-99 cause erratic rates). You can set parameters to make rates to fit the controller limitations.

- To assign different “UNITS” on line 8 (default –Lbs/Ac)
- Assign Input Surface name on lines 20 (Add as a Value)
- Assign “ZeroBreak” on line 23 - any pixel value in the map lower than this will go to “0” & any value higher than this value, but lower than the “MinRate” will become the “MinRate” value.
- Assign “MinRate” on line 25 – aside from “0” this will be the lowest rate on the map.
- Assign “MaxRate” on line 27 – This is the max value that will be assigned in the map, any values higher than that value will become the “MaxRate” value.
- The “Math” is done on line 32-44
- Creates a new Surface named “Map Math Output.grd”

Scripting—Using GK Created Scripts

Net Revenue - Uses the "If in Field" function. The script will require Yield data, all your VRT seed and fertilizers for the field you are working on. You will also need to have values for the selling price per bushel, cost per ton of product (fertilizer), the cost per bag of seed and the Fixed cost for the farm (less the VRT products).

- Line 7 will create a new Surface named "Net Revenue.grd"
- To assign different "UNITS" on line 8 (default -Dollars/Acre)
- Assign Input Surface name on lines 19-25 (Add as a Value)
- Assign the values for commodity, fertilizer, seed and fixed cost on lines 28-42
- The "Math" is done on line 48
- Note: before closing this script, suggest saving these values and renaming to save time.
 - Example - Save & Rename "Net Revenue-Corn-2018"

YieldMaxLayer - Uses the "If in Field" logic. Looks through all the layers turned on and finds the layer with the highest value at every pixel. This script is designed to work with yield data from the "Same Crop" on a given field.

- Creates a new Surface named "Yield Max Layer.grd" on line 7
- To assign different "UNITS" on line 8 (default -bu/ac)
- Runs Script on all Surfaces that are turned on!!
- The "Math" is done on line 20-22
- Useful for finding - maximum potential yield on any one crop with multiple years of yield data.

Quick Notes for GPS—In Field General



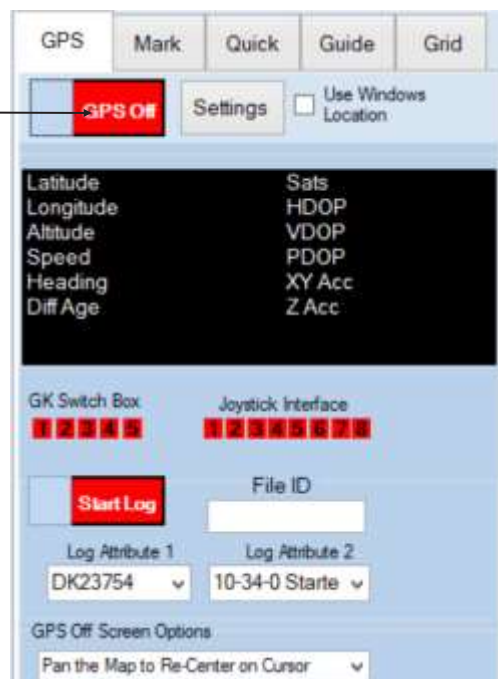
Starting—New Field

1. Click on the **“Log & Sample”** button.
2. Select the Grower, Farm, and Field you want to work with.
3. Turn on the Maps that you want to work with.
 - Put a “Check” in front of the name
 - Example—  **SH 8 Zones 2015.grd**
 ⇒ Need Zones on for sampling
More data is not a bad thing, use what you like.



Connect GPS

4. Go to the **“GPS”** tab
5. Connect GPS—  —
6. Your cursor will show you your location on the screen to the Right Side.



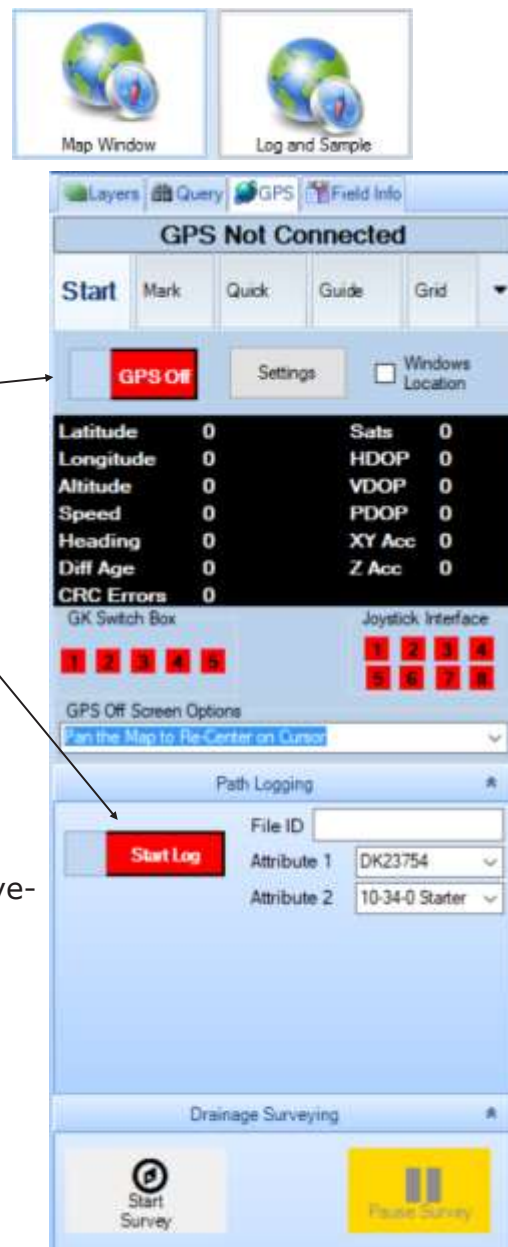
Quick Notes For GPS—In Field QM Points

Starting New Data Collection

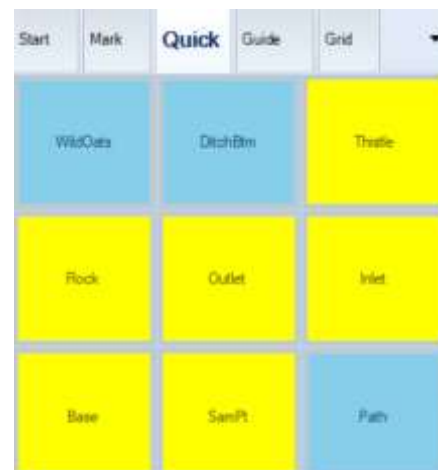
1. Open "Map Window" or "Log and Sample."
2. Select the Grower, Farm, and Field you want to work with.
3. Turn on the Map that you want to work with.

Connect GPS

4. Go to the "GPS" tab
5. Connect GPS—
6. To Collect Topo—"Start Log" ☐ "Log Path" ☐
 - ⇒ *This is your Topo "Collection"*
7. If you want to mark other "Points" - Go to the **"Quick"** tab
 - a. Naming Quick Marks—Go to the "GPS" tab
 - b. Click on Settings Button
 - c. Recommend settings like below
 - d. Name "Quick Marks" as you see fit
 - i. Limited to 8 characters
 - ii. Continuous—Will collect a point every second or every 2 feet.



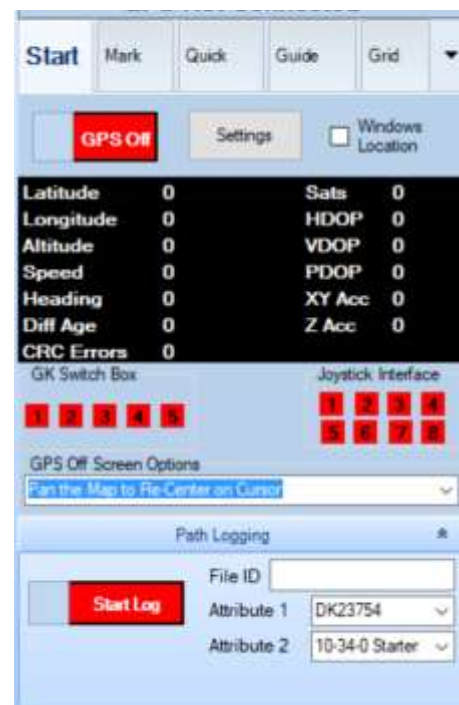
8. To use the Quick Marks, simply click on the button you want to mark.
9. Go to your new field and start at the top of the page.



Quick Notes For GPS—In Field Lines & Boundaries

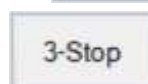
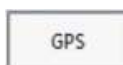
Starting a New Data Collection

1. Open the “Map Window” or “Log and Sample.”
2. Select the Grower, Farm, and Field you want to work with.
3. Go to the “GPS Mark” tab.
4. Under the “GPS” tab *Connect to GPS*.
 - a. Click—**GPS Off** (top button)



Marking Lines & Boundaries

5. Go to the “GPS” tab
6. Go to the “Mark” tab
7. “Select a Destination” (ex. Boundary)
8. Move to the location in the “field” where you want to start collecting data.
9. Click “1-Start” to begin collecting your line or boundary.
10. Click “3-Stop” when you get to the end of the line or boundary.
11. Repeat previous 2 steps until you finished collecting the lines or boundaries.
12. When finished with the field. “Stop” GPS and close the software and start over at the beginning at Step 1.

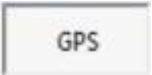


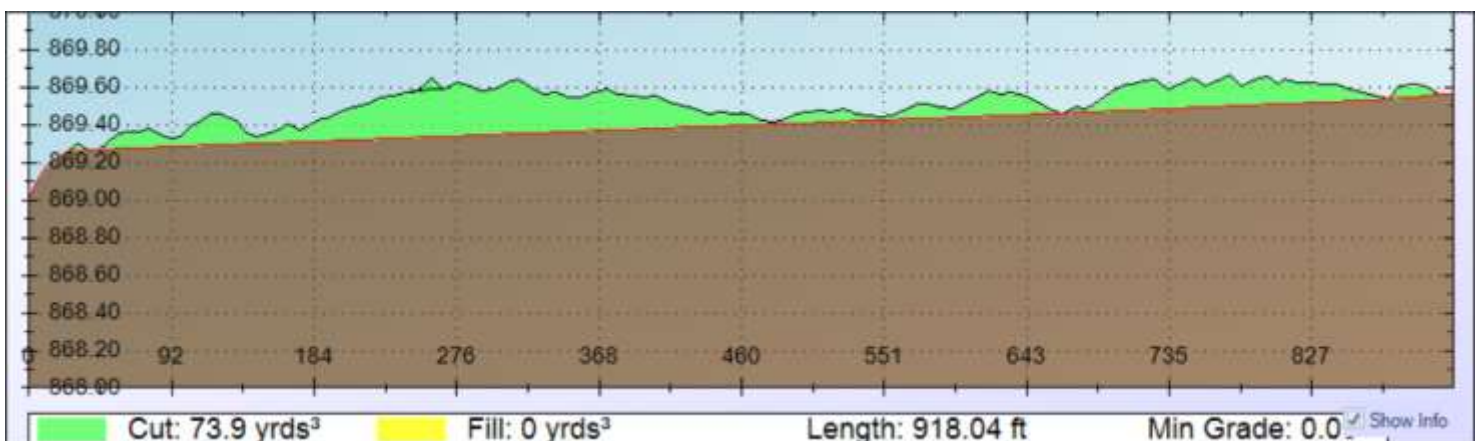
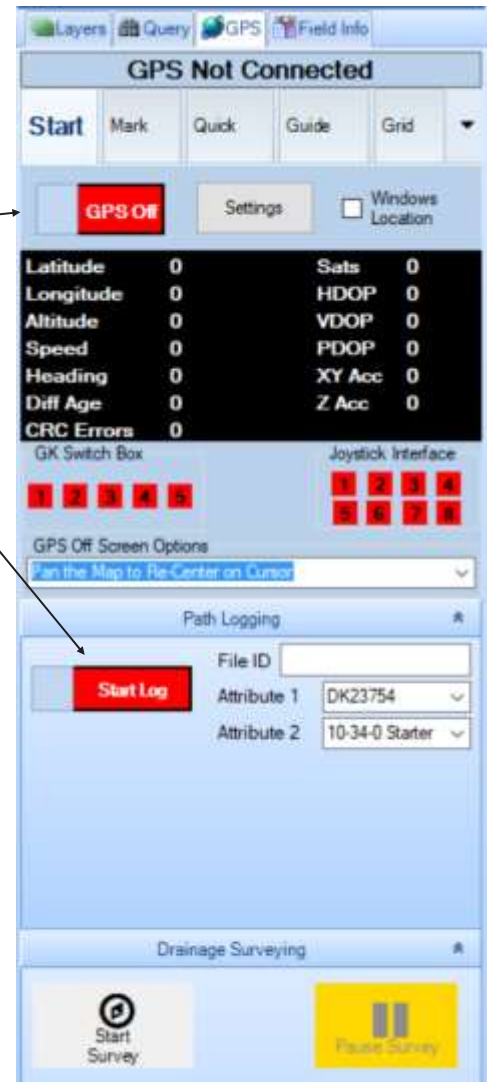
Quick Notes For GPS—Drainage Survey

Starting New Data Collection

1. Open one of these windows. 
2. Select the Grower, Farm, and Field you want to work with.
3. Turn on the Maps that you want to work with / view.

Connect GPS

4. Go to the "GPS" tab 
5. Connect GPS— 
6. To Collect Topo—"Start Log" ☐ "Log Path" 
 - ⇒ This is your Topo "Collection"
 - ⇒ Not Needed but suggested
7. If you want to mark other "Points" - Go to the **"Quick"** tab
8. Click open the "Drainage Survey"
9. Go to the hole / area to be drained
10. Surveys must be ran in the direction of water flow.
11. Click the "Start Survey" button
12. Drive ditch / tile line (pause to go around obstructions). In the drainage windows you will see profile generate as you drive.
13. Click "Stop Survey" at the end of the ditch / tile
14. If you are in the "Drainage" or "Tile" windows, a "PROFILE" will appear at the bottom of the window.



Quick Notes For GPS—Setup Instructions

GPS Settings—Get Connected



1. Click "Find GPS"

ADMS will search the Communications Ports or COM Ports for GPS data, using different Baud Rates.

2. Once it finds GPS. Suggest Clicking the "View GPS Data"

3. GPS—NEMA strings will appear. ADMS requires

- \$GPGGA
- \$GPGSA
- \$GPRMC or \$GPVTG
- \$GPGST—optional

4. If all looks good, Click "Stop Test"

GPS Config—Warning Criteria

Suggested setting (Soil Sampling)

Suggested Settings (RTK Data Collection)

Quick Notes For GPS—Setup Instructions

General GPS Information

Generally there are 2 major uses for GPS coming into ADMS

1. General Position—most cases this data is coming in via USB or Bluetooth. Most of the time the NEMA strings here are locked and cannot be adjusted.
2. High Accuracy RTK—most cases the data is coming in via 9 pin Serial connection. Most systems have adjustable Baud Rates and GPS Hertz rates (Hz). Most systems need to be adjusted before connecting to ADMS.

Baud Rate—is generally the number of bits per second. To find out what the baud rate is set to, suggest using the "Find GPS" function of ADMS. (NOTE: To collect GPS Data at 5 Hz you must be set to 19200 or higher on your Baud rate)

GPS Hertz or Hz is defines 1 Hz as one cycle per second or in the GPS function, one GPS Data String per second.

- Hz	=	Data String / 1sec	=	Seconds / 1Data String	=	ADMS Config Value
- 0.5	=	0.5 Strings/1 sec	=	0.5 / 1 = 2 Sec/String	=	2
- 1	=	1 Strings/1 sec	=	1 / 1 = 1 Sec/String	=	1
- 5	=	5 Strings/1 sec	=	5 / 1 = 0.2 Sec/String	=	0.2
- 10	=	10 Strings/1 sec	=	10 / 1 = 0.1 Sec/String	=	0.1

3 GPS NEMA Strings (required & 1 optional)

(National Marine Electronics Association)

- **GGA**—GPS fix location, supplying Longitude, Latitude, number of satellites, signal quality, and altitude.
- **GSA**—GPS quality DOP (dilution of precision) of active satellites.
- **RMC**—GPS time, date, speed, and heading information. If RMC is not available **VTG** can be used.
- **GST**—(Optional) - give GPS vertical and horizontal error in "meters"

Windows—"Device Manager" - Manual GPS Check

1. **GPS Port**—To find out if your GPS registered a COM port # , "Right Click" on the "My Computer" or "This PC" icon, then select "Manage".
2. This will open your "Computer Management" window. Select "Device Manager" and "Ports (COM & LPT)." You should see a series of PORT numbers similar to below. Pick out the one that matches the port you are connecting to. If you are unsure, it may be a trial and error method in Ag Data Mapping Solutions.



VR Control Quick Start Guide

Selecting a Controller:

On the Controller Tab of the Controller Tab, you will see a Setup button.

This is where you select the controller that will be connected. You need to know the com port that the controller is connected to, the baud rates are pre-selected.

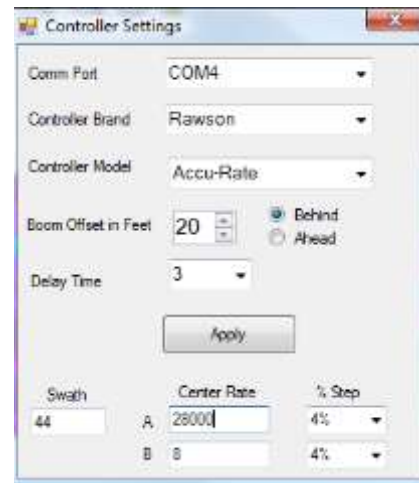
Select your Controller Brand and Controller Model and the Boom Offset from the GPS to the point of application in feet.

A delay time is provided for fine tuning the application. Since the GPS position that arrives at the computer is already where you were 1 second ago and it takes another second to send the rate to the controller and a couple of seconds for the controller to change rates, the delay time needs to be 3-4 seconds for most applications.

Several controller specific settings may also be on the bottom of the form.

The Variable Rate Unlock in Ag Data Mapping Solution provides for variable rate control with several aftermarket rate controllers. The current list includes:

- **AgTron Drill Manager**
- **GK Technology Relay Interface**
- **Hiniker 8605**
- **New Leader Mark III and Mark IV**
- **Raven 440, 450, 460, 660, 750, 760, 4000, 4600, 5000**
- **Rawson Accu-Plant and Accu-Rate**



Raven Configuration:

For Raven controllers to function properly, several settings need to be made in the data menu.

Refer to the individual product manual for additional help making these settings.

Applications are made with switch in Rate 1 position.

• Trigger Units	Seconds
• Trigger Value	1
• Baud Rate	9600
• DLog	On

The required cable connection varies by model and can be found in your Raven manual. Or contact us for assistance.

Rawson Configuration:

Rawson controllers need to be set to GPS mode. The value that has been set for the center rate position, and the Step Percentages and the swath width need to be entered in controller setup.

The cable required is a straight through male-female serial cable.

GK Technology Relay Interface:

Contact us for more information. The relay interface can be configured to trigger clutches or valves or trigger other events based on values in a map.

The controller is a pass through device that lives on the same serial port as the GPS.

VR Control Quick Start Guide

Start GPS:

On the main map window, click **"VR Control"** to start. Note that there are three main tabs; **GPS**, **Controller** & **LightBar**.

Under each of the tabs, there are three tabs. In the case of the GPS tab, you can see that they are GPS, Mark, and Quick Marks.

The first tab to display will be the GPS tab.

GPS port and connection information is displayed in the Preferences tab of the main program.

Click Connect GPS. When GPS Status is good to go, the Status bars will be **green**.

Select Prescriptions:

Use the drop down boxes to select the Grower, Farm and Field. When you have the proper field, the data available for that field will be displayed in the tree. Prescription files can either be .grd or .bmp files.

Check the box next to the file to load it. Depending on the application, you may be loading more than one file. Also, a file may be inside a folder. If it is, you will need to click the "+" sign next to the folder to open it.

The toolbar on the bottom of the data tree has a few tools used for maintenance. The last button, a red **X** on the toolbar, is a button to clear the map between fields.

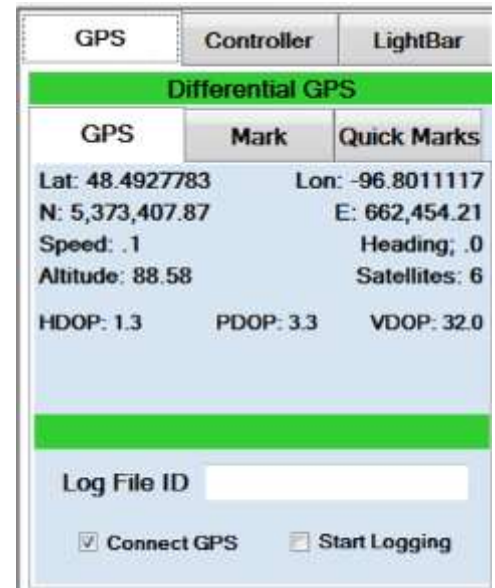
Start Controller:

Below is the interface for tying a map to a channel on a controller. In this case, the controller only has one channel. Maps that have been loaded show up in the drop down box that currently is displaying "None". Assign the map to be applied to the controller channel doing the application.

You can add other information about the application in the App ID box. You can also select Spray-Spread-Seed-Other, to add additional information to the file name that contains the as-applied data.

Check the box next to Connect to start the controller. Then click the **"Run"** tab to display the tab that will show a summary of what is happening with the controller and the GPS.

Click the globe on the toolbar to zoom out to the whole field. See the Ag Data Mapping Solution help file for assistance with the other buttons.



Veris Logging

Hardware Setup

The cable connection between the Veris box and the serial port of the PC requires hardware handshaking, so a full 9 pin serial cable is required. (A full 9 pin null modem adapter may also be required.)

Once you get to the bottom of this page you can adjust the configuration in the settings window.

Press Any Key

**Veris 1.77d You have 6088 min. available
Press any key**

Press the #2 Key

**1) Download/Delete old files
2) Continue**

Press the #2 Key

**1) Begin data acquisition 3) Probe
2) Output to external PC 4) Quit**

Press Any Key

Press any key to start (Any key to stop)

Up and Running

**SERIAL OUTPUT ONLY Shallow: 10.5
Not storing data Deep: 15.3**

Veris Logging

Cables

DB9 F-F 25



DB9 AD M-F NM



Both of these items are available at <http://www.yourcablestore.com/>. We also have these in stock.

Any good precision ag tool kit should contain several of these setups along with various gender changers, which are also available on this site.

Veris Logging

Software Setup

Settings for Veris logging mostly have to do with obtaining the proper communication ports to which the equipment is connected.



Settings

On the main screen of Ag Data Mapping Solution, click the **"Settings"** button, or click Tools-Preferences. The dialog to the right will appear. Click the **"GPS Settings"** tab.

If you do not know the comm ports that are available on your system, click **"Open Device Manager"**, click the **"+"** sign next to ports. You can see that on my system, I have 4 useable com ports COM2, COM3, COM4, and COM5.

Many computers will have a long list of Bluetooth ports, either write down, or make a mental note about what is available. COM17 and COM18 on my computer are serial ports on my Blackberry. You can then close the "Device Manager" dialog.

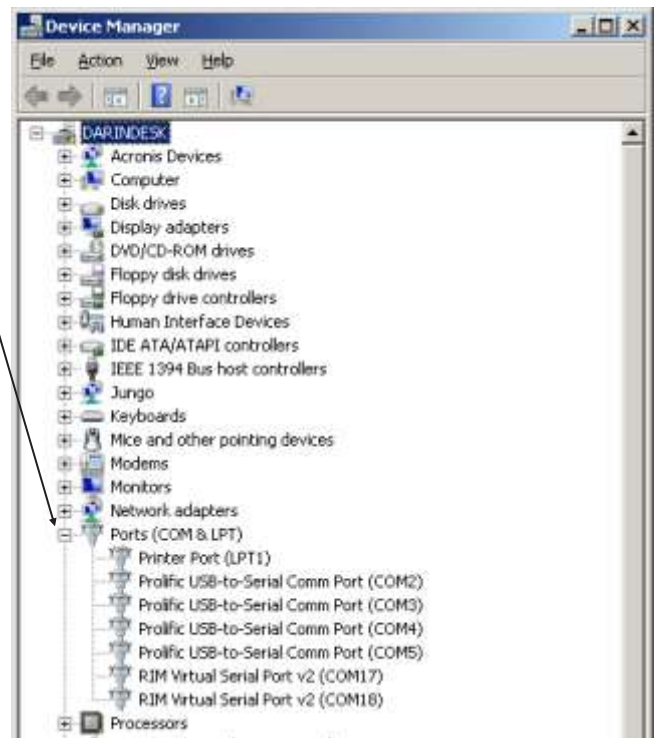
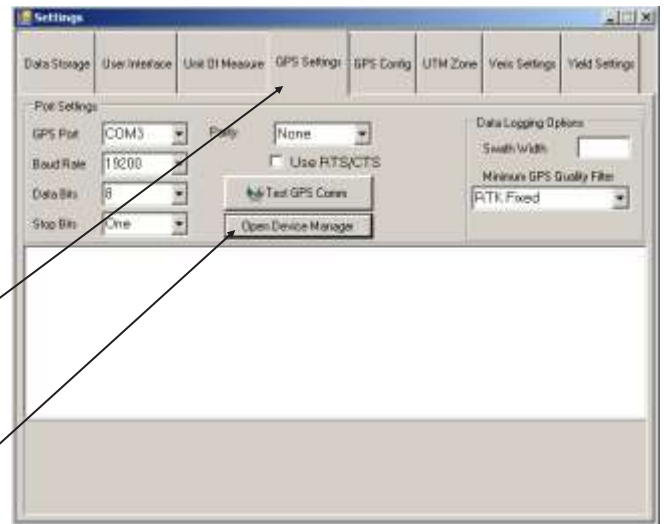
Choose a COM port and baud rate selection. Data like that in the dialog below should appear. Click **"Test GPS Comm"**.

Data may or may not appear in the white text box.

If nothing appears, then the wrong port is probably selected.

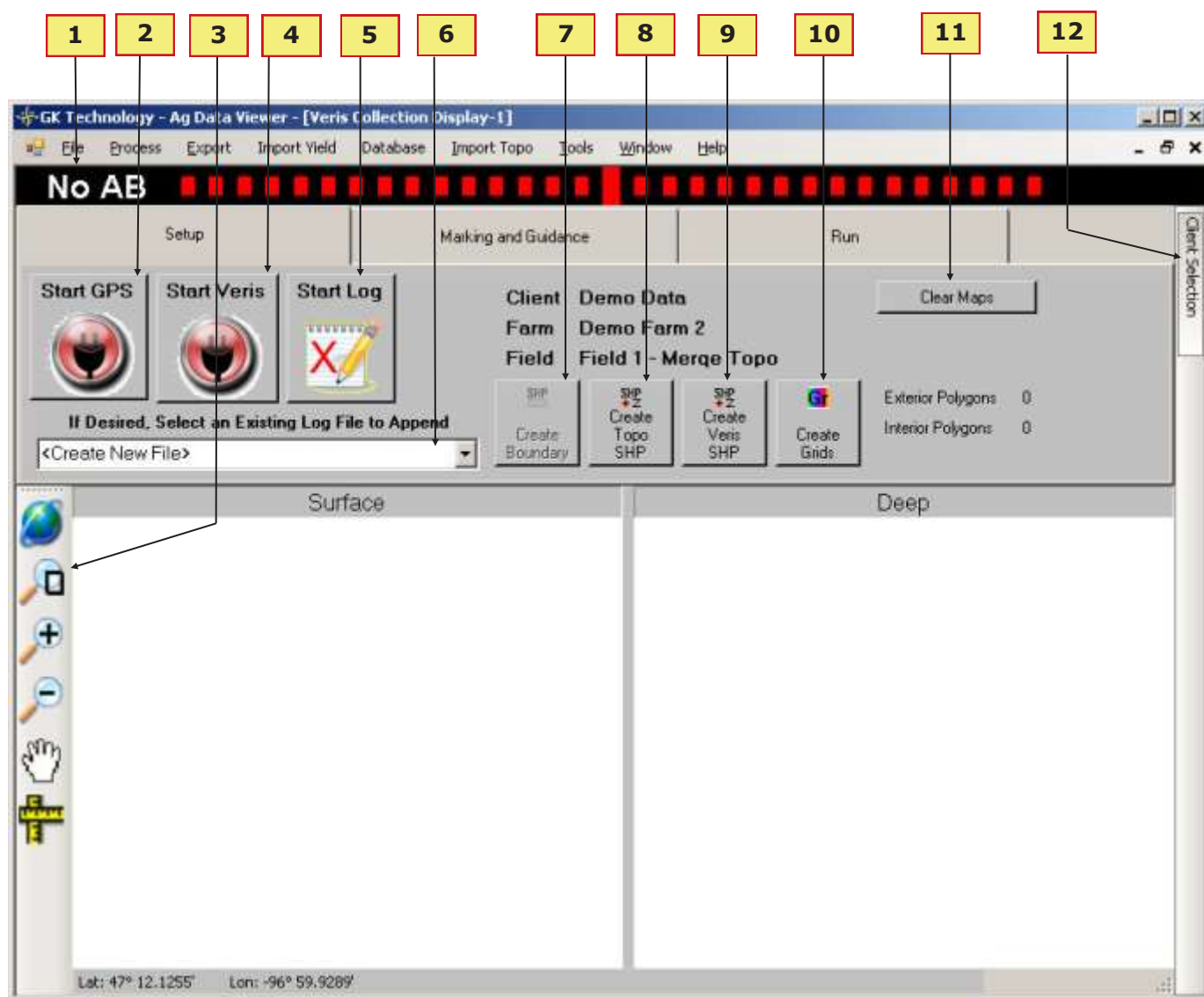
If foreign garbage characters appear, you probably need to change baud rates. Close the port between baud rate changes. **"Stop Test"**.

When data appears like in the dialog to the right, GPS settings are done.



Veris Logging

Items on the "Run" tab



1. Light Bar Display
2. Start-Stop GPS Button
3. Map Scaling Toolbar
4. Start-Stop Veris Button
5. Start-Stop Log to File Button
6. Open an Existing Log File
7. Create Boundary Button from Logged Data
8. Create Topo Shapefile from Logged Data
9. Create Veris Shapefile from Logged Data
10. Create Grids from Logged Data
11. Clear Maps
12. Grower Farm Field Selection Dialog

Using Web Based Background Layers—WMS Layers



Using WMS Servers

WMS servers are a web based map server that can be accessed through ADMS with an active internet connection. Most of them are state or region specific and are not available in all areas.

Finding WMS Links:

The easiest way to find new WMS links is by simply searching the web for them.

Here are some examples of WMS links:

MN: <http://geoint.lmic.state.mn.us/cgi-bin/wmsII?>

ND: http://ndgishub.nd.gov/ArcGIS/services/All_Imagery/MapServer/WMServer?

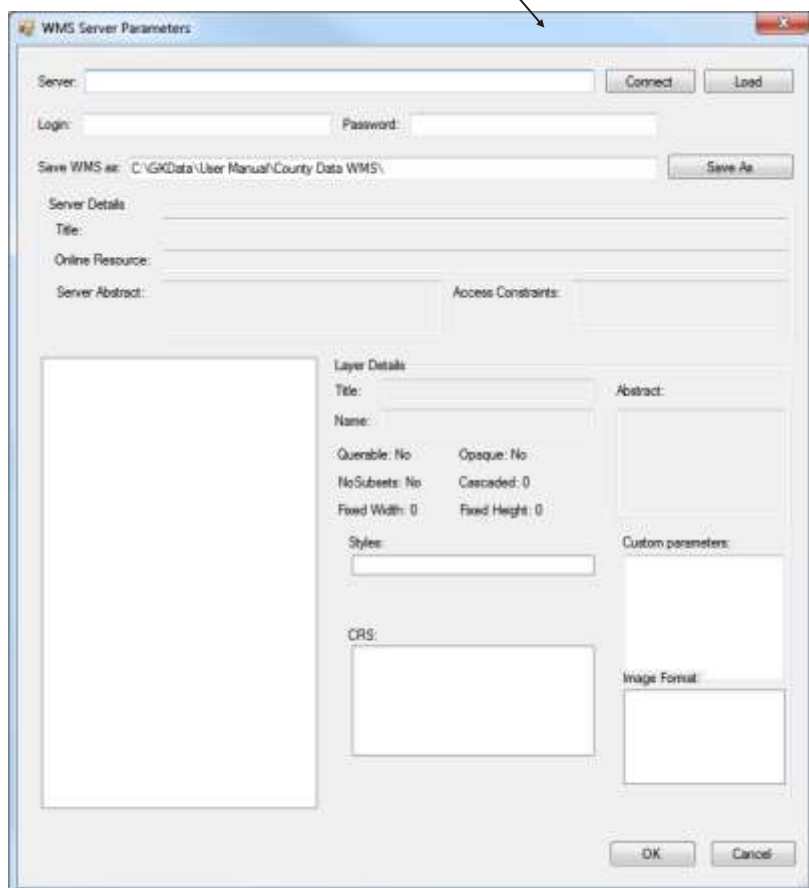
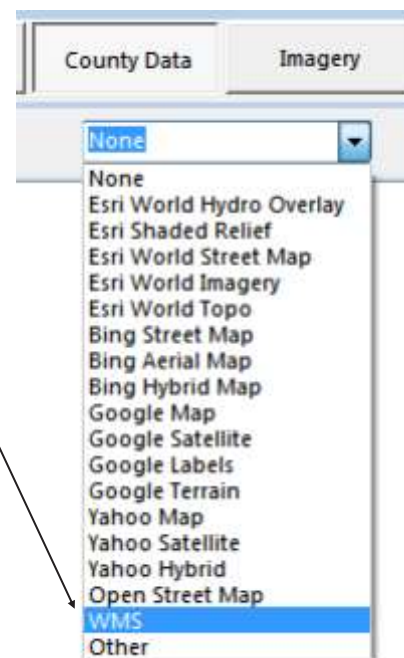
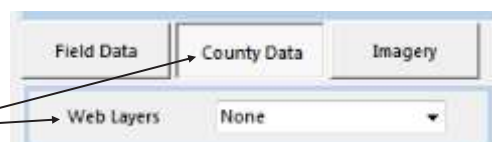
Adding WMS Links:

Select "County Data" so the "Web Layers" dropdown is visible.

From the "Web Layers" dropdown menu select "WMS."

The "WMS Server Parameters" window will appear.

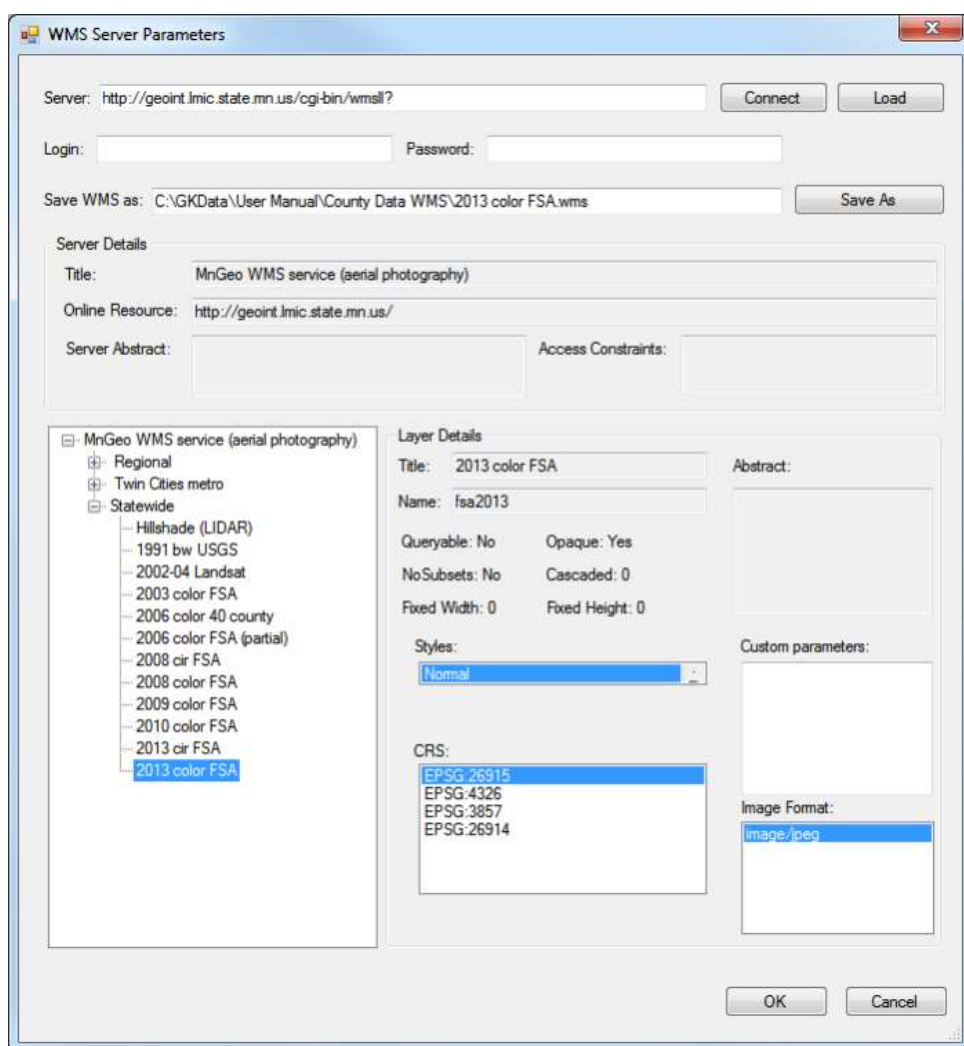
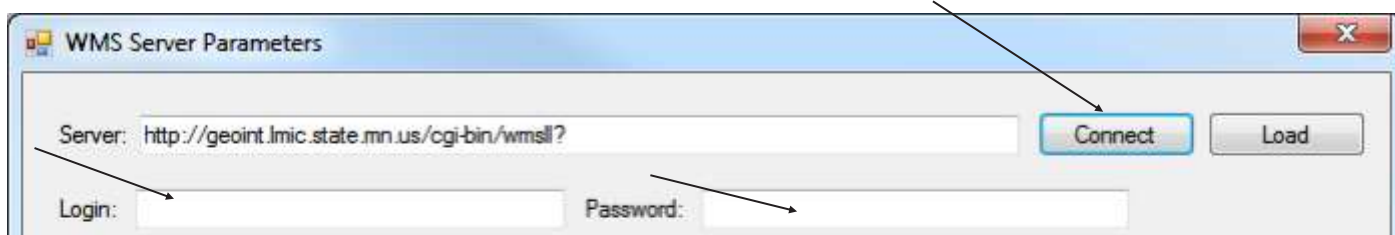
This window allows different links to be saved to the data tree and utilized within ADMS.



Using Web Based Background Layers—WMS Layers

The following example will use the MN WMS server link.

1. Enter the WMS server link where it says "Server."
2. Click "Connect."
 - * Some servers need special authentication which may require a login name and password. If this is the case enter it before connecting.



3. After successful connection to the server the window will populate with different options the layers are viewed and saved.
4. Different options may be available or lacking depending on which server is being accessed.

Using Web Based Background Layers—WMS Layers

On the left side of the window the different layers that are available on this server will populate. Depending on the server they may range from one to many.

In this MN example there are different categories that break the images up into categories: Regional, Statewide, and Twin Cities metro.

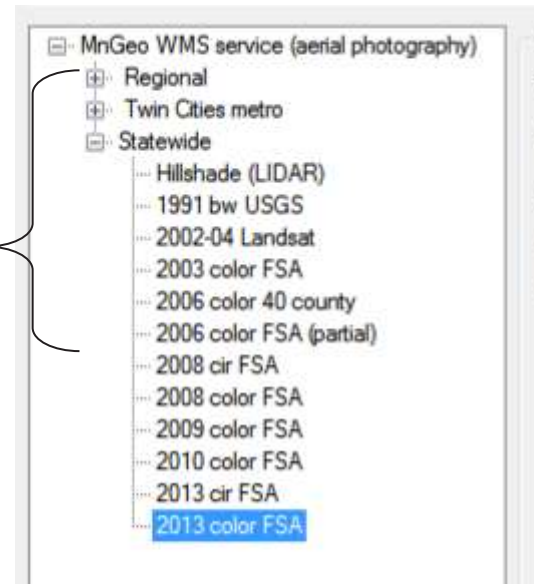
Common acronyms that are used with these layers are:

CIR: Color Infrared—this layer contains a NIR, RED, & GREEN band.

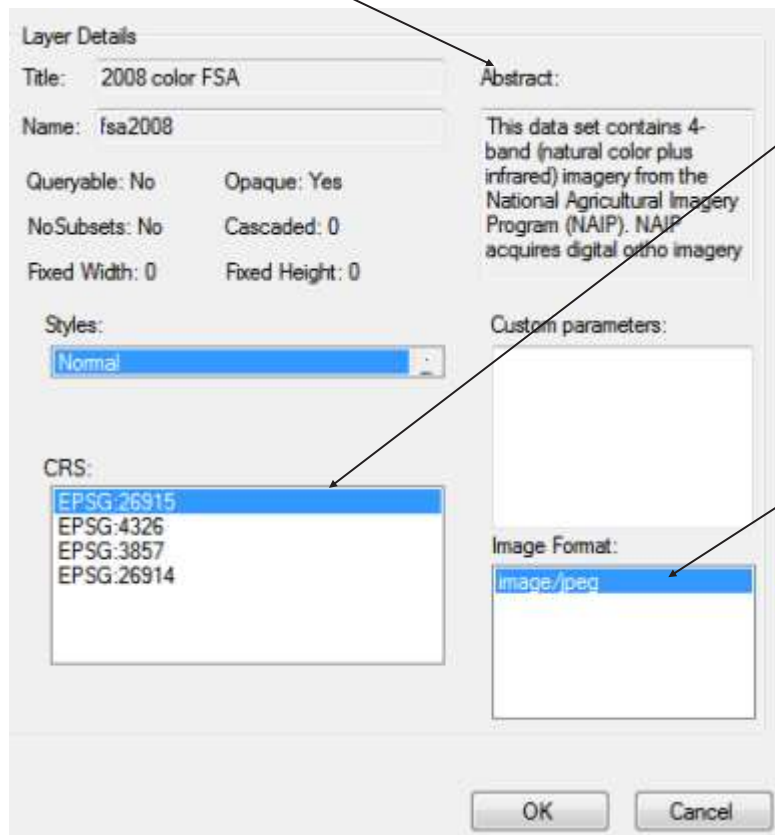
Hillshade: This is a elevation derived shaded relief map.

Color (RGB): These will have layers with the RED, GREEN, & BLUE bands.

BW: Black & White layers.



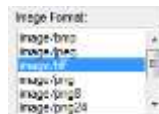
A description of the layer may be available in the Abstract like this 2008 layer.



CRS (Coordinate Reference System) is how the image is projected. By default the WMS layer will be projected in the UTM zone that is active. If the layer is not visible and should be it could be in an uncommon projection system and a different CRS can be selected.

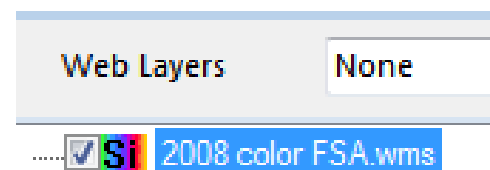
EPSG:26915 (NAD83 UTM15N)
 EPSG:26914 (NAD83 UTM14N)
 EPSG:32615 (WGS84 UTM15N)
 EPSG:4326 (WGS84)
 EPSG:3857 (Web Mercator)

Image Format: Some WMS servers will have options to select different image formats. Some are better quality than others. By default if image/tiff is available it will automatically be selected (because of quality this format is always recommended, but not always available as an option)



Example of different image formats from ND WMS server

5. Click "OK."
6. The image will be saved back to the County Data folder that is set as the root in settings with the title shown in Layer Details above.
7. This server is now ready to be used within ADMS.



Downloading USDA Geospatial Data

1. Go to the USDA Geospatial site - <http://datagateway.nrcs.usda.gov/>

2. On the top menu select
"Get Data".

(The files data/files to be downloaded are Roads, Sections, Soils, Townships, Water, Clu, and Boundary's.)

Note: No NAIPS.

3. Select the "State" from the drop down

4. Select the "County" (one at a time)

5. Click on the Button to the "Right" labeled
 "Add Counties to the Selected List"

Note: can select multiple counties so that it is not necessary to repeat this procedure. Limit to FTP size of request 8 GB of Data.

6. Click "Submit Selected Counties".



Downloading USDA Geospatial Data

7. In the “What” to download window, check the items listed below & to the right.

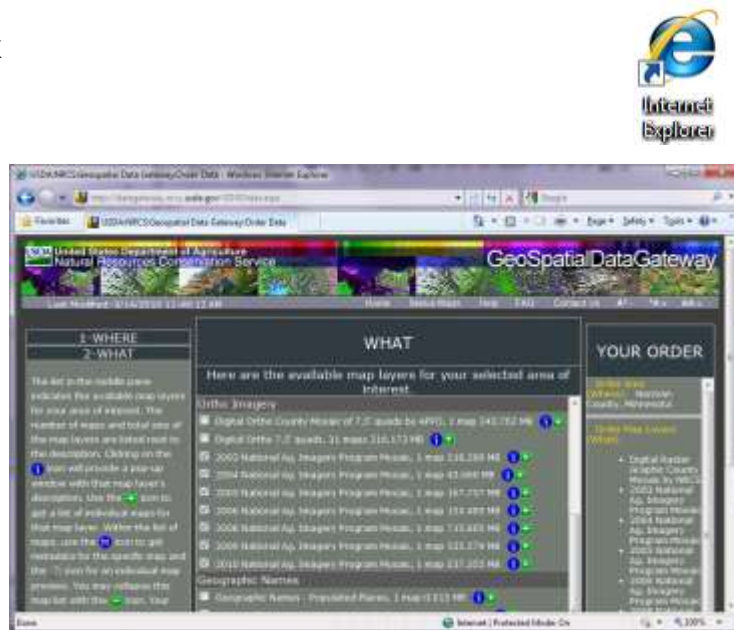
— Suggested Download Items

- Public Land Survey System (PLSS) Townships
- Public Land Survey System (PLSS) Sections
- National Elevation Dataset 10 Meter
- Also download Quadrangle Index 1:24,000
- National Elevation Dataset 30 Meter (60 meter AK)
- Geographic Names - Populated Places
- Geographic Names - Non-Populated Places
- NRCS Counties by State
- Digital Ortho County Mosaic of 7.5' quads by NRCS
- Digital Raster Graphic County Mosaic by NRCS
- TIGER 2010 Primary and Secondary Roads
- TIGER 2010 Streets

NOTE:

-For Soils data—See the next section—Soil SURGO Download

-



8. Once checked, click “Continue” button.

9. In the “How” window select the “FTP” button.

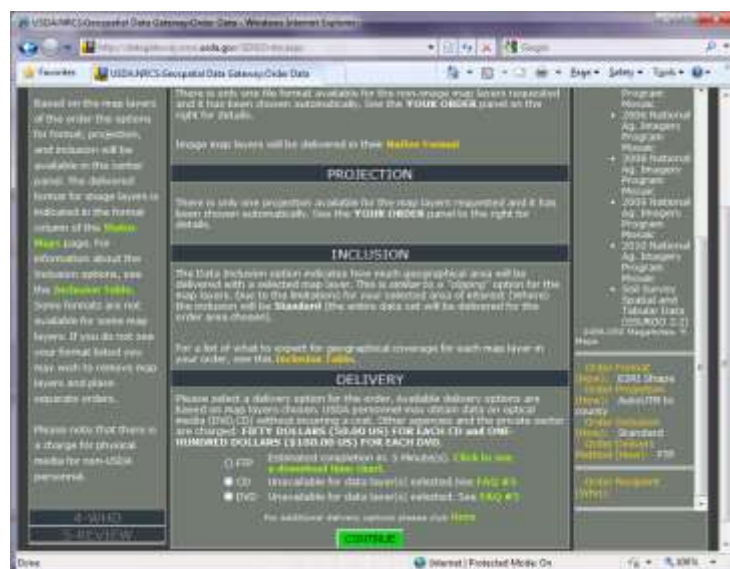
It may ask about File Type

ESRI Shape
Select Format
ESRI Shape
ESRI File GeoDataBase

It may ask about projection

- Geographic NAD 83 or WGS 84

Select Projection
Select Projection
Geographic NAD83
AutoUTM
UTM Zone 14 NAD83
State Plane Minnesota North NAD83



10. Click “Continue” button.

Downloading USDA Geospatial Data



11. Type in the required fields. A download link will be emailed to the address provided. This is a government site, and the address provided **will not be used for spam messages.**

12. Recommended – Put a check mark in the “Save Contact Data” box on the Left side of the screen

13. Click the “Continue” button.

14. Review order and click “Place Order”.

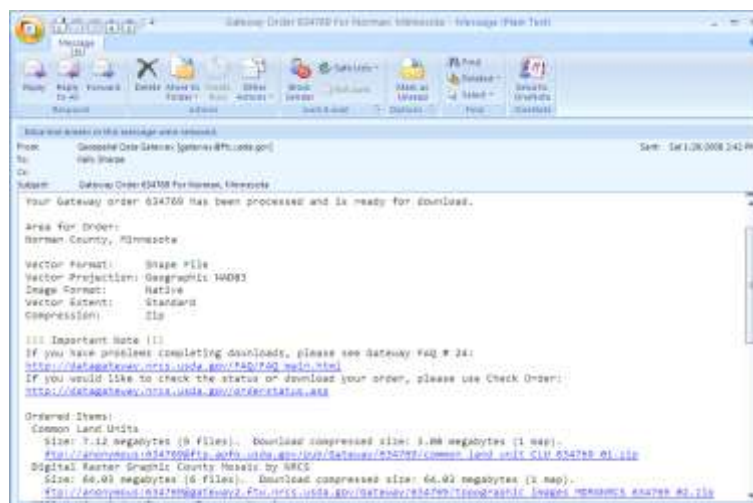
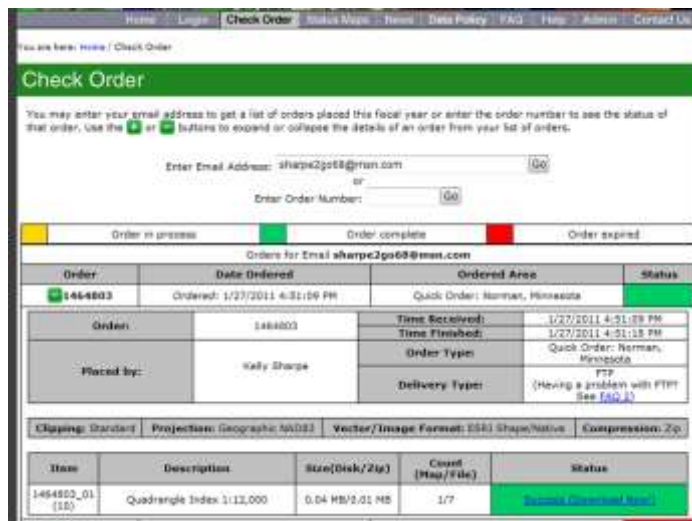
15. Option 1 – Wait a 10 seconds to a minute and click on the “Check Order” link

16. Option 2 – Close the window and wait for the Geospatial email. This can take anywhere from 20 seconds to 3 days for all the items of the order to be processed and bundled for download.

Downloading USDA Geospatial Data

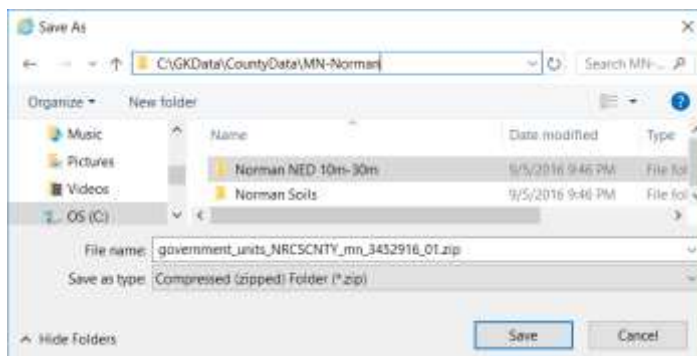


17. Check Order will bring up a window.
Click the "GO" button after typing
your email address.
18. Clicking on the "Success (Download
Now)" button (Link), will go directly to
a FTP download link from the USDA
site. You may be limited to the num-
ber of downloads you can do at a time
due to file type, file size and connec-
tion speed.
19. A "**Save**" or "**Save As**" option will ap-
pear. Choose '**Save As**'. (see below)
20. If you wait for the "email" to arrive,
Click the "[**ftp://download link**](#)"
21. A "**Save**" or "**Save As**" option will ap-
pear. Choose '**Save As**'. (see below)



*Note: Example using Internet Explorer
11. choose "SAVE AS" and you can
place the data in "GKData/CountyData"
location as shown.*

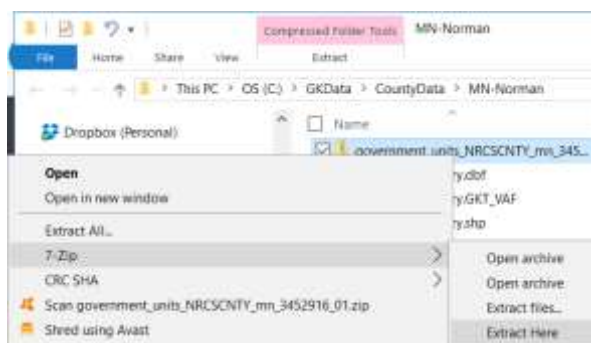
22. Repeat this process till all the data is downloaded.



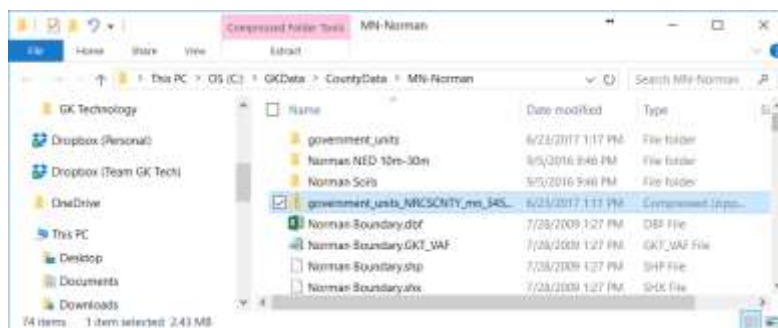
Downloading USDA Geospatial Data

23. "Right click" on zipped file and "7-Zip" and "Extract Here"

Note: Suggest using "7-Zip" to unzip files, or use what you currently have to unzip the files.

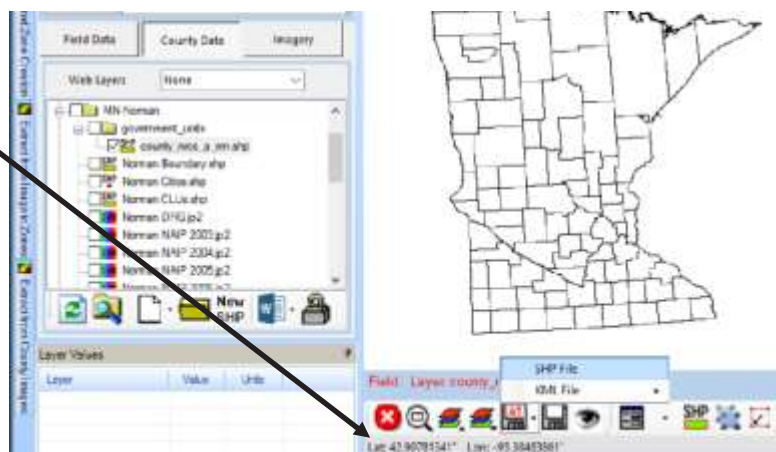


24. Once the files are unzipped save the files in you GKData/CountyData/ correct county file.



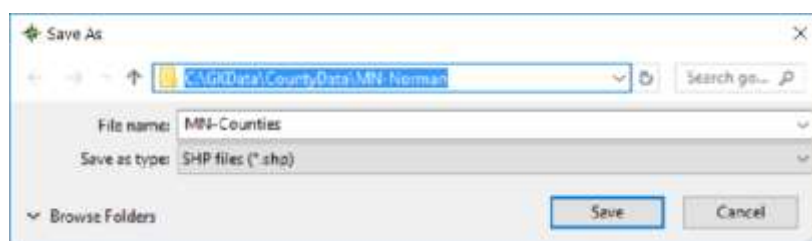
25. Make sure to save the data into the right UTM zone by looking at the "Lat" and "Lon" numbers at the bottom of the screen.

Note: if values are not in Lat—Lon, close Map Window & go to "Settings" and under "User Interface 2" change "Cursor Coordinate Units", also look at the "UTM" tab map - note Lat-Lon values.



26. Do a "Save As" and move to the correct level you want the data at and click "Save".

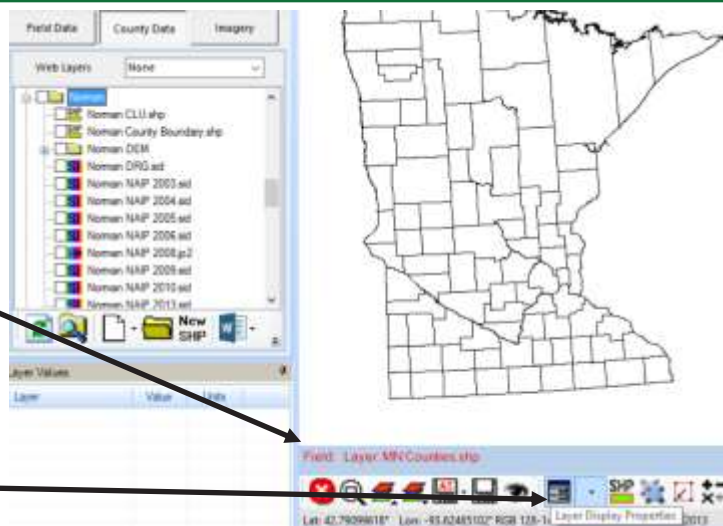
Note: By "Save or Save As" on any SHP file that is or may be in a UTM projection system. This Save process will convert the data to a LAT-LON—WGS84 projection.



Downloading USDA Geospatial Data

27. Turn on the newly created SHP file.
Example is MN-Countries.

SEE ACTIVE LAYER

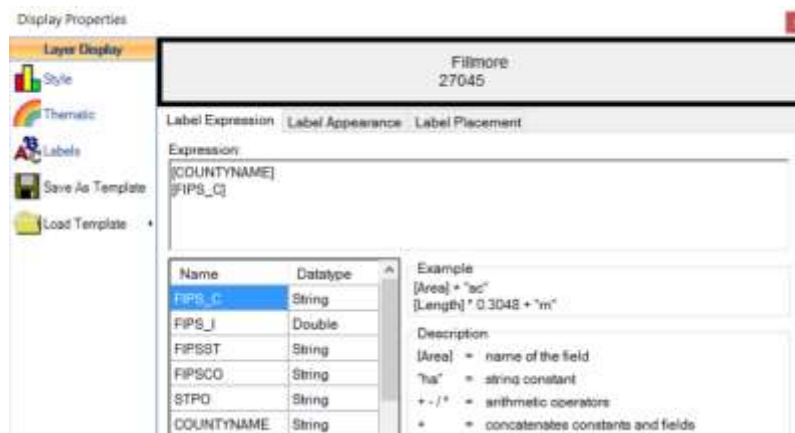


28. Go down to the “Layer Display Properties” on the bottom tool bar.

29. Click on the “Style” button and choose the color and line weight for the counties.



30. Click on the Labels button and select the “COUNTYNAME” and click “Enter” to get the cursor to the second line and choose the “FIPS_C” (should look similar to the example on the right)



31. Next click on the Label Appearance tab and select the Font, Pixel Scale Mode, Style and Color of the label.

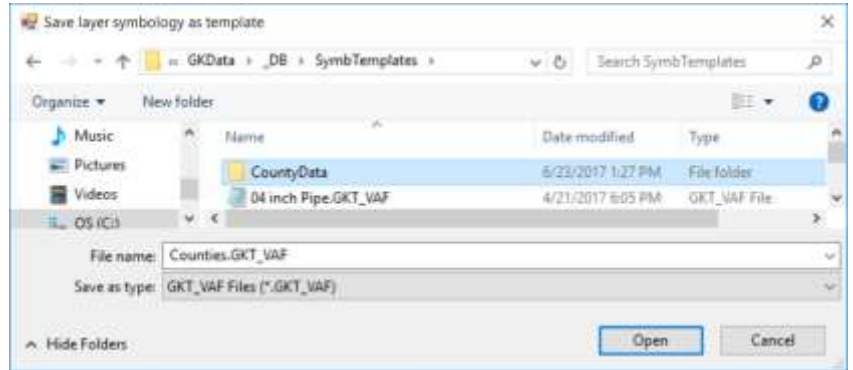
Note you may want to look at “Label Placement” options also.



Downloading USDA Geospatial Data

32. Once the color and labels are set, suggest "Save as Template" in the "Display" window.

NOTE: In the "Save" function you can create folders. In this example we save into a "CountyData" folder.



NOTE: GK has already created all of these templates, if you do not have them, contact us and we will gladly share.

33. It is recommended to rename everything and to create a file structure similar to the example listed below. This is done by dragging and dropping files in ADMS (once all the files are unzipped).

Color scheme for DRAWING layers

CLU – 1 pt lines – LightSkyBlue—300'

Counties – 3 pt lines - Yellow—15,000'

Cities—2 pixel—Black / Red—3,000'

Places—2 pixel—Black / Red —300'

Railroads—1 pt lines—Black

Roads Minor – 1 pt lines - Red

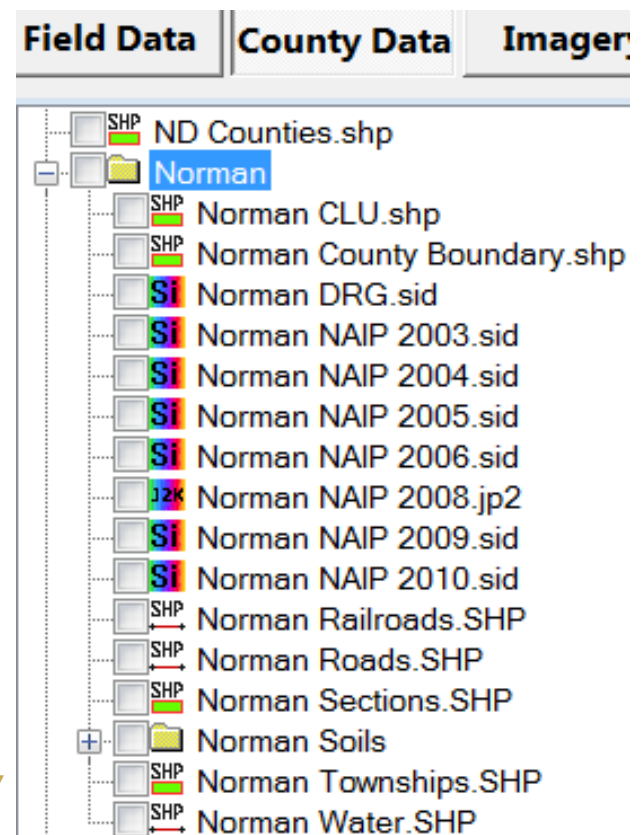
Roads Mjr—3 pt lines—Red

Sections – 1 pt lines – Lt. Gray—1,500'

Soils – 1 pt lines - Black—300'

Townships – 2 pt lines - Yellow - 4,500'

Water Lines – 1 pt lines – Blue



Downloading USDA Geospatial Data

Note: FIPS codes are needed when downloading NAIP data to identify counties.

FIPS (Fed Information Processing Standardization)

1. Go to the web site.

<http://datagateway.nrcs.usda.gov>

2. Select the NAIP Download tab.

28. Select the "**county FIPS**" link in blue.

3. Select the "State" that is going to be downloaded from the download tab.

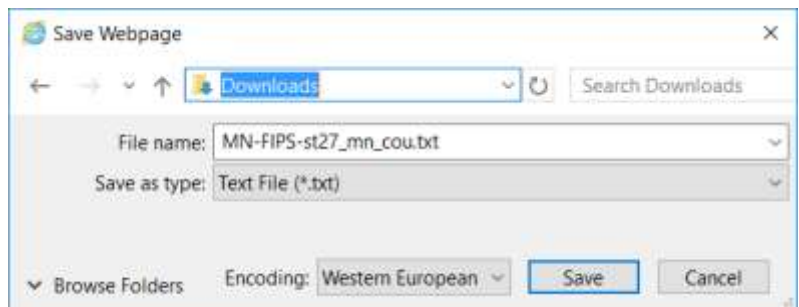
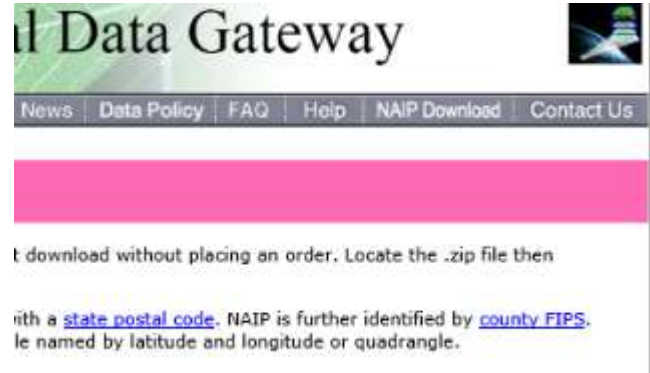
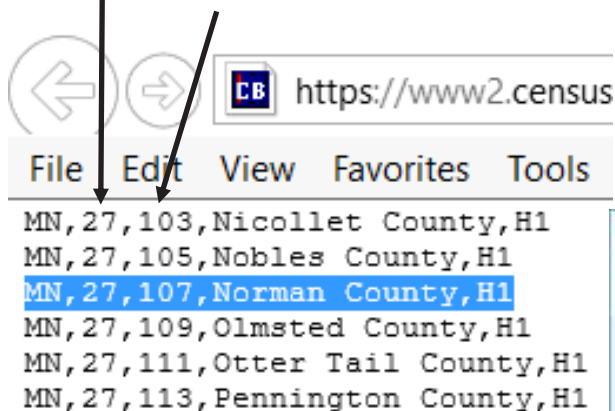
Note: write down the FIPS code for the Counties that are downloading

or

Click "File" & "Save As" a TXT file for later use, please note location and name of the file.

FIPS State Code

FIPS County Code



Downloading USDA Geospatial Data

FSA NAIP (National Ag Imagery Program)

1. to download NAIPs go to
<http://datagateway.nrcs.usda.gov>

2. Under the "I Want To..." area

Click the "**NAIP Download**" link.



3. Select "**2003-2016 National Ag. Imagery Program County Mosaic**" link.

4. Select the year of the NAIPs that are to be downloaded.

5. Select the State NAIP files.

Note: not every year will have all States. NAIP is flown on a 2 to 3 year cycle.



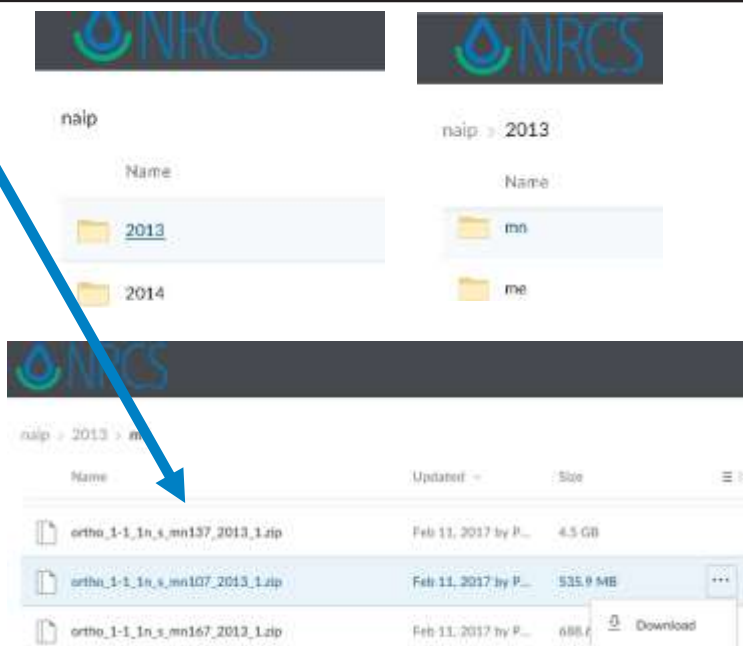
Note: the FIPS # location.

6. Move the mouse to the right to the "More Options" button.

Click to "Download" & "Save As" button to start the download.

Note: Also, clicking the header will resort the column ascending/descending.

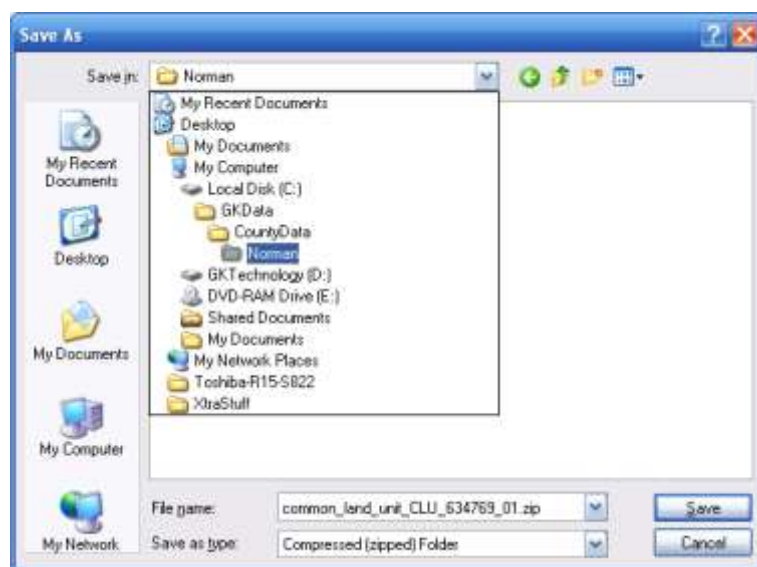
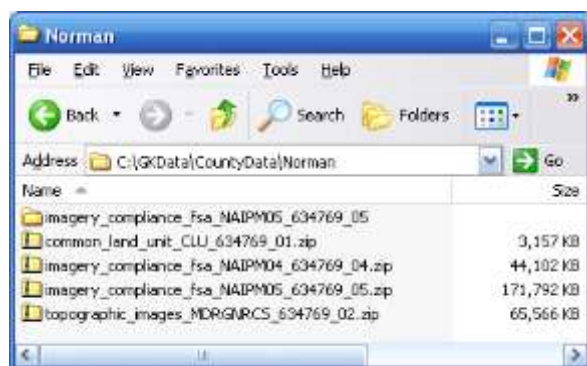
Download may take couple minutes to a couple hours depending on internet speed.



Downloading USDA Geospatial Data

7. Save the files into the C:\GKData\CountyData\"Name of County\" folder as shown to the right.

8. All of the downloads are .zip files. They must be unzipped or extracted.



9. Once files are unzipped, open the folder and "Cut" .sid file and move up to the "County Name" folder and "Paste"

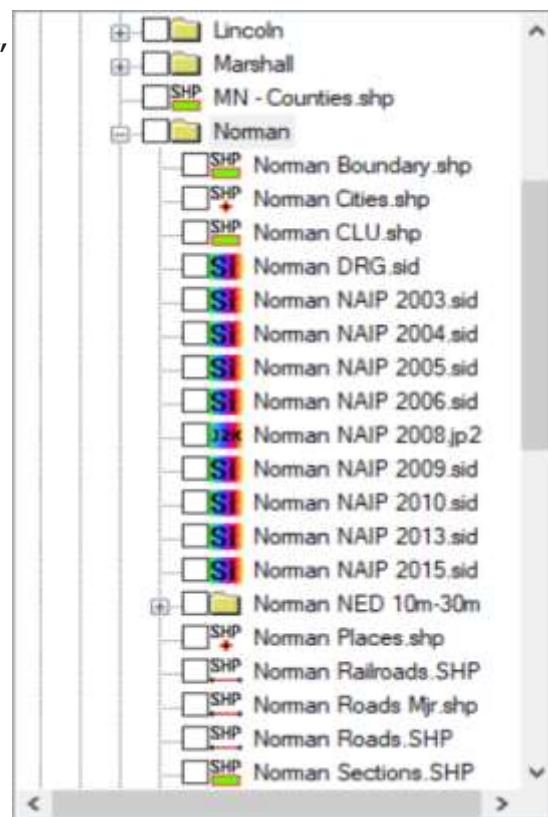
10. Rename the files to the following file structure

County Name NAIP year.sid

Example - Norman NAIP 2003.sid

Note: suggest turning the file on / off in ADMS. Confirm that all the data lines up with TWP / SEC / NAIP files. Look at the "Lat / Lon" values to confirm you are correct.

Final Note: If all looks good, the original ZIP folders and UNZIPPED folders can be deleted.



Soil SURGO Download

Web Soil Survey

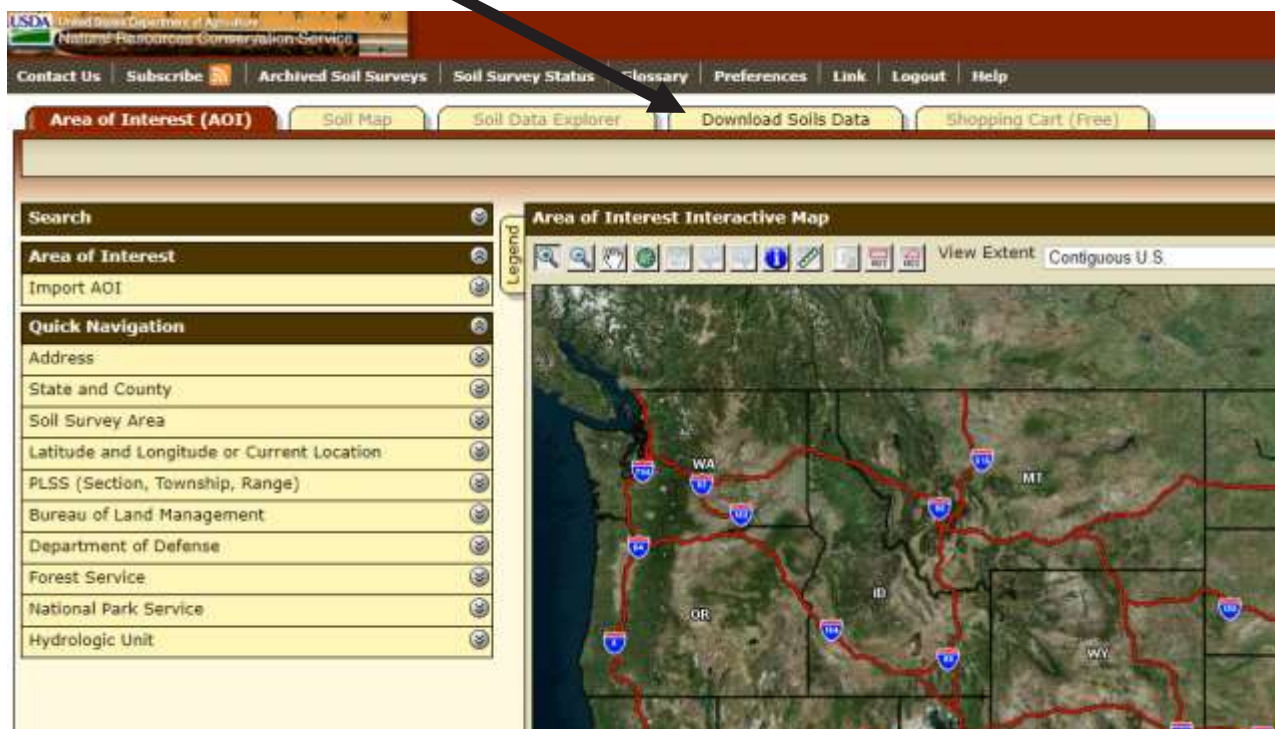
Download shape file soil maps by county here

<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Start by clicking on the "Start WSS" button



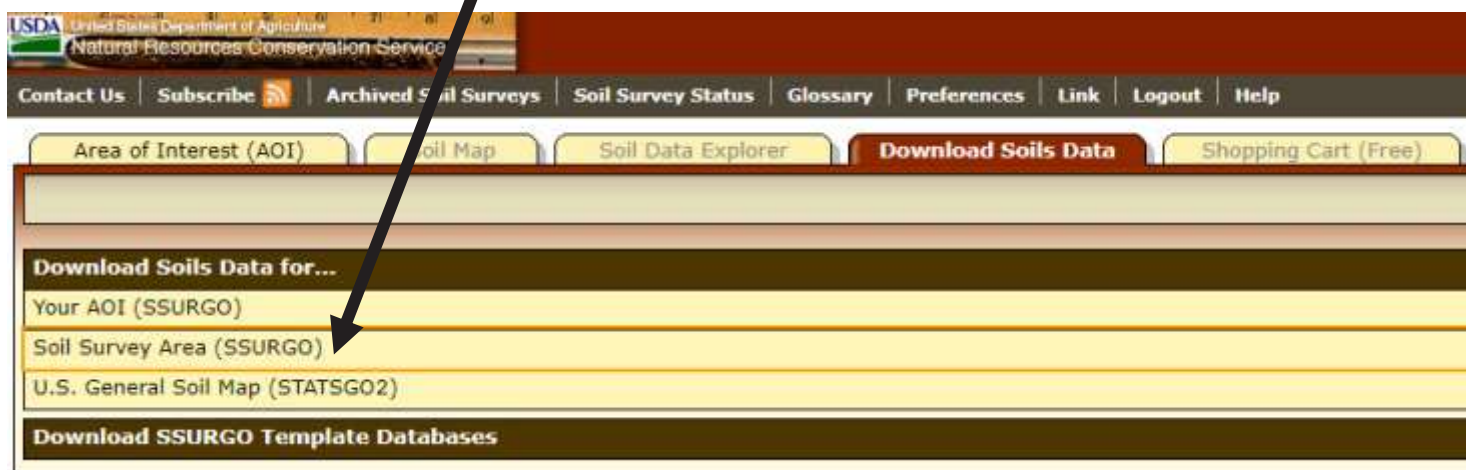
Click on "Download Soils Data Tab"



Soil SURGO Download

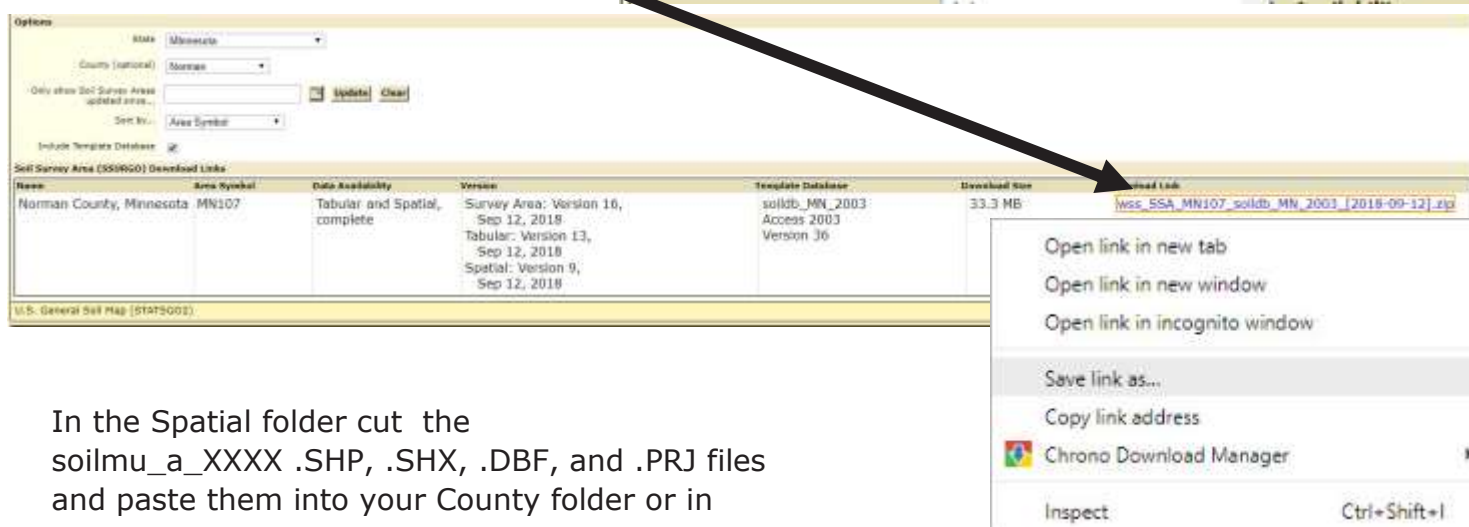
Web Soil Survey

Click on "Soil Survey Area (SSURGO)" tab



In the Options section select your state and county

Right click on the download link
Select "Save link as" or "Save target as" and direct to your CountyData folder and the County you are downloading.



In the Spatial folder cut the soilmu_a_XXXX .SHP, .SHX, .DBF, and .PRJ files and paste them into your County folder or in your County Soils folder.

Suggest renaming files to "County Name" Soils

Name	Date modified	Type	Size
soilmu_a_ne155	12/18/2018 10:20 ...	DBF File	720 KB
soilmu_a_ne155	12/18/2018 10:20 ...	PRJ File	1 KB
soilmu_a_ne155.shp	12/18/2018 10:20 ...	SHP File	26,322 KB
soilmu_a_ne155.shx	12/18/2018 10:20 ...	SHX File	87 KB

Downloading Imagery USGS

Earth Explorer

The USGS is a great source for downloading many different GIS data products for the entire US and Canada and much of the world. Below are instructions for downloading the following products:

These instructions will show how to download—Landsat—Sentinel

To get started go to <https://earthexplorer.usgs.gov/>

Register and login - This will allow you to create things like Standing Requests and save your Search Criteria to reuse later as well as order large amounts of data at one time.

The first time you get into Earth Explorer, do the following. This is a one time event that will save you lots of time.

Click on your **USER NAME**

Go to "**Settings**"

Go to "**Interface Options**"

Change your settings like below

Click "**Update**" and go to the "**Home**" button

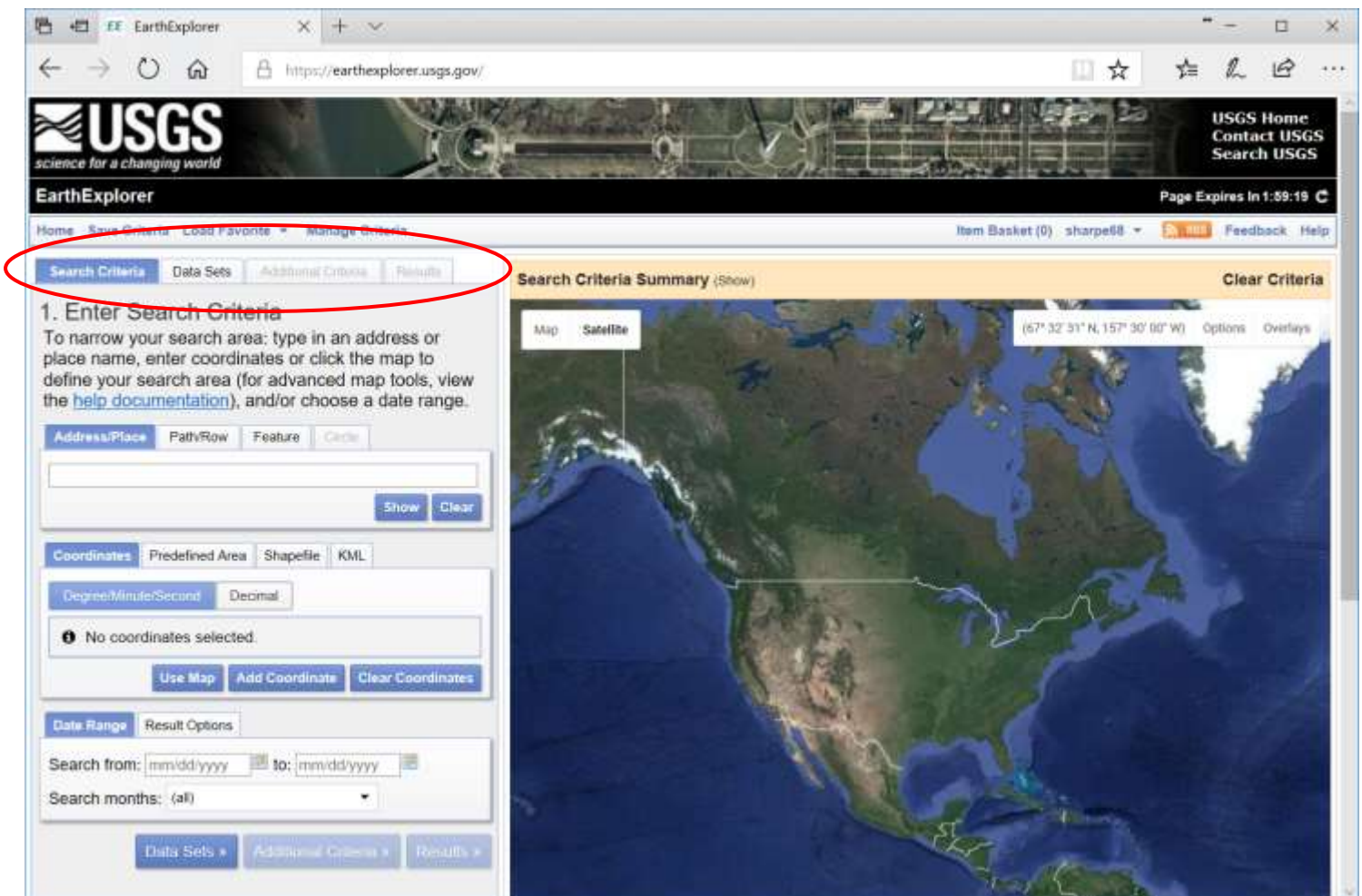
The screenshot shows the USGS Earth Explorer web application. The browser address bar displays <https://earthexplorer.usgs.gov/settings/interface>. The page header includes the USGS logo and navigation links. A sidebar on the left contains a 'Settings Menu' with options like Profile Overview, Item Basket Options, Interface Options, Area Of Interest, Data Sets, Sort Order, Metadata View, Saved Criteria, Standing Request, Order Tracking, Track Orders, Track Bulk Orders, and Search. The main content area is titled 'Update User Interface Options' and contains several sections: 'Profile Information' with fields for Results Per Page (250), Number of Logins (610), Result Set Size (10,000), and Last Login Date (2018-01-04); 'Site Access' with checkboxes for Allow Profile Editing, Allow Order Tracking, Allow Ordering, and Allow Saved Criteria; 'Standing Request Defaults' with a checkbox for Allow Standing Order; 'Interface Options' with a checked checkbox for Auto-Center Map; and 'Ordering Options' with a checked checkbox for Enable Bulk Auto Ordering. At the bottom of the form are 'Cancel' and 'Update' buttons. A user profile dropdown menu is open in the top right corner, showing options for Profile, Settings, and Logout.

Downloading Imagery USGS

Earth Explorer

The downloading process consists of several steps represented by the four tabs on the top left corner of the map window along with instructions for bulk downloading data

- **Search Criteria**
- **Data Sets**
- **Additional Criteria**
- **Results**
- **Bulk Downloading**



Downloading Imagery USGS

Search Criteria

Search Criteria involves selecting a search area or feature and a timeframe.

Address/Place - Something like a City/State can be entered here

Path/Row - Enter a scene number ie. 3027 (path 30 row 27)

Feature - Search by feature like a zip code

Coordinates - Create a defined area by clicking on the map to create a boundary

Predefined Area - Select a specific County

Shapefile - Upload a shapefile boundary such as a field, section, or township

KML - Upload a KML boundary (can be exported out of ADMS)

Date Range - Choose a beginning date and an ending date

Search Months - Choose specific month or months

Result Options - Default is 100, meaning that the Results are limited to 100 records. Often times the search criteria results produce much more than 100 records making it necessary to change the Number of Records limit to a higher number.

Data Sets

For this example we will be downloading satellite imagery from Landsat 8 & Sentinel 2 for Kidder County in North Dakota. (Note: we can use Landsat 7 & 4-5)

Regardless of whether or not you are downloading one data set or several, the process will be the same.



Downloading Imagery

Additional Criteria

Any acquisition information that is known can be entered to make the search more specific.

- Select 80% Scene Cloud Cover (recommended)

Landsat 4-5

Under **WRS Path** & **WRS Row**, Path and Row numbers can be entered

Landsat 8

Sentinel 2

Under Tile Number it's possible to search for a specific tile number.

Results



There are several options that can be applied to each product.

- Footprint - Shows a highlighted outline of the product's extents
 - Browse Overlay - Shows a visual rendition of the selected product
 - Compare Browse - Compare products you've selected using this button
 - Metadata - Provides specific details about the acquisition and processing of the product
 - Download - Allows to download the specific product directly
 - Bulk Download - Add the specific product to a bulk download
 - Order Scene - Used to purchase a product that is not cost free
 - Exclude - Exclude product from the results
- Select all the products you want to download by selecting the Bulk Download button for each individual scene or tile.

Downloading Imagery

Result Controls

At the top of the Results are several functions. Most commonly used are the Add All Results from Current Page to Bulk Download or to Order. Rather than selecting each individual product that you want to download, you can select them all at once to save time and unselect the ones you don't want.

Hide Result Controls

☐ Show All Footprints From Current Page
☐ Show All Browse From Current Page
☒ Add All Results From Current Page to Bulk Download
☐ Add All Results From Current Page to Order

Compare Browse:

Map Overlay

All Scenes

Compare

Browse Opacity: 100%

Creating Bulk Download

- Once you have selected all the products you wish to download, click on the View Item Basket button at the bottom of the results panel

[View Item Basket »](#)

Bulk Download

Note: Data sets may contain items with multiple product options. Expand a data set to view your list of ordered scenes including metadata and product options.

▼ Landsat 4-5 TM C1 Level-1 (26)

▼ Landsat 8 OLI/TIRS C1 Level-1 (115)

▼ Sentinel-2 (32)

- Expand the list by clicking the arrow next to the product name
- Ensure that the proper product item is selected

Landsat 4-5

Landsat 8

Sentinel

▲ Landsat 4-5 TM C1 Level-1 (26)

Remove All Scenes Modify Options For All Scenes

LT05_L1TP_032028_20120425_20160830_01_T1

ID: LT05_L1TP_032028_20120425_20160830_01_T1
Acquisition Date: 25-APR-12
Path: 32
Row: 28

Products:
LandsatLook Natural Color Image (6.1 MB)
LandsatLook Thermal Image (3.2 MB)
LandsatLook Quality Image (884.8 KB)
LandsatLook Images with Geographic Reference (10.2 MB)
Level-1 GeoTIFF Data Product (150.2 MB)

▲ Landsat 8 OLI/TIRS C1 Level-1 (115)

Remove All Scenes Modify Options For All Scenes

LC08_L1TP_032028_20170626_20180125_01_T1

ID: LC08_L1TP_032028_20170626_20180125_01_T1
Acquisition Date: 26-JUN-17
Path: 32
Row: 28

Products:
LandsatLook Natural Color Image (7.1 MB)
LandsatLook Thermal Image (3.8 MB)
LandsatLook Quality Image (606.5 KB)
LandsatLook Images with Geographic Reference (11.4 MB)
Level-1 GeoTIFF Data Product (527.2 MB)

▲ Sentinel-2 (32)

Remove All Scenes Modify Options For All Scenes

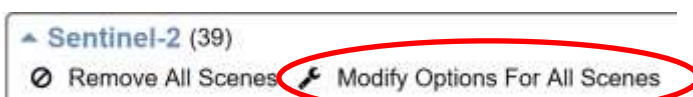
L1C_T14TMS_A009776_20170506T173824

ID: L1C_T14TMS_A009776_20170506T173824
Acquisition Date: 2017/05/06
Platform: SENTINEL-2A
Tile Number: T14TMS

Products:
L1C Tile in JPEG2000 format (750.1 MB)
Full Resolution Browse in GeoTIFF format (4.9 MB)

Downloading Imagery

- To change all the items in a list click on Modify Options For All Scenes.



- Save Changes

- Proceed To Checkout



- Review the final product list

- Once satisfied, click to submit the order.



- You will receive an Order Confirmation email at the address listed in your User Profile where you can click on Order Tracking to download the individual products. The email will also contain an Order number that will also show up in the Bulk Download Utility. If you don't have the Bulk Download Utility you can go to <https://earthexplorer.usgs.gov/bulk> to download.

USGS Online Bulk Download Order Confirmation — 969489

For complete order details please navigate to the [Order Tracking](#) page of your settings in Earth Explorer.

To begin the download process, the [Bulk Download Application \(BDA\)](#) is required. First time users: please download, install and open the BDA. Returning users: please open the BDA installed on your system. You will be required to login using the Earth Explorer username and password used to complete your download request. Information and installation links can also be found at <https://earthexplorer.usgs.gov/bulk>

If your order is Available, highlight the order number and click Select Order. On the next page, navigate to the download destination, make changes as you see fit for your system, highlight the first item in the list, and click Begin Download. When all items are downloaded you can select another order or close the window. The system will also keep track of failed downloads and retry them.

Bulk download orders are available for two weeks, after which they are removed. You will need to place a new order to obtain data products if you do not download them from original order.

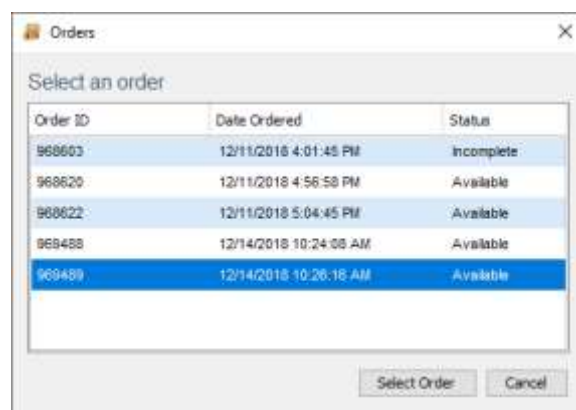
Date Recd	Scenes	File Size
Landsat 8 OLI/TIRS CT Level 1	113	104.4 GB
Landsat 4-5 TM CT Level 1	26	4.2 GB
Sentinel-2	32	19.8 GB
Total:		173 128.2 GB

- Open Bulk Downloader and Login (same Username and Password as Earth Explorer.)

- Select the desired Order Number

- Browse (top right corner) to the desired location for the downloaded data

- Click to Begin Downloads (bottom Right of the page)



Landsat Data Processing

Introduction:

Within ADMS there are different types of data that can be used for site specific field management. Among this data is satellite imagery. Landsat 5, 7, & 8 data is available for download from the USGS and can be utilized for creating management zones. When using this data there are some significant differences between Landsat 5, 7, & 8 that you should be aware of.

Landsat 5 & 7 (TM & ETM+)

- 8 bit images
- Values from 0-255
- File sizes – roughly 150 MB to 190 MB per image
- 7 bands of raw data (8 bands - LS7 ETM+)
- 30 meter resolution / band (120 meter on band 6)
- Fairly broad spectrum band widths

Landsat 8 (OLI)

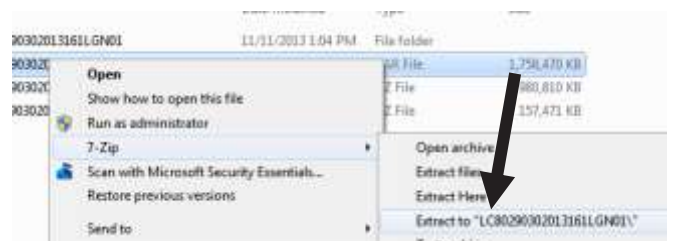
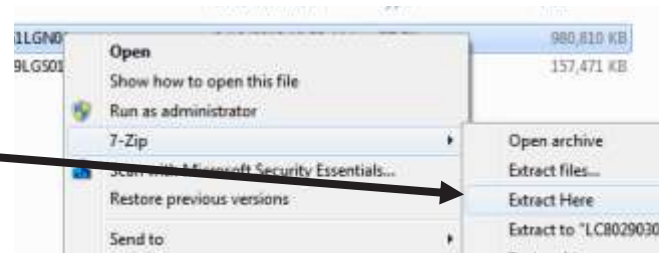
- 12 bit images distributed as 16 bit data
 - Values from 0-65,535
 - File sizes – roughly 920 MB to 980 MB per image
 - 11 bands of raw data
 - 30 meter resolution / band (100 meter on band 10 & 11)
 - Tighter band widths
- All of these TIFF images will now be handled as GeoTiff images within the software.

Processing the Data

Once the Landsat data has been downloaded, you will need to unzip it twice.

- ***The raw files will have the extension *.tar.gz.***
- ***An unzipping utility will be needed for this process (7-Zip will be used in these instructions).***

1. Open Windows Explorer where the raw files are located.
2. Right click on the raw Landsat file.
3. Select 7-Zip, click **"Extract Here"**
4. A new file will be created with the extension *.tar.
5. Right click file, 7-Zip, click **"Extract to "*\""**
6. A folder will be created with the same name as the file.
7. This folder may have up to 12 different TIFF files depending on where the data is coming from, Landsat 5, 7, or 8.



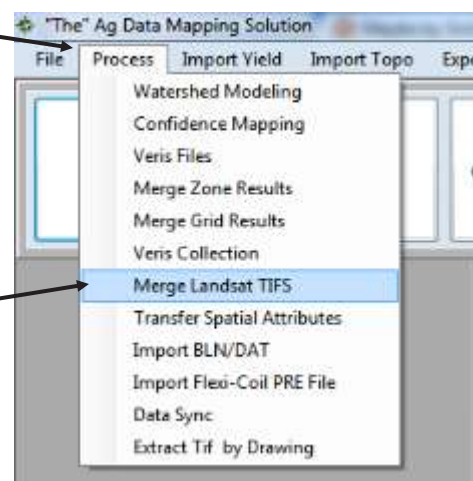
Landsat Data Processing—Merging Images

Merging Landsat Images

After the extraction process has been completed, the next step is to merge them into one image. This is done with a utility in ADMS.

- **ADMS will recognize the correct band order for the different types of Landsat data.**

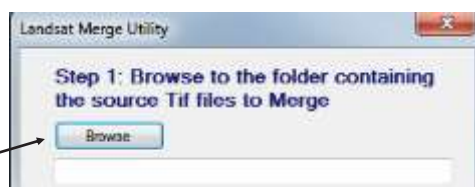
1. Open ADMS, the map window does not need to be open for this process.
2. Select "Process" from the top toolbar.
3. Select "Merge Landsat TIFs"



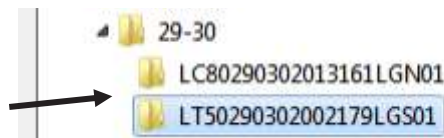
This will open the Landsat Merge Utility

**Scenes will be merged individually one at a time.*

Step 1: Browse to the folder containing the source Tif files to Merge



1. Select "Browse"
2. Select the **Folder** containing the extracted images. Click "OK."



3. The band orders will automatically be populated. The order will be determined by which satellite it came from. Click "Merge Images"
4. Repeat for additional scenes.
5. The images will automatically be named and be saved in the same location as the source folder.



Example: **2002_JUN28_2930_L5_4235.TIFF**

***NOTE:** It is recommended saving the original *.tar.gz file. This will always allow you to go back if image processing ever changes.

Landsat 8 (5,3,4,6)



Landsat 5 & 7 (4,2,3,5)



Landsat Data Processing—Cutting Images by Shapefile



Introduction:

Due to the fact that Landsat scenes are very large files (~200 MB, and 120 Miles²), it is helpful to manage them on a smaller scale. This is most often done on a county basis similar to the county data. However, do not confuse the two.

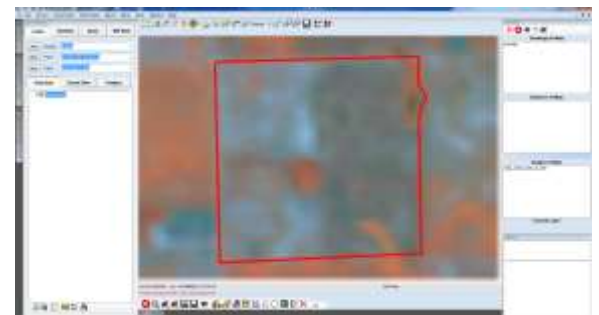
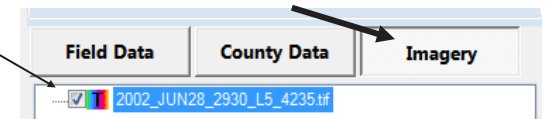
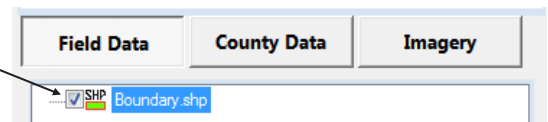
There are several advantages to doing it this way:

1. It allows the software to handle more images being loaded at once.
2. Images can be managed on a county by county basis.
3. Landsat scenes that overlap UTM zones can be easily re-projected so image processing is more consistent.

Preparing the Data For Clipping

This is a very important step in this process. Each of the Landsat scenes are saved as GeoTiffs after they are merged together. Each file will have to have it's location updated and re-saved. This is done to each scene individually.

1. Make sure the imagery folder is set in the correct directory. (Settings, Browse to Folder)
2. Open up the map window. (Make sure the correct UTM zone is selected)
3. Turn on a boundary that is located in the scene.
4. Select the "Imagery" tab.
5. Turn on the Landsat scene that is going to be clipped.
6. The Landsat scene and boundary should be close to lining up with each other.
7. With the TIF file being the active layer, adjust the image according to the field boundary. Do this with the arrows located in "Image Properties."



8. When the image lines up close to the boundary, click "**Update Position**" This will save and update coordinates of the GeoTiff.
9. If more images will need clipping, right click on the current TIF file and select unload layer. Repeat the process for any additional images.

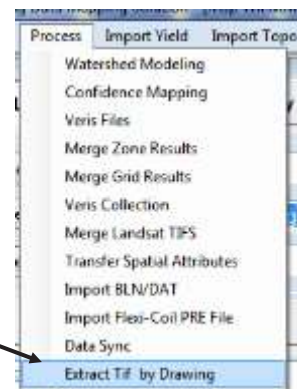
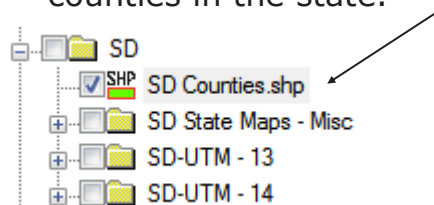


Landsat Data Processing—Cutting Images by Shapefile

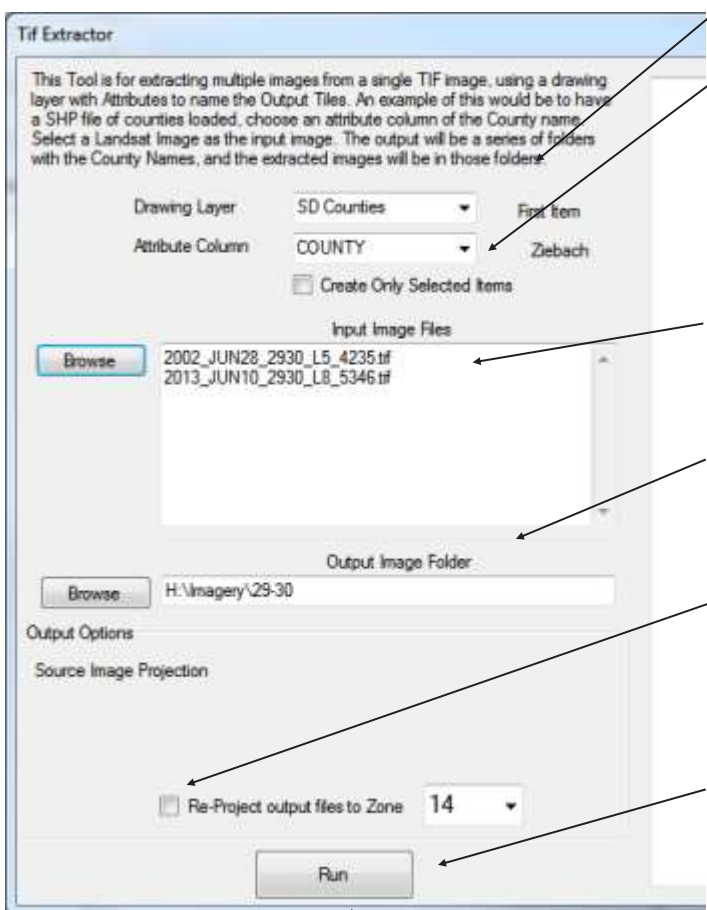


After all the images have had their coordinates updated, the tiff extractor utility may be used to clip them to a shape file. (This example will use a county shape file. Refer to downloading instructions to get it.)

1. Open the Map Window.
2. From the county data, select a shape file of the entire state containing all the counties in the state.

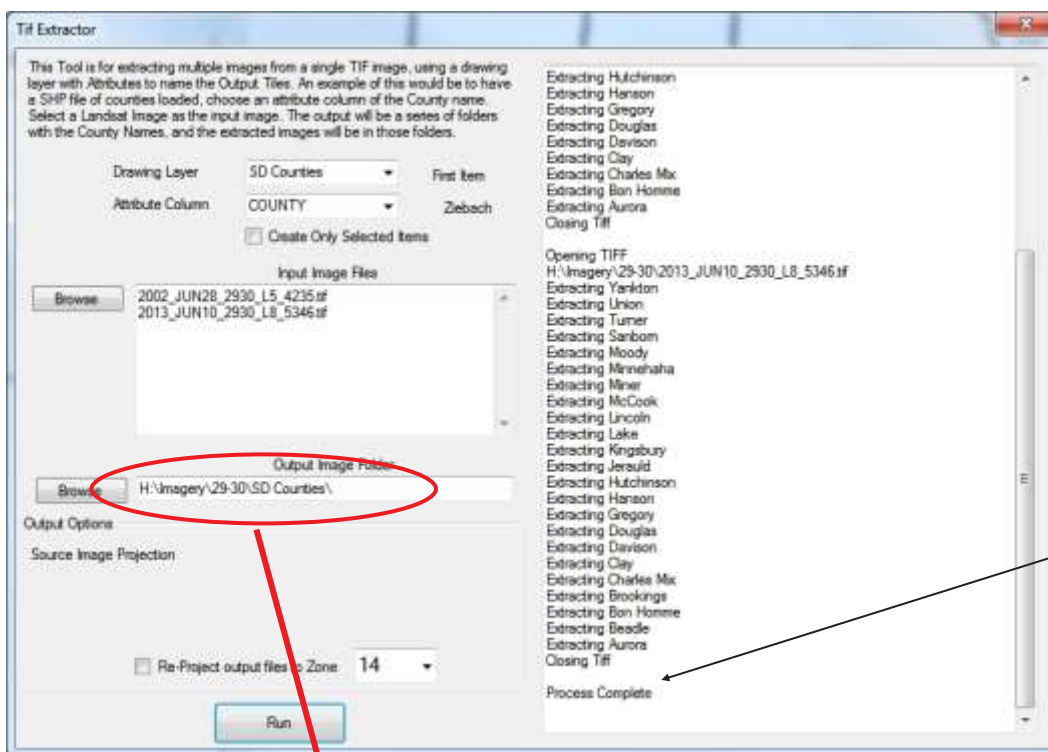


3. From the top of the screen, select "Process" and "Extract Tif by Drawing."
4. The tif extractor tool will open. This utility will clip the Landsat scene by the shape file that is loaded. Additionally, it will create a folder structure which is named by the database column that is selected.



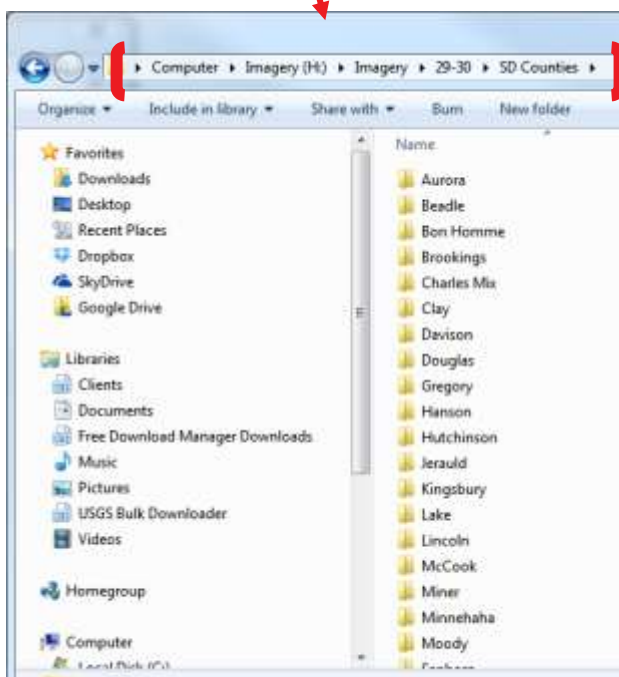
5. Select the drawing layer that will be used for clipping.
6. Select the database column to which the output folder(s) will be named. (*So with the attribute column selected as "COUNTY" it will create a folder for each county that the Landsat TIF covers and put it in that folder*).
7. Browse to the folder containing the images, select either one or multiple files. Click OK.
8. Browse to the Output Image Folder. (*This is where all the clipped images will be saved.*)
9. The desired output files may be re-projected to a different UTM zone. To do this, put a check by "Re-Project output files to Zone" and select the desired UTM zone.
10. Click "Run."
11. This utility will cycle through each image, create a folder for each county that it covers, and save it in the selected output directory. The progress will be indicated on the right side of the window.

Landsat Data Processing—Cutting Images by Shapefile



The extractor utility will cut an image out for each county that the Landsat scene covers and then creates and places them in a folder structure.

When all the files are finished being processed, "Process Complete" will be displayed at the bottom of the window.



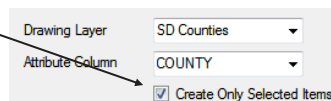
A file structure will appear in the directory that the output image folder was pointed at. Inside each of the counties will have a folder containing the extracted Landsat tiff images.

Additional Notes:

If only certain areas need to be processed, the function "Create Only Selected Items" can be used.

To utilize this function, the polygon(s) must first be selected before the Tif Extractor is opened.

1. With the polygon as the active layer, use the selection tools on the top toolbar.
2. Click in the polygons to be extracted.
3. Open the Tif Extractor
4. Follow the process above and put a check in "Create Only Selected Items."



Landsat Data Processing—Cutting to Trade Territory



As stated earlier, this process can be used with any shape file, not just a county file. Often there is not just a single county that is covered in a trade territory. Therefore, a custom polygon can be made to cover a multi county region, or an irregular area.

For this example, a county file will be used as a guide to draw the custom polygon.

1. Turn on a county file so all the counties are visible.
2. From the bottom toolbar below the layer selection window, select "Create a New Layer From Template." Select Boundary.
3. With the new boundary file checked on and set as the active layer, select "Draw a New Object" on the bottom toolbar.
4. Using the county file as a guide, draw a polygon that covers the desired area.

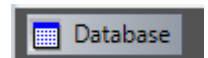


Example: I am an agronomist that covers Clay, Yankton, Turner, and the South Half of Lincoln Counties in SE SD.

A polygon is created to represent the area covered. The Landsat scenes will be cut out to the specified area. (Represented in blue)

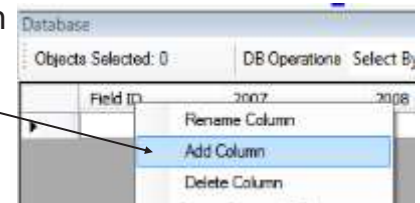


5. A column must be created and named in the database of the newly created shape file. This will tell the Tif Extractor how to name the output folder when the Landsat scenes are extracted.



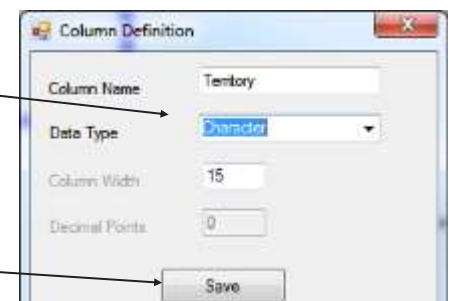
6. With the newly created shape file as the **Active Layer**, open the database tab on the bottom of the map window.

7. With the database open, right click on any column header and select "Add Column."



8. A column name will need to be entered, data type will be **Character**.

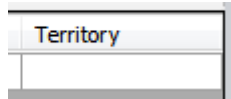
9. When the new column name is entered and data type is selected, click **Save**.



Landsat Data Processing—Cutting to Trade Territory



10. After clicking Save, a new column with the entered name will appear in the database.



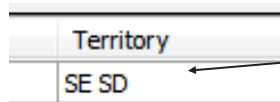
A name will have be entered in the column to define the output folder.

11. Double Click in the cell under the new column (Territory). This will allow for a name to be typed in.
12. Type the desired name, but keep it shorter than 15 characters. Hit the enter key on the keyboard and save the shape file.



13. A shape file will exist that:

1. Defines a specified area.
2. Has a character column added.



The output folder will be named SE SD.

3. A name will be in the character column under 15 characters. This will define the output folder.

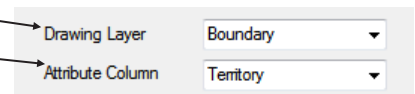
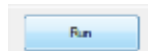
14. With the new shape file turned on, open the Tif Extractor.

15. Select the new boundary as the **Drawing Layer** and the newly created column as the **Attribute Column**.

16. Browse to the Landsat scenes that will be extracted.

17. Browse to the Output Folder.

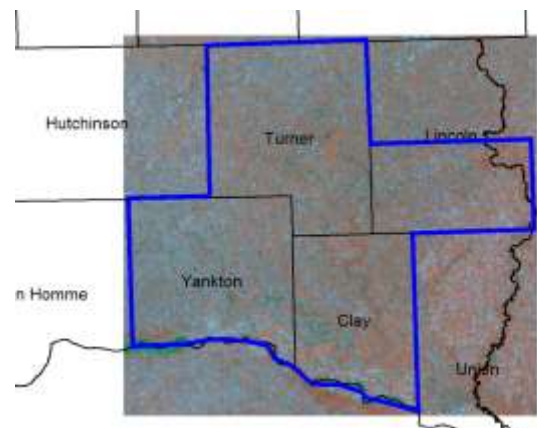
18. Select "Run"



19. A folder will be created in the Output Folder with the name entered in the database column.



20. When the images are turned on, they will cover the specified area as long as it is part of the Landsat scene.



ADMS 64bit vs 32bit

Note: There are two different versions of ADMS, 64 bit and a 32 bit. **DO NOT** try and use both versions at the same time. If both versions are used at the same time data can be lost and/or corrupted and may not be able to be recovered.

1. The reason for the 64 bit version of ADMS is it is able to process larger files such as Sentinel Data and large SHP files that throw "Out of Memory" error in the 32 bit.

Note:

In theory 32 bit PC single processor could use up to 4gb of RAM of which we are limited to 4gb of RAM by the Operating System. ADMS gets access to about 2gb.

In theory 64 bit PC single processor could use up to 16.8 million terabytes of RAM of which we are limited to 512gb of RAM by Operating System.

2. to get the 64bit version of ADMS go to www.gktechinc.com/adms64
to get the 32bit version of ADMS go to www.gktechinc.com/admsinstall

3. Both Version do the same thing other than the processing of larger files. There are some issues in the 64bit working with some 32bit data and some tools do not yet have full support yet.

DO NOT USE/RUN ADMS-64bit as your primary ADMS at this time. Use it to get the Sentinel Imagery processed to a "xxxxx.grd" and get your large SHP files cut down to smaller pieces or Dissolved to smaller files & go to 32bit.

USE ADMS-32bit as your Primary ADMS.

We are working on getting these merged into one install were all these issues will be resolved. We are not there yet! :)

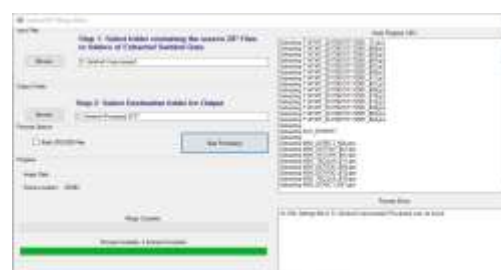
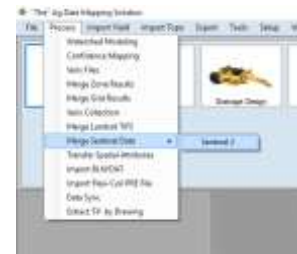
So keep paying your support fees and we will keep improving ADMS!

Processing Sentinel Imagery

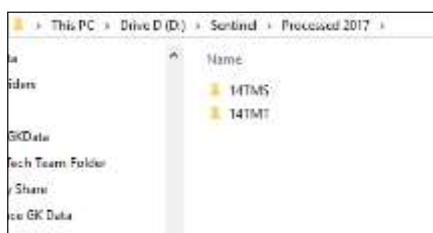
ADMS 64 bit

NOTE: Due to the file size of the individual Sentinel images, processing can **ONLY** be done using the 64 bit version of ADMS.

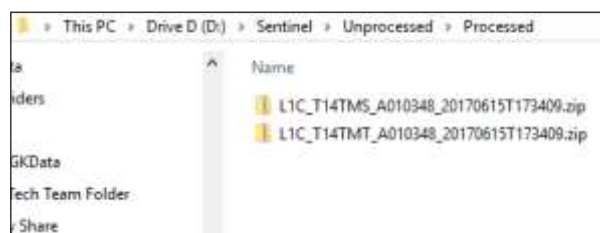
1. Open ADMS
2. At the top, select **Process>Merge Sentinel Data>Sentinel 2**
3. Browse to the folder containing the Sentinel zip files
4. Browse to the location you want the processed images to be placed
5. Click the **Start Processing** button
6. Once the utility has finished processing all the zip files it found in the input folder the progress bar at the bottom will show it has finished processing. Any errors encountered during the process will be displayed in the Process Error box. On occasion a zip file will have problems in the downloading process causing it to become corrupt and may need to be redownloaded.
7. As images are merged, they are placed in their respective tile folder
8. Error free zip files are also placed in a Processed folder within the input folder after processing



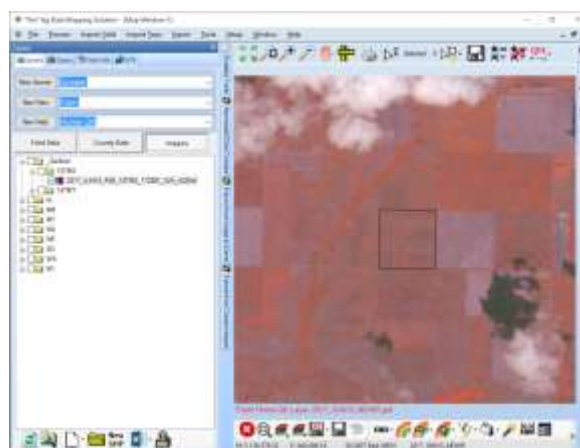
Tile Folders



Processed



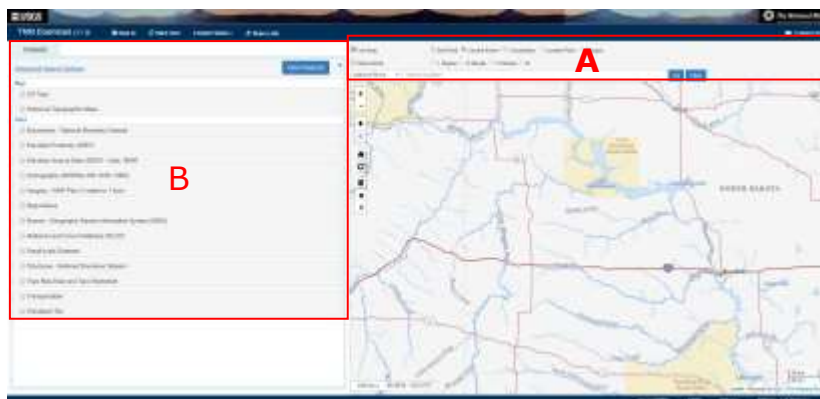
Note: It is recommended to place all the tile folders in a Sentinel folder within your **Imagery** folder so they can be viewed in the Imagery tab of the map window for extracting to a field boundary.



Downloading LiDAR—USGS National Map

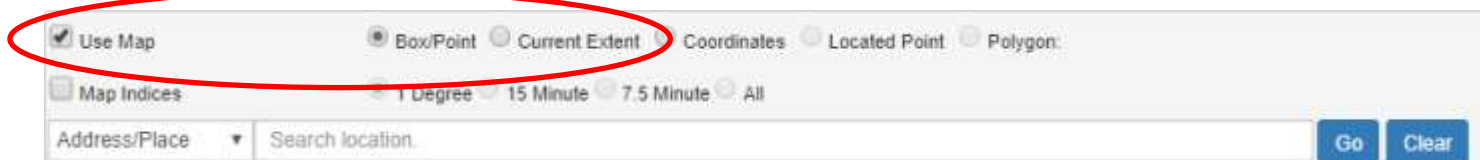
Go to <https://viewer.nationalmap.gov/basic/>

This site works well for downloading small, specific areas rather than larger areas like a county. For larger areas, it is recommended to go to the USGS FTP site (see instructions in this manual.)



A. Selection Tools

1. Check Use Map
2. Select Box/Point to click and drag a box around the desired area or select **Current Extent** to use the area shown in the map window

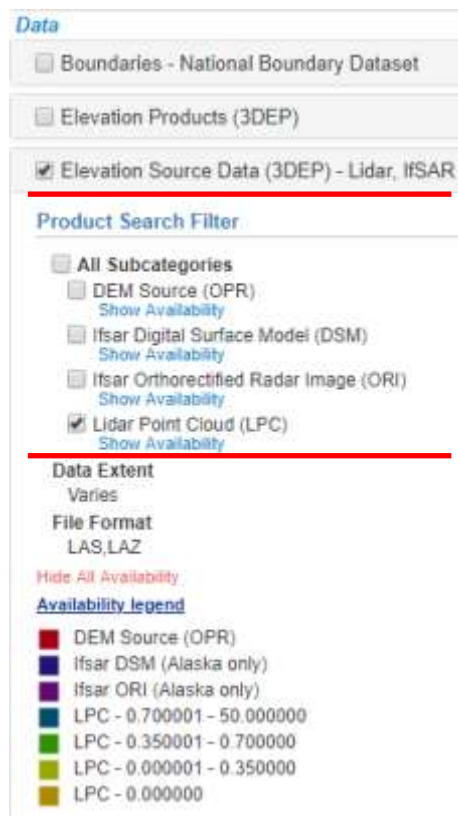


B. Dataset Selection

There are many different types of data available to download, but for this we will only be interested in elevation data.

1. Select Elevation Source Data (3DEP) - Lidar
 2. Ensure Lidar Point Cloud is selected
- Show Availability—click on to make datasets visible on the map
 - Availability Legend—click to see what the different colors represent
3. Click **Find Products** to view a list of products found based on the selection parameters you chose

* It is also possible to select **LAZ in Cloud** from **Custom Views** at the top to find tiles for your selected area.



Downloading LiDAR—USGS National Map

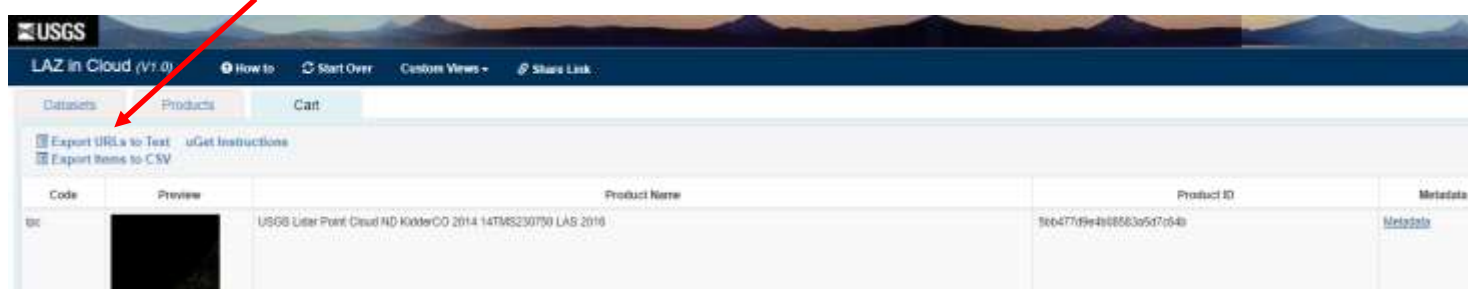
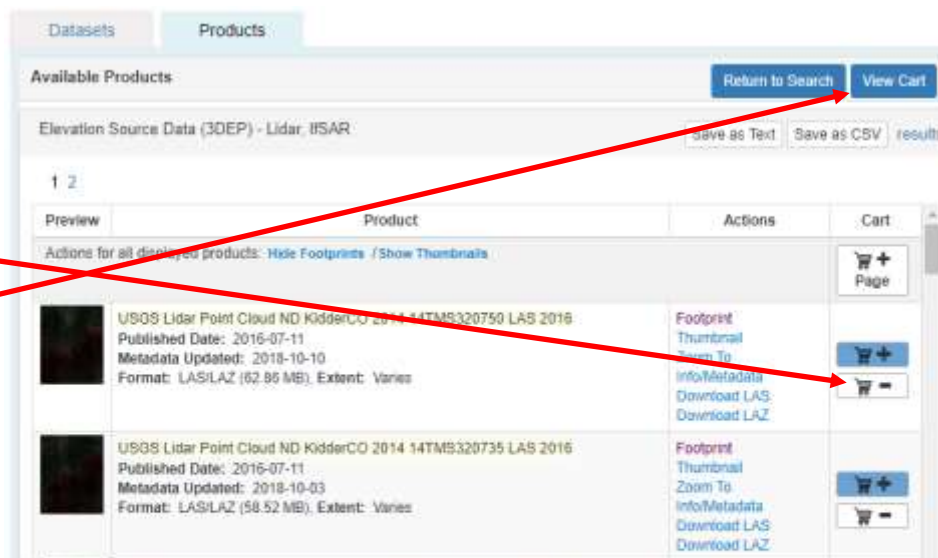
4. Select  to add all the tiles to your shopping cart

5. Deselect tiles that are unwanted

6. Click 

7. Click on **Export URLs to Text**

8. Import the text that was exported in the previous step into the **uGet** Utility and start downloading (see instructions below)



uGet Download Utility



1. Go to <http://ugetdm.com/downloads> to download the **uGet** Utility
2. Select the proper platform for your computer, in this example it's *Windows*
3. Scroll to the bottom and select **7Z Archive** to download the install file.

4. Unzip the downloaded file  **uget-2.2.1-win32+gtk3.7z** using "7-Zip" to extract to a folder

NOTE— 7-Zip install—www.7-zip.org

5. Select "uget.exe" file inside the bin folder to open the utility

6. For questions see the link below or click uGet Instructions under the Cart tab

<https://viewer.nationalmap.gov/uget-instructions/index.html#>



Downloading USGS-Rocky-FTP - LiDAR

For downloading large areas of LiDAR, we recommended using the USGS—Rocky FTP site. It is difficult to identify individual tiles to download, but is organized by state and county or project names. Also we recommended using FileZilla

To download individual tiles, we suggest using the USGS—National Map system, not this site. See the section prior to this in the user manual.

You could visit this website by using internet browser and download individual tiles, but this is not our suggested method.

<ftp://rockyftp.cr.usgs.gov>

We suggest skipping this function and use FileZilla to do the download and browsing of files.

FileZilla is a free FTP client. This will allow for a bulk download of files from the FTP site. This a recommended software, but others may be used. Please note the version below is an older version & may work better than the newer versions (Security Certificate issues).

1. Download FileZilla at: www.gktechinc.com/Downloads/FileZilla3321.exe
2. After the download and installation of FileZilla open up the software.
3. To Connect to the USGS site a Host and Port number are needed.

The Host will be <ftp://rockyftp.cr.usgs.gov>

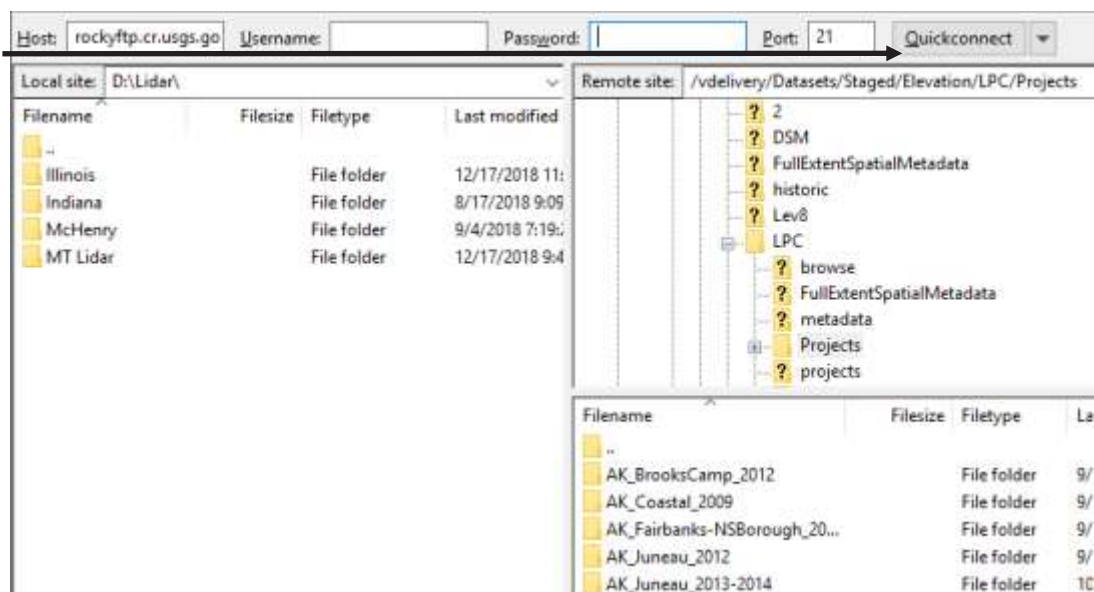
Port: 21

4. Click Quickconnect.

In the Remote Site window, double click

- vdelivery
- Datasets
- Staged
- Elevation
- LPC
- Projects

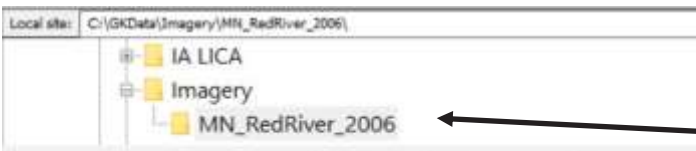
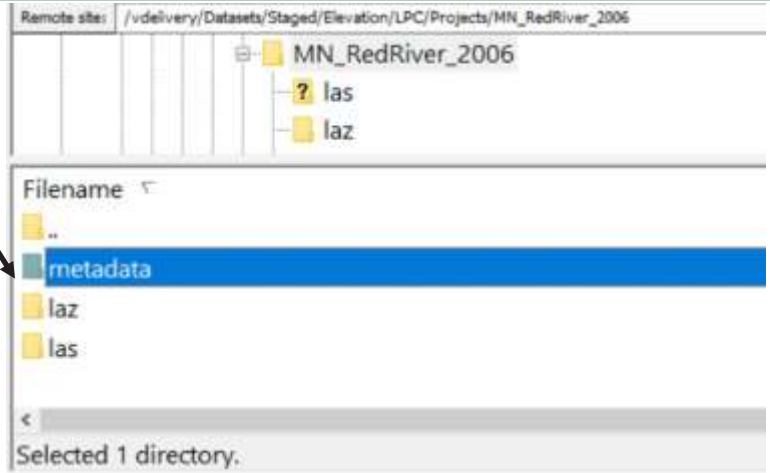
Be patient some folders are slow to open



Downloading USGS-Rocky-FTP - LiDAR

5. After connecting the project files should be visible on the right side of the screen under "Remote site" window. We suggest downloading Metadata and laz files.

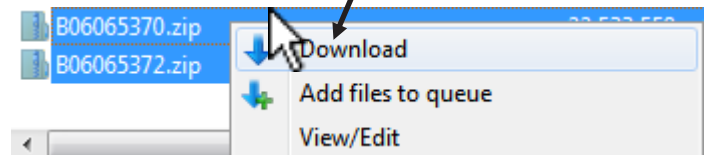
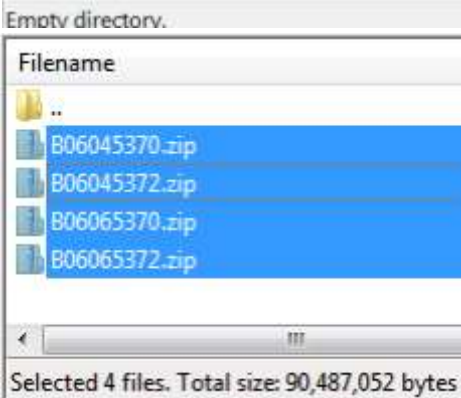
-NOTE- Open the folders and select the data to download.



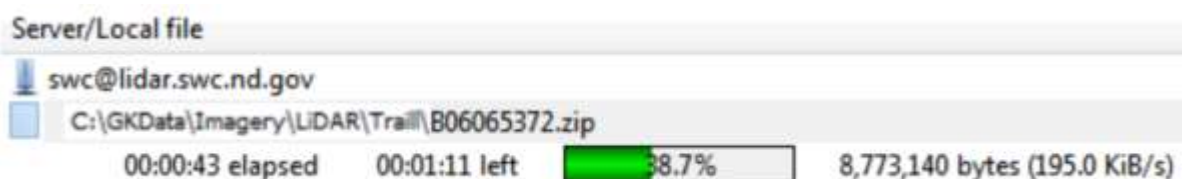
6. Using the 'Local site' window on the left browse to the location where the files will be saved to back on your Computer.

7. After connecting to the remote site and browsing to the location on the local computer right click on the folders to download.

-Note- Drag and Drop also works here



8. The files will start to transfer and the progress can be viewed on the bottom window.



***For detailed instructions on FileZilla visit:**

<https://wiki.filezilla-project.org/Tutorial>

Downloading LiDAR For North Dakota—Ordering

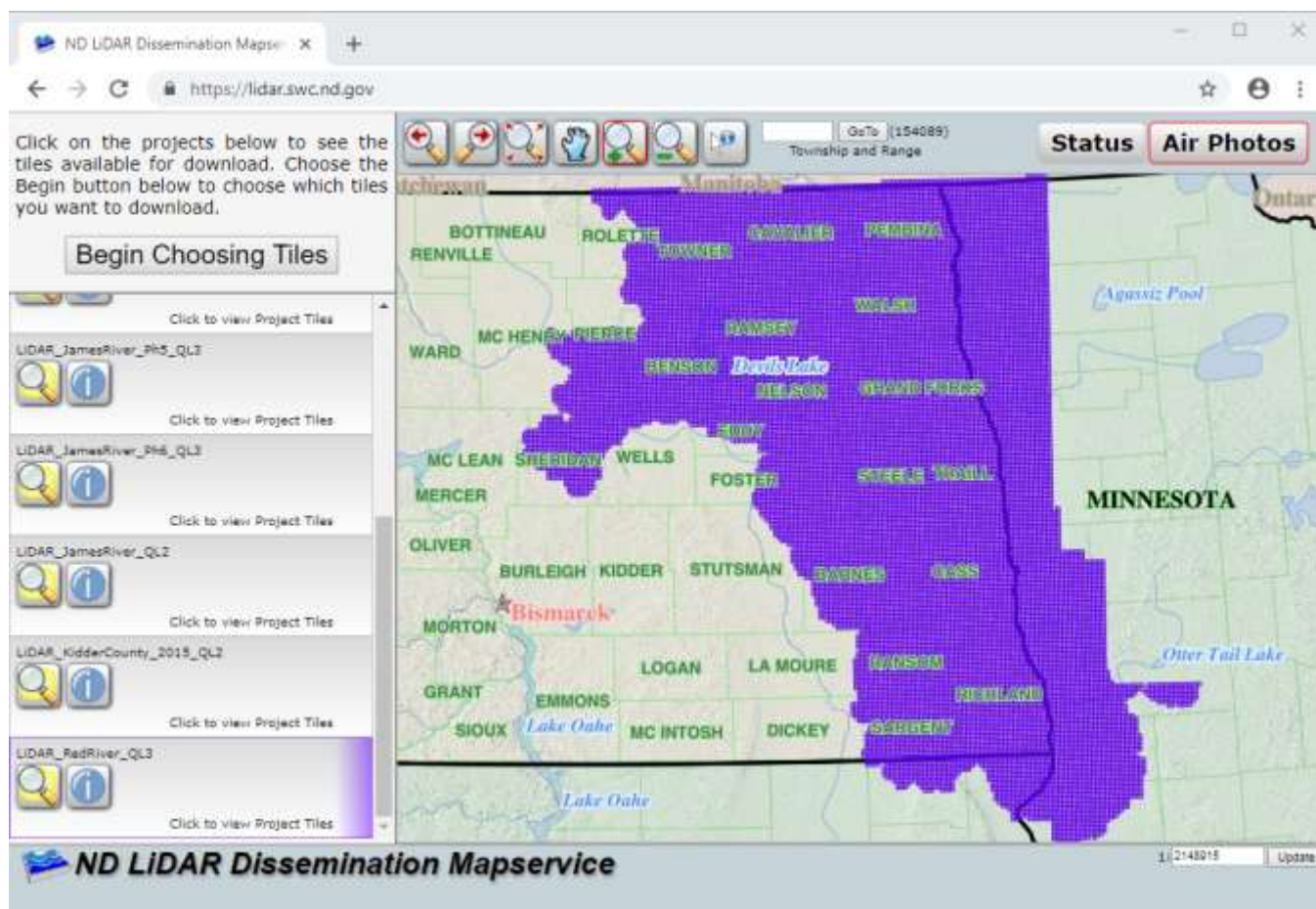
Requesting Data

LiDAR data can be downloaded for a large part of North Dakota from the ND LiDAR Dissemination Mapservice.

To get started first navigate to their website: <http://lidar.swc.nd.gov/>

Downloading process it is recommended to use Microsoft Edge or Google Chrome.

Once on the website it should look similar to the image below: (using Google Chrome)



Once on the website there are several steps to request LiDAR data to be downloaded.

1. Select the LiDAR Data Set to browse and download. These options are located in Left side of the website. This example will use Red River 2008-2010.

-Scroll down to the "LiDAR_RedRiver_QL3"

-Click on the "Magnifying Glass" 

2. Next Click the "Begin Choosing Tiles" button

Begin Choosing Tiles



Downloading LiDAR For North Dakota—Ordering

There are multiple ways to select the tiles to download. Make your selection using the options below. Once your selection is made, only the tiles highlighted will be downloaded.

Select tiles that intersect with a box you drag on the map.

Draw Box

Select tiles within a radius of a point clicked on the map.

Select Point

Select tiles that intersect a polygon that you draw on the map.

Draw Polygon

Select tiles that intersect an existing feature that you select.

Select Feature

Select all tiles within the project.

All Tiles

Cancel

3. The box to the Left will show up to "Choose Tiles". Use the feature that works best for you. I suggest downloading the whole COUNTY.

4. Using "Select Feature"

5. The box to the Right shows up and choose the "County" option and Click inside the county to download- Example using Traill County. (Note: this feature only works on ND counties)

Choose a feature from the list below to use to query the LiDAR availability. Once selected, click the Select Feature button then click on the map to select the feature to use to query the LiDAR.

Select By County

Select feature...

HUC12 Sub-Watersheds

HUC10 Watersheds

HUC8 Sub-Basins

County

Townships

Sections

NOTE: as you zoom in more you will see Twp Rng Sec numbers.

6. Click the "Green Down Arrow"

7. The "Select Formats" box will open, choose 1. ADMS needs LAS files. Others will NOT work

- First Choice- LAS_BareEarth
- Second Choice- LAS_Raw

8. Click the "Download" button

9. The "Selections Results" window will open.

10. If you want to download 1 by 1, Click-[LAS_BareEarth/lasb06185232.zip](#) This is SLOW, but if you only need a few tiles, it's great!

11. Suggest using FileZilla

Click on the projects below to see tiles that intersect your selection. Tiles that will be downloaded are highlighted in yellow. Projects not listed, have no tiles that intersect your selection.

Clear Selection

LIDAR_RedRiver_QL3

Click to view Project Tiles

Select the format(s) of the LiDAR data you wish to download from the LIDAR_RedRiver_QL3 project within your .

- ☐ ASCII_Grids_ft
- ☐ ASCII_Grids_m
- ☐ Intensity_Hybrid_Image
- ☒ LAS_BareEarth
- ☐ LAS_FirstReturns
- ☐ LAS_Raw

Cancel Download

Close

Selection Results

Below is the list of tiles that you have selected. You can download individual tiles by clicking on the relevant link for each tile. If you wish to download all of the tiles, we also provide ftp access where all of the tiles have been packaged and can be downloaded more easily.

Get the files at <ftp://lidar.svc.nd.gov>
 user: svc
 password: water
 path: /temp/15c32d45ee6449

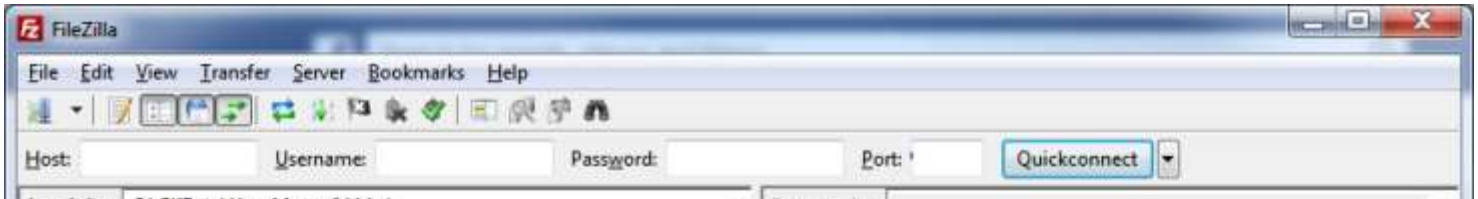
LIDAR_RedRiver_QL3

Zoom	LAS_BareEarth/lasb06185232.zip
Zoom	LAS_BareEarth/lasb06185232.zip
Zoom	LAS_BareEarth/lasb06205232.zip
Zoom	LAS_BareEarth/lasb06225232.zip
Zoom	LAS_BareEarth/lasb06245232.zip
Zoom	LAS_BareEarth/lasb06265232.zip
Zoom	LAS_BareEarth/lasb06285232.zip
Zoom	LAS_BareEarth/lasb06305232.zip
Zoom	LAS_BareEarth/lasb06165232.zip

Downloading LiDAR For North Dakota—FileZilla

FileZilla is a free FTP client. This will allow for a bulk download of files from the FTP site. This is a recommended software, but others may be used. Please note the version below is an older version & may work better than the newer versions (Security Certificate issues).

1. Follow the previous steps to order/select the data to download.
2. Download FileZilla at: www.gktechinc.com/Downloads/FileZilla3321.exe
3. After the download and installation of FileZilla open up the software.
4. To Connect to the ND site a Host, Username, and Password are needed.



5. The Host, Username, and Password are located on the information panel after the data is selected.

Get the files at <ftp://lidar.swc.nd.gov>.
 user: swc
 password: water
 path: [/temp/15c32d45ee6449](ftp://lidar.swc.nd.gov/temp/15c32d45ee6449)

The Host will be <ftp://lidar.swc.nd.gov> followed by [/temp/15c32d45ee6449](ftp://lidar.swc.nd.gov/temp/15c32d45ee6449) done correct—looks like below
<ftp://lidar.swc.nd.gov/temp/15c32d45ee6449>

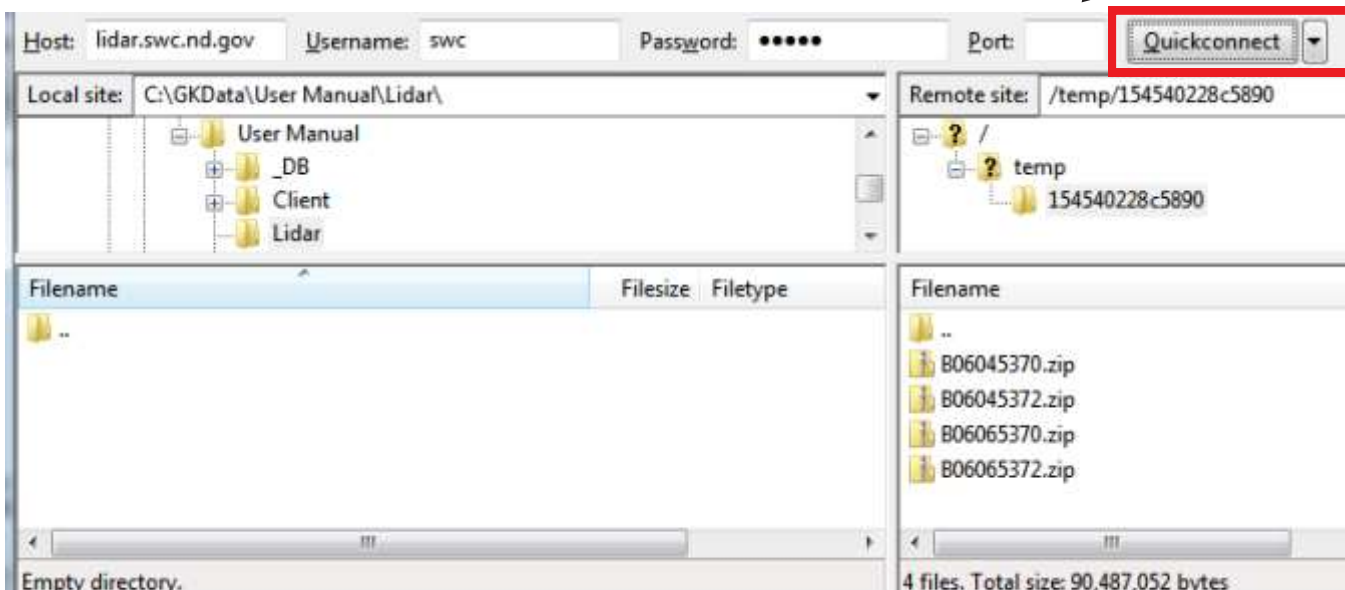
These will have to be copied and pasted separately into FileZilla. The last part of the address will change for every order.

The username = swc and password = water. These will not change.

Coping from Google Chrome - Use the "Shift Key" and "Left Click" to select Text.



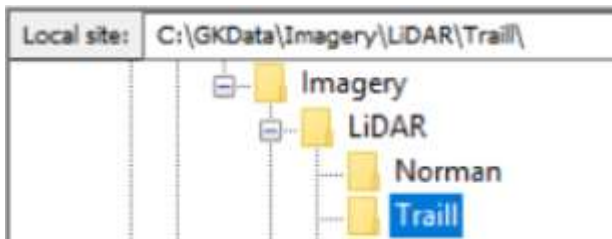
6. After this information is entered click Quickconnect.



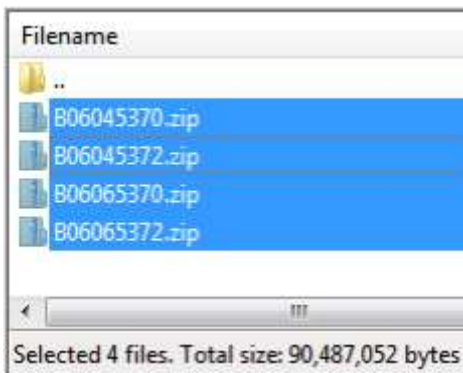
Downloading LiDAR For North Dakota—FileZilla

After connecting the files should be visible on the right side of the screen and will show up as *.zip files.

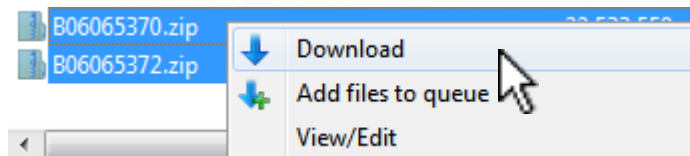
7. Using the Local site window on the left browse to the location where the *.zip files will be saved to.



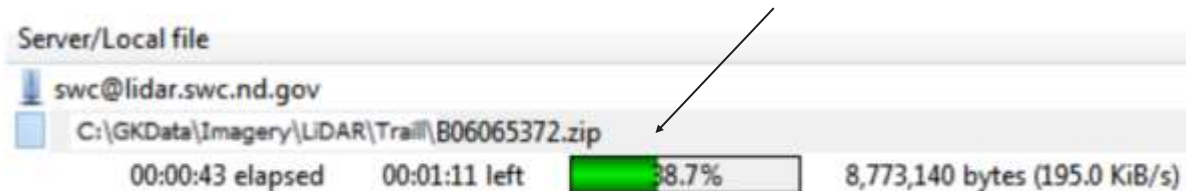
8. After connecting to the remote site and browsing to the location on the local computer select the *.zip LiDAR files to download.



9. After the files are selected:
Right Click—Select "Download"



10. The files will start to transfer and the progress can be viewed on the bottom window.



***It is recommended that before proceeding install 7-zip on your computer.**

<http://www.7-zip.org/>

11. After the files have finished downloading browse to the location where they were saved.

12. Select all of them.

13. Right Click and Go 7-zip>Extract Here (7-zip must be installed for this to work).

14. The *.las files will now show up in the same folder and can be imported into ADMS as elevation data. After extraction the *.zip files may be deleted to save space.

***For detailed instructions on FileZilla visit:**

<https://wiki.filezilla-project.org/Tutorial>

Downloading LiDAR—MN DNR—FTP: Site

This site contains LiDAR for ALL of Minnesota, data is projected in UTM 15. We strongly suggest using FileZilla or some other FTP-Download tool. From this site, you will be downloading "LAZ" files that will work directly in ADMS.

Download and "OPEN" FileZilla— www.gktechinc.com/Downloads/FileZilla3321.exe

This version of FileZilla is an older version that will keep you from running into "security certificate" problems. If you update to newer versions you may have problems.

REMINDER: All of the data on this site is in UTM 15

Starting Point for Downloading data—

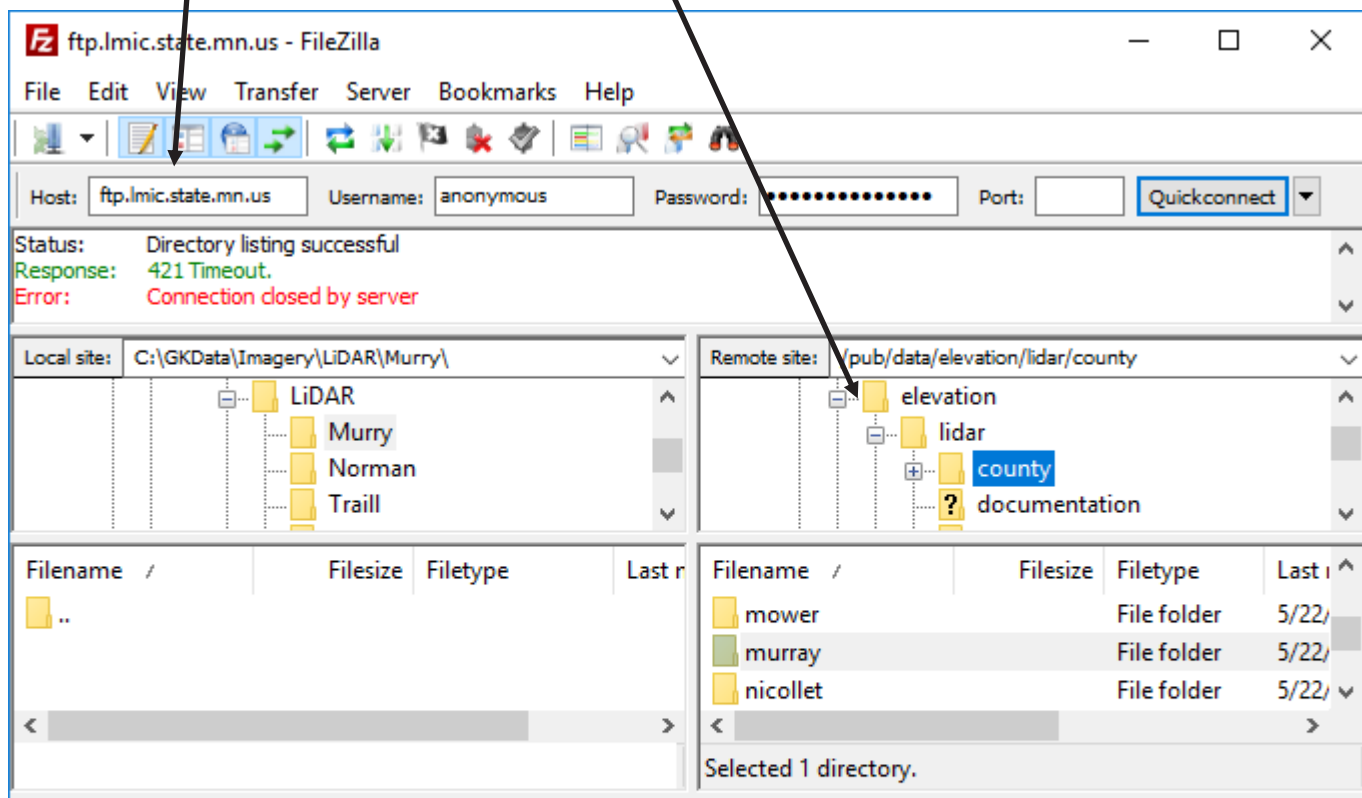
Copy this into "HOST" <ftp://ftp.lmic.state.mn.us/>

Click "Quickconnect" Button (right hand side)

Navigate to the "County" list of folders

Remote site: [/pub/data/elevation/lidar/county](ftp://ftp.lmic.state.mn.us/pub/data/elevation/lidar/county)

Browse to these locations and choose county.



Downloading LiDAR—MN DNR—FTP: Site

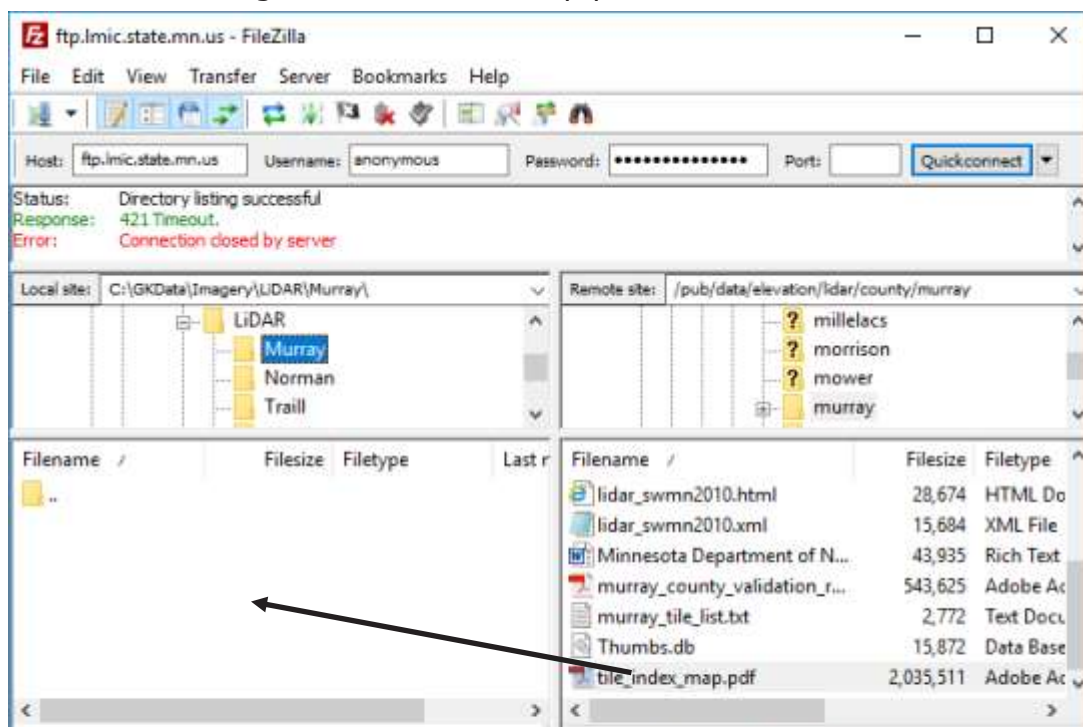
Now ready to "Download" data from the MN DNR LiDAR Site.

On the "Local Site" - (C:\GKData\Imagery\LiDAR\)

1. Right Click on "LiDAR" folder
2. Create a Directory
3. Name it the County or area name (Murray)
4. Make sure you are open into the correct "FOLDER" (Murray)

On the "Remote Site" area— (/pub/data/elevation/lidar/county/murray)

1. Click on the "county" folder
2. Click on the "county name" folder (Murray)
3. Scroll to the "tile_index_map.pdf".
4. Left click/drag the "tile_index_map.pdf" into the blank Local site:



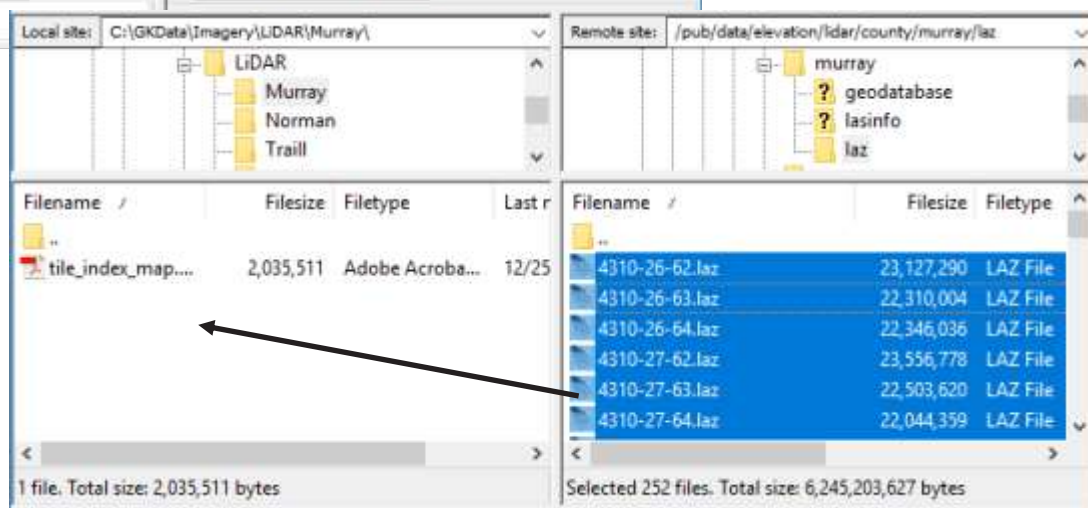
Note:
tile_index_map.pdf is a
useful map that we sug-
gest downloading for
each county you work in.

Scroll up your list in the
"Remote Site" to the
"laz" folder

Select all the "LAZ" file to
Download.

Drag the Files into the
Left "Local Site" location.

Files are now ready for
ADMS!

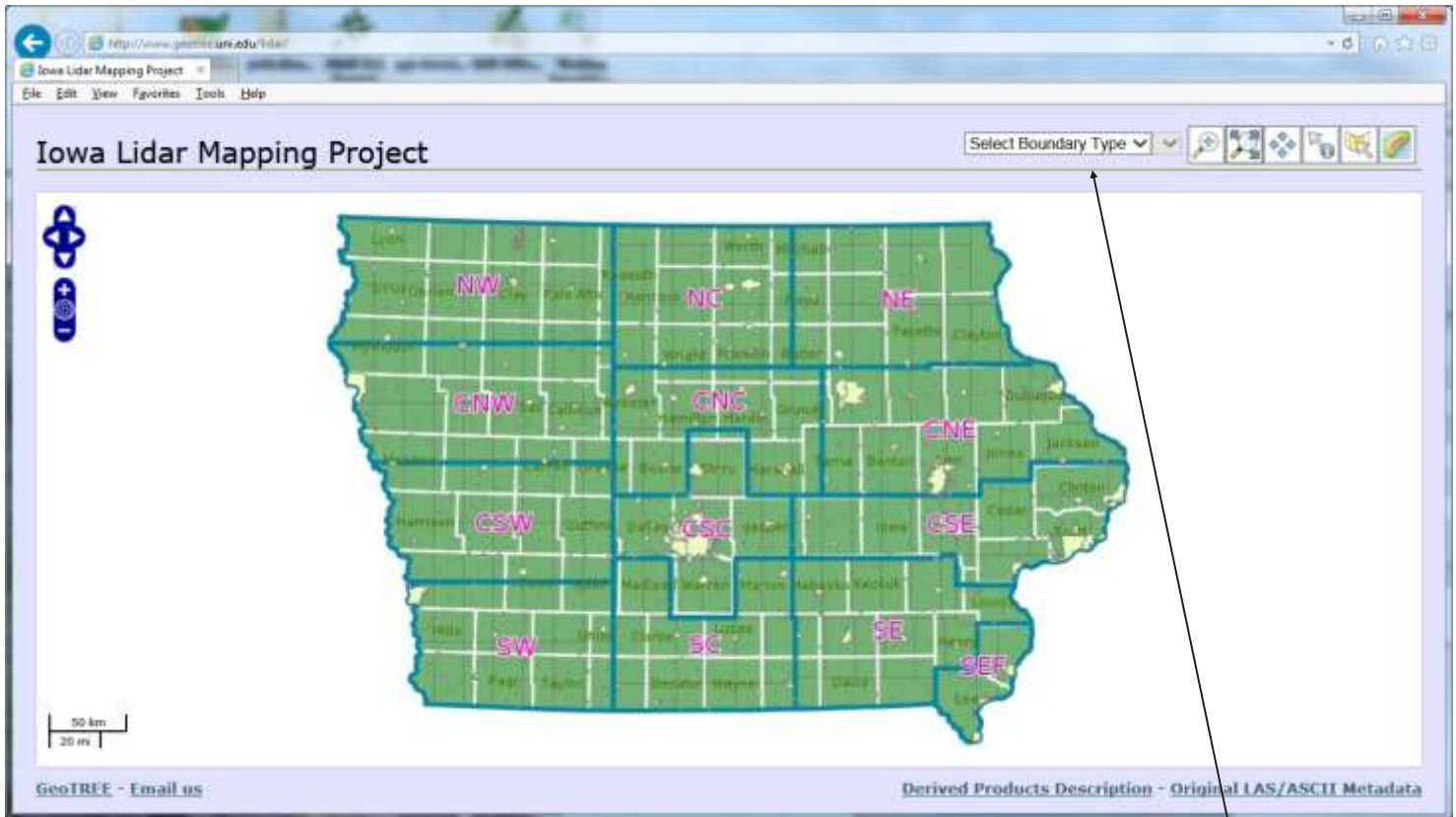


Downloading LiDAR—Iowa LiDAR Mapping Project

A source for importing LIDAR data in Iowa is the “Iowa Lidar Mapping Project”.

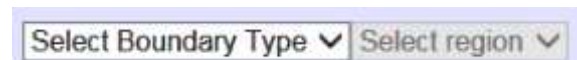
<http://www.geotree.uni.edu/lidar/>

Make sure there is no pop-up blocker on and they are allowed for this site.



There are several ways to select an area to download.

1. Select an area by boundary type (e.g. counties, cities, watersheds).
 2. Use the zooming tools on the top toolbar to get zoomed into the area to download.
- After getting zoomed into the area to download, draw a polygon to select LiDAR tiles to download (left click to drop points and double click to close the polygon.)
 - After drawing a polygon, a popup will appear in another window with the download links and instructions on how to download the data. See next page.



Downloading LiDAR—Iowa LiDAR Mapping Project

Once the new window opens.

Note: you do need "7-Zip" for unzipping files.

If you are downloading a lot of files, you may want to use the "Free Download Manager". Do NOT install the "Software Informer" or other additional installs.

3. Select /Click on
"LiDAR download"

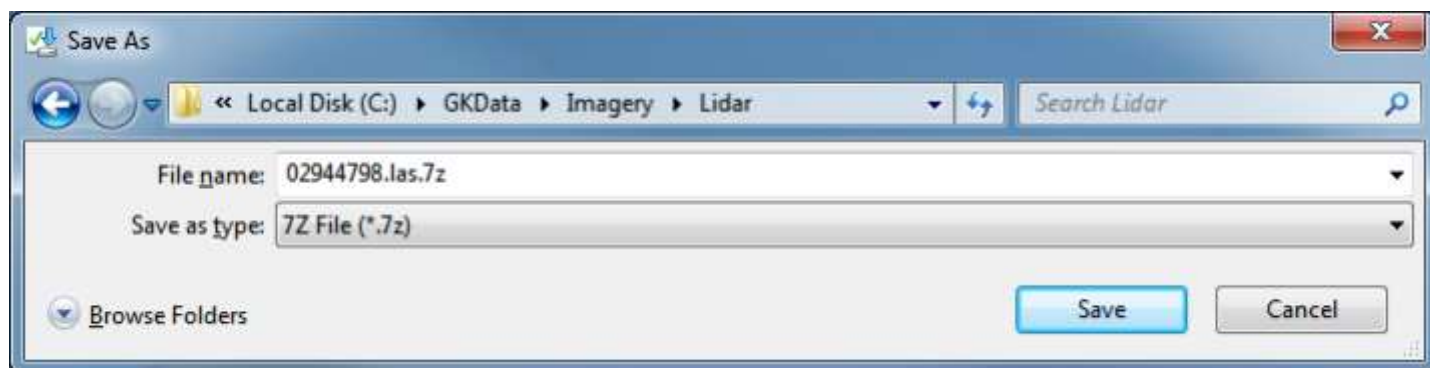
4. Click on the "LAS Links" to download.

5. Click "Save" when the download window opens.



In saving the files, we suggest you save the files back to your C:/GKData/Imagery/LiDAR folder. It is recommended to save all your files back to a "LiDAR" folder to keep things clear. If you are working with more than a couple counties of data, you may want to create "County" folders within the LiDAR folder.

Once saved there, the data must be UNZIPPED. Suggest cleaning up files so you have all the xxxx.las files in the "LiDAR" or "County" folder.



LiDAR—LAS Catalog Creation (LAS & LAZ)

LiDAR data is some very powerful & useful data. This data can be hard to index and catalog what data you have and what you are missing because files need to be processed into ADMS or you need to know "Tile #s" you are looking for.

The "Create LAS Catalog" tool will create a SHP polygon around all the Lidar Tiles (LAS or LAZ) in a folder and label them based on the File Name.



Using LAS Catalog Tool

Go to "Tools" and "Create LAS Catalog"

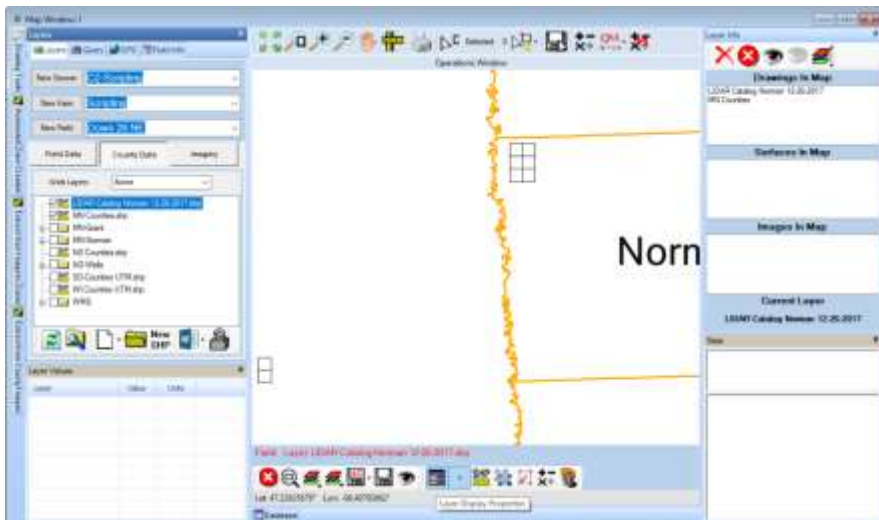
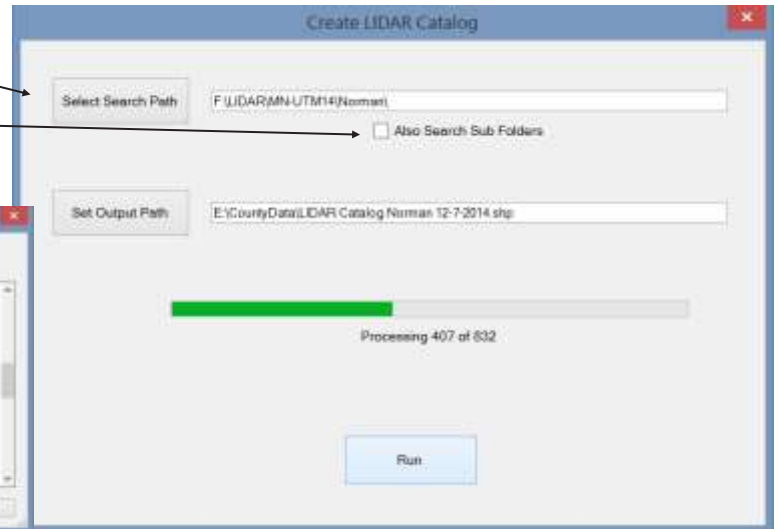
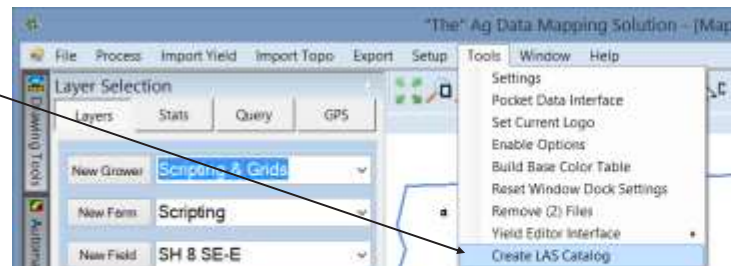
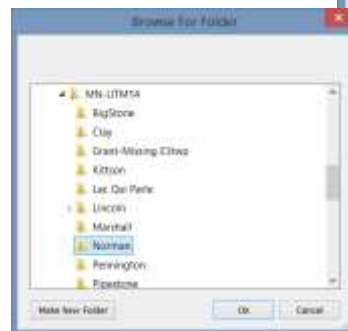
Ex.—shows a field in Norman County MN.

Question—What area do I have for Lidar?

Set your Lidar Source Folder

Note: you can Search Sub Folders

Click "Run"

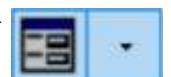


Your output location will default into your "County Data" folder.

Note: if you name or re-name the "Output" you must keep the .shp extension.

The SHP Catalog will be in your "County Data" folder

You may want turn on "Labels" for the SHP file using the Layer Display Properties button.



My Notes

Glossary

GIS— Geographic Information System is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

Projection—A method by which the curved three-dimensional surface of the earth is portrayed on a two-dimensional flat surface. This generally requires a mathematical transformation of the earth's lines of longitude and latitude onto a plane. Every map projection distorts distance, area, shape, direction, or some combination thereof.

Spherical Coordinate System—A coordinate system that uses positions of latitude and longitude to define locations of points on the surface of the earth.

Cartesian Coordinate System—Defined as a flat coordinate system placed on the surface of the Earth. In some projections it's not flat in the sense that it follows the earth's curvature in one direction and has a known scale of error in the other direction relative to the distance of the origin. The most well-known coordinate system is the Universal Transverse Mercator (UTM). It is very easy to work with, fairly accurate over small distances making measurements such as length, angle and area very straightforward.

UTM—Acronym for *universal transverse Mercator*. A projected coordinate system that divides the world into 60 north and south zones, 6 degrees wide. This is what everything is projected in within the software. Being in the correct UTM zone is critical to ensure the location is accurate.

Datum— Point, line, or surface used as a reference. The datum defines an ellipsoid and through set points on the ground they are related to points on the ellipsoid, the center of the earth is defined. There are many different datums used for measurements locally and worldwide. Common datums are WGS84 and NAD83.

NAD 83— *North American Datum of 1983*— Datum defined to remain consistent over the years for the North American Continental Plate.

WGS 84— Most well known datum. Gives a good approximation of points over the entire world and in theory remain consistent over time.

Latitude— The angular distance, usually measured in degrees north or south of the equator. Lines of latitude are also referred to as parallels.

Longitude—The angular distance, usually expressed in degrees, minutes, and seconds, of the location of a point on the earth's surface east or west of an arbitrarily defined meridian (usually the Greenwich prime meridian). All lines of longitude are great circles that intersect the equator and pass through the North and South Poles.

Glossary

Vector—A coordinate-based data model that represents geographic features as points, lines, and polygons. Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices. Attributes are associated with each vector feature, as opposed to a raster data model, which associates attributes with grid cells.

Point— Zero dimensional and do not have a volume, area, or length. Points have many uses, they can be yield, mark areas in the field, define elevation along with many other types of data.

Line— A path that is connected by at least two vertices. However, multiple consecutive vertices can be used to create a curved line.

Polygon— A combination of multiple line segments that represent a closed shape. Polygons are vector data and can be grids or boundaries.

Raster— This is how images are displayed within the software. Where each pixel has one or multiple values associated with it. This gives increased accuracy and more detail when creating application maps. It is a spatial data model that defines space as an array of equally sized cells arranged in rows and columns, and composed of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature.

Multiband Raster (Image)— A raster image that has more than one value associated with it at every pixel. Each band (reference to the color band on the electromagnetic spectrum) represents a segment of the electromagnetic spectrum collected by the sensor. When displayed the image is a color composite of each band. An examples of multiband images are ortho and satellite images.

Single Band Raster (Surface)— An image with one set of values per pixel.

Image—In the software an image usually is the county data or satellite imagery scenes before any data analysis has been done. It is a representation or description of a scene, typically produced by an optical or electronic device, such as a camera or a scanning radiometer. Common examples include remotely sensed data (for example, satellite data), scanned data, and photographs.

Surface— In the software surfaces are represented by almost any type of created raster data. This include elevation, yield, application raster maps, and satellite imagery. A surface is a geographic representation of a set of continuous data (such as elevation or geological boundaries); a spatial distribution which associates a single value with each position in a plane, usually associated with continuous attributes.

Ancillary Data— In GIS processing, data from other sources used to assist in analysis and classification or to populate metadata for another object.

Glossary

- MID**— MapInfo interchange format (always paired with MIF)
- MIF**— MapInfo interchange format (always paired with MID)
- SHP**—A vector data storage format for storing the location, shape, and attributes of geographic features. A shape file is stored in a set of related files and contains one feature class. Shapefiles can be used to represent lines, points, or polygons. Often times you will see shape files as field boundaries, sample points, yield points, elevation, and in tile planning. Shapefiles have at a minimum of three files associated with them to make them functional. These are a SHP, SHX, and DBF. The SHP file contains the primary geographic reference data in the file. SHX file is the index portion of the file. DBF is the database file. The shapefiles attributes are stored in database format and have a columnar structure for each attribute.
- CSV**— Common separated value. Stores data in plain text form. Can be opened in Microsoft Excel and in a text file editor (notepad). They are primarily separated by a comma. CSV files are generally used to import soil test results and yield data.
- XLS**— File extension used to identify the file as a Microsoft Excel file. XLS files are used when importing soil test results into the program.
- XML**— Extensible Markup Language—A markup language that defines a set of rules. These can be both human and machine readable. Textual data format, and is widely used to represent data structures.
- SID**— Compressed image that is created using the multi-resolution seamless image database. This is commonly used to partition large geo-referenced raster images. A common SID image is ortho imagery.
- JP2**— Compressed images with the metadata with XML embedded data. Geo-referenced images can be opened and displayed correctly on the earth's surface.
- JPEG**— Joint Photographic Experts Group—Common image compression method. Compression can be adjusted to select between size and quality of the image. Some of the original image quality is usually lost in the compression and cannot be restored. JPEG images can also support millions of different colors.
- BMP**—Bitmap Image File—Raster image files that can be edited, saved, geo-referenced, and used within the software. Often times they work well because they are compatible with other software packages and contain a higher resolution than a JPEG.
- TIFF**— Tag Image File Format— A common format for exchanging raster graphics images between application programs, including those used for scanner images. TIFF files can be composed of multiple of single bands and be georeferenced. There are many different types of TIFF file formats and not all are supported within the software. Often TIFF files will be satellite imagery scenes.

Glossary

- GRD**—Grid files which are used to generate maps. Most raster data created within the software is automatically saved as a GRD file. However, these files can be manually saved as a BMP, JPG, or TIFF file and maintain the geo-referencing. GRD files contain two-dimensional uniform lattices (regularly spaced, rectangular array) of XYZ data (e.g. easting, northing, and elevation); may be in a binary or text format, but is most often saved in the binary format.
- NIR**— Is a method of light extraction. This can be used on ortho images as well as satellite imagery. The best images to use this for are bare soil images. The NIR light is electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 0.74 micrometers (µm) to 300 µm.
- NDVI**— NDVI is best used on vegetative images which can be satellite or ortho images. It gives a good measure of light reflectance on green vegetation. It is a simple graphical indicator that can be used to analyze remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not. NDVI is defined as $NDVI = (NIR - VIS) / (NIR + VIS)$
- RGBVI**—Is Red Green Blue Vegetation Index combines the Red Green and Blue band. It is useful in images that do not have NIR but do have vegetation in the image. $RGBVI = G^2 - (B * R) / G^2 + (B * R)$
- Geo-referenced**— To define an objects location. This gives the images a position on the face of the earth.
- Remote Sensing**— To gather information about an object without physically being there. Most often this term is used to acquire information from aerial or satellite imagery which gives information about the field.
- CIR**— Refers to an Image that is “Color Infrared”. This means that there is an Infrared, red, and green band in the image. However band the orders may differ between them (e.g. NRG & NGR).
- NRG**— An image that has an Near-Infrared, Red, and Green band in it, in that order.
- RGB (Color)**— Also referred to as a “color” or “true color” image. These images only have a red, green, and blue band in them. Since it is lacking Infrared, NDVI and NIR extractions cannot be done on them.
- BW**— A term often seen on WMS links refers to a black and white image.
- LiDAR**—Which stands for Light Detection And Ranging = Elevation data collected by using reflected NIR light. Measuring the response times and color intensity LiDAR returns accurate elevation data and can create classifications of what the light hit (Ex.—ground, vegetation, buildings or water).
- Photogrammetry**— Is the science of making measurements from photographs. Using complex 2D and 3D models and known measured values, this process can give relatively accurate XYZ locations.