



**Environmental Restoration Group, Inc.**

**USER GUIDE**

**Setup and Operation of the ERG Model 105G**

**Revision: 1**

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## 1. PURPOSE

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The purpose of this manual is to demonstrate the proper setup and use of the ERG 105G handheld GPS surveying system and accompanying software.

## 2. DISCUSSION

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The 105G is a simple to use GPS mapping system for performing outdoor gamma radiological scans. It consists of an interface tablet containing all necessary software to acquire position correlated radiological scan data from a gamma detector and export the data for processing using a variety of applications, such as Microsoft Excel, or ESRI ArcGIS. The handheld logger comes installed with two applications necessary for collecting data and exporting to a removable disk drive. The ERG RadScout is used to collect gamma data and couple it to a GPS position. The RadSync software is also included on the handheld computer and is used to export all field data to a single removable disk. Using the ERG RadScene software, the data can be managed, analyzed, and merged from a single processing computer.

The 105G uses off-the-shelf Ludlum equipment for radiological detection. The system uses the Ludlum model 2221 meter. An optional setup uses a 2221 with Bluetooth radio incorporated to allow a completely wireless interface between the data logger, 2221, and sub-meter GPS receiver.

## 3. TRAINING AND QUALIFICATION FOR OPERATION OF SYSTEM

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To perform any of the functions listed below in a quality significant environment an operator should be trained and qualified on the steps/processes they will be performing.

- Setup of Hardware
- Calibration and Function Check of Radiological Components
- Testing and Validation of Positioning System and Scanning Parameters
- Survey Data Collection and Export

## 4. PROCEDURE

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The following section comprises the steps to setup and operate the 105G gamma scanning system.

### 4.1 Setting up the Hardware

#### *Power and Screen Lock*




Power on the Rad Scout by pressing the power button once, located on the bottom right-hand corner of the front of the device.

To unlock the device and reveal the home screen, slide a finger upwards on the display. Open the Rad Scout program by tapping its icon on the desktop.

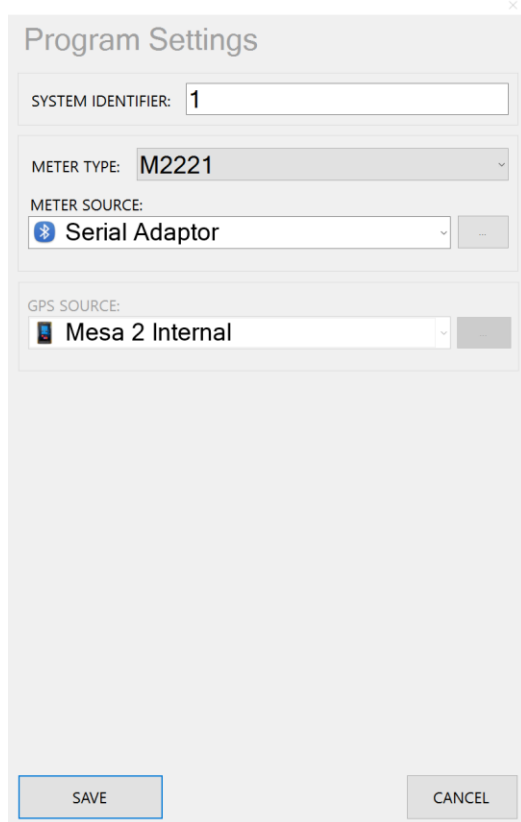
### ***Setting Up the Radiation Detector and Meter***

The typical radiological instruments used with the system are the Ludlum Model 2221 Counter with a gamma detector (typically 44-10 or 44-20). Refer to the Ludlum Technical Manuals for information on the use, calibration and maintenance of this equipment. Equipment calibrations and function checks should be performed in accordance with site and/or ERG Standard Operation Procedures (SOP) ITC.103 and ITC.104.

### ***Connecting the Meter to Tablet***

When using the wireless 2221 option, the meter incorporates a Bluetooth device that syncs with the RadScout. To connect to a specific meter, ensure the meter you wish to connect to is turned on and that the Bluetooth modem has a flashing blue light. In the RadScout software tap the Program Settings option from the File menu, and select the button next to the METER SOURCE drop down box as shown in Figure 1. Note that for this option to be available, the meter must be disconnected. Connect and disconnect the meter from the Settings menu  in the main form. The window, as shown in Figure 2 will appear with all discovered Bluetooth devices. Click on the serial name that matches the Bluetooth device of the 2221 you want to connect to and click SELECT. If the pairing is successful, the device name will show up in the drop down box. Save the project settings and connect to the meter through the settings menu in the main form by clicking on , METER – OPEN. If the meter is opened successfully, the values will be displayed next to the trifoil symbol  in the bottom left-hand corner of the screen. A red error icon indicates there is no connection.

Once the Bluetooth device is paired and selected in the drop down box, the device will be connected on every startup of the software.




**Figure 1. Program Setting Window**



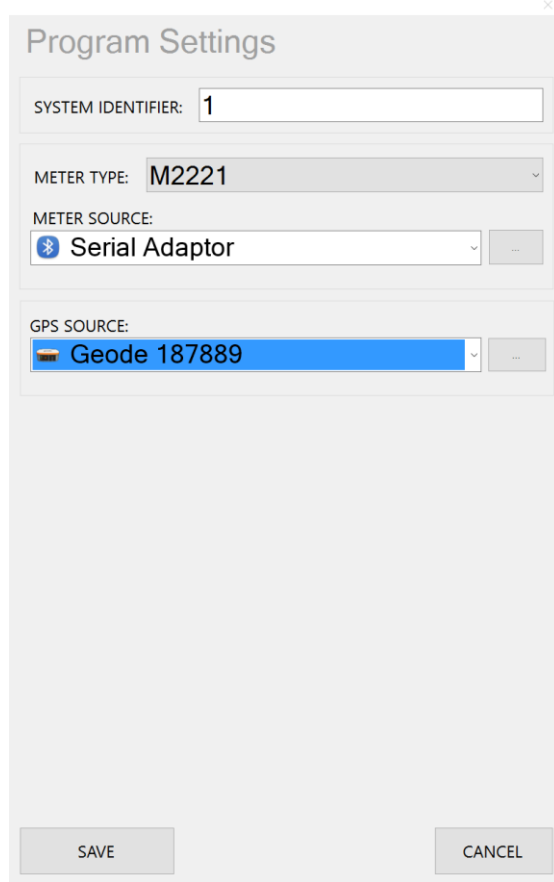
**Figure 2. Bluetooth Radio Selection Window**

### ***Connecting to Geode GPS***

The internal GPS is adequate for most surveying needs, but if sub-meter accuracy is desired, the external Geode sub-meter receiver may be used as the GPS source. To connect the Geode receiver, press the power button on the receiver to turn the unit on. From the File menu, tap Program Settings and select Geode from menu labeled GPS SOURCE as shown in Figure 3. Note that this option is only available when the GPS is disconnected. The GPS may be connected and disconnected through the settings menu . If the Geode being used is different than the one in the drop down menu, the new Geode must be paired by clicking on the button to the right of the drop down box and selecting the proper device. The Geode serial number may be found on the bottom of the receiver as a six-digit number. Once selected, click on the Settings menu, and tap GPS, then CONNECT to connect the new device.

The internal tablet GPS may also be used as the primary GPS source to reduce hardware. To select the internal GPS open the Program Settings window and select the Internal Mesa GPS in the drop down menu. Note that the GPS must be disconnected for this option to be available.

Note that once a successful connection is established, the software will reconnect the last device used upon starting the software.



**Figure 3. Program Settings GPS Window**

### ***Charging the Mesa 2 Tablet***

The 105G Mesa tablet comes with a standard wall charger that plugs into a port on the bottom of the device. The device will operate for approximately 10 hours on a single charge and takes about 3 hours to charge completely.

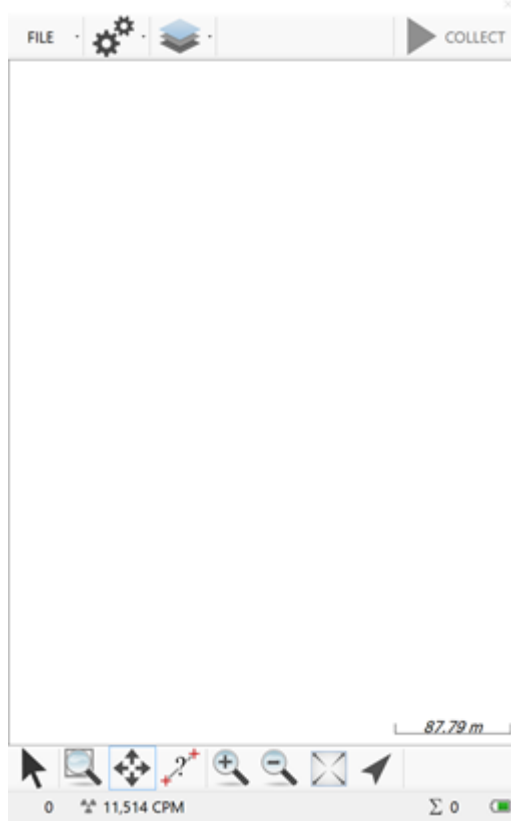
### ***Charging the Geode***

The 105G Geode receiver uses a standard mini USB cable for charging. The cable may be plugged into any USB device, such as a computer, or into a USB wall outlet adaptor. The Geode LED will flash while charging and will remain on when fully charged.

## **4.2 RadScout Interface**

The Rad Scout program interface is shown in Figure 4. The map window, the map toolbar, and other surveying features are all accessible from the main interface, and will be described in the succeeding sections.





**Figure 4. RadScout Interface**

### ***Map Controls***

Below is a description of the map controls in the map tool bar used to navigate the real-time position and data.



When the select tool is selected, the map coordinates will be displayed on the map window. Coordinates will be displayed in the units specified in the projection coordinate system.



The Pan tool may be used to pan the map in any direction. With the tool selected, tap and hold on the map, then drag in any direction to move the map.



The Zoom Rectangle tool may be used to zoom to a specified area. With the tool selected, tap and hold, then drag to create a rectangle to zoom to.



The Measure Tool may be used to measure the distance between a series of lines. With the tool selected, tap the screen at any position to measure the distance. The distance will be displayed on the map window.



Tap the Zoom In tool to zoom in a fixed amount.



Tap the Zoom Out tool to zoom out a fixed amount.



The Zoom Extents will zoom to the bounds of the survey data and background data. *Note that if the Autozoom Location (in settings menu) setting is checked, the map will always zoom back to the position.*



The Zoom Position tool will zoom to the current location of the array position.

### **Status Bar**

The status bar is displayed at the bottom of the software as shown in Figure 5. The items in the status bar are explained below.



The satellite icon will show the status of the GPS receiver. A flashing satellite will indicate that the receiver is connected, but that there are insufficient satellites to obtain a valid position. Once solid, the number of GPS satellites will be displayed next to the satellite icon. When a differential GPS position (high-accuracy) is obtained, the letters DGPS will be displayed over the satellite.



The real-time meter values will be displayed next to the tri-foil. Unless otherwise stated on the screen, these values will be in units of counts per minute (cpm).



The sum status will indicate the total number of records collected in the currently opened log file. This value will be reset to zero when a file is closed.



The battery indicator will show the status of the tablet batter. Click on the battery to open a window showing the percentage and remaining time of the battery. Tap anywhere on the screen to close the battery window.



**Figure 5. RadScout Status Bar**

### **4.3 Performing a Survey**

The Rad Scout software is used to view, collect, and analyze spatially correlated radiological data with superior accuracy and data quality. Using the position of the GPS receiver, or internal tablet GPS, collected radiological data are viewed in real-time. In addition, the program provides the ability to apply a legend to background and survey data to provide real-time mapping of the gamma levels.

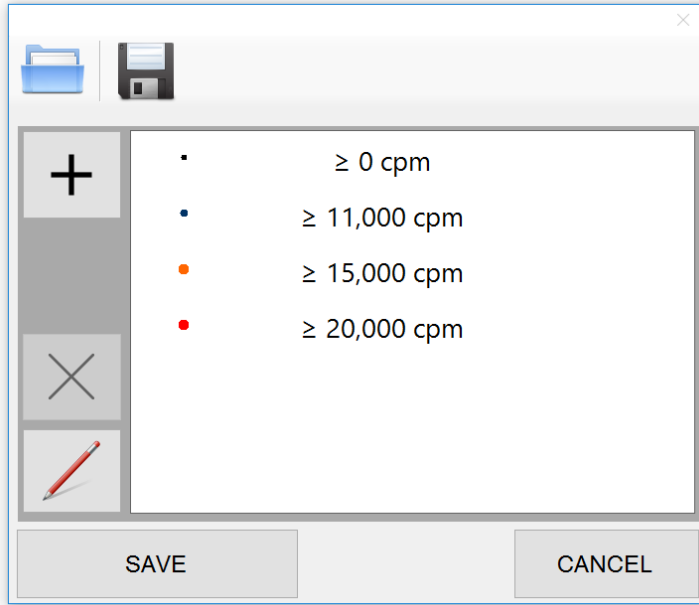
#### ***Defining a Coordinate System***

By default, the software will use the WGS84 longitude latitude geographical system for all mapping and log file collection. There are times, however, where it is necessary or practical to define a projected coordinate system. For instance, when adding a geotagged world image file, it is necessary to set the coordinate system to the same system as defined in the image. The coordinate system will also be beneficial when collecting point features, which will be discussed in more detail below.


To define a coordinate system, click on FILE, then COORDINATE SYSTEM. Select the desired System and Zone, then click Save to set the project coordinate system. Once set, the saved coordinate system will be applied every time the software is opened.

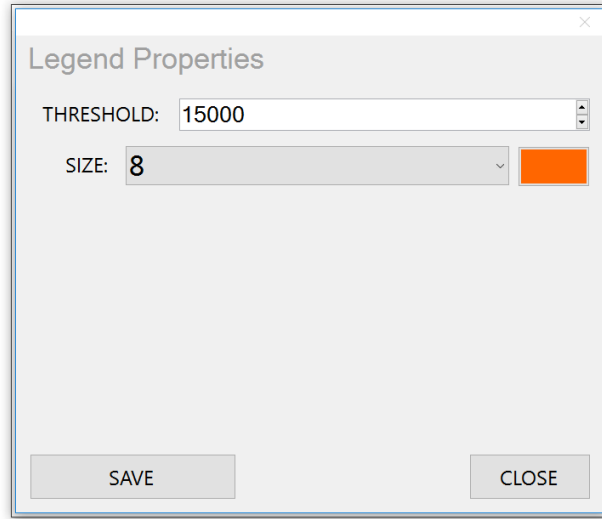
#### ***Defining a Legend***

The legend can be used to define specific colors to ranges of count rate data. Although the 2221 records both ratemeter and one-second scalar data, only the ratemeter will be evaluated and displayed using the legend. To apply a legend, tap Legend in the Settings menu. The thresholds and associated colors will be shown, as demonstrated in Figure 6. To add a new legend break, tap the Add  button. Enter the new threshold, desired point size, and the color, then tap Save. The threshold is defined as the count rate at which the data will be colored if it is equal to, or exceeds. For example, in the legend defined in Figure 6 all data that have a value between 15,000 counts per minute (cpm) and 19,999 will be colored orange. Data that are equal to or exceed 20,000 cpm will be colored red.



**Figure 6. Defining a Map Legend**

To edit an existing break, tap on the break you wish to edit, and tap the edit button , or simply double tap on the break to bring up the legend properties window, as shown in Figure 7. Make the necessary changes to the threshold, point size, or color and tap the Save button to apply changes. Note that the default map point will be defined by the  $\geq 0$  cpm break. The color and size of the point may be modified, but the threshold must be zero, and the break may not be deleted. Up to 10 breaks may be added to the legend. Once the legend is defined, tap the Save button to apply changes.



**Figure 7. Legend Properties Window**

The legend will be applied to both the background layers and the real time data. When adding background layers, the legend breaks will be ordered from smallest to largest values when being drawn on the map. This allows the larger, and typically more important values, to be more visible when viewing the data that are on top of each other spatially.

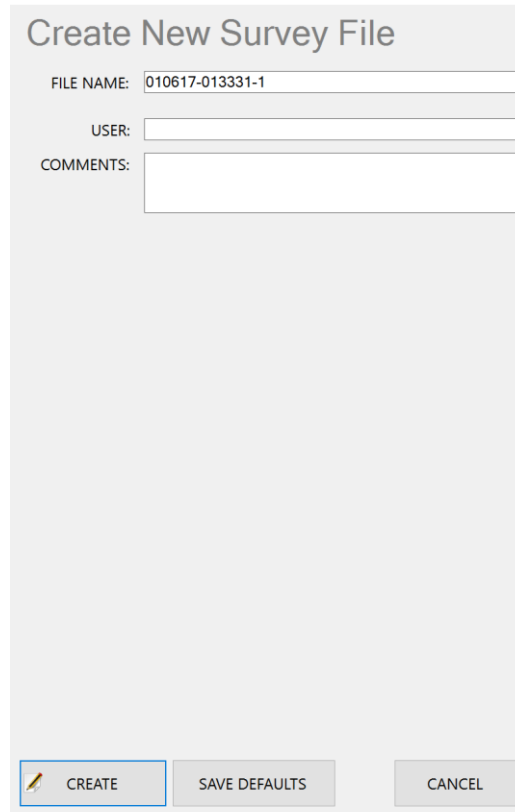
If multiple legends are being used, use the menu in the legend editor to save and recall legends.

### ***Creating a Survey File and Collecting Data***

Prior to collecting survey data, a file must be created that will store all the records. To create a file, tap on the Create File tool from the File menu. A Create New Survey File dialog will be displayed as shown in Figure 8. The filename will be automatically created using the date, time, and the system ID of the Rad Scout. The system ID is provided as an integer to distinguish files easily when multiple data loggers are used for a single survey. The system ID for each data logger is predefined and may not be modified. If desired, add additional information to the beginning of the filename string, however it is highly recommended that the numerical fields are not modified. If necessary, enter additional information in the following textboxes, such as the survey unit, the technician, and any additional comments. Tap the Create button to create the file.

Once a survey file has been created, survey data may be collected. Tap the Collect tool to start collecting data. Logged data will appear on the map in real time as individual points and the tablet will produce an audible beep when a new data point has been logged. Volume can be adjusted using the P1 and P2

hardware buttons on the front of the tablet. The total number of records logged to the file is also shown in the status bar. To pause the data collection, press the Stop tool. When surveying is complete, close the file by tapping the Close tool in the File menu. Once a file is closed, it may not be reopened to append data, however, all collected files may be opened as background layers.




The screenshot shows a dialog box titled "Create New Survey File". It features three input fields: "FILE NAME:" containing "010617-013331-1", "USER:", and "COMMENTS:". At the bottom, there are three buttons: "CREATE" (with a pencil icon), "SAVE DEFAULTS", and "CANCEL".

**Figure 8. Creating a survey file**

### ***Adding Background Layers***

The ability to add background files is an important feature that may be used to specify survey transects or to see where previous surveys have been performed. The application allows previous gsf files (ERG Geographical Survey File), gsfm (Geographical Survey File Merged), ESRI shapefile (.shp), or geotagged images (.tif and .jpg) files to be loaded as background layers. As discussed in previous sections, the same legend that is active on the map will be applied to the .gsf survey files that are loaded as background layers. This greatly simplifies the process of navigating back to hotspots or areas of concern based on survey data alone.

A shapefile may be a line, polygon, or point feature set. **Note that when a point feature set is loaded, the map legend will not be applied to the data.**

To add or remove background layers, tap Background Files from the Layers menu . A list of accessible files will be displayed. **To make a custom file accessible in the list, the file must be copied into the RadScout folder in the My Documents folder on the data logger. Note that this action is performed automatically using the RadSync application.** These files can include shape files jpg, and tiff files. Previously surveyed gsf files will also appear in the list. To select a desired file, tap the box next to the file name and the box will appear checked. Up to 10 layers can be added to the map and all coordinate systems will be re-projected into the active coordinate system if they differ. Tap Show Background from the Layers menu to reveal the selected background files. Tap Show Background again to hide the selected background files.

**Data Features**

The Data Feature function is useful for displaying points that are used for navigational or informational purposes. For instance, it might be necessary to navigate to previously defined sample locations as a shapefile. To open a feature file, select Data Feature from the file menu, then tap Open Feature File. A list of available shape files will appear. **To add custom shapefiles to the menu, the file must be copied into the RadScout folder in the My Documents directory.** Select a file, then tap Open. The points will be displayed on the map as shown in Figure 10. Unlike the background files, the data features allow user interaction through the map interface.

Click on the feature to bring up the sample window as shown in Figure 11. From the menu, select one of the three options as described below.



The edit tool may be used to edit information about a previously added data feature point. Note that this option is only available for points added manually.



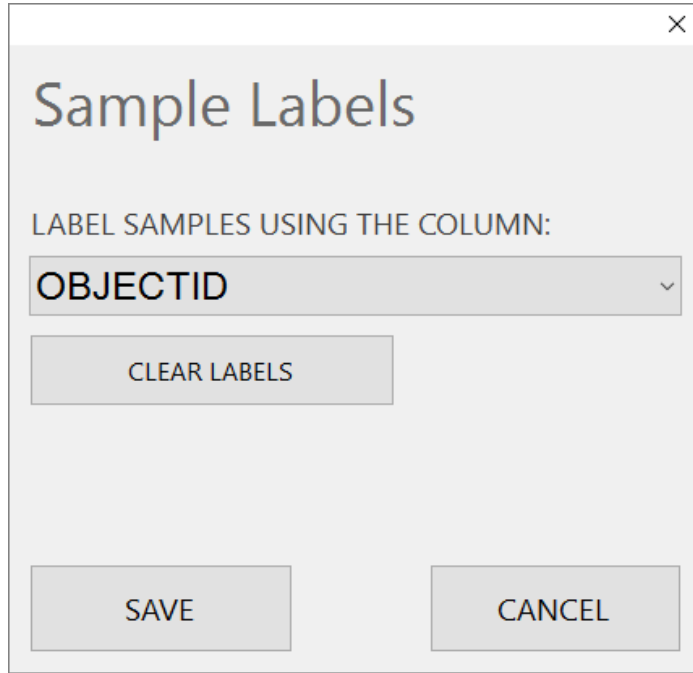
The select tool may be used to select a specific data feature. Once selected, the data feature can be navigated to by clicking FILE, DATA FEATURE, NAVIGATE TO.



The visibility tool may be used to turn individual samples on and off. This feature is useful to determine when tasks at specific locations have been completed.

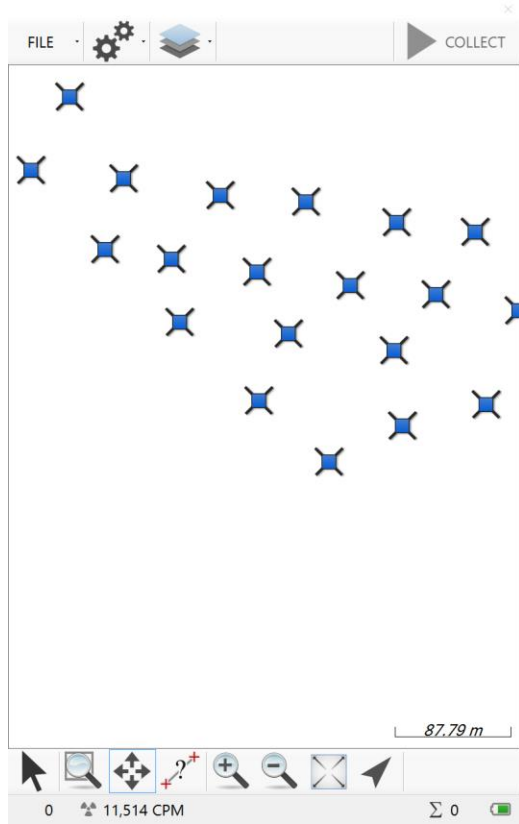
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To add labels to the data features, click the FILE, DATA FEATURE, LABELS tool. The samples label window will be displayed as shown in Figure 9. Select the shapefile column to use as the label and click Save to show labels next to each data feature. Open the same window to clear all labels.

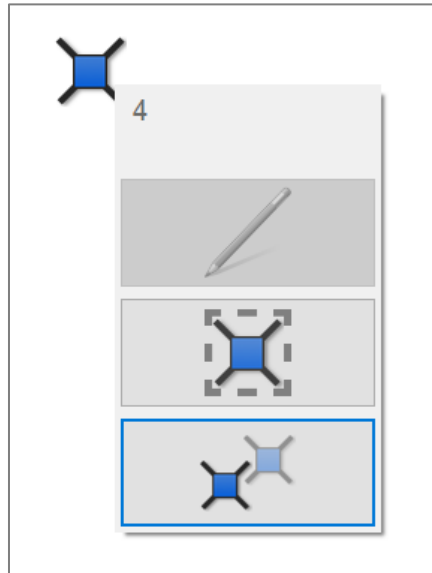


**Figure 9. Labeling data features**





**Figure 10. Data features**



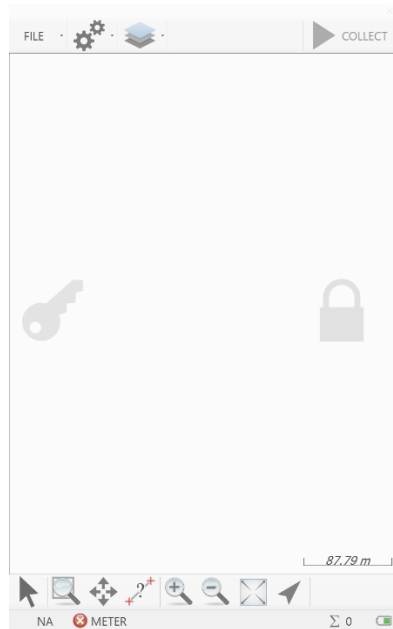
**Figure 11. Data feature sample window**

It may also be necessary to add new data features to the map while performing tasks, for instance if an existing data feature point falls in an inaccessible location and a new location must be noted. To add a data feature, move to the location where you wish to add the point and tap the Add button from the Data Feature sidebar to bring up the Add Feature window. The comments and value textboxes may be used to enter any information about the data point. The horizontal dilution is also provided to indicate the positional accuracy of the point. Click the Add button to add the point to the map.

This new point, along with any other points added, will be saved in a separate shapefile. **The projection of the shapefile will be assigned to the coordinate system currently set in the RadScout software.**

### ***Locking the screen***

When the RadScout software is active, the tablet sleep and shutdown power options will be disabled to prevent a loss of data. Because of this feature, it may be necessary to lock the screen in order to prevent accidentally tapping the screen when placing the data logger in a pouch. To lock the screen from the RadScout program, select Lock Screen from the Settings menu, a key and a lock will be displayed as shown in Figure 12. To unlock, drag a finger from the key icon to the lock icon. All real-time data and position updates will still show on the screen, however all touch functions will be completely disabled until the screen is unlocked.



**Figure 12. Locking the touch screen**

While the RadScout software is open, the tablet power hardware button will also be disabled to prevent data corruption and loss.

## 5. SURVEY DATA EXPORT

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Following the collection of data, it is often necessary to transfer all field data to a central computer used for processing and reporting. This section discusses the process for transferring field data from multiple field tablets to a single removable disk.

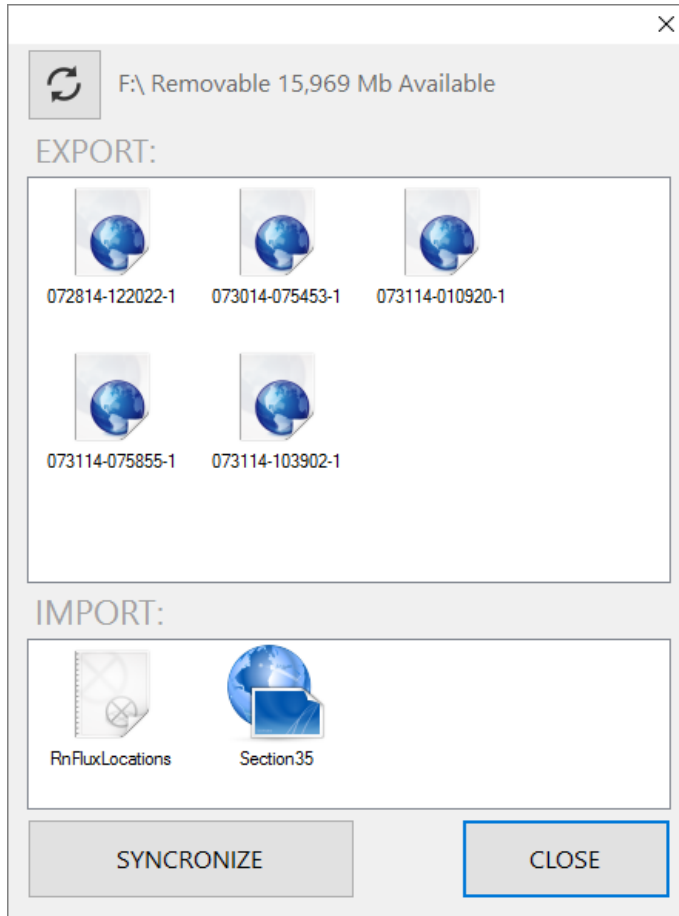
### *Synchronizing Data*

The Mesa tablet includes the ERG RadSync software which greatly simplifies the data exporting process and ensures no data are overwritten or deleted.

To export field data, place a removable disk in the USB slot on the bottom of the Mesa tablet and open the RadSync application. The application will display the .gsf survey files and data feature shapefiles that will be transferred to the removable drive as shown in Figure 13. The application will only display and attempt to transfer files that do not already exist on the removable drive. If the data feature shapefiles on the tablet are determined to be larger than the files on the disk (for instance, if features were added since the last transfer) then the shapefiles will be replaced with the newer file. All original files will always be maintained on the field tablet.

If multiple tablets are being used to collect data, the same removable drive should be used to export all data by following the same steps for each tablet.

The application also provides an easy method of getting data onto the field computer to be used as background files or data files. To synchronize import data, place the desired files (.gsf, .jpg, .tif, or .shp) on the removable drive in the directory "<Drive>:\RadScout\". The software will copy these files to the field computer if they do not already exist. Note that when this approach is used for synchronizing world image files, only the name will be used to determine if the file already exists.



**Figure 13. RadSync application**

## 6. DATA ANALYSIS

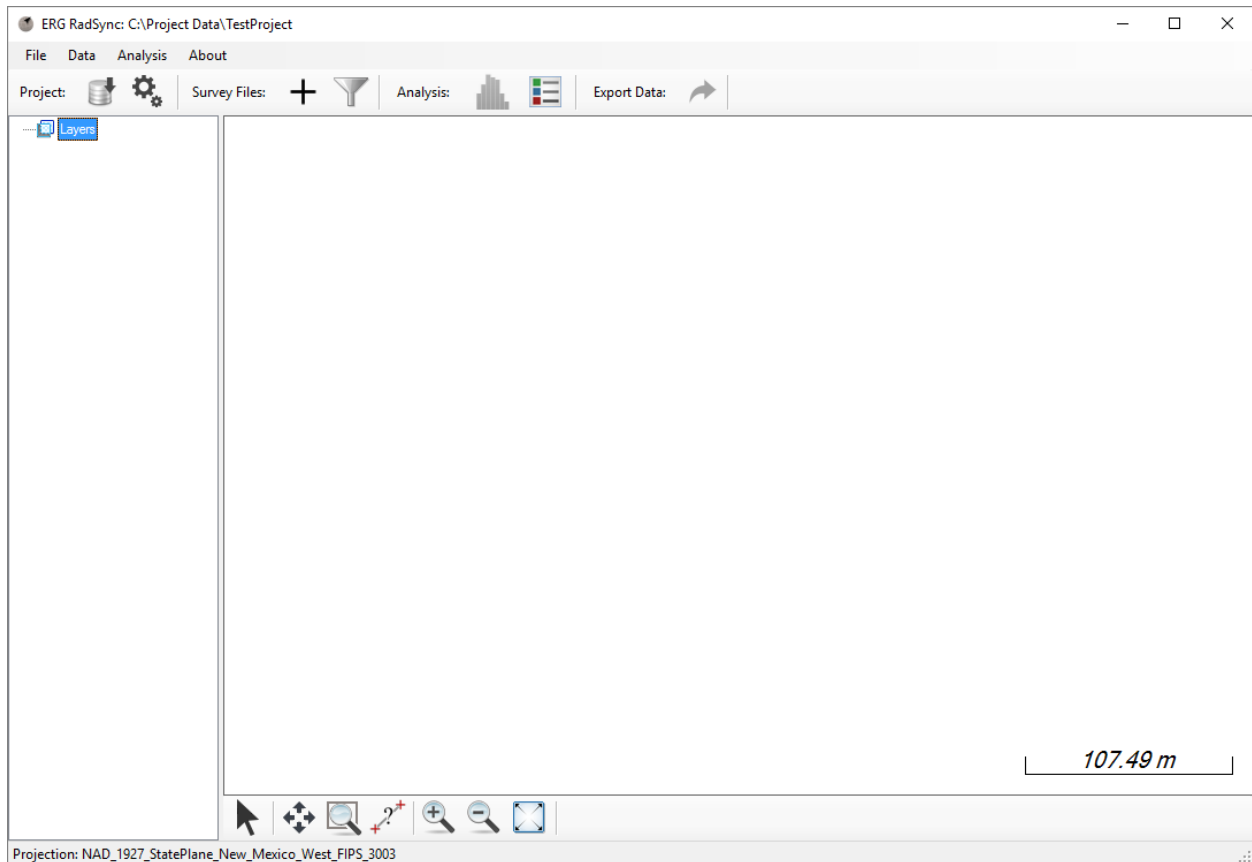
This section discusses the process for managing all field data using the ERG RadScene software on a single processing computer. The RadScene software provides the ability to create projects specific to the work being performed and makes it easy to import field data directly from the removable drive.

### 6.1 Installing the RadScene Software

Install the software on a computer that will be used as the primary processing computer. The RadScene software is compatible with Windows 8.1 and 10.

### 6.2 RadScene Interface

The RadScene program interface is shown in Figure 14. The map window, layers window, and other associated tools are all accessible from the main interface, and will be described in the succeeding sections.



**Figure 14. RadScene Interface**

### ***Map Controls***

Below is a description of the map controls in the map tool bar used to navigate the real-time position and data.



When the select tool is selected, the map coordinates will be displayed on the map window. Coordinates will be displayed in the units specified in the projection coordinate system.



The Pan tool may be used to pan the map in any direction. With the tool selected, tap and hold on the map, then drag in any direction to move the map.



The Zoom Rectangle tool may be used to zoom to a specified area. With the tool selected, tap and hold, then drag to create a rectangle to zoom to.



The Measure Tool may be used to measure the distance between a series of lines. With the tool selected, tap the screen at any position to measure the distance. The distance will be displayed on the map window.



Tap the Zoom In tool to zoom in a fixed amount.



Tap the Zoom Out tool to zoom out a fixed amount.



The Zoom Extents will zoom to the bounds of the survey data and background data.

### ***Toolbar Controls***

The toolbar controls are located at the top of the application. A description of each tool is outlined below.



The Import Data tool is used to import data from a USB disk drive to the project directory.



The Settings tool will open the project settings.



The Add Data tool is used to add survey files to the map. Multiple files may be added using control to select multiple files.



The Filter Tool allows bulk survey files to be added based on a parameter. For instance, a survey date may be selected to add all files associated with that date.



The Analysis Tool will display a histogram and statistics of all data currently loaded into the map. The tool will only be available when survey files are added to the map.



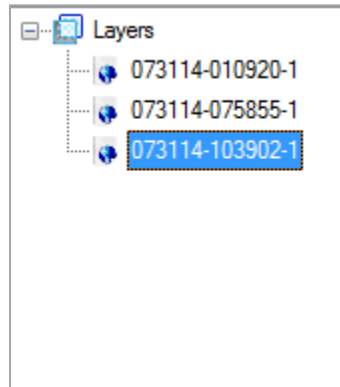
The Legend Tool is used to open the legend editor.



The Export Tool is used to export all data currently loaded in the map to a usable data format, such as comma separated (.csv) or shapefile (.shp).

### ***Layers Window***

The layers window, shown in Figure 15, will display all files currently loaded into the map. Double click on individual layers to display the survey information about the file. In addition, right click on the survey files to show a context menu with additional options, including Remove Layer, Attributes, and Zoom to Layer. To remove all layers simultaneously, right click on the Layers tree node and click Remove All.




**Figure 15. Layers window**

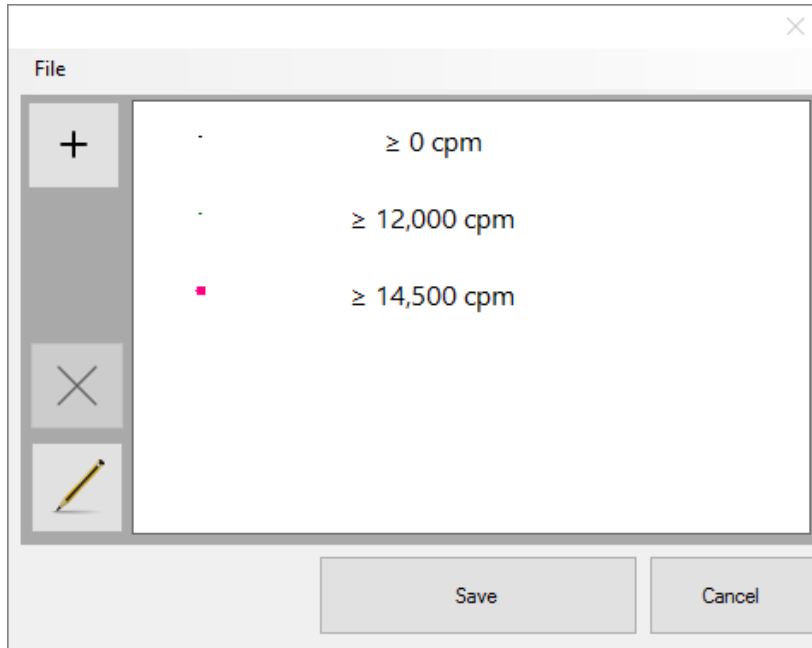
### ***Status Bar***

The status bar is displayed at the bottom of the application windows and will show the project coordinate system.


### ***Defining a Legend***

The legend can be used to define specific colors to ranges of count rate data. To apply a legend, click the Legend Tool to open the legend editor or to view the currently applied legend. The thresholds and associated colors will be shown, as demonstrated in Figure 16. To add a new legend break, tap the Add

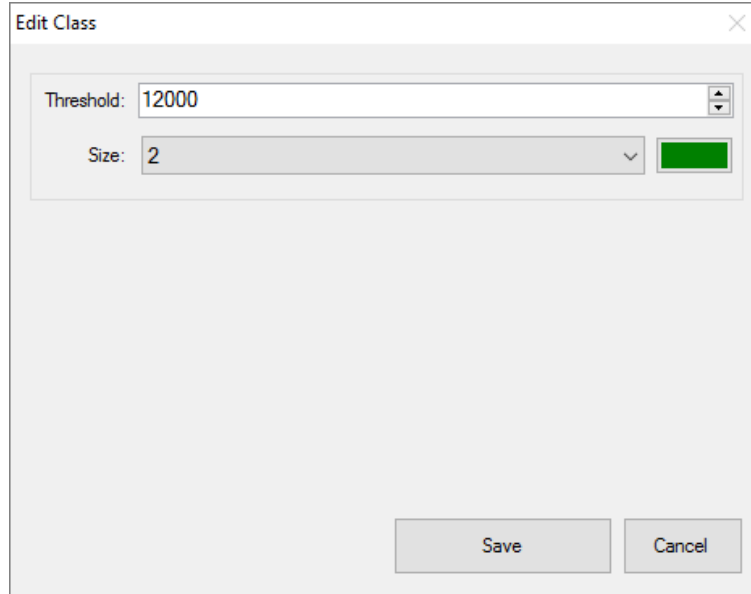
 button. Enter the new threshold, desired point size, and the color, then tap Save. The threshold is defined as the count rate at which the data will be colored if it is equal to, or exceeds.



**Figure 16. Defining a Map Legend**

To edit an existing break, tap on the break you wish to edit, and tap the edit button , or simply double tap on the break to bring up the legend properties window, as shown in Figure 17. Make the necessary changes to the threshold, point size, or color and tap the Save button to apply changes. Note that the default map point will be defined by the  $\geq 0$  cpm break. The color and size of the point may be modified, but the threshold must be zero, and the break may not be deleted. Up to 10 breaks may be added to the legend. Once the legend is defined, tap the Save button to apply changes.





**Figure 17. Legend Properties Window**

The legend will be applied to all layers loaded in the map window. The legend breaks will be ordered from smallest to largest values when being drawn on the map. This allows the larger, and typically more important values, to be more visible when viewing the data that are on top of each other spatially.

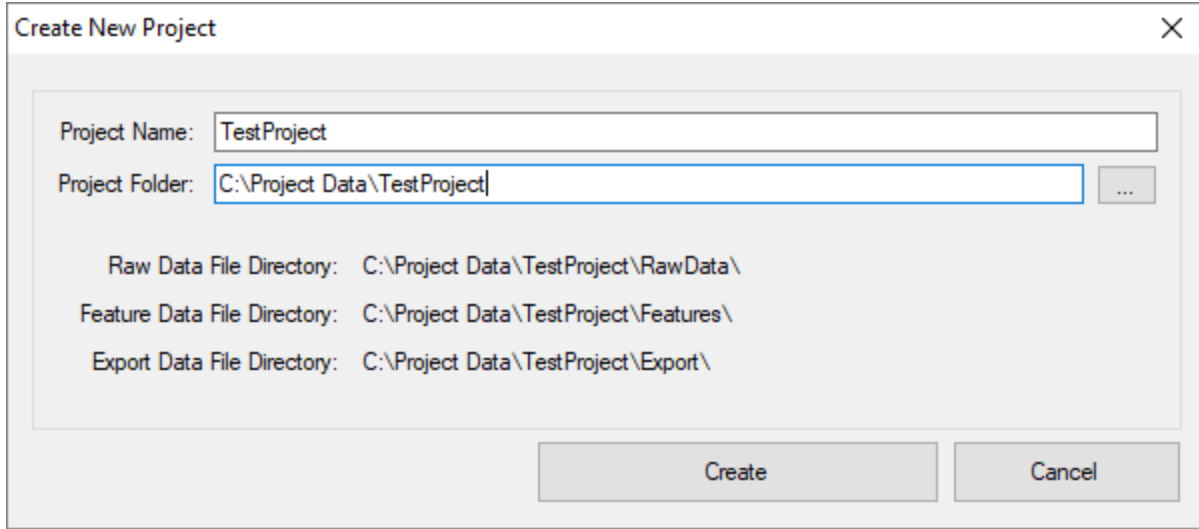
If multiple legends are being used, use the menu in the legend editor to save and recall legends.

### **6.3 Projects**

The RadScene software utilizes projects which will keep files organized and retain project settings, such as coordinate systems.

#### ***Creating a New Project***

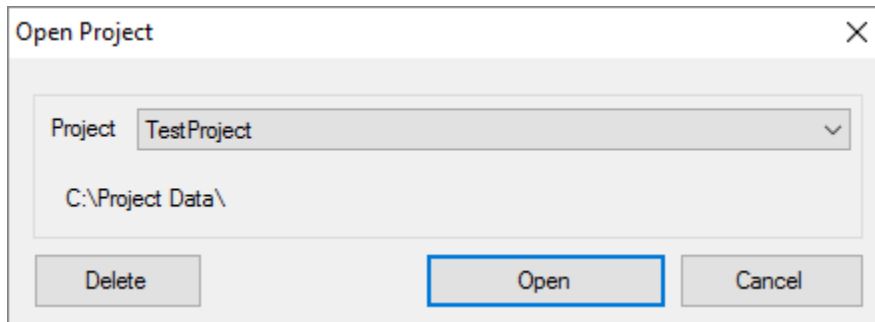
To create a new project click File, Project, Create. A New Project window will be displayed as shown in Figure 18. Choose the project name and a directory and click the Create button. The software will create a folder in the directory matching the project folder along with all sub folders used to store data.



**Figure 18. Creating a new project**

### ***Opening and Modifying Existing Projects***

To open or delete an existing project, click File, Project, Open/Modify to show the Open Project window as shown in Figure 19. The drop down box will contain all projects created on the computer. To open an existing project, select the desired project and click the Open button. To delete an existing project, select the project in the drop down box and click the Delete button. Note that when a project is deleted the project is removed from the project list, but all folders and survey data are retained in the original file path. If a project has been deleted but it becomes necessary to reopen the project, open the Create New Project window and enter the old project name in the Project Name textbox. The software will ask if you would like to associate the file data to the project. Click yes to reopen the project.



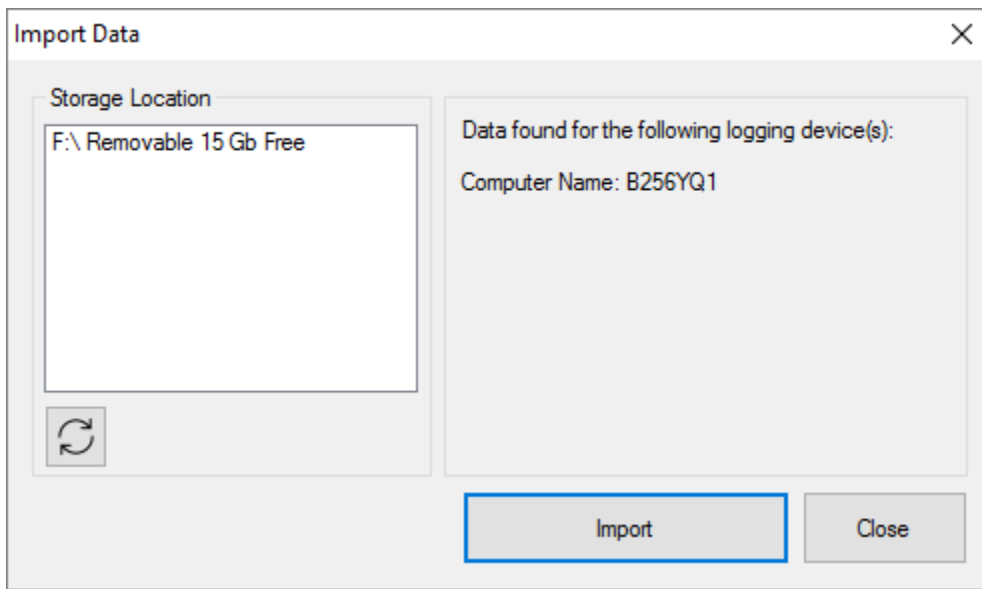
**Figure 19. Open or Modify an Existing Project**

### ***Defining a Coordinate System***

To define a coordinate system, click the Settings tool and select the System and Zone. The coordinate system will be saved with the project and is primarily used for exporting data to a specific system.

## **6.4 Importing Data**

Once a project is defined, field data may be imported. Insert the removable drive used to store field data from the RadExport software and click the Import Data tool to load the Import Data window as shown in Figure 20. If data is discovered on the drive, the computer names of all data loggers used to export data will be shown in the window. Click the Import button to copy all survey files and feature data from the USB drive to the project directory. The application will only copy files that do not already exist in the project directory. If the Data Features on the USB drive are determined to contain more data than the data feature files currently in the project folder, a message box will be displayed asking whether to replace the existing file or not. Note that if you choose to replace the existing file, the file in the project directory will be overwritten.



**Figure 20. Import Data from USB Drive**

## **6.5 Data Analysis**

Once data has been imported, it will become available to be added to the map. Click the Add or Filter Add tool to add survey data to the map. Refer to the RadScene Interface section for information on viewing survey file details, tables, and defining legends.

Click the Analysis tool to bring a histogram and statistics of all data displayed in the map window as shown in Figure 21. Note that the Scalar data tab will only be available if a scaler enabled 2221 was used to collect data. Click and hold on the blue cursor to drag in either direction. The corresponding cursor location value will be displayed in the blue text above the cursor.

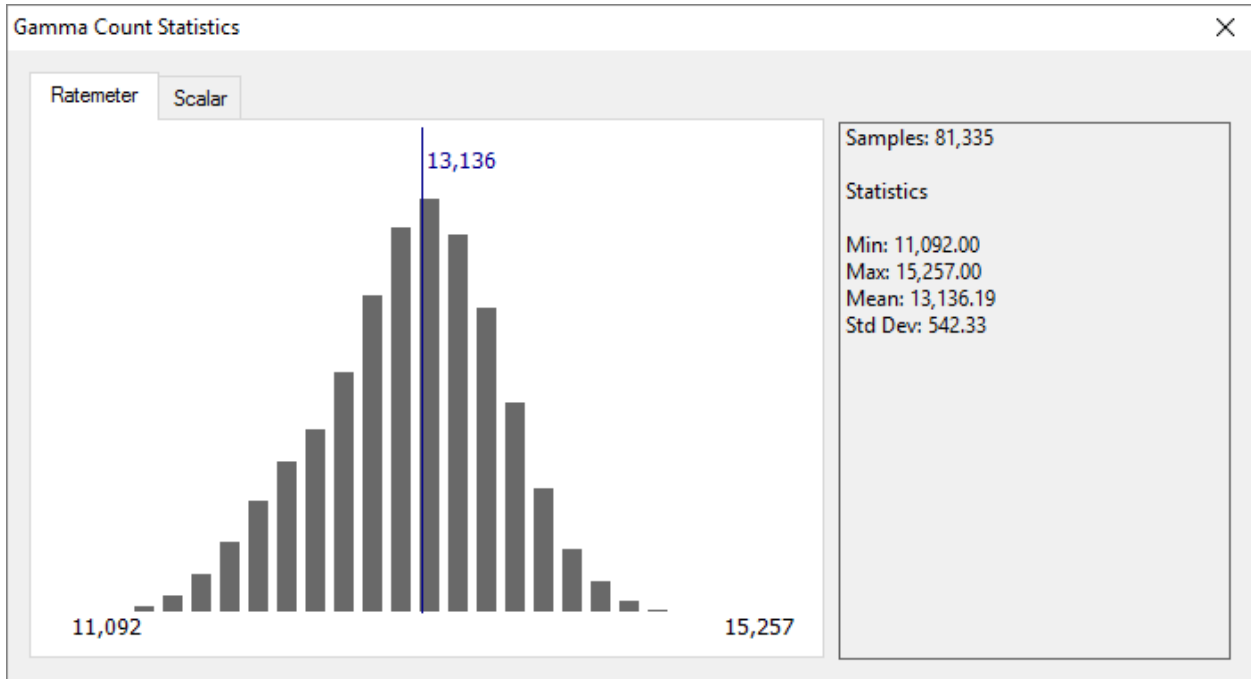
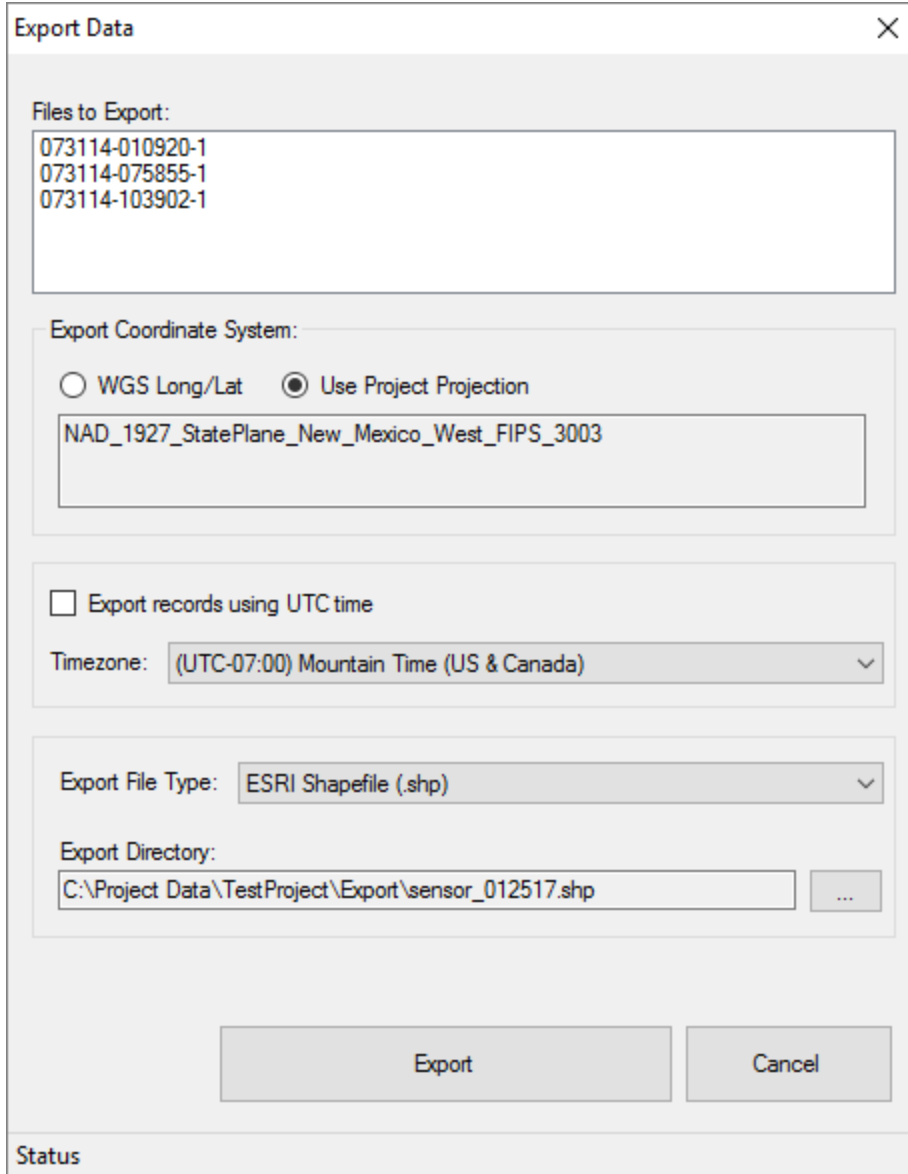


Figure 21. Data Histogram and Statistics

## 6.6 Exporting Data

Click the Export Data tool to export all survey files currently loaded into the map. The Export window will be displayed as shown in Figure 22. The Files to Export text box will display all files that are being exported. Click whether to use the project coordinate system or the WGS system (longitude/latitude). Also choose the time zone that the survey was performed in to correctly offset the time of each file record. The Use UTC time check box can also be used if it is preferable to keep data in UTC GPS time. Finally, choose the output file type as either a comma separated file (.csv) or ESRI shapefile (.shp) and select the directory. By default, the exported file will be named using a date string. When all parameters have been selected, click the Export button to export all survey files.




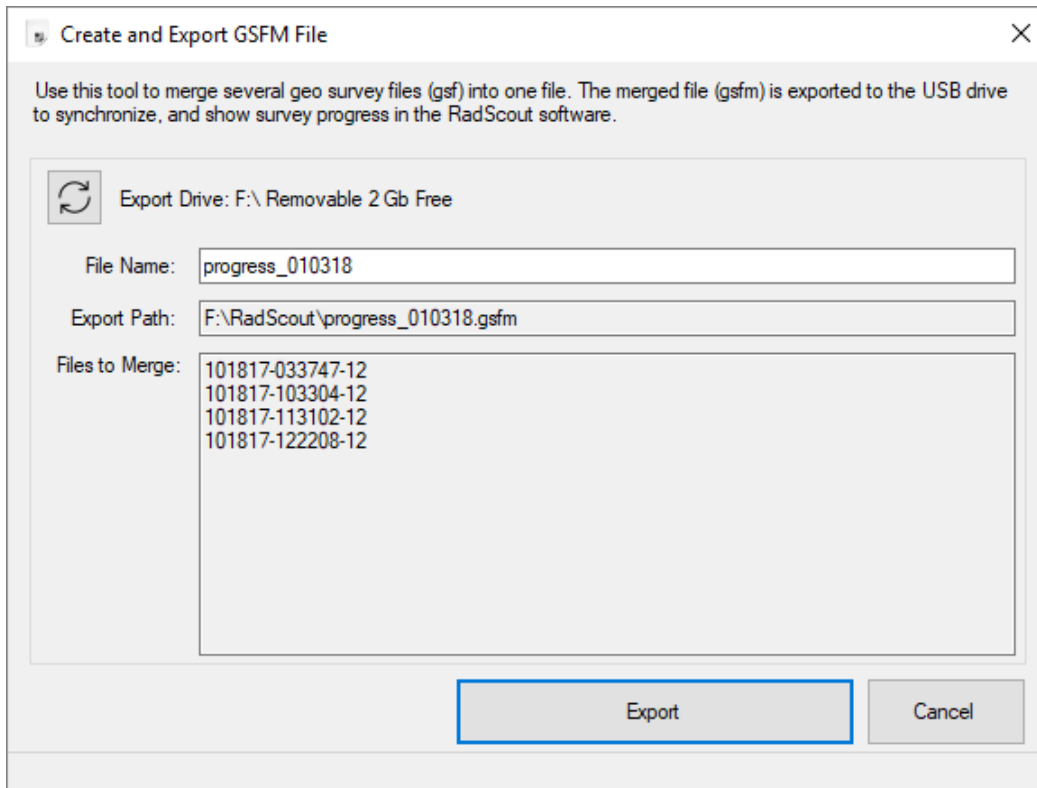
**Figure 22. Exporting Data**

Unlike the survey files, which are collected in binary format, the data feature files are already created as shapefiles and therefore do not require exporting. After importing the survey data, the feature data files will exist as shapefiles in the [project directory]/[project name]/Features folder. Note that if any manipulation is performed on the feature data shapefiles, it is recommended that the files be copied to a new directory. This will prevent the import process from overwriting data which is recognized as different than the USB data.

## 6.7 Data Tools

### *Merging and exporting gsfm files*

Commonly, it is necessary to display the survey progress on a data logger to prevent resurveying an area that is already complete. This is particularly important when there are multiple surveyors for a single area. The merging tool allows multiple survey files from different users to be merged into a single file and exported to each data logger for viewing progress. To merge files, load the desired gsf files as layers in RadScene. Insert the project removable drive and click the Merge and Upload GSF tool . Name the gsfm file if desired, and click the Export button to export the file to the removable drive. Remove the disk and insert it into the data logger. Open the ERG RadSync application. The merged file should appear in the Import window. Click the Synchronize button to upload the file to the data logger. Repeat for each data logger.



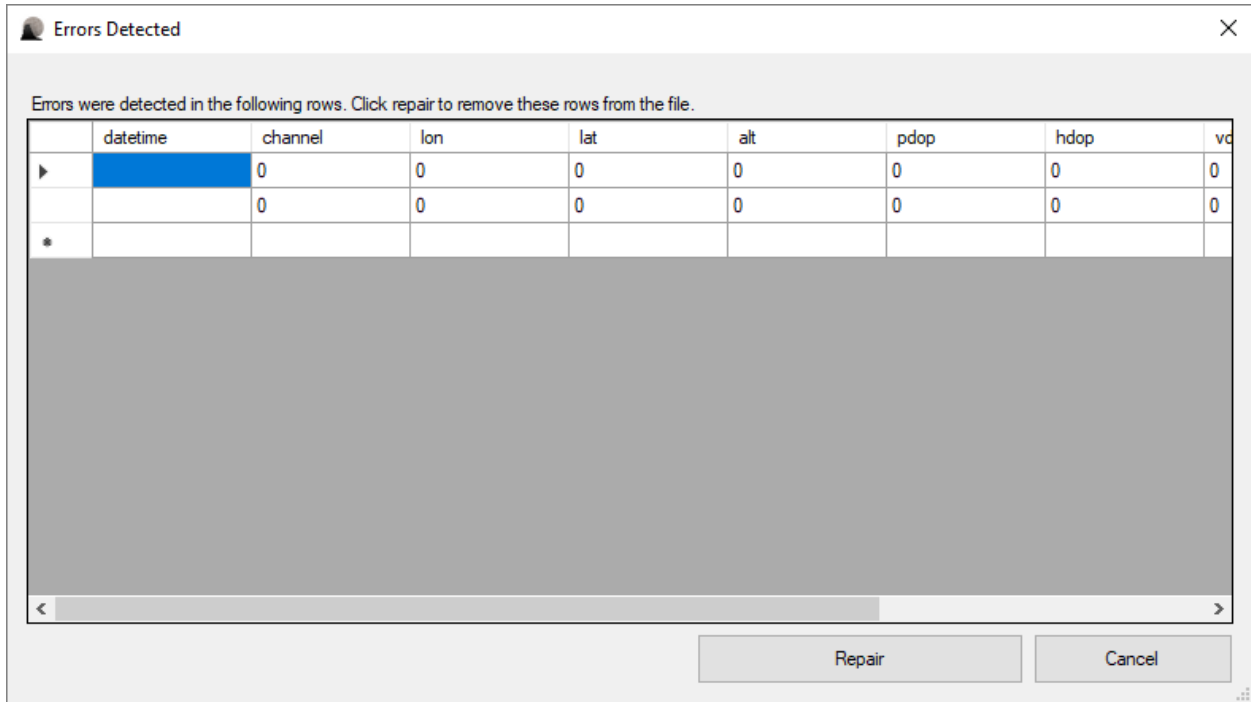
**Figure 23. Creating and Exporting a Merged GSFM.**

The merged files (.gsfm) may only be used for viewing data progress, therefore multiple gsfm files may not be merged, nor can a gsfm file be exported to a shapefile.

### *Repairing a Corrupt File*

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In very rare scenarios, a log file (.gsf) may become corrupt, preventing it from being able to be exported as a shapefile. This most commonly occurs if the data logger shuts down unexpectedly, or freezes while a record is being written to the file. To repair a corrupted file, click the Tools – Repair GSF File. Select the file from the open file dialog. If errors are detected, the repair form will be displayed, as shown in Figure 24. Click the Repair button to repair the file. The tool will create a backup of the original file, which will have the suffix ‘backup’, and will be copied to the same folder location as the original.



**Figure 24. Repair Corrupted GSF**