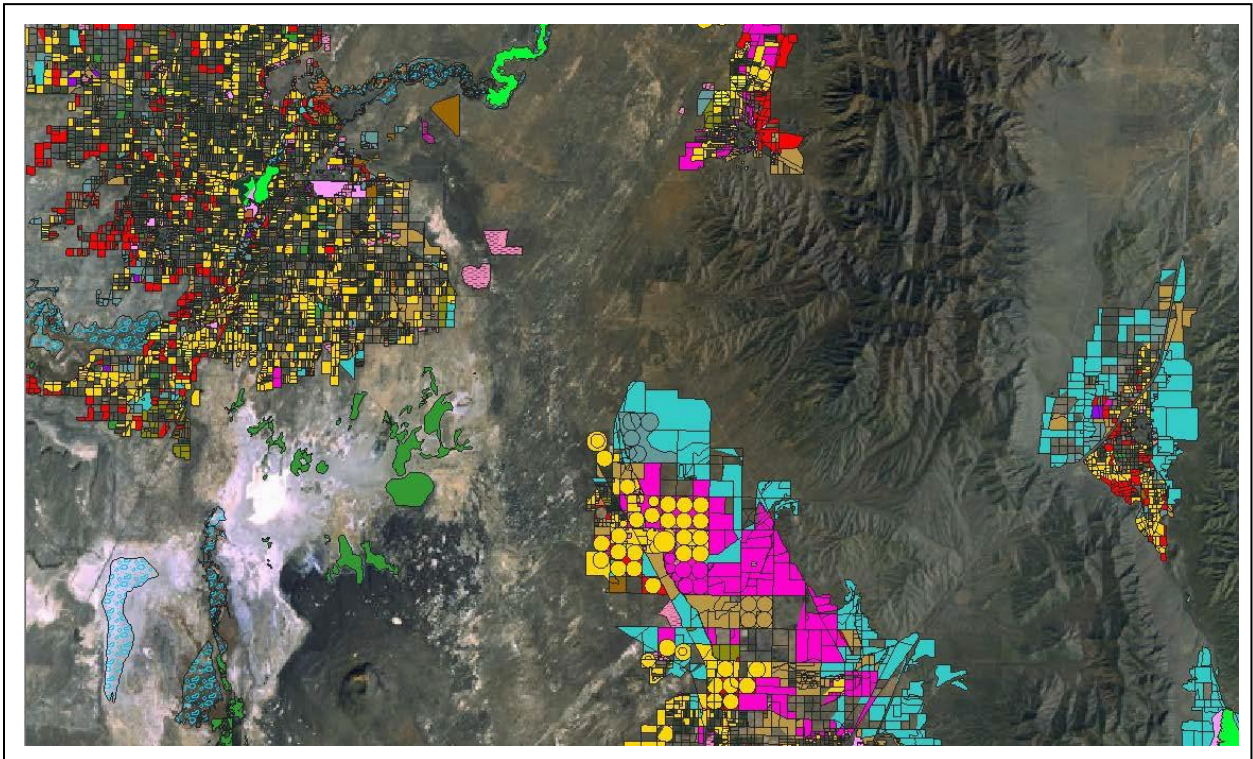*SMS 12.3 Tutorial*
GIS

Objectives

This tutorial demonstrates how to import GIS data, visualize it, and convert it into SMS coverage data that could be used to build a numeric model. This tutorial will instruct to import water related land use information acquired from Utah's GIS Portal, found online. However, the concepts can be useful to work with any GIS data in SMS.

Prerequisites	Requirements	Time
• None	• GIS Module • Map Module	• 15–30 minutes

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1 Getting Started

GIS (Geographic Information System) data can be useful for building models with SMS. This is particularly true for land use or other data that would be time consuming to digitize by hand. GIS data can also be made visible behind SMS data in the Main Graphics Window.

SMS contains two implementations for working with GIS data:

- Generic SMS implementation – Can import ArcGIS® shapefiles as well as MapInfo MIF/MID formats. Includes tools for selecting, viewing table data, and converting data to coverages and scatter sets.

- ArcGIS® implementation (ArcObjects®) – Uses ESRI code to import, manage, and display GIS data. Use of ArcObjects® requires a license of ArcGIS® on the computer being used. ArcObjects® implementation has more options for displaying ArcGIS® data (it uses the same layer settings functionalities that exist in ArcGIS®). ArcGIS® only works in the 32-bit version of SMS.

This tutorial uses the default generic SMS implementation. The ArcObjects® implementation has some differences which are not shown or discussed here.

2 Opening an Existing GIS Data File and Viewing Attributes

Start by opening the shapefile in the generic SMS implemented mode. Opening a shapefile with ArcObjects® implementation requires a different procedure which is not covered in this tutorial.

To open a shapefile in the generic SMS implemented mode:

1. Select *File* | **Open…** to bring up the *Open* dialog.

2. Browse to the *data files* folder for this tutorial.

3. Select "SGID_U024_WaterRelatedLanduse.shp" (make sure it is the one with ".shp" as the extension, not ".shp.xml").

4. Click **Open** to import the shapefile and exit the *Open* dialog.

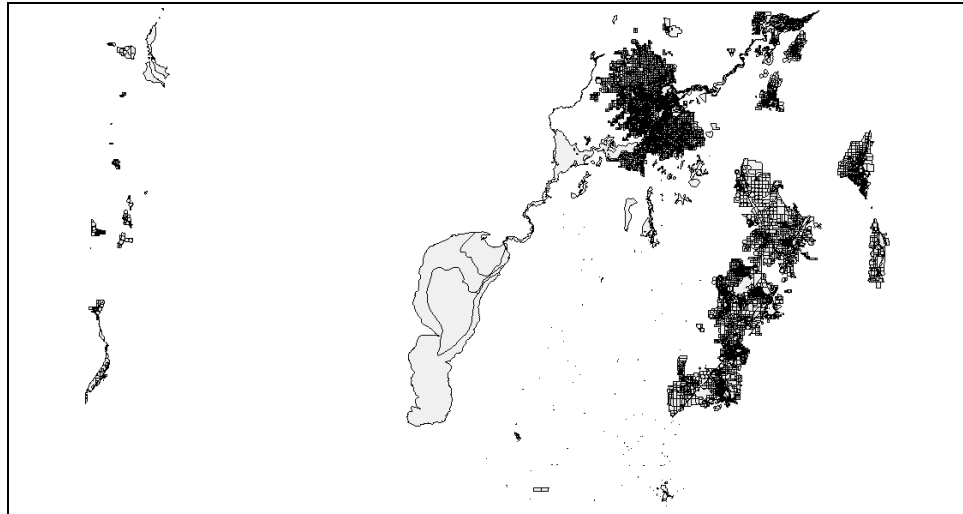The project should appear similar to Figure 1.

Figure 1   Shapefile after importing

5. Switch to the **GIS** 🌐 module.

6. Click **Get Attributes** ⓘ tool to bring up the *Info* dialog.

7. Move the *Info* dialog to the side and click inside the lake polygon located in the middle of the display.

The *Info* dialog should now show the attributes for the lake. This includes a description of the land use and land cover designation, the year the GIS data was acquired, the total polygonal area in acres, and its length in feet.

8. Close the *Info* dialog by clicking on another tool (such as the **Pan** ✥ tool).

9. Right-click on "⊠ SGID_U024_WaterRelatedLanduse.shp" and select **Open Attribute Table** to bring up the *Attributes* dialog.

The *Attributes* dialog shows the same information as the *Info* dialog, but with information listed for all polygons in the domain of the shapefile. Note that the dialog lists the total number of records in the bottom left corner of the dialog.

10. Click **OK** to close the *Attributes* dialog.

3   Mapping the Shape File to an Active Coverage

In order to incorporate data into models, the GIS data needs to be converted into native SMS data. GIS data is generally converted into map coverages, which are similar to GIS layers.

Data converted from GIS layers into map coverages are put into the active coverage. Therefore, it is important to create the type of coverage wanted and make it active before the conversion process.

To convert the landuse data into an area property coverage with designated materials,

do the following:

1. Right-click on "🌐 Area Property" and select **Rename**.

2. Enter "Landuse" and press *Enter* to set the new name.

3. Right-click on "🌐 Landuse" and select *Type | Generic |* **Area Property**.

4. Select "🌐 Landuse" to make it active.

5. Switch to the **GIS** 🌐 module.

6. Select *Mapping |* **Shapes → Feature Objects** to bring up the *GIS to Feature Objects Wizard* dialog.

7. Click **Next** to bring up the *Step 1 of 1* page of the *GIS to Feature Objects Wizard* dialog.

8. In the *Mapping Preview* section, in the *Description* column, select "Material" from drop-down on the *Mapping* row.

SMS will assign the polygon description to each polygon mapped to the active coverage.

9. Click **Finish** to close the *GIS to Feature Objects Wizard* dialog.

10. Turn off "🗂️ GIS Data" in the Project Explorer.

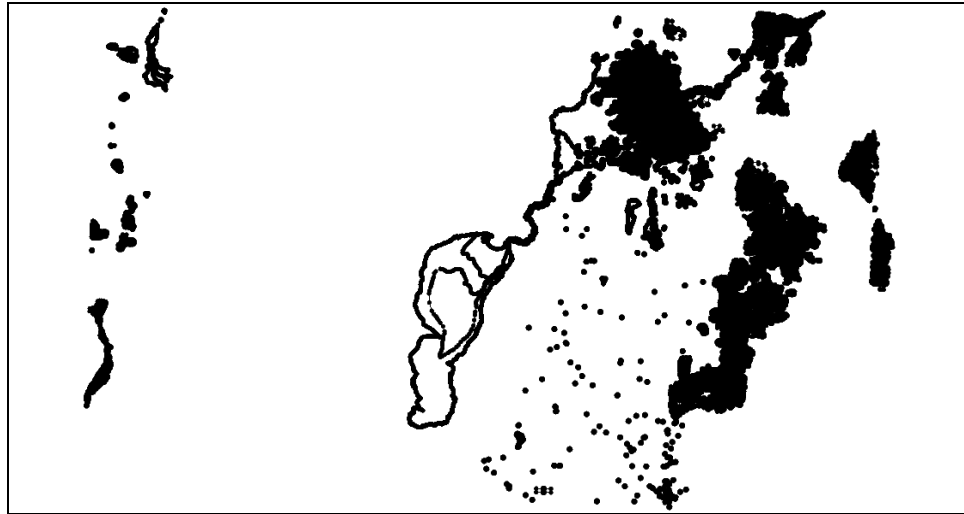The project should appear similar to Figure 2.

Figure 2   After mapping to feature objects

4   Map Module Display Options

The landuse data has now been copied to an area property coverage in SMS. Area property coverages can be used to define materials for numeric models. Each polygon is assigned a material based upon the description column that was mapped early.

To see the landuse information in the SMS map module, it's necessary to change the visualization setting. To do this:

1. Select *Display | **Display Options…*** to bring up the *Display Options* dialog.

2. Select "Map" from the list on the left.

3. Turn off *Node* and *Vertex*.

4. Turn on *Fill* under *Polygon* and *Legend* under *General*.

5. Click **OK** to close the *Display Options* dialog.

6. **Zoom** into the city located north-east of the lake (see Figure 3).

This area is farmland and residential as can be seen by observing the color of the polygon and matching it to the legend. Most fields are used for alfalfa according to the color associated with it.

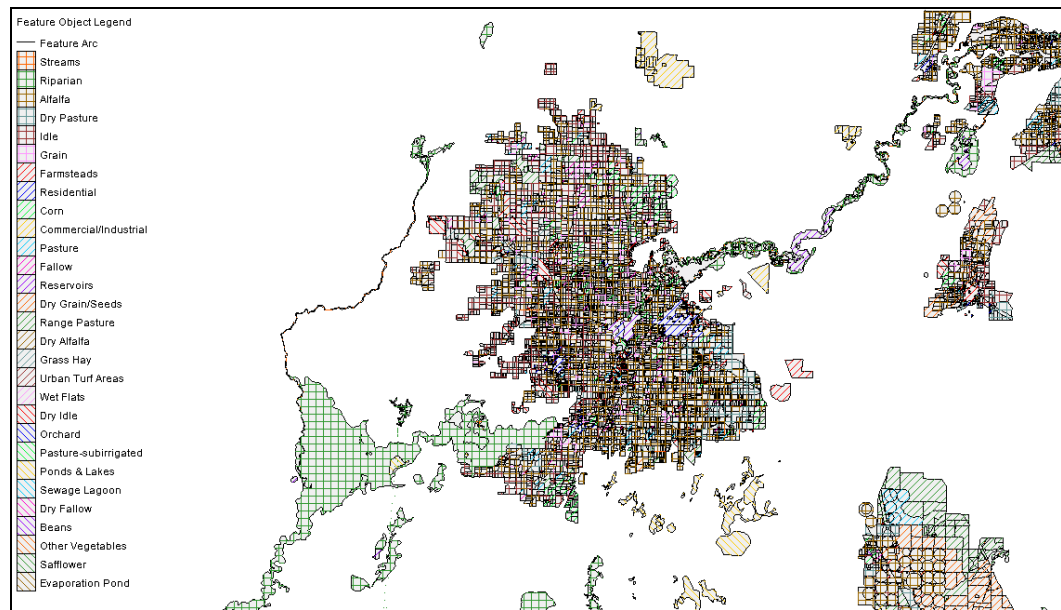The project should appear similar to Figure 3.

Figure 3   Display of the land use coverage

5   Downloading Aerial Photo

Sometimes it is useful to download an aerial photo in order to supplement the display and for better observations. The "Import from Web" tutorial gives instructions for one method for finding image data online. SMS can also grab image data from Terraserver for a specific geographic area. To grab an image from Terraserver for this area:

1. Click **Display Options** to open the *Display Options* dialog.

2. Select "Map" from the list on the left.

3. Turn off *Fill* under *Polygon*.

4. Click **OK** to close the *Display Options* dialog.

This makes the display easier to read once the aerial photo is imported.

5. **Zoom** in to the area shown in Figure 4.

6. Click **Get Data Tool** and drag a box to select a region within the city (see Figure 4) to bring up the *Data Service Options* dialog.

7. Select *World Imagery* and click **OK** to bring up the *Save Web Services Data File(s)* dialog.

8. Enter "aerial" as the *File name* and click **Save** to close the *Save Web Services Data File(s)* dialog and bring up the *Image Pixel Size* dialog.

9. When asked to confirm creating the file, click **Yes**.

10. Click **OK** to accept the default size and close the *Image Pixel Size* dialog.

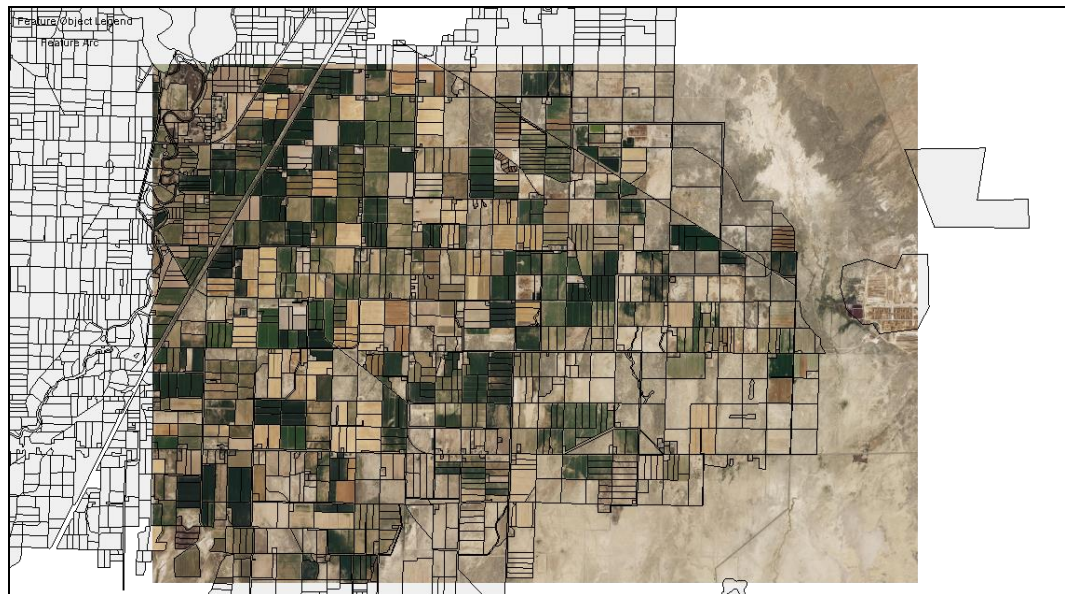The photo will take a moment to update and display. The image should appear similar to Figure 4.

Figure 4   Viewing the aerial photo

Multiple aerial images can be added to the project using the **Get Data Tool**, as shown in Figure 5. If desired, turn off *Arcs* in the *Display Options* dialog.
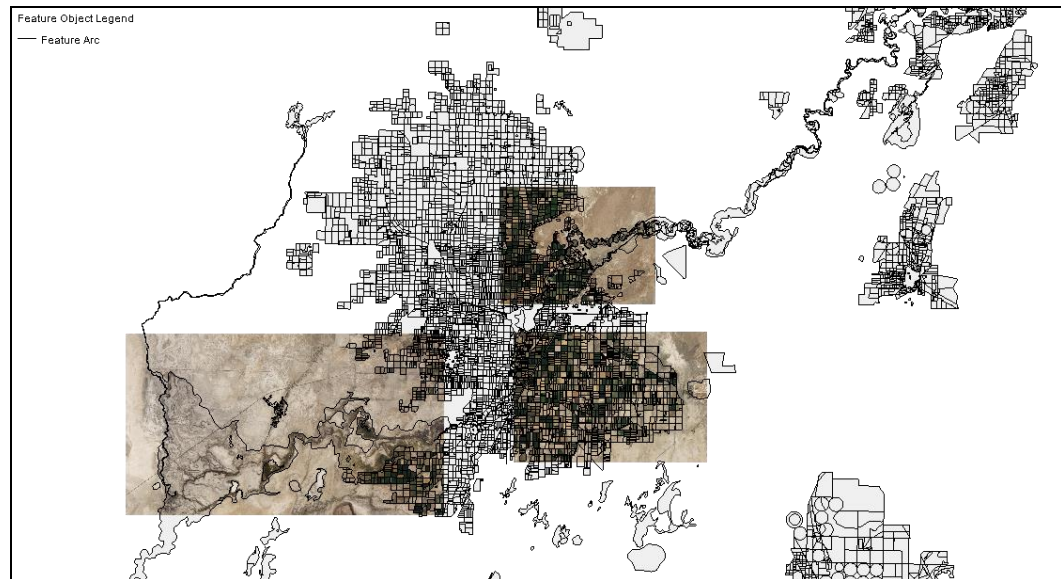
Figure 5   Multiple aerial images added to the project

6   Conclusion

This concludes the "GIS" tutorial. Feel free to continue to experiment with shapefiles in SMS by downloading other pertinent GIS data from websites. The SMS wiki[1] has a page that includes some ideas for places to acquire useful GIS and other spatial data.

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[1] See http://xmswiki.com/xms/GSDA:GSDA for more details.