



Vector GIS Updates From OrthoCorrected Imagery

RSAC

Remote Sensing For Ranger Districts Using Image Analysis For ArcGIS



Document Updated: June, 2005

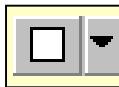


Assumptions of your imagery:

- 1) That your imagery has been OrthoCorrected.
- 2) That your image has sufficient spatial and spectral resolution to allow for interpretation of features you wish to digitize.



Refer to the Appendix—on Page 6—for additional information.



Drawing button

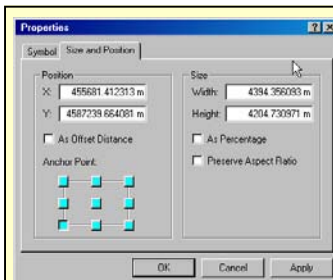
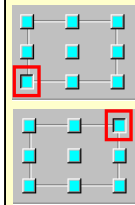


Figure 1. The **Size and Position** tab for your rectangle. This information will help you identify the spatial extent of your area of interest.



Press the **Lower Left Anchor Point**.

Press the **Upper Right Anchor Point**.

Objective

- To perform vector GIS updates from OrthoCorrected imagery.

Required Data

- An OrthoCorrected image (e.g., satellite imagery, scanned aerial photography, DOQs, etc.)

Introduction and Overview of Procedure Steps

Performing vector GIS updates from OrthoCorrected imagery is a commonly used method for updating your forest's digital information. The goal of this document is to describe how to perform vector GIS updates—emphasizing “Heads-Up” digitizing of polygons—from OrthoCorrected imagery in ArcMap. The topics include:

1. Determining the Spatial Extent of Your Area of Interest
2. Creating a Geodatabase With a Feature Class
3. Setting-up ArcMap
4. Digitizing Your First Polygon
5. Attributing Your First Polygon
6. Digitizing Other Polygons with Common Boundaries and Attributing Them
7. Editing Your Updated Polygons
8. Calculating Area of Your Updated Polygons

I. Determining the Spatial Extent of Your Area of Interest

1. Launch **ArcMap** from the **Start** menu (**Start | Programs | ArcGIS | ArcMap**).
2. Select the **Add Data** button from **ArcMap's Standard** toolbar.
3. Navigate to and select your **OrthoCorrected Image**.
4. Select **Add** to load your **OrthoCorrected Image** into **ArcMap's Table of Contents**.
5. Select **View | Toolbars** from **ArcMap's Main Menu**.
6. Click **Draw** (to open the **Drawing** toolbar).
7. Dock the **Drawing** toolbar if necessary.
8. Select the **New Rectangle** tool from the **Drawing** toolbar.
9. Draw a rectangle over your **OrthoCorrected Image** that defines the spatial extent of your area of interest.
10. Right-click on the rectangle.
11. Select **Properties**.
12. Click on the **Size and Position** tab (Figure 1).
13. Select the **Lower Left Anchor Point** (Figure 1).
14. Write down your **X** and **Y** values for your **Lower Left (LL) Coordinate**:

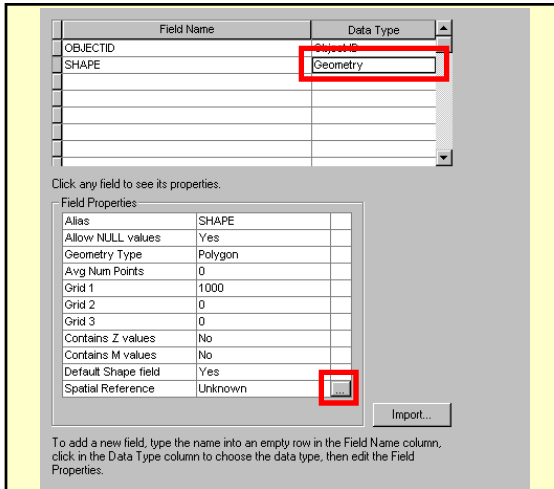


Figure 2. Setting your Spatial Reference information. Click the highlighted Geometry cell first and then the Spatial Reference Properties button.

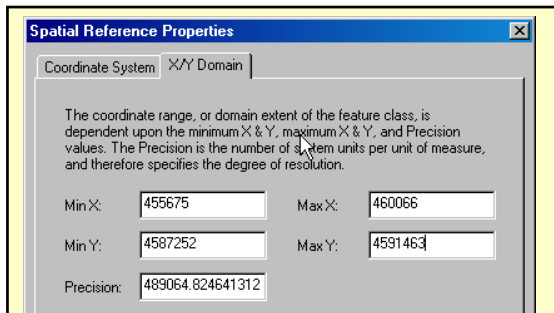


Figure 3. Enter your Lower Left Anchor Point coordinate as your Min X and Min Y, and your Upper Right Anchor Point coordinate as your Max X and Max Y.

- X= _____ (LL)
 - Y= _____ (LL)
15. Select the **Upper Right Anchor Point** (Figure 1).
 16. Write down your **X** and **Y** values for your **Upper Right (UR) Coordinate**:
 - X= _____ (UR)
 - Y= _____ (UR)
 17. Click **OK** to close the dialog.
 18. Press **Delete** on your Keyboard (...to delete the rectangle).

II. Creating a Geodatabase With a Feature Class

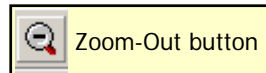
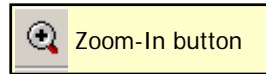
1. Click the **ArcCatalog** button from **ArcMap's Standard** toolbar.
2. Navigate to an appropriate output directory in the **Catalog Tree of ArcCatalog**.
3. Select **File | New | Personal Geodatabase** from **ArcCatalog's Main Menu**.
4. Type in a File Name for your **New Personal Geodatabase** in the **Contents** tab.
5. Press **Enter** on your Keyboard.
6. Right-click on your **Geodatabase**.
7. Select **New | Feature Class**.
8. Type in your **Feature Class** name in the **Name** option.
9. Click **Next**.
10. Ensure **Default** is enabled and click **Next**.
11. Click on **Geometry** under the **Data Type** column (Figure 2).
12. Click on the **Spatial Reference Properties** button (...) associated with **Spatial Reference** from the **Field Properties** table below.
13. Click the **Import** button (ensure that you are in the **Coordinate System** tab).
14. Navigate to and select your **OrthoCorrected Image**.
15. Click **Add** (You have just set the **Coordinate System** and **Projection** of your **Geodatabase**. This matches your **OrthoCorrected Image**.)
16. Click on the **X/Y Domain** tab. Type in the following values (Figure 3):
 - **Min X:** *your Lower Left X value* (Step 14, Section 1)
 - **Min Y:** *your Lower Left Y value* (Step 14, Section 1)
 - **Max X:** *your Upper Right X value* (Step 16, Section 1)
 - **Max Y:** *your Upper Right Y value* (Step 16, Section 1)
17. Notice that your **Precision** value adjusts as you enter your coordinate values.
18. Click **OK** (you have set the spatial extent for your **Geodatabase**).
19. Click **Finish**.
20. Close **ArcCatalog**.



Tip to improve your editing capabilities...

1. Single-click your **Feature Class** symbol in the **Table of Contents**.
2. Change the **Fill Color** to **No Color**, **Outline Width** to **2**, and **Outline Color** to a **high contrasting color** (e.g., yellow, red, etc.).

This should improve your ability to digitize accurately.



III. Setting-up ArcMap

1. Select the **Add Data** button from **ArcMap's Standard** toolbar.
2. Navigate to and select your **Feature Class** (Note: double-click your **Geodatabase**).
3. Select **Add** to load your **Feature Class** into **ArcMap's Table of Contents**.
4. Select **View | Toolbars** and click **Editor** (do not click if **Editor** is already checked). The **Editor** toolbar will appear (Figure 4).

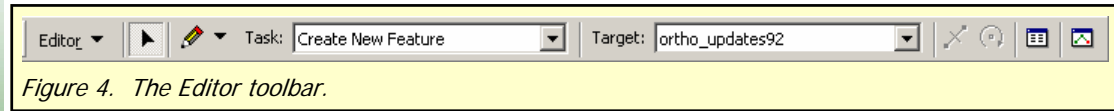


Figure 4. The Editor toolbar.

5. Select the **Editor** toolbar's **Title Bar** and 'dock' the toolbar in **ArcMap**.
6. Select **Editor | Start Editing** from the **Editor** toolbar. Set the following parameters in the **Editor** toolbar:
 - **Task:** *Create New Feature*
 - **Target:** *your Feature Class*

IV. Digitizing Your First Polygon

1. Select **View | Toolbars** from **ArcMap's** main menu, and check **Tools** (do not check if it is already checked).
2. Dock the **Tools** toolbar if necessary.
3. Use the **Zoom** and **Pan** buttons to explore your **OrthoCorrected Image**.
4. Zoom-in to an area of interest in your **Data View** (e.g., a stand of conifer trees).
5. Select the **Sketch** tool from the **Editor** toolbar (looks like a pencil).
6. Digitize a polygon around the area of interest.
 - Start with a single left-click, and continue single left-clicking (around the area of interest) until you nearly complete the polygon.
 - Double-click to close the polygon.
7. Select **Editor | Stop Editing** from the **Editor** toolbar.
8. Select **Yes** to save the edits.

V. Attributing Your First Polygon

1. Right-click on your **Feature Class** file name in the **Table of Contents** and select **Open Attribute Table**. You should see four columns in the **Attribute Table**—OBJECTID, SHAPE, SHAPE_Length, and SHAPE_Area.
2. Select **Options | Add Field** in the Feature Class's **Attribute** dialog.
3. Type in a **Field Name** in the **Name** section—ensure that the name is less than 13 characters and no spaces (e.g., land_cover).

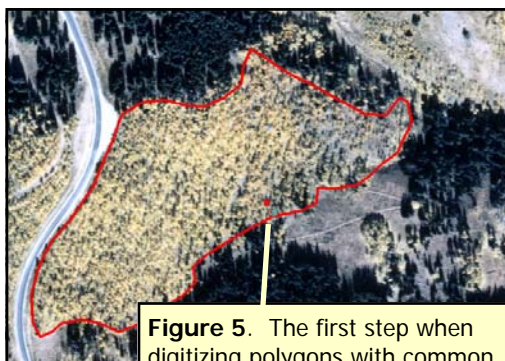


Figure 5. The first step when digitizing polygons with common boundaries—start just inside the existing polygon.

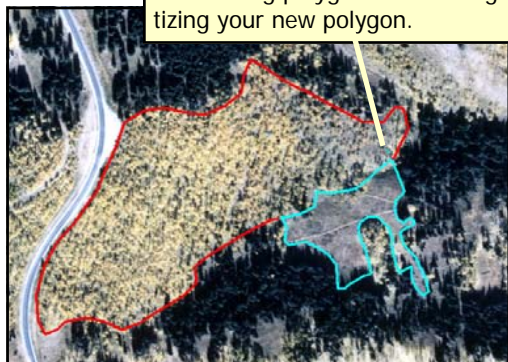


Figure 6. Double-click just inside the existing polygon to finish digitizing your new polygon.



*When using the **Auto Complete Polygon** function in ArcGIS 8.3, the **Feature Class's** attribute table is not automatically updated (if it is open) once a polygon has been digitized. You are required to close and then re-open your attribute table—this updates the attribute table and allows you to attribute your polygons.*

4. Set the **Type** appropriately (see appendix to determine which data **Type** is appropriate).
5. Set the **Field Properties** appropriately (Note: this will vary depending on what you set as the **Type**. For example, if you set **Type** as **Text**, then you will have to set the appropriate number of characters in the **Length** option.).
6. Select **OK** in the **Add Field** dialog. You should now have a 5th column in your **Attribute Table**.
7. Select **Editor | Start Editing** from the **Editor** toolbar.
8. Click the first cell under your new attribute column.
9. Type in the attribute for that polygon (e.g., conifer, 825, 012con, etc.).
10. Press **Enter** on your keyboard.
11. Close the **Attribute Table**.

VI. Digitizing Other Polygons With Common Boundaries and Attributing Them

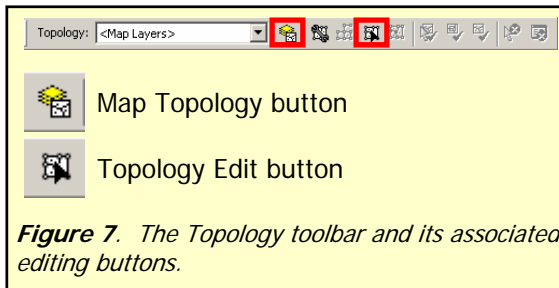
1. Explore your image and identify the location of your next polygon—ensure that your next polygon shares a “common boundary” with your first polygon.
2. Zoom to your next polygon location appropriately.
3. Select **Auto Complete Polygon** from the **Task** pulldown menu of the **Editor** toolbar.
4. Select the **Sketch** tool from the **Editor** toolbar.
5. Click just inside your existing polygon at one edge of your common boundary to start digitizing your new polygon (Figure 5).
6. Digitize your new polygon.
7. Complete the new polygon by double-clicking inside your first polygon at the other edge of your common boundary (Figure 6). Note that the two polygons now share a common boundary.
8. Right-click on your **Feature Class** file name in the **Table of Contents** and select **Open Attribute Table**.
9. Click in the cell (under your new attribute column) for your new polygon (Note: the entire row should be highlighted).
10. Type in the appropriate attribute for your new polygon.
11. Press **Enter** on your keyboard.
12. Close the **Attribute Table**.
13. Select **Editor | Save Edits** from the **Editor** toolbar.
14. Digitize and attribute the all other polygons using the same procedure described in steps 1-13 of this section (see critical comment to left).
15. Select **Editor | Stop Editing** from the **Editor** toolbar when you are finished digitizing.
16. Select **Yes** when prompted to save the edits.

VII. Editing Your Updated Polygons

1. Select **View | Toolbars** from **ArcMap's Main Menu** and check **Topology**.
2. The **Topology** toolbar will appear—dock the toolbar if necessary.



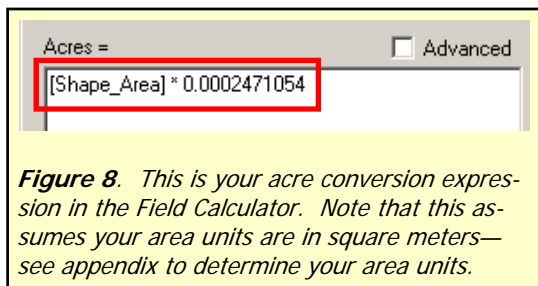
Vector GIS Updates From OrthoCorrected Imagery



What is a Vertex?
 A vertex is a point on your digitized polygon that identifies where the line changes direction.

Make sure that no cells are selected (highlighted) in your attribute table before you select Calculate Values!

Select **Selection | Clear Selected Features** from **ArcMap's Main Menu** to ensure that no feature is selected. If a feature is selected, it will only perform the calculation on the selected feature rather than on all features.



3. Select **Editor | Start Editing** from the **Editor** toolbar (ensure the **Target** is set to your **Feature Class**).
4. Select the **Map Topology** button from the **Topology** toolbar (Figure 7).
5. Check the box next to your **Feature Class** and select **OK**.
6. Select the **Topology Edit Tool** button from the **Topology** toolbar.
7. Double-click any polygon boundary in the **Data View** that requires editing.
8. Move your cursor over a **Vertex** (your cursor will change shape).
9. Single left-click the **Vertex** (hold the click), move the **Vertex** to a more accurate location, and then release.
10. Single left-click anywhere in the **Data View**.
11. Inspect your edits.
12. Follow the same procedure for all polygons requiring edits (remember, save your edits often).
13. Select **Editor | Stop Editing** from the **Editor** toolbar when finished editing.
14. Click **Yes** when prompted to save your edits.

VIII. Calculating Area of Your Updated Polygons

1. Right-click on your **Feature Class** in the **Table of Contents** and select **Open Attribute Table in ArcMap**.
2. Inspect the **Attribute Table**. Each polygon area has been calculated in the **SHAPE_Area** column (see appendix to determine your **area units**).
3. Select the **Option** button, then **Add Field**. Set the following parameters in the **Add Field** dialog:
 - **Name:** *Acres*
 - **Type:** *Double*
 - **Precision:** *18* (indicates the length of the field)
 - **Scale:** *3* (indicates the number of decimal places)
 - Click **OK**.
4. Right-click **Acres** in the **Attribute Table** and select **Calculate Values** (see critical comment to left).
5. Click **Yes** to perform calculations outside of an editing session.
6. Double-click **SHAPE_Area** in the **Fields** section of the **Field Calculator**.
7. Select the **Multiplication** button in the **Field Calculator**.
8. Press the **Space Bar** on your keyboard.
9. Type in **0.0002471054** (after the multiplication sign) in the **Formula Area** (Figure 8). Note that this expression assumes your area units are in meters.
10. Click **OK**.
11. Inspect your new acres values.



Vector GIS Updates From OrthoCorrected Imagery



To summarize, you:

- Determined the spatial extent of your area of interest.
- Created a Feature Class from a Geodatabase in ArcCatalog.
- Digitized and attributed your first polygon from your OrthoCorrected imagery.
- Used the Auto Complete Polygon function and the Topology toolbar to digitize subsequent polygons that share common boundaries, and attributed them appropriately.
- Calculated the area in acres for your new updated polygons.



How do I determine which data **Type** I should use when adding a field to my attribute table?

1. **Short Integer**- Set for whole number data only; can hold values up to 65,535.
2. **Long Integer**- Set for whole number data only; can hold values up to 4,294,967,295.
3. **Float**- Set for data that is fractional (with decimals) or whole numbers; has about a 7 digit precision.
4. **Double**– A type of floating point data, but more accurate; has about a 16 digit precision.
5. **Text**– Also called string. Set for nonnumeric or character data (e.g., conifer).

How do I determine my area units for area calculations?

1. Double-click on **Layers** in the **Table of Contents** in your **ArcMap** project.
2. Select the **General** tab from the **Data Frame Properties** dialog.
3. Inspect the **Units** section in the **General** tab—check what the Map and Display options are set as.
 - If **Map** and **Display** are set to **Meters**, then your **Shape_Area** values are in square meters.
 - If **Map** and **Display** are set to **Feet**, then your **Shape_Area** values are in square feet.

What are the conversion formulas for square meters and square feet to acres?

square feet * 0.000022956 = acres

square meters * 0.0002471054 = acres

In your **Formula Area** in the **Field Calculator**, the expressions to calculate **Acres** are written like this:

[Shape_Area] * 0.000022956 (If your area units are in square feet)

[Shape_Area] * 0.0002471054 (If your area units are in square meters)