

CHAPTER 11

Editing boundaries

Occasionally you may need to change the physical boundary of an existing polygon. For example, if your agency uses a target area boundary to deliver services and would like to extend the service area, editing the boundary would become necessary. Target area boundaries might include things like school districts, voting wards, or neighborhoods.

In this exercise, we will change the boundary of a state polygon (we use Oregon but you can use your own state). Of course in real life, it's highly unlikely that you would need to change a state boundary. In this exercise, though, we chose a simple and easily recognizable boundary to make it as easy as possible to learn how to edit boundaries. **1**



Exercise goal

Perform various editing tasks, including changing a boundary outline, merging polygons, creating shapefiles out of selected polygons, appending shapefiles to each other, and clipping shapefiles.

Exercise file locations

Chapter directions: Follow the exercise as it appears in this book

This exercise uses the following:

- A U.S. states shapefile.
- A U.S. counties shapefile.

These files are downloaded as a part of this exercise.

CD: Use the CD included with this book

All files needed for this exercise are included on the book's CD. Files are organized by chapter.

Personal files: Use files you've gathered from other sources

To complete this exercise, you will need at least two shapefiles that you don't mind editing.

1 Go to the U.S. Census Bureau Web site and select files


1. Go to www.census.gov.
2. On the main census site, to the right of the Geography link, select the TIGER link. A link on that page is the gateway to the most current Census shapefiles.
3. Select the 2009 TIGER/Line Shapefiles Main Page link.
4. On the next page, select the Download Shapefiles link on the left in the orange TIGER Navigation panel.


2 Make geographic selections (States and Counties for U.S.), download, and unzip

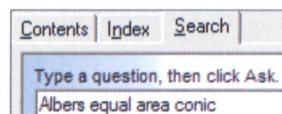
1. Under Nation-Based Shapefiles on the left, click the State and Equivalent (Current) link, which will give you one shapefile with all the U.S. states.
2. Click Save when prompted and save the zipped file on your computer's hard drive.


3. Under Nation-Based Shapefiles on the left, click the County and Equivalent (Current) link, which will give you one shapefile with all counties in the United States. This file is large and may take a while to download.
 4. Click Save when prompted and save the zipped file on your computer's hard drive.
 5. Unzip the files. You can use any unzipping program you wish. Follow the instructions for that program to unzip the first file then the second file. Each file should unzip in its own folder. If you do not know if you have an unzipping program, you might try double-clicking on the zipped file to unzip it.
- One of the most common editing tasks is to change the shape of a boundary. The next two steps show you how to change the physical outline of a polygon.

3 Open a shapefile with polygons and turn on the Editor toolbar

1. Open ArcGIS.
2. Click the Add Data icon .

Optional: Right-click inside the blank data frame and select Properties. Change the data frame's projection to "North America Albers Equal Area." Refer to chapter 3 for a reminder about projections. .




3. Either open Folder Connections or select the Connect to Folder icon and navigate to **tl_2009_us_state**, which you just downloaded and unzipped.
4. Use the Magnifying tool to zoom in closer to Oregon (or whichever state you want) so you can really see the outline well.
5. Click the EditorToolbar icon . In ArcGIS 10 this button should already be visible as it's a part of the default ArcGIS interface. In older versions of the software, you must go to View, select Toolbars and Editor. The icon will look the same.
6. Once you click the Editing icon, a new Editor toolbar should be visible. Dock the toolbar if it is not already docked by dragging it to the top of the window where the other toolbars are located.

4 Edit the state outline

1. Click the Editor button and select Start Editing. This makes not only the polygon boundaries editable, but also the attributes table.
2. A little arrow is now activated and serves as the pointer. With this arrow, *double-click* the polygon you would like to change, in this case Oregon, and notice how several little dots (ArcGIS calls them vertices) appear in green. **2** Zoom in very close so you can really see them. By moving these dots, you can reshape the boundary of the state. Use the Magnifying tool to zoom in super close to be able to see the dots clearly. **3**



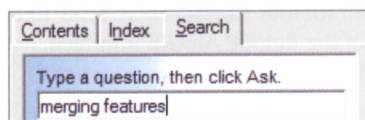
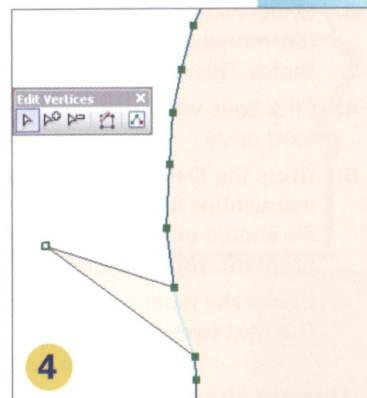
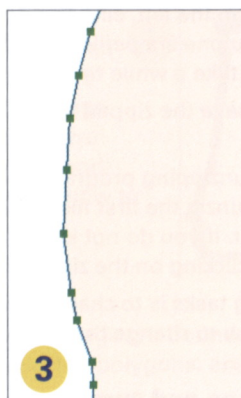
You may need to re-activate the Edit tool  after using the Magnifying tool.

3. Click any one of the dots and drag it to a different position to begin reshaping. 4 Try this with a few more vertices. When you are finished, click anywhere outside the state boundary to complete the edits.
4. To stop editing and save, click Editor and select Stop Editing, and then Save Edits when prompted.
5. One last thing to know is that you can move an entire polygon at once. Click Editor again and click any polygon once. Notice the state becomes highlighted in light blue. This means the entire polygon is selected and you can actually move that polygon. Try moving it. Select Stop Editing and do not save changes.

Another common editing task involves merging multiple polygons into one large polygon *with the same outer boundary* as the first set of polygons. With merging, any data within the attributes table will be summed to one record. Essentially you're making one polygon out of multiple polygons.

5 Merge polygons ?



1. Begin by making the shapefile editable. Click Editor and select Start Editing.
2. Hold down the Shift key and with the Edit tool, select multiple contiguous polygons such as three different states (in this example Oregon, Washington, and Idaho). You can tell they are selected when all appear with bright blue shading. 5
3. Click Editor and select Merge.
4. Because the data for those states will be summed and dumped into one of the three states, it is necessary to select one state for all the states' data. When you get the dialog box that says Choose the feature within which other features will be merged, select one of the states. Oregon was selected for this example. Click OK.
5. Notice that all three states have merged into one.

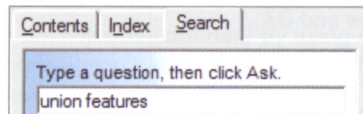


6. Open the attributes table. Notice that now there is no Idaho and Washington. The data for these states has been summed for all polygons and is now warehoused in one line item (Oregon).

Union differs from merge in that the data is not summed to one record. Instead, each polygon keeps its own record even though the visible boundary between the polygons disappears. *Visually* a union looks like one big new polygon (similar to merge), but within the attributes table, a record is maintained for each polygon.


6 Union polygons

1. Hold down the Shift key and with the Edit tool , select another set of three multiple contiguous polygons. You can tell they are selected when all appear with bright blue shading. In this example, Texas, New Mexico, and Oklahoma are selected.
2. Click Editor and select Union. When the dialog box displays that says Choose a template to create feature(s) with, click OK.
3. Notice the three states now appear as one. However, they are still three distinct states. Click anywhere outside the states to get rid of the selection (the blue highlight). Now click more or less in the area where Texas should be (or any one of the states you may have selected) and notice how the original outline of that one state appears selected. Visually it appears to be one boundary, but they are still three separate line items in the attribute table.
4. Open the attributes table to confirm that you still have a line item for Texas, New Mexico, and Oklahoma. 



The ability to select individual items in your maps and create a brand new file *with just those specific items* can be very useful. In this example, you will export California, Nevada, Utah, and Arizona to their own shapefile to create a focus area or target area.

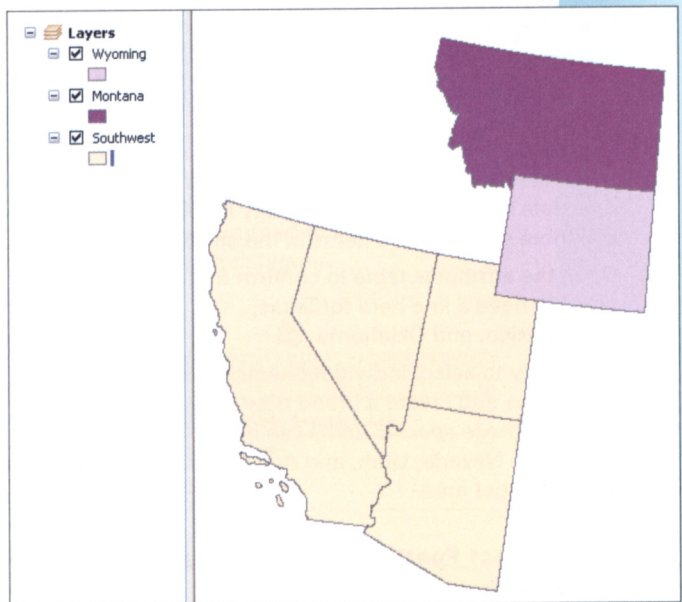
7 Use the Select Features tool and create a new shapefile from selected geographies

1. On the toolbar at the top of ArcGIS, activate the SelectionsTool button. 
2. Hold down the Shift key and click once on each state to select it (California, Nevada, Utah, and Arizona). They will be highlighted in bright blue.
3. In the table of contents, right-click the shapefile **tl_2009_U.S._state**.
4. Select Data and Export Data. Type the file name **Southwest** and where to save it by clicking the browse folder icon. Click Save and OK.
5. Select Yes to add the data as a layer. This should add a new layer to ArcGIS.
6. To get rid of the blue outline, select the Selection menu at the top and Clear Selected Features. Notice if you check the check box next to each layer in the table of contents you can see just the Southwest shapefile.

Another useful technique is to take multiple shapefiles and combine them into one shapefile. The Append tool is most helpful here.

8 Create other shapefiles to append

1. We need other files to work with to show how to append. Right now you have one new shapefile (Southwest). Let's create two more.
2. Review the toolbars at the top of the window, select the Selections Tool icon.
3. Click any other state once—in this example, Montana. It will be highlighted in bright blue.
4. In the table of contents, right-click the shapefile **tl_2009_U.S._state**.
5. Select Data then Export Data. Specify the file name (Montana) and where to save it by clicking the browse folder icon. Click Save, then OK.
6. Select Yes to add the data as a layer. This should add your new layer to ArcGIS.
7. We need one more file. Click any other state once. (In this example, we selected Wyoming.) It will be highlighted in bright blue.
8. In the table of contents, right-click the shapefile **tl_2009_U.S._state**.
9. Select Data then Export Data. Specify the file name (Wyoming) and where to save it by clicking the browse folder icon. Click Save and OK.
10. Select Yes to add the data as a layer. This should add your new layer to ArcGIS.
11. To remove the state layer, in the table of contents right-click and select Remove. All you should have left open are the three shapefiles: Southwest, Montana, and Wyoming.




9 Create a new shapefile that will ultimately become the new layer containing all files

Now we're ready to create a new shapefile that will contain all three of these shapefiles. The first step is to make a new shapefile that will eventually hold all three files. Think of this as a starter file.

1. In the table of contents, right-click the Southwest shapefile layer name, select Data and Export Data.
2. Use the browse button to navigate to where you would like to save this file. Give this file the new name **AllThreeTogether.shp**.
3. When prompted, add it to the table of contents.

10 Activate the Append tool

1. Click the ArcToolbox icon  to open ArcToolbox.
2. Expand the Data ManagementTool menu, then expand the General menu.
3. Double-click Append.

11 Append

1. In the first field Input Datasets, select the Wyoming and Montana shapefiles. Do not include the **AllThreeTogether.shp** or the **Southwest.shp**. (We created the **AllThreeTogether** file from the Southwest file, so it already has the Southwest geographies in it. If you do include it, duplicate records from that file will append. You are adding the Montana and Wyoming files to the **AllThreeTogether.shp**, which, as it stands, is composed of the Southwest polygons.)
2. In the Target Data set drop-down menu, select the **AllThreeTogether.shp** file. This is where they are going to be appended.
3. In the Schema Type, leave as the default TEST.

NOTE: In the future, if the attributes table for each of your geographies is not identical, select NO_TEST.

4. Click OK. It may take a minute to complete.
5. Open the attributes table of **AllThreeTogether.shp** and review the results. Now you have one shapefile, created from multiple other files.

Another tool you may find useful is Clip. You can clip one boundary by using the outline of another boundary. For example, let's say you have a shapefile of all the counties in the United States and you also have a boundary of Montana. Clipping allows you to select only those counties within the boundary of Montana. So you can create a new shapefile of just those counties in Montana. Let's try it.

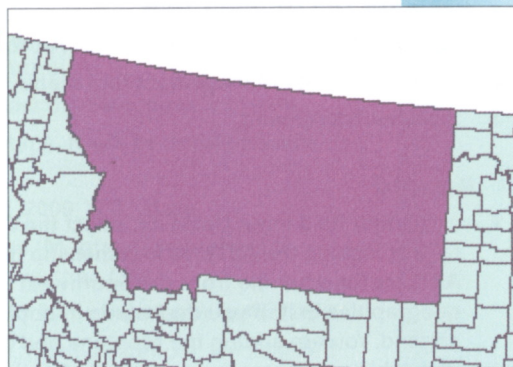
12 Add data to be clipped

1. Close ArcGIS and reopen with a blank map. No need to save any changes. We need a clean, fresh mapping session.
2. Add the **Montana.shp** file and the U.S. counties shapefile (**tl_2009_U.S._county.shp**) to the ArcGIS window, using the Add Data button.

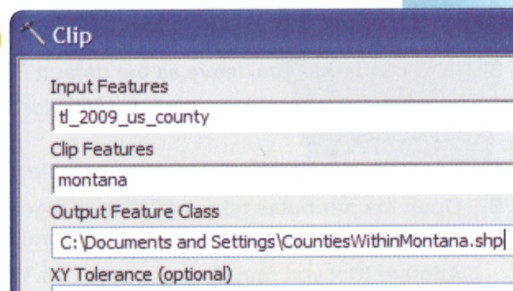
3. Zoom in so you can see Montana fairly well. You may have to move Montana in to the first position in the table of contents. **7**

13 Clip

1. Under the Geoprocessing menu, select Clip.
2. For Input Features, select the file to be clipped (**tl_2009_U.S._county.shp**).
3. For Clip Features, select the file that will serve as the clipped boundary, in other words, the file that will be used to clip the first file (**Montana.shp**).
4. In the Output Feature Class drop-down box, navigate to where you would like to save what will be a newly created shapefile and give it a name such as **CountiesWithinMontana.shp**. **8**
5. Click OK. The operation may take a few minutes.
6. The new file will automatically be added to ArcGIS. Turn off all other shapefiles so you can clearly see the new **CountiesWithinMontana.shp** file. **9**



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