COA 690 / 790 GIS in Marine Science

Lab 6

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There are two exercises in this lab. You need to hand in the answers to the five questions and one map from Exercise 2.

Exercise 1 Find the tools you need

In this exercise, you will learn a couple of different ways to find the tools you need.

Step 1 Add data

Start ArcMap and open a new map document. Add the **Rivers** feature class from the **CentralFlorida** geodatabase. This feature class contains the major rivers in central Florida, where Marion County is located.

Step 2 Find "Buffer" tool

Suppose you would like to create a feature class that represents a 300-meter buffer on either side of each river feature. Is there a Buffer tool?

In Search tab on the right, type **buffer,** and then click the search symbol (like a magnifier).

Buffer (Analysis) (Tool) is the first one on the result list of searching buffer. ArcToolbox finds the Buffer tool in the Proximity toolset of the Analysis Tools toolbox.

Step 3 Run the Buffer tool

Click the Buffer tool to open its dialog box.

For Input Features, choose Rivers from the drop-down list.

For Output Feature Class, click the Browse button and navigate to your folder which stores CentralFlorida.gdb and double-click **CentralFlorida.gdb**.

For Name, type **RiverBuf** and click Save.

In the Buffer tool dialog box, for Distance, enter **300** and make sure Meters is selected for the measurement unit.

For the Dissolve Type parameter, click the drop-down arrow and choose ALL.

This will dissolve all the river feature buffers together into a single feature and remove any overlap.

Click OK to run the tool.

When the process completes, a new output feature is added, but it may be difficult to see it on the map. Zoom in if you would like to take a closer look at the buffer you just created.

Step 4 Find ”Count” tool

Click the Search tab, type **count**, then click search symbol.

ArcToolbox finds the Get Count (Data Management) (tool) in the Table toolset of the Data Management Tools toolbox. The Get Count is listed as a possible match along with several other tools.

Click Get Count to select it.

Step 5 Use the tool help

Open the Get Count tool.

To be sure this is the right tool, you will want to check the tool's documentation.

Click the Show Help button at the bottom of the dialog box. (This step may be skipped if the help panel on the right of the dialog box is shown.)

The help panel on the right of the dialog box provides a brief description of the tool.

This looks like the tool you want.

For Input Rows, choose Rivers.

Notice that the help panel updates to describe the Input Rows parameter. Clicking inside a tool dialog box's text box will give you a description for that parameter.

Tip: If you need more detailed information about the tool, you could click the Tool Help button at the bottom of the tool dialog to open a more comprehensive help document for

the tool. You can also access this information by right-clicking a tool in ArcToolbox and choosing Help.

Click OK to run the tool.

When the process finishes, click the notification message “Get Count” on the lower right corner, then the “Results” window appears, which shows the row count. Notice that, in this case, instead of a new output feature class, the Get Count tool reports the table row count of the Rivers feature class in the Results window. You can always bring up “Results” window by clicking “Results” under the “Geoprocessing” menu.

Conclusion

You now know how to find the tool you need using the Search tabs. When you do not know which toolbox and toolset contains the tool you need, using Search is usually the most efficient way to find the tool.

Exercise 2 Assess fire damage

Lightning sparked a wildfire in a national forest. After two days, the fire was finally contained. Now it's time to assess the damage. Of particular concern is the fire's impact on riparian habitat (the land adjacent to water bodies such as rivers, streams, and creeks) as well as the amount of forest that was lost.
In this exercise, your job is to determine how much riparian habitat and forest was burned. Using the ArcGIS geoprocessing tools, you will map and analyze the areas that were affected.

Step 1 Start ArcMap and open a map document

Start ArcMap™ and open **Assessment.mxd** from your **\FireAssessment** folder.
The map includes layers representing the area's infrastructure (roads and trails), a layer of vegetation types, and layers of the water bodies in the area. The shadedrelief layer represents the terrain (elevation) of the area. The FirePerimeter layer represents the area that was burned.

Your task is twofold:

- You will assess the damage to riparian habitat, which is prone to erosion, along the creeks. Ashes, soil, and other matter flowing into creeks can degrade water quality and adversely impact aquatic life. You are going to map the area within 200 meters of the creeks so that the amount of erosion control materials that will be needed for remediation can be calculated.
- In addition to riparian habitat, the fire also burned a broader wilderness area. You will find the amount of forest that burned on each day.

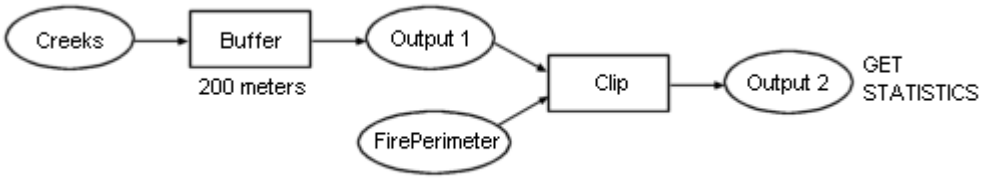
For each task, you will use different geoprocessing tools to find the information you need.

Step 2 Examine a workflow diagram

The first part of your analysis consists of answering the question, "How much area was burned within 200 meters of a creek?" To find the answer, you will follow this three-step process:

1. Define the area within 200 meters of a creek.
2. From this area, extract the burned part by clipping out the burned area polygons.
3. Find the area of the burned polygons.

In the steps above, notice that the output of the first step (the area within 200 meters of the creeks) is used as the input for the second. The output of the second step is used in the third.
This part of the analysis can be translated into the workflow diagram shown below.



Step Buffer the creeks
3

Find “Buffer” tool, and then click it.
For Input Features, choose Creeks in the drop-down list.
For Output Feature Class, go to the path to the Fire geodatabase, the geodatabase in which the Creeks feature class is stored. This is where you want to store the output. You’re your ouput “Creeks_Buffer”.
Under Distance, enter **200** for the Linear unit.
By default, the distance units are meters (the map units). This is what you want.
Click OK to run the tool.
When the buffer operation completes, the Creeks_Buffer layer displays on the map with a random color.
If Creeks_Buffer appears at the top of the table of contents, drag it below the Creeks layer.
Buffers were created around all the creeks in the study area. The buffer layer is intermediate data that you will use as the input for your next geoprocessing task.

Step Clip the burned area
4

The workflow diagram shows that from the Creeks_Buffer layer you will extract the area that lies within the burned area, using the Clip tool. The Clip tool works like a cookie cutter—features in one layer that fall within the extent of another (polygon) layer are extracted and saved to a new layer, whose extent is the same as the clipping layer.
The FirePerimeter layer is a polygon layer representing the boundaries of the burned area; therefore, it will be the clipping layer.

Use the Search tab to find the Clip tool in ArcToolbox.
Click the Clip tool and enter these parameters:

Parameter	Value
Input Features	Creeks_Buffer
Clip Features	FirePerimeter
Output Feature Class	Creeks_Buffer_Clip

Click OK.
After the tool completes, the output layer is added to the table of contents and displays on the map. The Creeks_Buffer_Clip layer represents the area within 200 meters of a creek that was burned.

Turn off the Creeks_Buffer layer.
If Creeks_Buffer_Clip appears at the top of the table of contents, drag it below the Creeks layer.
Now you see only the buffered area that is entirely within the burned area.
In the next step, you will use the Creeks_Buffer_Clip layer to find the area of burned riparian habitat.

Step 5 View statistics for burned riparian area

The third step in this part of the analysis is to find the area of the output layer created in the previous step by the Clip tool.
You can find the area by using the tool "Calculate areas" (Spatial statistics). Name the output "Clip_area".
Right-click Clip_area and choose Open Attribute Table.
The area of the burned riparian area is the sum of the values in the F_Area field.
Right-click the F_Area field name and choose Statistics.
Examine the information in the Statistics area.

Question 1: What is the total area of the burned riparian areas?

Close the Statistics window, then close the attribute table.
You have now finished the first part of your analysis.
Turn off the Creeks_Buffer_Clip and Clip_area layers.
Next, you will use a geoprocessing tool to determine how much forest burned in the fire.

Step 6 Determine which geoprocessing tool to use

Besides knowing how much forest was burned, you would like to know how much forest burned on each of the two days of the fire. You have this data, but it's contained in separate layers.
Open the FirePerimeter attribute table.
Notice the BurnDay field.
Close the table.
Now open the Vegetation attribute table.
The Type field stores the vegetation type of the polygons in the study area. You are interested in the features whose vegetation type is forest.
Close the table.
Because the data of interest is contained in two separate layers, you need to use a geoprocessing tool that will create an output layer containing features and attributes of both the FirePerimeter and Vegetation layers. You are interested only in the area within the FirePerimeter layer, however.
You can create the needed output layer using an overlay operation.
In ArcToolbox, under Analysis Tools, expand the Overlay toolset.
Double-click the Intersect tool to open it.
Click Show Help at the bottom right of the dialog box and read the description of Intersect.

With an intersect operation, only the features common to both input layers are included in the output. With intersect, you can create an output dataset that contains the Vegetation features within the fire perimeter—this is the data you are interested in.
Click Hide Help.

Step 7 **Intersect the FirePerimeter and Vegetation layers**

Now you're ready to perform your last geoprocessing task.

In the Intersect tool dialog box, for Input Features, choose FirePerimeter.
The layer is added to the Features list.
Add the Vegetation layer to the Features list.
In the output feature class, go to the path to the Fire geodatabase and name your output FirePerimeter_Intersect.
Click OK.
When the intersect operation completes, the FirePerimeter_Intersect layer is added to the map.
Turn off the FirePerimeter and Vegetation layers.
If FirePerimeter_Intersect appears at the top of the table of contents, drag it below the Creeks layer.
Zoom to the extent of the FirePerimeter_Intersect layer.
FirePerimeter_Intersect contains the Vegetation and FirePerimeter features that were within the area where the two layers overlapped.
In the next step, you will use the FirePerimeter_Intersect layer to find how much forest was burned on each day.

Step 8 **Find the total area of burned forest**

In this step, you will find the amount of forest that burned during the fire. First, you will find how much forest was burned on day 1, then you will do the same for day 2.
From the Selection menu, choose Select By Attributes.
In the Select By Attributes dialog box, create a query expression that will select features in the FirePerimeter_Intersect layer that have the following attributes: BurnDay = 1 AND Type = Forest.
Click Apply, then move the Select By Attributes dialog box out of the way so you can see the map.
The selected polygons are the forested areas that burned on the first day of the fire.
Open the FirePerimeter_Intersect attribute table.
Right-click the SHAPE_Area field name and choose Statistics.
The Selection Statistics window shows the statistics for the selected records.

Question 2 How much forest burned on day 1?

Close the Selection Statistics window. Click the Clear Selected Features button.
In the Select By Attributes dialog box, change the query expression to select forest features that burned on day **2**.

Click Apply, then close the Select By Attributes dialog box.
View statistics for the selected features' SHAPE_Area field.

Question 3 On which day did more forest burn?

Click Clear Selected Features.
The second phase of your analysis is complete—you now know how much forest burned on each day of the fire.

Step 9 Adjust layer symbology

To make the map easier to read and more meaningful, you will symbolize each type of vegetation in the FirePerimeter_Intersect layer with a different symbol, then you will make the layer semi-transparent so that you can see the underlying terrain.
Open the Layer Properties dialog box for FirePerimeter_Intersect and click the Symbology tab.
Currently, all the features are drawn with the same symbol.
Rather than defining the vegetation type symbols from scratch, you will import them from the Vegetation layer.
Click Import.
In the Import Symbology dialog box, in the Layer drop-down list, choose Vegetation.
Click OK.
In the Import Symbology Matching Dialog box, make sure that Type is selected in the Value Field drop-down list, then click OK.
In the Symbology tab, the vegetation types are now drawn with different symbols.
Click Apply. If necessary, move the Layer Properties dialog box so you can see the map.
In the map, the imported symbology now displays.
Changing the layer symbols is enough to distinguish the vegetation types, but you will make the layer semi-transparent so that you can see the terrain underneath.
In the Layer Properties dialog box, click the Display tab.
In the box next to Transparent, type **35**.
Click OK.

Step 10 Save your work and exit ArcMap

Your analysis is complete, so save your work and **print the final map**.
Exit ArcMap.

More questions:

Question 4 Could you use UNION to retrieve information on the areas of forests burned on each day? If yes, what is the disadvantage of using UNION?

Question 5 Make a flow diagram similar to that shown in Step 2 to summarize all the geoprocessing steps in Exercise 2.