CREATING AND USING BUFFERS IN ARCGIS 10.1

Using buffers can answer such questions as “Do any roads pass within 1000 meters of a stream?”. Buffer analysis works by creating a new feature class of buffer polygons around specified Input Features. Features can be polygons, lines, or points.

Buffering Vector Data using the Buffer Tool:

1. Open ArcMap: **Start** > **Programs** > **ArcGIS** > **ArcMap**. Open a new or existing map and add your data if necessary.
2. Because you are buffering at a specified distance (e.g. metres) you must assign a projection to your map. Right-click on the Layers Data Frame and select Properties. In the **Select a Coordinate System,** click on **Predefined** > **Projected Coordinate System.** Choose the appropriate coordinate system: **UTM** > **NAD 1983 – UTM Zone 17N** is a good choice for south-western Ontario**.**
3. Open **ArcToolbox** by clicking the **ArcToolbox** icon.
4. In the **Toolbox** menu expand **Analysis Tools** > **Proximity**.
5. Double click on **Buffer**. When the dialog box opens, click on **Show Help** to see instructions for each entry you will need to make. Instructions will show on the right as you progress through the form.
6. In the **Input features box**, click **Browse** to navigate to the location of the file that you want to buffer and click **Open**. Alternatively, in the drop down menu select the file you want to buffer.
7. In the **Output feature class box**, **Browse** to the location where you are saving you data and name your new file something meaningful. Click **OK**.
8. In the **Distance** (linear or field) field select linear and type in the value for the distance of your buffer from the Input features (e.g. 500). Use the drop menu to specify the units (e.g. metres). Click **OK**.
9. The new vector file will be added to your map.

Buffering Raster Data :

The **Spatial Analyst** extension provides several sets of tools that can be used in proximity analysis. The **Distance** toolset contains tools that can be used to determine distance and nearness to source features. The **Euclidean Distance** tool creates a distance surface (raster) showing the distance of each cell from a set of source features. The **Euclidean Allocation** tool creates a distance surface (raster) that allocates each cell to the closest source feature.

Distance surfaces are often used as inputs for overlay analyses; for example, in a model of habitat suitability, distance from streams could be an important factor for water-loving species. Euclidean distance is straight-line distance, or distance measured "as the crow flies". For a given set of source features, the minimum distance to a feature is calculated for every cell. To find locations close to streams, you must first calculate the Euclidean (straight-line) distance from streams.

These instructions will describe how to create **distance rasters** from an input vector or raster file of source features. If the input file is a raster, only the source feature cells may contain data; all other cells must be NoData. A study area layer (raster or polygon) will be used to define the extent of the analysis.

Using the Euclidean Distance tool

1. Open **ArcMap**. Click **Customize** on the **Main Menu** and point to **Extensions**. Check the **Spatial Analyst** check box and click **Close**.
2. Add your source features layer and your study area layer to your map.
3. Before you start to perform analyses on your data you should set the relevant environment settings.
    1. Right-click in a blank area of **ArcToolbox** and choose **Environments.** Make the following changes:

        - **Workspace** > set **Current** and **Scratch** Workspaces
        - **Output Coordinates** > set to same as your source features layer
        - **Processing Extent** > set to same as your study area layer
        - **Raster Analysis** > Cell Size > Maximum of Inputs

4. In **ArcToolbox**, expand **Spatial Analyst Tools** > **Distance** > double-click on **Euclidean Distance**.
5. For **Input raster or feature source data**, choose your source features layer from the drop-down box.
6. For **Output distance raster**, it should automatically save the output to your **Scratch** workspace. Change the default file name to something more meaningful, if you like.
7. Click **OK**. The output will be a floating point grid.

Using the Euclidean Allocation tool

Euclidean allocation divides an area up and allocates each cell to the nearest input feature. The Euclidean Allocation tool creates raster zones that show the locations that are closest to a given point. If you specify a maximum distance for the allocation the results are analogous to buffering the source features.

1. Repeat Steps 1 to 3 above.
2. In **ArcToolbox**, expand **Spatial Analyst Tools** > **Distance** > double-click on **Euclidean Allocation**.
3. For **Input raster or feature source data**, choose your source features layer from the drop-down box.
4. For **Source field**, choose a field from your source features layer that contains integer data and uniquely identifies your source features.
5. For **Output distance raster**, it should automatically save the output to your **Scratch** workspace. Change the default file name to something more meaningful, if you like.
6. For **Maximum distance**, enter your desired buffer distance. Click **OK**.
7. The output grid will be an integer grid showing your source features buffered at the specified maximum distance. If a maximum distance is not specified the output grid will create zones of cells nearest a source feature.