Staff Conference 2023 GIS Training Workshop

# The Burgate Manor Dog Outbreak

## Activity 1

The GIS department have all decided to bring their dogs into work. You have been tasked with figuring out just how much of the working day the GIS department are spending looking after their dogs. In order to do this, you need to calculate:

1. How many dogs each staff member owns.
2. How many total walks per day each staff member is going on.
3. The cumulative minutes spent by each staff member walking their dogs, and the average length of each walk.

## Question 1 – No. dogs per staff member

Select the ‘Analysis’ tab from the ribbon at the top of the page. From there, navigate to ‘Geoprocessing’ and select ‘Tools’.

Within the now-opened ‘Geoprocessing’ pane, search for and open the ‘Summary Statistics’ tool.

Select the ‘GWCT Dogs’ dataset as your Input Table, and rename the Output Table as ‘GWCTDogs\_Count’. We are interested in calculating a **count** of the number of dogs per staff member, and so use ‘Dog Name’ as the Statistics Fields and ‘Count’ as the Statistic Type.

A screenshot of a computer

Description automatically generatedIf we run this now, we’ll simply produce a table counting the number of dogs! We need to set a Case Field to calculate a count of dogs based on a grouping variable. Set ‘Owner Name’ as the Case Field and run the tool. See below for example tool configuration:

Open the table, and note the frequency of dogs against each staff member.

## Question 2 – Total walks per day

Before we are able to calculate this value, we must first resolve the <Null> values within the data. If any of these values are used in a calculation, they will ensure that the answer is always <Null>, making the dataset useless.

In this instance, we know that a <Null> value of walks means that the dog hasn’t been walked – and so we can replace any <Null>s in the ‘Daily Walks’ column with a value of ‘0’. You could do this by hand, but there are easier ways – especially in the case of larger datasets!

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Description automatically generatedOnce again in the ‘Geoprocessing’ pane search for the ‘Select Layer By Attribute’ tool and open it. Select the ‘GWCT Dogs’ dataset as the Input Row, and edit the Expression to read “Where Daily Walks is null”. See below screenshot for tool configuration:

This should select the three dogs which have a <Null> amount of Daily Walks.

Retaining this selection, return to the Geoprocessing pane, search for and open the ‘Calculate Field’ tool.A screenshot of a computer

Description automatically generated Set the ‘GWCT Dogs’ as the Input Table, ‘Daily Walks’ as the Field Name, and edit the Expression to read ‘Daily\_Walks = 0’ (without apostrophes). See below screenshot for tool configuration:

Run the tool - all of the <NULL> values in the ‘Daily Walks’ column should now have been replaced with ‘0’.

Applying what you’ve learned in Question 1, calculate the total number of dog walks each staff member takes their dogs on each day. Make sure you clear the current selection first before calculating any statistics (the ‘Edit’ tab in the ribbon, under ‘Selection’ click the highlighted ‘Clear’ button).

## Question 3 – Length of walks

Uh-oh! There’s more <NULL> values in the ‘Minutes Walked’ column, and so we can’t possibly begin using this data until we’ve fixed them. We could use the method taught in Question 2, but let’s try something a bit quicker using a bit of Python.

Open the ‘Calculate Field’ tool, once again setting ‘GWCT Dogs’ as the Input Table. Select ‘Minutes Walked’ as our Field Name.

Change the Expression to read ‘Minutes\_Walked = Reclass(!Minutes\_Walked!)’ (without apostrophes). This tells ArcGIS that we want to **reclassify** some of the values in the ‘Minutes Walked’ column.

Navigate to the Code Block, and enter the following Python code (without apostrophes):

‘def Reclass(Minutes\_Walked):

if Minutes\_Walked is None:

return 0

A screenshot of a computer program

Description automatically generated else:

return Minutes\_Walked’

This tells ArcGIS that where the value in ‘Minutes Walked’ is None or <NULL>, replace that value with a 0. Otherwise, keep the original value. See right for example tool configuration:

Run the Calculate Field tool, and then apply what you’ve learned in Questions 1 and 2 to calculate a total time spent on dog walks for each staff member, and an average time per walk for each staff member.

## Activity 2

HR & Facilities are, rightfully, concerned about the number of dogs. They’ve asked you to come up with answers to the following questions:

1. For health and safety reasons, no dog is allowed near 20 meters of the River Avon. How close is the nearest dog to this waterbody?
2. No location is allowed to hold more than four dogs at any one time. Exactly how many dogs are in each location? In which location are dogs taken for the most walks per day and for the longest total duration?

## Question 1 – Calculating distances

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Description automatically generatedWe could manually measure the distance between each dog and River Avon using the ‘Measure’ functionality on the ‘Map’ section of the ribbon, but this is time-consuming and doesn’t save the records! To perform a similar function across multiple data points we can use the ‘Near’ tool.

Set the ‘GWCT Dogs’ dataset as the ‘Input Features’, the ‘Rivers’ dataset as the ‘Near Features’, and the ‘Distance Unit’ as ‘Meters’. Leave all of the other settings as default:

Run the tool, and open the attribute table for the ‘GWCT Dogs’ dataset.

The ‘NEAR\_FID’ column refers to the feature in the ‘Rivers’ dataset each dog is nearest to – specifically referring to the OBJECTID column. Since we only have one river, this value is exactly the same across all of the rows in the ‘GWCT Dogs’ dataset.

The ‘NEAR\_DIST’ is the distance, in our case in meters, between the dog and the River Avon. Are any dogs within 20 meters of the river? Which dog is furthest away?

## Question 2 – Location-based summaries

Once again, we could manually count up the number of dogs in each location and keep track of how many walks they’re taken on – but ArcGIS Pro can handle all of this for us.

Open the ‘Summarize Within’ tool. This calculates summary statistics, similar to those in Activity 1, on a polygon-by-polygon basis.

Set the ‘Input Polygons’ as the ‘GWCT Buildings’ dataset, and the ‘Input Summary Features’ as the ‘GWCT Dogs’ dataset. Leave all other parameters as their defaults, and run the tool. This should create a new polygon feature class titled ‘GWCTBuildings\_SummarizeWithin’.

Open this new feature class and inspect the ‘Count of Points’ column – this tells us how many dogs are in each building.

Unfortunately, this doesn’t answer our other questions about the total number of walks and duration of walks in each building!

Return to the ‘Summarize Within’ tool, and look at the ‘Summary Fields’ section. In the ‘Field’ section, add the ‘Daily Walks’ column, and set the ‘Statistic’ to ‘Sum’.

A screenshot of a computer

Description automatically generatedLikewise, add the ‘Minutes Walked’ column to ‘Field’ and also set the ‘Statistic’ to ‘Sum’:

Run the tool again and re-open the attribute table, taking note of the new columns.

Which building’s dogs are taken for the most walks per day?

Which building’s dogs are taken for the greatest duration of walks per day?