

Exercise 1: Quantifying Patterns: Missed Trash and Recycling Collection

Instructions

Use this guide and ArcGIS Online to reproduce the results of the exercise on your own.

Note: ArcGIS Online is a dynamic mapping solution. The screenshot graphics that you see in course materials may differ slightly from the version of ArcGIS Online that you will use.

Introduction

This exercise presents the spatial analysis approach using ArcGIS to map point density of 311 requests. 311 is the telephone number that provides access to municipal services in the United States, such as damaged traffic signs or sidewalk repairs. The result will be a map of areas where different types of 311 requests occur more frequently. You could use the map to determine where to prioritize resources. The purpose of this example is to show how you can use GIS to perform density analysis and determine where more of something is occurring or has occurred. Although the data is real, the scenario, analysis, and resulting decisions are hypothetical.



Scenario

The Department of Public Works in Washington, DC, collects residential trash and materials for recycling from single-family homes and apartment buildings with three or fewer units. If trash and recycling collection does not occur, residents can report it using 311. Officials want to understand where trash and recycling collection is being missed.

For the purposes of this exercise, imagine that you are an analyst for the city. You are assigned to an initiative to improve the city's trash and recycling collection. The city is organized into eight wards, and you will begin your analysis by looking at the missed collection locations for the two most populous wards. Using 311 data, you need to show the patterns of missed trash and recycling collection.

In this exercise, the analysis question can be framed as follows:

Where does the Department of Public Works most frequently miss the collection of trash and recycling in the area of interest?

Note: This example provides a starting point. In the real world, an analysis such as this would likely involve more factors and criteria.

Technical notes

1. You will make full use of web mapping services throughout this course. You will need a robust web connection to complete this exercise and the exercises that follow.
2. Use the latest version of Google Chrome or Microsoft Edge. Other web browsers may not display your maps and apps correctly.

Note: For information on supported web browsers, see ArcGIS Online Help: Supported browsers (<https://esriurl.com/browsers>).

Estimated completion time: Approximately 45-60 minutes

- Step 1: Open the map

Using ArcGIS Online, you will create a map with the provided layers to use for your analysis. For this exercise, the initial map has already been created showing missed collection locations for trash and recycling and ward boundaries.

Before opening the map, you will sign into ArcGIS Online.

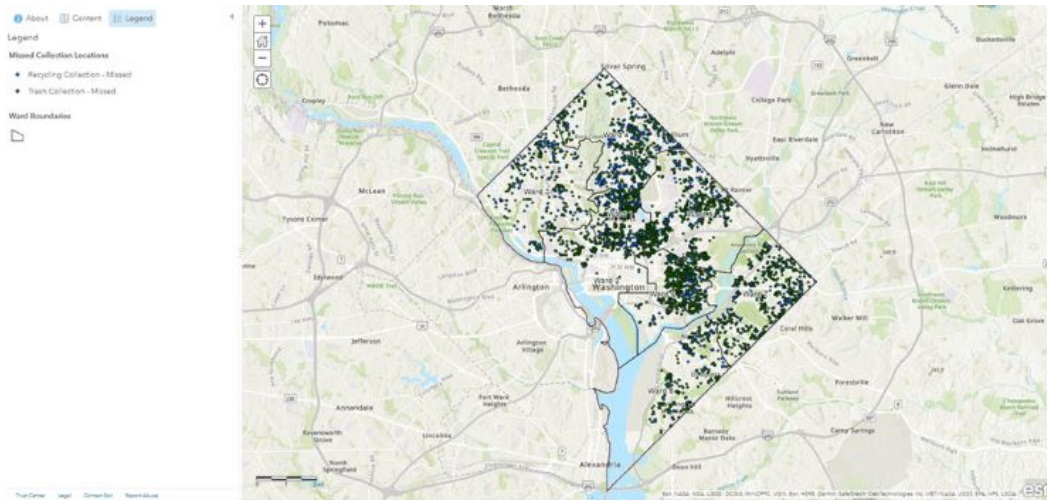
- a Open a new private or incognito web browser tab or window.

To help prevent confusion between your ArcGIS Online accounts, we recommend that you open a private or incognito web browser window for all course work.

- b In your private or incognito web browser window, go to <https://www.arcgis.com/home/item.html?id=fc149dc9e0d443408d9b7a8ac24f0ce8> (<https://esriurl.com/Sec5Map>).
- c On the top right of the page, click Sign In.
- d Sign in to ArcGIS Online using your course ArcGIS credentials.

Note: Section 1, Exercise 1 explains how to determine your course ArcGIS credentials (username and password). If you have trouble signing in, please refer to the Common Questions list on the course Help tab.

- e Click the thumbnail image to open the map.



Step 1e: Open the map.

A map of the area of interest (<https://esriurl.com/aoi>) opens, showing ward boundaries and missed collection locations for trash and recycling.

The dataset of missed trash and recycling collection locations in this map contains more than 6,000 points. The points represent reports of missed trash and recycling collection in Washington, DC, over a three-month period.

- Step 2: Save a copy of the map

For the purposes of this exercise, you will save a working copy of the map.

- a On the ribbon above the map, click Save and choose Save As.
- b In the Save Map dialog box, for Title, replace -Copy at the end of the name with your initials.

✕

Save Map

Title:

Tags: [Add tags](#)

Summary:

Save in folder:

- c Click Save Map.

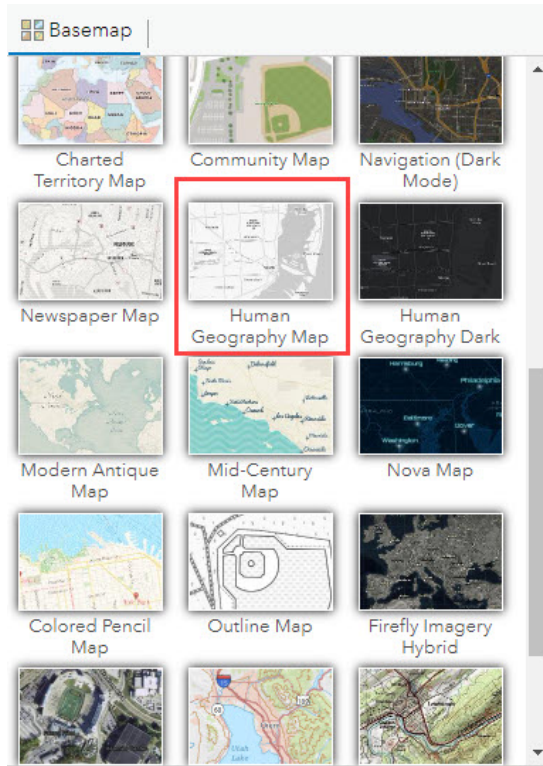
A copy of the map will be saved to your My Content collection.

Note: ArcGIS Online does not automatically save maps; therefore, you should periodically save your map as you are working.

- Step 3: Select a basemap

You will start with the second step of the spatial analysis approach, explore and prepare data. The initial map uses the Topographic basemap. In this step, you will select a different basemap to better represent the thematic nature of the map data.

- On the ribbon above the map, click Basemap.
- From the basemap gallery, scroll down to select Human Geography Map, as indicated in the following graphic.



With the new basemap selected, the points become the main focus in the map.

- Step 4: Examine the data

Before any analysis, it is important to understand your data. In this step, you begin by examining the attribute tables for the layers in the map.

- Observe the spatial distribution of the points in the Missed Collection Locations layer.
- Note:** In this dataset, each point represents a single reported missed collection location.

? Do the points seem to be clustered in one ward or area on the map?

- Answer

It looks like more missed collections (points) may be concentrated in Ward 6, but it is difficult to be sure.

When points are highly scattered, patterns are not obvious. There may also be multiple points at a single location or close to one another. Nearby point symbols will be drawn on top of each other and appear as a single point, especially if the map is zoomed out. Using spatial analysis, you can reveal patterns in your data.

The map contains many points representing reports of missed trash and recycling collection. However, on the basis of points alone, you cannot tell where there are higher numbers of the different types of missed collections. Examining the attribute table may reveal where there are higher incidences of missed collections.

First, you will open the attribute table for the Missed Collection Locations layer to get a better understanding of your data. This understanding will help you interpret your results.

- b In the Details pane, click the Content button .
- c In the Contents pane, point to or click the Missed Collection Locations layer name and click the Show Table button .

Service Code	Service Code Description	Service Type Code Description	Organization	ADDDATE	RESOLUTION	SERVICEDUE	SERVICEORD
S0441	Trash Collection - Missed	SWMA- Solid Waste Management Administration	DPW	6/1/2020, 8:00 PM	6/2/2020, 8:00 PM	6/3/2020, 8:00 PM	6/1/2020, 8:00 PM
S0441	Trash Collection - Missed	SWMA- Solid Waste Management Administration	DPW	6/1/2020, 8:00 PM	6/3/2020, 8:00 PM	6/3/2020, 8:00 PM	6/1/2020, 8:00 PM

Step 4c: Examine the data.

The table lists 6,341 reports of missed trash or recycling collection. Each point includes the type of collection missed in the Service Code Description field.

The Department of Public Works would like you to look at the missed collections by ward. You could overlay, or combine, the layer information about the missed collection locations and the boundaries of the wards.

- d After examining the data, close the Missed Collection Locations attribute table.

Your map includes the Ward Boundaries layer. Because you are interested in finding out how many collections were missed in each ward, you will need to combine the two datasets together, overlaying the wards with missed collection locations.

Before combining the datasets, you will examine the Ward Boundaries layer table.

- e Open the attribute table for the Ward Boundaries layer.

Legal/statistical area name	Area Land	Area Water	Total Population	Total Population Male	Total Population Female	Total housing units	Ward
Ward 4	23,013,646	147,351	89,992	44,141	45,851	33,459	4
Ward 3	26,946,477	1,316,331	82,737	37,221	45,516	40,665	3
Ward 5	26,400,212	403,080	90,172	42,727	47,445	38,521	5
Ward 1	6,383,542	180,515	83,811	41,561	42,250	39,068	1

Step 4e: Examine the data.

The Ward Boundaries table includes information about each of the eight wards in the city, including the name, land and water area, population, and number of housing units.

For your initial analysis, you will focus on the two wards with the highest populations.

- f Point to or click the Total Population field name and choose Sort Descending.



Which two wards have the largest populations?

- Answer


Ward 6 and Ward 5 have the two largest populations.

- g After examining the data, close the Ward Boundaries attribute table.

To identify which missed collection locations occurred within which ward, you will need to combine information from the Missed Collection Locations layer with information from the Ward Boundaries layer.

- Step 5: Combine layers and data

In this step, you will create a layer that contains the missed collection points located within the ward boundaries, with the corresponding ward boundaries attributes appended.

- a Point to or click the Missed Collection Locations layer name and click the Perform Analysis button .

- b In the Perform Analysis pane, expand Manage Data.
- c Click Overlay Layers.

The Overlay Layers tool combines two layers into a single layer using one of three methods: Intersect, Union, or Erase.

- d In the Overlay Layers pane, for Choose Input Layer, ensure that Missed Collection Locations is selected.
- e For Choose Overlay Layer, ensure that Ward Boundaries is selected.
- f For Choose Overlay Method, ensure that Intersect is selected.

The Intersect method will overlay the Ward Boundaries layer features with the layer of Missed Collection Locations point features. The result layer will contain only those features, or portions of features, in the overlay layer (Ward Boundaries) that overlap with features in the analysis or input layer (Missed Collection Locations).

- g For Result Layer Name, type **Intersect of Missed Collection Locations and Ward Boundaries_<your first and last name>**.

Note: If you run the analysis multiple times, you will need to provide a unique result layer name each time to avoid encountering an error message.

The Save Result In field defaults to your account name; you do not need to change this value.

- h At the bottom of the Overlay Layers pane, uncheck the box for Use Current Map Extent, as indicated in the following graphic.

Overlay Layers

1 Choose input layer

Missed Collection Locations

2 Choose overlay layer

Ward Boundaries

3 Choose overlay method

Intersect Union Erase

Output: Points

4 Result layer name

Intersect of Missed Collection Locations and Ward B

Save result in username_analyze

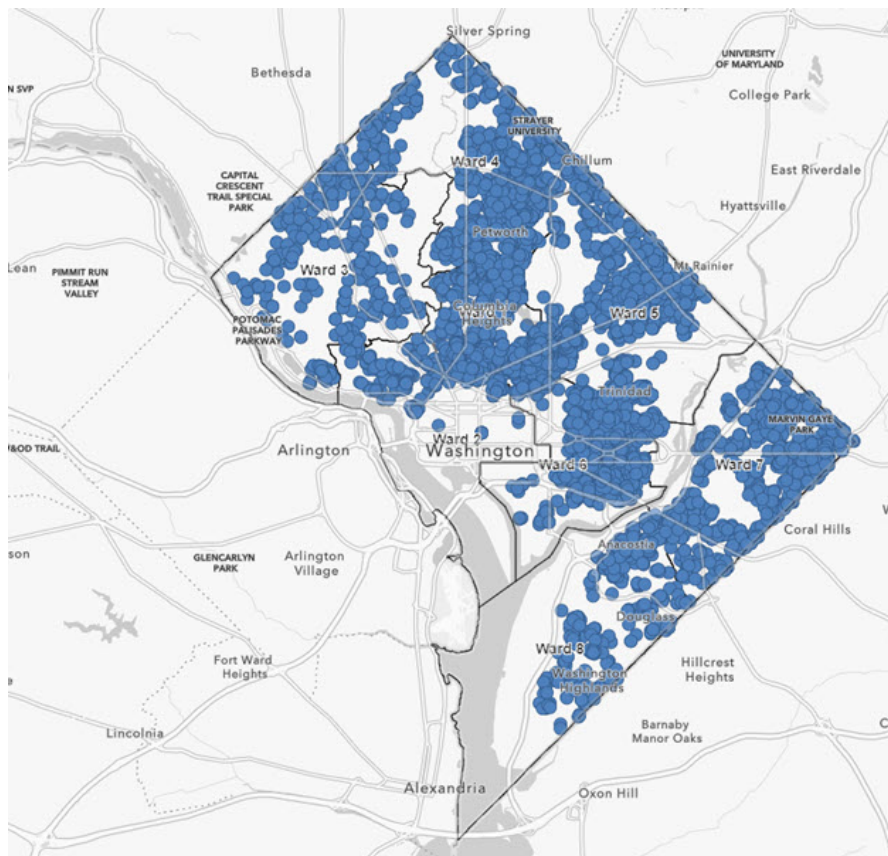
☐ Use current map extent

Show credits

For this analysis, you want to analyze all records in the Missed Collection Locations layer, so you will uncheck the box.

- i Click Run Analysis.

Note: If your analysis is not complete after 4 minutes, try saving the map and refreshing the page. You can also exit ArcGIS Online and try again later.



Step 5i: Combine layers and data.

A new result layer with the name that you assigned appears in the Contents pane. The map display updates to show the missed collection locations point features overlaid on the ward boundaries features.

The new layer contains the original information about each missed collection point, as well as which ward it occurred in. Next, you will examine the details related to the locations.

- Step 6: Examine the data

In this step, you will examine the attribute table for the new layer to further understand what you see on the map.

- Open the attribute table for the Intersect Of Missed Collection Locations And Ward Boundaries layer.
- Scroll through the fields in the attribute table and examine the data.

Note: You will need to scroll to the right of the table to view all of the fields.

? How many features are in the new layer that you created?

- Answer
6339 features.

The number of features in the table is less than the number of features in the Missed Collection Locations table. Two points are located just outside of the Ward Boundaries layer. The Intersect result layer includes only features located within the Ward Boundaries layer.

In addition to the information for each missed collection location, the table now includes more fields at the far right of the table. The Ward field identifies the particular ward where the missed collection occurred.

- Close the attribute table.

Next, you will assess how many missed trash collections occurred in each of the two most populous wards.

- Step 7: Filter data to limit feature display for a single ward

In this step, you will filter the data by ward and missed collection type to show where missed trash collection occurs most frequently across the city.


- a Zoom and pan the map so that you can see the entire Ward 6 area.

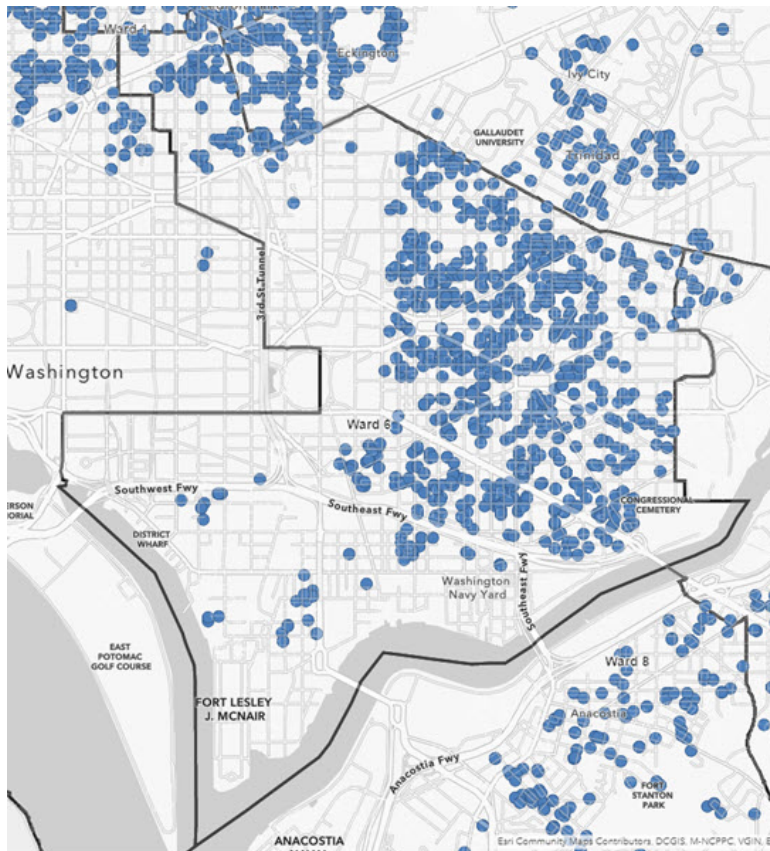
The ward outlines are difficult to visualize. You will address this by changing the symbology of the Ward Boundaries.

- b Change the outline of the Ward Boundaries to the color black, with a line width of 3 px.

- Hint

First, try changing the style on your own. If needed, the detailed steps are as follows:

- In the Contents pane, point to or click the Ward Boundaries name and click the Change Style button .
- In the Change Style pane, for Choose An Attribute To Show, confirm that Show Location Only is selected.
- Click Options.
- Click Symbols.
- At the top of the Change Symbols window, click the Outline tab.
- From the palette, choose an outline color, such as black (hex color #1A1A1A).
- Change the Line Width to 3 px.
- Click OK to close the Change Symbols window.
- Click OK, and then click Done.




Step 7b: Filter data to limit feature display for a single ward.

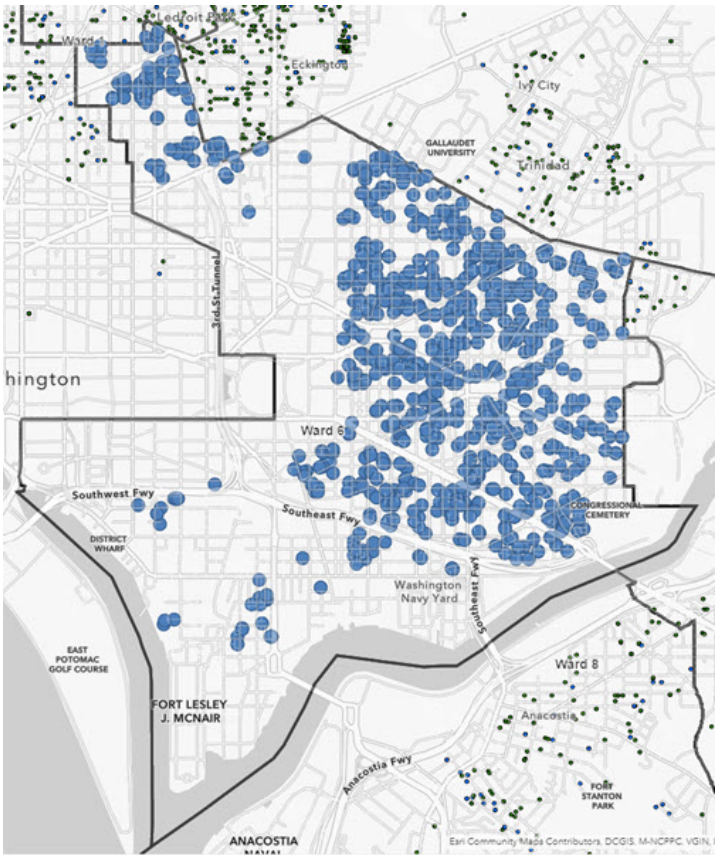
- c Filter the data so that only missed collection locations in Ward 6 are visible.

- Hint

First, try filtering the data on your own. If needed, the detailed steps are as follows:

- Point to or click the Intersect Of Missed Collection Locations And Ward Boundaries layer name and click the Filter button .
- In the Filter dialog box, choose Ward as the field to filter on.

- Confirm that the second field is set to Is.
- For the third field, select the Unique option and choose 6 from the drop-down list.
- Click Apply Filter.



Step 7c: Filter data to limit feature display for a single ward.

The map display updates to show only reported missed collections in Ward 6.

- d View the attribute table for the Intersect Of Missed Collection Locations And Ward Boundaries layer again and examine the data.


Intersect of Missed Collection Locations and Ward Boundaries (Features: 1154, Selected: 0)				
Join_Count	TARGET_FID	Service Code	Service Code Description	Service Type Code Description
1	7,888	S0441	Trash Collection - Missed	SWMA- Solid Waste Management Admistration
1	7,935	S0441	Trash Collection - Missed	SWMA- Solid Waste Management Admistration

Step 7d: Filter data to limit feature display for a single ward.

After filtering on Ward 6, you can see from the attribute table that there are 1,154 missed collections. Next, you want to understand the spatial distribution of the missed trash collection locations.

- Step 8: Edit a filter to see missed trash collection locations

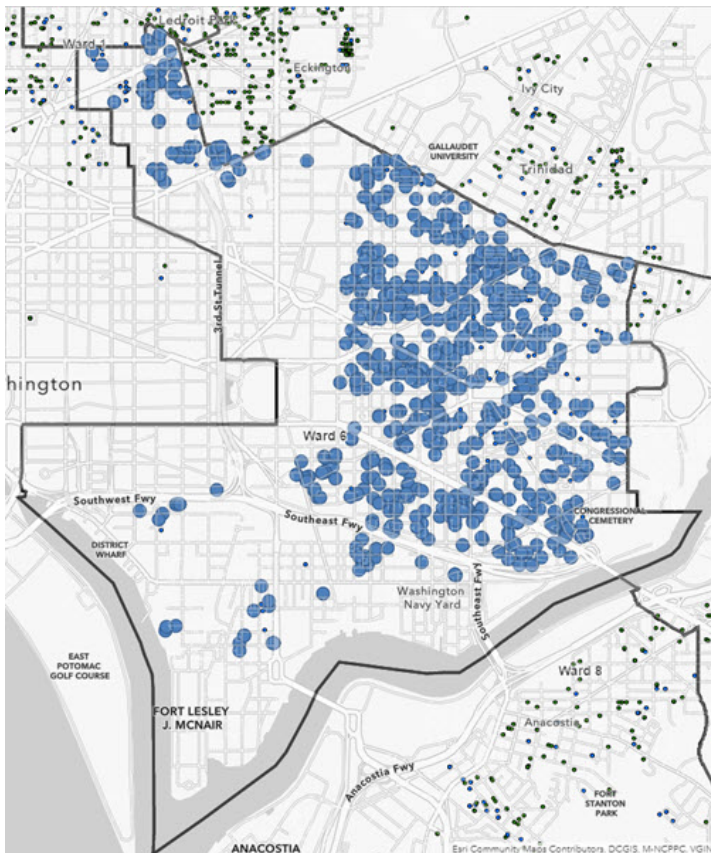
You have filtered the missed collection data to include only incidents reported in Ward 6. In this step, you will edit the filter to determine how many reports were for missed trash collection.

- a Point to or click the Intersect Of Missed Collection Locations And Ward Boundaries layer name and click the Filter button .
- b In the Filter dialog box, click the Edit tab.
- c Click Add Another Expression.
- d In the second expression, choose Service Code Description as the field to filter on.

- e Confirm that the second field is set to Is.
- f For the third field, select the Unique option and choose Trash Collection - Missed from the drop-down list.
- g At the top of the Filter dialog box, accept the default to limit results to features that match all of the expressions, as indicated in the following graphic.

You want to include points that meet both criteria; that is, missed trash collection locations in Ward 6.

- h Click Apply Filter.



Step 8h: Edit a filter to see missed trash collection locations.

The map display updates to show only missed trash collections in Ward 6.

There are 899 missed trash collection locations. By dividing the number of missed trash collection locations (899) by the total number of missed collections in Ward 6 (1,154), you can conclude that 77.9 percent of all reports of missed collections in Ward 6 are for missed trash collection. The rest of the reports are for missed recycling collection.

Note: It is fine to simply use feature count to represent the number of missed collections. In this dataset, you know that each point represents a single report. If there were multiple reports at a single location, you would use the Join_Count field in the table to identify statistics. The sum of values would be the same, but the total number of values would be different.

- i Close the attribute table.

- Step 9: Filter data to limit feature display for a different ward

For comparison purposes, you want to find out how many missed collections in Ward 5 are missed trash collections. That information could be useful in determining which ward should receive additional resources to improve trash collection.

In this step, you will repeat the process of filtering the data to find the number of missed collections in Ward 5, the second most populous ward in the city.

- a Zoom and pan the map so that you can see the entire Ward 5 area.

Note: Ward 5 is north of Ward 6.

- b Edit the filter for the Intersect Of Missed Collection Locations And Ward Boundaries layer to view only missed collection locations in Ward 5, including both types of missed collections (trash and recycling).

- Hint

First, try editing the filter on your own. If needed, the detailed steps are as follows:

- Point to or click the Intersect Of Missed Collection Locations And Ward Boundaries layer name and click the Filter button 🗲.
- In the Filter dialog box, click the Edit tab.
- For the first expression, change the ward from 6 to 5.
- Next to the second expression, click the Delete This Expression button ✖ to remove the filter.

View Edit

+ Add another expression ☐ Add a set

Display features in the layer that match the following expression

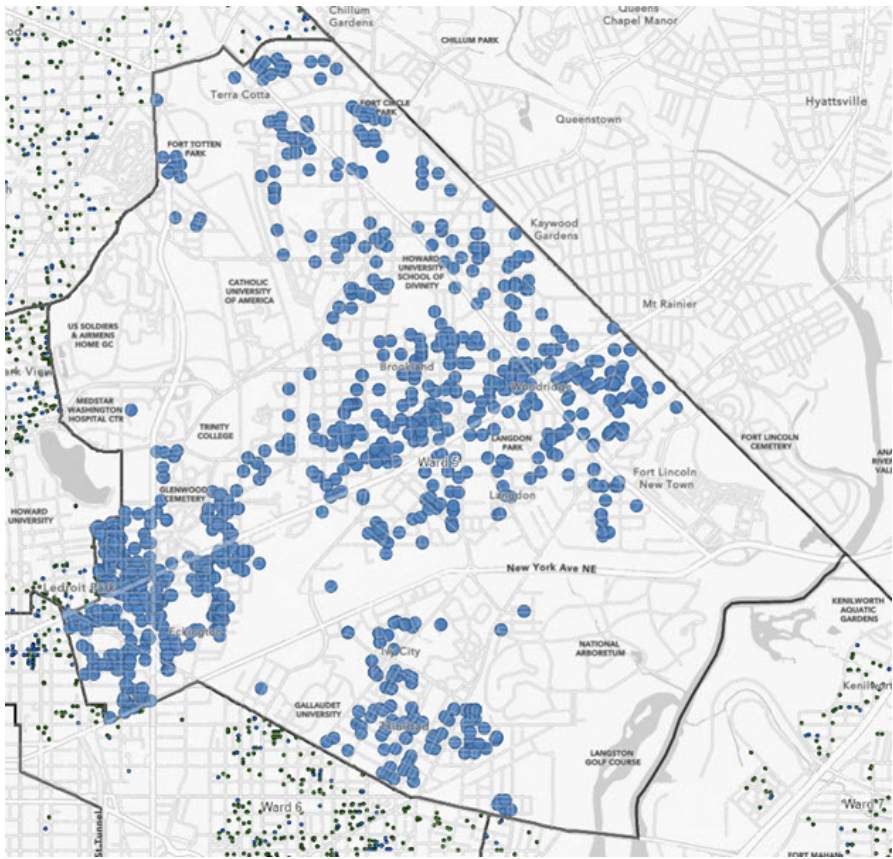
Ward is 5

☐ Ask for values ▼

☐ Value ☐ Field ☒ Unique

APPLY FILTER APPLY FILTER AND ZOOM TO CLOSE

- Click Apply Filter.



Step 9b: Filter data to limit feature display for a different ward.

The map display updates to show the missed trash and recycling collection locations in Ward 5.

- c View the attribute table for the Intersect Of Missed Collection Locations And Ward Boundaries layer again.

Intersect of Missed Collection Locations and Ward Boundaries (Features: 1307, Selected: 0)				
Join_Count	TARGET_FID	Service Code	Service Code Description	Service Type Code Description
1	7,885	S0441	Trash Collection - Missed	SWMA- Solid Waste Management Admistration
1	7,890	S0441	Trash Collection - Missed	SWMA- Solid Waste Management Admistration

Step 9c: Filter data to limit feature display for a different ward.


After filtering on Ward 5, you can see that there are 1,307 missed collections. To determine how many of those were missed trash collections, you will edit the filter.

- d Edit the filter to select only missed trash collections in Ward 5.

You want to include points that meet both criteria; that is, missed trash collection in Ward 5.

- Hint

First, try editing the filter on your own. If needed, the detailed steps are as follows:

- Point or click the Intersect Of Missed Collection Locations And Ward Boundaries layer name, and click the Filter button .
- In the Filter dialog box, click the Edit tab.
- Click Add Another Expression.
- In the second expression, choose Service Code Description as the field to filter on.
- Confirm that the second field is set to Is.
- For the third field, select the Unique option and choose Trash Collection - Missed from the drop-down list.

- At the top of the Filter dialog box, accept the default to limit results to features that match all of the expressions.

View

Edit

+ Add another expression

☐ Add a set

Display features in the layer that match all of the following expressions

Ward

is

5

×

☐ Value
☐ Field
☒ Unique

☐ Ask for values

Service Code Descr

is

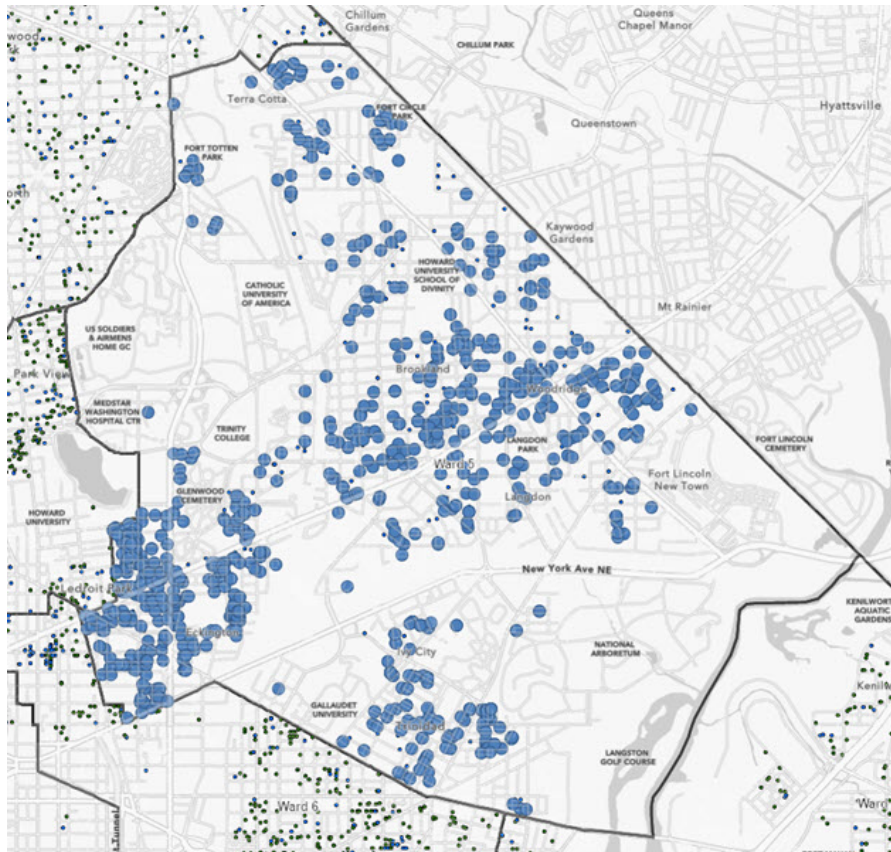
Trash Collection - Misse

×

☐ Value
☐ Field
☒ Unique

☐ Ask for values

- e Click Apply Filter.



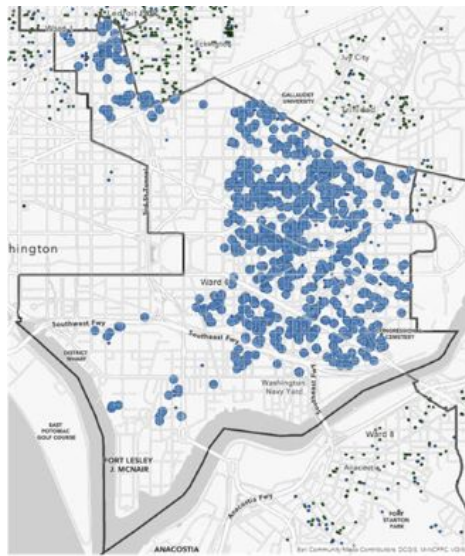
Step 9e: Filter data to limit feature display for a different ward.

The map display updates to show only missed trash locations in Ward 5.

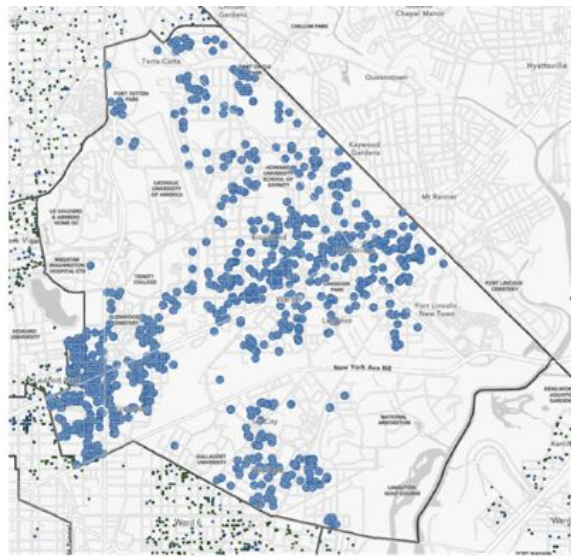
- f View the attribute table for the Intersect Of Missed Collection Locations And Ward Boundaries layer again.

There are 1,069 missed trash collection locations. By dividing the number of missed trash locations (1,069) by the total number of missed collections in Ward 5 (1,307), you can conclude that 81.8 percent of all missed collections in this ward are for missed trash collection. Recall that the missed trash percentage for Ward 6 was 77.9 percent of all missed collections. In terms of percentage, the missed trash collection reports do not differ much between these two wards.

- g Close the attribute table.



Ward 6 Missed Trash Collection



Ward 5 Missed Trash Collection

As you examine the spatial distribution, what do you notice? Ward 5 appears to be larger than Ward 6. This size difference could be a factor in the variation in spatial distribution. You can derive little information from the pattern of points because it is difficult to tell whether the points are more concentrated in one area. The points may be overlapping. Within each area, you cannot easily tell whether the spatial pattern is the same. Other considerations might be density of housing or population distribution.

Density represents features normalized by area, such as the number of missed trash collections per square mile. Density analysis allows you to clearly see spatial distribution. Next, you will perform a density analysis, which takes known quantities of some phenomenon and spreads these quantities across the map.


- Step 10: Calculate density of features

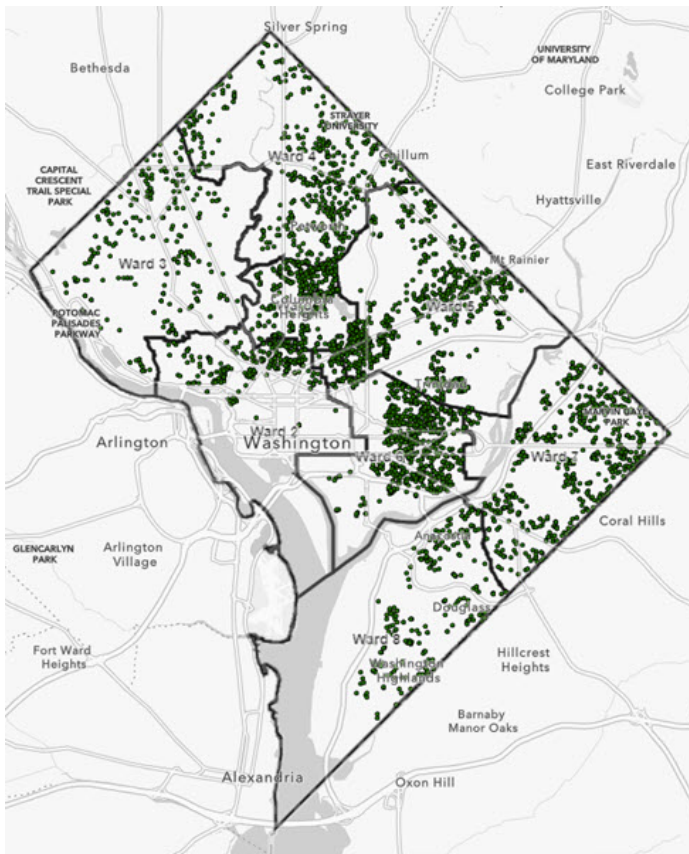
In this step, you will perform an analysis of the density of missed trash collection locations throughout the city.

- Turn off the Intersect Of Missed Collection Locations And Ward Boundaries layer.
- Zoom to the Missed Collection Locations layer extent.
- Filter the Missed Collection Locations layer for missed trash collection locations.


- Hint

First, try filtering the data on your own. If needed, the detailed steps are as follows:

- Point to or click the Missed Collection Locations layer name and click the Filter button .
- In the Filter dialog box, choose Service Code Description as the attribute to filter.
- Confirm that the second field is set to Is.
- For the third field, select the Unique option and choose Trash Collection - Missed from the drop-down list.
- Click Apply Filter.



Step 10c: Calculate density of features.

d Point to or click the Missed Collection Locations layer name and click the Perform Analysis button .

e In the Perform Analysis pane, expand Analyze Patterns.

f Click Calculate Density.

The Calculate Density tool (<https://esriurl.com/CalculateDensity>) uses input point or line features to calculate a density map within an area of interest.

g In the Calculate Density pane, for Choose Point Or Line Layer From Which To Calculate Density, confirm that Missed Collection Locations is selected.

h Accept the default of No Count Field.

Each point represents a single report of missed trash collection, and there are not multiple missed collections at any one point.

i Expand Options.

j For Clip Output To, choose Ward Boundaries.

This setting will ensure that the result of the analysis is clipped to the outer boundary of the city.

k For Classify By, accept the default Equal Interval method with 10 classes.




l For Output Area Units, accept the default of Square Miles.


m For Result Layer Name, type **Trash Missed Collection Locations Density_<your first and last name>**.


Note: If you run the analysis multiple times, you will need to give a unique result layer name each time.


The Save Result In field defaults to your account name; you do not need to change this value.


n At the bottom of the Calculate Density pane, uncheck the box for Use Current Map Extent, as indicated in the following graphic.


 Calculate Density  


1 Choose point or line layer from which to calculate density 


2 Use a count field (optional) 


Options 



Search Distance 


Clip output to 




Classify by 


Number of classes 

Output area units 

3 Result layer name 

Save result in

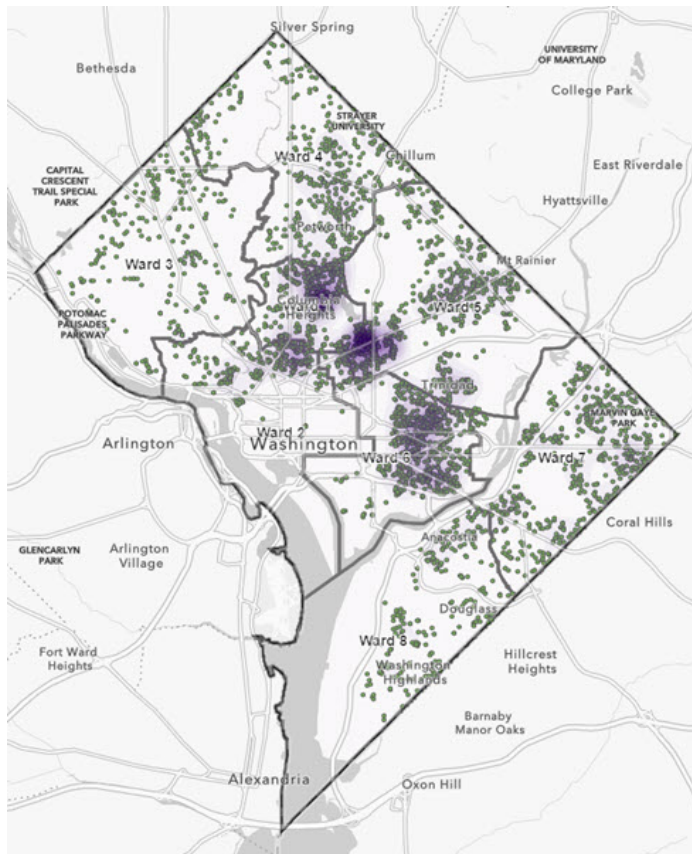
☐ Use current map extent 

RUN ANALYSIS

For this analysis, you want to analyze all records in the Missed Collection Locations layer, so you will uncheck the box.

- o Click Run Analysis.

Note: If your analysis is not complete after 4 minutes, try saving the map and refreshing the page. You can also exit ArcGIS Online and try again later.



Step 10o: Calculate density of features.

A new result layer with the name that you assigned appears in the Contents pane. The map display updates to show the density of missed trash collection reports.

- p To more clearly see the density layer, turn off the Missed Collection Locations layer.

The map shows spatial patterns representing the density of reported missed trash collection across the city. The darkest purple areas indicate the areas with the highest density of missed collections. Ward 1 and Ward 5 have the highest density of missed collection reports. The reports of missed trash collection reports are concentrated in a small area of Ward 5. In Ward 6, the reports are spread out over a larger area.


- Step 11: Filter layer data to limit feature display

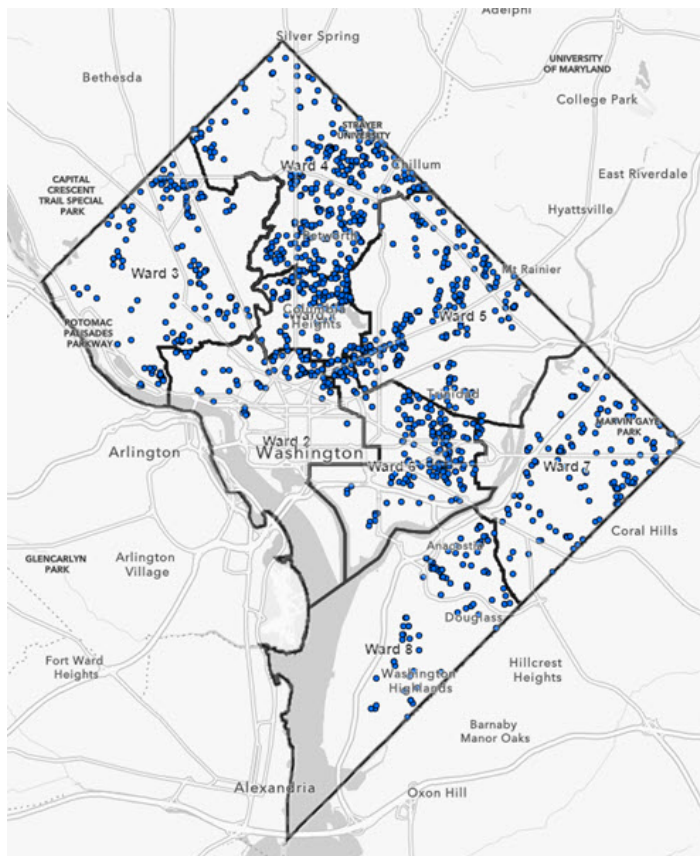
You want to compare the density of the missed trash collection reports to the missed recycling collection reports. In this step, you will edit your filter to view only missed recycling collection locations.

- If necessary, zoom out to view the full study area.
- Turn off the Trash Missed Collection Locations Density layer.
- Turn on the Missed Collection Locations layer.
- Edit the data filter on the Missed Collection Locations layer to display only missed recycling collection locations.

- Hint

First, try editing the filter on your own. If needed, the detailed steps are as follows:

- Point to or click the Missed Collection Locations layer name and click the Filter button .
- In the Filter dialog box, click the Edit tab.
- In the third field, select the Unique option, if necessary, and choose Recycling Collection - Missed from the drop-down list.
- Click Apply Filter.




Step 11d: Filter layer data to limit feature display.

The map now only shows points that represent missed recycling collection locations.

Again, seeing patterns from just the points is difficult, so you will perform another density analysis.

- Step 12: Calculate density of features

In this step, you will calculate the density of missed recycling collection locations. You will use the same approach that you used for the missed trash collection locations. Because you already filtered the data, the analysis will only show the density of missed recycling collection locations.

- In the Contents pane, point to or click the Missed Collection Locations layer name and click the Perform Analysis button .
- In the Perform Analysis pane, expand Analyze Patterns.
- Click Calculate Density.
- In the Calculate Density pane, for Choose Point Or Line Layer From Which To Calculate Density, confirm that Missed Collection Locations is selected.
- Accept the default of No Count Field.

Each point represents a single missed recycling collection, and there are not multiple missed collections at any one point.

- Expand Options.
- For Clip Output To, choose Ward Boundaries.

This setting will ensure that the result of the analysis is clipped to the boundary of the city.

- For Classify By, accept the default Equal Interval method with 10 classes.
- For Output Area Units, accept the default of Square Miles.
- For Result Layer Name, type **Recycling Missed Collection Locations Density_<your first and last name>**.

Note: If you run the analysis multiple times, you will need to provide a unique result layer name each time.

The Save Result In field defaults to your account name; you do not need to change this value.

- k At the bottom of the Calculate Density pane, uncheck the box for Use Current Map Extent, as indicated in the following graphic.

Calculate Density

1 Choose point or line layer from which to calculate density
Missed Collection Locations

2 Use a count field (optional)
No count field

Options

Search Distance
Search Distance Miles

Clip output to
Ward Boundaries

Classify by
Equal Interval

Number of classes
10

Output area units
Square Miles

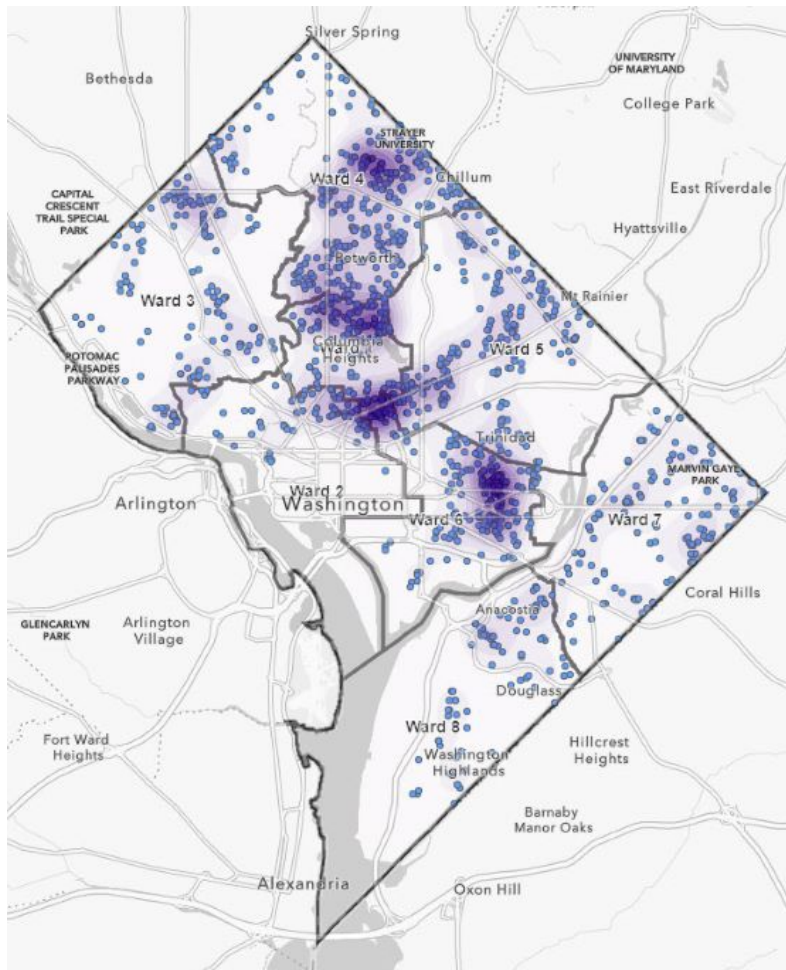
3 Result layer name
Recycling Missed Collection Locations Density

Save result in username_analyze

☐ Use current map extent [Show credits](#)

- l Click Run Analysis.

Note: If your analysis is not complete after 4 minutes, try saving the map and refreshing the page. You can also exit ArcGIS Online and try again later.



Step 12: Calculate density of features.

A new result layer with the name that you assigned appears in the Contents pane. The map display updates to show the density of missed recycling collection locations.

- m To more clearly see the density layer, turn off the Missed Collection Locations layer.

There are areas of higher missed recycling collection density in Ward 1, Ward 4, and Ward 6.

The darkest purple class represents areas with the highest incidence of missed recycling collection per square mile over a three-month period. The areas with darker purple would be candidates for increased resource allocation. Performing density analysis was required to determine these locations. You could not have identified these locations by looking at the attribute information.

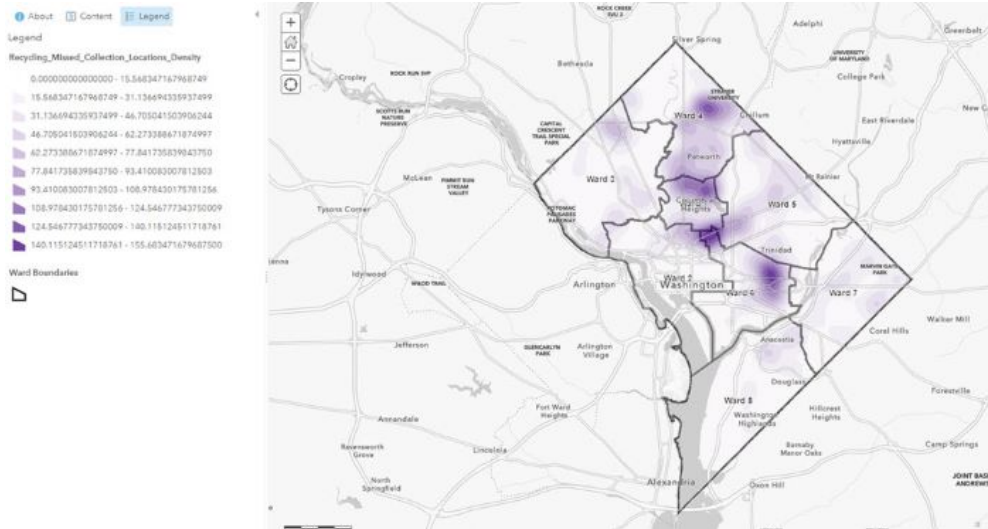
- Step 13: Compare visual and data patterns

You have created two layers to visualize the density. In this step, you will examine the class values for missed trash and recycling locations to determine which type is denser.

- a View the map legend.

- Hint

At the top of the Contents pane, click the Legend button .

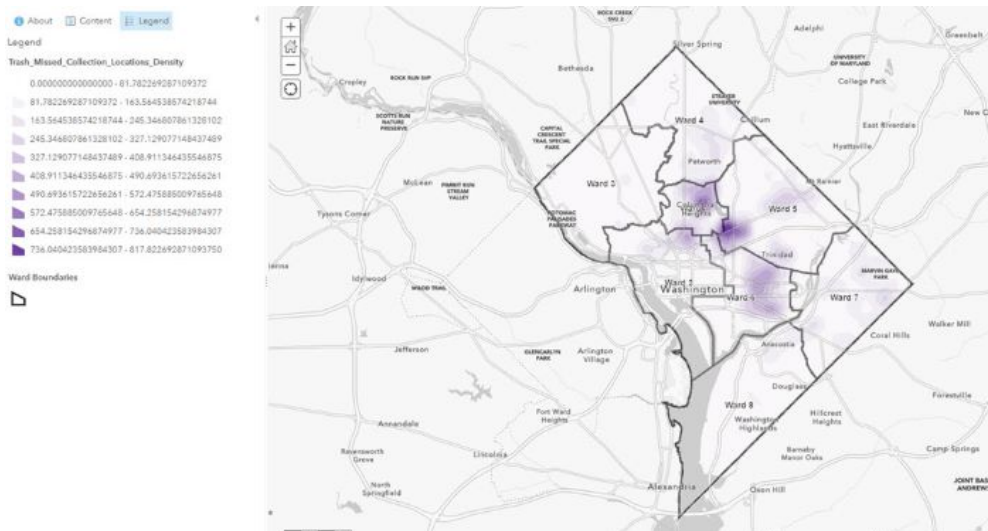


Step 13a: Compare visual and data patterns.

- b Notice that the density values are between 0 and 155 missed collections per square mile.

Next, you will examine the range of density and the different areas of density represented for the missed trash collection locations.

- c In the Contents pane, turn off the Recycling Missed Collection Locations Density layer and turn on the Trash Missed Collection Locations Density layer.
- d View the map legend.



Step 13d: Compare visual and data patterns.

Notice that the density values are between 0 and 817 missed collections per square mile.



When you examine the range of density values and different areas of density represented on the map, what spatial and data patterns do you see for each type of missed collection?

- Answer

Missed trash collection reports tend to be concentrated in a few locations, whereas missed recycling collection reports are distributed across the city. The highest class for missed trash collection represents about 736-817 missed collections per square mile, whereas the highest class for missed recycling collection represents about 140-155 missed collections per square mile.

- e On the ribbon above the map, click Save and choose Save.
- f Close your private or incognito web browser window.

- Step 14: Conclusion

In this exercise, you looked at an example of the type of problem that can be addressed by applying density analysis to detect and quantify patterns. Next, you will review how each step of the spatial analysis approach was used throughout this exercise.

**Ask questions**

In this exercise, the following spatial question was asked:

Where does the Department of Public Works most frequently miss the collection of trash and recycling in the area of interest?

Explore and prepare data

You determined a different basemap would be more appropriate and examined the attributes of the Missed Collections layer prior to analysis.

Analyze and model

In the exercise, you performed overlay analysis to create a layer that contains the missed collection points located within the ward boundaries. This analysis appended the corresponding ward attributes to the missed collection points. Next, you filtered the data by ward and missed collection type to show where missed trash collection occurs most frequently across the city. The final analysis was calculating the density of missed trash and recycling collection locations throughout the city.

Interpret results

After comparing the density results, you determined that there are different patterns for missed trash and recycling collection reports. The missed trash collection reports tend to be concentrated in a few locations, whereas missed recycling collection reports are distributed across the city.

Repeat or modify

For the analysis, you compared missed trash collections and missed recycling collections. This required you to repeat the calculate-density analysis.

Present results

This information is valuable and can be used to prioritize areas for improved trash and recycling collection. You can present the identified locations with higher incidence of missed collections to the Department of Public Works.

Make decisions

Using the analysis you provided, the Department of Public Works in Washington, DC, can determine where available funding can be most effectively used to allocate resources to these locations.

- a Save your map.
- b Close your private or incognito web browser window.