SD2005 Labs

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Preface

This is a Quarto book. To learn more about Quarto books visit https://quarto.org/docs/books.

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[1] 2
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Introduction

This is a book created from markdown and executable code.

See Knuth (1984) for additional discussion of literate programming.

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```

Summary

In summary, this book has no content whatsoever.

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[1] 2
```

Lab No 1: Getting Started with ArcGIS Online

This tutorial is inspired from ArcGIS Online Learning resources available at https://learn.arcgis.com/en/projects/get-started-with-arcgis-online/

Mapping Census Data for Emergency Planning

By the end of this lab, students will be able to: - Navigate and use the ArcGIS Online interface - Add and configure data layers from ArcGIS Living Atlas - Style demographic data using appropriate symbology - Filter data to focus on specific geographic areas - Apply visual effects to emphasize important data patterns - Create a professional web map for emergency planning purposes

Background

In this lab, you will create a web map to identify areas that may need additional evacuation assistance during emergencies. You will work with census data to identify households with limited vehicle access, which is crucial information for emergency planning and resource allocation.

Estimated time of completion: 45 Minutes

Part 1: Begin a Map

Step 1: Access ArcGIS Online

1. Sign in to ArcGISOnline, using your University Credentials.

2. On the ribbon, click the **Map** tab

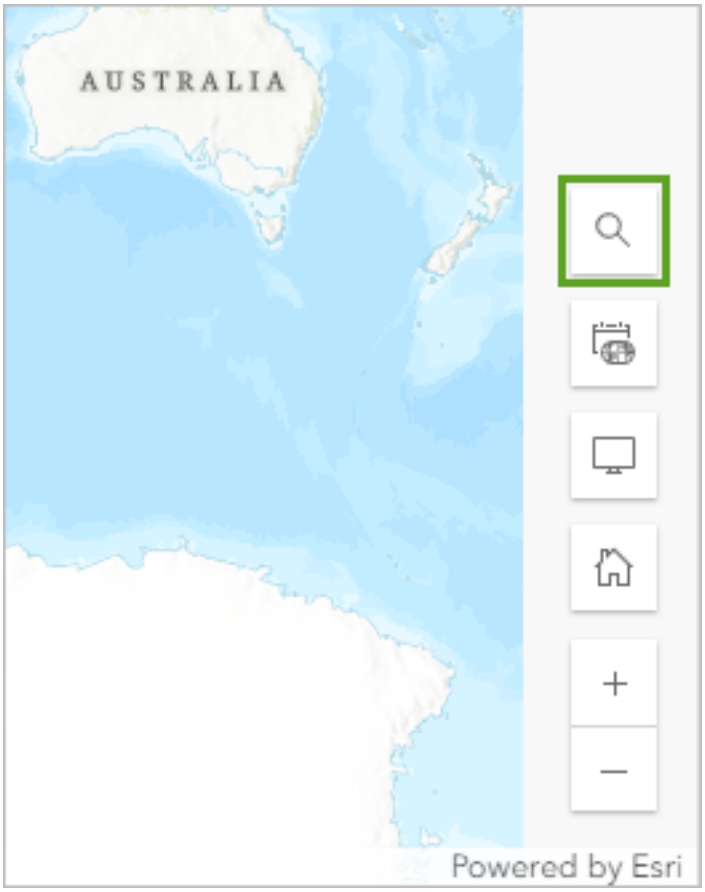
A default web map appears. Your map's appearance varies based on your account or organizational settings and your browser window size. It may show the United States, the world, or another extent.

The only layer on the map is the basemap, which provides geographic context such as water bodies and political boundaries. The default basemap is **Topographic**, but your map may have a different basemap depending on your organization's settings.

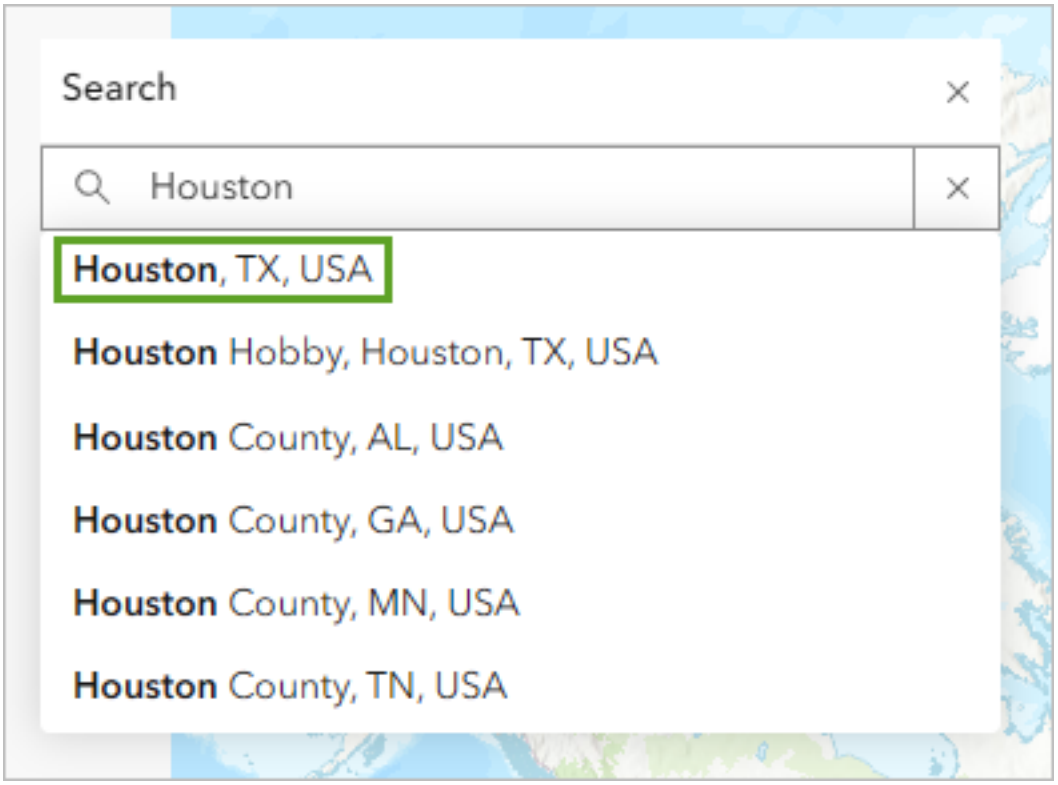
On either side of the map are the toolbars: - **Contents (dark) toolbar:** Allows you to manage and view map contents - **Settings (light) toolbar:** Provides tools and options for configuring and interacting with map layers - **Layers pane:** Lists the data you add to the map

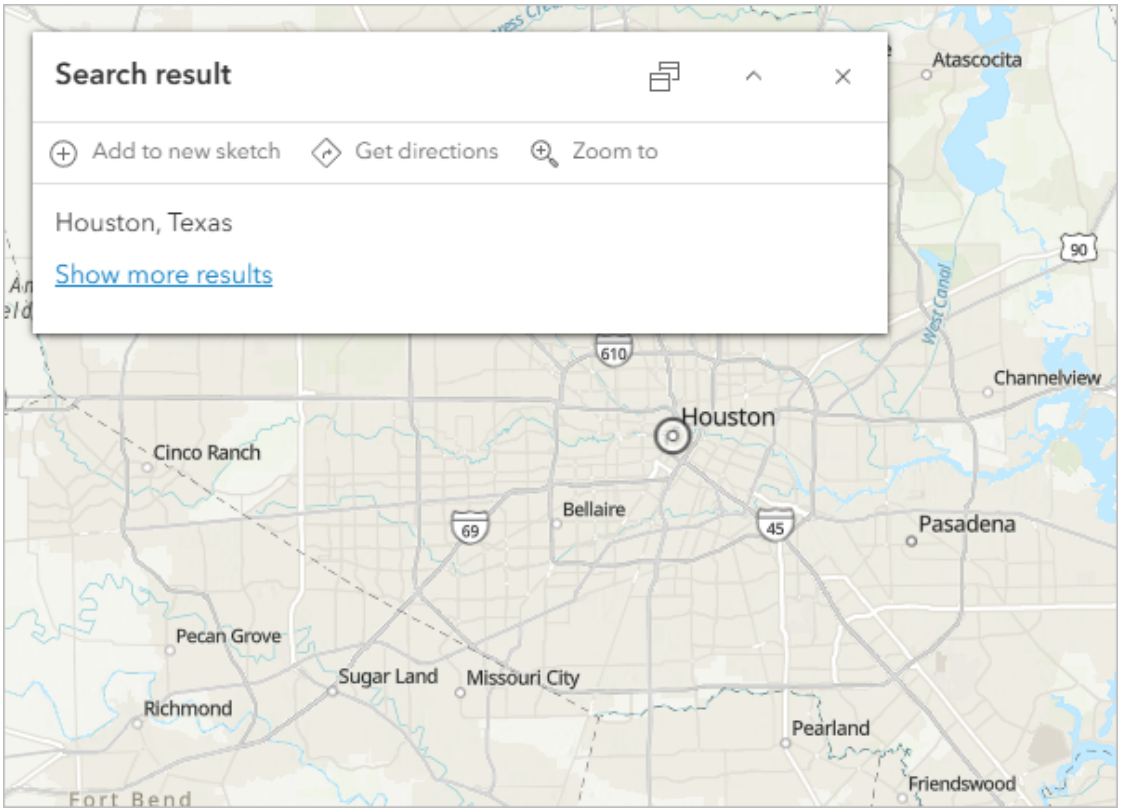
Step 2: Navigate to Your Area of Interest

1. On the map, at the bottom corner, click the **Search** button



2. In the search box, type `Houston` and choose **Houston, TX, USA** from the list of suggested locations


Search
Houston
Houston, TX, USA
Houston Hobby, Houston, TX, USA
Houston County, AL, USA
Houston County, GA, USA
Houston County, MN, USA
Houston County, TN, USA



3. Close the **Search** result window when the map zooms to your location

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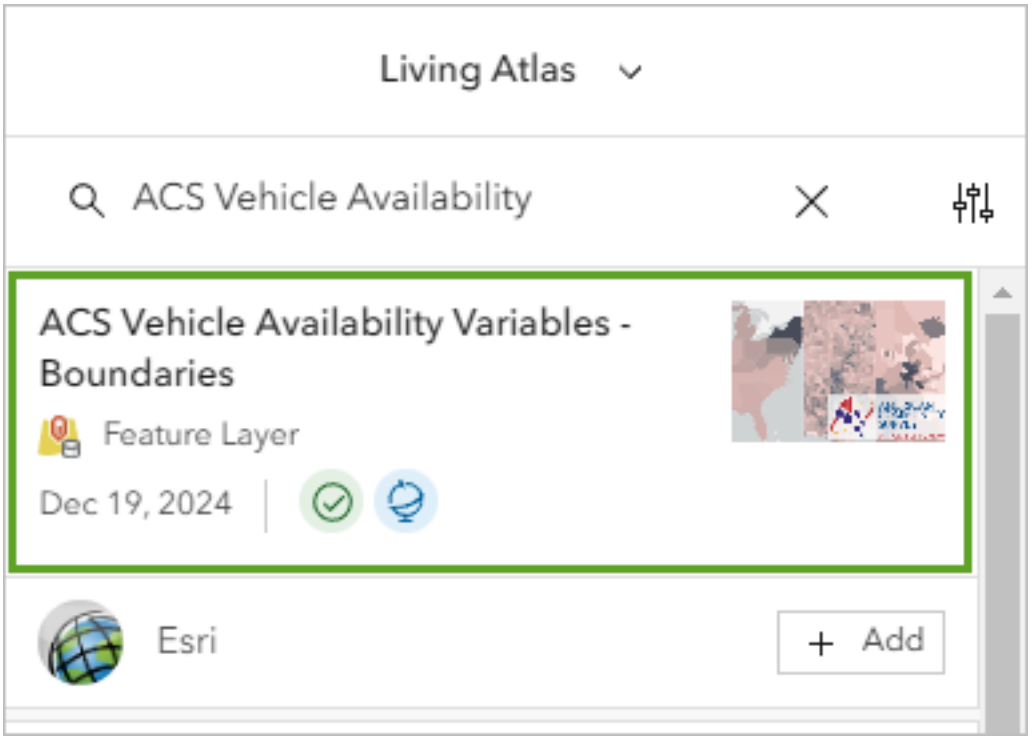
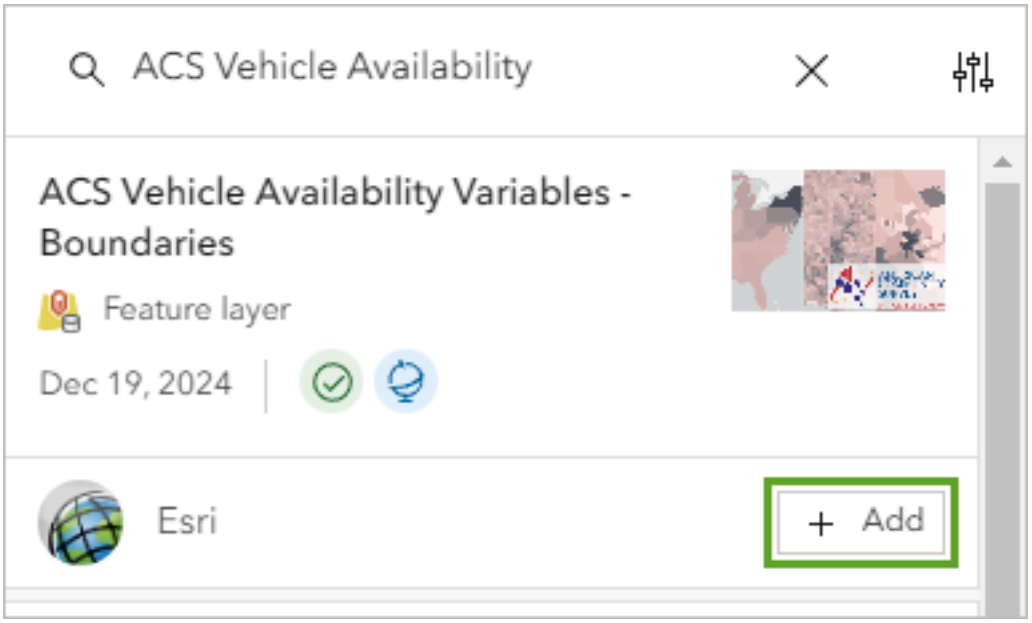
Part 2: Add a Layer

Layers contain geographic data that can be displayed on your map. To determine areas that may need evacuation assistance, you'll add a layer containing demographic data by census tract.

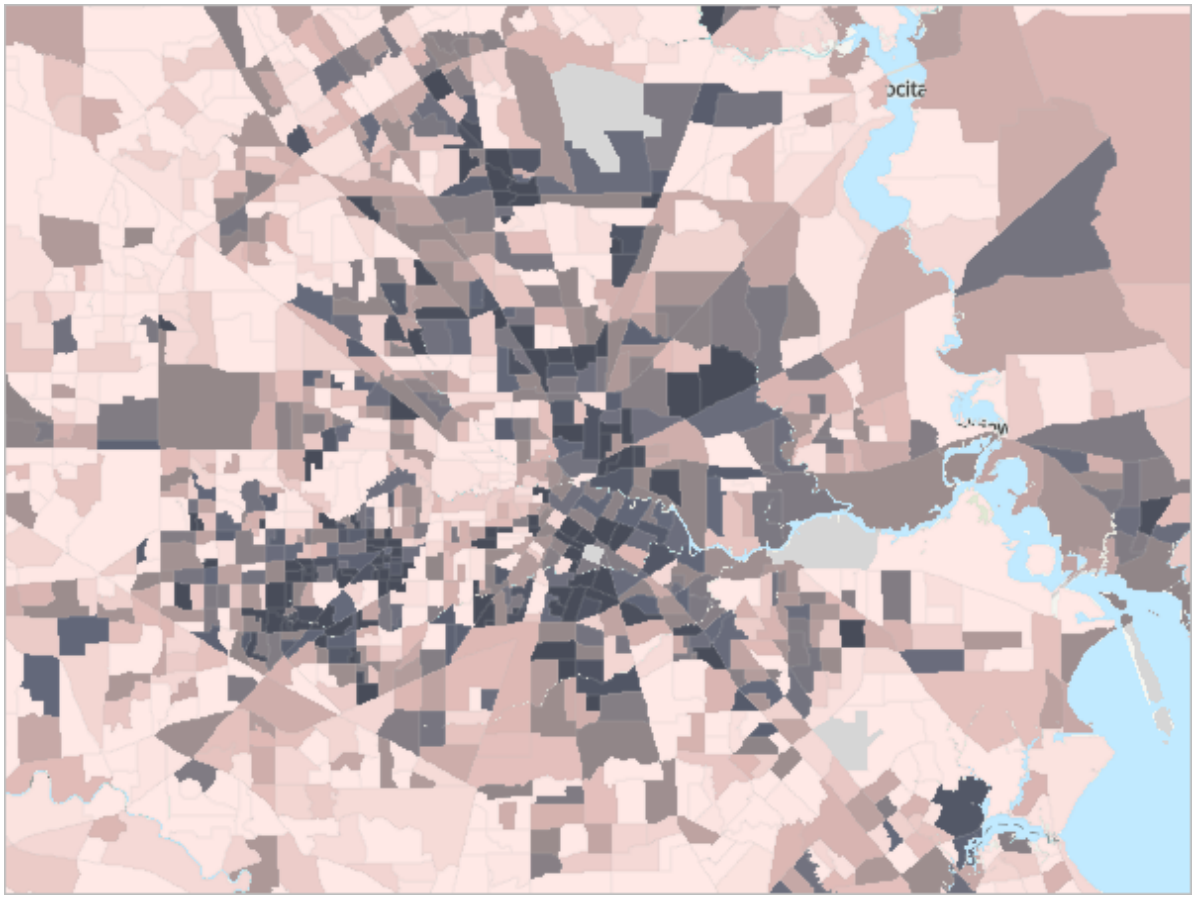
1. In the **Layers pane**, click **Add**
2. In the **Add layer pane**, click **My content** and choose **Living Atlas**
3. In the search box, type or paste `ACS Vehicle Availability`
4. Click the **ACS Vehicle Availability Variables - Boundaries** result



5. In the item pane, expand the **Description** section and read about the layer
6. Close the item pane
7. For the **ACS Vehicle Availability Variables - Boundaries** layer, click **Add**



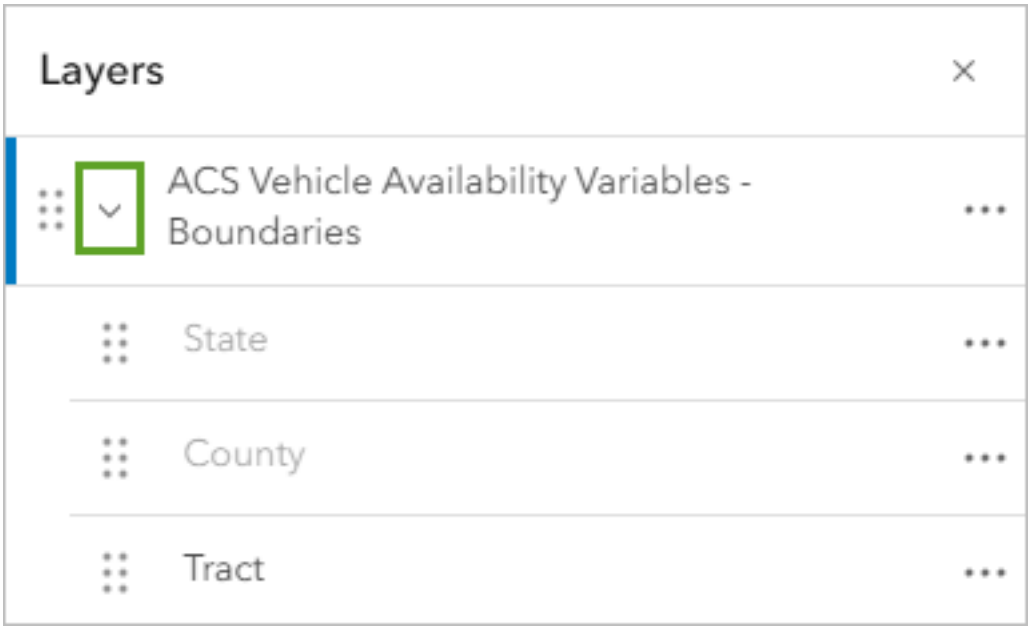
The layer is added to the map, styled to show the percentage of households with no vehicle available in each census tract. Darker areas have higher percentages of households without vehicle access.



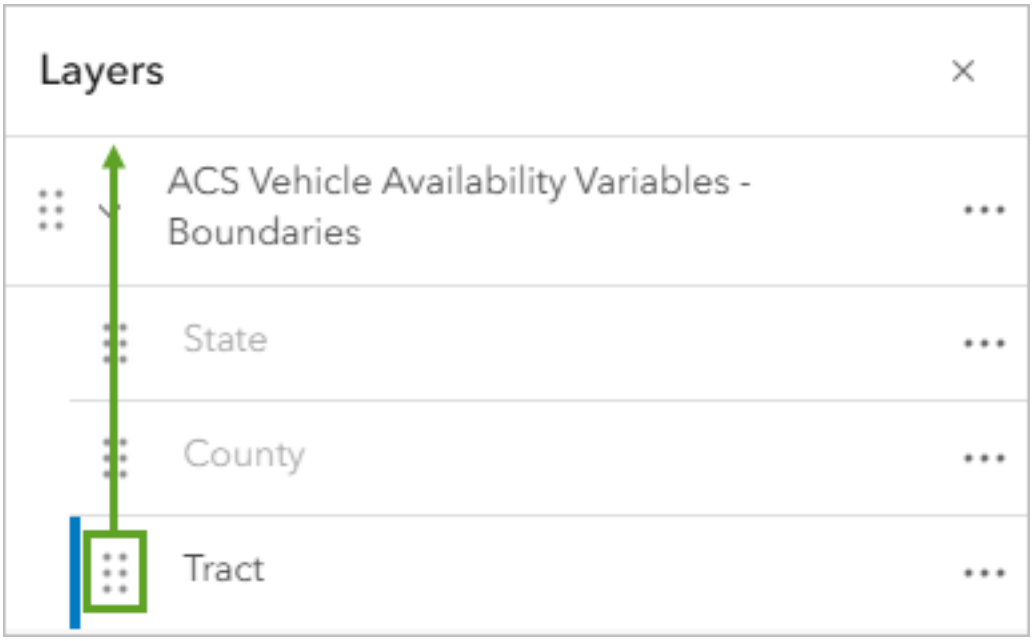
Step 1: Manage Layer Groups

1. At the top of the Add layer pane, click the **Back** button

2. In the **Layers pane**, expand the **ACS Vehicle Availability Variables - Boundaries** group



3. Drag the ==**Tract**== layer above the group

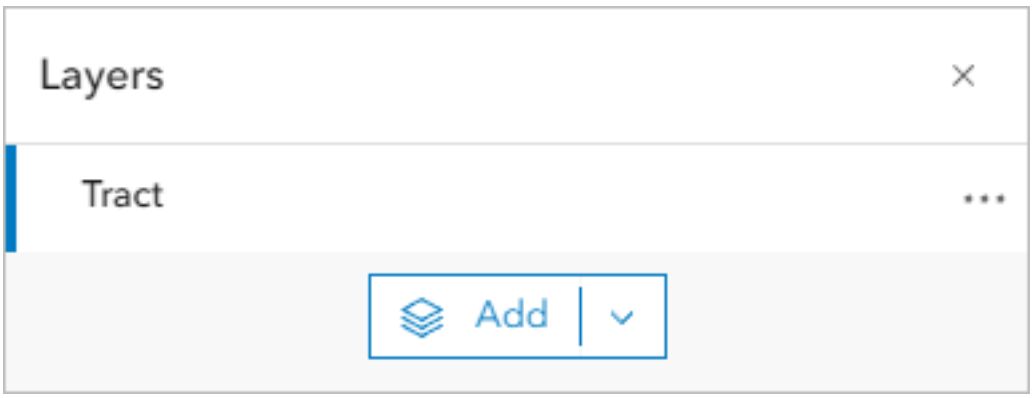


4. For the group, click the **Options** button and choose **Remove**

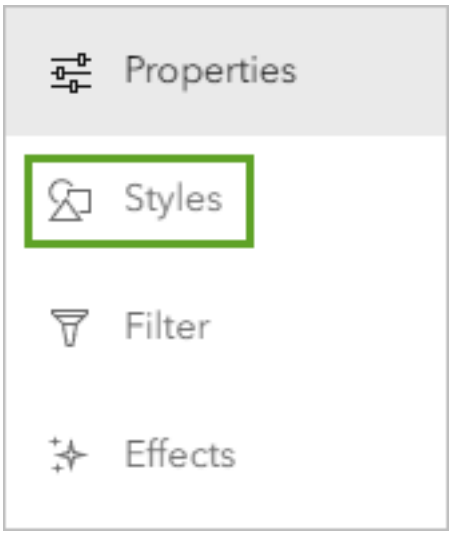
Part 3: Style Demographic Data

Step 1: Select Styling Options

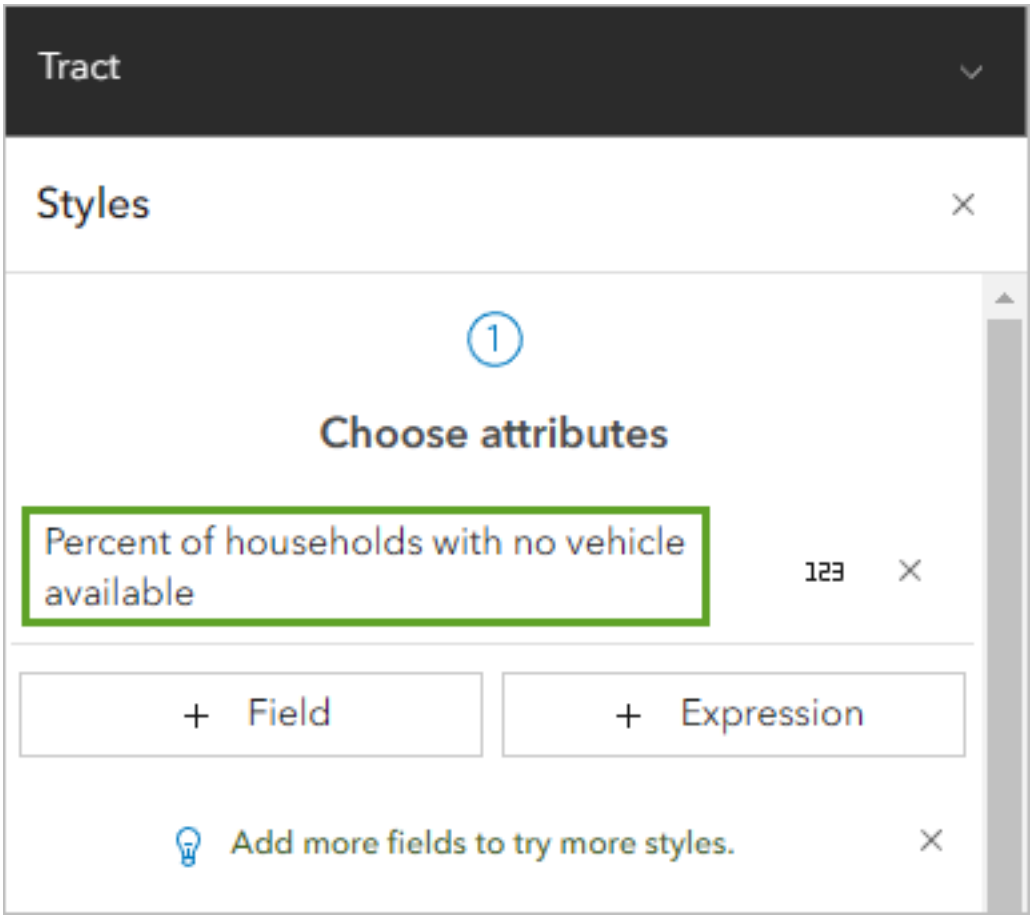
1. In the **Layers pane**, click the **Tract** layer to select it



2. On the **Settings toolbar**, click the **Styles** button



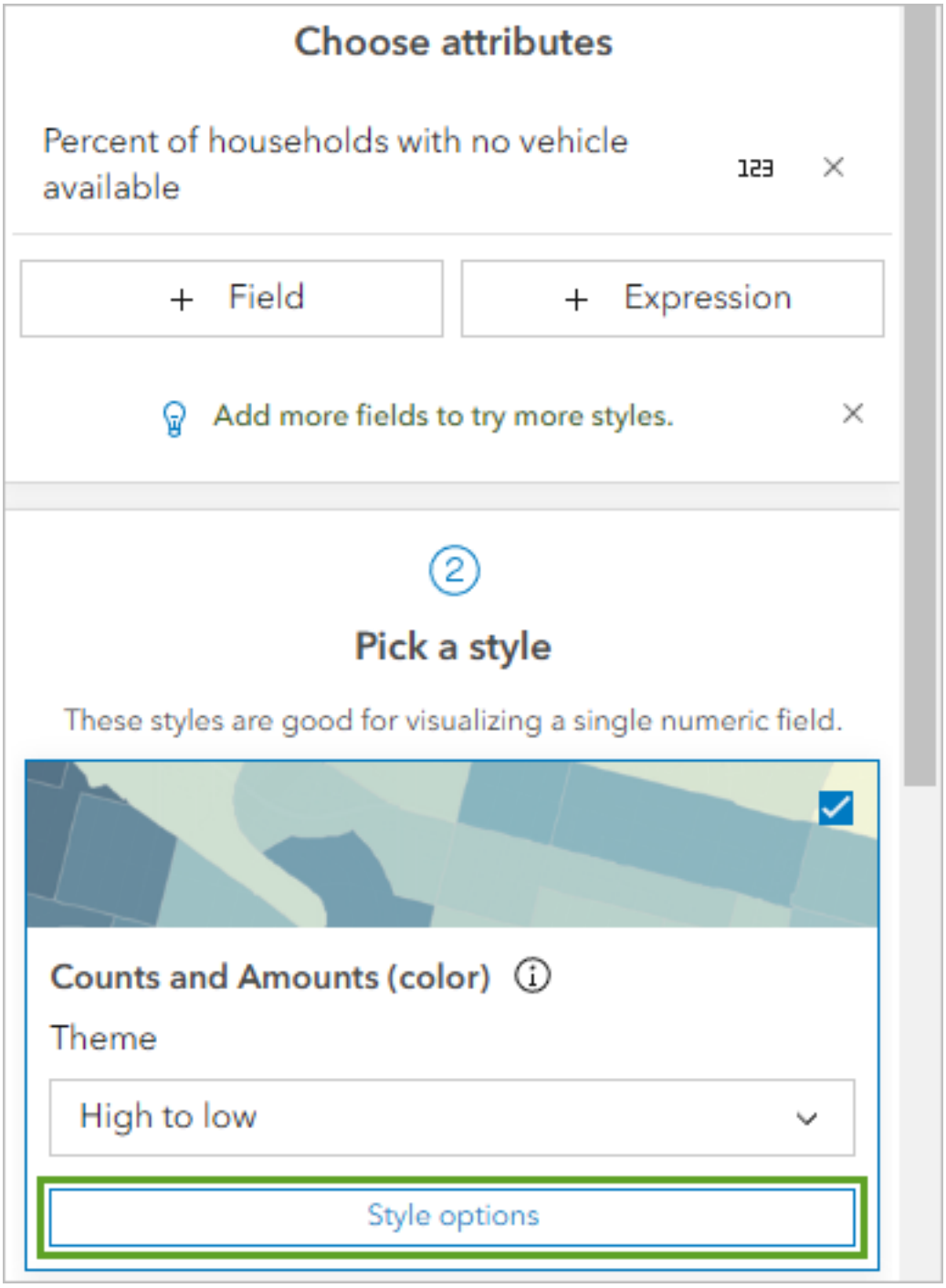
3. In the **Styles pane**, ensure **==Percent of households with no vehicle available==** is selected



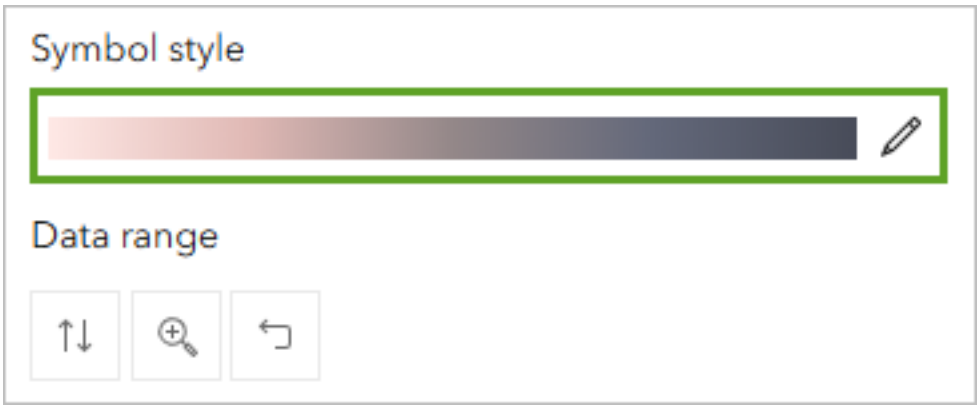
The list of available styles is determined by the data type. In this case, the options are for numeric data. The map shows the **Counts and Amounts (color)** style. The colors are based on the **High to low** theme. This style symbolizes each census tract with a different color based on the percentage of households without a vehicle. Census tracts with the lowest values have a light color, while those with the highest values have a dark color.

Step 2: Customize Symbol Style

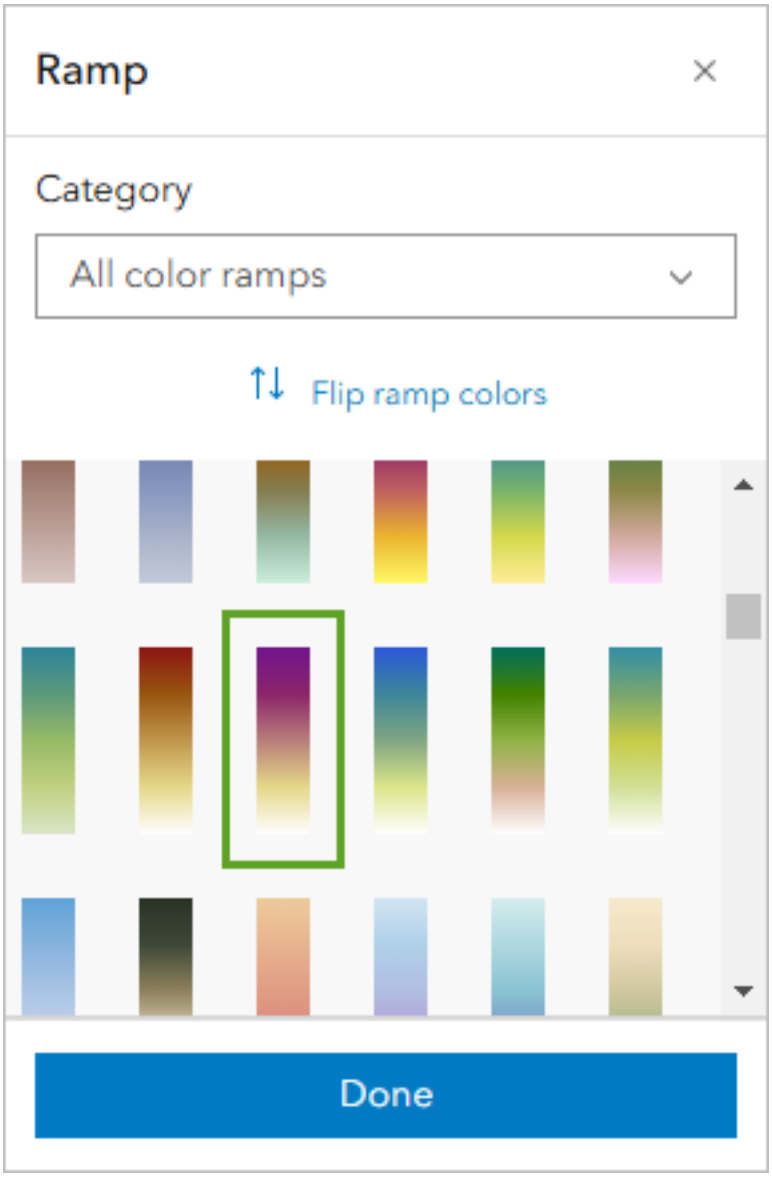
1. For **Pick a style**, on the **Counts and Amounts (color)** card, click **Style options**



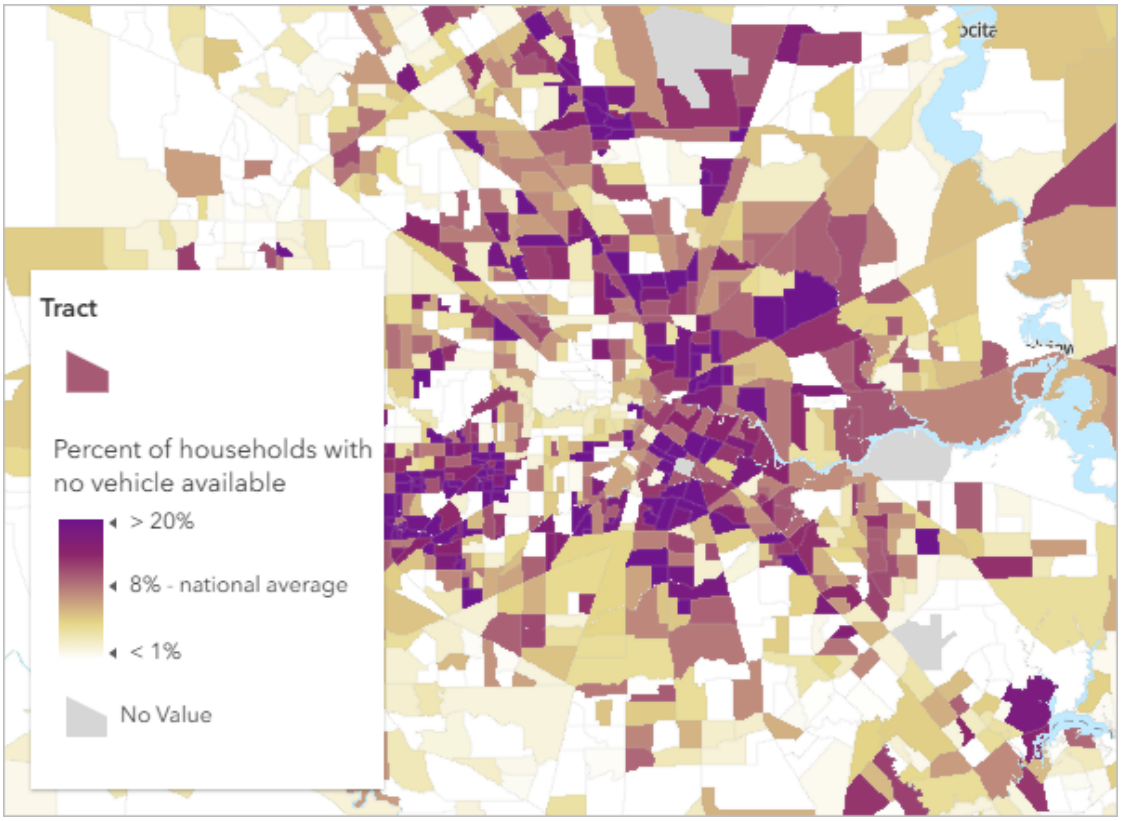
2. For **Symbol style**, click the color ramp



3. In the **Symbol style** window, for **Colors**, click the color ramp
4. In the **Ramp** window, choose **Purple 18**



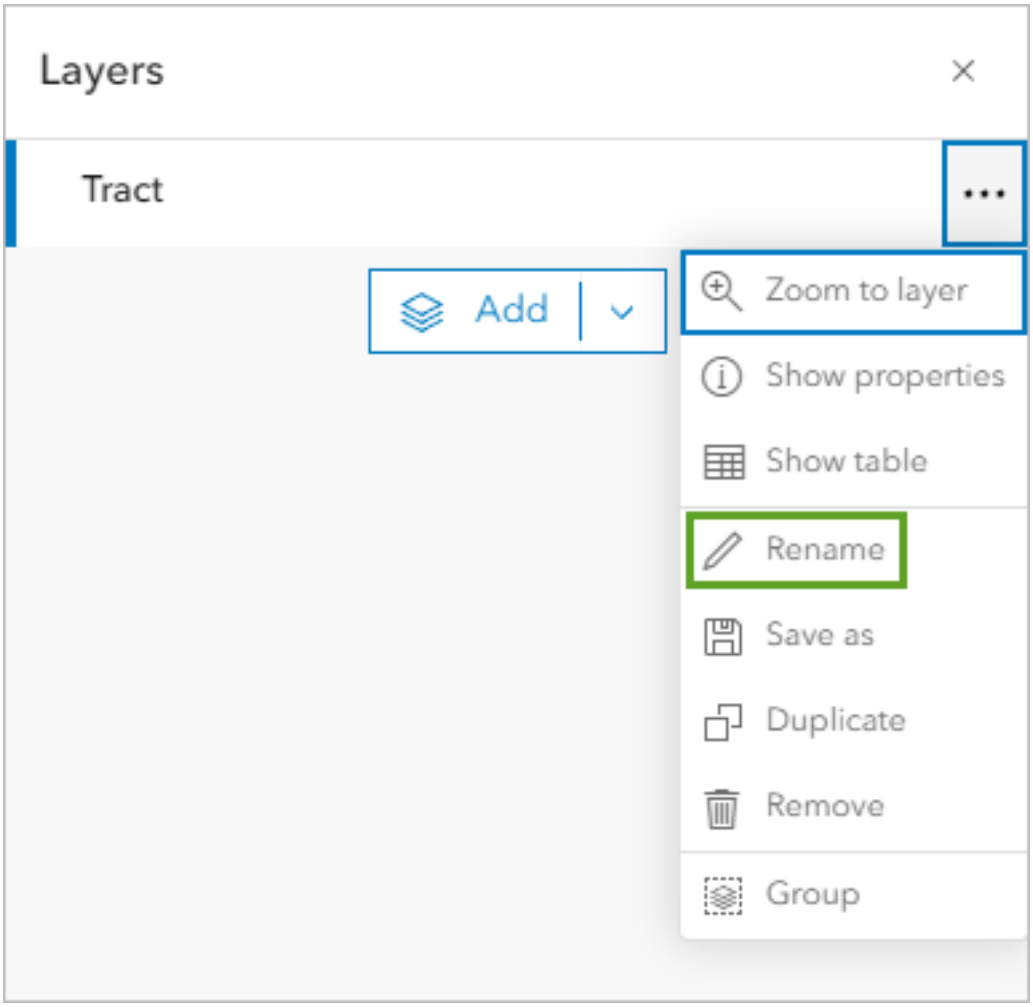
The new color ramp is applied to the map. Census tracts with high percentages are displayed in dark purple while low percentages are white.



5. If needed, click **Flip ramp colors** so high percentages show in dark purple
6. Click **Done** to close all style windows

Step 3: Rename the Layer

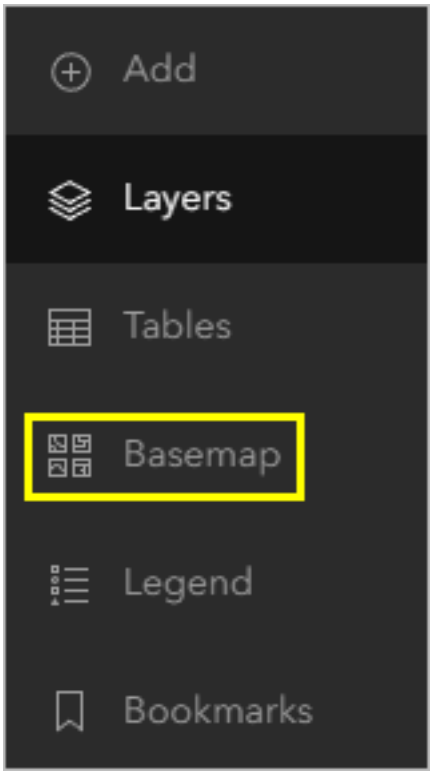
1. In the **Layers pane**, for the layer, click the **Options** button and choose **Rename**



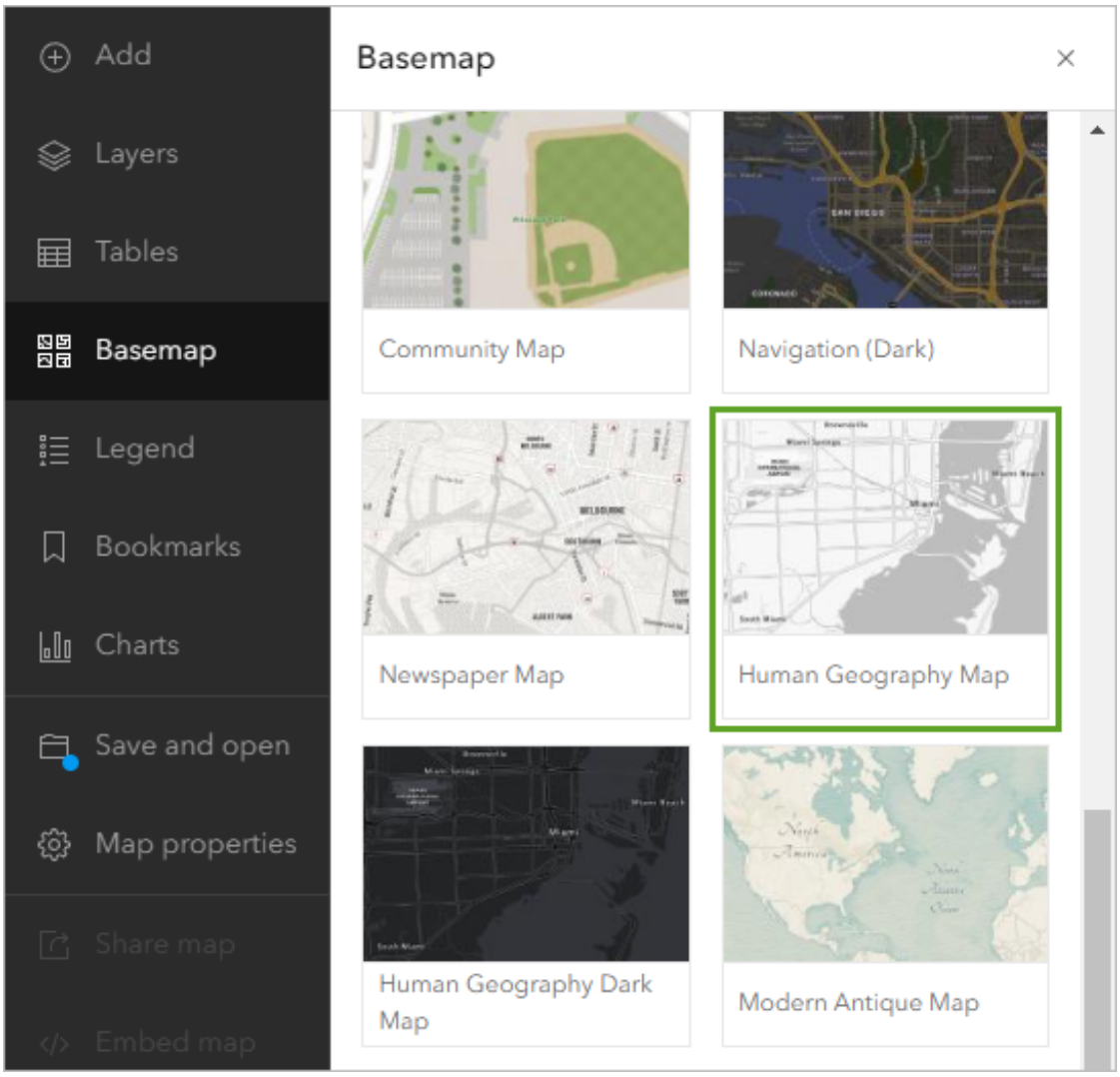
2. For **Title**, type **Percent of Households with No Vehicle Access**
3. Click **OK**

Part 4: Change the Basemap

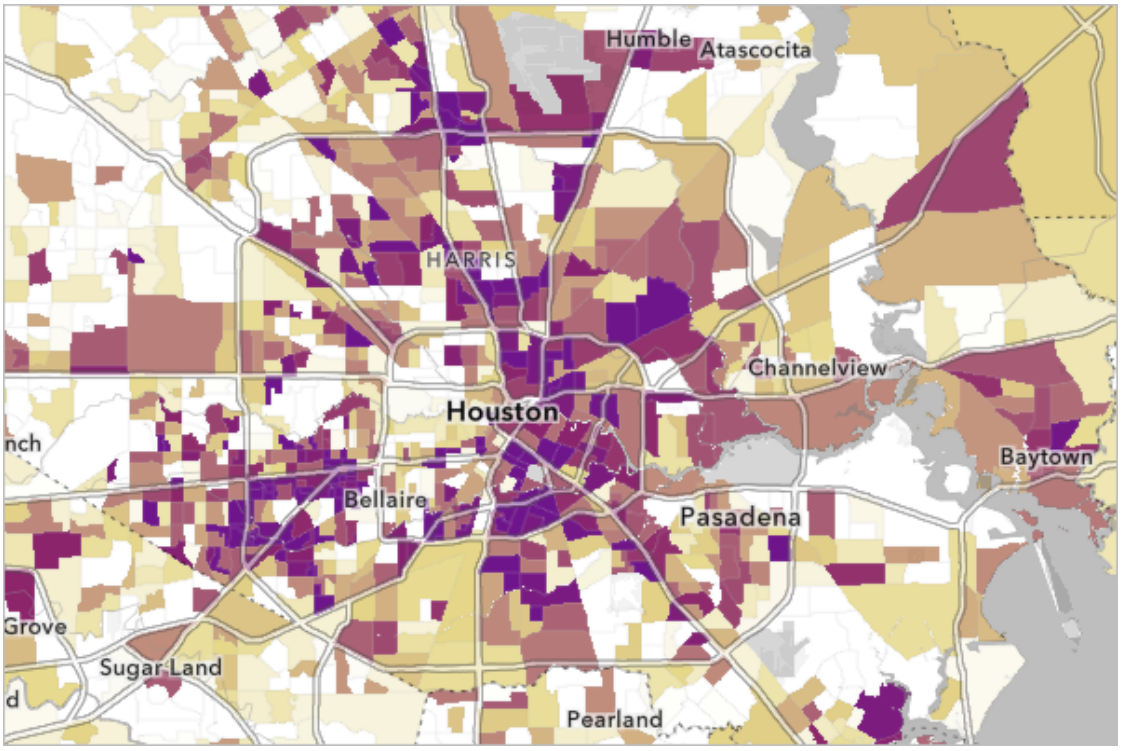
1. On the **Contents toolbar**, click **Basemap**



2. In the **Basemap pane**, find and choose **Human Geography Map**



3. On the **Contents toolbar**, click **Layers** to return to the Layers pane

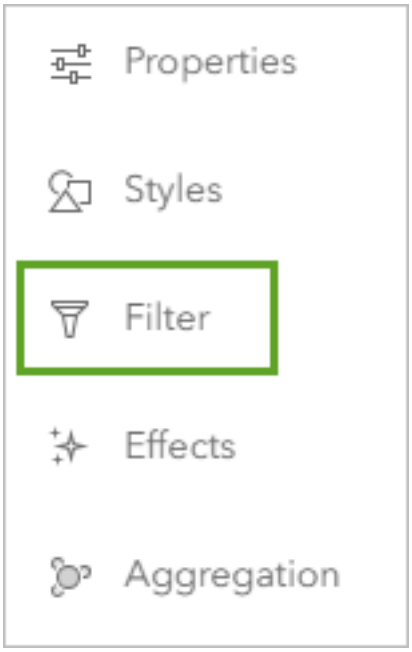


The new basemap shows labels and contextual information over the census data.

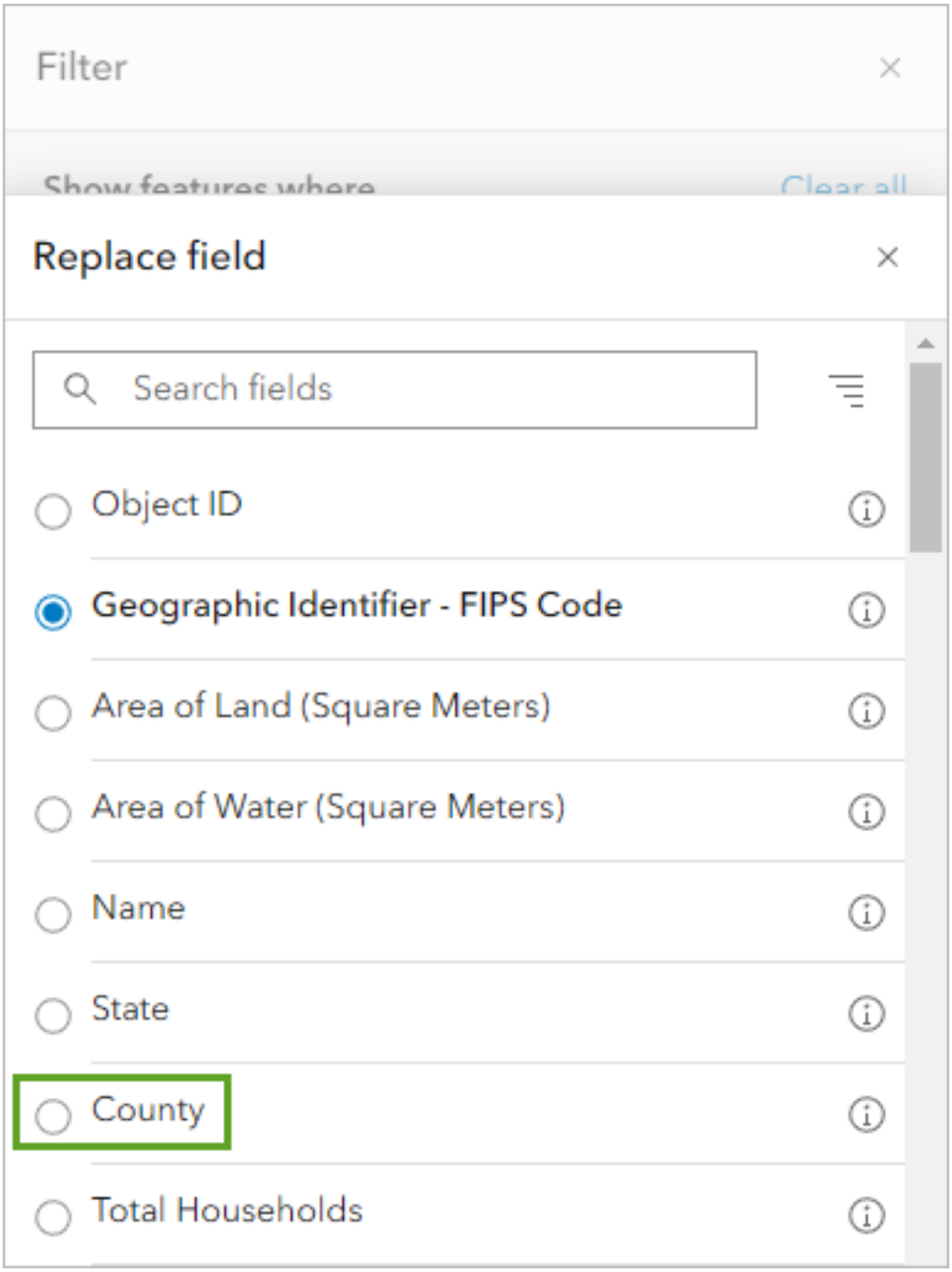
Part 5: Filter the Map

Step 1: Create a Geographic Filter

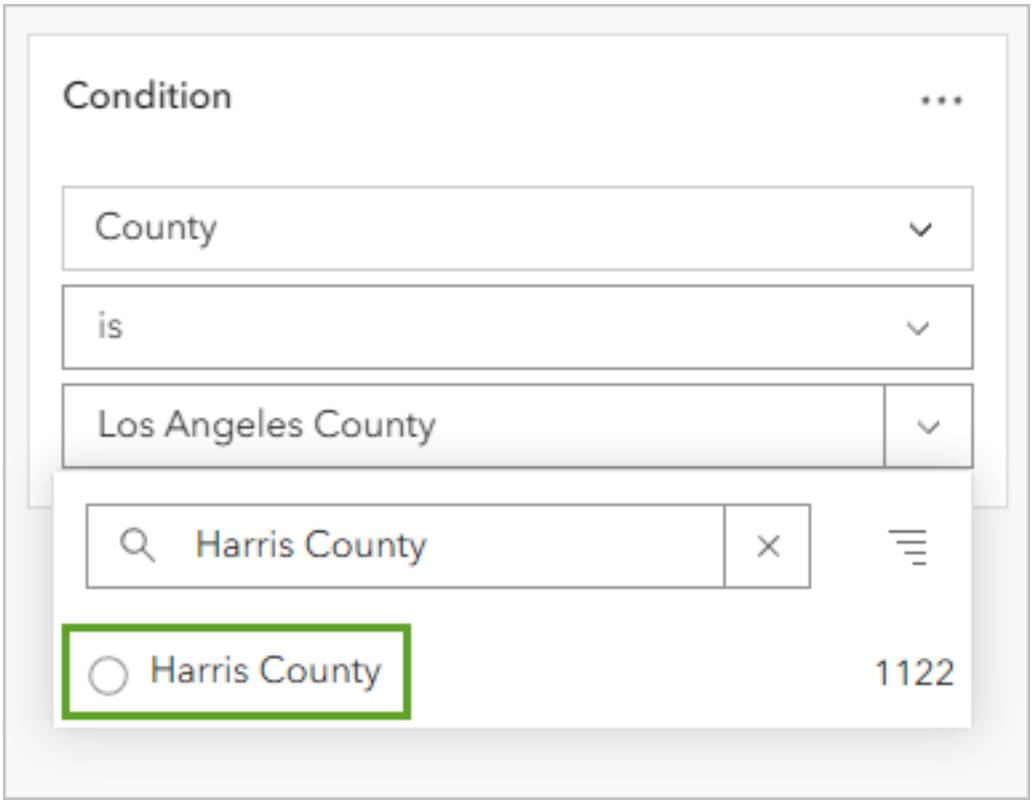
1. Ensure the **Percent of Households with No Vehicle Access** layer is selected
2. In the **Settings pane**, click **Filter**



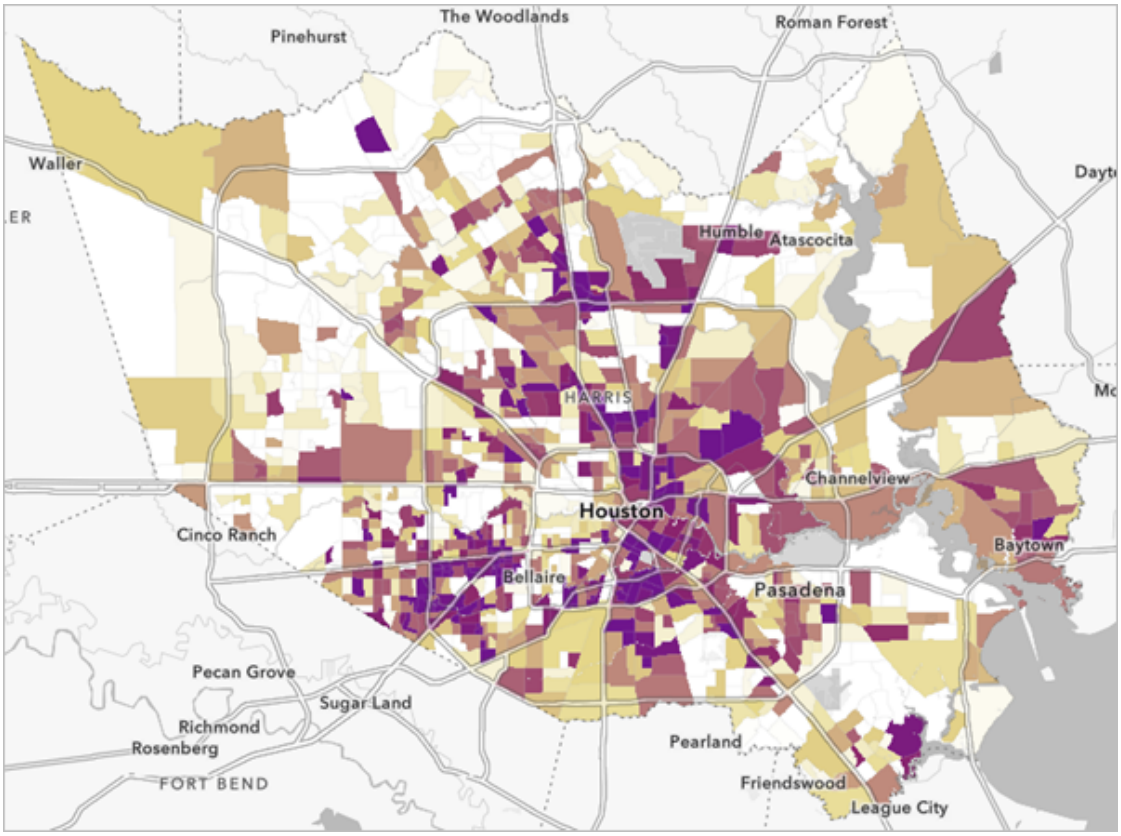
3. In the **Filter pane**, click **Add new**
4. Under **Condition**, click the first box and choose **==County==**



5. Leave the operator as **is**
6. For the third box, click the drop-down arrow, type **==Harris County==** and select it

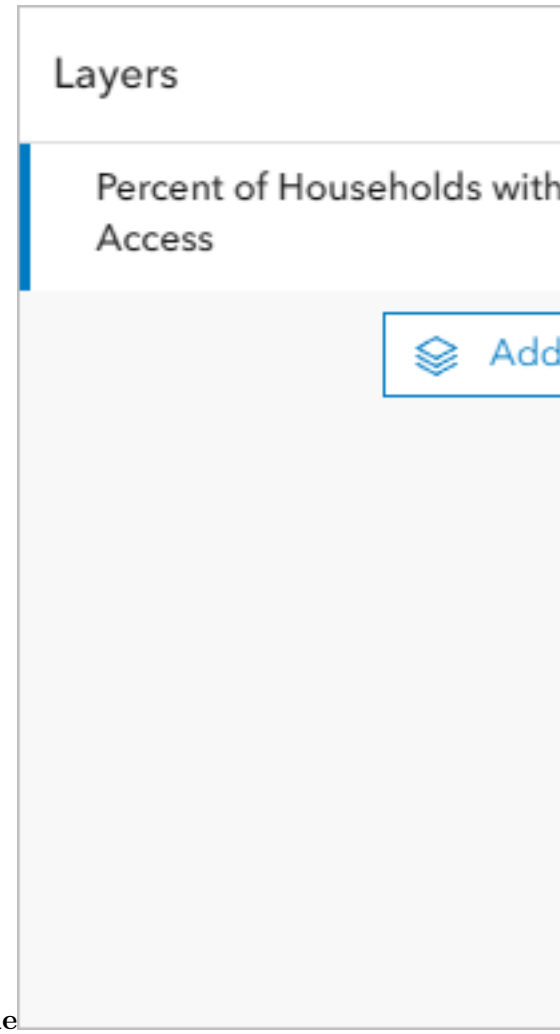


7. Click **Save** to apply the filter


The Woodlands
Pinehurst
Roman Forest
Waller
Humble
Atascocita
HARRIS
Channelview
Houston
Cinco Ranch
Baytown
Bellaire
Pasadena
Pecan Grove
Sugar Land
Richmond
Rosenberg
Pearland
FORT BEND
Friendswood
League City

Part 6: Emphasize the Top Tracts

Step 1: Examine the Attribute Table

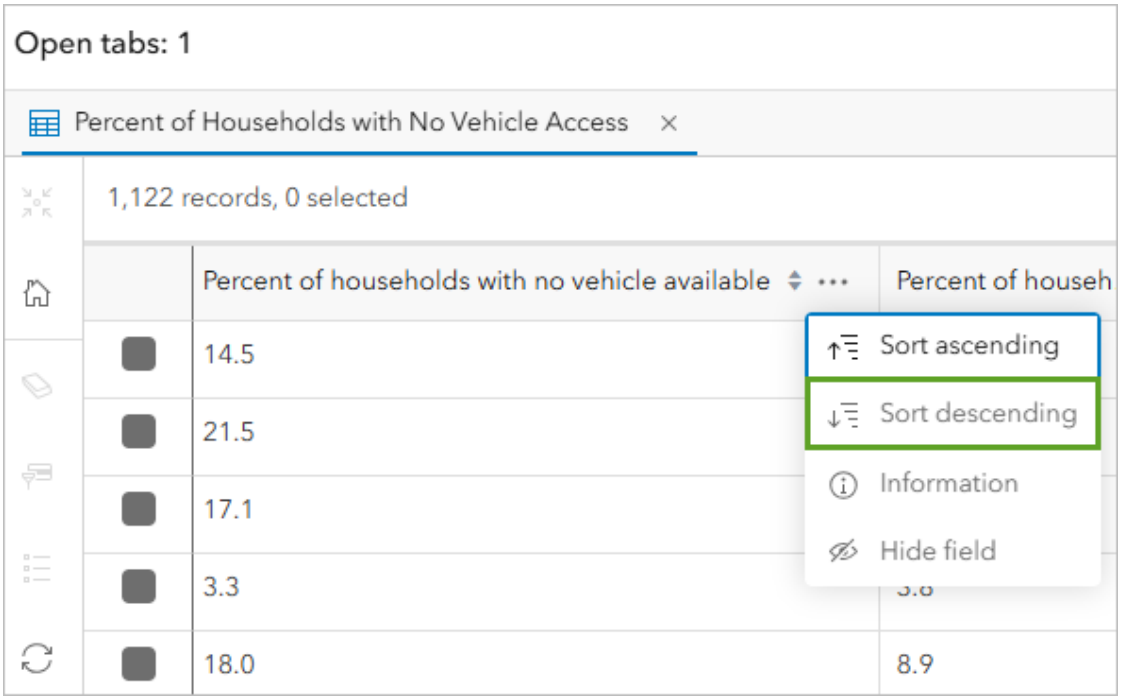


1. For the layer, click the **Options** button and choose **Show table**

   The layer's attribute table appears. The attribute table is a way of viewing all of the attributes that exist for each feature. Each row in the table represents a feature (in this case, a census tract area). The columns, or fields, provide information about the census tract features, such as the **County** attribute that you used to filter the data earlier.

   The top of the table indicates that there are 1,122 census tracts in Harris County.

2. Scroll right to find the **==Percent of households with no vehicle available==** column

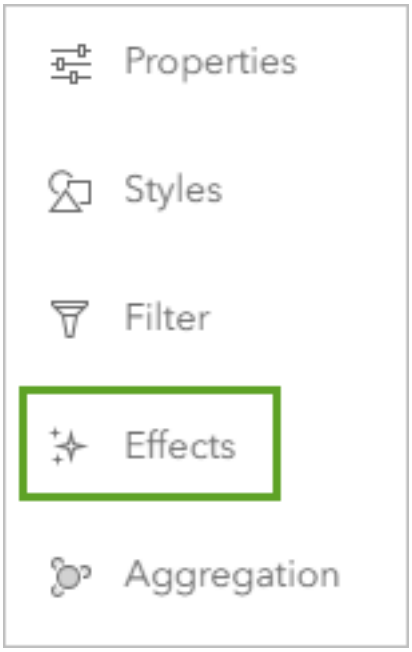


The table is sorted so that the **Percent of households with no vehicle available** field shows tracts in order of highest to lowest values. The highest value is 48.9 percent.

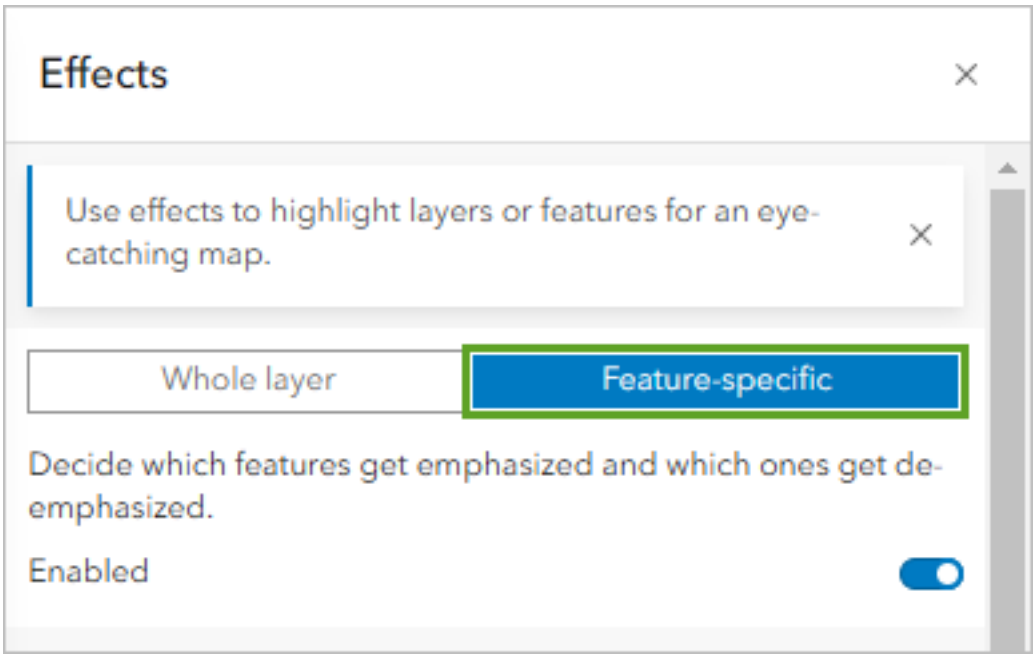
3. Click the **Menu** button for this column and choose **Sort descending**
4. Identify the 10 highest values in the table
5. Close the table

Step 2: Apply Visual Effects

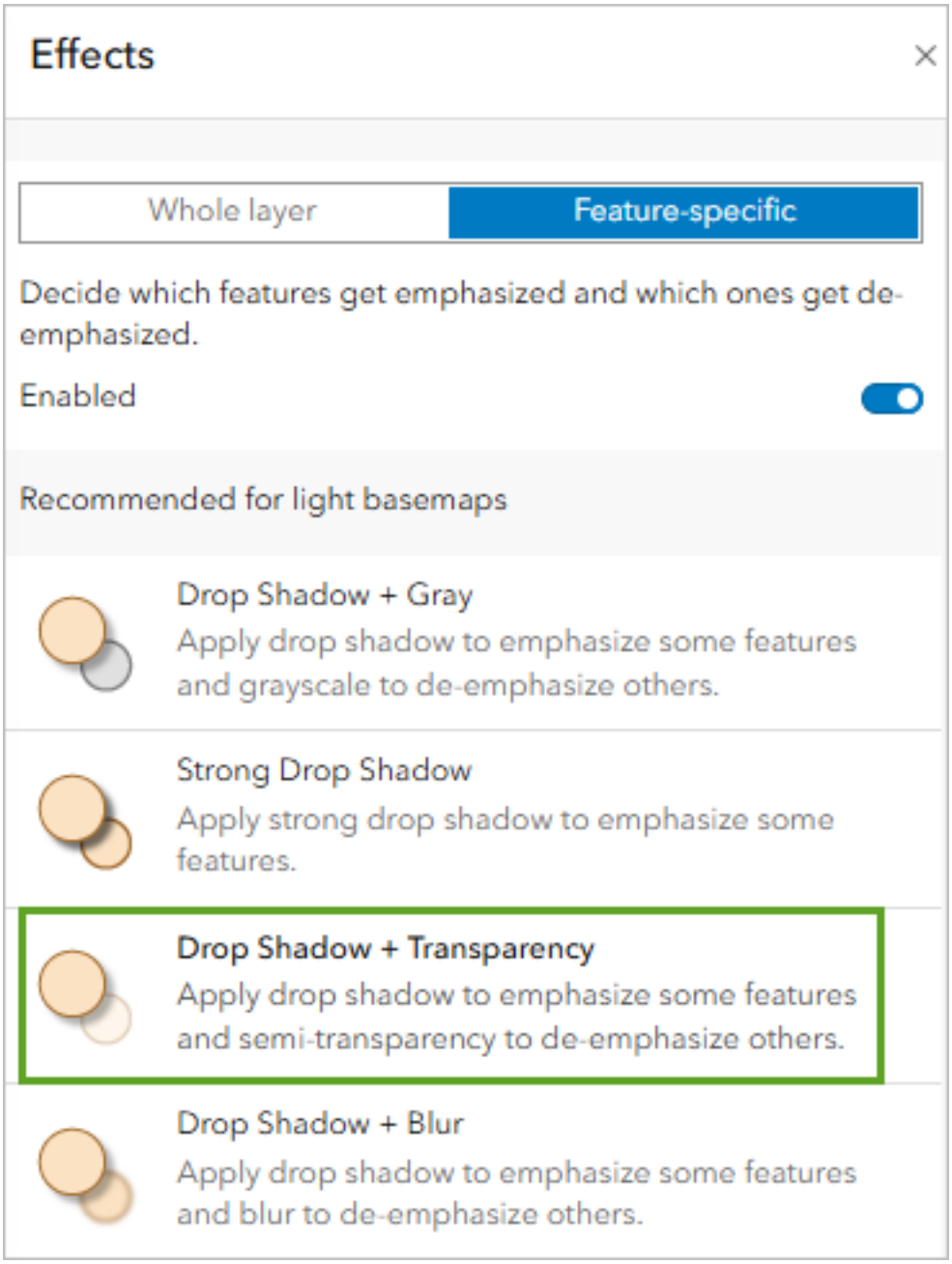
1. In the **Settings pane**, click the **Effects** button



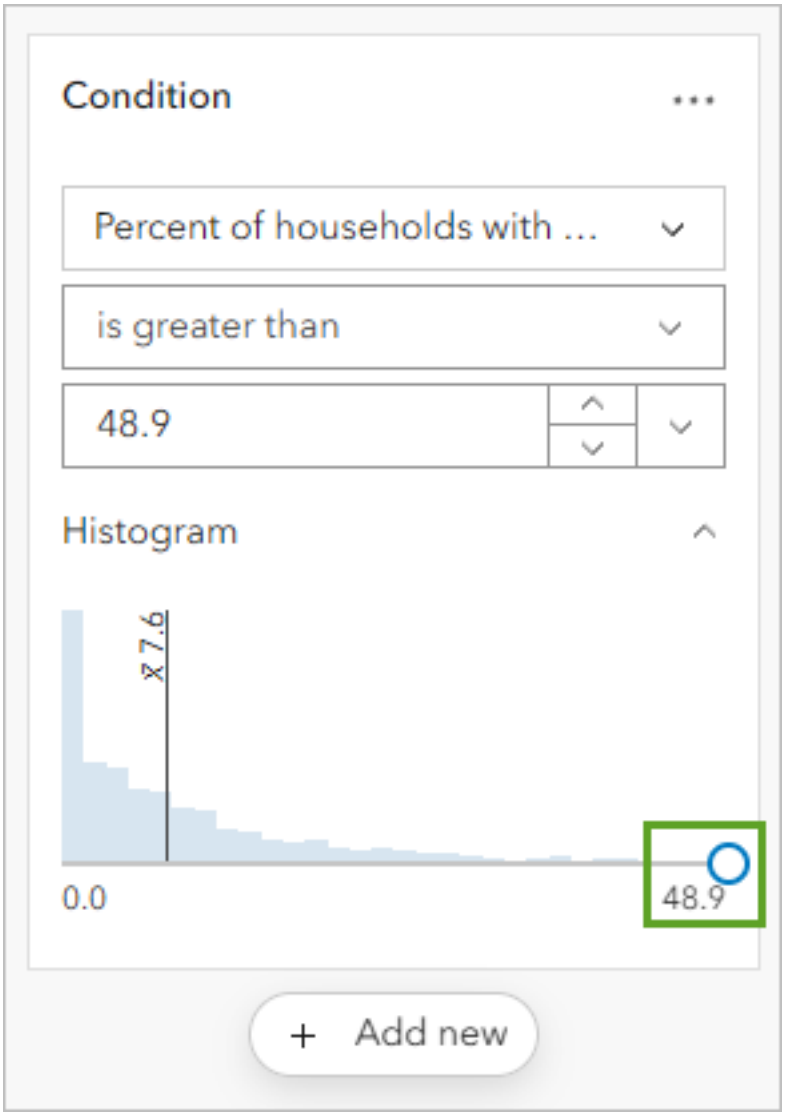
2. In the **Effects pane**, click **Feature-specific**



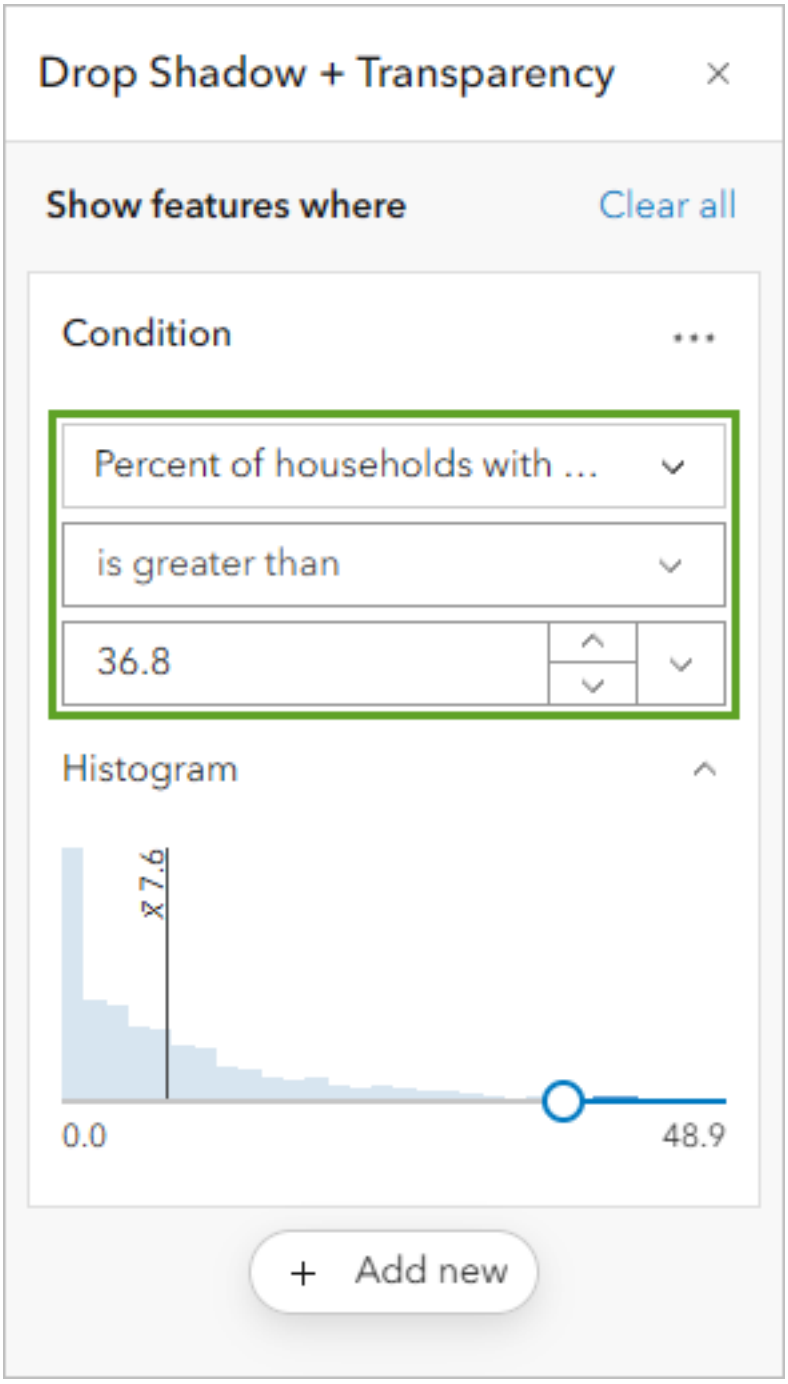
3. Click the **Drop Shadow + Transparency** effect

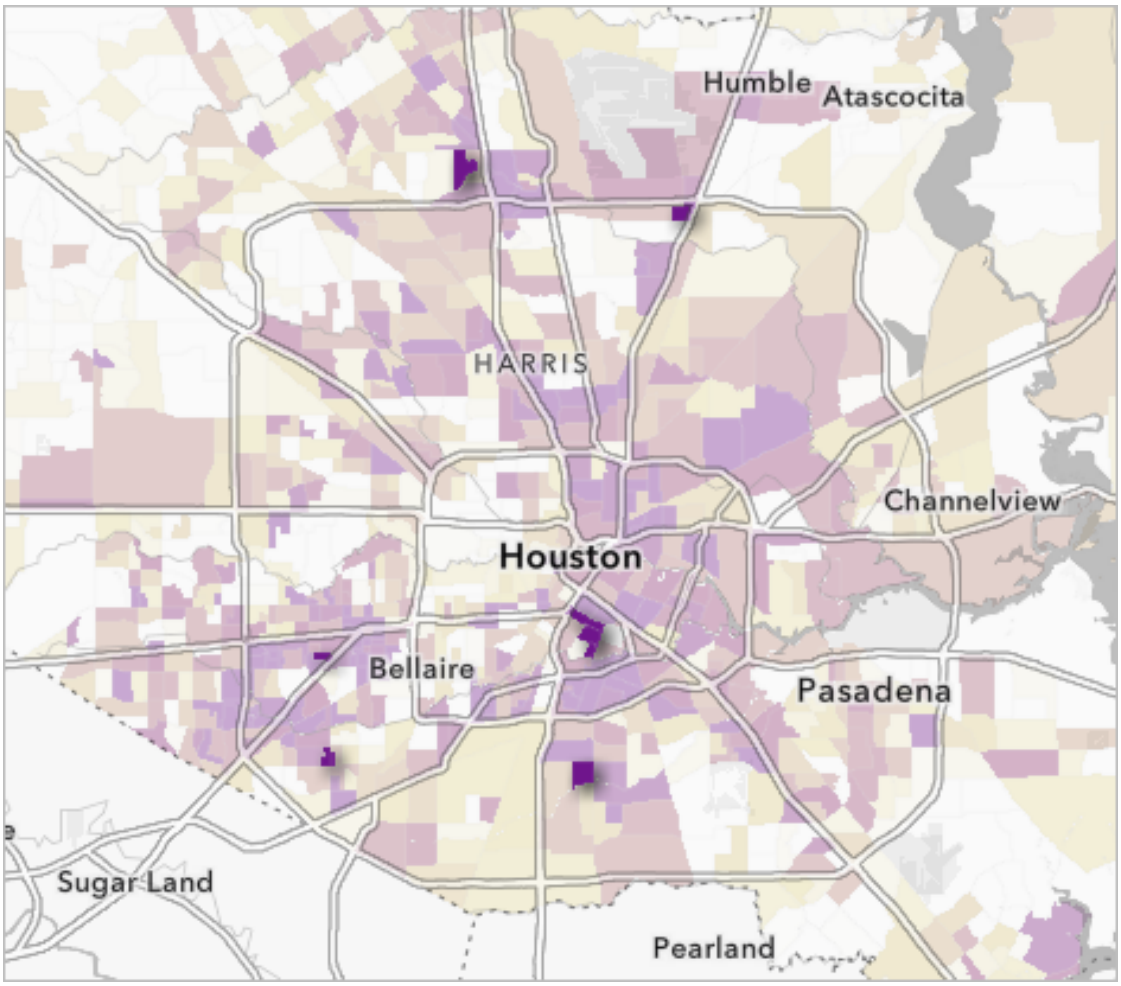


4. In the **Drop Shadow + Transparency** pane, drag the histogram slider to the **48.9** label. This will adjust the histogram slider to emphasize the top 10 tracts



5. Modify the logical expression to highlight areas above your identified threshold. Change the logical expression to read **Percent of households with no vehicle available is greater than 36.8**.


Drop Shadow + Transparency
Show features where
Clear all
Condition
Percent of households with ...
is greater than
36.8
Histogram
x̄ 7.6
0.0
48.9
+ Add new



6. Close the effects windows

Part 7: Final Documentation and Submission

Step 1: Save Your Map

1. On the **Contents toolbar**, click **Save and open** and choose **Save as**
2. For **Title**, type: **==Census tracts in Houston with low vehicle access==**
3. For **Tags**, add the following (press Enter after each):

- **==Hurricanes==**
- **==Evacuation Assistance==**
- **==Houston==**

4. For **Summary**, type: **==This map shows census tracts in Houston, Texas, that have many households without access to a vehicle. These areas may need to be considered for evacuation assistance in case of a hurricane or other natural disaster.==**

The map is saved. It now appears in your account's content. You can access your content by clicking the options button next to the map's name and choosing **Content**. For now, you'll set the sharing permissions.

By default, your content is private and only visible to you and your organization's administrator. You can share content to different groups of viewers depending on the level of privacy you want to maintain and the content's audience and purpose. For example, if you choose to share it with your organization, only users with accounts in the same organization as you can access your content. For this tutorial, you've created a public information map and you want it to be available to everyone, so you'll share it publicly.

1. Click **Save**

Step 2: Submission Requirements

IMPORTANT: Instead of sharing your map publicly, you must provide descriptions of your completed work.

Take a screenshot that includes: - Your complete computer screen - The ArcGIS Online map you created - The system date and time visible (usually in the taskbar/menu bar) - All relevant map elements (legend, layers panel, styled data)

1. Ensure your map displays all required elements: - Properly filtered census data - Appropriate styling with color scheme - basemap - Applied effects highlighting top areas - Descriptive layer name.
2. Take a full-screen screenshot showing:
    - Your completed map
    - Current date and time from your system
    - ArcGIS Online interface with your map title visible
3. The date-time stamp allows the marker to validate when the work was completed

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Additional Resources

- ACS Vehicle Availability Variables - Boundaries data is from the American Community Survey.
- Topographic map sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, OpenStreetMap contributors, and the GIS User Community
- Human Geography Map sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, OpenStreetMap contributors, and the GIS User Community

To extend your learning with ArcGIS Online: - Create interactive apps from web maps - Learn advanced styling techniques - Explore spatial analysis tools - Access the ArcGIS tutorial gallery for more exercises

- To learn how to transform your web map into an interactive app, check out the tutorial Create an app.
- To learn useful tips and tricks for web maps, check out the series Common skills for working with data in ArcGIS Online.
- To learn about performing spatial analysis, check out the series Perform analysis in Map Viewer.
- To learn more advanced techniques for styling your map, check out the series Cartographic creations with web maps.

Lab No 2: Create a Map Lab

This tutorial is inspired from ArcGIS Online Learning resources available at:

https://learn.arcgis.com/en/projects/create-a-map/

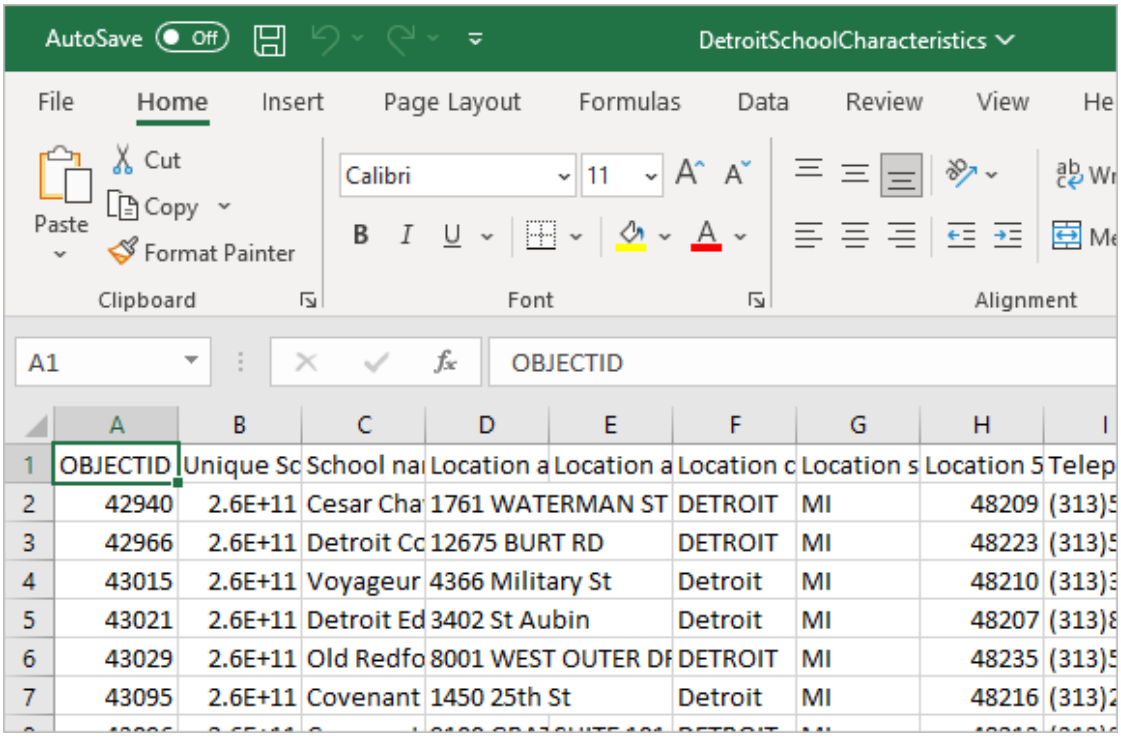
Objective: The idea of this tutorial is you learn how to create a web map using ArcGIS Online, Add a data layer to a new map and start visualizing patterns. You will see how to add new data from external sources, format your charts, and then be able to filter and structure your map to only read and illustrate what you need.

Estimated time of completion: 45 Minutes

Download and Examine the Data

First, you will download a .csv file that contains general information about public high schools in Detroit, Michigan.

1. Download the DetroitSchoolCharacteristics.csv file to your computer and open it in Microsoft Excel or another spreadsheet program like Google Sheets.



	A	B	C	D	E	F	G	H	I
1	OBJECTID	Unique Sc	School nai	Location a	Location a	Location c	Location s	Location 5	Telep
2	42940	2.6E+11	Cesar Cha	1761 WATERMAN ST		DETROIT	MI	48209	(313)5
3	42966	2.6E+11	Detroit Cc	12675 BURT RD		DETROIT	MI	48223	(313)5
4	43015	2.6E+11	Voyageur	4366 Military St		Detroit	MI	48210	(313)3
5	43021	2.6E+11	Detroit Ed	3402 St Aubin		Detroit	MI	48207	(313)8
6	43029	2.6E+11	Old Redfo	8001 WEST OUTER DF		DETROIT	MI	48235	(313)5
7	43095	2.6E+11	Covenant	1450 25th St		Detroit	MI	48216	(313)2

You will see a table with columns of longitude, latitude, school name, total students eligible for free and reduced meal plans, and race and ethnicity data. This data comes from the National Center for Education Statistics' (NCES) Education Demographic and Geographic Estimate (EDGE) program.

It's hard to visualize where these schools are located or any patterns in the information from the table alone. Making a map is a better way to understand your data than viewing it as a table, so that's your next task.

> **Note:** You can find data about public schools across the United States in the Public School Characteristics - Current layer.

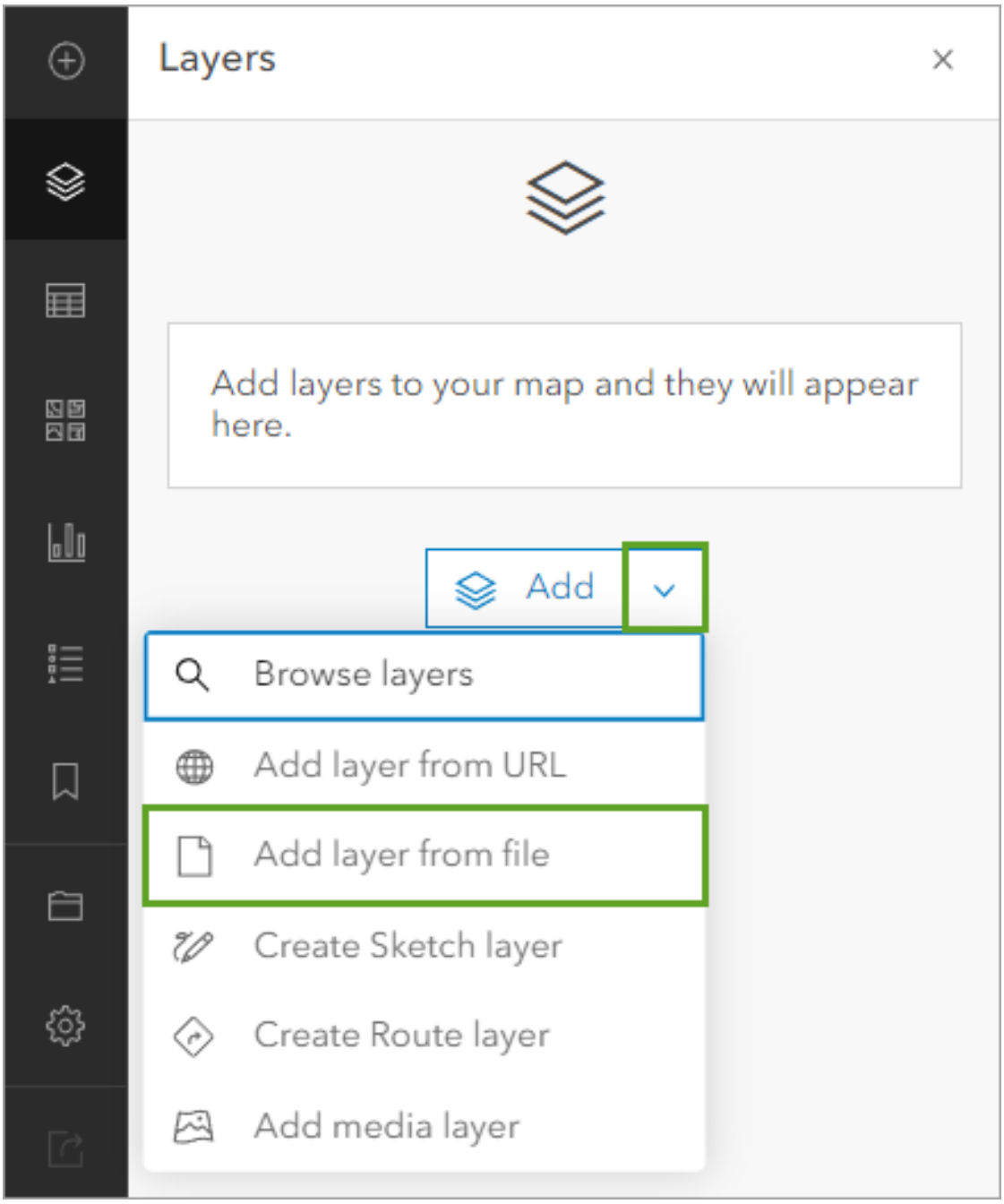
2. Close the .csv file.

Create a Map Layer

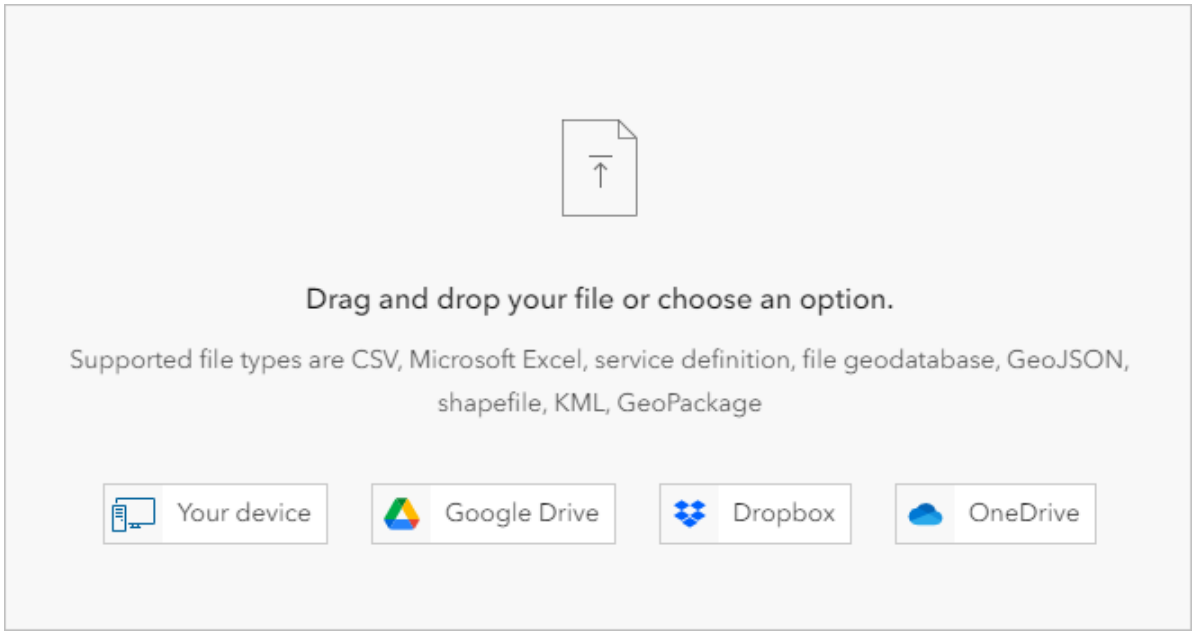
Layers are the way geographic data is organized and combined to create maps. For example, a map may consist of a roads layer, a lakes layer, and buildings layer. These layers are also the basis for geographic analysis to aid in decision making. You will create a map layer by adding your .csv file to an empty map.

1. Sign in to your ArcGIS account using your university credentials.

2. On the ribbon, click the **Map** tab.
3. In Map Viewer, in the Layers pane, click the arrow next to the **Add** button and click **Add layer from file**.



The Add Layer window appears.



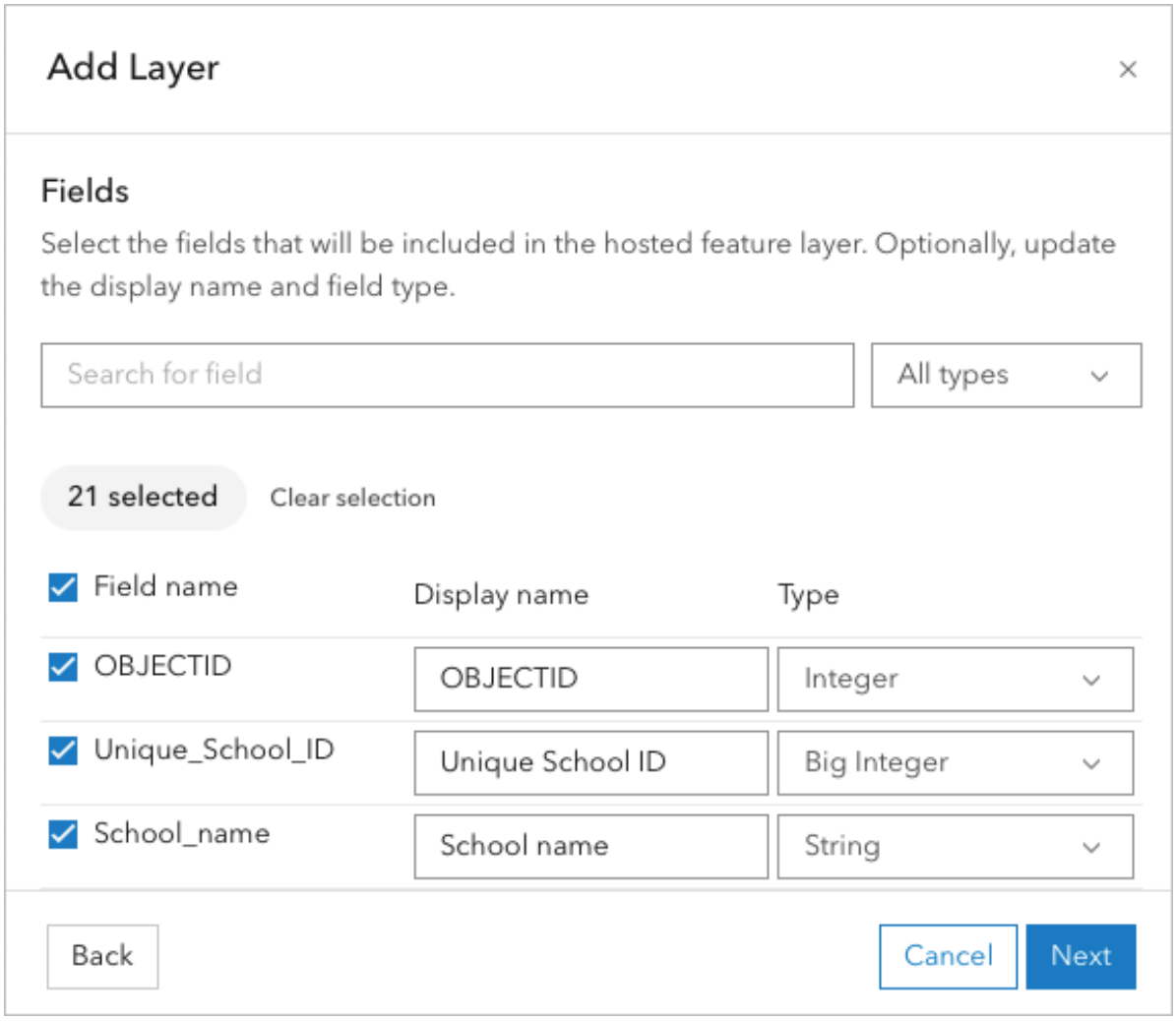
4. Drag the DetroitSchoolCharacteristics.csv file to the Add Layer window.

   Tip: Alternatively, click **Your device** and browse to the .csv file.

5. For **How would you like to add this file**, choose **Create a hosted feature layer and add it to the map**. Click **Next**.

A list of fields appears. Map layers consist of spatial and tabular information. The table will contain the same columns—also called fields or attributes—as the .csv file. On this page, you can choose which fields from the .csv file you want to include, provide display names, and data type information.

The software automatically detected the fields and produced default display name and data types. This page is an opportunity for you to review that the automatic assignments are accurate.



In this example, you will choose to include all the fields, so you won't adjust the check boxes.

Display name sets a nickname or shortened name of the field name that is more readily understandable to others. Field names cannot include spaces or numbers, so sometimes you may want these in the display name. Setting Display name allows you to provide meaningful names without changing the Field name text.

Type describes the data you will store in the field: - **Date**—Date and time. - **Double**—Numbers with decimal places. - **Integer**—Whole numbers from -2,147,483,648 to 2,147,483,647 (long integer). - **Big Integer**—Whole numbers between -(2^53) and 2^53. - **String**—Any sequence of characters. The default length is 256 characters.

You will accept all the default settings and continue.

6. Click **Next**.

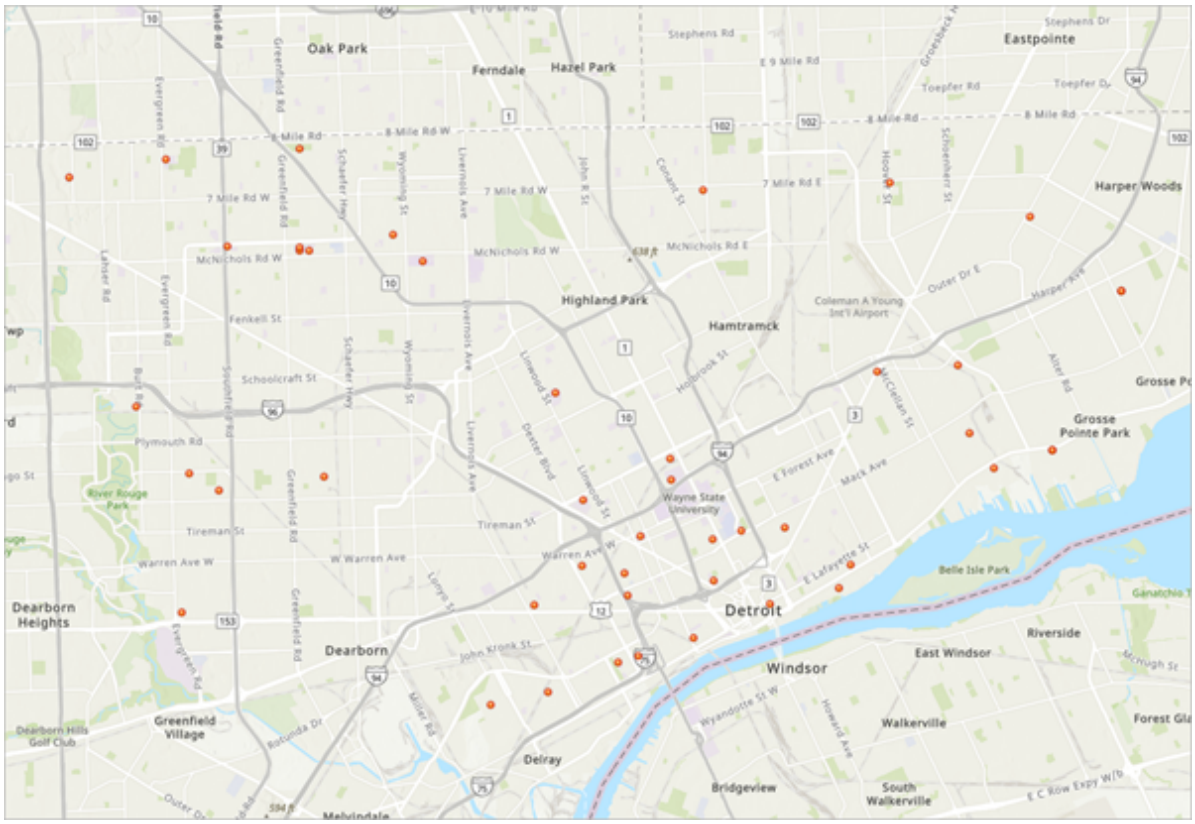
The Location settings page appears. Spatial information for the layer will be derived from the Latitude and Longitude columns in the .csv file.

> **Note:** If your table contains the names or addresses of locations (like Paris or 15 Central St. Bethlehem, PA) instead of latitude and longitude fields, try this tutorial about geocoding data: Convert a list of historic places into a map.

7. Click **Next**.
8. For **Title**, type "Detroit high schools" followed by your name or initials (for example "Detroit high school (Your name)").

   > **Note:** You cannot create two layers in an ArcGIS organization with the same name. Adding your initials to a layer name ensures that other people in your organization can also complete this tutorial. Once a layer has been created, you can rename it in the map to remove your initials, which will not affect the name of the underlying data layer.

9. Click **Create and add to map**.

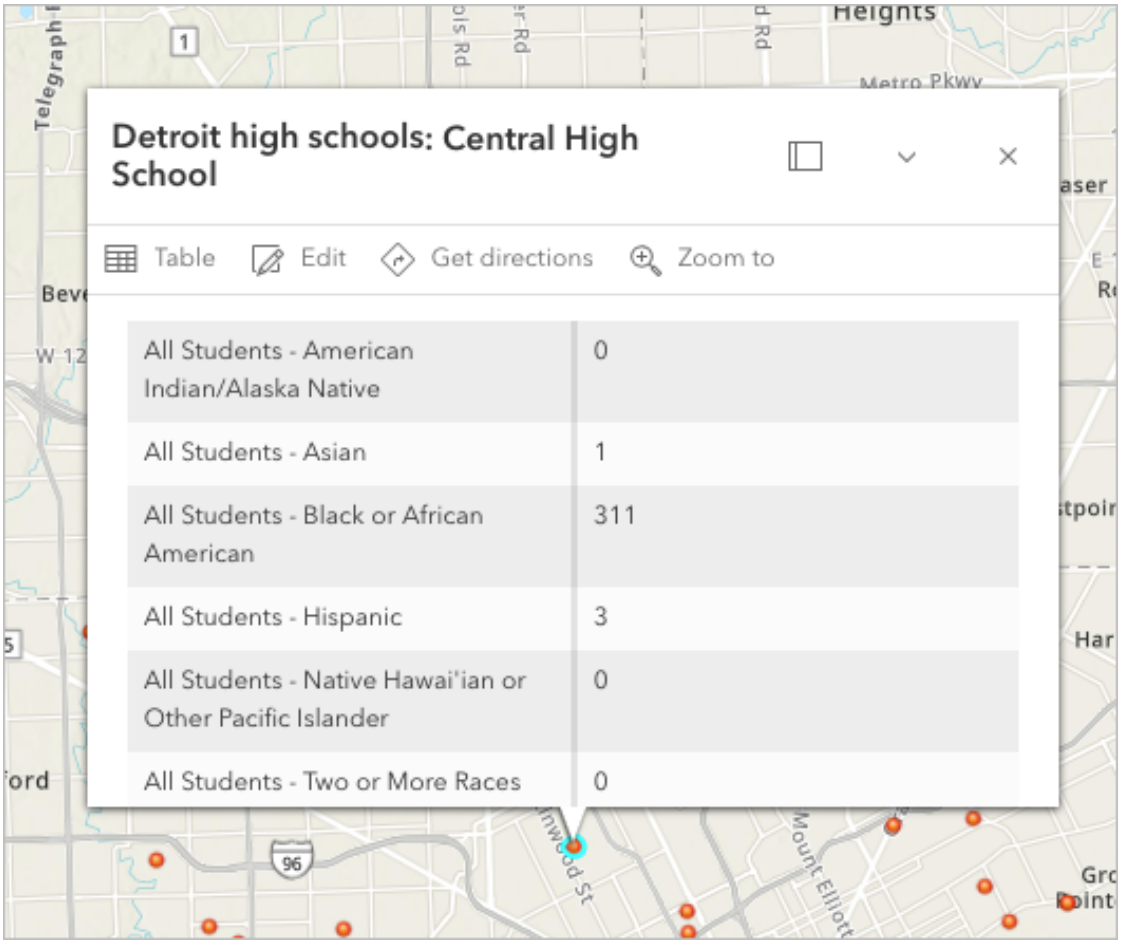


The new layer appears on the map. The map displays the locations of the schools listed in the .csv file. Each school is considered a feature in the layer. You have access to the descriptive information, or attributes, by viewing pop-ups for features on the map.

10. On the map, click any circle.

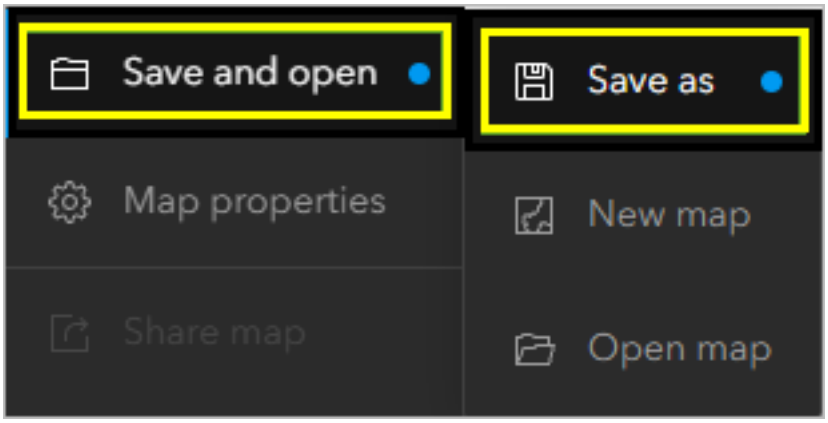
A pop-up window appears with information about the school from the layer's table.

11. Close the pop-up.



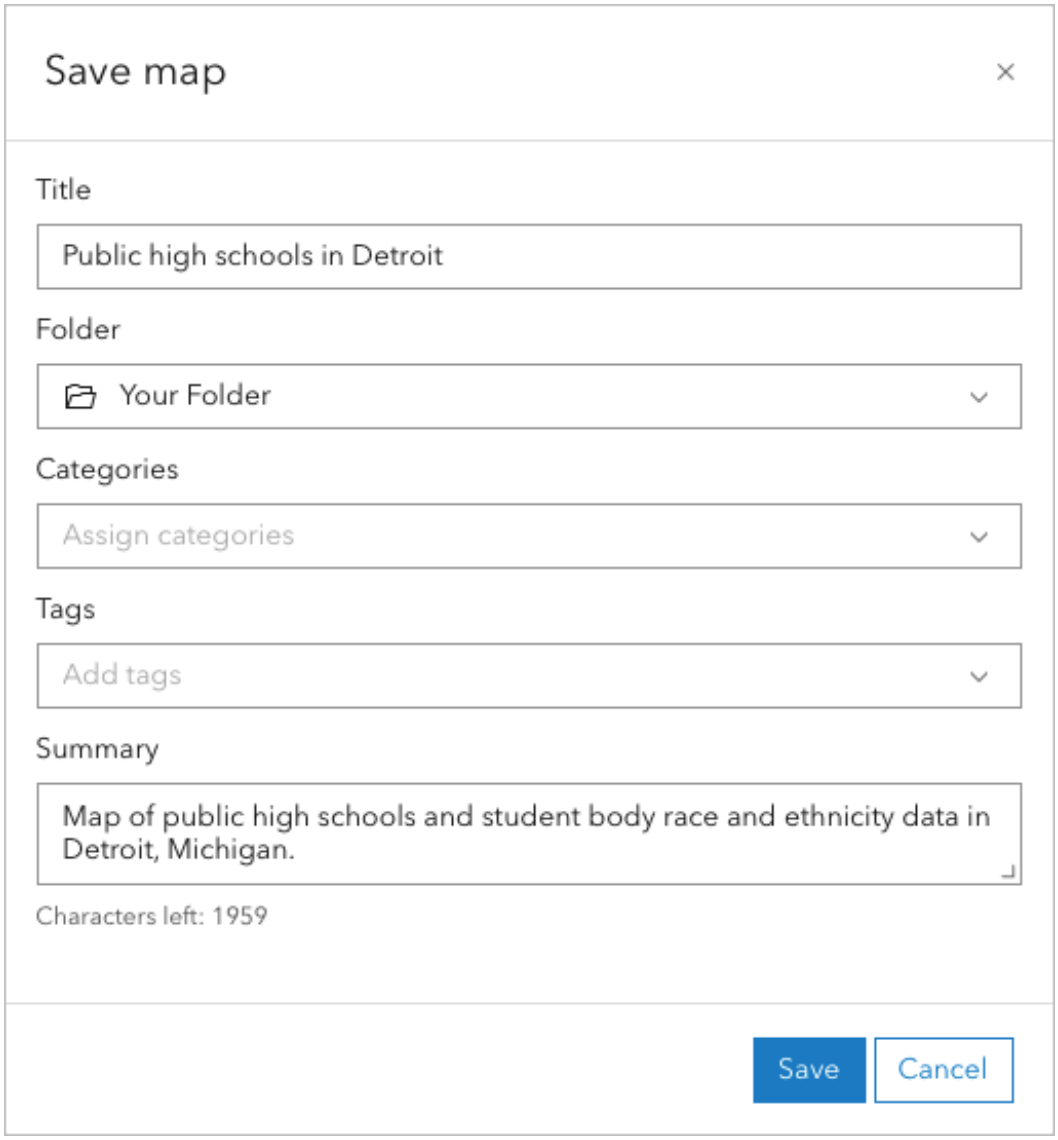
Before you continue, you will save the map.

12. In the Contents pane, click **Save and open** and click **Save as**.



13. In the Save map window, enter the following:

    - For **Title**, type "Public high schools in Detroit".
    - For **Summary**, type "Map of public high schools and student body race and ethnicity data in Detroit, Michigan".

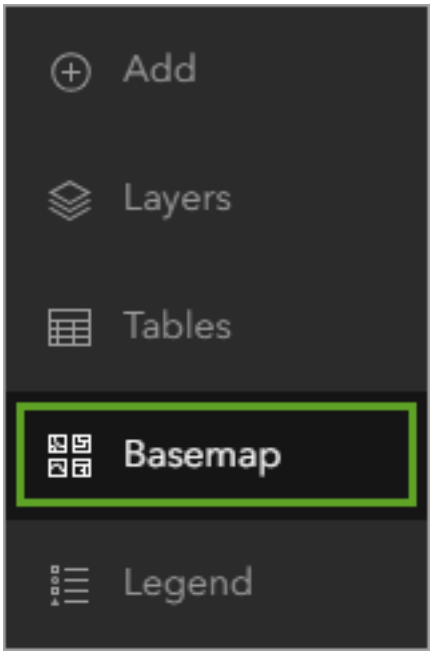


14. Click **Save**.

Change the Basemap and Layer Style

Maps in ArcGIS Online consist of layers. You added the Detroit high schools layer, but the map also has a basemap layer by default. Next, you'll change the basemap layer and the style of the feature layer.

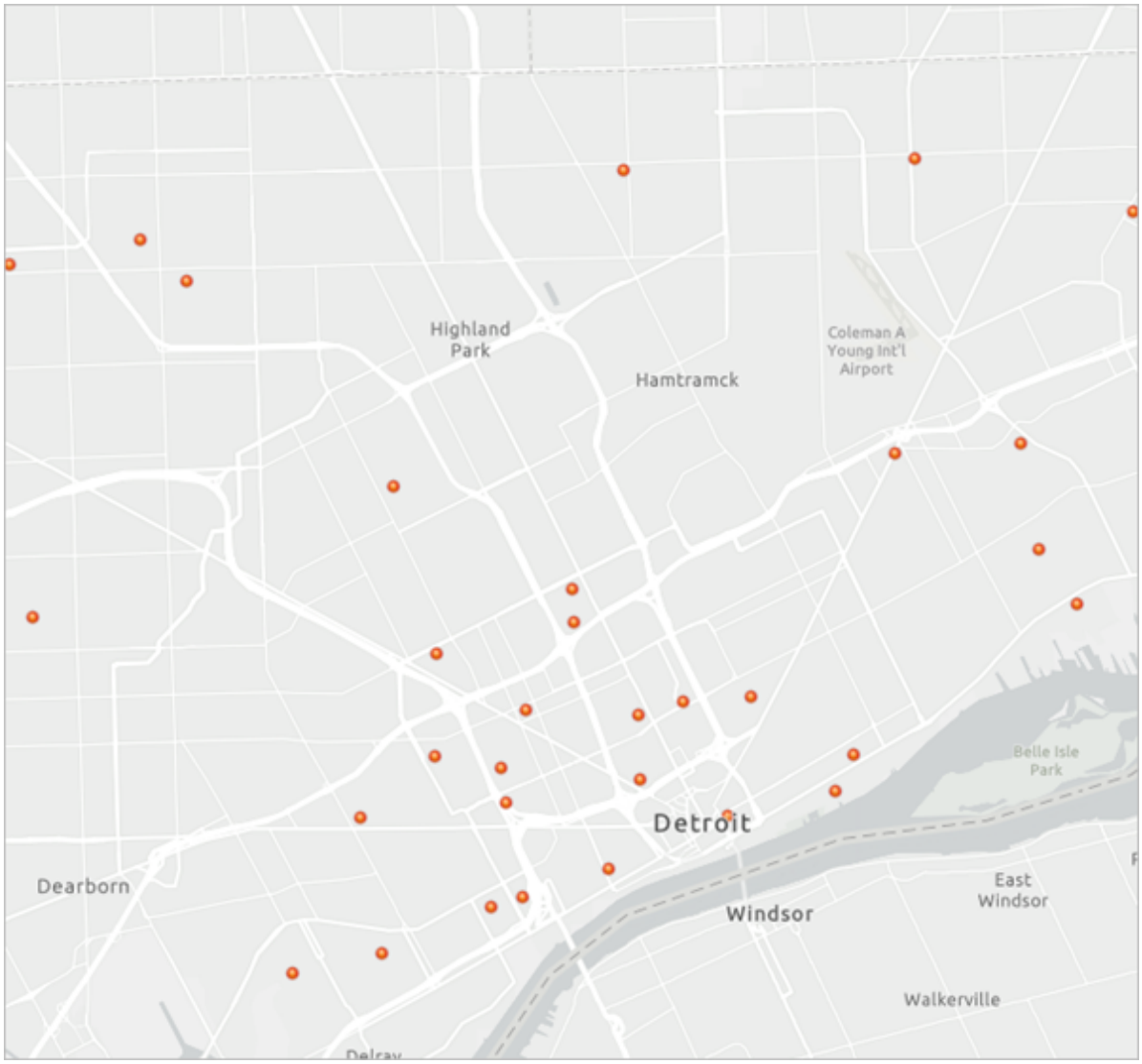
1. On the Contents (dark) toolbar, click **Basemap**.



The Basemap pane appears. The Topographic basemap is selected. This basemap looks good but is better suited for a reference map. You'll choose a more minimally designed basemap so it does not distract from the school data.

2. In the Basemap pane, click **Light Gray Canvas**. Close the Basemap pane.

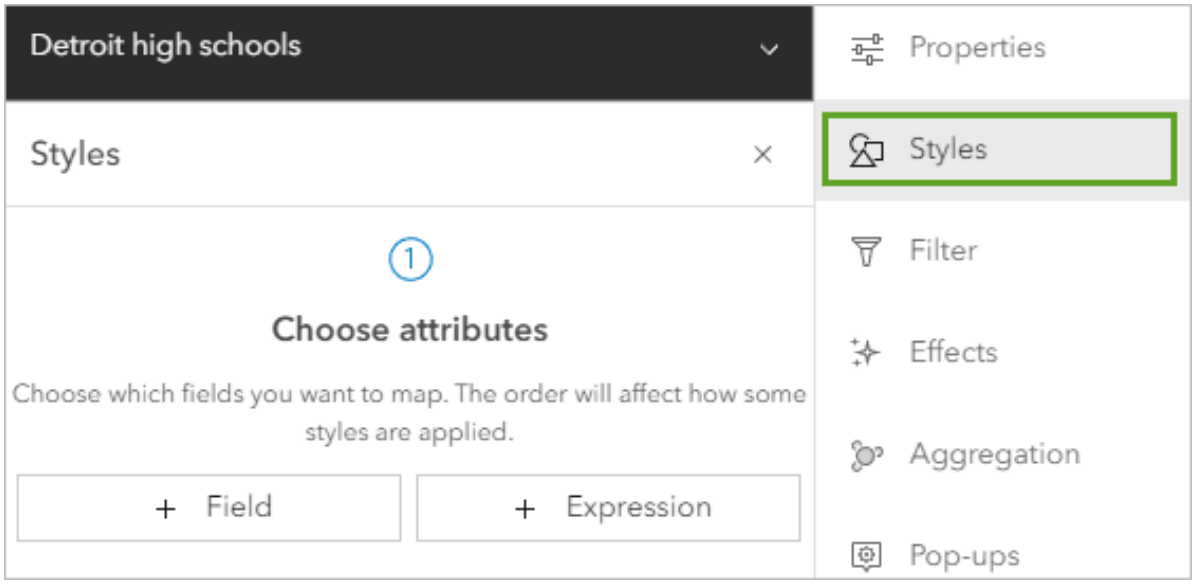
   Note: You may see different basemaps depending on the configuration of your organization. If the Light Gray Canvas basemap is not available, skip to the next step without changing the basemap.



Next, you'll configure the high school layer's symbols so they are sized based on the number of students at each school eligible for free and reduced meal plan programs.

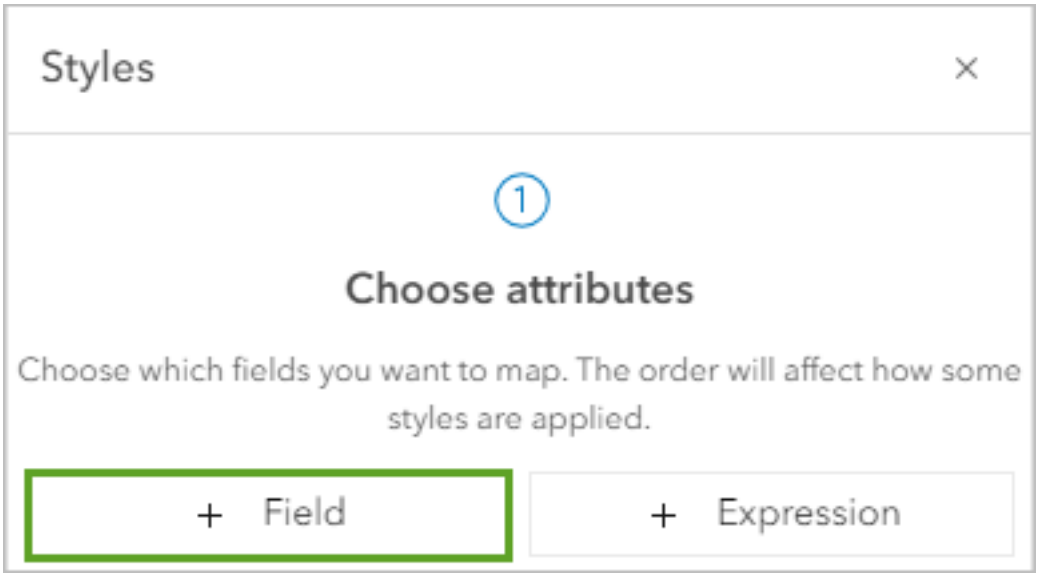
3. On the Settings (light) toolbar, click **Styles**.

   Note: If the Settings toolbar is unavailable, on the Contents toolbar, click **Layers**. In the Layers pane, click **Detroit high schools** to select the layer.



The Styles pane appears. Currently, the style is based on the data's location only. You'll configure the symbols to convey both location and one of the data's attributes.

4. In the Styles pane, click the **Field** button.

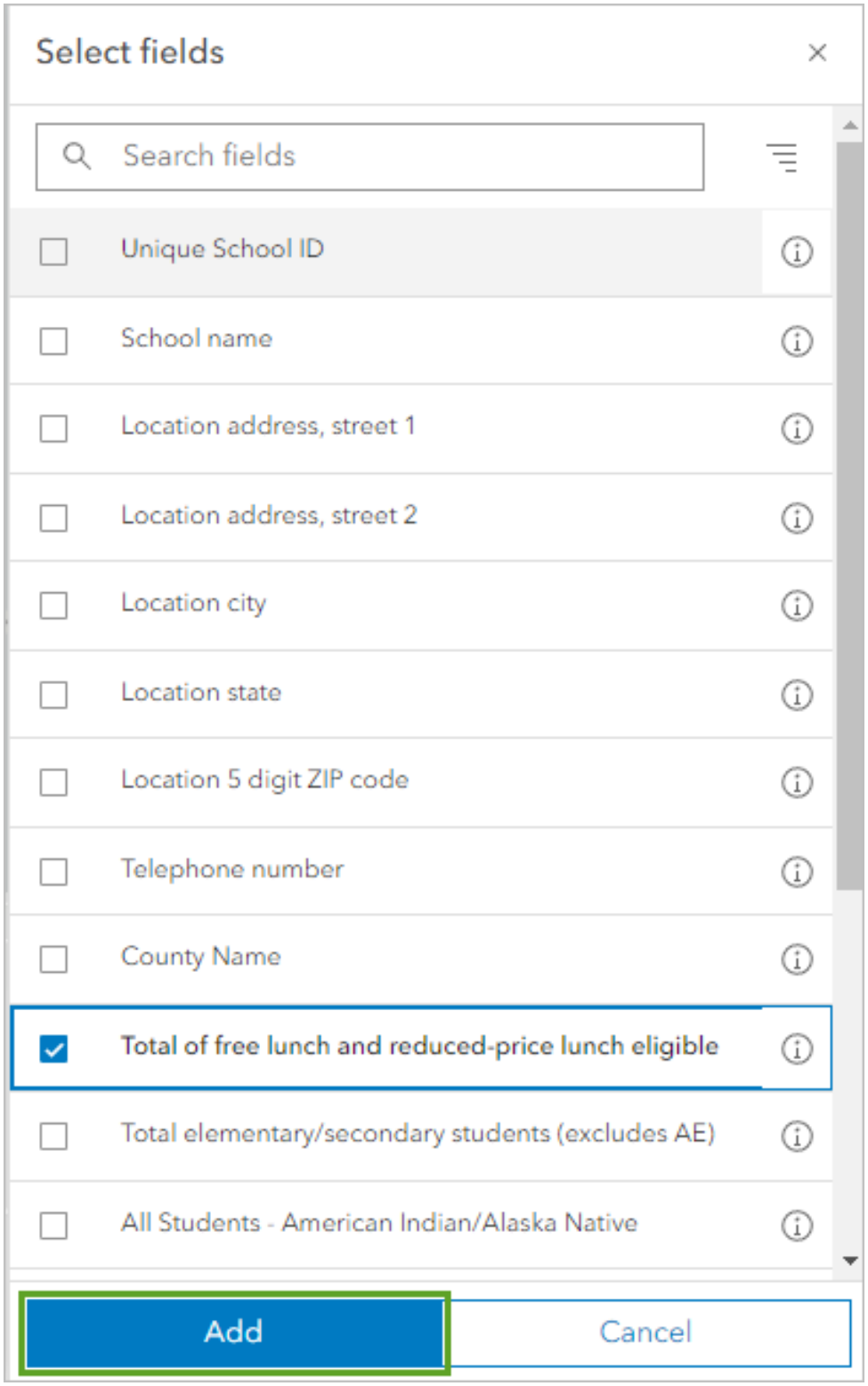


You will choose to style the map by the number of students at each high school who are eligible for free and reduced price meal (FRPM).

Eligibility for FRPM is set by U.S. Department of Agriculture Child Nutrition Programs and is based on Federal poverty guidelines issued by the Department of Health and Human Services.

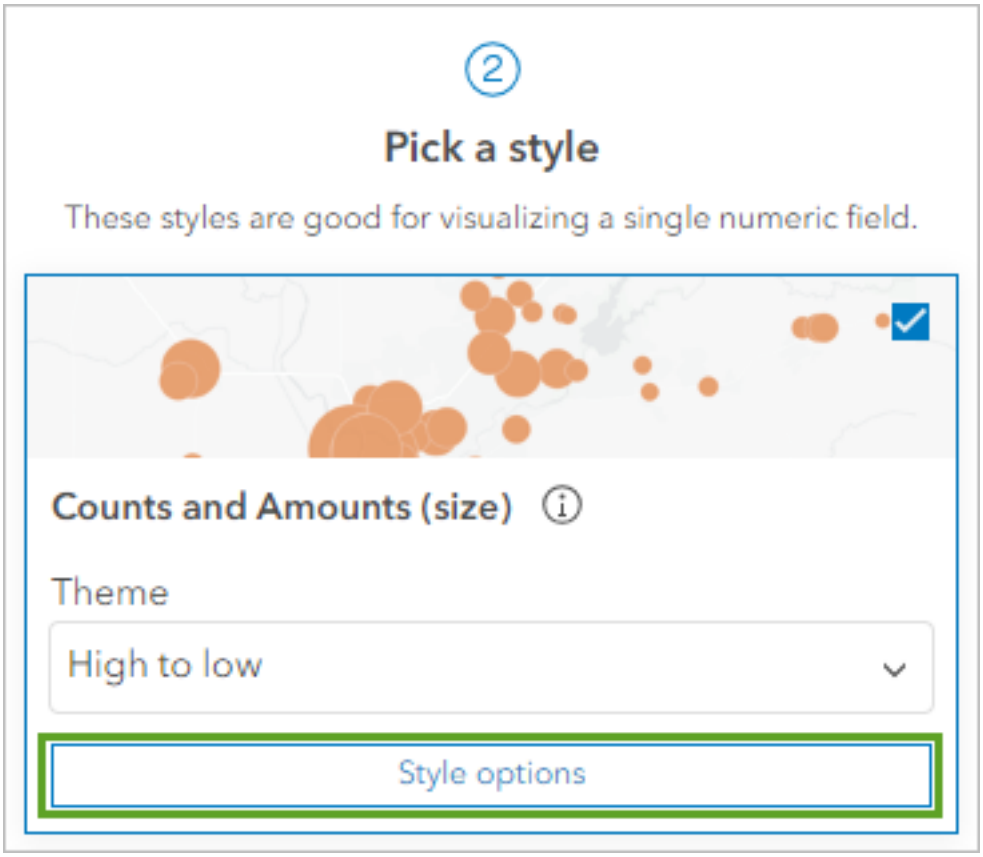
The number or percent of students eligible for FRPM is often used as an equity indicator to understand the needs of school-aged children.

5. On the Select fields menu, choose **Total of free lunch and reduced-price lunch eligible** and click **Add**.

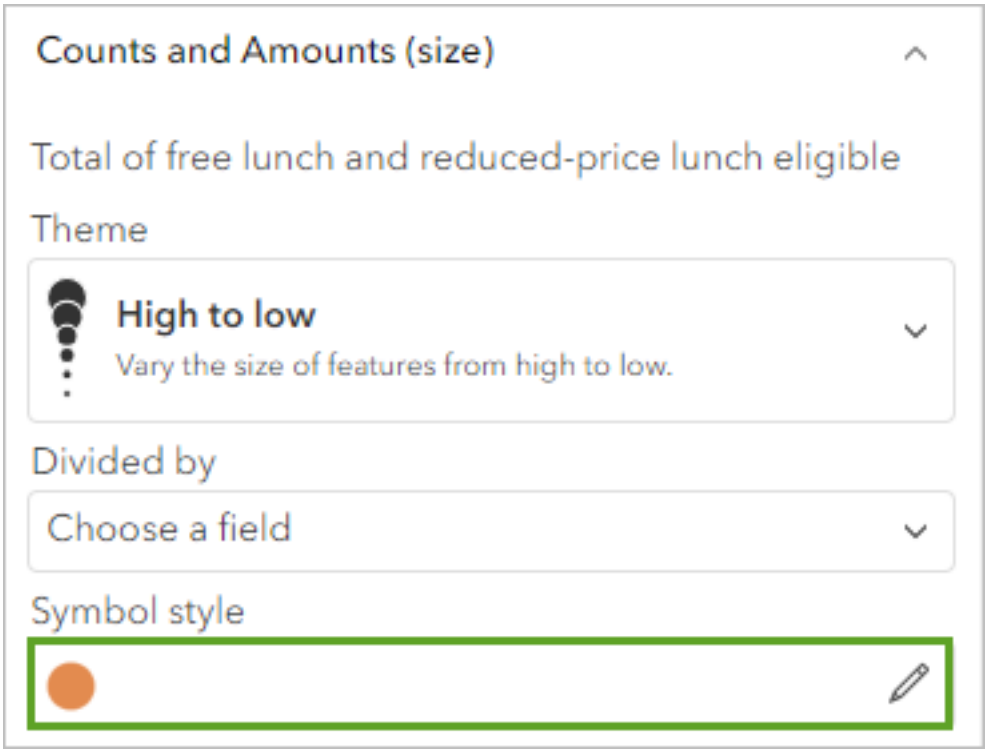

Select fields
Search fields
Unique School ID
School name
Location address, street 1
Location address, street 2
Location city
Location state
Location 5 digit ZIP code
Telephone number
County Name
Total of free lunch and reduced-price lunch eligible
Total elementary/secondary students (excludes AE)
All Students - American Indian/Alaska Native
Add
Cancel

The options under Pick a style update to reflect choices that are suitable for the Total of free lunch and reduced price lunch eligible field. **Counts and Amounts (size)** is selected and the map updates to reflect this style. This style reveals some new patterns in the data. The larger the circle, the more students are eligible for FRPM at the school.

6. On the **Counts and Amounts (Size)** card, click **Style options**.

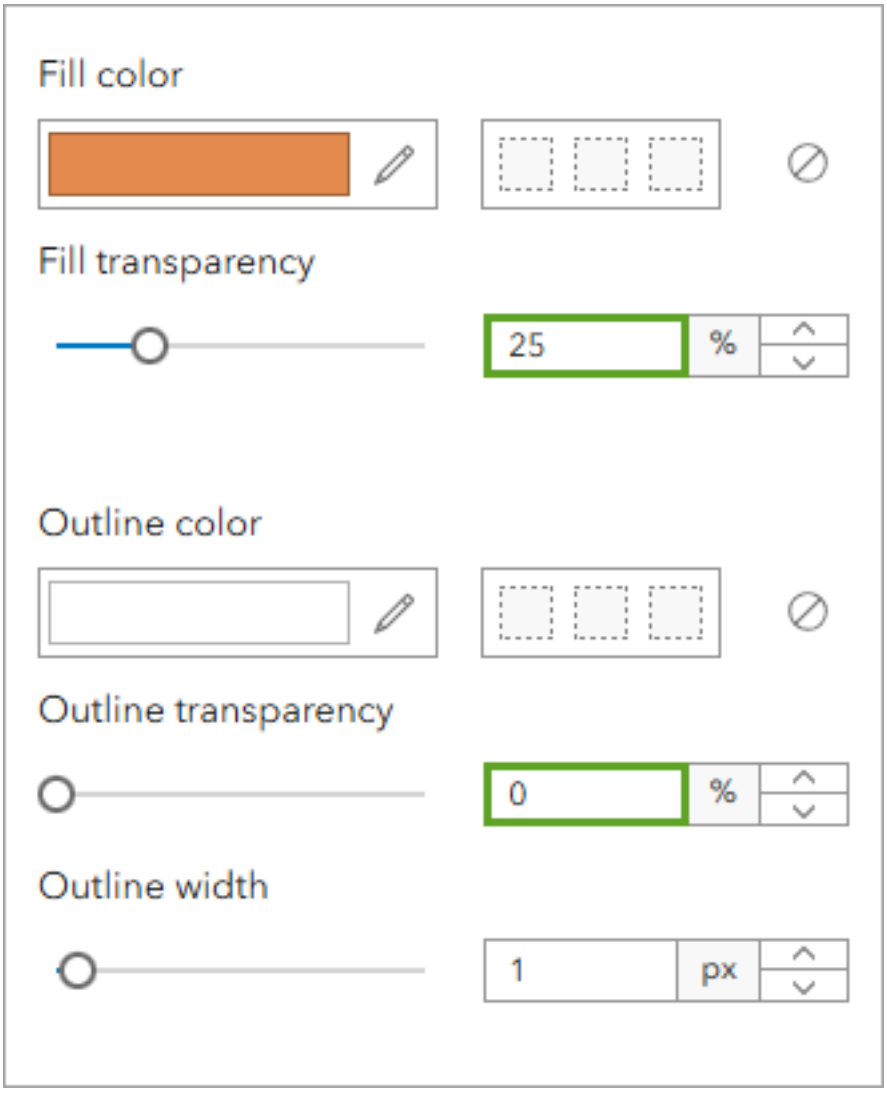


7. In the Counts and Amounts (size) pane, for **Symbol style**, click the current symbol.



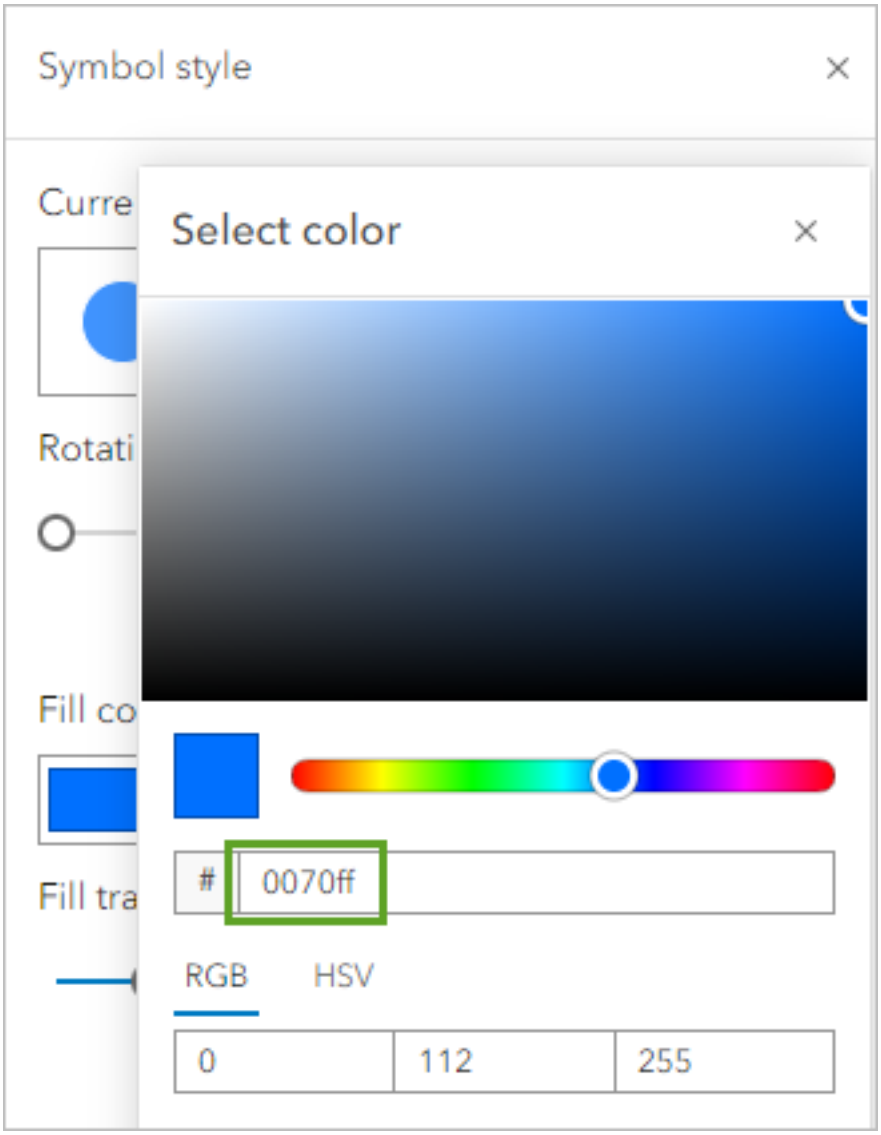
The Symbol style window appears. You'll adjust the symbol's properties so circles can be seen even when they are overlapping.

8. Set **Fill transparency** to 25. Set **Outline transparency** to 0.



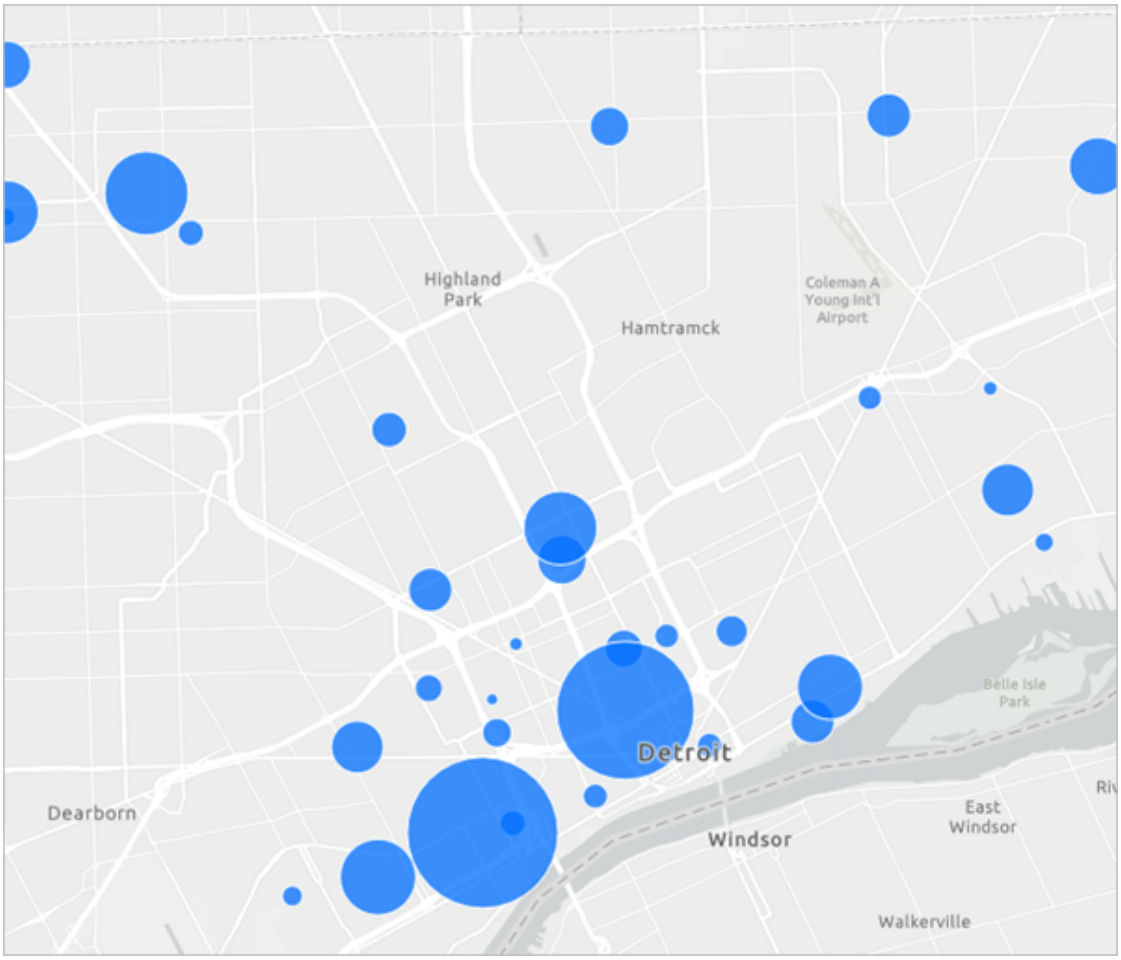
The symbols on the map update. It is now easier to see overlapping circles.

9. In the Symbol style window, for **Fill color**, click the current color. In the Select color window, for #, type **0070FF** and press Enter.



The color of the map symbols changes to blue.

10. Click **Done** in the Select color window, the Style options pane, and the Styles pane.



The map shows the number of students at each high school who are eligible for FRPM programs. The schools with more students who are eligible for FRPM programs are represented by larger circles. Schools represented with smaller circles have fewer students who are eligible for FRPM programs.

11. On the Contents pane, click **Save and open** and click **Save** to save your map.

Configure Pop-ups and View a Table

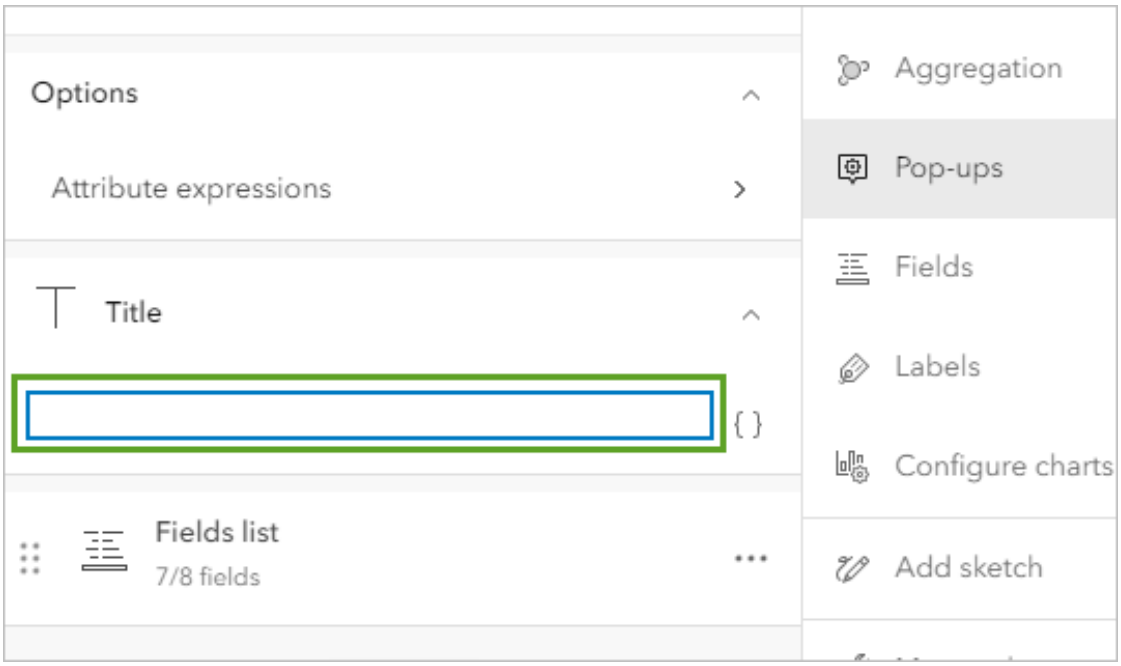
The pop-up that you viewed earlier displayed all the attributes for the features, which may be unnecessary for your map. You can configure pop-ups to show only those attributes that are important to your map. In this example, you want to show only the name of the school and the number of students eligible for FRPM programs.

1. In the Layers pane, ensure that the **Detroit high schools** layer is selected.

2. On the Settings toolbar, click **Pop-ups**.

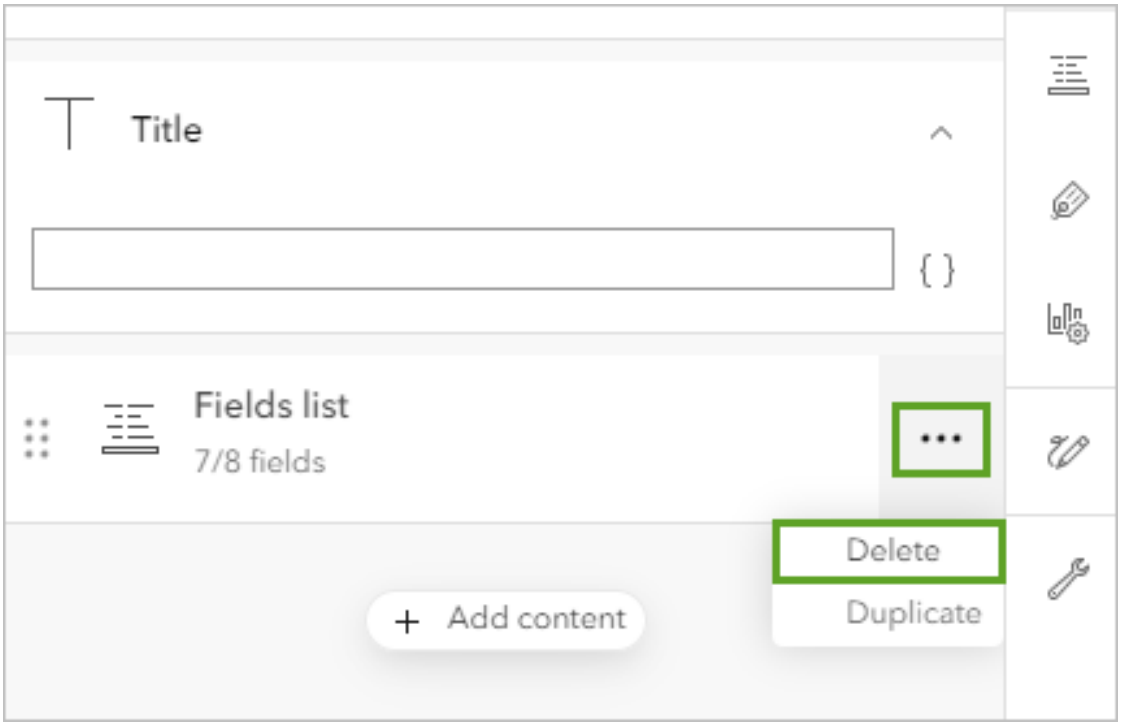
The Pop-ups pane appears and a sample pop-up appears on the map. The pop-up's title contains the name of the layer and the name of the school. This title is unnecessary for your map, so you'll remove it.

3. In the Pop-ups pane, click **Title**. Erase the text in the box.

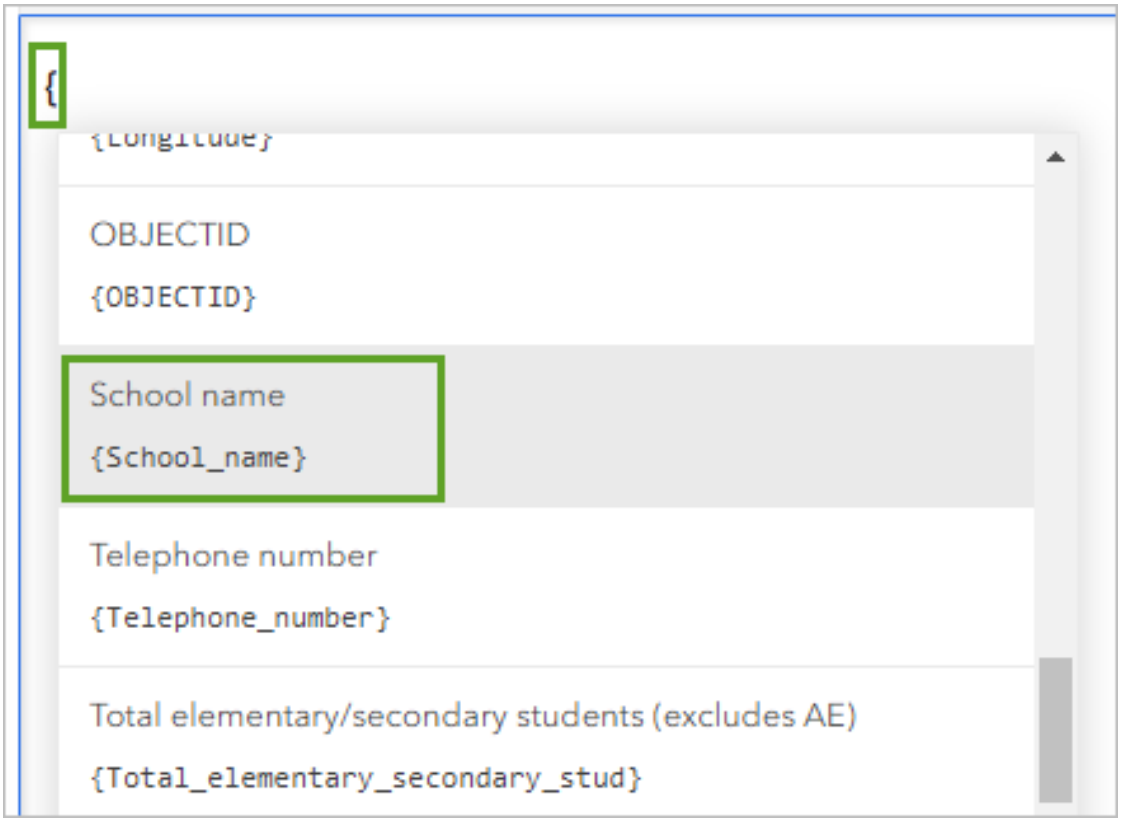


The title text disappears from the sample pop-up. You'll replace the list of fields with a sentence that includes the relevant information.

4. Next to **Fields list**, click the **Options** button. Click **Delete**.



5. Click **Add content** and click **Text**.
6. In the text editing window, type **{**. In the menu that appears, scroll almost to the bottom and click **School name**.

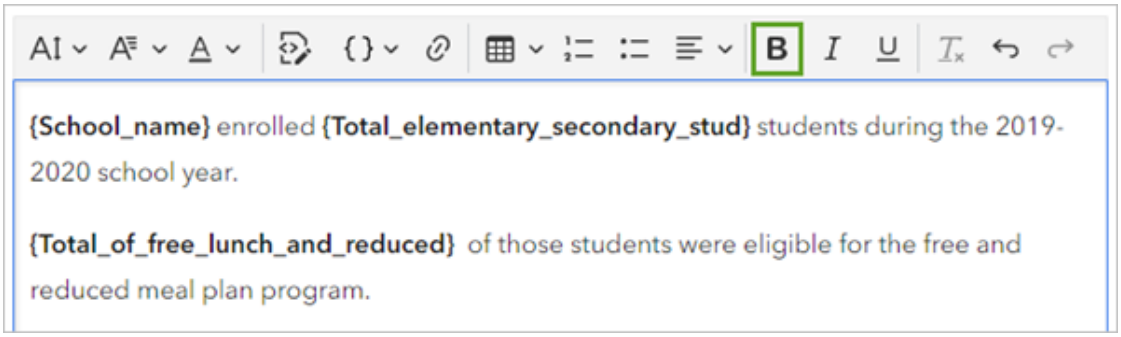


The School_name field was one of the fields in the .csv file you used to create the feature layer. By setting the dynamic text to this field, the pop-up that displays for each school point will display the corresponding School_name field.

7. After **{School_name}**, type **enrolled {Total_elementary_secondary_stud} students during the 2019-2020 school year.**

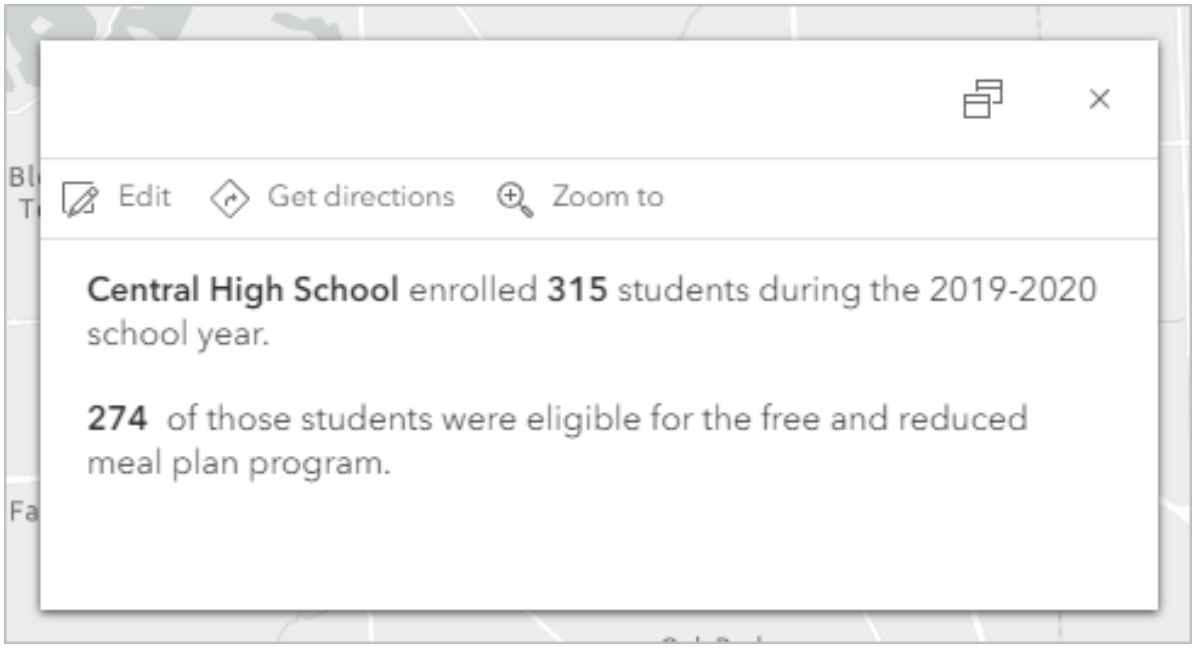
You can add fields by typing their names inside of curly brackets or by choosing them from the list that appears when you type a curly bracket.

8. Press Enter to start a new paragraph. Type **{Total_of_free_lunch_and_reduced} of those students were eligible for the free and reduced meal plan program.**
9. Use the **Bold** button on the toolbar to add bold formatting to **{School_name}**, **{Total_elementary_secondary_stud}**, and **{Total_of_free_lunch_and_reduced}**.



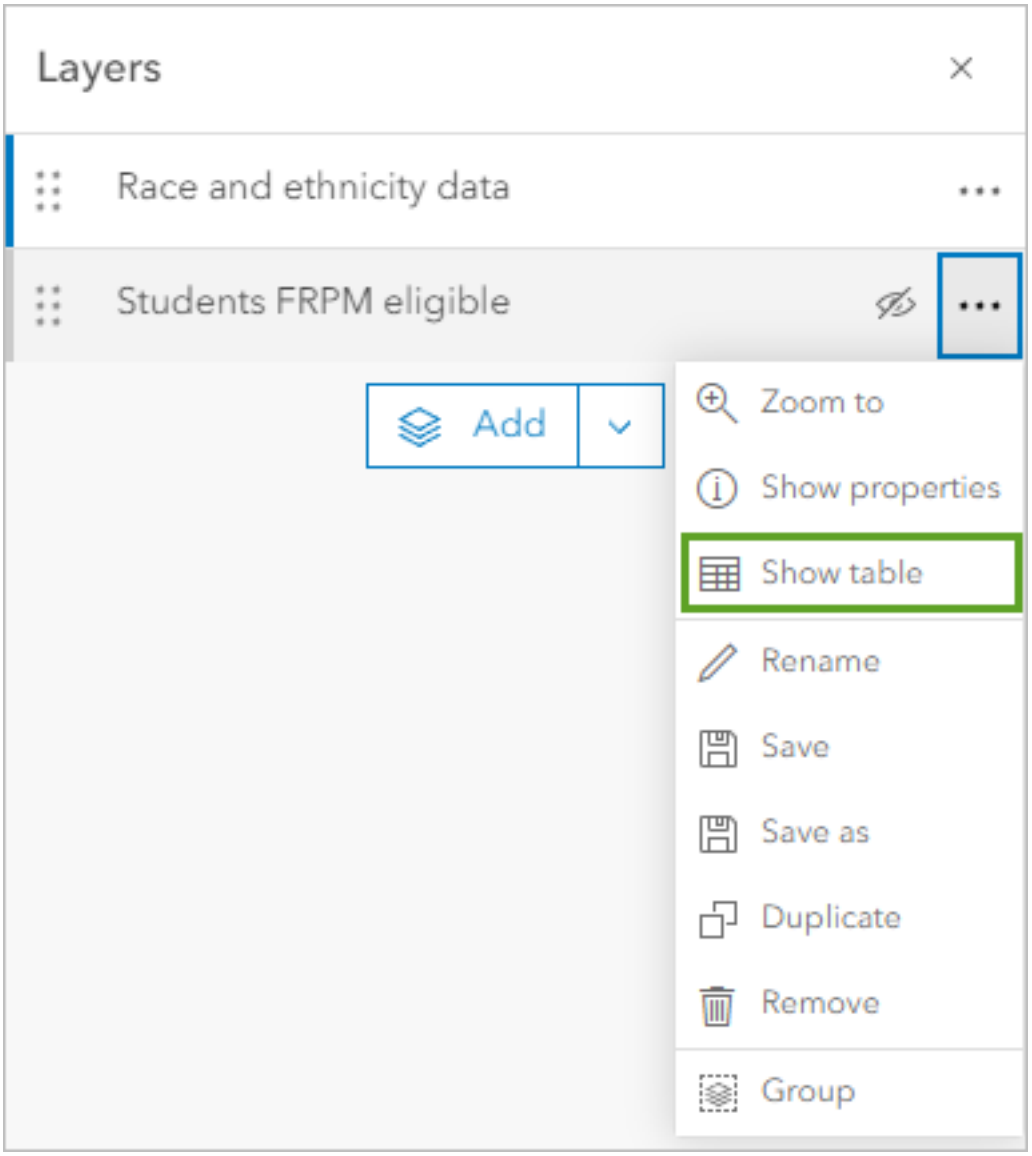
10. Click **OK**.

The preview pop-up replaces the field names with the attribute values of one of the features.



All the fields still exist in the data table, but they don't display in the pop-up. You can modify the contents of the pop-up at any time. You can still see all the attributes by showing the table.

11. In the Layers pane, next to **Detroit high schools**, click the **Options** button. Click **Show table**.



The layer's table appears below the map.

12. Review the data in the table. Close the table when you are finished.
13. Close the Pop-ups pane.
14. Save the map.

Style the Layer in Another Way

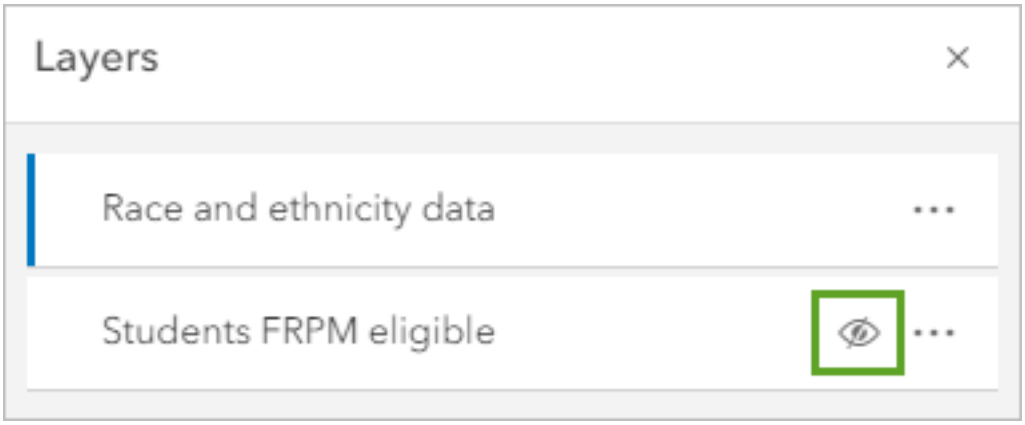
Your goal is to identify which schools would most benefit from more after-school programs. You have styled the school data by the number of students eligible for FRPM. But there are other aspects of equity that are also important to consider. Due to historic and present-day practices, race and ethnicity can play a critical role in how many resources and opportunities students have at their schools. Practices like segregation in schools and neighborhoods have widened inequities in resource allocation to schools.

Next, you will style the schools to show the race and ethnicity of the student body. First, you will rename the layer you had previously styled to show FRPM eligibility.

1. In the Layers pane, for the **Detroit high schools** layer, click the **Options** button and click **Rename**.
2. For **Title**, type **Students FRPM eligible** and click **OK**.

Next, you will make a copy of the layer.

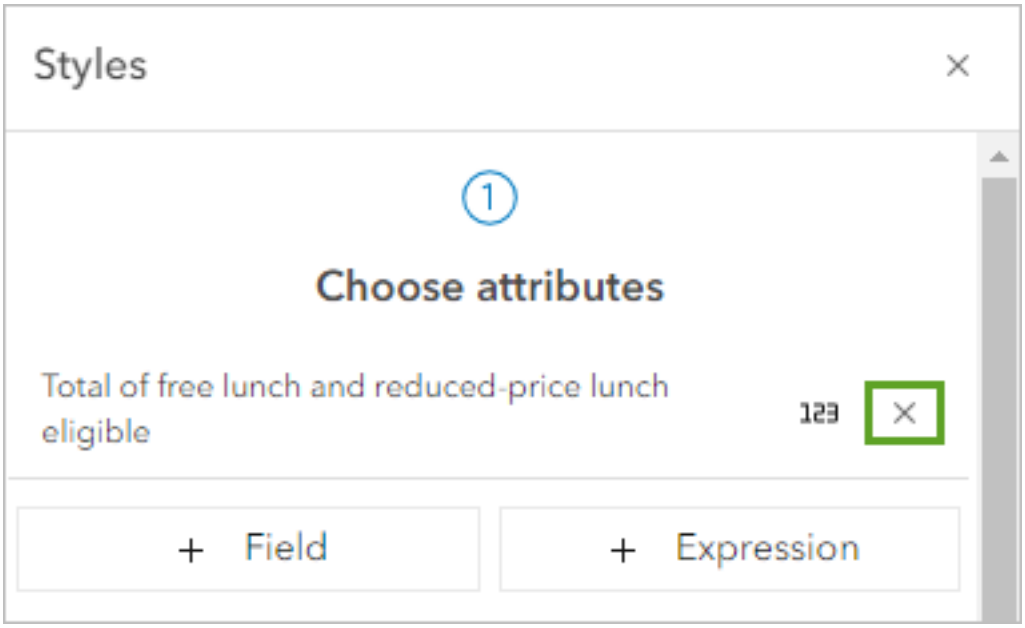
3. For the **Students FRPM eligible** layer, click the **Options** button and click **Duplicate**.



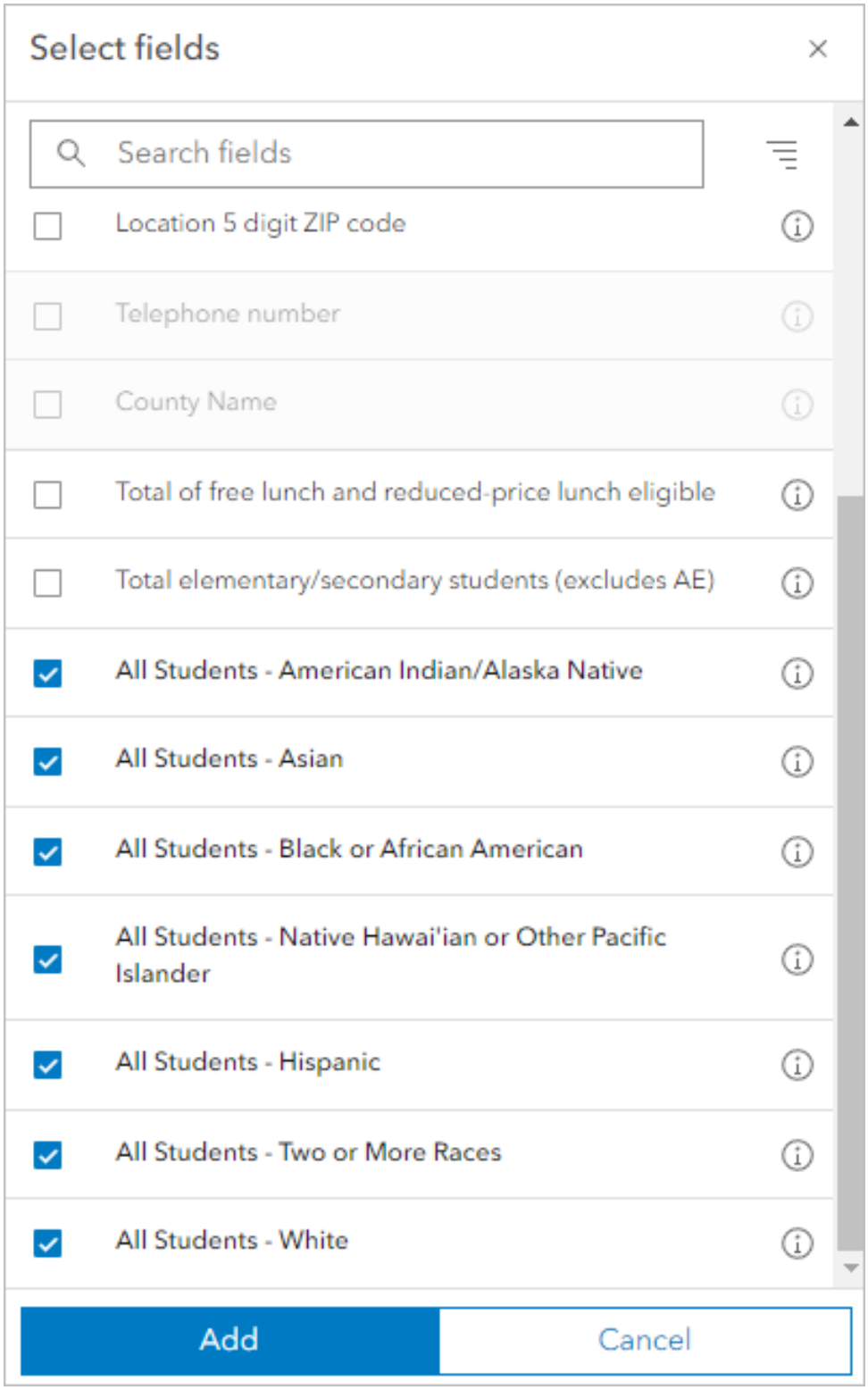
4. Rename the copied layer to be **Race and ethnicity data**.
5. Next to **Students FRPM eligible**, click the **Visibility** button to hide the layer on the map.

Next, you will style the Race and ethnicity data layer with race and ethnicity attributes.

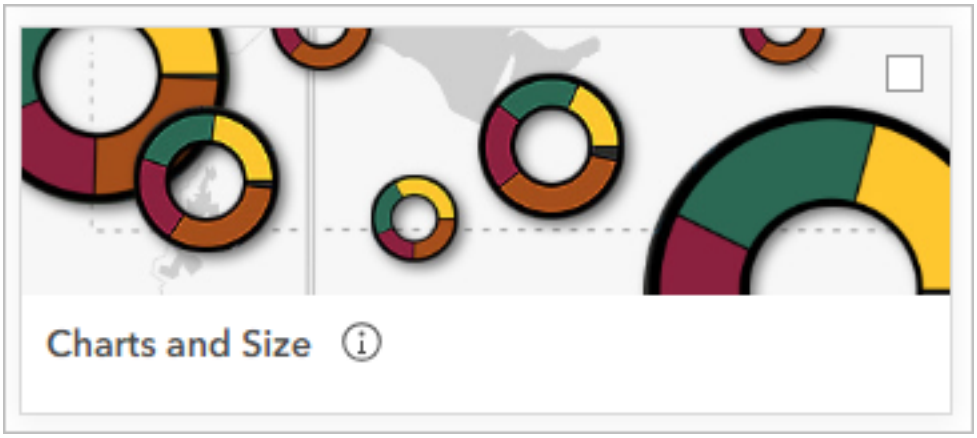
6. Ensure that the **Race and ethnicity data** layer is selected in the Layers pane. In the Styles pane, remove the **Total FRPM eligible** attribute.



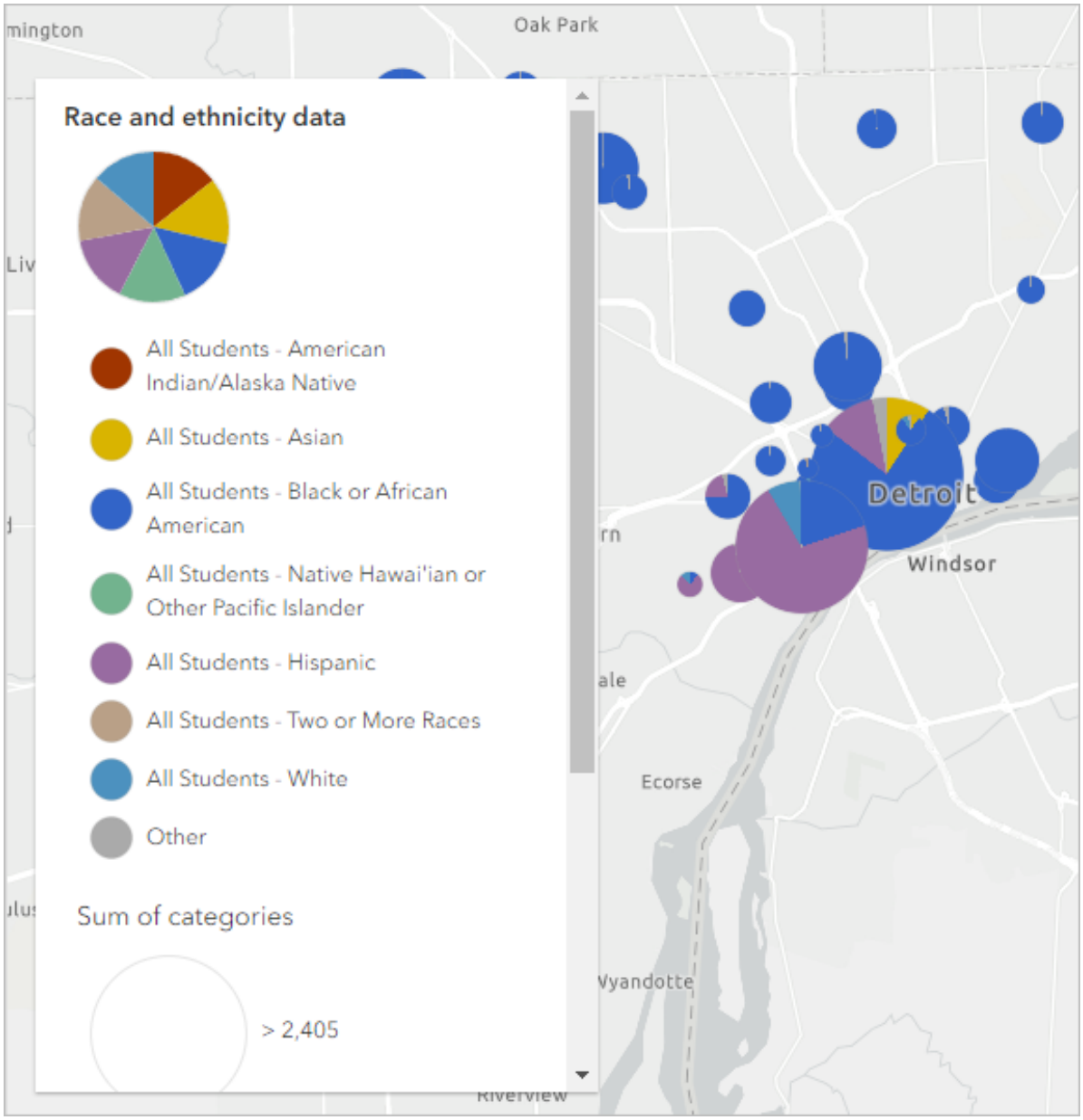
7. Click the **Field** button.
8. In the Add fields window, check the following fields:
    - All students - American Indian/Alaska Native
    - All students - Asian
    - All Students - Black or African American
    - All Students - Native Hawai'ian or Other Pacific Islander
    - All Students - Hispanic
    - All Students - Two or More Races
    - All Students - White


Select fields
Search fields
Location 5 digit ZIP code
Telephone number
County Name
Total of free lunch and reduced-price lunch eligible
Total elementary/secondary students (excludes AE)
All Students - American Indian/Alaska Native
All Students - Asian
All Students - Black or African American
All Students - Native Hawai'ian or Other Pacific Islander
All Students - Hispanic
All Students - Two or More Races
All Students - White
Add
Cancel

9. Click **Add**.
10. Under **Pick a style**, click the **Charts and Size** style.



The layer style updates.



The map now shows pie charts of the student body's race and ethnicity categories. The sizes of the pie charts represent the number of students at the schools.

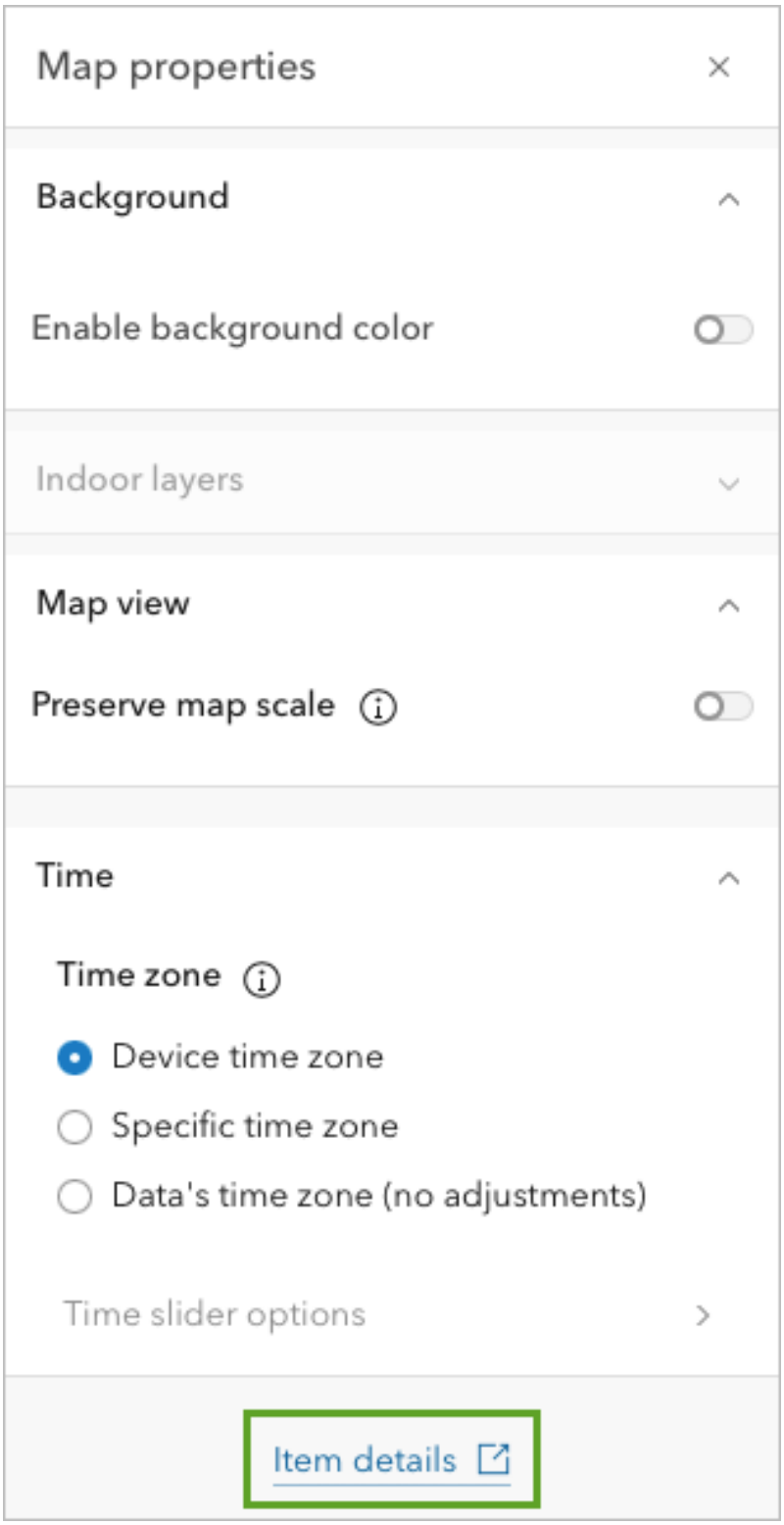
11. Save the map.

Update the Item Details

Your map now tells a story about the locations and some socioeconomic attributes of public high schools. For example, the school with the largest number of students eligible for FRPM programs is Western International High School in southwest Detroit. Many of the schools have a high percentage of students who identify as Black or African American. In southwest Detroit, there are more schools with higher percentages of Hispanic or Latino students.

By saving your map, you also created a corresponding item page that contains information, actions, options, and settings for the map.

1. On the Contents toolbar, click **Map properties**. In the Map Properties pane, click **Item details**.


Map properties
Background
Enable background color
Indoor layers
Map view
Preserve map scale
Time
Time zone
Device time zone
Specific time zone
Data's time zone (no adjustments)
Time slider options
Item details

Your map's item page opens in a new browser tab. The item details are missing important attribution and descriptive information that you will fill in before you share the map. For example, you must give credit to the data providers.

2. Scroll to the bottom of the page. Next to **Credits (Attribution)**, click **Edit**.
3. Type **National Center for Education Statistics' (NCES) Education Demographic and Geographic Estimates (EDGE)**. Click **Save**.
4. Close the item page's tab.

Submit Your Work

To demonstrate completion of this lab, take a screenshot that includes your entire computer screen showing your completed map. Ensure that the date and time are visible on your screen (either in the system taskbar or by opening the system clock). This screenshot will allow the instructor to validate that you have successfully completed the mapping exercise.

Submit your screenshot through the designated course submission portal.

What's Next?

You have created a web map with a .csv file of school location and demographic data. Now that you have the data mapped, you have more ideas for how to share and explore potential after-school program needs in your city.

You can create a web app to display your map data in an interactive way so viewers can explore the data without editing the map. There are many ways you can use your web map to visualize data, understand problems, determine informed solutions, and discover what else is possible.

You can find more tutorials in the tutorial gallery.

1 Mapping Meaningful Places in Your Community - Lab Tutorial

1.1 Overview

In this lab, you will learn to identify and map meaningful places in your community using ArcGIS Survey123. This project involves designing a research study, collecting data through surveys, and analyzing the results to understand what places contribute to your community's identity and resilience.

1.2 Learning Objectives

By the end of this lab, you will be able to: - Design a research project with clear objectives and methodology - Create digital surveys using ArcGIS Survey123 - Collect and analyze spatial data about community places - Visualize data patterns using heat maps and other analytical tools - Draw conclusions about community identity and important places

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1.3 Part 1: Design Your Project

1.3.1 Step 1: Formulate a Research Question

Before collecting any data, you need to establish a clear research question that will guide your entire project. Your research question should address: Why are you collecting data? What do you want to know?

Task: Write a research question to guide your project about important places in your community.

Examples: - What places in my community have social, economic, and political value and add to my community's identity? - What places in my community contribute to its identity?

Scottish Context Examples: - What places in Edinburgh contribute most to the city's cultural identity beyond the obvious tourist attractions? - How do community spaces in Glasgow neighborhoods support local resilience and social cohesion? - What locations in the Scottish Highlands are most valued by local residents for their cultural and economic importance?

1.3.2 Step 2: Plan Your Data Collection

Now that you have your research question, consider what kinds of data you need to collect. Think about the who, what, when, where, and why of your data collection.

Task: Write five sample questions that you can use to collect data to answer your research question.

Example Questions: - What is the name of this place? - Why is it important to you? - What activities do you do at this place? - How often do you visit here? - Who is there with you? - How many people are typically there with you?

1.3.3 Step 3: Consider Data Types

Different types of questions collect different types of data (numbers, text, dates, rating scales, images). Planning your data types in advance will make analysis easier later.

Task: Write 5-8 survey questions, keeping in mind your research question and the types of data you want to collect about each location.

Sample Survey Questions Table:

Question	Options	Data Type
What is the name of this place?		Text
Where is this place?		Map
What kind of place is this?	School, Neighborhood, Park or open space, Library, Market, Shopping center, Religious space, Community center, Memorial or historic site, Restaurant, Performing Arts space, Other community space	Single select

Question	Options	Data Type
How do you interact with this space?	To spend time with family, To spend time with friends, To exercise, For recreation, To shop, To learn, To worship, Other	Multiple select
How important is this place to you?		Rating
How many times per week do you visit this place?		Number
What kinds of challenges might this place face?	Climate threats and adaptability, Funding challenges, Land use change and development, None	Multiple select
Upload a photo of this location		Image

Scottish Context Examples: - For "What kind of place is this?" you might add: Village hall, Distillery, Castle/Historic site, Farmers market, Pub, Community sports club, Gaelic cultural center - For challenges: "Highland depopulation," "Tourism pressure," "Language preservation needs," "Weather-related access issues"

1.3.4 Step 4: Determine Sample Size

Consider how many responses you need to answer your research question effectively. Also consider potential data bias - does your sample represent the population you're trying to understand?

Task: - Decide how many data points you need to collect and from how many different people - Set a goal as a class for how many data points you need to collect and how many people you should survey

Important Note: Be aware of data bias. If you only survey your classmates, your data will tell you what's important to people your age, but may not represent the broader community.

1.4 Part 2: Create the Survey

1.4.1 Step 5: Set Up ArcGIS Survey123

1. Go to the ArcGIS Survey123 website and sign in with your ArcGIS organizational account
2. Click **New survey**
3. For Blank survey, click **Get started**

1.4.2 Step 6: Configure Survey Information

1. On the ribbon, click the **Edit survey info** button
2. In the Edit survey info window, for Name, delete "Untitled survey" and type "Places of importance"
3. Click **OK**

1.4.3 Step 7: Add Survey Title and Description

1. Click **Survey title not set**
2. In the Survey header pane, delete the existing text and type "Places of importance in our community"
3. In the survey builder pane, click **Description content for the survey**
4. In the Survey description pane, delete the existing text and type:

   ```
   What places in the community have social, economic, or political value and add to my com
   ```

1.4.4 Step 8: Add Questions to the Survey

1.4.4.1 Add Text Question

1. In the Survey description pane, click the **Add** tab
2. Find the **Singleline text** question and drag it into the survey pane
3. On the Edit tab, for Label, type "What is the name of this place?"
4. For Validation, check the box for "This is a required question"

1.4.4.2 Add Map Question

1. In the Add pane, find the **Map** question type and drag it into the survey pane below the first question
2. For Label, type "Where is this place?"
3. For Hint, type: "Keep in mind with maps that some information is personal: you probably shouldn't share your home's location nor other personal locations. But you can safely share locations like your city or a major intersection."
4. For Drawing tools, make sure **Point** is selected
5. For Map and extent, type the address of your school and press Enter, or zoom and pan until you find your campus
6. For Default location, choose "Center of the map extent specified above"
7. For Validation, check the box for "This is a required question"

1.4.4.3 Add Additional Questions

1. Click the **Add** tab and add the rest of the questions you've formulated
2. Test various question types to see what will get you the best survey results
3. When you're finished adding your questions, at the bottom of the design pane, click **Save**

1.4.5 Step 9: Publish Your Survey

1. Review your work to ensure everything's in the correct order, spelled correctly, and properly configured
2. Click **Publish** two times
3. The survey may take a few minutes to publish

1.5 Part 3: Collect Data

1.5.1 Step 10: Share Your Survey

1. In the Survey123 site, click the **Collaborate** tab
2. For "Who can submit to this survey," check the box **Everyone (public)**
3. Click **Save**
4. For "Share this survey," copy and share the link, or click "Show the QR code" to allow your class to open the survey

1.5.2 Step 11: Gather Survey Responses

1. Have your classmates fill out and submit the survey
2. Monitor the number of responses to ensure you meet your data collection goal
3. Remember to consider data quality and potential bias as responses come in

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1.6 Part 4: Analyze Data

1.6.1 Step 12: Review Your Data

1. Click the **Data** tab
2. Examine both the map view and the attribute table
3. Click a point on the map to see the corresponding record highlighted in the attribute table

1.6.2 Step 13: Create a Heat Map

1. On the Data ribbon, click **Open in Map Viewer**
2. On the Settings toolbar, click the **Styles** button
3. Under "Pick a style," click **Heat map**, and click **Done**
4. Zoom in to your study area to examine the heat map patterns

Analysis Questions: - Does your heat map show that many students think the same places are important? - Are there many different places that are important to students? - What patterns do you notice in the spatial distribution of important places?

Scottish Context Analysis: - Are important places clustered in city centers or distributed across neighborhoods? - Do rural and urban areas show different patterns of meaningful places? - Are there differences between places important to different age groups or communities?

1.6.3 Step 14: Analyze Survey Responses

1. Close the Map Viewer window
2. On the ribbon, click the **Analyze** tab
3. Review how each question was answered
4. Look for patterns, similarities, and differences in responses

Analysis Questions: - What similarities do you notice about your class's answers? - What differences stand out? - Are there any surprising results? - Do the results vary by demographic characteristics?

1.7 Part 5: Draw Conclusions

1.7.1 Step 15: Evaluate Your Research Question

Return to your original research question and consider whether your data adequately answers it.

Questions to Consider: - Does your data answer your research question? - What places in your community appear to have the most social, economic, or political value? - What contributes to your community's identity based on your findings? - Are there gaps in your data that need to be addressed?

1.7.2 Step 16: Consider Data Limitations

Reflect on potential limitations in your data: - Who was surveyed and who was not? - What biases might exist in your sample? - What additional data might strengthen your conclusions?

Scottish Context Considerations: - Does your data represent different Scottish communities (urban/rural, Highland/Lowland)? - Are there cultural or linguistic factors that might affect responses? - How might seasonal variations affect the importance of certain places?

1.8 Part 6: Submit Your Work

1.8.1 Step 17: Document Your Results

Instead of sharing your map online, you will submit a comprehensive screenshot for assessment.

Task: Take a screenshot that includes your entire computer screen showing: 1. Your completed survey results and analysis 2. The date and time display from your computer 3. Your ArcGIS Survey123 interface with your data

Requirements for Screenshot: - Must show the complete screen (not just the browser window) - Date and time must be clearly visible in the system tray/menu bar - Your survey data and analysis should be displayed - Image should be clear and readable

File Naming: Save your screenshot as "YourLastName_MeaningfulPlaces_[Date].png"

1.8.2 Step 18: Written Reflection

Along with your screenshot, provide a brief written reflection (300-500 words) addressing: - Your research question and methodology - Key findings from your data analysis - Limitations of your study - How your findings relate to community identity and resilience - Specific examples relevant to Scottish communities if applicable

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1.9 Assessment Criteria

Your lab will be evaluated based on: - **Project Design (25%)**: Clear research question, appropriate methodology, well-designed survey questions - **Technical Execution (25%)**: Successful use of ArcGIS Survey123, proper data collection and analysis - **Data Analysis (25%)**: Meaningful interpretation of results, appropriate use of visualization tools - **Documentation (25%)**: Complete screenshot showing date/time validation, thoughtful written reflection

1.10 Extension Activities

For students who complete the basic lab early: 1. Compare your community's results with data from other regions 2. Investigate seasonal variations in place importance 3. Explore how different demographic groups value different types of places 4. Research how similar studies have been conducted in Scottish communities

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1.11 Conclusion

This lab demonstrates the complete process of spatial data collection and analysis, from research design through data interpretation. The skills you've learned can be applied to any research question involving spatial data and community analysis. Consider how similar methodologies might be used to study other aspects of community life, cultural heritage, or environmental issues in Scottish contexts.

References

Knuth, Donald E. 1984. “Literate Programming.” *Comput. J.* 27 (2): 97–111. https://doi.org/10.1093/comjnl/27.2.97.