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# GIS for Beginners

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## GIS for Beginners

*Given the wide ranges of uses that GIS has in education and society, what are the best ways to get started using GIS in teaching and research? Join Keith VanGraafeiland and Joseph Kerski as they guide you through some powerful yet easy-to-use tools and approaches in this engaging, hands-on workshop. We will focus on creating, symbolizing, classifying, and sharing maps using ArcGIS Online, how to manage your own content, how to find data and check its quality, and perform some simple spatial analysis.*

### Learning Objectives

Key concepts or skills

- Introduction to ArcGIS Online
- Publishing Content to ArcGIS Online
- Options for viewing and symbolizing data
- ArcGIS Online Content Item
- Sharing your work

### ArcGIS Named User Accounts

Your ArcGIS username and password for this workshop will be provided by your instructor. Please record them here:

Username \_\_\_\_\_

Password \_\_\_\_\_

Notes: This username and password will expire tonight.

This exercise requires an ArcGIS Named User account. A free ArcGIS Online Public account will not work.

## Crime Mapping

### Applying GIS Technology to Crime Analysis

GIS is an essential part of a crime analyst's toolkit—your means of creating valuable information for your officers in the field. By incorporating traditional law enforcement data with data such as demographics, infrastructure, and offender tracking, you can use GIS to transform information into actionable intelligence.

Crime mapping is used by analysts in law enforcement agencies to map, visualize, and analyze crime incident patterns. It is a key component of crime analysis and the CompStat policing strategy. Mapping crime, using Geographic Information Systems (GIS), allows crime analysts to identify crime hot spots, along with other trends and patterns.

([https://en.wikipedia.org/wiki/Crime\\_mapping](https://en.wikipedia.org/wiki/Crime_mapping))

In this exercise we are going to take on the role of a crime analyst in Tempe Arizona. Crime mapping data were obtained from [DATA.GOV](https://data.gov) (last accessed 05/10/2018).

Workshop data located in ArcGIS Online Group “GIS for Beginners” in EdUc Org.

<https://educ.maps.arcgis.com/>

<https://educ.maps.arcgis.com/home/group.html?id=238aee262a2a4ebfb6b738476da320de#overview>

Extract the data to “C:\Workshop\”

Resultant Directory Should Be: “C:\Workshop\ GIS for Beginners”

### **Step 1 – Create Content**

In ArcGIS Online – navigate to “Content”.

The content page is used to organize, access, browse, search, and work with content in ArcGIS Online. Using the following steps, we will create our own content for use by uploading a spreadsheet.

Let’s create a new folder called “Crime Mapping”. This will help us keep our content organized.

Select “Add Item” → “From my computer”.

Use the following inputs on the dialogue:

- File: “Police\_General\_Offense.csv”.
- Title: “General Offense Crime”
- Tags: “Crime, General Offense, EdUC 2018”.
- Checked: Publish this file as a hosted layer. (Adds a hosted layer item with the same name.)
- Locate features by: Coordinates
- Time Zone: (UTC-0:700) Arizona

Add an item from my computer

File:  
 Police\_General\_Offense.csv

Title:  
 General Offense Crime

Tags:  
    
 Add tag(s)

Publish this file as a hosted layer. (Adds a hosted layer item with the same name.)

Add an item from my computer

name.)

Locate features by:  
 Coordinates  Addresses or Places  None, add as table

Review the field types and location fields. Click on a cell to change it.

Field Name	Field Type	Location Fields
X	Double	Longitude
Y	Double	Latitude
OBJECTID	Integer	Not used

Time Zone: (UTC-07:00) Arizona

Once the information is populated, click “Add Item” to add the item to your ArcGIS Online.

A screen will display showing the content item for the feature layer that you just created and it will indicate “Creating Service”.

Home Gallery Map Scene Groups Content Organization

**General Offense Crime** [Edit](#)

Overview Usage Settings

[Edit Thumbnail](#)

Add a brief summary about the item. [Edit](#)

Feature Layer (hosted) by [Edit](#)

Created: May 14, 2018 Updated: May 14, 2018 View Count: 0

[Add to Favorites](#)

**Description** [Edit](#)

Add an in-depth description of the item.

**Terms of Use** [Edit](#)

Add any special restrictions, disclaimers, terms and conditions, or limitations on using the item's content.

**Comments** (0)

[Open in Map Viewer](#) [Open in Scene Viewer](#) [Open in ArcGIS Desktop](#) [Share](#)

**Item Information** [Learn more](#)

Low High

[Top Improvement: Add a summary](#)

**Details**

Source: Feature Service  
Created from: General Offense Crime, CSV

Once the service has been successfully created, additional options will appear.

## Step 2 – Visualize Data

One of the best ways to visualize the data that you just created is through the map viewer. Let's begin to visualize the crime data by "Opening in Map Viewer".

Home ▾ General Offense Crime New Map ▾

Details Add ▾ Basemap Analysis Save Share Print Directions Measure Bookmarks Find address or place

**Change Style**

General Offense Crime

- Choose an attribute to show
  - Show location o...
- Select a drawing style
  - Location (Single symbol)
  - Heat Map

**OPTIONS**

**SELECT**

**DONE** **CANCEL**

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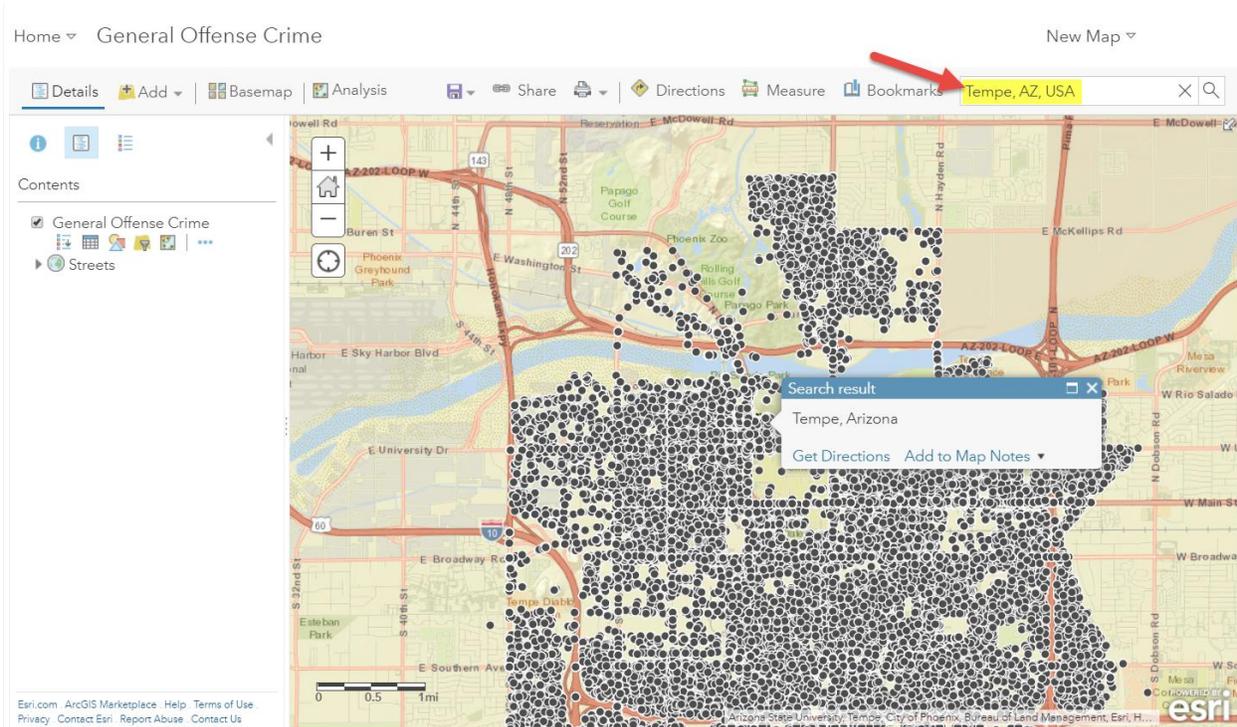
Esri, HERE, Garmin, FAO, USGS, EPA, NPS

Initial map view

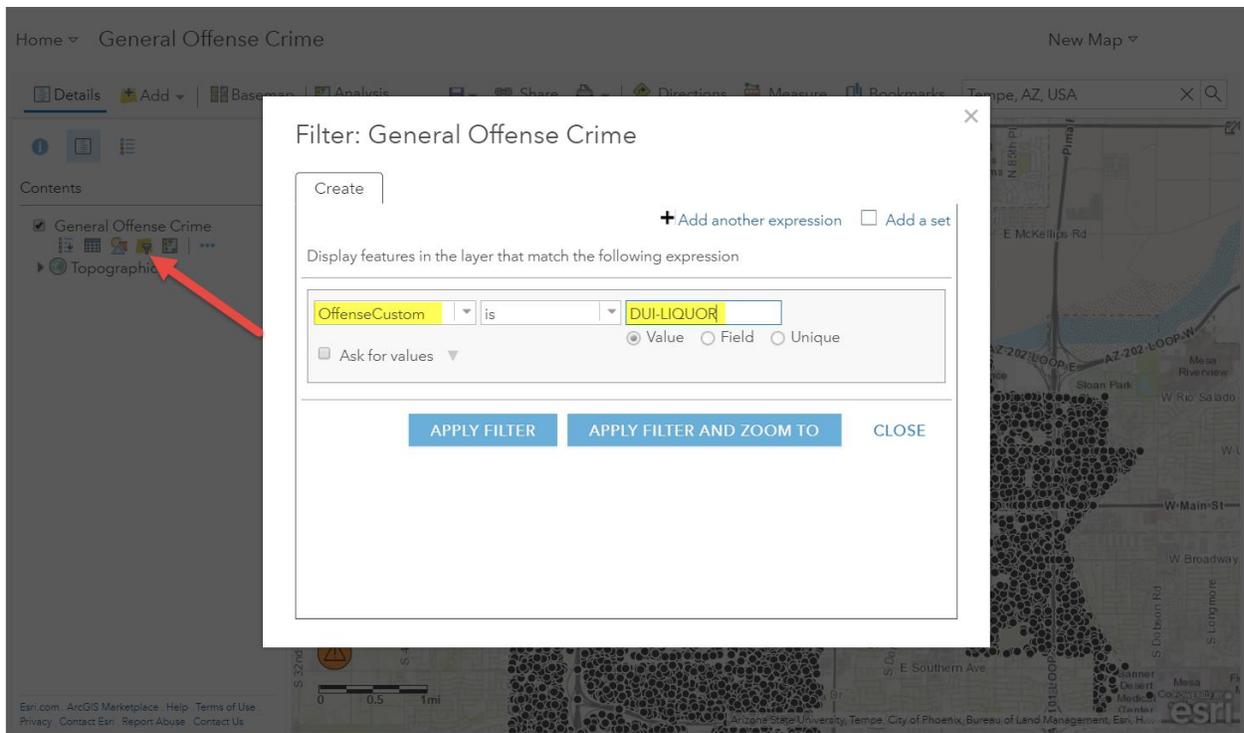
By Default, the mapping engine tries to symbolize the data using an attribute. Let's choose to "Show Location Only" and click "Done".

Give a few moments for the points to render. What do you notice?

Let's use our geocoder to locate "Tempe, AZ, USA".



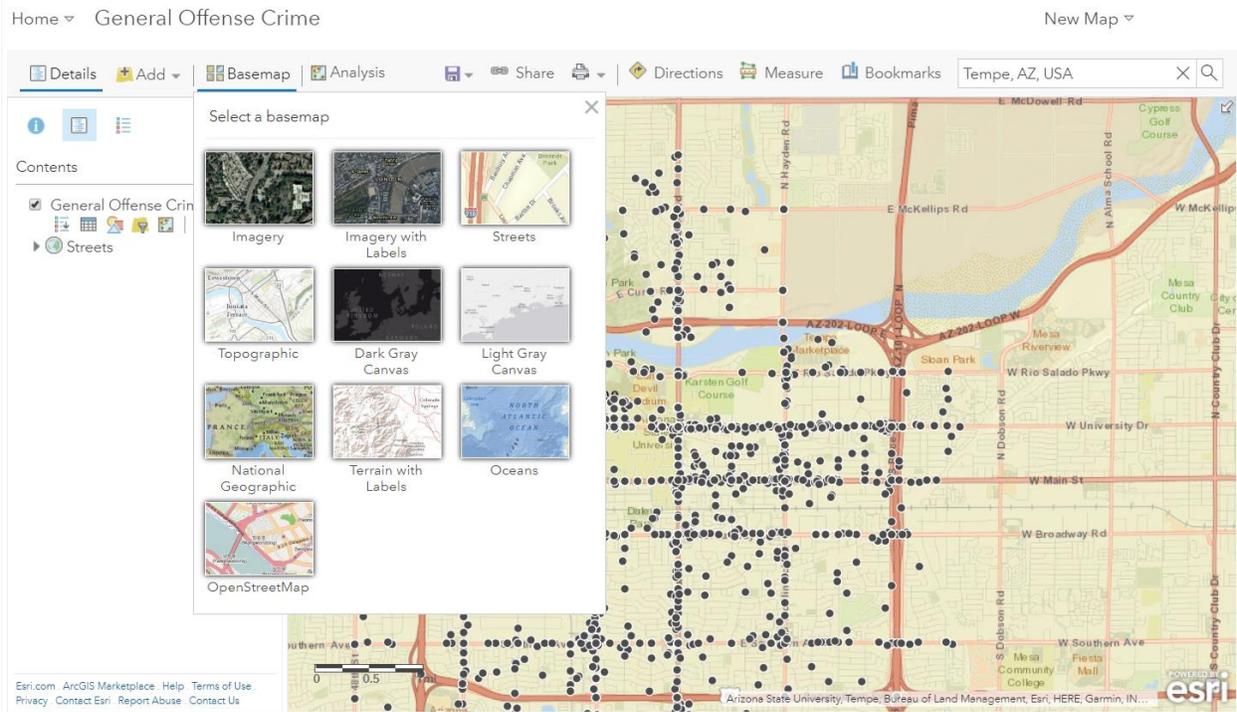
For the purposes of this crime analysis we are interested in only DUI related offenses. We can apply a filter to the feature layer to show us only these crimes.



*Apply filter on General Offense Crime*

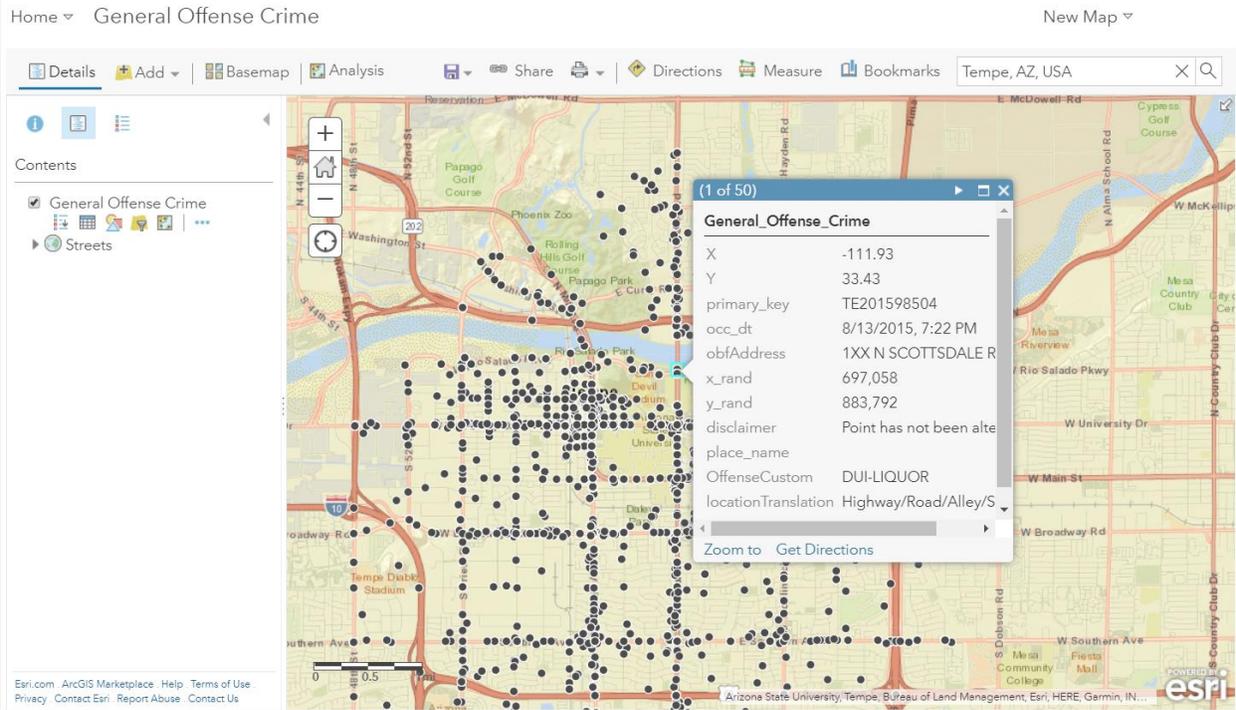
By applying the filter “Offense Custom is DUI-LIQUOR”, we have significantly reduced the number of points in our dataset.

Configuring Basemap - Since we’re looking at DUI’s – Driving Under the Influence related offenses, we should utilize our Streets basemap. Switching to this basemap will help bring some context to our mapping effort.



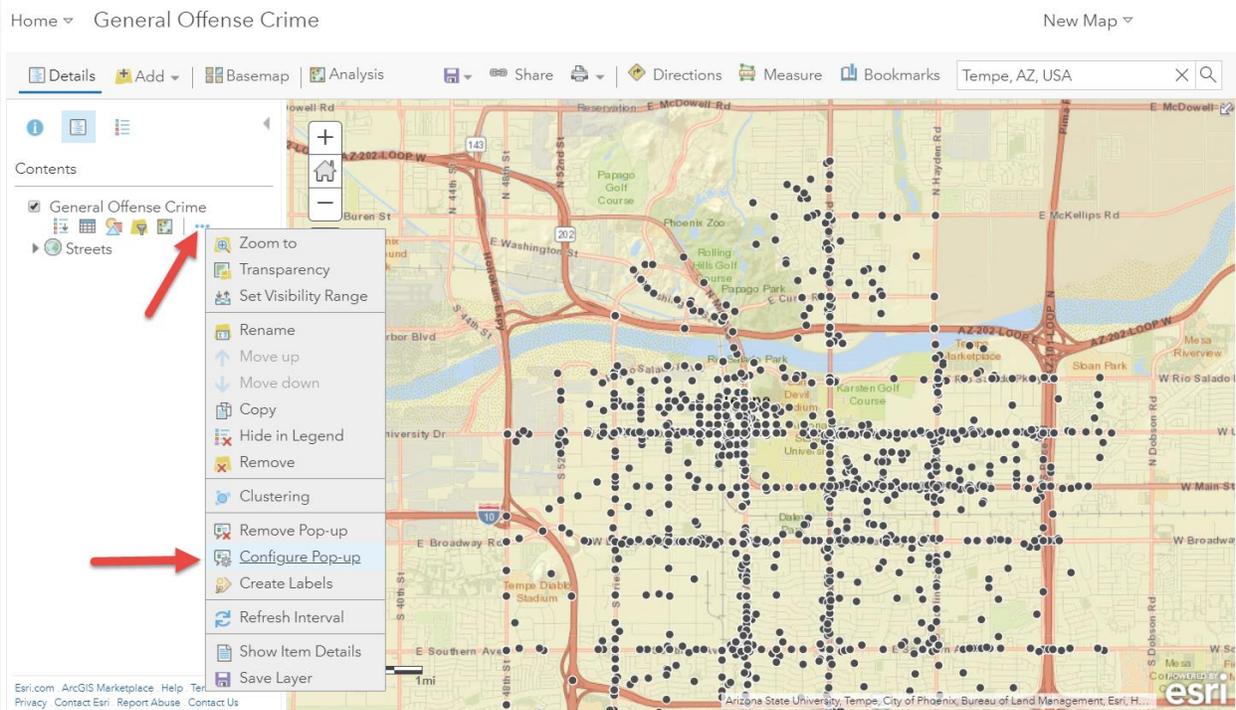
### Selecting a basemap

Configuring Pop-ups - When we interact with the map by clicking on a point, we can obtain specific information about that point. It should be clear and concise and easy to read. By default, the popups are set to display everything. In the following steps we are going to configure popups to be more informative.

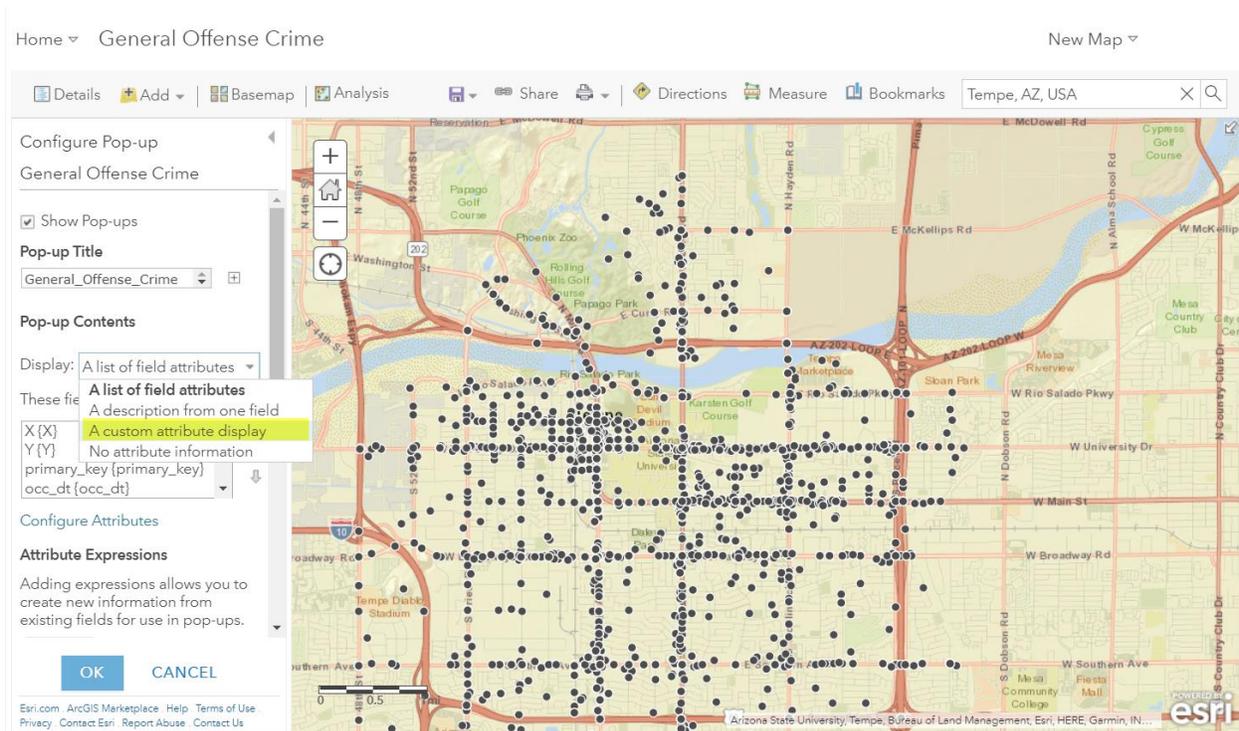


### Default Pop-up Configuration

You can configure pop-ups using the “More Options”



Click More Options for Configuring Pop-up



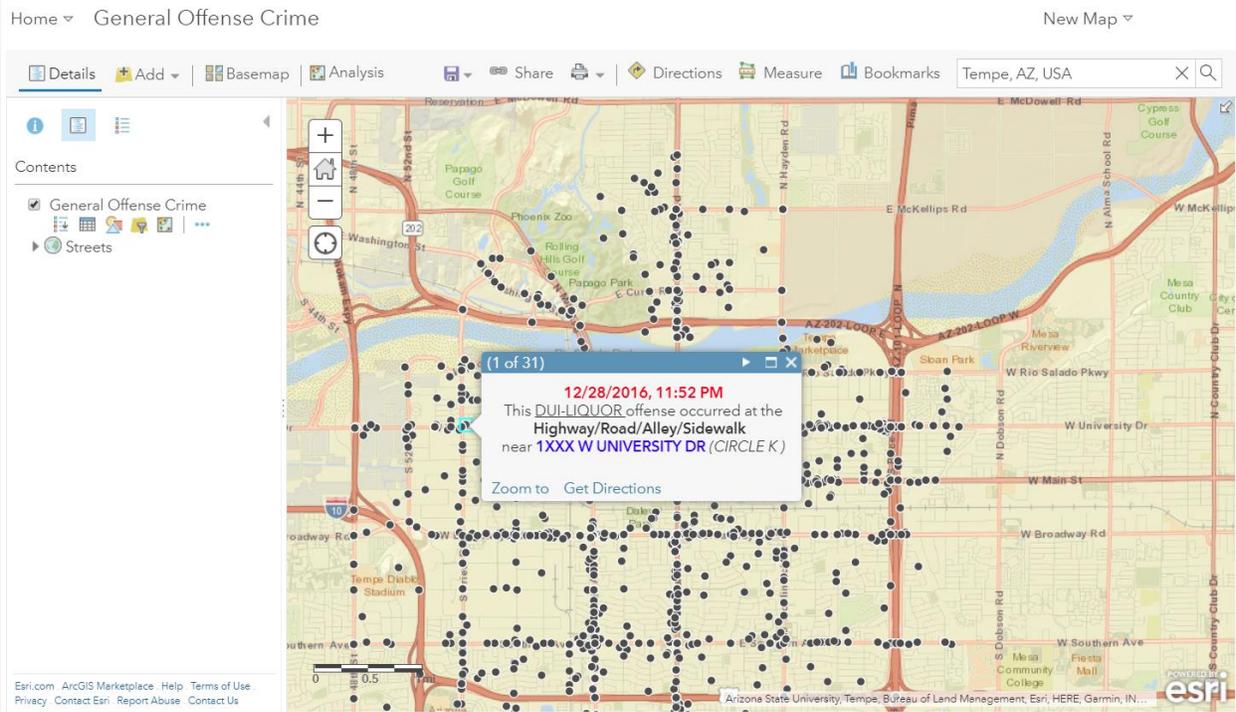
Configuring a custom attribute display

Select “A custom attribute display”

Paste the following into the dialogue:

**{occ\_dt}**  
This {OffenseCustom} offense occurred at the **{locationTranslation}**  
near **{obfAddress}** (*{place\_name}*)

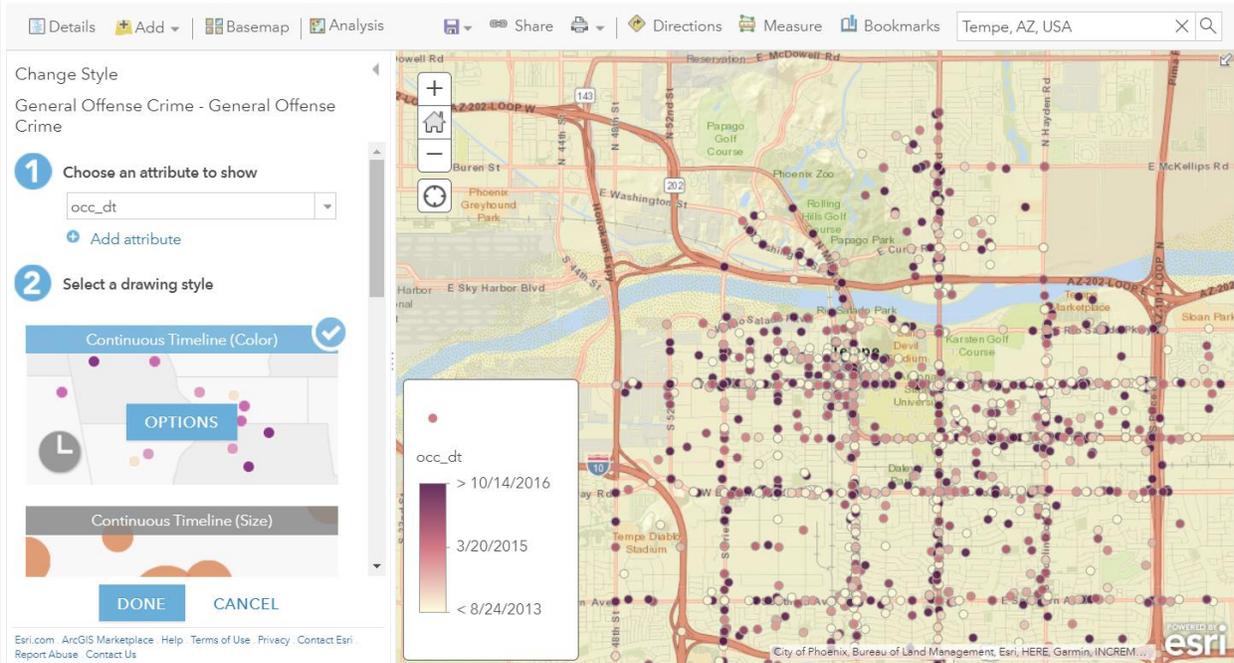
This was built using the attribute fields and the data dictionary from Tempe Open Data.  
(<https://gis.tempe.gov/general-offense-dictionary/>).



*Configured Pop-up Configuration*

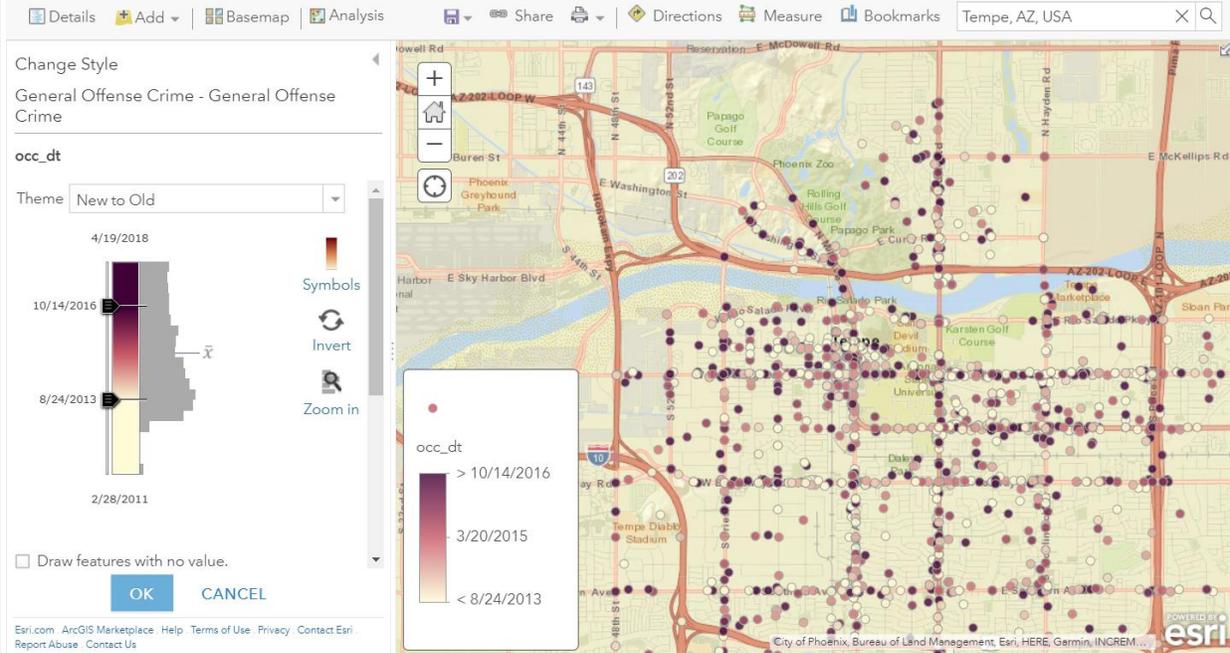
Configuring Style - We can also symbolize our data to help us understand it better by changing the style. The style can be altered to display an attribute, multiple attributes, or everything represented the same.

Let's change the style to show an attribute "occ\_dt". This field is the "Date on which the crime occurred or earliest possible date/time". (<https://gis.tempe.gov/general-offense-dictionary/>).



### *Symbolizing by attribute*

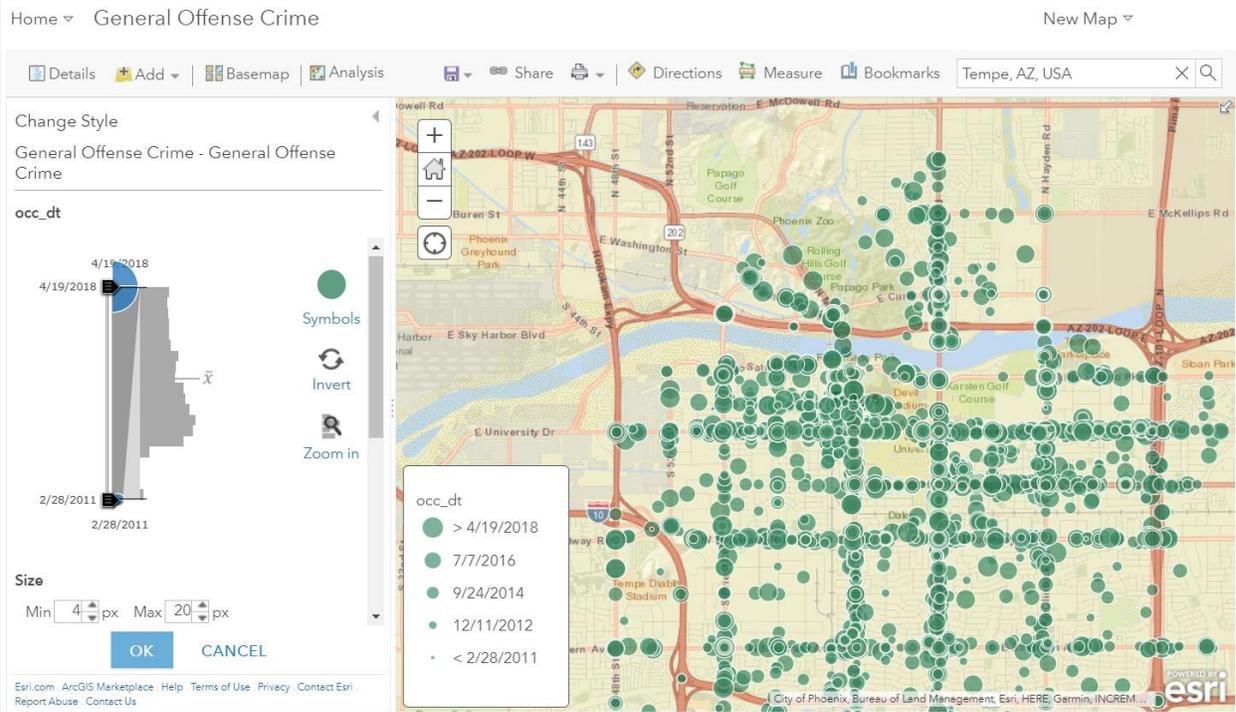
Notice that the appearance of the points has been altered to show the offenses that are more temporally distant to be lighter and the offenses that are closer in temporal proximity to be lighter. You can choose the “Options” to change the color ramp or visualize using a different theme.



*Symbolizing by Continuous Timeline (Color)*

Another opportunity to style your data is the Continuous Timeline (Size) option.

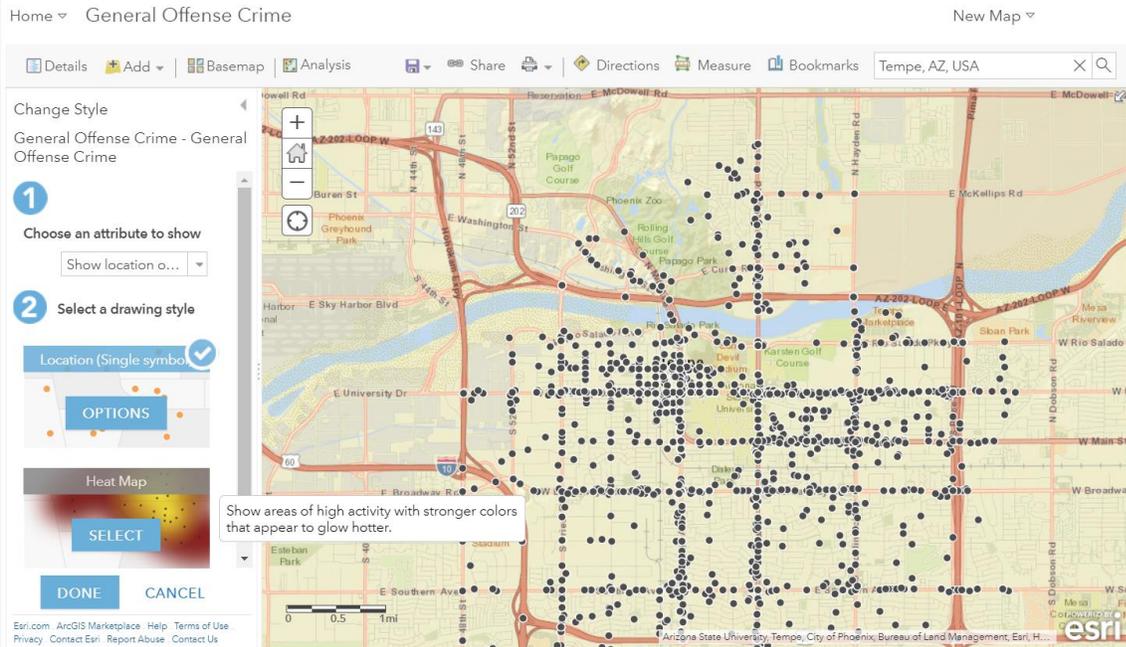
This style allows you to symbolize using proportional symbols, showing things that are closer in time as larger and things more distant in time as smaller.



Symbolizing by Continuous Timeline (Size)

These are helpful ways to visualize the information, but nothing glaring as far as trends is jumping out.

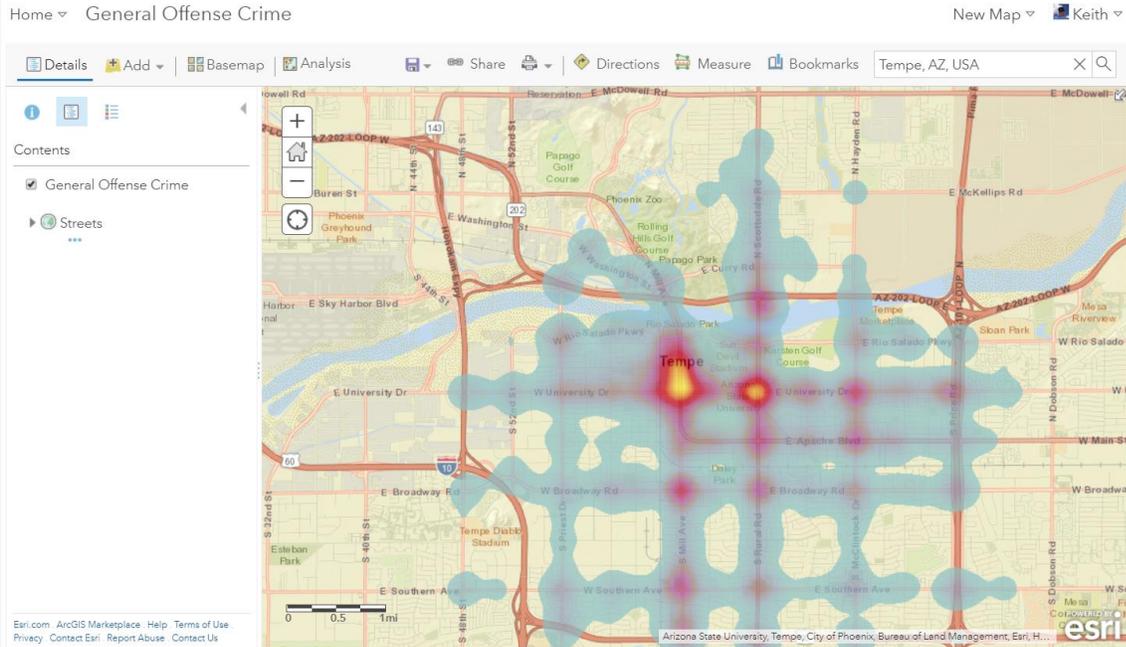
Next let's change the drawing style of the offense locations to a Heat Map. The heat map show areas with higher activity with stronger colors that appear to glow hotter. Select Heat Map and click "Done".



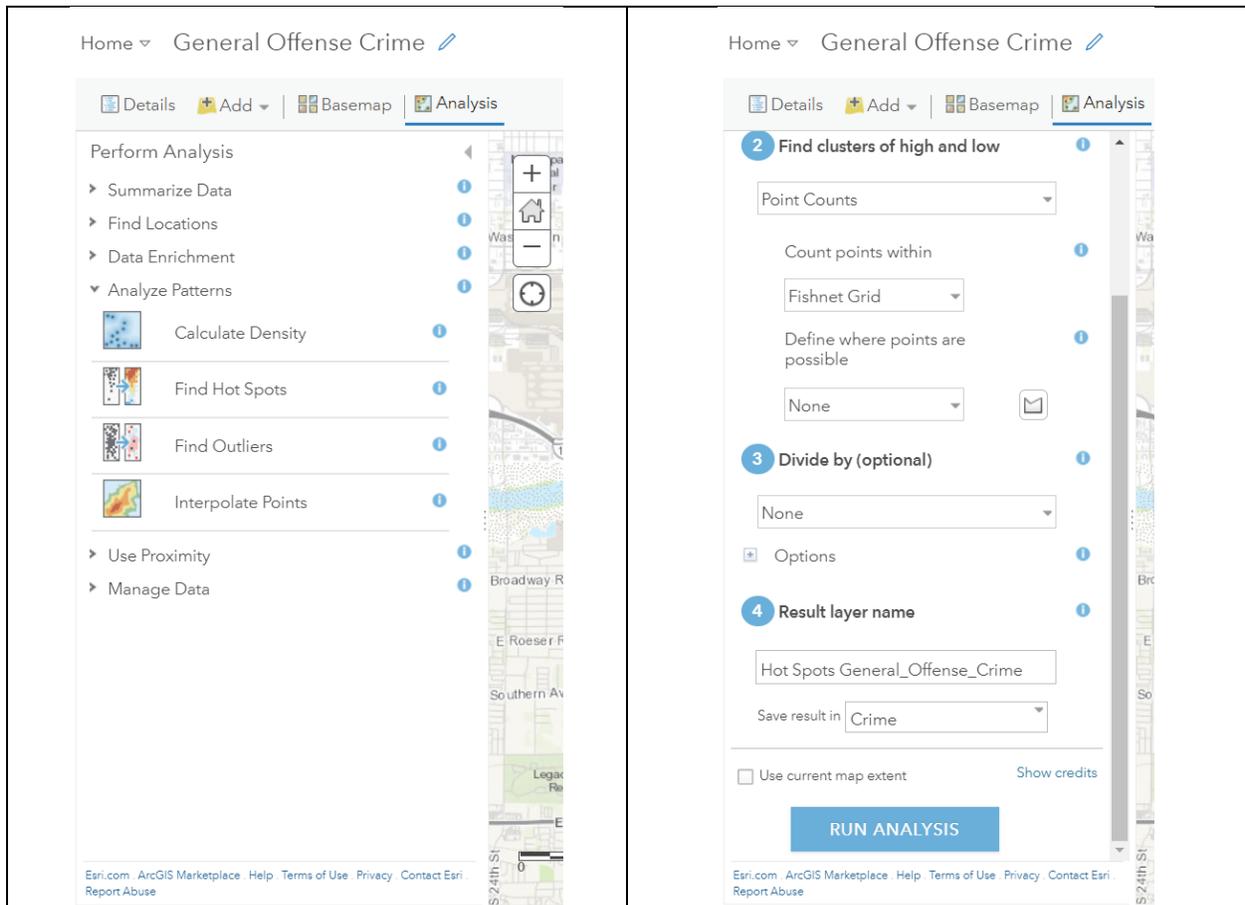
*Selecting the Heat Map style*

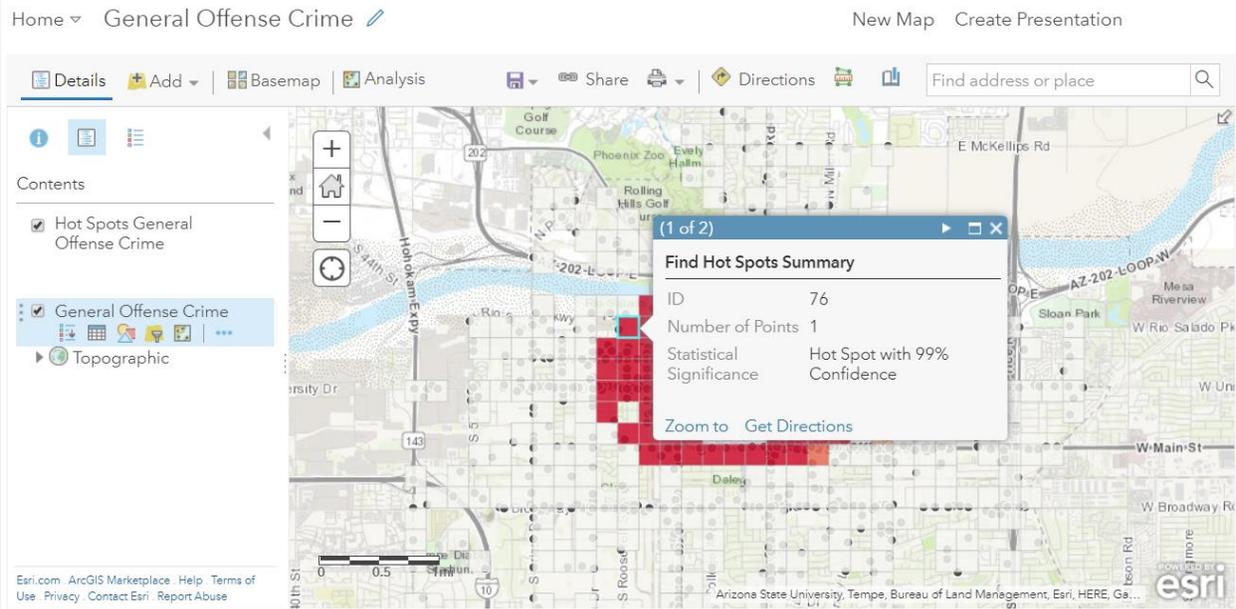
Observe the heat map. What can you notice?

Heat Mapping analyze point data to create an interpolated surface showing the density of occurrence. Each raster cell is assigned a density value and the entire layer is visualized using a gradient.



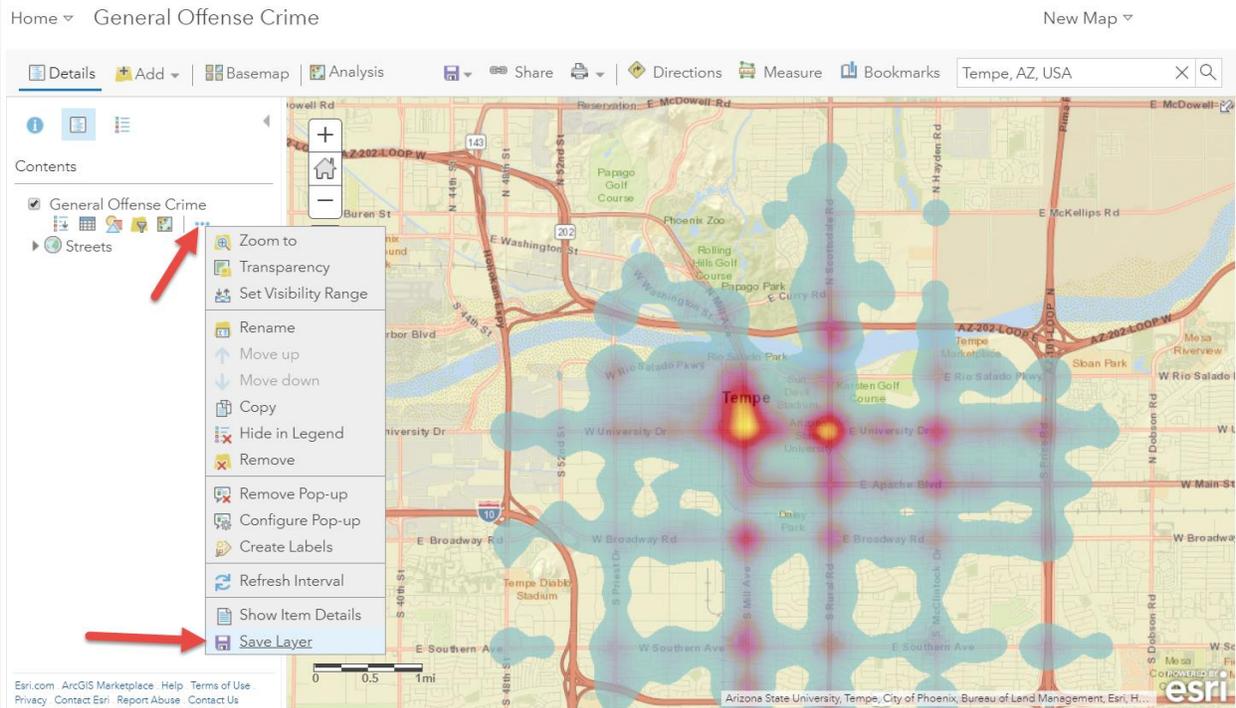
Hot Spot analysis is something that can help show trends in data. Hot spot analysis uses statistical analysis to define areas of high occurrence versus areas of low occurrence. Since hot spot areas are statistically significant, the end visualization is less subjective. Use the analysis tool “Analyze Patters” to “Find Hot Spots”.





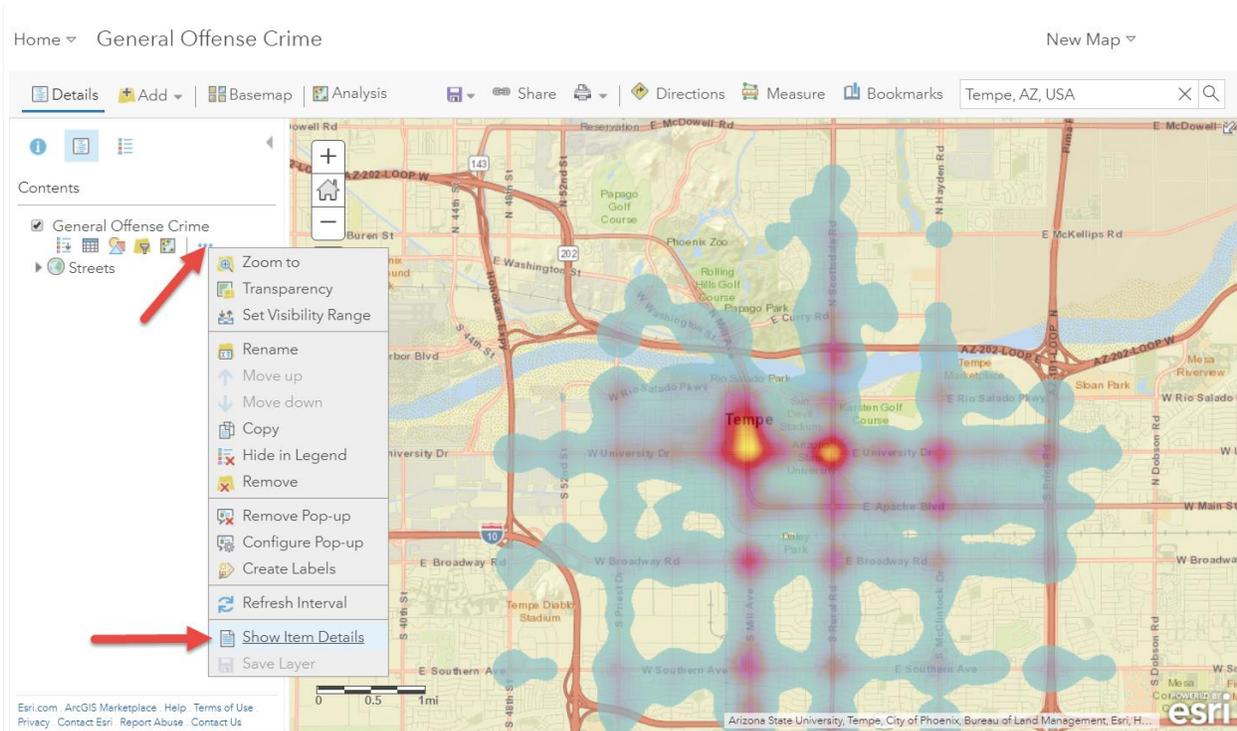
Resultant Hot Spot Analysis Layer

### Step 3 – Save and manage your layer



Saving layer "General Offense Crime"

Once you have saved your layer then you can access your item details.



#### Getting to Item Details Page

Each item in ArcGIS Online includes an item page with a variety of information. The Overview tab includes overview information about an item, such as a description, tags, data source information, creation date, size, and sharing status. It also includes a [status bar and interactive checklist](#) that help item owners and administrators provide more complete item information.

Item Details Page

We're going to edit the title, thumbnail, summary and description of the item and keep track of the Item Information progress bar along the way.

**Title:** DUI Offenses of Tempe

**Thumbnail:** C:\Workshop\GIS for Beginners\Crime\Thumbnail

**Summary:** DUI crimes mapped from the General Offense Crime Report Dataset for Tempe, AZ.

**Description:** Getting behind the wheel of a vehicle – car, truck, motorcycle or any other motorized vehicle – after consuming alcohol is a serious crime. Drinking and driving is referred to as driving under the influence (DUI) and involves operating a vehicle with a blood alcohol content (BAC) level of at least 0.08 percent.

The General Offense Crime Report Dataset includes criminal and city code violation offenses which document the scope and nature of each offense or information gathering activity. It is used to compute the Uniform Crime Report Index as reported to the Federal Bureau of Investigation and for local crime reporting purposes.

**Contact:** Noah Fritz - Police Analysis & Administrative Manager

The DUI crimes are a subset of the General Offense Crime Report Dataset. Information was last accessed from DATA.GOV on May 10, 2018. The [data dictionary](#) was imperative for understanding the attributes of the data.

Source Data from [DATA.GOV](https://data.gov).

**Terms of Use:** Access and Use Information: This dataset is intended for public access and use.

**Credits:** Noah Fritz - Police Analysis, City of Tempe, AZ

Home Gallery Map Scene Groups Content Organization ☰

## General Offense Crime ✎ Edit

Overview Data Visualization Usage Settings

✎ Edit Thumbnail



DUI crimes mapped from the General Offense Crime Report Dataset for Tempe, AZ. ✎ Edit

 Feature Layer (hosted) by

Created: May 14, 2018 Updated: May 14, 2018 View Count: 4

★ Add to Favorites

### Description ✎ Edit

Getting behind the wheel of a vehicle - car, truck, motorcycle or any other motorized vehicle - after consuming alcohol is a serious crime. Drinking and driving is referred to as driving under the influence (DUI) and involves operating a vehicle with a blood alcohol content (BAC) level of at least 0.08 percent.

The General Offense Crime Report Dataset includes criminal and city code violation offenses which document the scope and nature of each offense or information gathering activity. It is used to compute the Uniform Crime Report Index as reported to the Federal Bureau of Investigation and for local crime reporting purposes.

Contact: Noah Fritz - Police Analysis & Administrative Manager

**Open in Map Viewer** ▼

Open in Scene Viewer

Open in ArcGIS Desktop

Publish ▼

Create View Layer

Export Data ▼

Update Data ▼

Share

Item Information ? [Learn more](#)

Low High

*Final Item Details*

Last Updated on: [05/14/2018](#)



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