

EXERCISE 2

Create custom pop-ups and visualizations with Arcade



Introduction

Arcade provides great power to customize pop-ups. Using the new FeatureSet capability within the Arcade language, you can build a pop-up that queries other layers from your map and returns information from those layers to show in your pop-up. Traditionally, if you had multiple layers in your web map, you would need a separate pop-up for each layer or you would need to go back and re-process your data to get it all into one layer. Now you can use a single layer to display data from other layers in your map. This makes your maps easier to understand, and easier to navigate for your map reader.

Arcade also allows you to calculate values for each feature in a layer at runtime and use those values as the basis for a data-driven visualization. This is convenient when you need to derive new data values on data sources that update frequently, or on layers that you don't own.

Objectives

- Customize a pop-up window with Arcade Expressions
- Create a custom visualization using an Arcade expression

Prerequisites

- ArcGIS Online Organizational Account
 - User role or [equivalent](#)



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Table of Contents

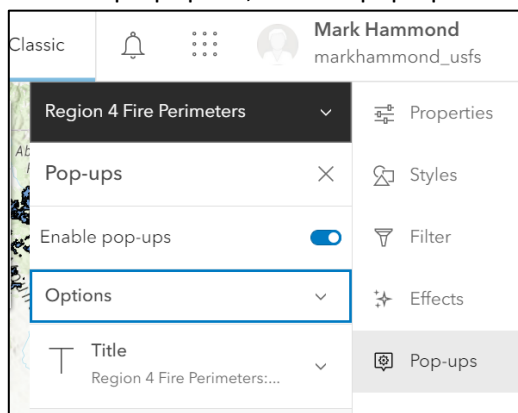
Part 1: Customize a pop-up with Arcade expressions	4
A. Evaluate the default pop-up window	4
B. Create attributes with Arcade expressions.....	5
C. Create a pop-up window with the new Arcade attributes	7
D. Use FeatureSets to create a new attribute expression.	8
Part 2: Create a custom visualization using an Arcade expression	11
A. Add a layer to the map	11
B. Create an Arcade expression to set the symbol size by map scale	12
C. Set the symbol style options.....	14

Part 1: Customize a pop-up with Arcade expressions

A. Evaluate the default pop-up window

In this step, you will evaluate the default pop-up window in the Region 4 Fires map for the Region 4 Fire Perimeters feature layer in the Map Viewer.

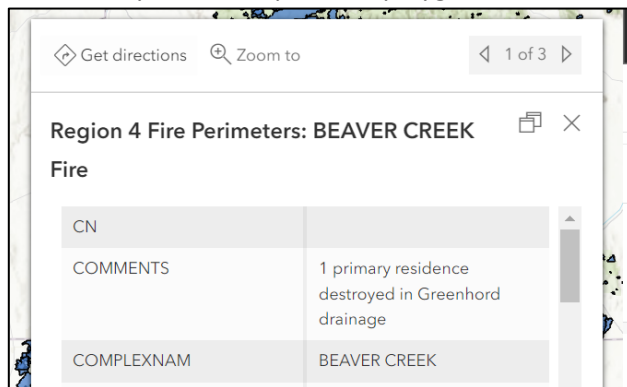
1. If necessary, open the Region 4 Fires map that you created in AGOL.
2. On the right-side **Settings** toolbar, click **Pop-ups**.
3. In the Pop-ups pane, confirm pop-ups are enabled.



4. Click the arrow on the right side of the Title box to expand it.
 - i. Notice the FIRENAME field is used in the title for the default pop-up window.



5. If necessary, in the map, click a polygon to view the default pop-up window.



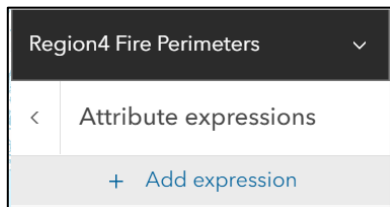
The pop-up window table has a lot of information that isn't necessary or readily understandable for most users. In the next steps you will modify this pop-up window with Arcade expressions.

6. Close the pop-up window.

B. Create attributes with Arcade expressions

First, let's create an attribute for the square mileage of each fire area because the unit of square miles is better understood by the scientific community than acres.

1. In the **Pop-Ups** pane, under **Options**, click **Attribute Expressions**.
2. In the Attribute Expressions pane, click **Add Expression**.



3. At the top of the page, next to Custom, click **Edit**.
4. Delete the existing text, type **Square Miles**, and click **Save**.

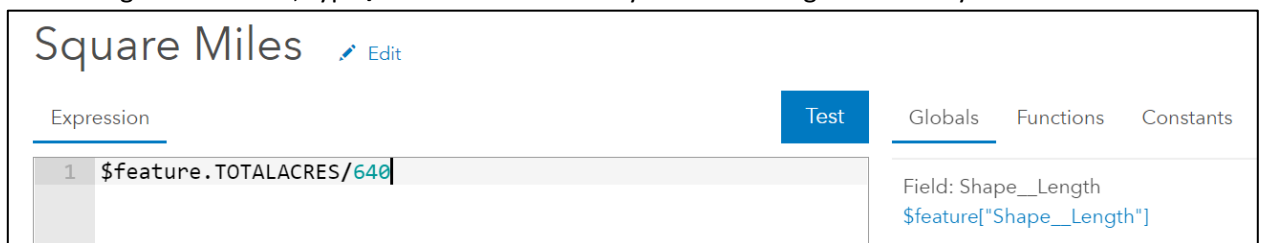


Naming the expression will help you identify what value this expression is creating.

5. In the **Globals** section, next to **\$feature**, click the arrow to expand the fields in the feature layer.
6. Click **\$feature.TOTALACRES** to add the global variable to the expression.



7. After the global variable, type **/ 640** to indicate that you are dividing the value by 640.



8. Click **Test** to see the created value.

Results	Messages
Result	Value
Result	1.125
Type	Number

We can adjust the expression so it rounds the result to 2 decimal places.

9. On the **Functions** tab, in the Filter by Name field, type **round** to filter the functions to the Round function.
10. In the Expression editor, highlight the existing expression, right-click the selection, and choose **Cut**.
11. In the Functions section, click **Round** to add the function to the expression.
12. In the Expression editor, highlight the **fieldOrValue** placeholder, right-click the selection, and choose **Paste**.
13. In place of numPlaces, type **2** for the value to be rounded to two digits.

The new expression should now read: **Round(\$feature.TOTALACRES/640, 2)**

Expression
1 Round(\$feature.TOTALACRES/640, 2)

14. Click **Test** to check the value of the attribute.

Result	Value
Result	1.13
Type	Number

15. Click **OK**.

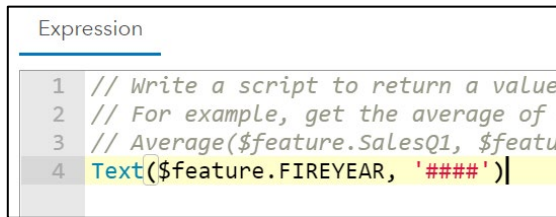
Next, we will create another attribute expression to remove the comma from the FIREYEAR field values.

16. In the Attribute Expressions pane, click **Add Expression** again.
17. Change the Expression title to **Remove comma from year**.
18. In the Functions section, click **Text** to add it to the expression.

Remove comma from year
Expression
1 // Write a script to return a value to show in the map
2 // For example, get the average of 4 fields:
3 // Average(\$feature.SalesQ1, \$feature.SalesQ2, \$feature.SalesQ3, \$feature.SalesQ4)
4 Text(fieldOrValue, '#,###')

19. In the Expression editor, highlight **fieldOrValue**.
20. In the Globals section, click **\$feature.FIREYEAR** to replace fieldOrValue.
21. In the Expression editor, delete the comma between the # symbols.

The new expression should now read: **Text(\$feature.FIREYEAR, '####')**

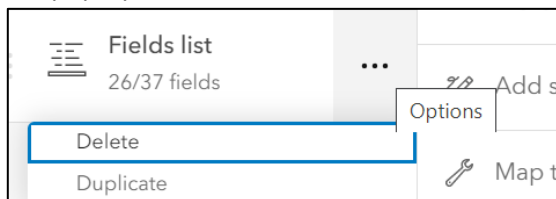


22. Click **OK**.

C. Create a pop-up window with the new Arcade attributes

In this section, you will customize the pop-up window in the Region 4 Fires map using the attributes you created.

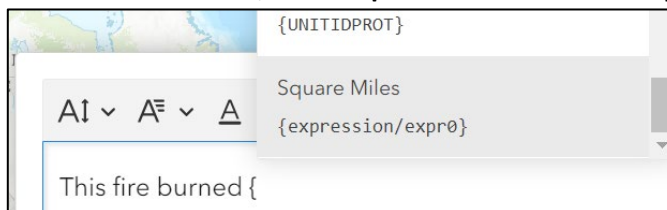
1. In the Attribute Expressions pane, click the **back arrow** to return to the Pop-Ups pane.
2. Next to Fields List, click the **Options** button ... and choose **Delete** to remove the fields from the pop-up window.



3. Click **Add Content** and choose **Text**.
4. If necessary, in the **Text** section, click the **Click Here To Add Text** field to open the text box.

In the text box, there is a message about how to access the fields using the { key. You will use this technique in the pop-up window.

5. In the text box, type **This fire burned {** to see the list of fields appear.
A pop-up window in a web map can contain a combination of text, fields, and Arcade expressions. You can use any combination of them to create the desired pop-up window.
6. From the list of fields, select **Square Miles** to add the square mileage value.

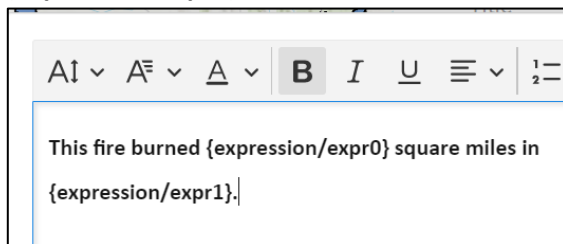


In the expression, the field will be shown as {expression/expr0}, indicating the first expression that you created is being used at the attribute. The title that you entered in the expression is important when adding more than one expression as they will be reported as their number when used. Without a title, determining which expression is being referenced in the pop-up window may be confusing.

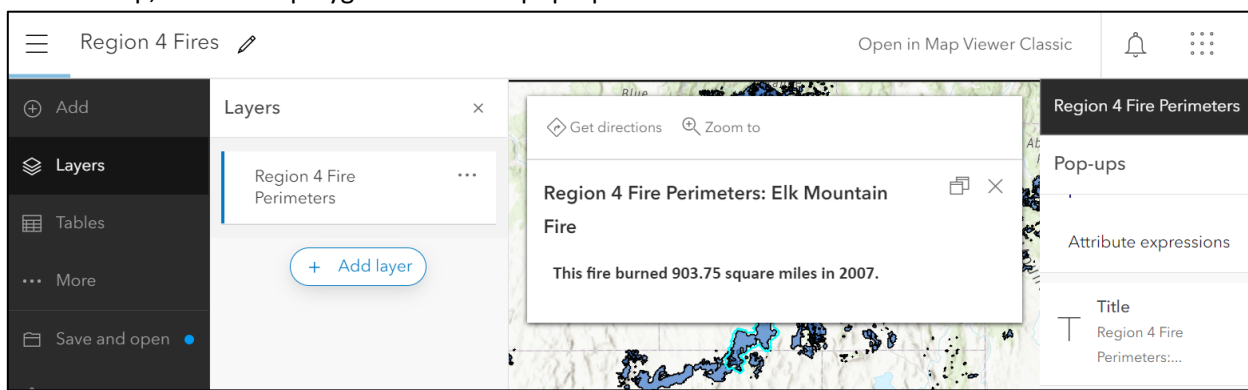
7. After {expression/expr0}, type **square miles in {** then select **Remove comma from year**.
The pop-up window now contains a combination of fields, text, and Arcade expressions. The output will not indicate where the information is obtained, but it will provide the map user with an informative pop-up window.

8. Add a period after {expression/expr1}.

The full expression should read: **This fire burned {expression/expr0} square miles in {expression/expr1}.**



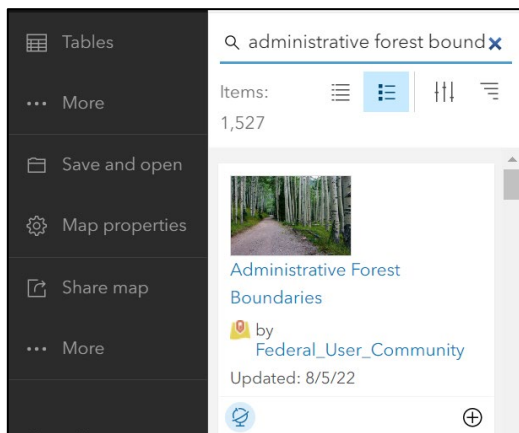
9. Click **OK**.
10. In the map, click a fire polygon to view its pop-up window.



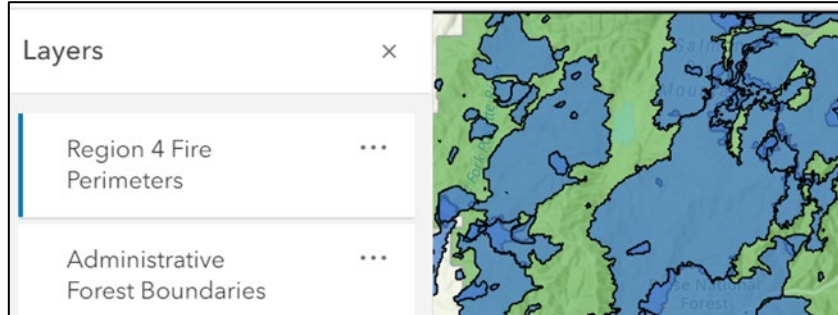
D. Use FeatureSets to create a new attribute expression.

FeatureSets allow us to reference multiple layers in an Arcade expression. In this section, you will add an administrative forest boundaries layer then use it with the fire perimeters layer to create a new attribute listing which forests intersect each fire perimeter. Then you will add the new attribute to the fire perimeter layer's pop-up.

1. In the Layers pane, click **Add Layer**.
2. Click the **My Content** down arrow and choose **ArcGIS Online**.
3. In the search field, type **administrative forest boundaries** then press **Enter**.
4. Click the **Administrative Forest Boundaries by Federal_User_Community** layer in the results.



5. Click **Add to map**.
6. In the Layers pane, click and drag the Administrative Forest Boundaries layer below the Region 4 Fire Perimeters layer so those layers have the same order in the map viewer.
7. In the Layers pane, click Region 4 Fire Perimeters so it is selected (a blue line will show on the left side).



8. On the right-side Settings toolbar, click **Pop-ups**.
9. In the Pop-ups pane, click **Attribute Expressions** then click **Add expression**.
10. Name the expression **Forest Names**.
11. Create an expression for the Administrative Forest Boundaries layer.
 - i. Create a variable that returns the FeatureSet of intersecting feature attributes:


```
var intersectLayer = Intersects(FeatureSetByName($map, "Administrative Forest Boundaries"),$feature)
```

Expression Values Explained:

var intersectLayer – specifies the intersecting features variable name.

Intersects – specifies the geometry function; one feature intersects the geometry of the other specified layer.

FeatureSetByName – Creates a FeatureSet from a Feature Layer based on its name within a map or feature service.

\$map,"Administrative Forest Boundaries" – identifies that the feature set is a layer named Administrative Forest Boundaries within the web map.

\$feature is the feature that is being selected in the Administrative Forest Boundaries layer that provides the initial spatial information.

- ii. Create a variable for the forest names:

```
var forestNames = ""
```

"" is an empty string for the initial value.

- iii. Loop through the feature set created and return the forest names from the feature set:

```
for (var f in intersectLayer){
```

```
forestNames = concatenate(forestNames,f.ForestName,'\n')
}
return forestNames
```

The '\n' in the concatenate function puts a line break between each forest name.

12. The full expression should read:

```
var intersectLayer = Intersects(FeatureSetByName($map, "Administrative Forest
Boundaries"),$feature)
var forestNames = ""
for (var f in intersectLayer){
    forestNames = concatenate(forestNames,f.ForestName,'\n')
}
return forestNames
```

13. Click **Test** and make sure the expression returns a forest name(s), not an error.

Forest Names [Edit](#)

Expression

Test

```

1 var intersectLayer = Intersects(FeatureSetByName($map, "Adm
2 var forestNames = ""
3 for (var f in intersectLayer){
4     forestNames = concatenate(forestNames,f.ForestName,'\n'
5 }
6 return forestNames
7

```

Results

Messages

Result	Value
Result	Payette National Forest Nez Perce-Clearwater National Forest
Type	String

14. Click **OK**.

15. In the Attribute Expressions window, click the **back arrow**.

16. In the Pop-ups pane, click the Text editor box shown in gray below.

Text

This fire burned

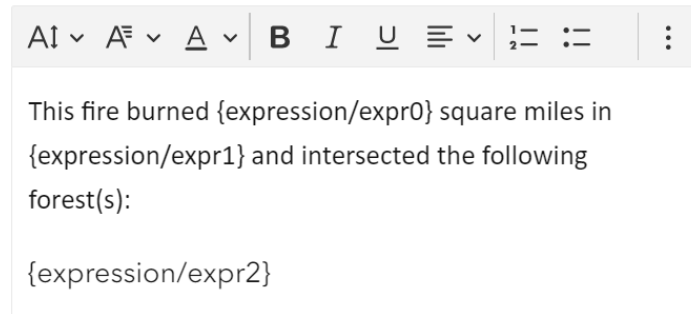
{expression...}

This fire burned

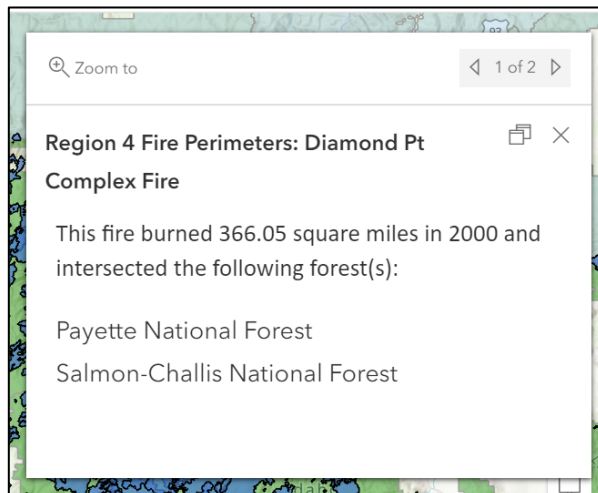
{expression/expr0} square

miles in {expression/expr1}...

17. In the text editor, delete the period at the end of the sentence and add the following text:
and intersected the following forest(s):
18. Hit **Enter** to put the cursor on the next line
19. Type **{** to bring up a menu of attributes.
20. Select the **Forest Names** attribute you just created.



21. Click **OK**.
22. Click a fire polygon in the map to inspect its pop-up.



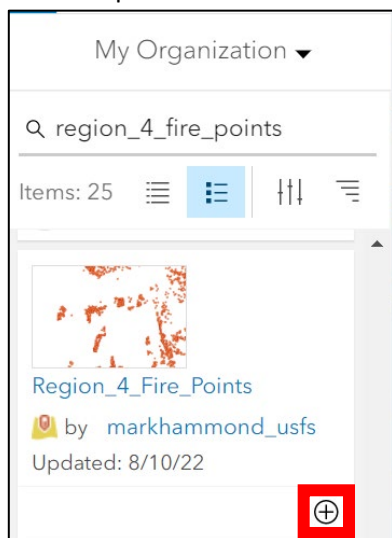
Part 2: Create a custom visualization using an Arcade expression

Next, you will create an Arcade expression to allow your layer's symbol sizes to adjust accordingly as your map viewer zooms in and out. You will use a version of the Region 4 Fire Perimeter layer which is converted to points.

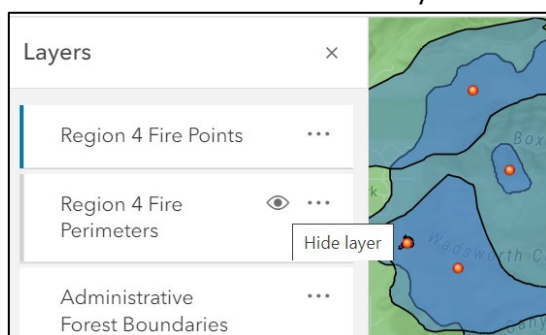
A. Add a layer to the map

1. In the Layers pane, click **Add Layer**.
2. Click the **My Content** down arrow then choose **My Organization**.
3. In the search field, type **region 4 fire points** then press enter.
4. Scroll down to the **Region_4_Fire_Points** layer.

5. Click the plus button to add it to the map.

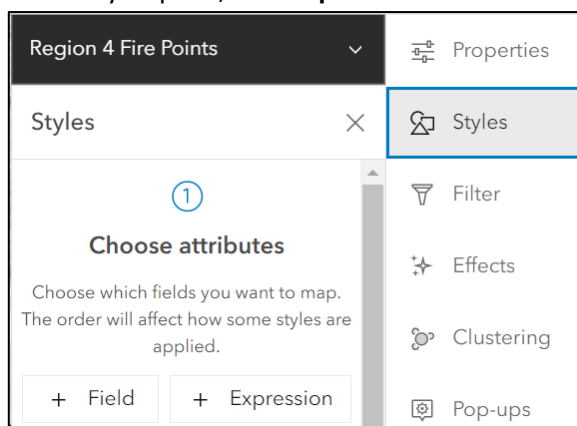


6. In the Layers pane, place your cursor on the left side of the Options ... button in the Region 4 Fire Perimeters box and click the eye button that appears. Doing this will hide the layer.



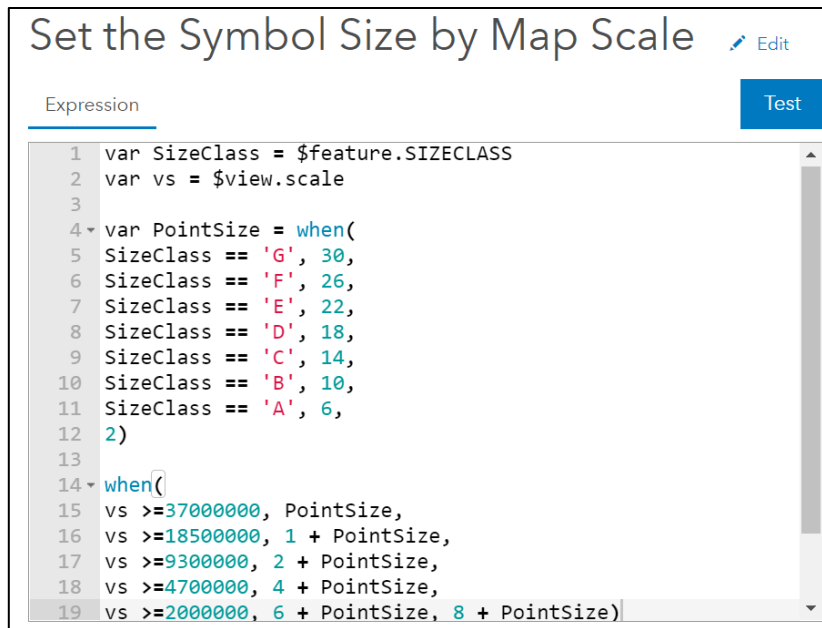
B. Create an Arcade expression to set the symbol size by map scale

1. On the Settings toolbar, click **Styles**.
2. In the Styles pane, click **Expression**.



3. Name your expression **"Set the Symbol Size by Map Scale"**.

The following steps will explain the code in the screenshot below that you will use.



4. In the expression editor, create variables for the \$feature.SIZECLASS and \$view.scale fields using the following code:

var SizeClass = \$feature.SIZECLASS

var vs = \$view.scale

5. Set the point sizes using this code:

```
var PointSize = when(
  SizeClass == 'G', 30,
  SizeClass == 'F', 26,
  SizeClass == 'E', 22,
  SizeClass == 'D', 18,
  SizeClass == 'C', 14,
  SizeClass == 'B', 10,
  SizeClass == 'A', 6,
  2)
```

Size class A is for the smallest fires and G is for the largest. For example, when SizeClass is equal to G, it gets a point size of 30.

6. Set the point sizes using addition as the map scale changes with this code:

```
when(
  vs >= 37000000, PointSize,
  vs >= 18500000, 1 + PointSize,
  vs >= 9300000, 2 + PointSize,
  vs >= 4700000, 4 + PointSize,
  vs >= 2000000, 6 + PointSize, 8 + PointSize)
```

For example, when the “vs” is > 37,000,000, keep the point size at what “PointSize” already specified (which is 30). When you zoom in and the “vs” is 18,500,000, increase the size by one (which would make

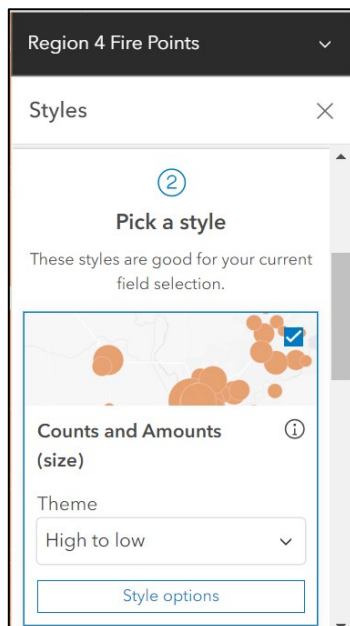
it 31). When the the “vs” is > 9,300,000 increase the size by two (which would make it 32), and so on. The maximum symbol size for our map will be $30 + 8 = 38$. The smallest size will be 2.

7. The combined expression should read:

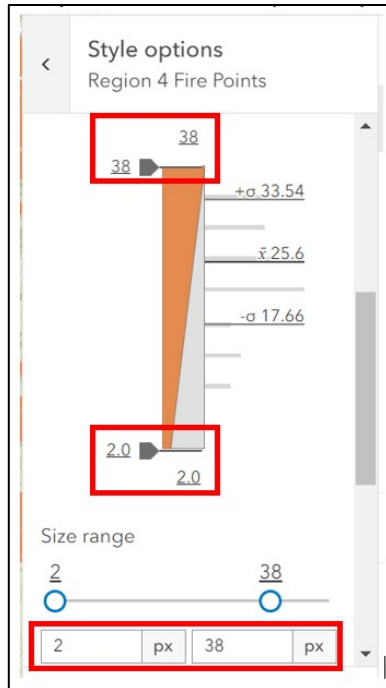
```
var SizeClass = $feature.SIZECLASS
var vs = $view.scale
var PointSize = when(
  SizeClass == 'G', 30,
  SizeClass == 'F', 26,
  SizeClass == 'E', 22,
  SizeClass == 'D', 18,
  SizeClass == 'C', 14,
  SizeClass == 'B', 10,
  SizeClass == 'A', 6,
  2)
when(
  vs >= 37000000, PointSize,
  vs >= 18500000, 1 + PointSize,
  vs >= 9300000, 2 + PointSize,
  vs >= 4700000, 4 + PointSize,
  vs >= 2000000, 6 + PointSize, 8 + PointSize)
```

C. Set the symbol style options

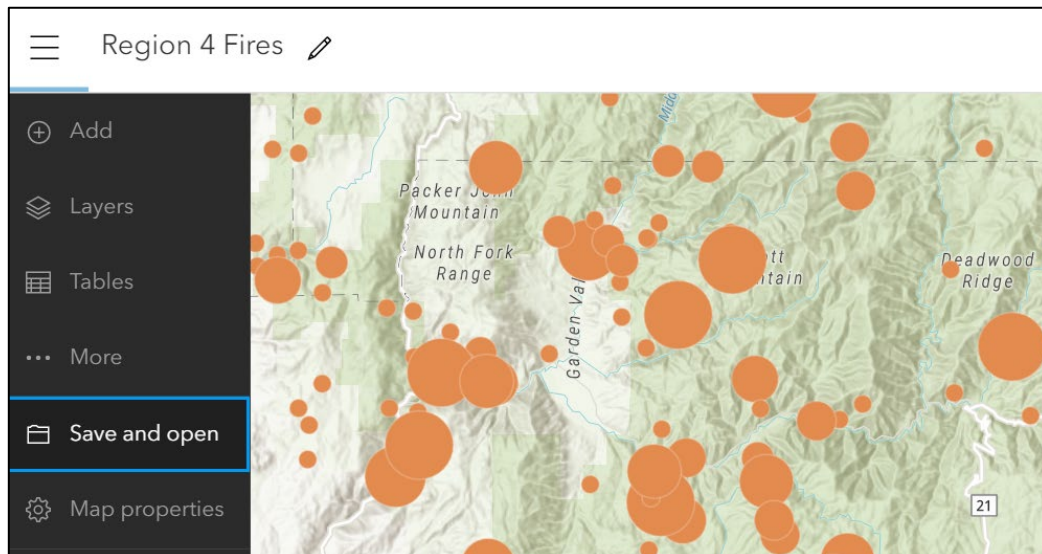
1. In the Styles pane, scroll to the **Pick a style** section.
2. In the Counts and Amounts box, click **Style options**.



3. Set your Max value as **38** (in three places) and the Min value as **2** (in three places).



4. Click **Done**.
5. Zoom in and out of the map and notice how the point sizes adjust according to the scales in your expression.



Congratulations! You have finished this exercise.