ArcGIS Online

Visualizing Data:
Tutorial 4 of 4

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Contents of This Tutorial

The Goal of This Tutorial

In this tutorial we will learn about more analysis tools that ArcGIS Online has to offer. By just creating a map to visualize the data can definitely aid in finding the story the data holds. But just visualizing a basic map, just looking at the raw data on the map can sometimes mislead you. By using analysis tools, you can better see the story and maybe even use the tools to answer specific questions you may have about the data. We will explore all of these ideas within this tutorial, Tutorial 4, as well as the previous tutorial, Tutorial 3. Before we get started, it is important to note that there is more than one way to get the same results, especially when it comes to using these analysis tools. Another important note is that for the purpose of this course, ensure that you check how many credits will be used for the analysis you choose. Each analysis should only use about 1 credit or less. For more information on credits, see Tutorial 1 or the ArcGIS Online help. Keeping this in mind, let's start by introducing you to some of the analysis tools.

The layout of this tutorial is a step by step walkthrough. There is also a bonus section if you wish to reach ahead and try something interesting.

By doing this tutorial, you will learn the basics of ArcGIS Online analysis tools and how to use them.

Quick Access

A Brief Introduction to Some Tools

Summarize Data

Aggregate Points

To use this tool, you must have a layer made of points. This tool will count and summarize any points that fall within the area you choose. You have the option of adding statistics that will calculate the sum, mean, minimum, maximum, or standard deviation of the points within the area. The statistics will then be added to the new layer. The result is a new layer with a point or polygon representing the number of point and statistics of the points that fall within the specified areas. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_B222A3C999C74BBBA717278E05279DBF

Summarize Nearby

This tool creates a new layer that contains the summarized features that are within a specified distance of another layer you choose. You can calculate the number of nearby points as well as statistics such as Sum, Average, Minimum, Maximum, and Standard Deviation. The distance you specify can either be a Line Distance, a Driving Distance, or a Driving Time. The Driving Distance and Driving Time both use a large amount of credits, so it may be more efficient to use Line Distance. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_B222A3C999C74BBBA717278E05279DBF

Summarize Within

This tool is similar to the "Summarize Nearby" tool. The difference is that instead of specifying a distance, the features are summarized if they fall within the boundaries of the features in another layer that you specify. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_B222A3C999C74BBBA717278E05279DBF

Analyze Patterns

Find Hot Spots

This tool determines if there is any statistically significant clustering of the points in a layer you choose to do the analysis on. You can either choose an analysis field, which will give a result of the calculated clustering as well as the analysis fields you chose. If you do not choose an analysis field, this will give a result of the clustering as well as the number of points that fall within each section that the tool creates for the Hot Spot Analysis. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_B36DE51FB18B4D609C65E36B37DC0C0E

Interpolate Points

This tool needs a point feature layer to work. It allows you to predict values at new locations based on values from a collection of points. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_B36DE51FB18B4D609C65E36B37DC0C0E

Calculate Density

This tool calculates the density of features given a specified layer. This tool is compatible with layers of point feature type as well as line feature type. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_B36DE51FB18B4D609C65E36B37DC0C0E

Use Proximity

Create Buffers

This tool needs either a point feature layer or a line feature layer. The tool creates a new layer made of polygon features that surround the features in the chosen layer based on a specified distance. Essentially you create a bubble around each of the features. For more information on this tool, follow this link: http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_2EF24808665E4E028F9AED9E438D9E9D

Create Drive-Time Areas

This tool needs a point feature layer to work. This tool creates a new layer that has area features based on a specified driving distance or driving time from each point feature. Essentially this tool creates buffers based on driving distance or time instead of a specified line distance like the Buffer tool. This tool uses a significant amount of credits. For more information on this tool, follow this link:
http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_2EF24808665E4E028F9AED9E438D9E9D

Find Nearest

This tool can only support up to 1000 locations. This tool finds the nearest locations of another specified layer to the layer you chose. This can be based on a specified line distance, driving distance or driving time. The line distance option may be more efficient as it uses significantly less credits. You can also limit the number of nearest locations calculated or show all locations ordered from nearest to furthest away. For more information on this tool, follow this link:
http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_2EF24808665E4E028F9AED9E438D9E9D

Plan Route

This tool does exactly as it seems it would do. The tool uses a set of stops and the number of vehicles that you specify and determines an efficient route. This tool uses a significant amount of credits. For more information on this tool, follow this link:
http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm#ESRI_SECTION1_2EF24808665E4E028F9AED9E438D9E9D

Outline of Process

Summarize Data

1) Add Data to New Map
2) Aggregate Contaminated Sites
3) Edit and Save the Map

Analyze Pattern

1) Add Data to New Map
2) Find Hot Spots of contaminated sites for all of Canada
3) Edit and Save the Map
4) Add Data to New Map
5) Find Hot Spots of Contaminated Sites for all of Ontario
6) Edit and Save the Map

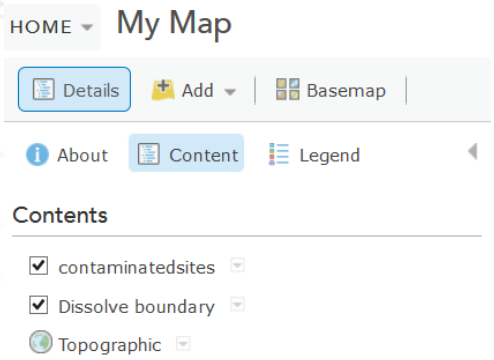
Use Proximity

1) Add Data to New Map
2) Buffer the Contaminated Sites
3) Derive New Locations
4) Edit and Save the Map

Tools: Summarize Data

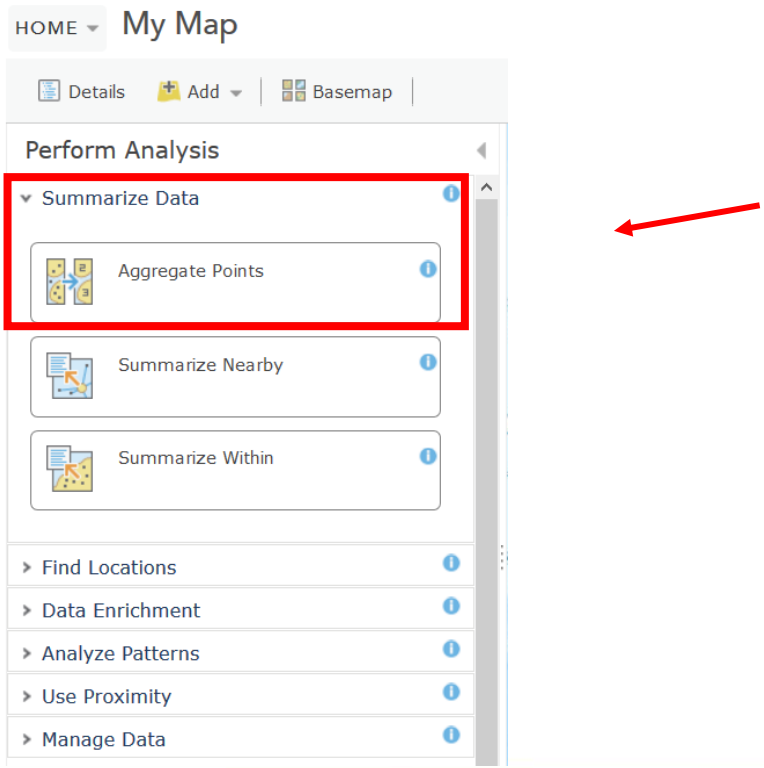
Step 1

First, create a new map and add the dissolved boundaries as well as the contaminated sites.



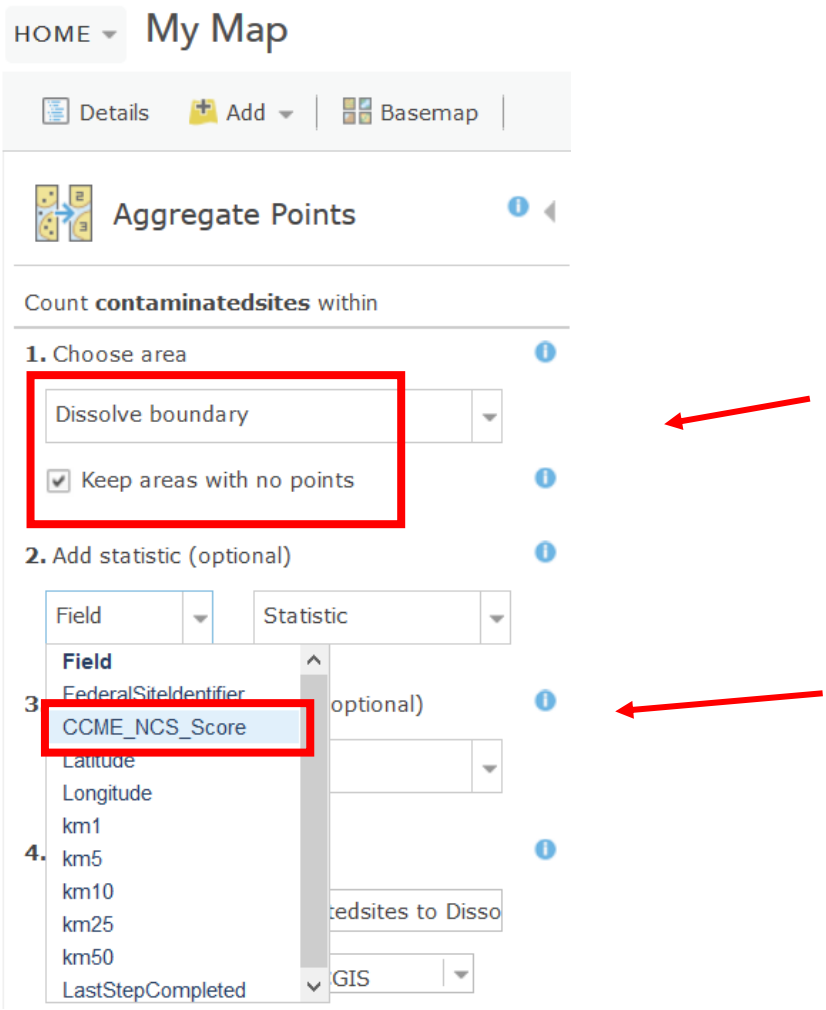
Step 2

We will now try using the "Aggregate Points" tool to analyze the Contaminated Sites based on the provinces. Click on the contaminated sites layer and choose "Perform Analysis" -> "Summarize Data" -> "Aggregate Points"



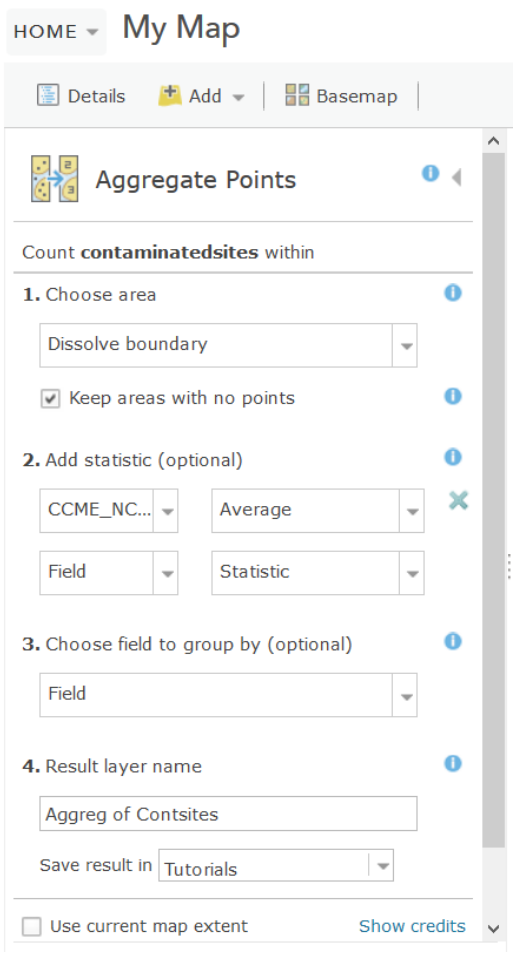
Step 3

We want to choose the Dissolve Boundary layer as the first step. In doing this, the tool will summarize the points based on the provinces in the Dissolve Boundary layer. We also want to check the box marked “keep areas with no points”. This means that the result will not only return the provinces with the summarized data, but also provinces that do not have any contaminated sites. We will use the optional statistic of the Average Score (CCME_NCS_Score) of the Contaminated Sites in the provinces.



Step 4

The dialogue box should look like the one below. Make sure that the box for using the map at its current extent is unchecked.

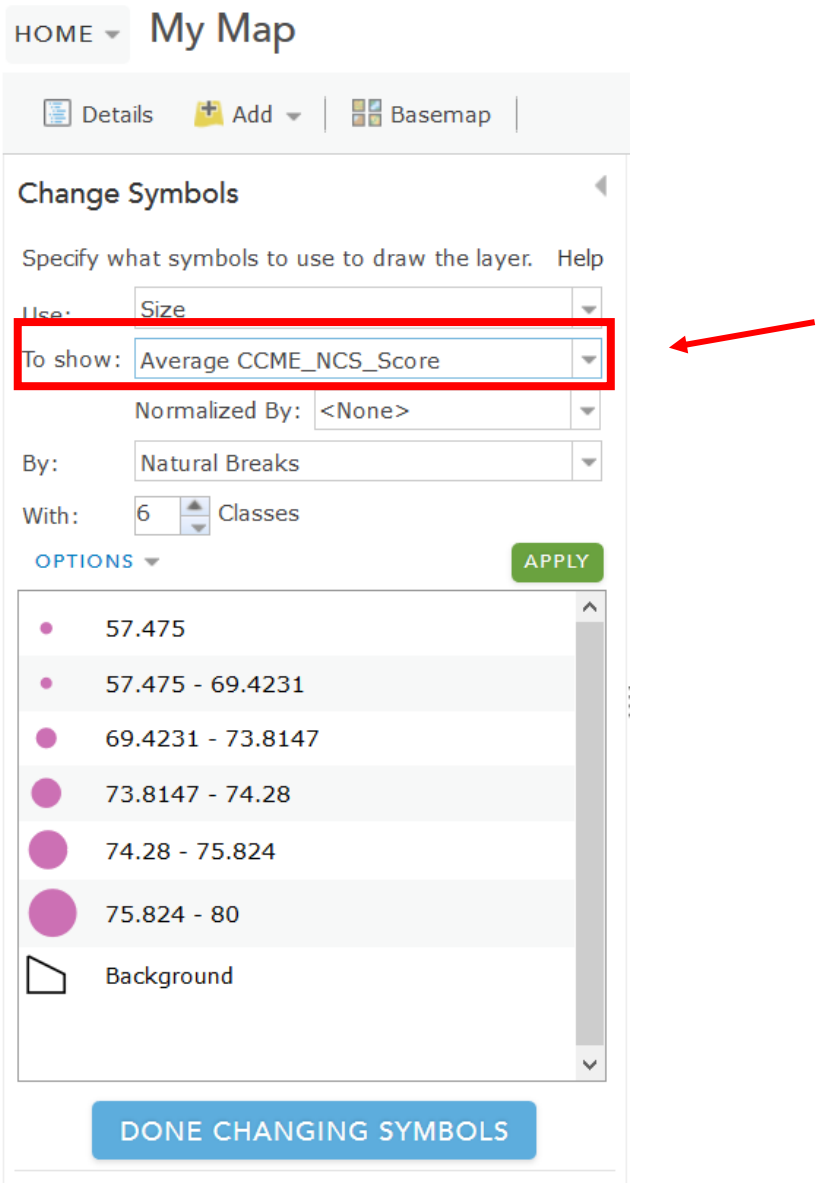


Step 5

Before we continue with the analysis, ensure that the credits needed are under or around 1 credit.

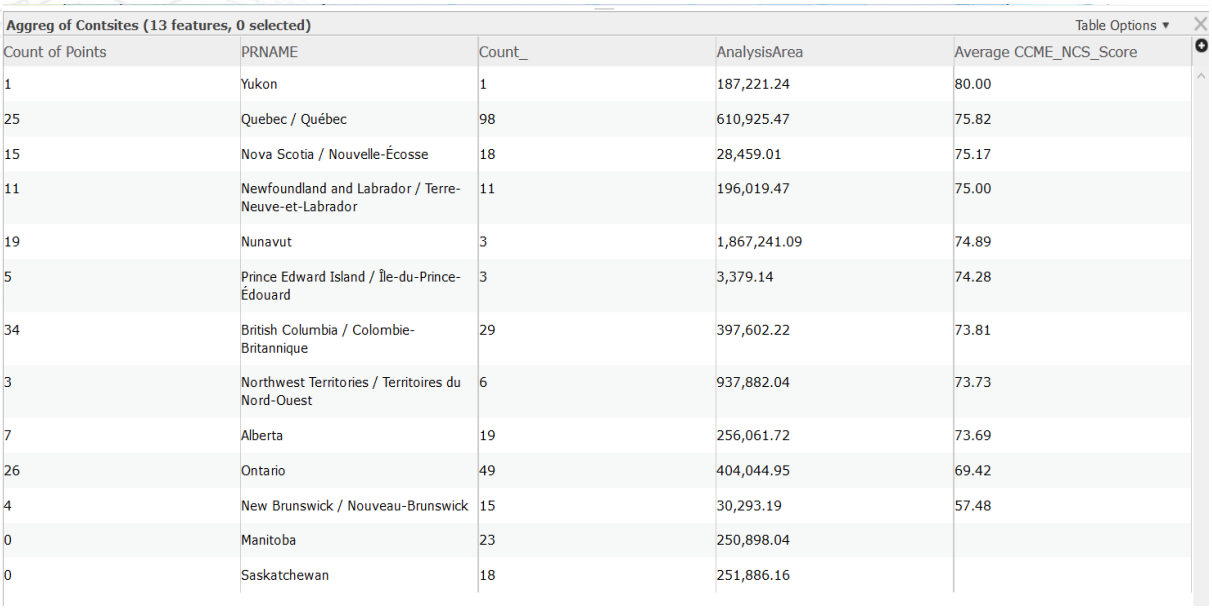
Step 6

Once you have run the analysis, change the symbology of the new layer so that the symbols represent the average scores.



Step 7

Show the table for this new layer. Make sure you understand what is being displayed in your map and what each of the columns in the table mean.



Aggreg of Contsites (13 features, 0 selected) — Table Options

Count of Points	PRNAME	Count_	AnalysisArea	Average CCME_NCS_Score
1	Yukon	1	187,221.24	80.00
25	Quebec / Québec	98	610,925.47	75.82
15	Nova Scotia / Nouvelle-Écosse	18	28,459.01	75.17
11	Newfoundland and Labrador / Terre-Neuve-et-Labrador	11	196,019.47	75.00
19	Nunavut	3	1,867,241.09	74.89
5	Prince Edward Island / Île-du-Prince-Édouard	3	3,379.14	74.28
34	British Columbia / Colombie-Britannique	29	397,602.22	73.81
3	Northwest Territories / Territoires du Nord-Ouest	6	937,882.04	73.73
7	Alberta	19	256,061.72	73.69
26	Ontario	49	404,044.95	69.42
4	New Brunswick / Nouveau-Brunswick	15	30,293.19	57.48
0	Manitoba	23	250,898.04	
0	Saskatchewan	18	251,886.16	

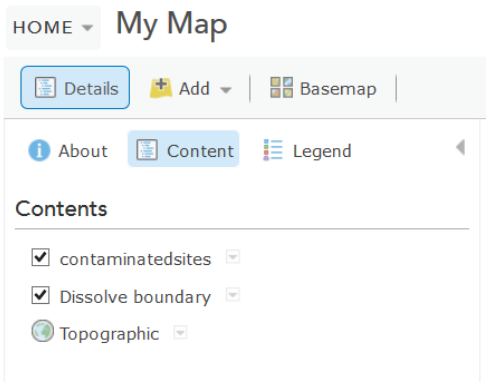
Step 8

Now, save your map. What can you conclude by looking at the map? How does this coincide with what is in the table for the layer? Try displaying the layer using the number of Contaminated Sites found in each province instead of the average score. Does the meaning of the map change? If so, how? If not, why?

Tools: Analyze Patterns

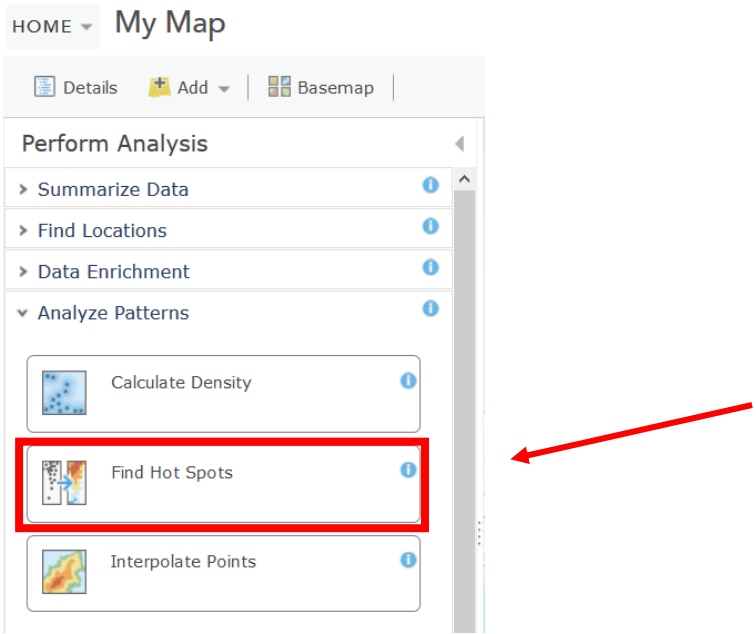
Step 1

Now we will use another tool to analyze the Contaminated Sites. First, create a new map and add the dissolve boundary layer as well as the contaminated sites layer.



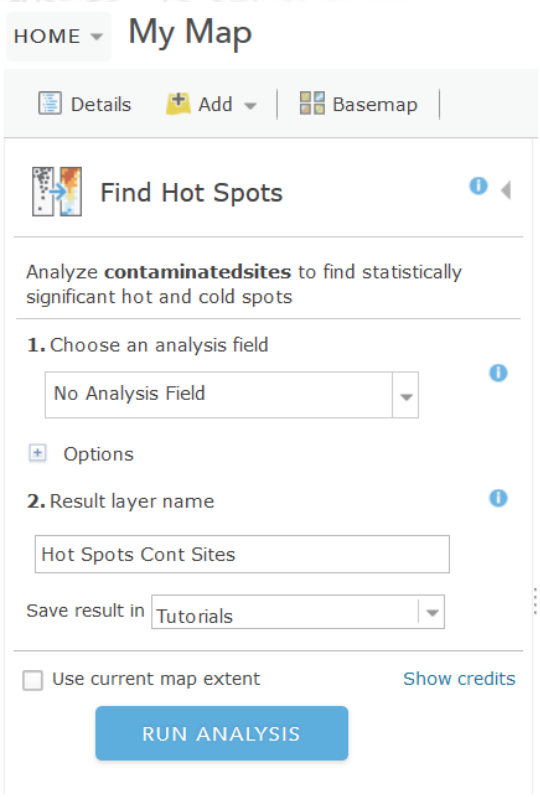
Step 2

We will now try using the "Find Hot Spots" tool to analyze the Contaminated Sites. This will calculate for us if there is any significant clustering of the Contaminated Sites. This could indicate certain problem areas that are more likely to have a contaminated site. Click on the contaminated sites layer and choose "Perform Analysis" -> "Analyze Patterns" -> "Find Hot Spots".



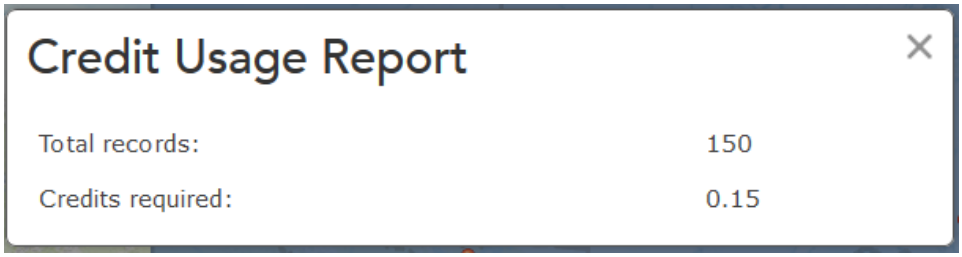
Step 3

First we will try to find Hot Spots throughout all of Canada. To do this make sure the box marked “use current map extent” is unchecked.



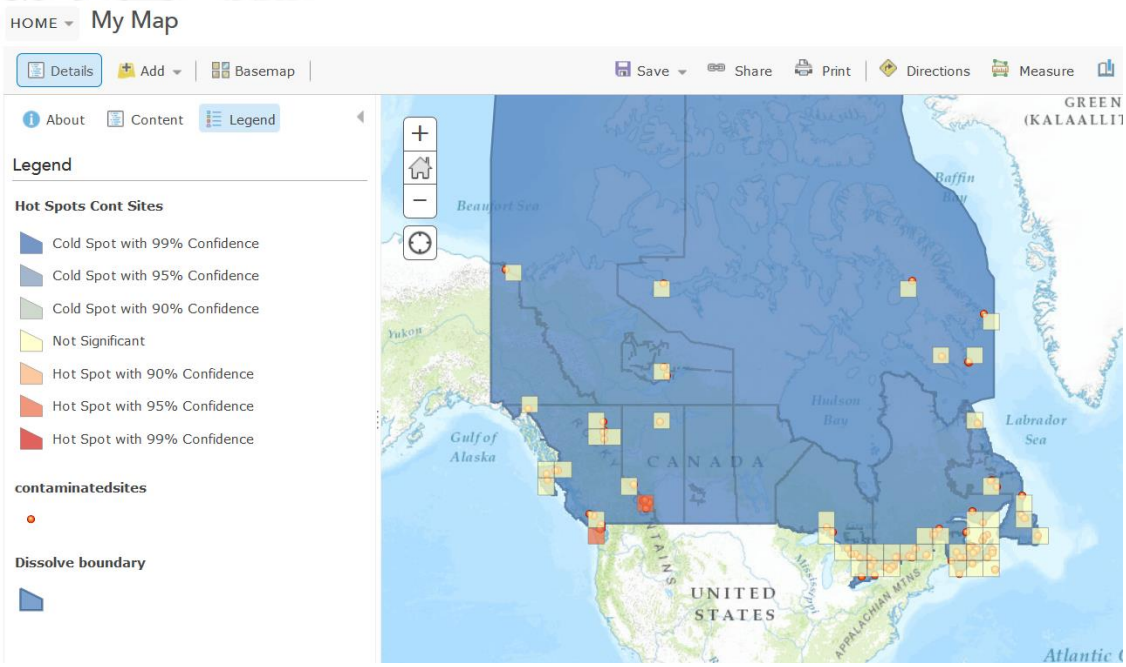
Step 4

Once again, before we continue, check the amount of credits this will use.



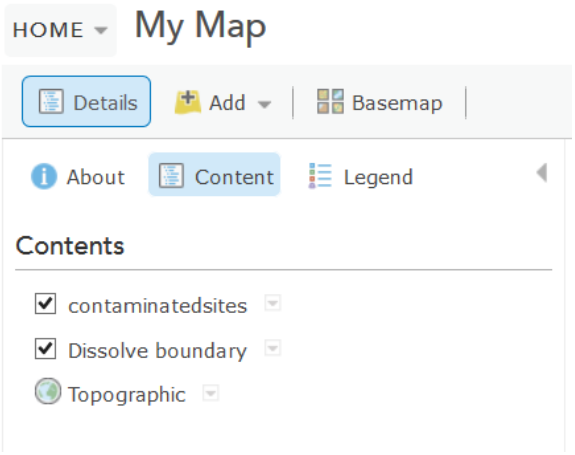
Step 5

Examine the results of your map. What does this tell us? Edit the layers as you deem appropriate and save your map.



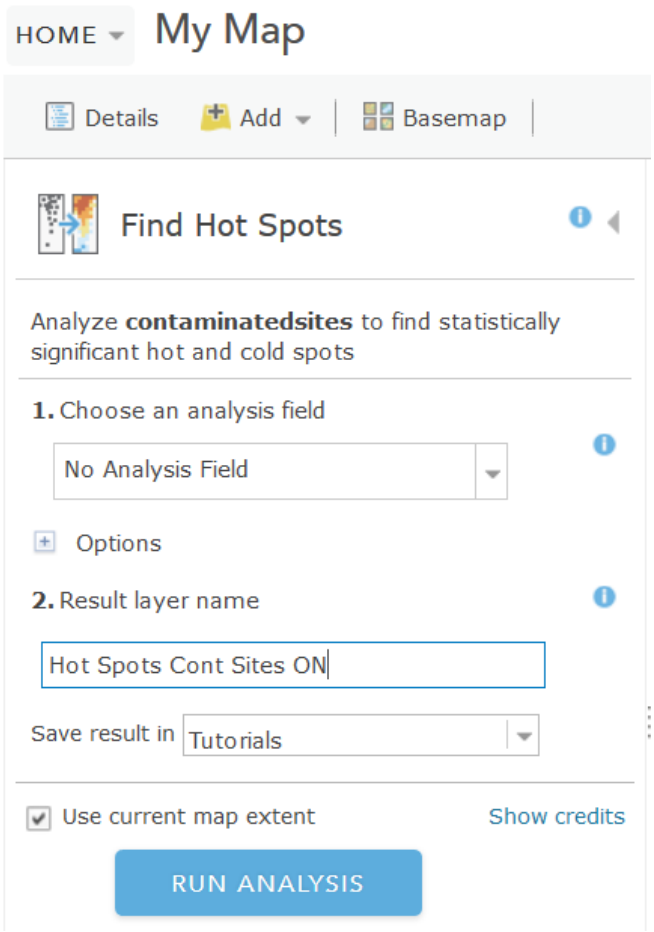
Step 6

Now we will run this tool again, but this time just in the eastern part of Canada, specifically near Ontario. Create a new map and add the contaminated sites layer and the dissolve boundaries layer.



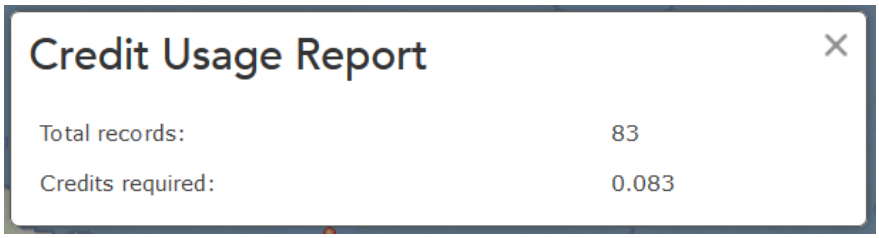
Step 7

This time check the box marked “use current map extent” and zoom in on the eastern part of Canada, specifically near Ontario.



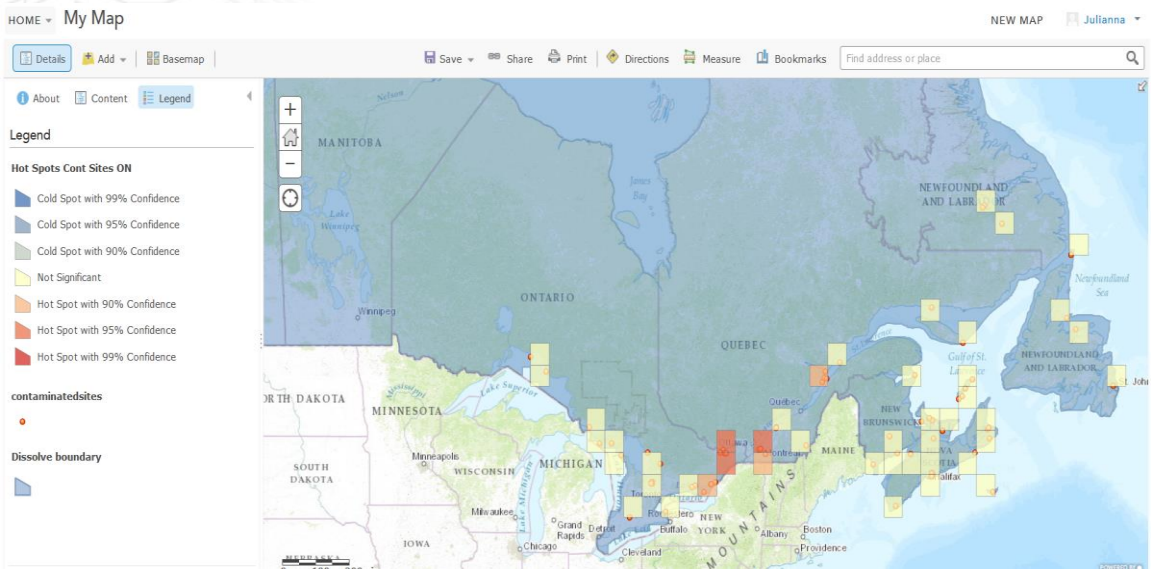
Step 8

Check the number of credits this will use. Then run the tool.



Step 9

Edit the layers as you deem appropriate and save your map. What does this map say about the contaminated sites? How does this compare to the first time we used this tool? Why do you think they would produce different results?



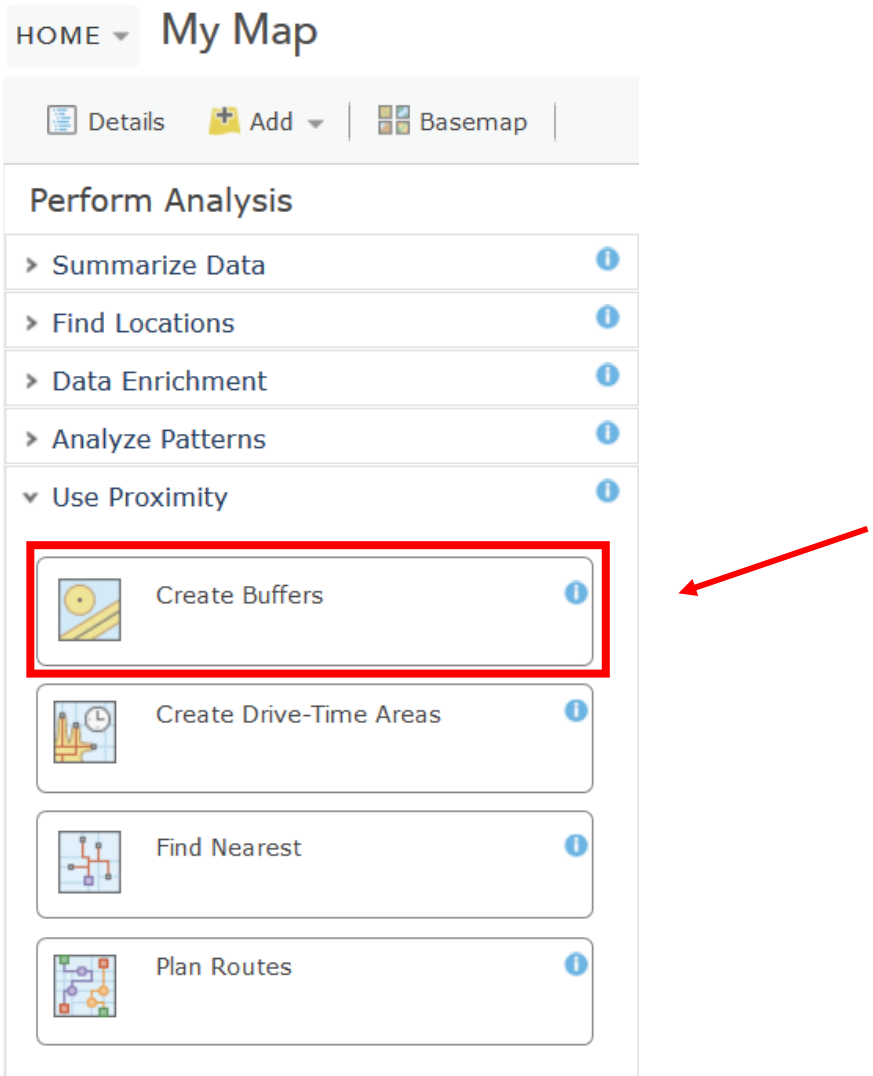
Tools: Use Proximity

Step 1

Now we will use another method to determine the Conservation Areas that are within a distance of contaminated Sites. First, create a new map and add the dissolve boundary layer, the ontarioConservation layer as well as the contaminated sites layer.

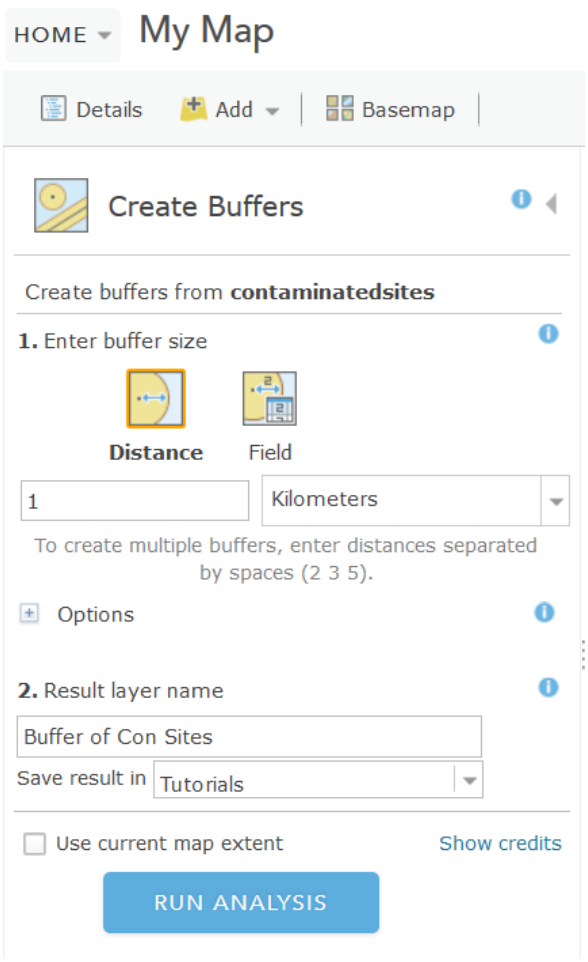
Step 2

We will first create the distance from each site we want to search by creating a buffer around each site. Click on the contaminated sites layer and choose "Perform Analysis" -> "Use Proximity" -> "Create Buffers".



Step 3

We want to make it a buffer of 1km, just like in Tutorial 3 so that we can compare the two methods later. We also want to make sure that the "use current map extent" is unchecked.



Step 4

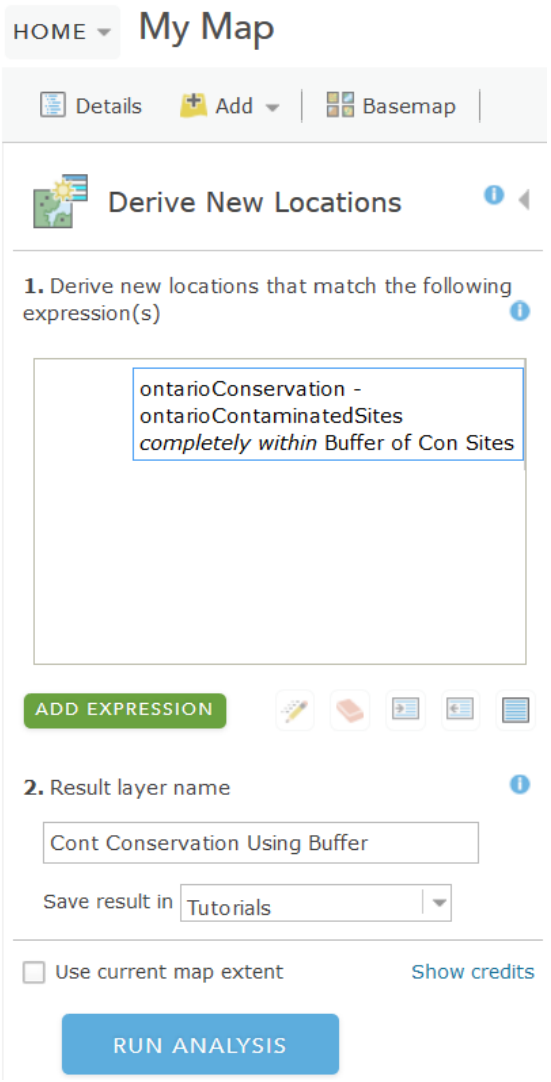
Check the number of credits needed to use this tool before you run the analysis.

Step 5

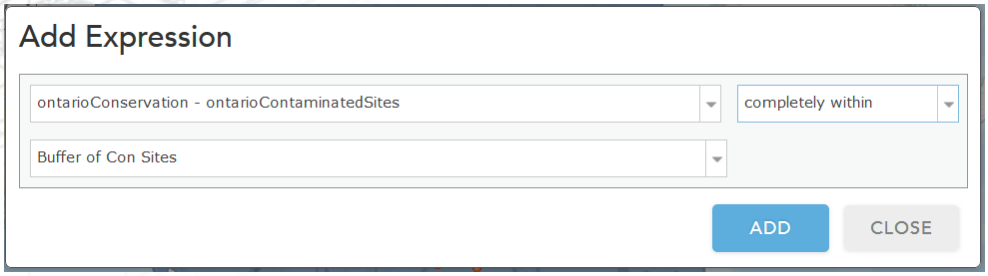
Now remove the original contaminated sites layer and add the ontarioConservation layer. On your map, you should now have the new buffer layer, the ontarioConservation layer, and the dissolve boundary layer.

Step 6

We want to find Conservation areas that are within the polygons of the contaminated sites buffered features. We will use Derive New Locations to give you an idea of how this tool works in comparison to the Find Existing Locations.



The expression we will use for this tool is as follows:

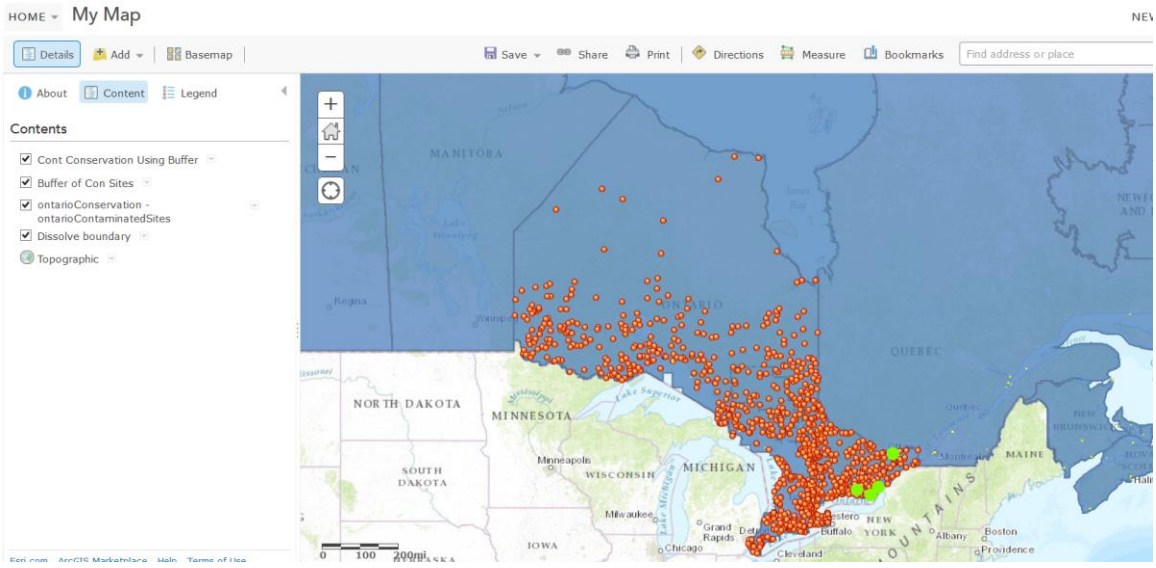


Step 7

Check the number of credits needed to use this tool before you run the analysis.

Step 8

Edit the layers as you deem appropriate and save your map. What does this map say about the contaminated sites in relation to the conservation areas? How does this compare to the method we used in Tutorial 3?



Bonus: Conclusions

For this section, if you decide to test your conclusions, remember to be careful of how many credits you use. If you find that your analysis will use an excessive amount of credits (over 1), limit the number of records you analyze. To do this, zoom in to a smaller number of records in the map. Then ensure that the box marked "Use Current Extent" is checked.

Conclusions 1

In Tutorial 3 you used the "Find Existing Locations" to find the Conservation Areas within a distance of the Contaminated Sites. Compare this method with the method you used in this tutorial (Creating a buffer, then finding the locations within the buffer). Are the results different or the same? Which method is more accurate? Which method is more efficient?

Conclusions 2

Compare the results from the Hot Spot Analysis, the Aggregate Points, and the Conservation Areas within the buffers. Do each of these results tell a similar story? What story do they tell? What would change in the results if you changed any of the variables when performing the analysis? Would this change the story being told? It is important to make sure that you are accurately visualizing the data and not creating a visualization to get the results you want. Keep this in mind when making your conclusions.

Resources:

ESRI Website:

www.esri.com

ArcGIS Online Help:

http://doc.arcgis.com/en/arcgis-online/create-maps/make-your-first-map.htm

ArcGIS for Professionals:

http://pro.arcgis.com/en/get-started/organizations/introduction.htm

Questions?

Don’t hesitate to ask.

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