



LEVEL
2

Rivers: Watershed Analysis

from the GeolInquiries™ collection for Earth Science

Target audience – Earth science learners

Time required – 35 minutes

Activity	Analyze major and local rivers and their watersheds.
Science Standards	NGSS: ESS2.C. Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features, create underground formations.
Learning Outcomes	<ul style="list-style-type: none">• Students will explore the major watershed in which they reside.• Students will create a local watershed and examine its population and landcover.
Level 2 GeolInquiry Requirements	<ul style="list-style-type: none">• A free school ArcGIS Online organization account. Instructors or students must be signed in to the account to complete this activity.• Approximately 1 credits will be used per person in the completion of this activity as scripted.

Map URL: <http://esriurl.com/earthGeolInquiry10>



Engage

Which major watershed do you live in?

- Click the link above to launch the map.
- In the upper-right corner, click **Sign In**. Use your ArcGIS Online organization account to sign in.
- With the Details button underlined, click **Content** (Show Contents of Map).
- Turn off all layers, and then turn on only the layer **US Watershed Boundaries**. Click it to see its sublayers.
- Identify the name of the major watershed (HUC 2) in which you live.
- Filter the HUC 2 layer to display only that watershed by clicking **Filter** and writing an expression.



Explore

Which rivers and streams does your watershed drain into?

- Turn on the **World Rivers** layer.
- ? Which major rivers and streams are within your major watershed? Which is the most prominent?
[Answers will vary.]



Explain

Which cities are in your regional watershed?

- ? Using your basemap as a guide, how many states is your major watershed located in? *[Answers vary.]*
- ? Click the **Add** button and choose **Search for Layers**.
- Search for **USA Major Cities owner:esri_dm** from ArcGIS Online. Add the layer to your map.
- ? How many major cities are in your watershed? *[Answers vary.]*
- Click the **Analysis** button. Expand **Find Locations** and choose **Find Existing Locations**.
- In the Find Existing Locations pane, set the following parameters:
 - 1 Choose USA Major Cities.
 - 2 Click **Add Expression** and add the following expression: **USA Major Cities Intersects US Watershed Boundaries-HUC 2 Drainage Regions**.
 - 3 Provide a unique name for the new layer that will be created, uncheck the **Use current map extent** box, and run the analysis.
- Hover over the new layer's name. Click the **Show Table** button.
- ? How many cities are within your watershed? Which city is most populous?
- ? Looking at the map, is there a spatial relationship between city locations and rivers?



Elaborate

How can you represent your local watershed?

- Turn off all layers and zoom to a city or town of interest.
- Click the **Analysis** button. Expand **Find Locations** and choose **Create Watersheds**.
- In the Create Watersheds pane, set the following parameters:
 - ① Use the **Draw** marker symbol to drop a point on your location.
 - ② Type a search distance of **0.5 Miles**. *[If left blank and not near an existing stream, result will be tiny. Consider what is best for your location. 0.5 miles is a good start.]*
 - ③ Give the layer a unique name, uncheck the **Use current map extent** box, and run the analysis.
- In the map, click the new watershed to see its pop-up information.
- ? What is your local watershed's area in square miles? How does the local compare to the major watershed?
- Turn off all layers.



Evaluate

How does the local watershed compare?

- Use the same **Create Watersheds** tool and pick another part of the United States to create a watershed.
- ? How does the local watershed compare to the new location? Identify three similarities and three differences between the watersheds.
- ? Would you prefer to live in one watershed or the other? Why?

FIND EXISTING LOCATIONS

- This tool selects existing features in your study area that meet a series of criteria that you specify.
- These criteria can be based on attribute queries and spatial queries (for example, within 1 mile of a river).

CREATE WATERSHEDS

- This tool determines the watershed, or upstream contributing area, for each point in your input layer.
- The result layer name must be unique, so consider adding three initials, school code, and a number after the layer name (example: FileName_REED_ABC1).

Next Steps

Continue using an ArcGIS Online organizational account (www.esri.com/schools) to dig deeper into data using the analysis tools, and save your maps to your account.

THEN TRY THIS...

- Run the **Trace Downstream** tool to identify where water from your local watershed flows.



TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these high school texts.

- *Earth Science* by Glencoe McGraw Hill — Chapter 9
- *Earth Science* by Holt — Chapter 10
- *Earth Science* by McDougal Littell — Chapter 1
- *Earth Science* by Prentice Hall — Chapter 12