LEVEL 2

Rivers: Watershed Analysis

from the GeoInquiries™ 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	• Students will explore the major watershed in which they reside. • Students will create a local watershed and examine its population and landcover.
Level 2 GeoInquiry Requirements	• 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/earthGeoInquiry10

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 the button, Content (Show Contents of Map).
- Turn off all layers, and then turn on only the layer, US Watershed Boundaries.
- Identify the major watershed in which you live.

Explore

Which rivers and streams does your watershed drain into?

- Turn on the layer, World Rivers.
- ? 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 button, Add. choose Search For Layers.
- Search for **USA Major Cities** by esri_dm (or esri) from ArcGIS Online. Add the layer to your map.
- ? How many major cities are in your watershed? *[Answers vary.]*
- Click the button, Analysis. 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 HUC2 Watersheds.
  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 button, Show Table.
- ? 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?

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Elaborate

How can you represent your local watershed?

- → Turn off all layers and zoom to a city or town of interest.
- → Click the button, Analysis. 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*
  3. *what is best for your location. 0.5 miles is a good start.]*
     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*

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