**Activity 3:**
# *Dams in New York State*

## Background

There are 5,736 state-regulated dams in New York State.  Most are privately owned, and most are earthen-type dams (not the big concrete dams you typically see out west, such as the Hoover Dam, for example).  The NYS Department of Environmental Conservation (DEC) maintains records in a database for those dams (and also for dams that have been breached or removed).

As part of its record in the database, each dam is assigned a hazard rating.  The rating doesn't tell us about the condition of the dam, only its potential for destruction should something happen to it.

- Class A = low hazard – unlikely to cause substantial economic loss, or pose the threat of personal injury
- Class B = intermediate hazard – substantial economic loss or substantial environmental damage is likely, loss of human life is not expected
- Class C = high hazard – substantial economic loss and/or loss of human life is likely
- Class D = defunct/no hazard – this dam has already been breached or has been removed

Approximately 79% of the dams in New York were built prior to 1970, which means that most are at least 45 years old.  Why is that significant?  As a dam ages, it can become more unstable or unsafe, especially if the dams aren't regularly maintained and inspected.  This is because:

- Materials rust or corrode
- Erosion occurs
- Tree roots and burrowing animals can cause damage
- Reservoirs fill with sediment

Only about 20% of the dams in New York State have an intermediate or high hazard rating.  That means that the majority are not going to cause much damage if they fail.  It would make sense, then, to spend time and money on monitoring only the dams with the potential to cause damage or loss of life.

**Based on what you read above, which two classes would you most likely want to monitor?**

_____

**Which hazard class poses no threat at all?** _____

For the first part of this activity, we are going to pretend that Monroe County has asked us to create a map of the dams in the county that displays the hazard rating, so that they know where to focus their resources, and which dams to closely monitor.
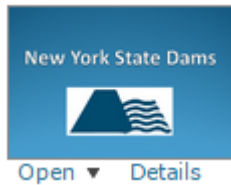
## Open the map

1. <u>If you are not logged in</u>: Sign in to your ArcGIS Online account, and click Groups in the upper right corner of the Map screen.

Home   Gallery   Map   Scene   (Groups)   My Content

Then click on the Cohort 1 group. Scroll down to the New York State Dams webmap and click on the thumbnail to open it.
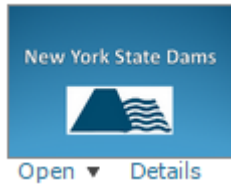
<u>If you are already logged in</u>: Make sure you have saved any changes on the map you have been working on. Then, hover over HOME and select Groups. Click on the Cohort 1 group. Scroll down to the New York State Dams webmap and click on the thumbnail to open it.

## Configure the map

When the map opens, you should see points that represent all of the locations of dams in New York State. Notice that there is only one entry showing in the Legend.

2. Click the Content button.

ⓘ About   ▤ Content   ▤ Legend

Notice that now the entry for the Monroe County Dams layer is present, but the points are not currently visible at this scale (that is why it is grayed out).

**Which NY region appears to have the fewest dams?** _____
*(Hint: remember, you can turn off the NYS Dams layer to view the topographic map beneath it)*

3. Turn off the NYS Dams layer. Then, click on Bookmarks and select Monroe County.
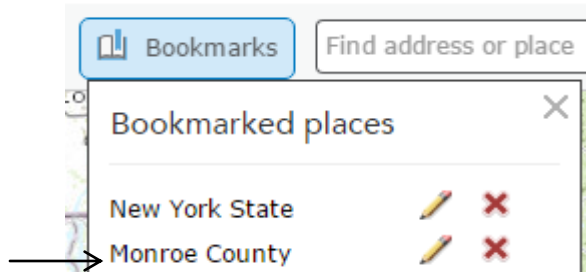
Notice, that now in the Legend, the Monroe County dams layer is no longer grayed out. Turn it on.
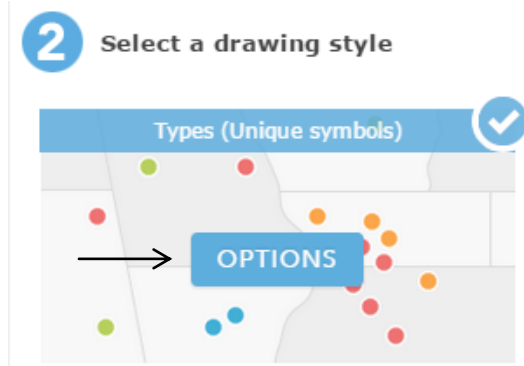
You should now see points that represent the locations of dams within Monroe County only.

4. The next step is to change the symbols to something more meaningful. Hover over the Monroe County dams layer and click the Change Style button.

Under step 1, select HAZARD_COD from the drop-down box.

Under step 2, make sure Types (Unique symbols) is selected, and then click options.

5. In the Change Style pane, you can change the symbol and the label for each category in the legend. Click on the point next to A. Since A is a low hazard, select the yellow square from the Shapes menu, and make the size 20px.
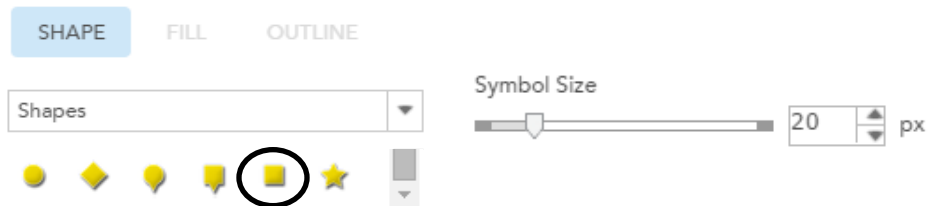
Then click OK.
6. Click on the A under LABEL, and type Low Hazard into the text box. Hit enter.

Click to edit symbol or label.

| | | LABEL | COUNT | |
|---|---|---|---|---|
| ⋮ | ■ | Low Hazard | 41 | |

7. In the same way, make changes to the labels for the remaining points. Follow the guide below:
   - For D, the point should be a green square, 15px. The label should read: Defunct/No Hazard.
   - For C, the point should be a red square, 30px. The label should read: High Hazard.
   - For B, the point should be an orange square, 25px. The label should read: Intermediate Hazard.
   - For 0, the point should be a black square, 10px. The label should read: Unassigned Hazard

| | | LABEL | COUNT |
|---|---|---|---|
| ⋮ | ■ | Low Hazard | 41 |
| ⋮ | ■ | No Hazard | 16 |
| ⋮ | ■ | High Hazard | 9 |
| ⋮ | ■ | Intermediate Hazard | 6 |
| ⋮ | ■ | Unassigned Hazard | 5 |
| ☐ | ● | Other | 0 |

8. When you hover over the three dots to the left of a layer in the Change Style pane, the cursor turns into arrows, indicating that you can move the layer.

Click to edit symbol or label.

| | | LABEL | COUNT | |
|---|---|---|---|---|
| ⋮ | ■ | Low Hazard | 41 | |

Click and drag to rearrange your layers in order of descending hazard. When you are finished, click OK at the bottom of the Change Style pane, and then click DONE. You can click on Legend to view the legend, and then go back to Content again.

9. Click on the Save button at the top of the map, and then select Save As. Change the title of the map to Monroe County Dams, and type a summary that describes the content of this map.

Monroe County Dams

dams ✕  new york state ✕  monroe county ✕

Add tag(s)

Dams in Monroe County, NY classified by hazard rating.

## Use your map for analysis

In New York State, a dam is broadly defined as any artificial barrier, together with its supplemental works, that impounds or will impound waters, and includes, but is not limited to, earth fills, with or without controllable outlet gates, and roads, bridges or fords that unduly impede the flow of water.

To get a sense of what this means, we can take a look at some dams in our region.

1. Change basemap to Imagery, and turn the NYS dams layer on.

2. Click on Bookmarks, and select Mt. Morris Dam. At 215 feet in height, the Mt. Morris Dam is the tallest dam in New York State. It was built for the purpose of flood control and storm water management.

   Turn the NYS dams layer back off, and then select the Court Street Dam bookmark. The Court Street dam and the Mt. Morris dam are both located on the Genesee River, but they are different in size and in function. Click on the square symbol next to the dam and use the information to answer the following questions:

   **What is the hazard classification rating for the Court Street dam? What does that mean if this dam fails?**

   **What is the height of the Court Street dam? How many feet taller is the Mt. Morris dam?**

   **What is the purpose of the Court Street dam?**

3. If your school is in Monroe County, locate it on the map by using the Find address or place search box. If your school is outside of Monroe County, locate Monroe Community College.

   Click on Add to Map Notes in the pop-up box.
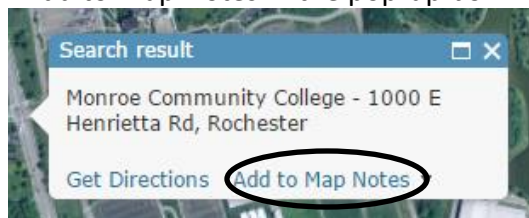
   

   This will add a marker to the map at your school's location. If you click on the marker, you can then click on Edit to change the symbol if you want.
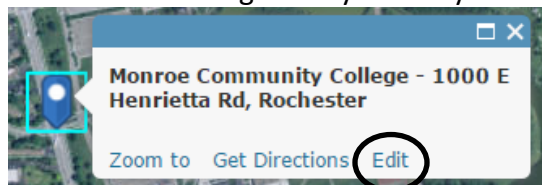
4. Take a few minutes to examine the dams near your school. Do they all look like the Mt. Morris and Court Street dams?

5. Save your map as: Dams within 5 miles of school

6. Next, you are going to find out how many dams in Monroe County are within a 5 mile radius of your school. Click on the Analysis button on the ribbon at the top of the map.

   Basemap | Analysis | Save ▾
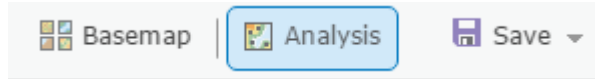
7. Click on Find Locations, and then choose Find Existing Locations.

   ▾ Find Locations ⓘ

   Find Existing Locations ⓘ
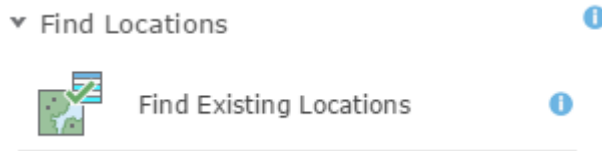
   In the Find Existing Locations pane:
   - For option 1, select Monroe County Dams from the drop-down menu

   - Under option 2, click the green ADD EXPRESSION button, and create an expression that reads: <u>Monroe County dams</u> <u>within a distance of</u> <u>5 miles</u> from <u>Map Notes  Points</u>. Then click the ADD button.

   ## Add Expression

   | Monroe County dams | ▾ | within a distance of | ▾ |

   | 5 | Miles ▾ | from |

   | Map Notes_Points | ▾ |

   ADD    CLOSE
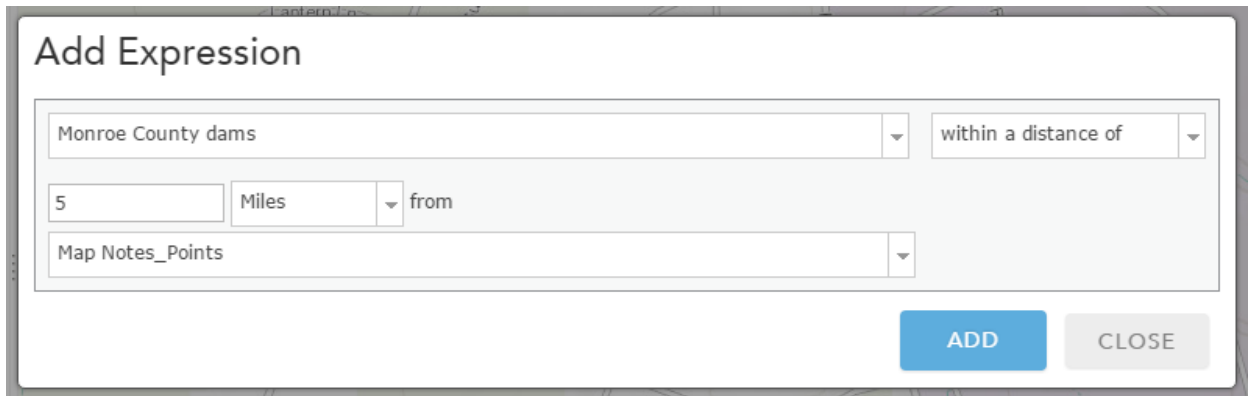
   - In option 3, change the result layer name to: Dams within 5 miles of school_*your initials*

   - Uncheck the box that says Use current map extent. You want to use the whole map, not just what you can currently see in the map viewer.

   ⟶ ☐ Use current map extent

   - Finally, click the RUN ANALYSIS button at the bottom. Be patient, the analysis may take a few minutes.

8. Zoom out so that you can see Monroe County (or use the bookmark). You should see new points on your map surrounding your school. These are the dams within 5 miles.

9. Hover over the Dams within 5 miles of school layer, and click on the Show Table button
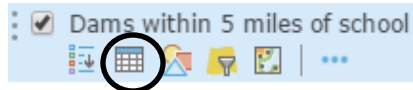


A table should appear at the bottom of the map. It looks just like a spreadsheet that you might open in Excel. If you hover over the labels at the top of the columns in the table, a gear will appear in the right corner. You can click it if you want to view the options for the column.



Use the information in the table below the map to answer the following questions:

**How many dams are within 5 miles from your school?** _____

**How many of these have a class C hazard rating?** _____

10. Click on the X in the top right-hand corner of the table to close it again. Then save your map.

## Resources:
- NYS DEC website on dam information: http://www.dec.ny.gov/lands/66952.html

- DEC Guidance for Dam Hazards: http://www.dec.ny.gov/docs/water_pdf/togs315.pdf

- Pocket Safety Guide for Dams and Impoundments: http://www.fs.fed.us/eng/pubs/htmlpubs/htm12732805/toc.htm