Assessing Stream Channel Change

Audience- GEG 421 Watershed Analysis | Time Required: 25 Minutes

Activity Use historic aerial photographs to examine rates of channel change in the Cazenovia Creek Watershed.

Map URL:
http://geographyplanning.buffalostate.edu/geography/home/webmap/viewer.html?webmap=190177a3708f4688b8a61388d7b8c556&extent=-78.9922,42.5639,-78.2341,42.9089

Background:

Assessment of stream channel change is an important part of watershed analysis. Channel migration is defined as the lateral or downstream shifting of a river channel within a river valley. The dynamic physical processes of rivers, including the movement of water, sediment and wood, cause the river channel in some areas to move, or "migrate," over time. This is a natural process in response to gravity and topography and allows the river to release energy and distribute its sediment load. Migration processes include bank erosion and avulsion. The area within which a river channel is likely to move over a period of time is referred to as the **channel migration zone** (CMZ).

Generally, high rates of channel movement occur where:

- Steep streams flow from foothills onto flatter floodplains.
- Reaches have high rates of sediment deposition.
- Reaches have large woody material or other objects that deflect flow.
- Eroded banks are present.

Engage:

- Is there evidence of channel change from historic conditions?
- What do existing channel conditions indicate about past and present active geomorphic processes?

Historic changes in stream channels provide a context to assess current and potential future channel conditions. Aerial photographs are the primary data source used to investigate changes in stream channels.

- ✓ Click the map URL above. Click the **Bookmarks** button. Select **Site 1** from the list of locations for a closer examination.
- ✓ Click the **Content** tab and uncheck all the layers expect the year **2002.** This image shows conditions in the watershed in 2002 and will be used as the starting year to examine channel change
- ✓ Click the dropdown arrow next to the **Add** button and select **Add Map Notes**
- ✓ In the **Add Map Notes** Box set the name to **Site 1 2002** and click **Create.**
- ✓ From the **add features** menu, click **Stickpin**
- ✓ Drop the stickpin in the center of the stream channel as shown in **Figure 1.**

✓ Check the box and turn on the **2014** aerial photographs**.**
✓ Create another **Map Note** and name it **Site 1 2014** and drop a **stickpin** in the center of the channel in 2014**; Figure 2**

Evaluate

- Has channel migration occurred at site 1 between 2002 and 2014?
- In what direction is the channel migrating? Is the channel moving in the expected direction given your knowledge of erosion processes?

The rate of channel change can be calculated by measuring the distance between the stream channel centerlines in 2002 and 2014 and then dividing the distance by the number of years between the aerial photographs, in this case it will be 12 years. Answer the questions on a separate sheet of paper

✓ Use the measure tool from the main tool bar. Set the distance units to feet. See **Figure 3**.
✓ Measure the distance between the two stickpins by clicking at the base of each pin. The measurement result is shown in the measure tool bar window.

Figure 1. 2002

Figure 2. 2014

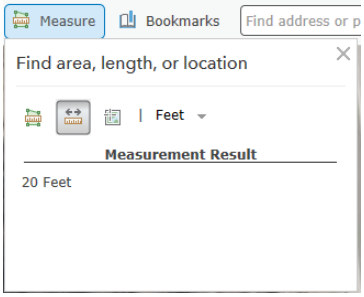
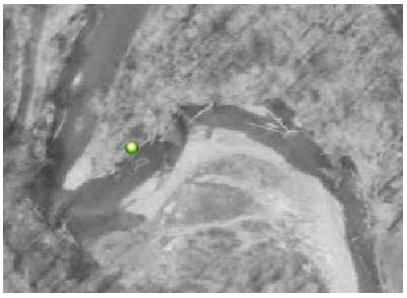


Figure 3. Measure Tool

✓ Repeat the steps above to compute the average rate of channel change for the other five sites

Site 2. 2002



Site 3. 2002

Site 4. 2002

Questions: Assessing Stream Channel Change

Respond to the following questions in the space provided below

1. Has channel migration occurred at site 1 between 2002 and 2014? What is the rate of migration?

2. In what direction is the channel migrating at site 1? Is the channel moving in the expected direction given your knowledge of erosion processes?

3. Calculate the rates of channel migrations at sites 2, 3 and 4.
    1. Migration rate Site 2_____
    2. Migration rate Site 3_____
    3. Migration rate Site 4_____

4. Which site has the slowest channel migration rate? What might be some factors that influence the slow rate of change at this site?

5. What type of erosional and depositional processes are occurring at site 3 from 2002- 20014?