CREDIT VALLEY CONSERVATION

CVC

Bringing Back the Brook Trout

Climate Change Solutions for the Credit River

Student Guide

Activity # 1 – Watch the Video "Bringing Back the Brook Trout" (http://www.creditvalleyca.ca/brooktroutvideo) and answer the following viewing guide questions:

1. Name three ways that climate change is affecting the Credit River.

2. What species of animal are we concerned about in this video and why is this species important?

3. What are the students doing to restore the river? How is this project helping the river adapt to climate change?

Activity # 2 – Identifying High Priority Areas for Rehabilitation

Step 1: Read this background information to learn about water monitoring, Brook Trout ecology, and river restoration

We are going to be Water Monitoring Specialists and use water monitoring data collected by Credit Valley Conservation (CVC) to identify high priority areas in the watershed for rehabilitation projects for Brook Trout habitat.

CVC's water resource technicians regularly visit various locations across the watershed to gather data about the river including water temperature, turbidity, dissolved oxygen, chloride concentration and other things that can affect the health of the river and the animals living there.

CVC also has 57 environmental monitoring stations across the watershed that send information in real-time to the head office via Wi-Fi. Because of these stations, staff can predict and respond to events like flooding, droughts and threats to water quality.

Brook Trout Health is Linked to Water Temperature

Brook Trout are the only native trout in the Credit River and need clean, cold water to live. They prefer temperatures between 11-16°C and can't live for long periods in water temperatures above 23°C. The cooler water is also needed for spawning (egg laying) and embryo survival.

Brook Trout

Warm water contains less oxygen than cold water. When water levels are low and the water is warm during the summer, low oxygen levels stress fish. Some trout are able to survive in temperatures up to and exceeding 24°C but stop growing at 23°C. In the upper limits of the temperature range, trout that are otherwise unstressed (by pollution, fishing etc.) will die should those conditions persist for 24 to 48 hours.

All three major trout species (brook, brown and rainbow) begin to experience stress at approximately 20°C, with stress increasing rapidly as the temperature rises further. For Brook Trout, these limits are generally accepted to be a few degrees lower.

What influences stream temperature?

- ***Air temperature****:* is the only parameter in this list that does not directly change with watershed development (although big cities are warmer than the suburbs).
- ***The amount of light hitting the water***: clearing streamside (riparian) vegetation allows more sunlight to reach the stream, warming the water.
- ***Water depth***: more volume leads to cooler habitats at depth.
- ***Turbidity***: turbid (cloudy) water absorbs more heat from the sun. Erosion causes the water to become turbid with suspended sediment. More frequent, stronger storms equal more erosion, which equals more turbidity.
- ***Runoff***: rain falling on hot asphalt or other warm surfaces will warm up dramatically (on a typical 27°C summer day, pavement temperatures can be well above 38°C) and as this water drains into our streams, the streams warm up as well.

One of the purposes of stream restoration is to help cool the water. As seen in the video, the stream restoration project at Upper Credit Conservation Area involved attaching Christmas trees to the stream bank to act as sediment traps. This rebuilding of the bank resulted in a deeper, colder stream. Other restoration projects include planting trees to shade the water and the establishment of gravel beds for spawning.

Step 2: Read the activity instructions. Using the attached map and graph, answer the questions below.

Your Turn to be the Scientist

Now that you know how streams heat up and how important it is to keep them cool, we are going to identify areas on the Credit River that need rehabilitation in order to make good Brook Trout habitat.

How to use the resources

Look at the **map of Real-time Monitoring stations** on the Credit River. The coloured area represents the watershed boundary – every drop of rain that falls within this area eventually makes its way to the Credit River (the bold blue line). Smaller blue lines are tributaries – streams that run either into the main Credit River or directly into Lake Ontario. Each of the green dots represents a permanent station that records data and sends it via Wi-Fi directly to scientists at CVC. Water in the Credit River runs from the headwaters in Orangeville, through Caledon, Georgetown, Brampton and Mississauga and finally into Lake Ontario in Port Credit.

The **Daily Maximum Water Temperature graph** contains data that was collected at the Real-time Monitoring Stations for the period of June to August 2016. Each line represents data from one monitoring station.

Activity Questions

1. Locate the five different monitoring stations listed on the graph on the station map. What do you notice happens to the water temperature as the water moves from the northern part of the watershed into the southern part?

2. Which areas had the lowest temperatures? Which areas had the highest temperatures? Why do you think that is (refer to "What Influences Stream Temperature" on page 3) and what are some contributing factors?

3. Based on the water temperature, which areas of the Credit River could host Brook Trout during the month of August 2016?

4. If you were an aquatic biologist, which areas would you identify to rehabilitate for Brook Trout habitat? Why and what are some possible solutions for prevention/rehabilitation?

5. Pairs or teams can discuss with the class why they chose the areas they did for rehabilitation in question 4.