

# Flint River GREEN Testing at the Stream



<b>MATERIALS</b>	<p>LaMotte Test Kits</p> <p>Cooler with Coliscan</p> <p>Water</p> <p>Lab Bottles (TS and FC)</p> <p>Safety Goggles (1/person)</p> <p>Nitrile Gloves (2/person)</p> <p>Hazardous Waste Container</p> <p>Trash Bags</p> <p>Foil</p> <p>Boots or waders</p>	<b>VOCABULARY</b>	<p>Algae</p> <p>Aquatic</p> <p>Data</p> <p>Habitat</p> <p>Hazardous Waste</p> <p>Meniscus</p> <p>mg/L</p> <p>Parts Per Million (ppm)</p> <p>Photosynthesis</p>	<p>Q-Value</p> <p>Run-Off</p> <p>Sediment</p> <p>Stormwater</p> <p>Surface Water</p> <p>Tributary</p> <p>Vegetation</p> <p>Water Quality Index (WQI)</p> <p>Watershed</p>
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<b>WATER QUALITY STANDARDS</b>	<u>DRINKING WATER:</u>	<u>SURFACE WATER:</u>
	<p>Where is your drinking water coming from?</p> <p>Under the Safe Drinking Water Act, the EPA sets standards for drinking water quality from public drinking water supplies.</p>	<p>The EPA and State of Michigan sets limits for each type of water quality test. If you find that your data is not within the standards, notify your mentor or FRWC immediately.</p>

<b>WHAT DO THESE TESTS MEASURE?</b>	<p>The Flint River GREEN water quality monitoring program allows for student scientists to collect information about the water quality of the Flint River through a series of 9 tests (pH, Temperature, Dissolved Oxygen, Biological Oxygen Demand, Phosphates, Nitrates, Turbidity, Fecal Coliform, and Total Dissolved Solids). Data collected from each of these tests combines to give an overall rating for a specific point in time along the Flint River or one of its tributaries. Data is then reported and used by policy makers to make decisions within and beyond our local communities.</p>
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<b>LOOK FOR THESE CAUSES:</b>	<u>EVIDENCE FOR DECREASES IN TEST MEASURE?</u>	<u>EVIDENCE FOR INCREASES IN TEST MEASURE?</u>
	<p>Each water quality test comes with its own set of both man-made and natural causes for changes in water quality. This section provides questions that help students think about what might cause these changes.</p>	<p>Students should look at areas surrounding the site through electronic resources and on-the-ground observations to answer these questions. These answers can help build claims, evidence, and reasoning for analysis.</p>

<b>CONNECTING CONCEPTS</b>	<p>Students will find that each test is somehow connected to one or more other tests. These connecting concepts will help students to identify patterns in their data which will contribute to being able to generate claims for suggested courses of action using evidence and reasoning. Other connecting concepts will help students link each test to other areas of investigation and link this project to other subject areas.</p>
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<b>WEB LINKS</b>	<ul style="list-style-type: none"> <li>Flint River GREEN website: <a href="http://www.FlintRiverGREEN.org">www.FlintRiverGREEN.org</a> for past years' data and resource links</li> <li>Flint River Watershed Coalition website: <a href="http://www.FlintRiver.org">www.FlintRiver.org</a> for watershed maps and more</li> <li>Case Study: The Flint Water Crisis– What Happened and Why: <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5353852/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5353852/</a></li> <li>USGS Water Science School: <a href="https://water.usgs.gov/edu/waterquality.html">https://water.usgs.gov/edu/waterquality.html</a></li> </ul>
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## Flint River GREEN Data Collection:

It is extremely important that the data collected for this project be as high quality as possible. Some of this data is used to satisfy National Pollutant Discharge Elimination System (NPDES) storm water requirements and is being used by other policy makers to make decisions. Additionally, if a water quality problem is identified and action plan is developed for a civic approach to resolve or minimize the problem, the data should also be as accurate as possible.

## Use Standard Chemistry Procedures and Safety:

These tests use small measurements and hazardous chemicals. Be sure to always follow safe and precise procedures.

- ALWAYS wear safety goggles and gloves when handling materials
- Work over a overflow container/tarp to prevent spills and wipe up your area after testing
- Understand what a **meniscus** is and use this to measure your samples
- When adding drops of chemicals, hold the bottle upside down and squeeze gently. Holding the bottle sideways or squeezing the bottle too much will add extra chemical to your sample.

## Standard Water Sample Collection Procedures:

**Bucket Method:** Your group may find that dropping a bucket on a rope from a bridge or sending one person into the stream to collect a bucket of water may be safest and easiest for most tests (including pH, nitrates, turbidity, phosphates, fecal coliform, and total solids. If you do this, be sure to first rinse the bucket with stream water.

It is highly recommended that the Temperature, Dissolved Oxygen, and Biochemical Oxygen Demand test samples are collected directly in the stream unless deemed unsafe.

**In-Stream Collection:** SAFETY NOTE: Do not stand in water above your ankles if wearing boots or above your knees if you are wearing waders. DO NOT EVER enter flooded streams.

1. Enter the stream *downstream* of your sample location with your bucket or sample bottle, wearing gloves and waders or boots.
2. Begin walking upstream aiming to stand as close to the middle of the main stream flow as possible. Move slowly allowing the sediment to wash behind you (sediment stirred up from the bottom could otherwise cause inaccurate readings).
3. Rinse your bucket or collection bottle with stream water and discard away from your sample location.
4. Collect your sample while facing *upstream*. Be sure to collect from the middle of the stream flow, in the middle of the water column—not just the surface and not too close to the bottom.

## Hazardous Waste:

All treated samples, chemicals and containers should be disposed of in designated hazardous waste containers and disposed of following MSDS recommendations which can be found at <http://www.lamotte.com/en/support/sds-search>.

**TIP:** Your local waste authority or municipality likely has regular hazardous waste disposal days throughout the year. Containers should be labeled with all potential chemical components before being dropped off at events.

## WHAT TO WATCH OUT FOR

- Be sure to practice all of your tests in the classroom and if possible outdoors in a pond or ditch before going to the stream.
- If you feel like you made an error at any point, you should re-do the test.
- Always ask yourself if the result makes sense. If it does not make sense, talk with your mentor.
- If you are conducting the same test multiple times (or if multiple groups do the same test), be sure to sample as closely to the same time on the same day as possible. Most test results can be averaged, except a mode (most common value) should be reported if doing multiple tests for pH and phosphates.