

Lesson Plan: Reading the Genesee River Report Card

Description

Students will use discussion and active reading protocols to study the Genesee RiverWatch’s report card for the Genesee River watershed. Students will interpret data in the document to understand what affects the river’s “grade” and understand how this grade is a measure of the river’s health.

Essential Question

What grade do scientists give the Genesee River?



Learning Targets

1. I can interpret a scientific document.
2. I can understand the evidence scientists use to grade the river.
3. I can explain how scientists measure the health of a river.
4. I can assess what can be done to improve the health of the river.

<p>Class 7th-8th grade science Regents Living Environment</p>	<p>Duration 1 class periods (45 minutes)</p>	<p>Topics Environmental Health Human Impact Genesee River Scientific Evidence</p>
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NGSS

<p>Science and Engineering Practices Constructing Explanations and Designing Solutions</p>	<p>Disciplinary Core Ideas ESS3.C: Human Impacts on Earth Systems</p>	<p>Crosscutting Concepts Influence of Science, Engineering, and Technology on Society and the Natural World</p>
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NYS Standards:

- 4.7.1e The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.



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Plan for Lesson

Notes:

The data and information for this lesson is published by Genesee RiverWatch in the document “Genesee River Report Card Draft”.

Engage (5 minutes)

What do you think scientists consider when they give a river a grade?
Have students pair-share their answers.

Explore (5 minutes)

Have students read the introduction to the Report Card.
As they read, ask them to choose and record 2 sentences, 2 phrase and 2 words that they think explain how scientists grade the river.

Explain (10 minutes)

Have students read the graphs and complete the chart about the characteristics and grade for each watershed that feeds the Genesee River.

Have students read the explanation from the [Genesee Report Card](#) to consider why some watersheds have a higher score than others. As they read ask them to text code with the following:

WQ = Reading discusses things that affect the **water quality** or how it can be improved
- Phosphorus - Total Suspended Solids

UI = Reading discusses things that affect the **use impacts**, or characteristics of the river that affect its ability to be studied or used.
- Supports Use - Well Characterized

Elaborate / Evaluate (10 minutes)

Have students answer the following question about what they learned:
What are three activities that would increase the Genesee River’s score and why?



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Name _____

Date _____

Student Worksheet

Reading the Genesee River Report Card

What grade do scientists give the Genesee River?



Learning Targets

1. I can interpret a scientific document.
2. I can understand the evidence scientists use to grade the river.
3. I can explain how scientists measure the health of a river.
4. I can assess what can be done to improve the health of the river.

Step 1: Study the map - “Grade” for Genesee River Watersheds and answer the following question and share your answer with a partner.

<p>What do you think scientists consider when they give a river a grade?</p>	<p style="text-align: center;"><u>“Grade” for Genesee River Watersheds</u></p> <p style="text-align: center; font-size: small;">Copyright © 2015 Center for Environmental Initiatives (CEI) Map prepared by Wayne D. Howard of Sotara Concepts - Rev. 03-25-2015</p>
<p>Your Answer:</p>	
<p>Your Partner’s Answer:</p>	

Source:



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Step 2: Read the Introduction to the report card. As you read find, 2 phrases and 2 words that you think explain how scientists grade the river.

Genesee River Report Card

***Introduction:** Genesee RiverWatch works to improve the water quality of the Genesee River and its tributaries to create environmental, recreational, and economic assets for its communities. We also connect people to the river, encouraging them to explore, experience, and celebrate the river. As part of that effort, Genesee RiverWatch has published its first annual Genesee River Basin Report Card. This Report Card rates the Genesee on the basis of water quality measurements and assessments as to whether or not the River and its tributaries are useable for activities such as fishing, swimming, drinking, boating, etc. The information used to develop this first Report Card is based on publicly available information, primarily data collected by SUNY Brockport and the New York State Department of Environmental Conservation (NYSDEC).*

Step 3: Record the information that you found.

2 phrases
1.
2.
2 words
1.
2.

Step 4: Study the attached graphs to find the letter grade for four out of the six watersheds.

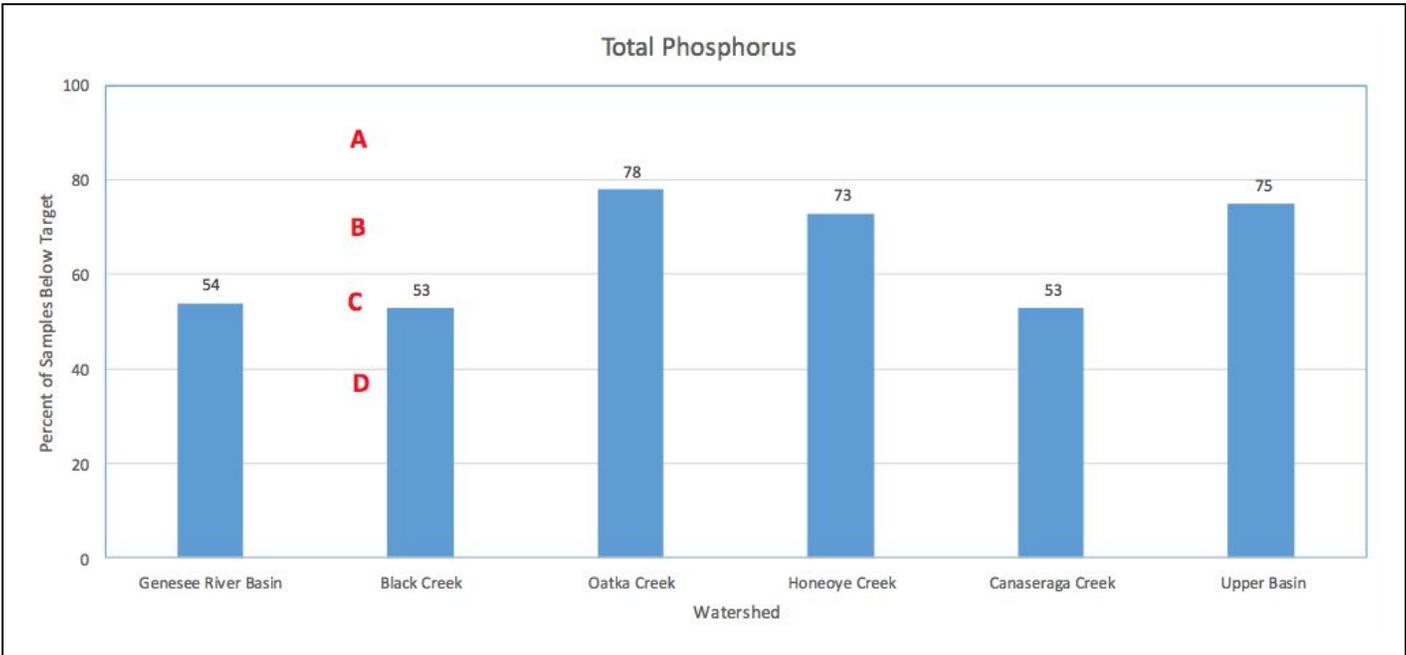
Letter Grade Based on Measurements of River Health

Watershed				
Phosphorus				
Suspended Solids				
Supports Use				
Well Characterized				

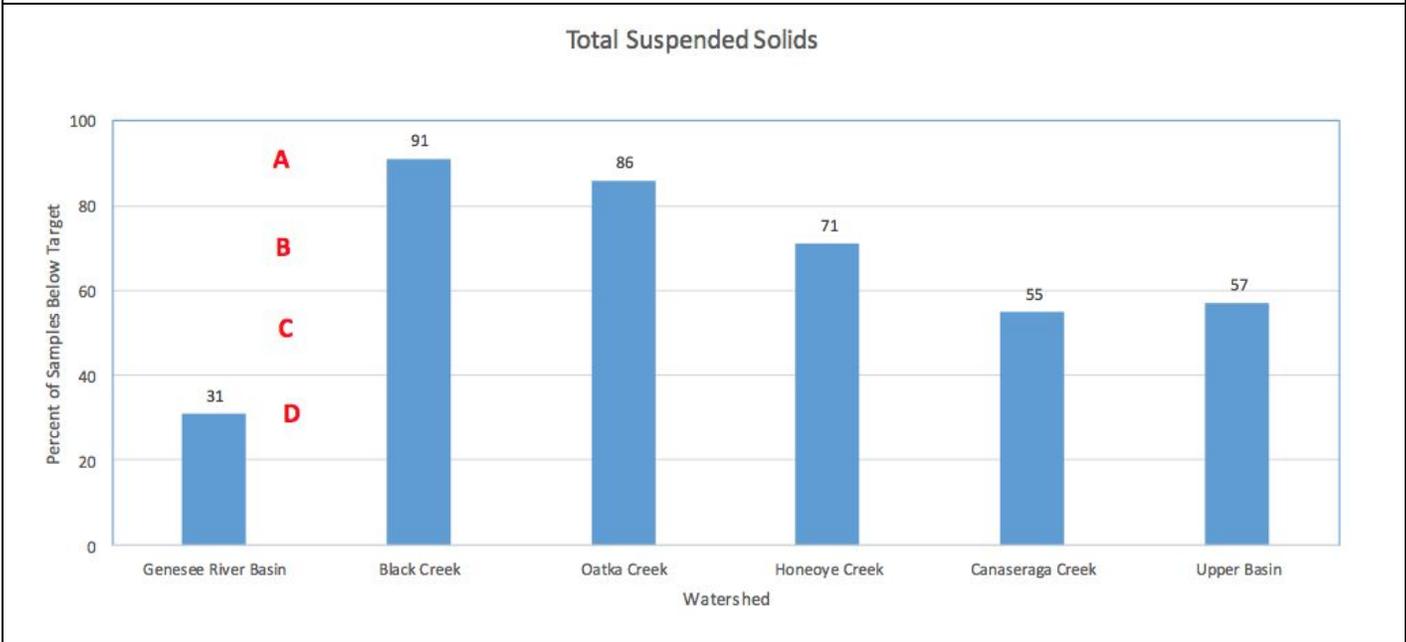


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Total phosphorus is a way to measure phosphorus that enters water from wastewater treatments plants, septic systems and farms.
 High score = Low phosphorus

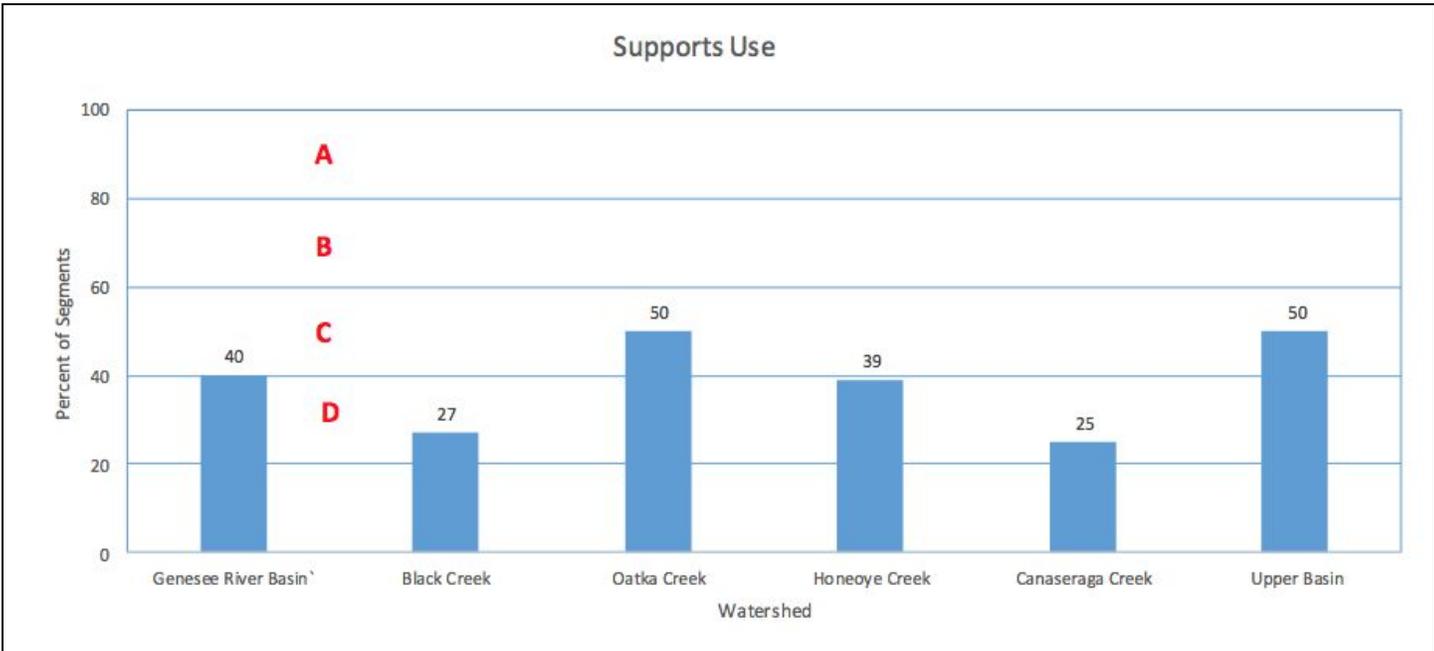


Total Suspended Solids is a way to measure soil and other sediment that enters the water.
 High Score = Low suspended solids

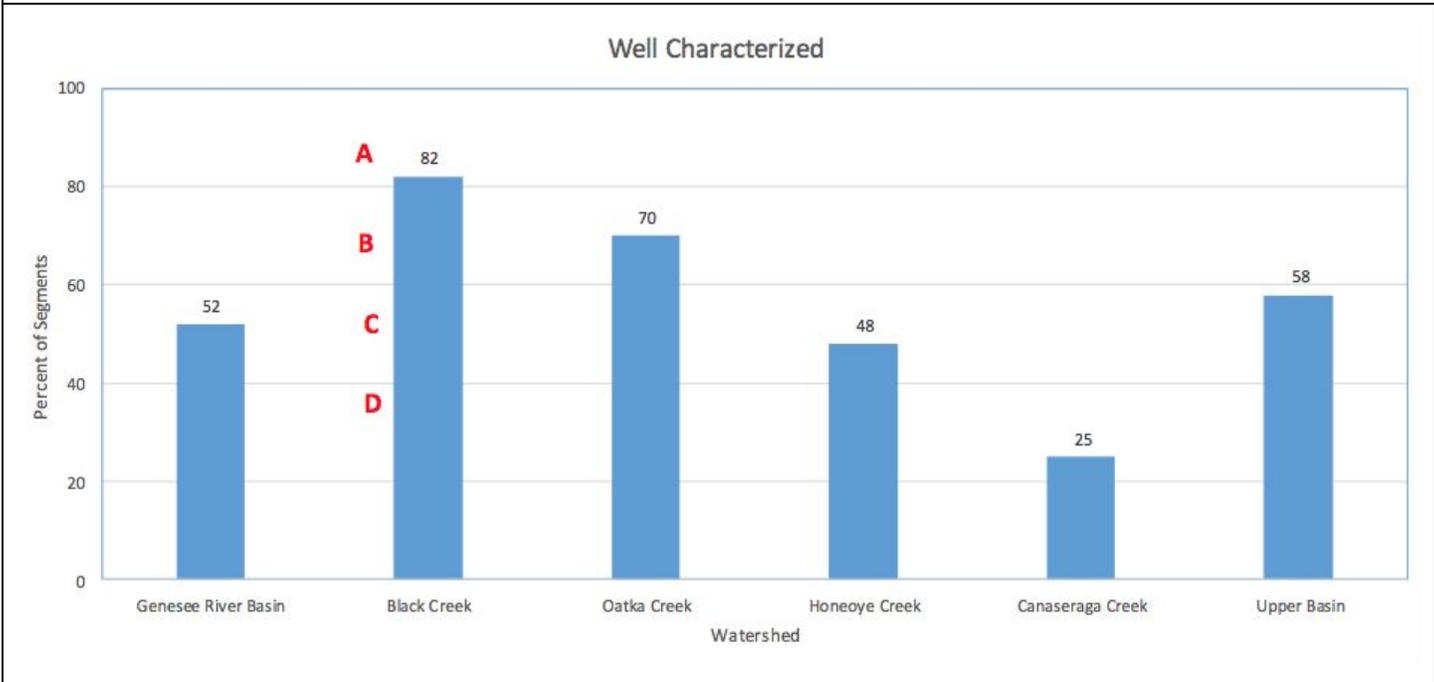


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Supports use is a way to measure if the water is clean enough for people to use it for boating, fishing and drinking.
 High Score = Better for use by people



Well characterized is a way to measure whether or not the quality of the river has been studied.
 High Score = More parts of the river have been studied.



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Step 5: Read this explanation from the Genesee Report Card to consider why some watersheds have a higher score than others. As you read text code with the following:

WQ = Reading discusses things that affect the water quality or how it can be improved.

- Phosphorus
- Total Suspended Solids

UI = Reading discusses things that affect the use impacts, or characteristics of the river that affect its ability to be studied or used.

- Supports Use
- Well Characterized

GRADING THE RIVER

The grades on the map represent the overall grade in each sub-watershed within the Genesee River watershed. It is based upon the average of the individual Water Quality grades and the Use Impacts grades in the table above. Each grade is determined by a comparison of the actual sub-watershed value in the table below to a target value. The closer the concentration is to the target value the higher the grade.

The Genesee River Basin overall grade is D. This grade reflects the need for improvement in two major areas:

- Water Quality: The water quality of the Genesee River and its tributaries is compromised by excess phosphorus and suspended solids. The major sources of these pollutants are streambank erosion, effluents from wastewater treatment plants, animal feeding operations, and septic systems.

- Use Impacts: Significant parts of the Genesee River and its tributaries are not able to support intended uses evaluated by the NYSDEC. Also a significant percentage of stream segments have not been assessed, so that use potential is unknown.

ACTIVITIES THAT IMPROVE/PROTECT WATER QUALITY

Point Sources: There are 61 DEC permitted municipal and industrial wastewater treatment plants. Very few of these plants have a requirement in their permits to monitor for phosphorus in their effluent to determine if they adversely impact water quality. Only one has an actual discharge limit. All plants are designed to reduce the oxygen depleting capability associated with their wastewater along with some specific pollutants included in their discharge permit. Most of the municipal plants treat their effluent to reduce bacterial pollution to the stream or river.

Non-Point Sources:

- Farm Animals - Concentrated animal feeding operations (CAFOs) are required to have DEC-approved nutrient management plans (NMPs). Almost all of the CAFOs have NMP and all are inspected by DEC regularly.
- Development - Many municipalities have ordinances that require implementation of erosion & sediment control practices.
- Septic Systems - Few municipalities have ordinances that require inspection and maintenance of septic systems.
- Cropland - Many farms participate in the voluntary Agricultural Environmental Management (AEM) program facilitated by County Soil & Water Conservation Districts. This national program provides farmers with technical assistance to identify improvement opportunities and funding to implement the best practices identified.
- Improvement Projects - Stakeholder groups define and implement a wide variety of projects that reduce the amount of nutrients and sediment discharged to the river/stream.



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RIVER ACCESS OPPORTUNITIES

- The Black Creek Watershed Coalition has prepared a map showing all canoe/kayak/fishing access points in the watershed available at: http://www.blackcreekwatershed.org/docs/BlackCreekWatershedMapGuide_Map.pdf
- The Oatka Creek Watershed Committee has a map showing canoe/kayak/fishing access points in the watershed available at: <http://oatka.org/>
- The Genesee RiverWatch maintains an interactive map of canoe/kayak access points along the main stem of the Genesee River that can be found at: <http://ceinfo.maps.arcgis.com/apps/webappviewer/index.html?id=4e092f2c597f4f49a18a1e896531a8c0>

WHAT ACTIONS SHOULD BE TAKEN

NYSDEC – Enforce concentrated animal feeding operations and point source permits. Require all point sources to monitor their effluent for total phosphorus. Adopt a water quality standard for total phosphorus in moving water.

S&WCD – Encourage more farmers to adopt AEM, a program that helps farmers address sources of water pollution originating from agricultural activities. Assist farmers with implementation of best practices.

Municipalities – Adopt and enforce septic system and erosion/sediment control ordinances. Adopt green infrastructure when possible. Reduce combined sewer overflows.

Farmers – Adopt AEM or agricultural best management practices whenever possible.

Citizens – Support your S&WCD, municipality, and DEC efforts to promote activities that improve water quality. Get involved with your watershed’s committee or form one.

Genesee RiverWatch – Collect water quality data. Publish and share the Report Card with as many audiences as possible. Assist S&WCD, municipalities, farmers, and landowners to define and implement soil conservation and/or best management practices.

Step 6: Share what you have learned by answering the following question:

What are three activities that would increase the Genesee River’s score and why?

Activities that would increase the score	Why would they increase the score?



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