



Gunpowder Creek Watershed Health Report - Phase I

Gunpowder Watershed Initiative Steering Committee
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Gunpowder Creek Watershed Initiative

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For more information

Like "Kentucky Watershed Health Reports" on Facebook and check DOW webpage for watershed Health Reports at <http://water.ky.gov/waterquality/Pages/TMDLHealthReports.aspx>



Water Quality Reports
<http://water.ky.gov/waterquality/Pages/default.aspx>

Or contact:
Kentucky Division of Water
Lajuanda Haight-Maybriar
Licking River Basin Coordinator
200 Fair Oaks Lane 4th Floor
Frankfort, KY 40601
502-564-3410 Ext. 4937

What other watersheds are doing:

- Hinkston Creek at <http://www.hinkstoncreek.org/index.html>
- Strodes Creek Conservancy at <http://www.strodescreek.org>
- Friends of Stoner Creek at <http://www.stonercreek.us/>

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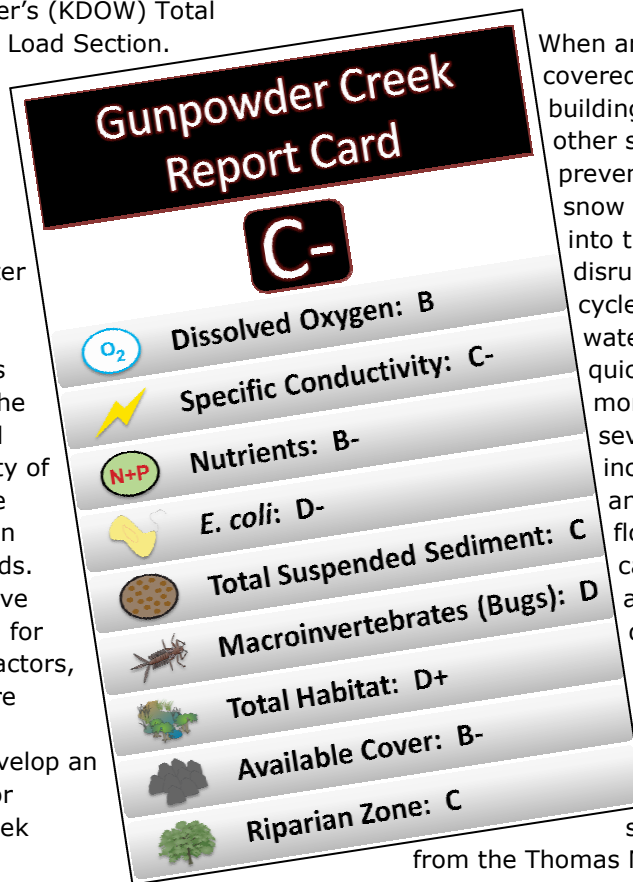
The Energy and Environment Cabinet and Conservation Districts prohibit discrimination in all programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status.

The Gunpowder Creek Watershed Initiative (GCWI) is developing a watershed plan for Gunpowder Creek and its tributary creeks. As a part of this process, samples are being collected to determine the health of these creeks and watersheds. In order to share the findings from these samples with residents and stakeholders of Boone County, GCWI has borrowed a "report card" approach from the Kentucky Division of Water's (KDOW) Total Maximum Daily Load Section. With assistance from KDOW, this approach processes the findings from the samples collected. A letter grade is calculated for different factors that influence the watersheds and affect the quality of the water in the creeks flowing in these watersheds. After grades have been calculated for the individual factors, these grades are combined and averaged to develop an overall grade for Gunpowder Creek Watershed.

A **watershed** is an area of land where runoff flows to a common stream. When creeks come together, the two creeks' watersheds combine to make a larger watershed. Many small creeks, such as Fowlers Fork and Riddles Run, flow into Gunpowder Creek. Eventually, Gunpowder Creek flows into the Ohio River, and is therefore part of the Ohio River Watershed. A map of the watershed is included in this report card. As rainfall

or water from melting snow and ice flows across the land and structures in the watershed, it picks up any pollution on the ground and carries it into creeks. This includes bacteria from humans and animals, fertilizers from homes, farms, and businesses, oils and chemicals from roads, parking lots, homes and farms, dirt from construction areas and farms, and heat from rooftops, roads, parking lots and other paved areas.

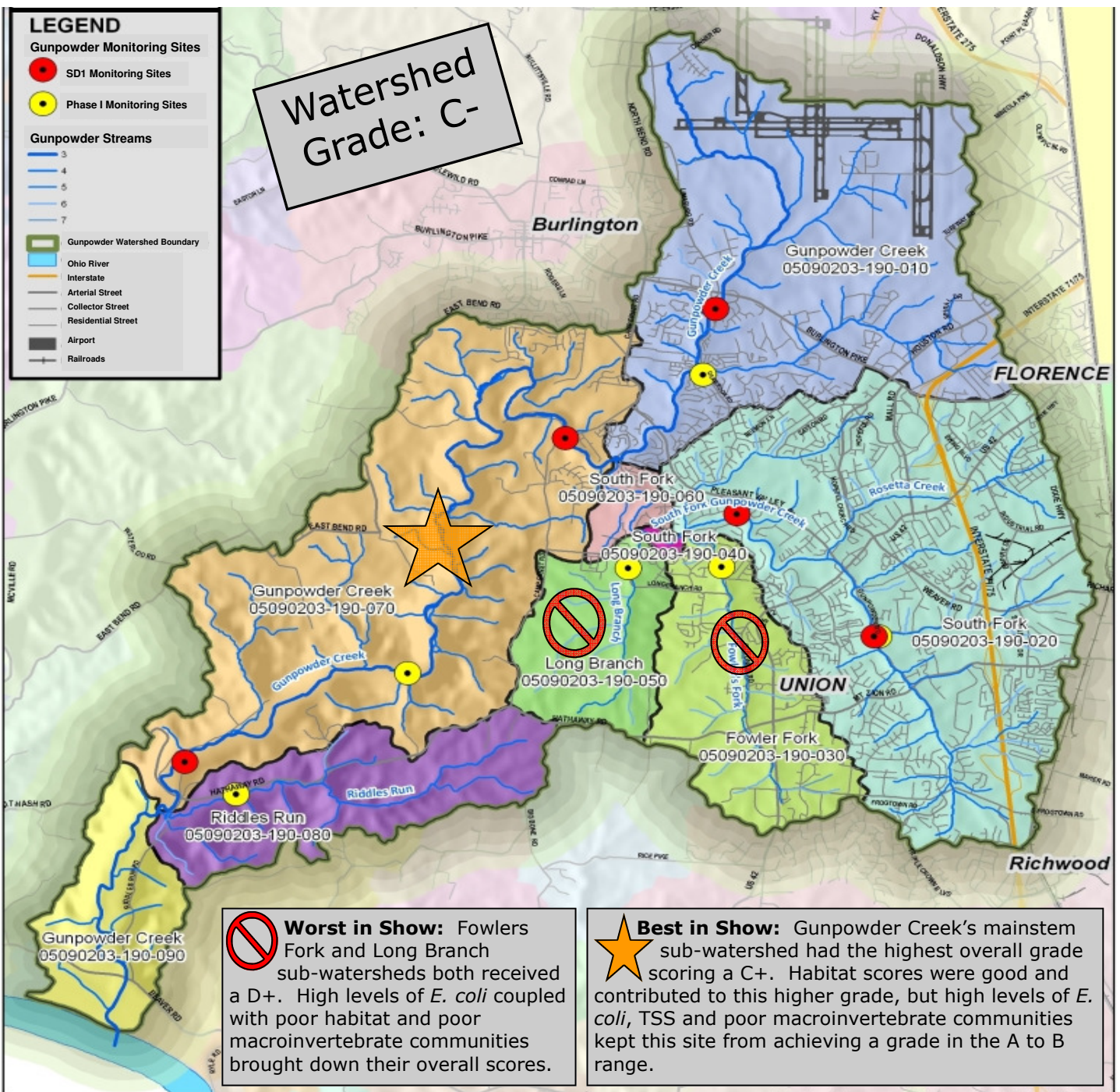
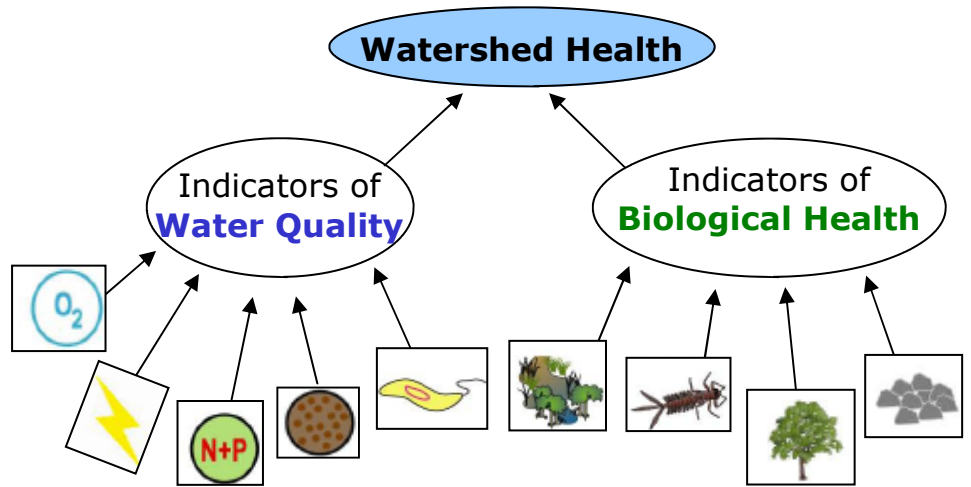
When areas of land are covered over with buildings, pavement, and other structures, we prevent the rain and snow melt from soaking into the ground, disrupting this natural cycle. This sends more water to creeks more quickly and causes more frequent and severe flooding. The increased amounts and strength of flooding in creeks cause erosion that adds smothering dirt to the system and cause stream banks to become unstable.



In 2011 project staff and students from the Thomas More College Environmental Academy were trained and then conducted tests to gather scientific information. Based on this information, GCWI has given a "report card grade" of C- to the Gunpowder Creek Watershed. This health report card explains where the segments of creeks with poor grades are located, describes the indicators of health that went into calculating the grades for each watershed and provides information on how the grades can be improved.

How was Gunpowder Creek Graded?

- Information collected was divided into indicators of **water quality** or indicators of **biological health**.
- Each indicator received a grade, A through F, according to the results of our study, which were compared to health and science requirements and KDOH scientific information.
- The grades from each biological health indicator were averaged to achieve a biological health score.
- Similarly, each indicator of water quality was averaged to achieve a water quality score.
- These two scores were averaged to achieve a **watershed health grade**.



Indicators of Water Quality



Dissolved Oxygen (DO): Concentration of oxygen dissolved in water and readily available to fish and other aquatic organisms.



Specific Conductivity: A measure of the ability of water to conduct an electrical current, which is used for approximating the total dissolved solids content of water. Low specific conductivity is desired, and increasing specific conductivity negatively impacts fish and aquatic bugs.



Nitrogen and Phosphorus (Nutrients): Although natural sources of nutrients exist, human activity is a major source of nutrient pollution, including municipal sewage treatment plants, industrial outflows, commercial fertilizers and animal waste.



E. coli: A type of bacteria that lives in the intestinal tract of humans and other warm-blooded animals. To receive an A, and therefore not be impaired for Primary Contact Recreation (PCR), the *E. coli* concentrations were above the level considered safe for swimming 0–20% of the time. Grades B through F indicate an impairment for PCR and reflect *E. coli* levels that were above the standard 20–100% of the time.



Total Suspended Solids (TSS): A cloudy condition in water due to suspended silt or organic matter. As TSS increase, fish and aquatic bugs experience stress and altered behavior.

Indicators of Biological Health



Total Habitat: Stream habitat is assessed by scoring 10 habitat indicators, which are both living and nonliving parts of the surroundings that support an organism, population or community.



Aquatic Macroinvertebrates (bugs): An animal without a backbone, large enough to be seen with the naked eye. They are often the immature forms of insects that live on land as adults and are an important food source for fish. Different species prefer different habitats, and some are more tolerant of pollution than others.



Riparian Zone: A component of total habitat that is defined by the land adjacent to a stream that has distinct soil types and plant communities, which aid in absorbing water and shading the stream. To receive an A, the riparian zone must be at least 18 yards wide on each side of the stream.



Available Cover: A component of total habitat, which looks at the quantity and variety of structures in the creek that provide fish and aquatic bugs a place to hide, feed, reproduce and raise young. Examples include cobble and boulders, fallen trees, logs, branches, root mats, undercut banks and aquatic vegetation.

Creek Name (Hydrologic Unit Code)											Site Grade
Gunpowder Creek (Middle: 05090203-190-070)	A-	C	B-	D	D+	D	A	B	B	B	C+
Tributary to Gunpowder Creek (Upper: 05090203-190-010)	B	D+	C+	D	C	F	D	B	B	B	C
Tributary to South Fork Gunpowder Creek (South Fork: 05090203-190-020)	B	D-	B	D	C-	F	D	B	D	D	C-
Fowlers Fork (05090203-190-030)	B+	C	C+	F	C-	D	D	C	F	F	D+
Riddles Run (05090203-090-080)	C+	C-	B-	F	B-	C	D	B	A	A	C
Long Branch (05090203-090-050)	B	C	C+	D	C-	D	D	D	D	D	D+
Indicator Grade	B	C-	B-	D-	C	D	D+	B-	C		



Highest Scoring Indicator: Nutrients had the highest overall score in the Gunpowder Creek watershed with a B-. At their current levels, nutrients do not seem to be the main pollutant of concern, and should be managed correctly so that they remain at their current concentrations or perhaps decrease their concentrations slightly to bring them closer to the A range.

Summary: The good is on the edge, while degraded dominates.

POSITIVES



Dissolved oxygen (DO)

levels were suitable for fish and bugs most of the time. Some lower DO levels that lowered the average grade from an A to a B may have resulted from high levels of suspended sediment, which shades photosynthetic organisms and increases bacterial communities that consume oxygen.



Nutrient

levels scored a B- on average, putting this indicator of water quality on the edge between normal and elevated. Nutrients should be managed accordingly so that this indicator of water quality remains in the positive column.



Available Cover

levels scored a B- on average. This cover is important for a healthy population of aquatic bugs and fish and should be protected to increase the likelihood of recolonization.

GRAY AREA



Specific conductivity

levels were elevated throughout the watershed, indicating a level of total dissolved solids that may impact biological communities.



Total Suspended Solids (TSS)

on average, scored a C. All sites throughout the watershed scored some type of C, with the exceptions being Gunpowder Creek, which scored a D+, and Riddles Run, which scored a B-.



The Riparian Zone

scored a C, on average. This indicator of biological health varied greatly throughout the watershed, with some sites having a relatively wide riparian zone while other sites had a riparian zone that was greatly reduced or non-existent, such as Fowlers Fork.

NEGATIVES



E. coli levels were above the standard considered safe for swimming between 62% (D) and 87% (F) of the time, depending on the site. When *E. coli* levels are elevated, there is an increased risk of gastrointestinal illness if the water is swallowed or an infection if contact is made with an open sore or wound.



Aquatic macroinvertebrates (bugs)

scored a D on average. The best bugs were found at Riddles Run where they were classified as fair. At all other sites, the bug communities were classified as poor or very poor, which is most likely linked to reduced habitat and elevated specific conductivity levels.



Total Habitat scored a D+ on average with all sites scoring D except for Gunpowder Creek. Total habitat is the base of the building blocks for a healthy population of aquatic organisms, and when it is reduced, biological health begins to degrade.

What can you do?

- **Protect the good** that remains. Work with local government and land owners to protect areas that are less degraded and improve land management to minimize further degradation.
- **Trees and other plants protect and restore water quality and biological health.**
 - ◇ Leave in place or establish trees and other vegetation along streams to provide natural filters that stabilize stream banks, minimize erosion, regulate water flow, provide shade, retain sediment, absorb excess nutrients, and provide habitat.
 - ◇ Don't mow to the edge of a stream. Leave a buffer of trees and other vegetation at least 18 yards wide along the stream bank.
 - ◇ Allow fallen trees, logs, leaves, gravel, cobble and boulders to remain in the stream to create habitat for fish and macroinvertebrates to feed, find refuge and reproduce.
 - ◇ Minimize streamside grazing by animals.
- **Reduce Total Suspended Solids (TSS)**
 - ◇ Maintain streamside vegetation.
 - ◇ Plant cover crops.
 - ◇ Install settling ponds.
 - ◇ Reduce animal access to streamside grazing.
 - ◇ Guard waterways during construction activities.
- **Education**
 - ◇ Check out some of the resources provided on the front page. Knowing how our daily actions affect water quality is half the battle to improve it.
- **To keep water safe for swimming**
 - ◇ Maintain functional septic systems and replace failing septic systems.
 - ◇ Pick up after your pets. Dispose of animal waste properly.
 - ◇ Keep animals out of the stream.
- **Other Tips**
 - ◇ Keep grass clippings and petroleum products out of storm drains. This material enters the stream directly without treatment.
 - ◇ Dispose of trash and recyclables properly.
 - ◇ Disconnect downspouts from storm sewers.
 - ◇ Install a rain garden to absorb storm water and reduce the amount of runoff from your property.
 - ◇ Consider using porous pavement for driveways and parking lots.
 - ◇ Have your soil tested and apply fertilizers according to the results of the soil test. Apply pesticides according to label directions. Check the weather before applying fertilizers and pesticides to be sure they will be absorbed before it rains!
- **Volunteer**
 - ◇ Become a certified citizen water quality monitor by joining Kentucky Watershed Watch. Contact Watershed Watch in Kentucky at water.ky.gov/wsw/Pages/default.aspx or contact Jo Ann Palmer at 800-928-0045 or JoAnn.Palmer@ky.gov
 - ◇ Organize a creek clean-up to remove litter along and within Gunpowder Creek.