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Strodes Creek Watershed

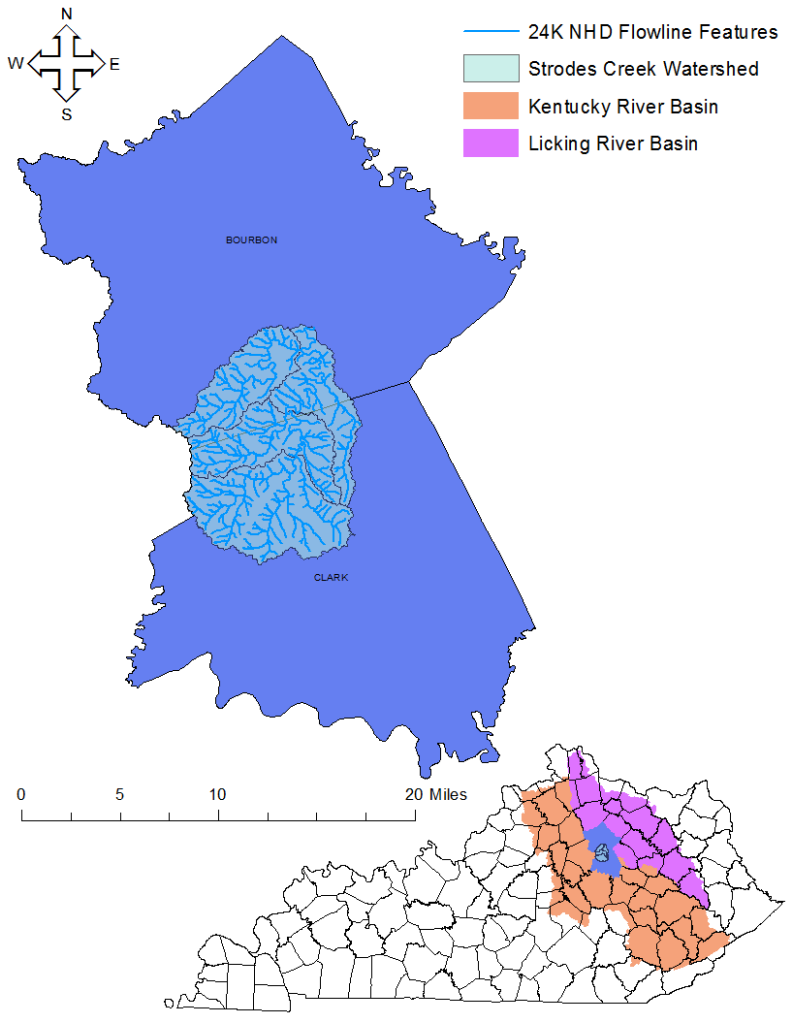
Department for Environmental Protection - Division of Water

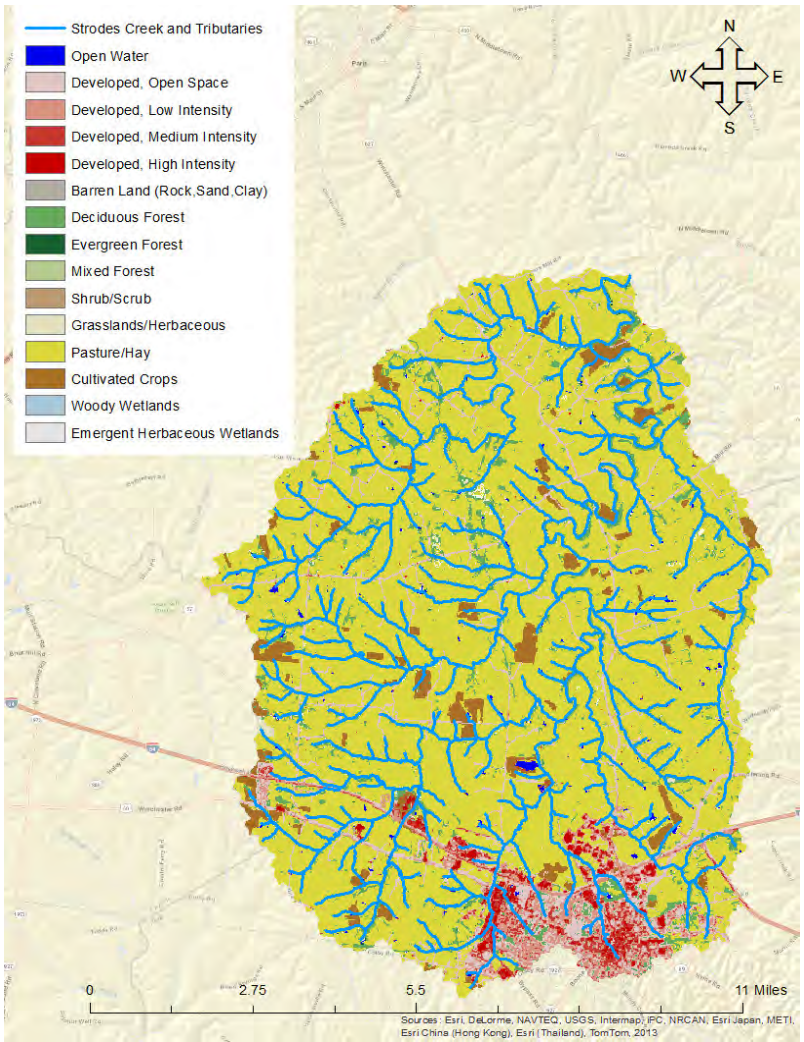
In the 1960s government officials started to realize how polluted streams, rivers and lakes of the U.S. had become. In 1972, Congress passed laws, known as **The Clean Water Act** (CWA), to protect surface water. The goal of the CWA is for all waters in the U.S. to be safe for swimming, fishing and drinking (called **uses**).

We rely on local water sources for water to drink. We pay water treatment plants to withdraw and treat water with chemicals or other processes to make it safe for drinking. The dirtier the water, the more expensive it is to clean the water, which makes drinking water more expensive. The cleanliness of water is also referred to as **water quality**.

We all affect water quality because we all live in a watershed. A **watershed** is an area of land where runoff flows to a common stream. When streams come together, the two streams' watersheds combine to make a larger watershed. The **Strodes Creek** Watershed (see map on right) is a small watershed within a much larger watershed called the Licking River Basin.

There are two types of pollution that can affect a watershed: **point sources** and **nonpoint sources**. Point sources are any distinct points from which pollutants are or may be discharged. Examples include any pipe, ditch, channel, tunnel, well or concentrated animal feeding operation. Nonpoint sources are pollutants originating from the land surface that have no well-defined source. The pollutants are generally carried off the land by storm water.





Land cover is the best way to understand how humans may potentially pollute the watershed in which they live. Cities and towns tend to have more point sources due to the number of facilities required to clean the water used in households and businesses, and may also have an increase in nonpoint sources due to impervious surfaces such as roads, parking lots and sidewalks. Rural areas tend to have more nonpoint source pollution associated with agriculture. Animal waste, fertilizers, pesticides and loose soil, which is exposed when trees are cut down and fields are tilled, may enter the stream during rain events.

The map on the left shows the land cover for the **Strodes Creek** Watershed. Much of the watershed is yellow, demonstrating that the major land cover is pasture and hay. The red area located in the headwaters of Strodes Creek represents the development associated with Winchester, KY.

The Clean Water Act, Impaired Waters and TMDLs

The Clean Water Act (CWA) requires states to submit a report to congress, called the **305(b) list**, which reports the water quality of streams, rivers and lakes within the state that have been assessed. To prepare this report, the Kentucky Division of Water (DOW) identifies the **designated uses** of a waterbody and then assesses the waterbody to see if the water is clean enough to meet these uses. If the stream is not clean enough to meet its uses, the stream is found to be impaired.

Examples of designated uses include:

- **Aquatic Habitat** - water quality promotes a healthy population of plants and animals that live in the water
- **Primary Contact Recreation** - water is safe for human swimming

Another requirement of the CWA is the **303(d) list of impaired waters**. This report lists all of the assessed waters from the 305(b) list that partially support or do not support their uses and identifies the impairment as being caused by a **pollutant**, even though impairments can result from pollution or pollutants. **Pollution** is a general term that refers to something that causes instability, disorder, harm or discomfort to an ecosystem and can include removing habitat from a streambank to littering. **Pollutants** are measureable substances that contribute to pollution that makes the water harmful or unsuitable for a specific purpose; examples include chemicals or waste products.

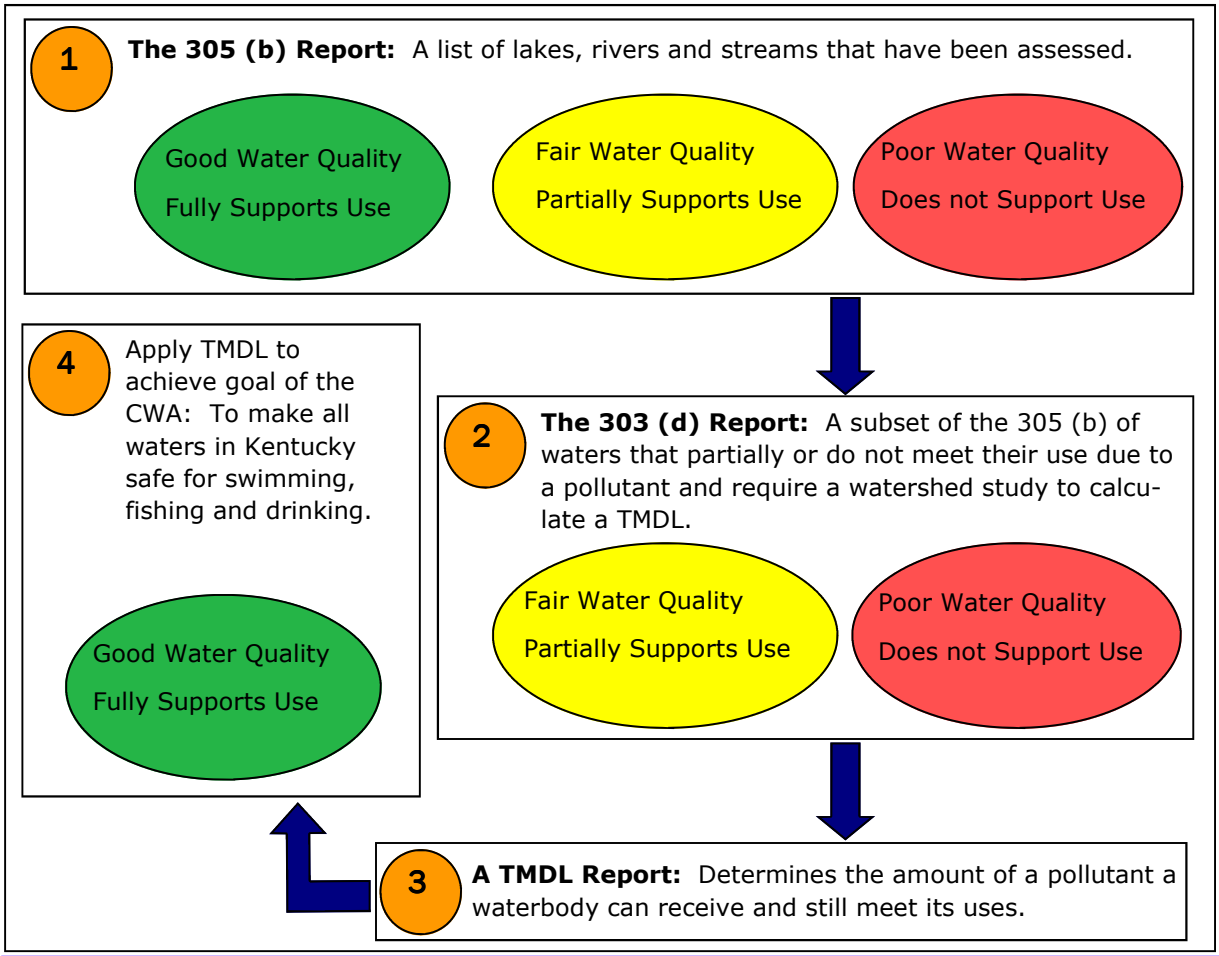
Only impairments caused by a pollutant can be placed on the 303(d) list since waters on the 303(d) list require a pollutant load reduction plan, usually in the form of a **Total Maximum Daily Load** (TMDL). A TMDL calculation is the total amount of pollutant(s) a waterbody can receive and still meet its designated use(s). A TMDL can be thought of as a watershed diet; the watershed's intake of a pollutant must be reduced by a certain percentage in order for the watershed to be healthy once again.

Upon assessment in 2005, it was determined that 44 segments of Strodes Creek and its tributaries do not meet its designated uses. Of these, 11 segments were found to not support the Primary Contact Recreation use, while 25 segments were found to not support the Aquatic Habitat use.

For a stream to be listed as impaired for Primary Contact Recreation, *E. coli* concentrations exceeded the level considered safe for swimming at least 20 percent of the time when the assessment was completed. Elevated *E. coli* concentrations indicate an increased risk of gastrointestinal illness if the water is swallowed or infection if contact is made with an open sore or wound.

To be impaired for Aquatic Habitat, the fish and aquatic bug populations have reduced numbers or types due to a lack of habitat, which provides refuge, and/or pollutants present in the water, such as nutrients or sediment, that negatively impact their ability to breath, feed or reproduce.

Since Strodes Creek and its tributaries do not support some of their designated uses, and the cause of the impairment was identified as a pollutant, they are on the 303(d) list of impaired waters and require a pollutant load reduction plan, which could be a TMDL or an alternative plan to reduce pollutant loading. In order to develop this plan, a watershed study must first be completed to collect the necessary data.

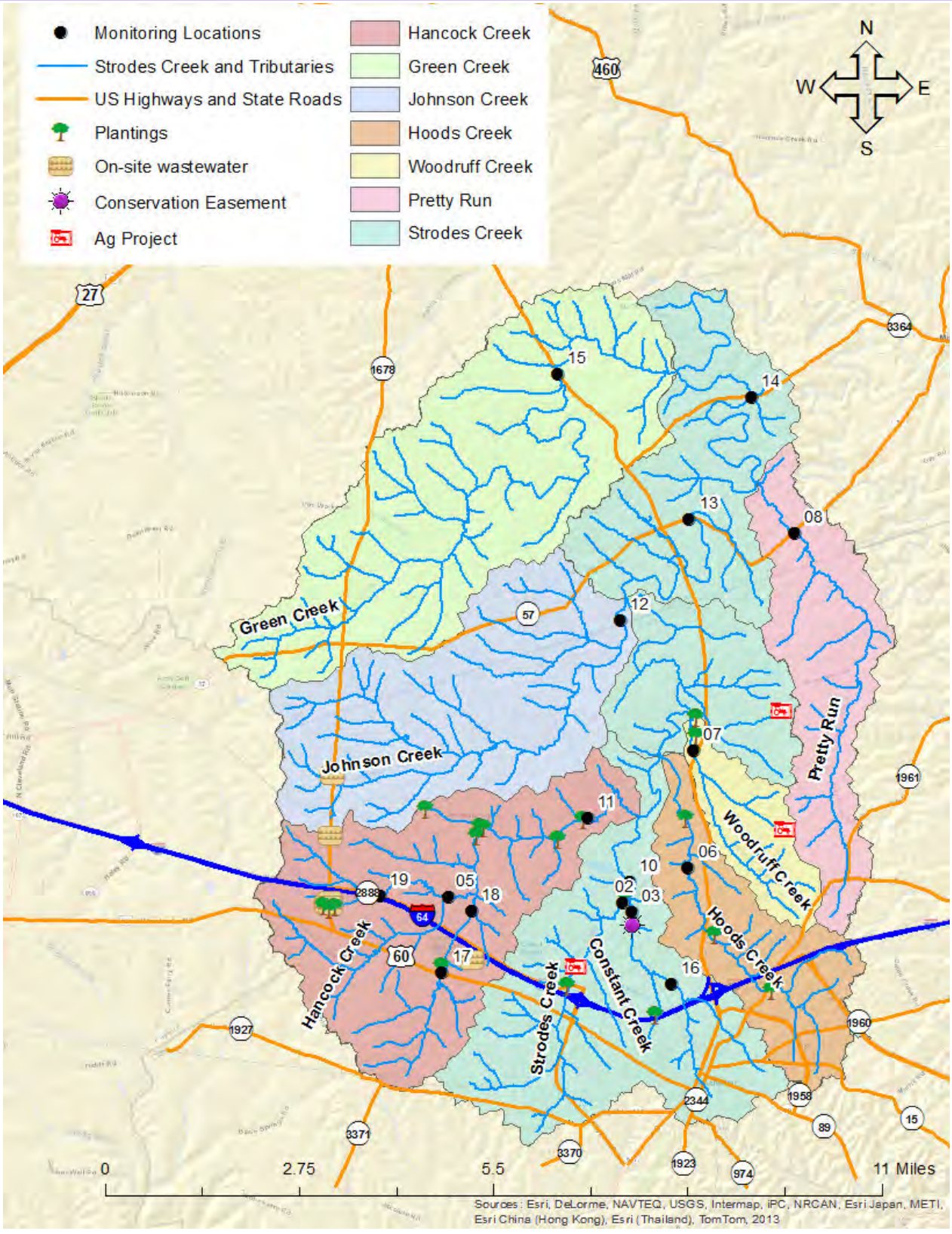


Strodes Creek Watershed Study

Strodes Creek and its tributaries will be studied from March 2014 through October 2015 by the Kentucky DOW, TMDL section. A report for Strodes Creek watershed will be written as a result of the two year long study, which will be made available to the public with the goal of improving water quality.

DOW biologists will sample 16 locations throughout the Strodes Creek watershed once a month from November through April and two to five times a month from May through October at the locations shown in the map on this page. At each site the following will be measured or collected (these terms are defined on the next page):

- **Dissolved Oxygen**
- **Specific Conductivity**
- **Nutrients**
- ***E. coli***
- **Sediment**
- **Bugs**
- **Algae**
- **Habitat**



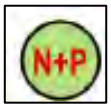
Since Strodes Creek was studied in 2005, the Strodes Creek Conservancy (SCC) has installed many best management practices (BMPs) with the goal of improving water quality. Most of these BMPs have been implemented in Hancock Creek, Hoods Creek, and the headwaters of Strodes Creek, as shown in the map on this page. The BMPs implemented include conservation easements, on-site wastewater projects such as septic pump outs and septic rehabilitation, tree plantings, and agricultural BMPs such as limiting cattle access to waterways. Therefore, the goal of this monitoring is to not only collect data necessary for calculating pollutant load reductions, but to also collect data to see what initial impact these BMPs may have had on the water quality of Strodes Creek. It is important to remember that water quality improvement happens on a decadal time frame, and significant improvements may not be seen right away.

Each measurement made or sample collected is considered an indicator of **Water Quality** or an indicator of **Biological Health**. These indicators demonstrate how pollution entering the stream impacts the overall health of the **Strodes Creek Watershed.** Below, each indicator of watershed health that DOW biologists will measure or collect is defined.

Indicators of Water Quality

Dissolved Oxygen: 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 estimating 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, major sources of nutrient pollution are typically caused by man's activities and include municipal sewage-treatment plants, industrial outflows, commercial fertilizers and animal waste.

E. Coli: A type of bacteria that lives in the intestinal tract of man and other warm-blooded animals.

Sediment: Soil, sand and minerals washed from land or stream banks into water, usually after rain. Sediment can be suspended in the water column, making the water turbid, or it can deposit on the stream bottom when water flow slows and loses energy.

Indicators of Biological Health

Total Habitat: Stream habitat is assessed by scoring 10 habitat signs, 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. An ideal riparian zone is 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 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.

Algae: (singular form is alga) A simple, rootless plant that is an important source of food and produces oxygen via photosynthesis. However, when excess nutrients enter the stream and there is enough sunlight due to a lack of trees, algae can bloom. During a bloom, algae can lower the dissolved oxygen as they die and decay, which negatively affects bugs and fish.

What can you expect?

- Over the **next two years**, DOW biologists will begin collecting water and biological samples in the watershed every month. If you see them, feel free to ask questions about their work.
- Within the **next three years**, DOW will distribute an informal "health report" of the Strodes Creek Watershed to share results of the study and explain ways the community can help improve water quality.
- Within the next **five years**, DOW, in collaboration with the SCC, will write a document that outlines the load reductions needed throughout the Strodes Creek Watershed, which will help guide further BMP implementation and watershed plan development. The ultimate goal is improved water quality throughout the Strodes Creek Watershed.
- Within the **decade**, load reduction implementation and community efforts will continue to help improve water quality and biological health of the Strodes Creek Watershed.
- To stay informed, **LIKE** 'Kentucky Watershed Health Reports' on Facebook.