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# North Fork Nolin River

Department for Environmental Protection - Division of Water

In the 1960s, government officials started to realize how polluted streams, rivers, and lakes of the United States 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 **designated 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**.

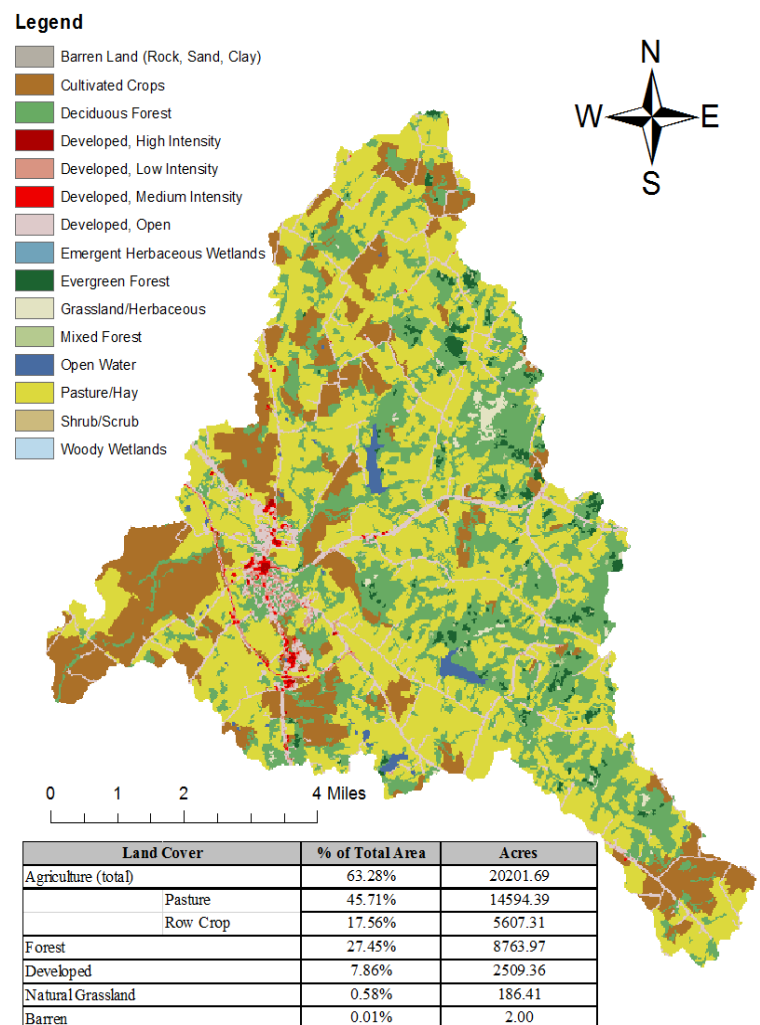
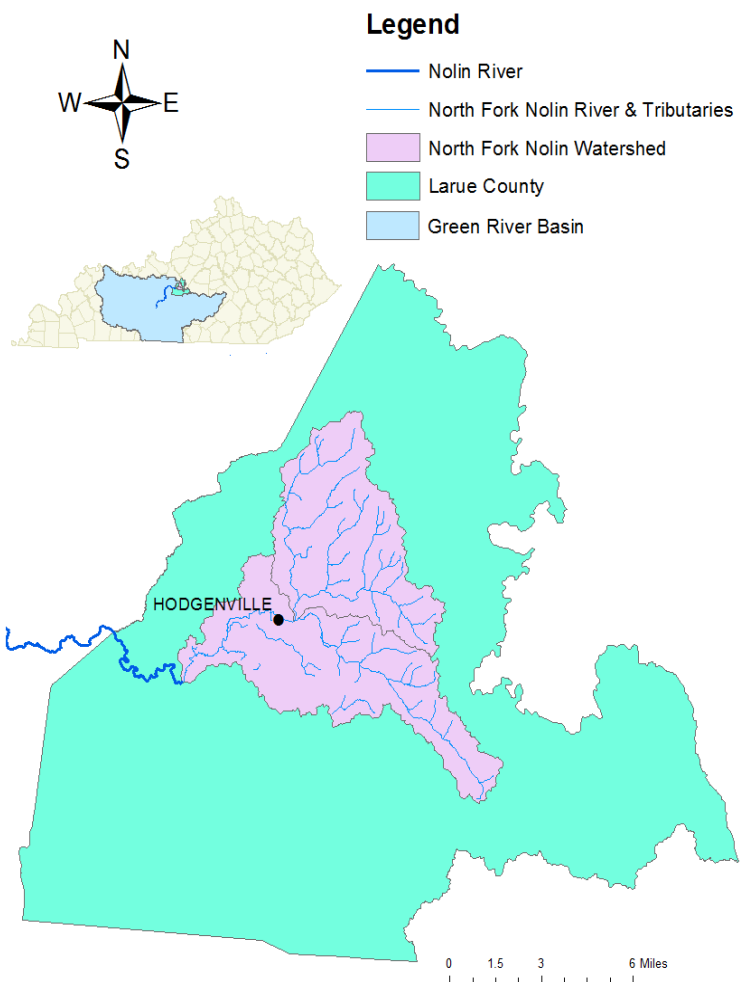
We all affect water quality because everyone lives in a watershed. A **watershed** is an area of land where runoff flows to a common stream. When streams come together, the two streams' watersheds combine to make a larger watershed. The North Fork Nolin Watershed (see left map on this page) is a small watershed within a much larger watershed called the Green River Basin.

There are two types of pollution that 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 non-point 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, may enter the stream during rain events.

The map on the right side of this page shows the land cover for the North Fork Nolin Watershed. Much of the watershed is yellow or brown, demonstrating that the major land covers are pasture/hay and cultivated crops.



# 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.

An example of designated use is:

**Warm Water Aquatic Habitat (WAH)** - water quality promotes a healthy population of plants and animals that live in the water.

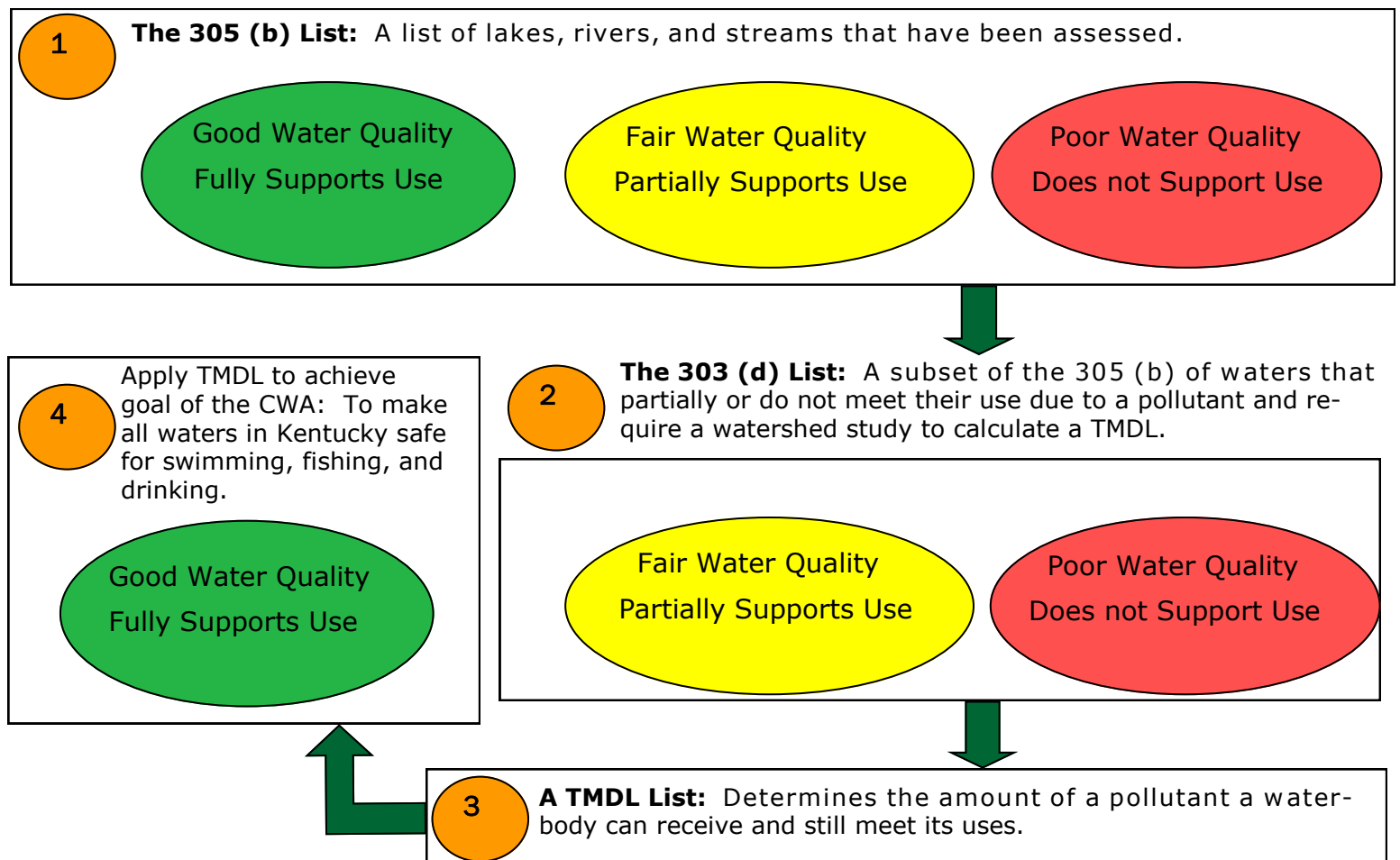
Another requirement of the CWA is the **303(d) list of impaired waters**. This report lists all of the assessed waters from the 305(b) list that do not support their uses and identifies the impairment as being caused by a **pollutant**, even though impairments can result from pollution or pollutants. **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 make the water harmful or unsuitable

for a specific purpose; examples include chemicals or waste products.

Only impairments caused by a pollutant are 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.

To be impaired for WAH, 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 North Fork Nolin River does not support one of its designated uses, and the cause of the impairment was identified as a pollutant, it is on the 303(d) list of impaired waters and requires a TMDL for those stream segments. Therefore, a watershed study has been initiated for the North Fork Nolin Watershed.



# North Fork Nolin Watershed Study

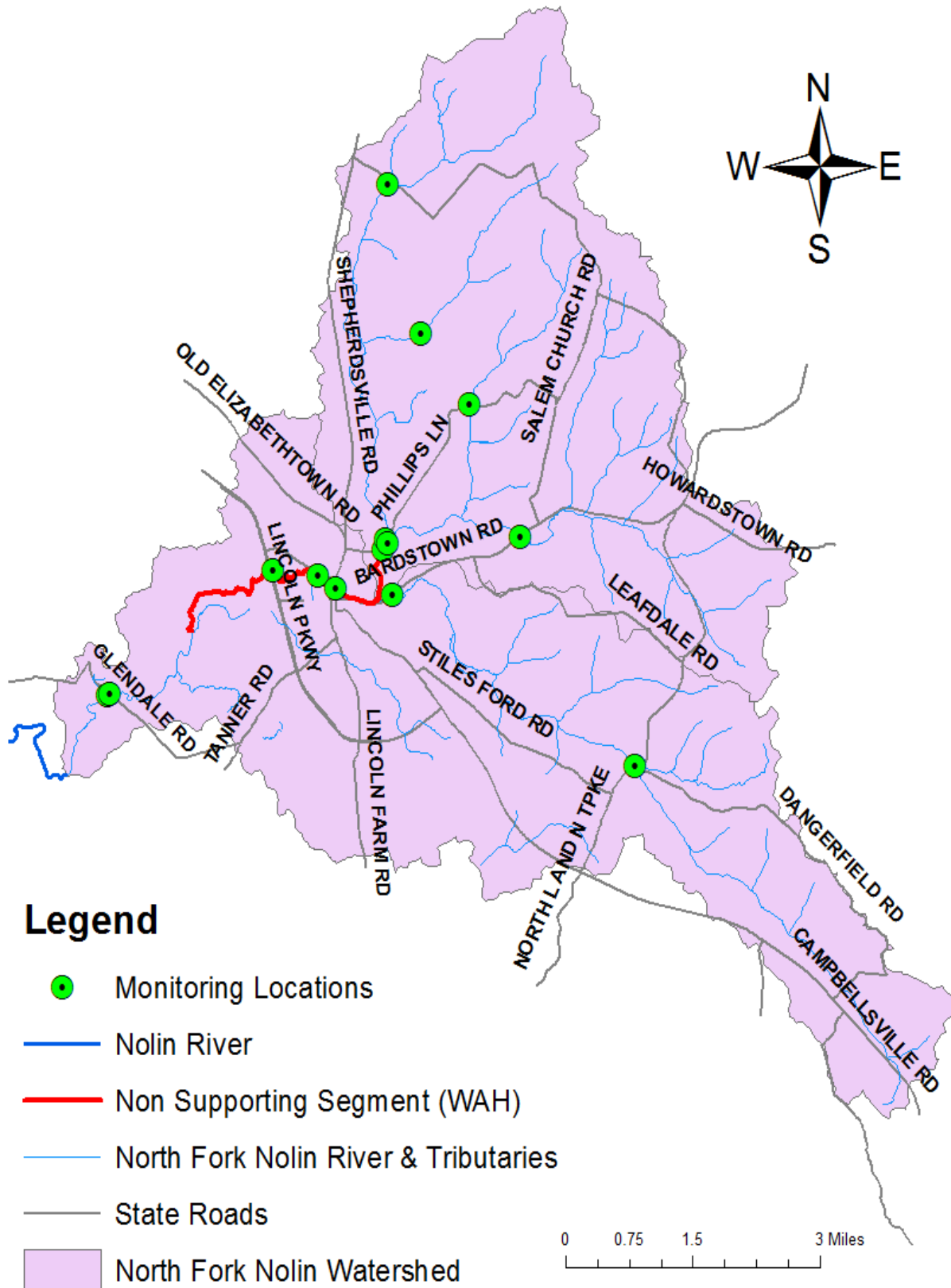
North Fork Nolin River is a 49.9 mi<sup>2</sup> tributary of Nolin River, and flows into the Nolin River in Larue county. North Fork Nolin River was listed on the 2007 303(d) list as impaired for its WAH designated use. The causes of impairment are nutrient eutrophication and organic enrichment. Nutrients are a part of a healthy watershed but an abundance of nutrients can lead to eutrophication. Eutrophication is an excessive amount of nutrients in a body of water, frequently caused by runoff. Organic enrichment is an over abundance of decaying organic material, sewage, and other animal waste. Both can negatively impact aquatic life. These impairments are based on the collection, identification, and analysis of biological indicators. These biological indicators, such as macroinvertebrates or fish. These indicators are a reflection of the overall health and/or problems associated with the watershed.

North Fork Nolin River (river mile 3.0 to 7.05) does **not support** the WAH designated use and is therefore highlighted **red** (see map on this page). North Fork Nolin River does **support** the Domestic Water Supply (DWS) use. It is important to know that this segment fully meets the standards to withdraw water for drinking water treatment.

The data collected for this study will be used to support 305(b) use-attainment assessments throughout the watershed.

The TMDL Section implements an intensive approach to monitoring watersheds to determine impairments and sources. As a result, watershed monitoring will occur over the next two to three years. During the first year of sampling, March 2018 through February 2019, data collection will focus on confirming the impairments and probable sources of impairments within the main stem and

larger tributaries of the North Fork Nolin River. The second year of sampling will consist of targeted sampling for sources of impairment identified during the first year. The second year of sampling may also include data collection in un-assessed tributaries not sampled during the first year of monitoring. A third year of monitoring may be warranted if data gaps still exist. The parameters being measured or collected are defined on the next page.



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

## Indicators of Water Quality



**Dissolved Oxygen:** The concentration of oxygen dissolved in water that is readily available to fish and other aquatic organisms.



**Sedimentation:** 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.



**E. coli:** A type of bacteria that lives in the intestinal tract of humans and other warm-blooded animals. The higher the amount of bacteria in the water, the higher the chance of getting sick when recreating in that water.



**Nutrient Enrichment:** Although natural levels of nutrients are part of a healthy watershed, excess nutrients can cause water quality problems. Human activities that can contribute nutrients include: municipal sewage treatment plants, industrial outflows, failing septic systems, commercial fertilizers, and animal waste.

## Indicators of Biological Health



**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.



**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.



**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.



**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.



**Algae:** 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, algae can bloom. During a bloom, algae can lower the dissolved oxygen as they die and decay, which negatively affects fish and aquatic bugs.

## What can you expect?

- Over the **next year**, DOW biologists will collect 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 North Fork Nolin Watershed to share results of the study and explain ways the community can help improve water quality.
- Within the next **five years**, a pollution reduction plan such as a TMDL may be written for the North Fork Nolin Watershed. The plan will outline which pollutants need to be reduced and by how much for the watershed to meet its designated uses.
- Within the **decade**, TMDL implementation and community efforts may help improve water quality and biological health of the North Fork Nolin Watershed.
- To stay informed, **LIKE** 'Kentucky Watershed Health Reports' on Facebook.
- Visit our website and view the story map at <http://water.ky.gov/waterquality/Pages/TMDLProgram.aspx>
- Visit the Kentucky Water Health Portal at <http://watermaps.ky.gov/WaterHealthPort-1>

(scan to link to our Facebook page)

