

TN Water Watch Frequently Asked Questions

Why do we test for *Escherichia coli*?

Escherichia coli or *E. coli* is a common indicator of fecal contamination in freshwater. Fecal contamination typically refers to waste/feces from warm-blooded animals (livestock, dogs and cats, humans, birds and other wildlife), which can carry disease-causing bacteria in humans (*i.e.* human pathogens). Most *E. coli* strains are harmless to humans, but when *E. coli* levels are elevated in a body of water, that indicates the likely presence of pathogens – *Salmonella*, *Legionella*, *Giardia*, and *Cholera* are all examples of water-borne pathogens.

Common symptoms of waterborne illnesses include diarrhea, vomiting, nausea, cramps, fever, or skin, ear, or eye problems.

How do we test for *Escherichia coli*?

Typical *E. coli* enumeration requires about 24 hours to attain results. Below you will find a summary of this process:

1. Water sampling – Fill a sterile sampling bottle with river water by dipping the bottle 6 inches below the surface. Collect at least a volume of 100 mL of water. Samples should be stored/transported in a cooler with ice.
2. Samples are transported to the Harpeth Conservancy laboratory and the IDEXX QuantiTray2000 system is used for analysis (<https://www.idexx.com/en/water/water-products-services/quantitraysystem/>). In short, a fluorescence reagent is added to the water samples. The sample is then incubated overnight (24 hours). *E. coli* within the sample will metabolize the reagent causing the *E. coli* cells to fluoresce under black light.
3. 24 hours after samples were placed in an incubator, we count the number of fluorescing colonies and record the amount of *E. coli* in the sample.

This process helps us determine when *E. coli* are elevated. TN Water Watch utilizes this data and makes predictions based on current conditions (rain, sunlight, river flow, etc.) in order to avoid the 24 hour holding time and inform community members in real-time when there is a threat to human health.

What do the TN Water Watch status colors and *E. coli* counts mean for my health?

The U.S. Environmental Protection Agency recommends a Recreational Water Quality Criteria of 235 colony forming units (CFUs)/100 mL. At this water quality criteria, the EPA estimates an illness rate of 36 per 1,000 people that come into direct contact (swimming, boating, wading, etc.) with that body of water. The status colors (green, yellow, orange, and red) incorporated in our TN Water Watch tool correspond to “risk”.

Green represents values of *E. coli* from 0 – 234 CFUs/100 mL, corresponding to all locations with less *E. coli* than the EPA recommendation.

Yellow represents values of *E. coli* from 235 – 350 CFUs/100 mL, slightly above the EPA recommended “safe” value.

Orange represents a more risky values of *E. coli* from 351 – 750 CFUs/100 mL

Red represents values of *E. coli* greater than 751 CFUs/100 mL.

Note: In certain circumstances, *E. coli* values can be as high as several thousand CFUs/100 mL. Our current scale does not differentiate between 800 CFUs/100 mL and 2,000 CFUs/100 mL as both results would be “red” however, the location with 2,000 CFUs/100 mL would be more risky due to the higher levels of *E. coli*. Feel free to check the actual predicted values of *E. coli* by clicking on your location of choice. These values will offer more information about risk than the status colors. Status colors should be used as a “quick glance” metric.

Information based on EPA Recreational Water Quality Criteria document:
<https://www.epa.gov/sites/default/files/2015-10/documents/rwqc2012.pdf>

Is it safe to stand in water that contains *E. coli*?

Water-borne illnesses (such as Cryptosporidium, Giardia, Pseudomonas, Naegleria, etc.) are most commonly caused by swallowing contaminated water. Contaminated water can also get it your eyes, ears, or nose and lead to water-borne illness. In fact, contaminated water can even cause skin irritation or rash when your skin is directly in contact with the water. It is important to practice good hygiene after recreating in surface waters.

Tennessee Department of Health has additional information about how to recreate safely -
<https://www.tn.gov/health/cedep/waterborne-diseases/recreational-water.html>

Should I let my dog swim in the river if *E. coli* levels are high?

Bring water for your dog to drink. One of the easiest ways to get sick from *E. coli* is direct ingestion. On a hot day, dogs will get thirsty and even attempt to drink the river water. Having clean drinking water for your dog will greatly reduce their health risk.

What should you do before you swim?

Swimming in a river can be an enjoyable and refreshing experience, but it's important to take some precautions to protect your health. Here are some tips you should consider before taking a plunge:

1. **Check Tennessee Water Watch:** Before swimming, check the water quality forecast at www.tnwaterwatch.org and check the water level in the river to determine if it is safe at www.canikayak.com.

2. **Observe Water Conditions:** Visually inspect the river for any signs of pollution, such as floating debris, oil slicks, or unusual colors. Also, be aware of strong currents, floating or submerged logs, and other hazards.

3. **Avoid After Rainfall:** Heavy rainfall can lead to increased runoff into rivers, often carrying pollutants like bacteria, chemicals, and trash from the land into the water. It's generally a good idea to wait 24-48 hours after a heavy rain before swimming.

4. **Be Aware of Wildlife:** Understand the local wildlife in the river. Tennessee is blessed with an incredible variety of wildlife that love our rivers including great blue herons, river otters, turtles, and snakes. If you don't mess with them then they won't bother you.

6. **Avoid Algal Blooms:** Stay out of water that contains harmful algal blooms. These can appear as thick mats of algae on the surface, they can appear to look like spilled green paint and can be harmful to humans and animals.

7. **Use Protective Footwear:** Wear water shoes to protect your feet from sharp objects, slippery surfaces, or rocky riverbeds.

8. **Avoid Ingesting Water:** Try to keep the river water out of your mouth to avoid swallowing organisms that could cause illness.

9. **Cover Cuts and Wounds:** If you have any open wounds, cover them with a waterproof bandage to prevent infection.

Taking these precautions can help ensure that your river swimming experience is safe and enjoyable. Remember to respect the natural environment and leave no trace of your visit to preserve the beauty and health of the river.

What should you do after you swim?

After having some fun on the water, it is important to rinse-off with clean water and sanitize your hands, particularly before eating food. Wash your hands for at least 20 seconds and rinse off any sand or dirt. Alcohol-based hand sanitizer can be a serviceable substitute when soap and water are unavailable. Using hand sanitizer may not work as well if your hands are visibly dirty or greasy, so it could be beneficial to wipe away any sand before applying it. After a day on the river be sure to wash off with soap and dry your ears gently with a towel – ear drops can also be effective in preventing swimmers ear.

How do we stop bacteria from getting into our rivers?

The easiest and most effective means to prevent bacteria contamination of our rivers is to identify the source and mitigate or remediate the issue. For example, pasture fencing can prevent livestock from standing and defecating in streams, which could be a source of bacteria for downstream users. Unfortunately, bacteria are relatively diffuse across the landscape and there usually isn't a single source to fix. Therefore, sometimes a multi-pronged approach is necessary, such as improving stream

vegetation that helps filter bacteria, encourage people to pick-up after their dogs, and/or improving sewer infrastructure, to name a few examples.

The TN Water Watch program will help us identify “hot spots” of *E. coli* and allow for further investigation into the likely source of the contamination. Additional scientific techniques can also be used to genetically identify the source of *E. coli* based on animal group (water fowl, cattle, horses, humans, dogs, etc.).

What are some common sources of *E. coli*?

E. coli can enter rivers and lakes through various pathways. Some common sources include:

Animal Feces: Waste from animals such as livestock, wildlife, and pets can contain *E. coli* bacteria. Rainwater runoff can carry this fecal matter into water bodies.

Sewage Overflows: Malfunctioning or overloaded sewage systems can lead to the release of untreated sewage into waterways, which may contain *E. coli* bacteria.

Agricultural Runoff: Fertilizers and manure from agricultural activities can contain *E. coli* bacteria. When rainwater washes over fields, it can carry these contaminants into nearby rivers and lakes.

Human Activities: Activities such as boating, swimming, and camping near water bodies can introduce *E. coli* from human waste into the environment.

Faulty Septic Systems: Improperly maintained or failing septic systems can leak sewage into the ground, eventually reaching groundwater sources or surface water bodies.

Overall, *E. coli* contamination in rivers and lakes often stems from a combination of human, animal, and environmental factors.