Water Quality Database

SCAVENGER HUNT

1. The guidance value for the analyte "total phosphorus" is _____.
(don't forget units!)

2. The DEC recently (2020-2022) proposed that Lower Fall Creek be listed as impaired for high pH based on DEC-collected data. The EPA considers a pH of 9 to be high, while the DEC considers 8.5 to be high pH in Class A, B, and C waters. Lower Fall Creek is listed as class B. Do you think listing Lower Fall Creek as impaired for this reason is warranted?

Hint: try looking at data for Cayuga Street Bridge on Fall Creek

3. When is the last time CSI data demonstrated *E. coli* levels above the NYSDOH contact recreation limit of 235 colonies / 100 ml at the Outfall of the Trumansburg Wastewater Treatment plant ("Outfall of Sewage Plant" in Trumansburg Creek)?

4. Go to the page for the Great Gully Creek monitoring set (within Cayuga Lake Watershed).
   a. Let's look at "total phosphorus." Which values are higher: base flow or stormwater?
   b. What about for Total Kjeldahl Nitrogen (TKN)?
   c. On the dropdown menu, why are there so many different indicators for phosphorus and nitrogen?
   d. On CSI's database, the data is presented in an interactive format with self-populating graphs. However, you can also download data into an excel sheet to make your own graphs and tables. Try downloading all nutrient data from Great Gully Creek.

Applying CSI Data

Did you know that CSI data are frequently applied to real-world issues?

As Question #3 suggests, CSI data led to necessary infrastructure improvements at the Trumansburg Wastewater Treatment plant, which prevented additional bacteria pollution in Trumansburg Creek. Read more by scanning the QR code!

The nutrient levels you look at in Question #4 are unusually high for tributaries of Cayuga Lake. CSI demonstrated and explored this pattern in a 2019 publication you can find by scanning the second QR code.

Glossary

Looking at the drop-down menu for water quality indicators, you may notice a number of options all referring to phosphorus or nitrogen. We've provided a glossary to help you understand some nuanced differences between similar indicators. Nutrients occur in different forms in our waterways, which can impact the way the rest of the environment interacts with them. Our tests aim to quantify these differences to the best of our ability with the methods and tools we have at our disposal. The following analytes differ both in how they are conducted and what they tell you about each nutrient.

Phosphorus

Total Phosphorus (as P) – all phosphorus in the water sample, regardless of its form. Total phosphorus includes both particulate phosphorus (phosphorus bound to particles such as clay), and dissolved phosphorus (not bound to particles). Particulate phosphorus can be considered less "bioavailable" than dissolved phosphorus, meaning it is not immediately available for consumption and use by algae. Because of this, total phosphorus is not always considered to be an ecologically relevant measurement. However, more total phosphorus in the environment *does* generally correspond to more bioavailable phosphorus in the environment and is much cheaper and simpler to measure. This is one of the forms of phosphorus most regularly tested in CSI's lab.

Total Dissolved Phosphorus (as P) – phosphorus not bound to particles. This can be considered more bioavailable than particulate phosphorus because it is unbound. To measure total dissolved phosphorus (TDP), the sample is filtered, then heat and acid are added to it to "digest" the dissolved phosphorus. CSI does not typically test for this type of phosphorus because it is not certifiable by ELAP (Environmental Laboratory Approval Program)

Soluble Reactive Phosphorus (as P) – this form of phosphorus is considered "immediately bioavailable." Though total dissolved phosphorus or even particulate phosphorus can become bioavailable eventually, soluble reactive phosphorus (SRP) is often seen as the most direct measurement of dissolved phosphorus readily available for uptake by algae and plants. To measure SRP, the sample must be filtered through a 0.45 micron filter, either in the lab or in the field (making it "Field-Filtered").

Nitrogen

Total Nitrogen – as it occurs in our database, this refers to a method CSI no longer uses to measure all nitrogen in a sample. Instead of this measure, total nitrogen can be approximated by adding total Kjeldahl nitrogen (TKN) with Nitrate and Nitrite.

Kjeldahl Nitrogen, Total (as N) – Organic nitrogen is found in plants and animals in the form of proteins, DNA and other large molecules essential to life. There is no direct test to measure organic nitrogen. Total Kjeldahl nitrogen (TKN) measures the sum of organic nitrogen plus ammonia. Ammonia can then be measured separately and subtracted from TKN to obtain organic nitrogen. Because TKN is the sum of ammonia plus organic nitrogen, it serves as a useful indicator of water quality impacts due to human and animal waste.

Ammonia - Nitrogen (as N) – the major form of nitrogen present in animal and human waste. Ammonia is toxic to aquatic life. One of the principal functions of sewage treatment plants is to remove ammonia from wastewater before it is discharged to streams and lakes.

Nitrate-+Nitrite-Nitrogen (as N) – Nitrate is the form of nitrogen that plants take up from the environment as a nutrient. Nitrate may come from underground minerals that dissolve in groundwater as it flows to streams and lakes. Nitrate may also come from man-made fertilizers that are applied, for example, to agricultural fields, golf courses, and suburban lawns and enter streams and lakes in runoff when it rains.

Nitrite - Nitrogen (as N) – produced by bacteria in the environment and in the intestinal tract from nitrate, NO3. Concentrations of nitrite are generally very low, and nitrite is rarely detectable in stream and lake water. The test for nitrate includes nitrite.