**BAE 204: Lab #11**

Most of the examples during the lab were given using the River Maudouve at Saint Donan, in France. The entire code for the lab is in the “BAE204-QClab-2021.Rmd”.

The goal of this lab is to be able to apply the tools provided and apply them to another watershed, and derive indicators of hydrographs, chemographs, concentrations, and loads as explained in “BAE204-QClab-2021.Rmd”.

The study watershed for this lab is the Cuyahoga River at Independence, Ohio. The watershed is 707 square miles in surface area.

The data is available at

<https://raw.githubusercontent.com/francoisbirgand/BAE204-Qlab/master/Lin_1h_cuyahoga_all_2008-2009_SI_ref.csv>

Exercise 1:

Plot the yearly hydrograph for the Cuyahoga River at Independence, Ohio. For this knit the “BAE204-QClab-2022.Rmd” copy/paste the code chunk from the lab “BAE204-QClab-2022.Rmd” document and modify accordingly.

Exercise 2:

Calculate the lowest, highest, mean, and median flow rates, as well as the 10th percentile, and the 90th percentile. For this, there is the quantile function, which works as quantile(Q,percentile value).

Report them in a bullet list using embedded code.

Exercise 3:

Calculate and report the arithmetic average and medium concentrations for nitrate, TP, SRP, and TSS over the entire year of record.

The reference values for agricultural watersheds are, respectively, 5 mg N/L, 0.3 mg P/L, 0.03 mg P/L, and 20 mg TSS/L. Compare your results to these reference values.

Exercise 4:

Plot the hydrograph and nitrate, TP, SRP, and TSS chemographs for the Cuyahoga River at Independence, Ohio, over the first two weeks of March 2009.

Report whether the chemographs exhibit a concentration or a dilution effect.

Exercise 5:

Plot the flow duration curve over the entire period of record using the log/log scale graph.

Report the total flow volume that occurred in 2%, 5%, and 10% of the time, corresponding to the highest flow.

Exercise 6:

Plot the load duration curve over the entire period of record using the log/log scale graph.

Report the total load that occurred in 2%, 5%, and 10% of the time, corresponding to the highest loads.

Compare these values to the ones you obtained for flow, and discuss whether or not that makes sense.