

A photograph of a stream in a wooded area. On the left bank, a grey sensor box is mounted on a tree trunk, with red and black cables running down the bank. The water in the stream is calm, reflecting the surrounding trees and sky. The foreground shows a grassy bank with fallen leaves.

# Ecological patterns seen in data from online in-stream sensors

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10-14-2020

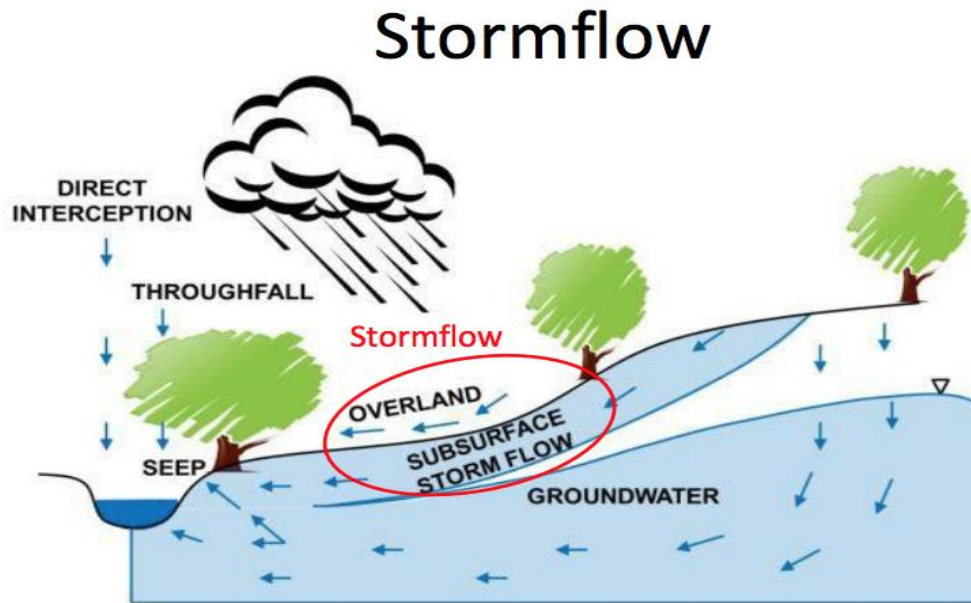
Green Valleys Watershed Association

# What are 'natural' patterns?

1. Changes in water depth during rain events
2. Changes in depth caused by evapotranspiration
3. Changes in e-conductivity when depth changes
4. Changes in e-conductivity in winter season
5. Changes in temperature in urban settings during rain events
6. Changes in stream pollution around human activity

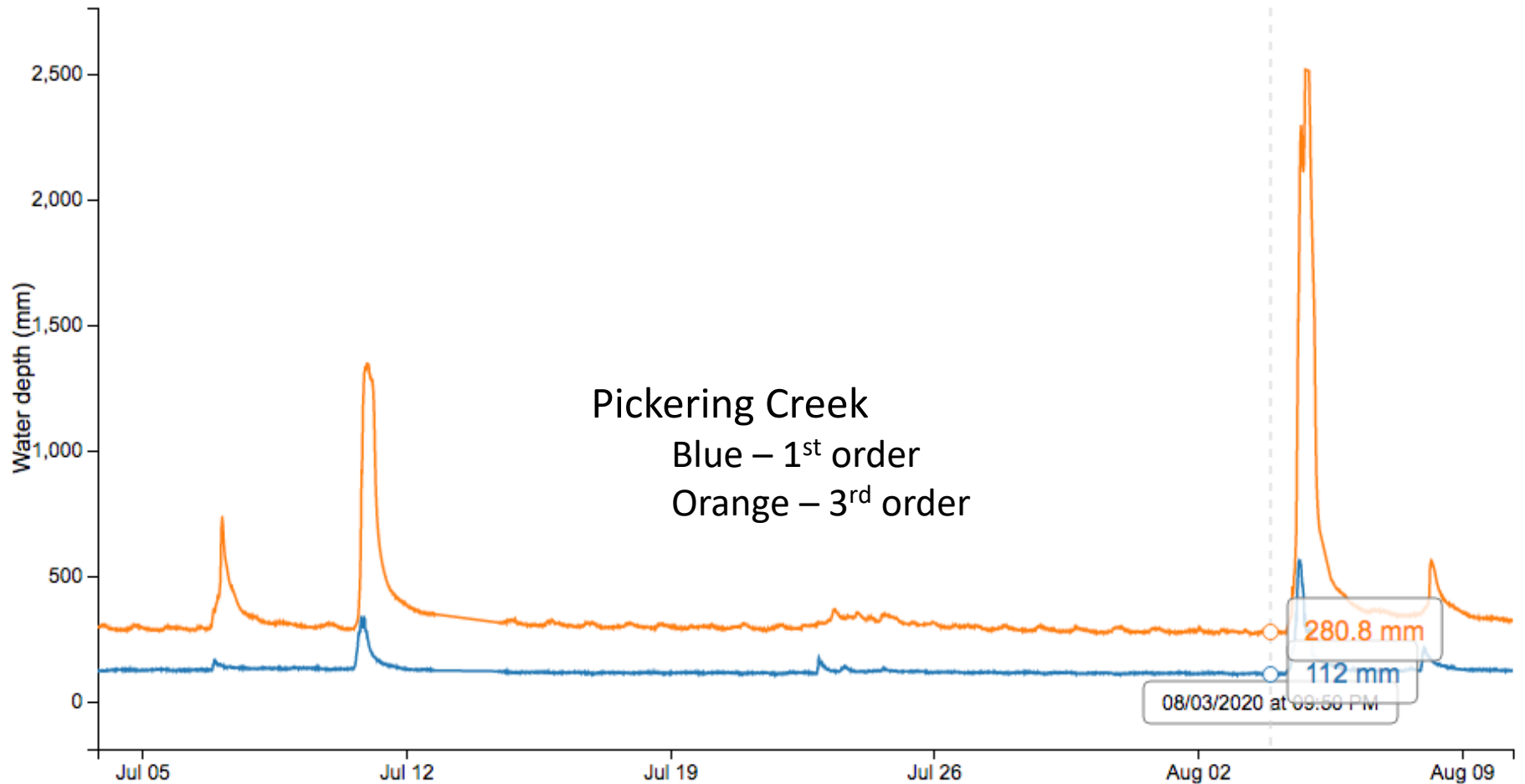
# 1. Changes in water depth during rain events

- Most PA streams perennial: Groundwater and surface water
- All of the precipitation that falls into a watershed flows into the streams in that watershed





# Depth as measured by a CTD sensor

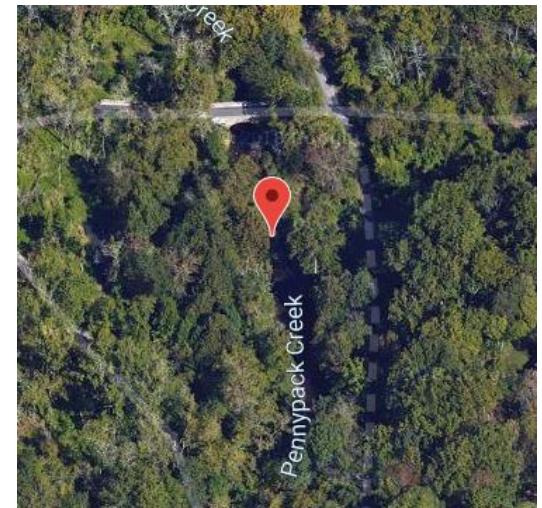
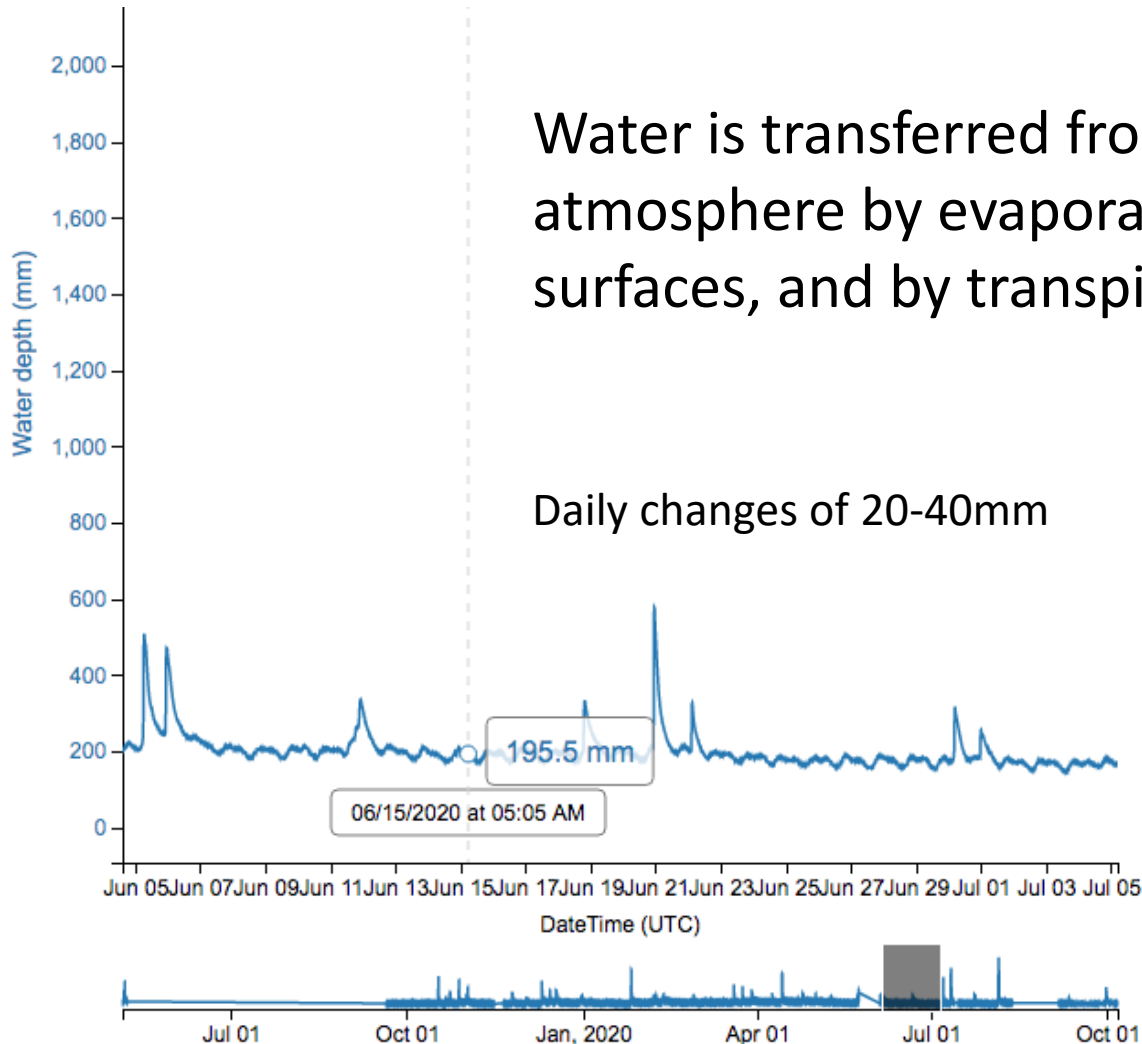


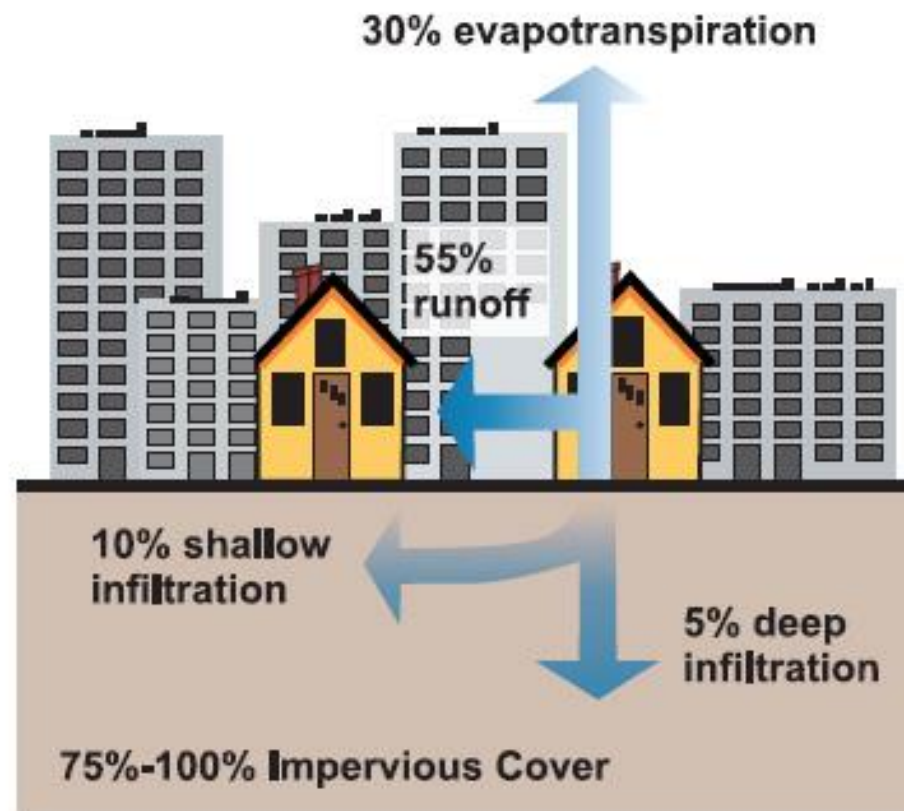
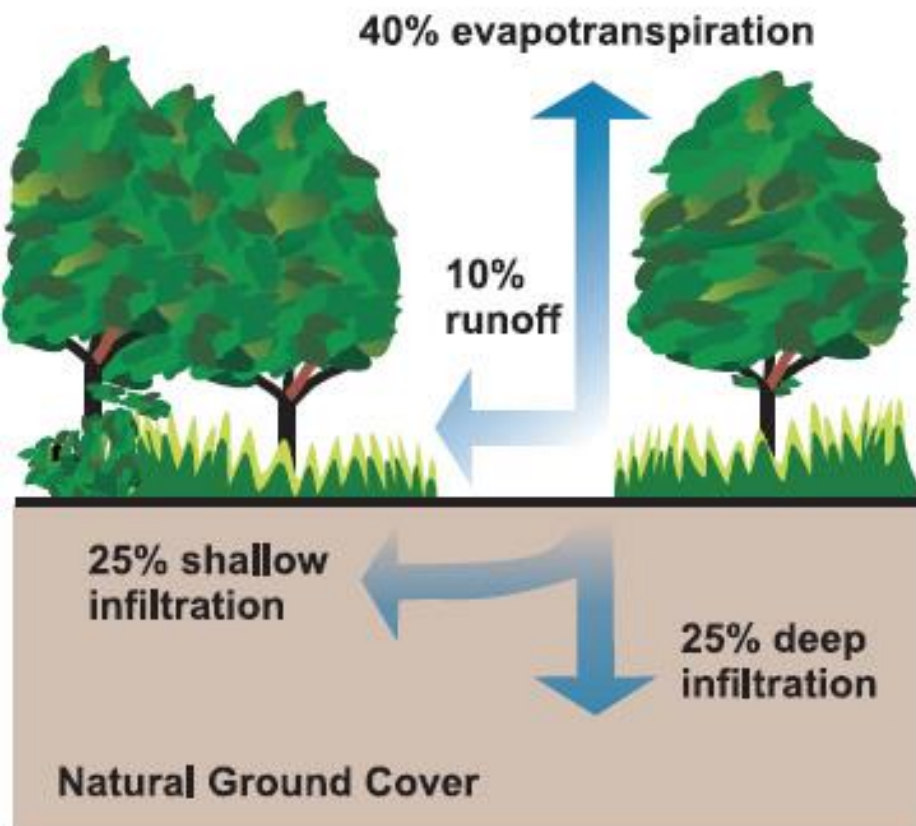
2020

## 2. Changes in depth caused by evapotranspiration

Water is transferred from the land to the atmosphere by evaporation from ground surfaces, and by transpiration from plants

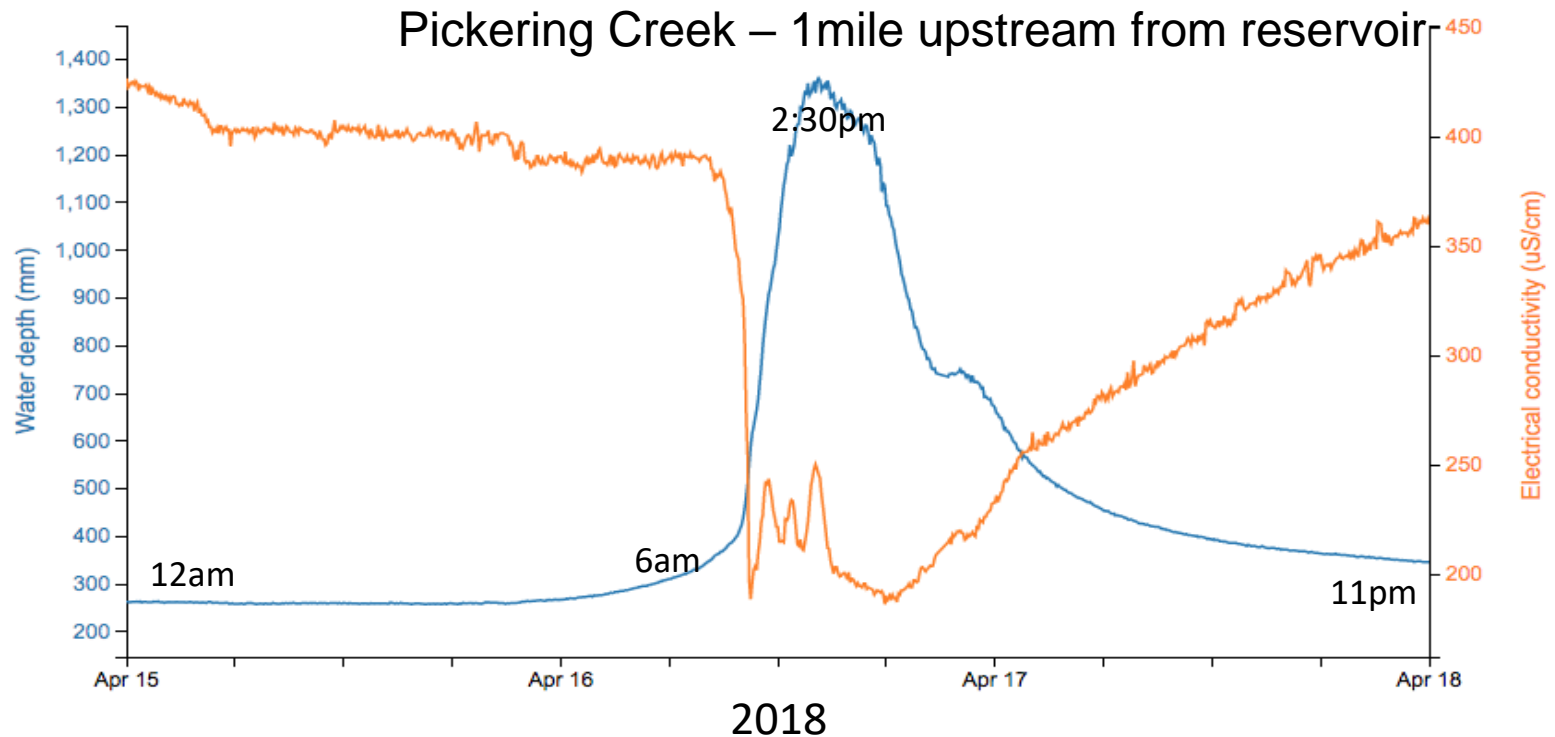
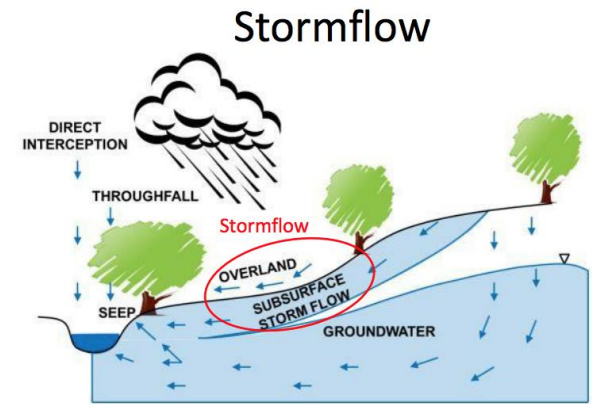
Daily changes of 20-40mm





### 3. Change in e-conductivity w depth changes

- When the rate of rainfall is faster than the rate of infiltration, then runoff occurs
  - Quality of the ground has big impact on the rate of runoff: sand, loam, silt, clay, impervious



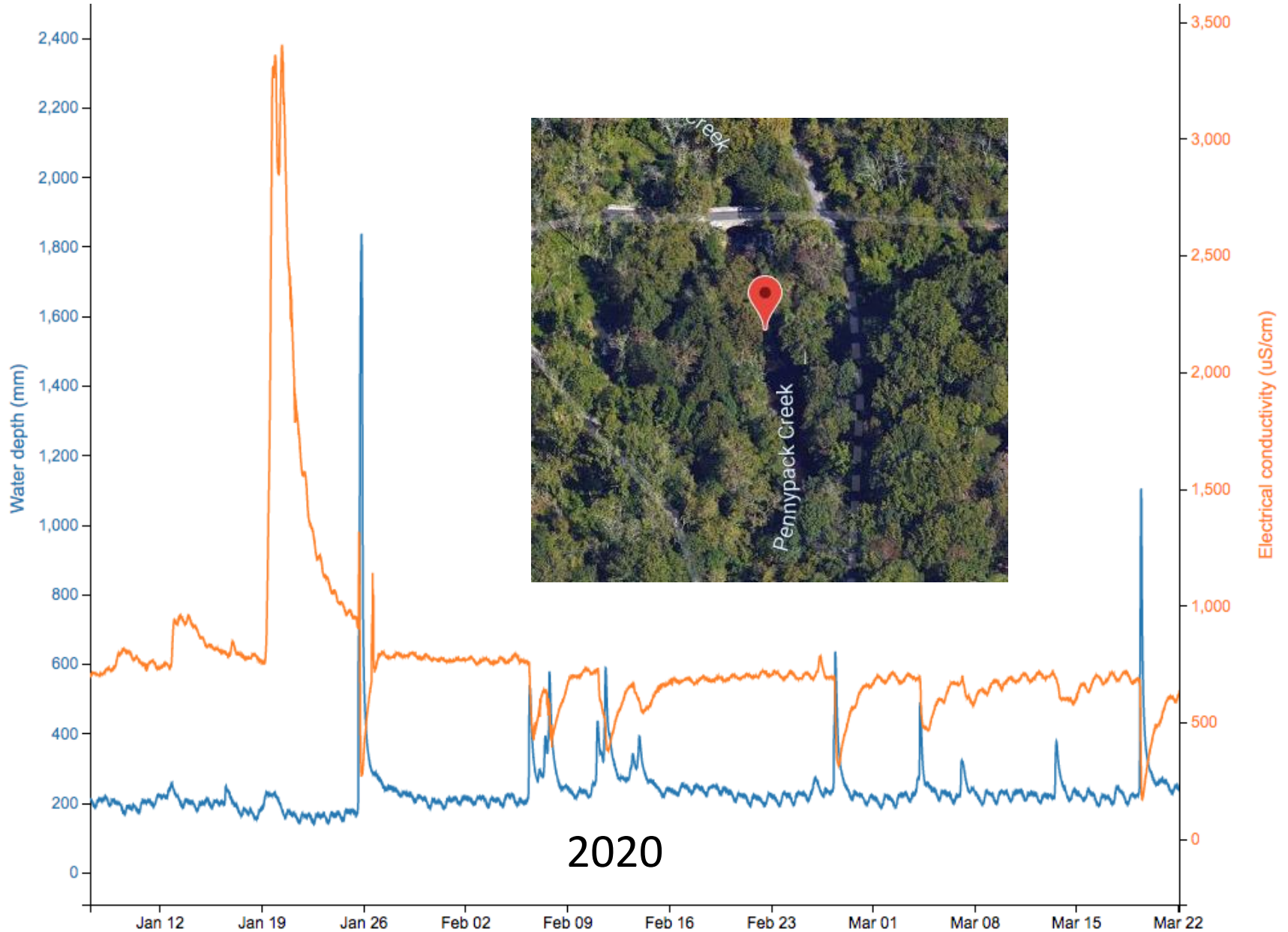


April 2018

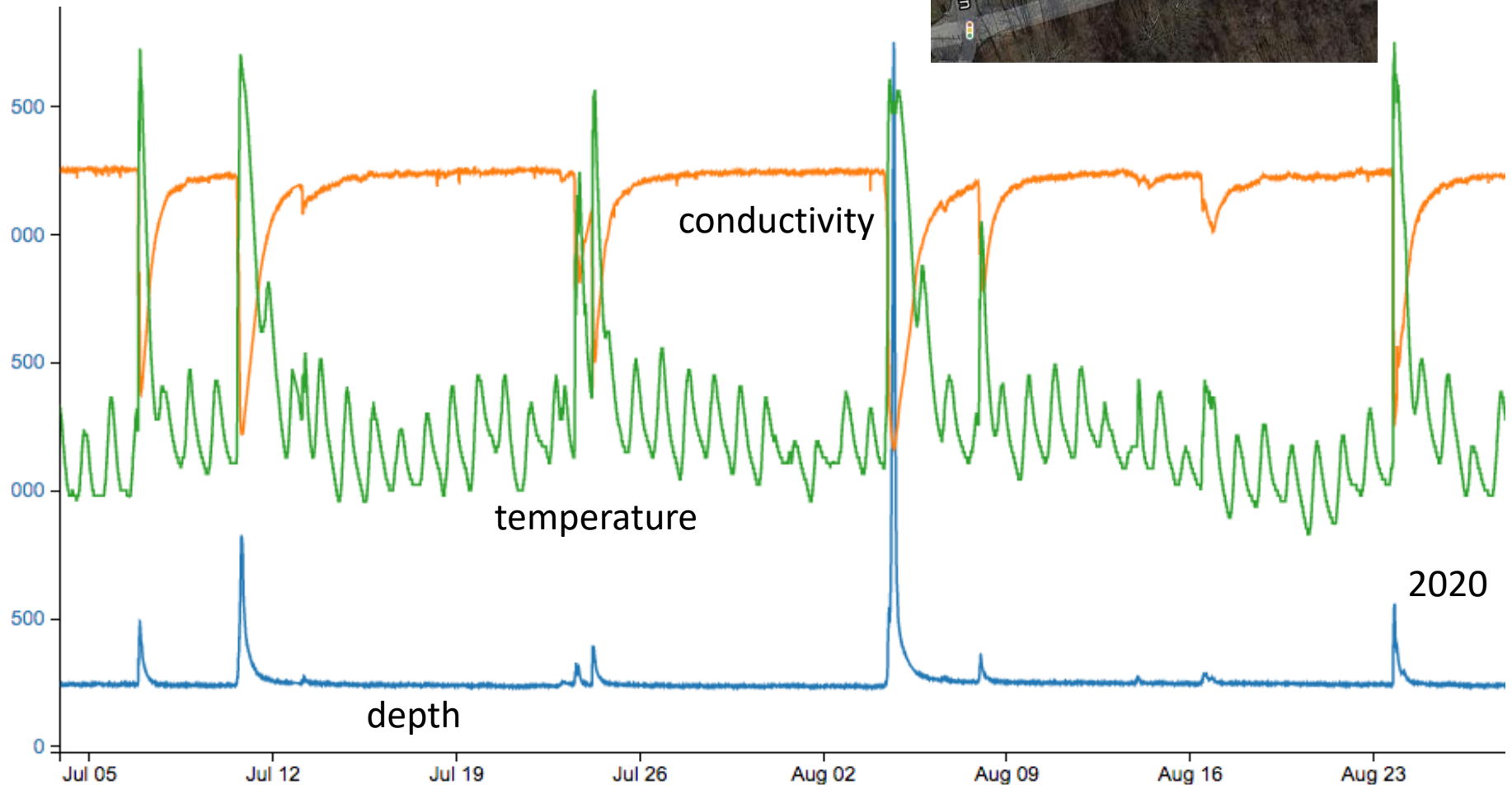
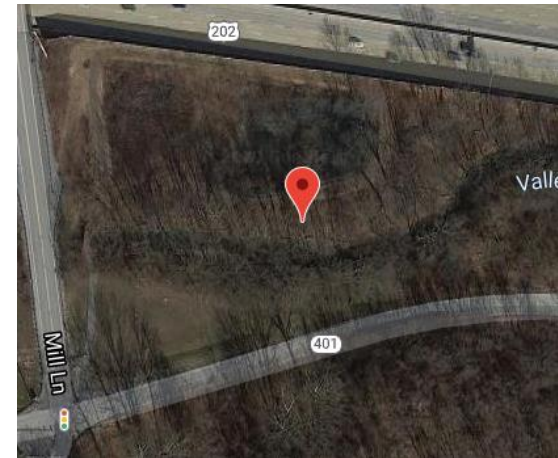




# 4. Changes in e-conductivity in winter



## 5. Changes in temperature in urban settings during rain events

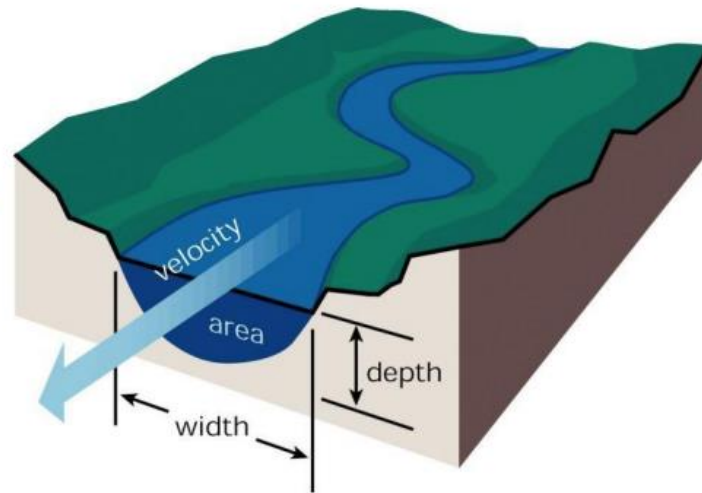




## 6. Changes in stream pollution around human activity

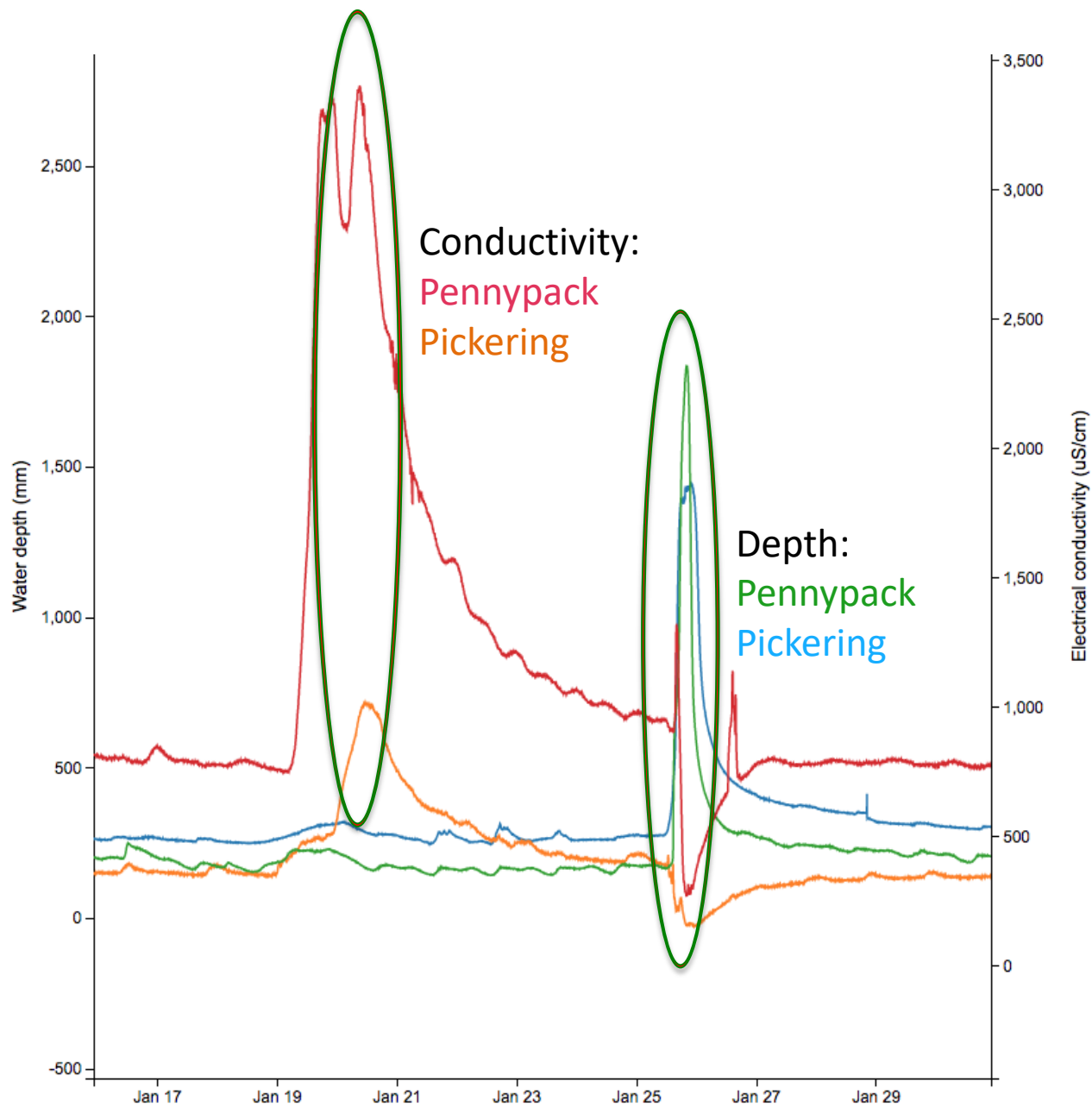
$$Q = A * v$$

- $Q$  = discharge,  $m^3/s$
- $A$  = x-sectional area ( $m^2$ ) = Depth \* Width
- $v$  = velocity ( $m/s$ )



Melinda Daniel, Stroud Water Research Center

Land and human activity are not equivalent, and both determine pollutants.





Mason's studies showed that human activity is an influence beyond land use.

