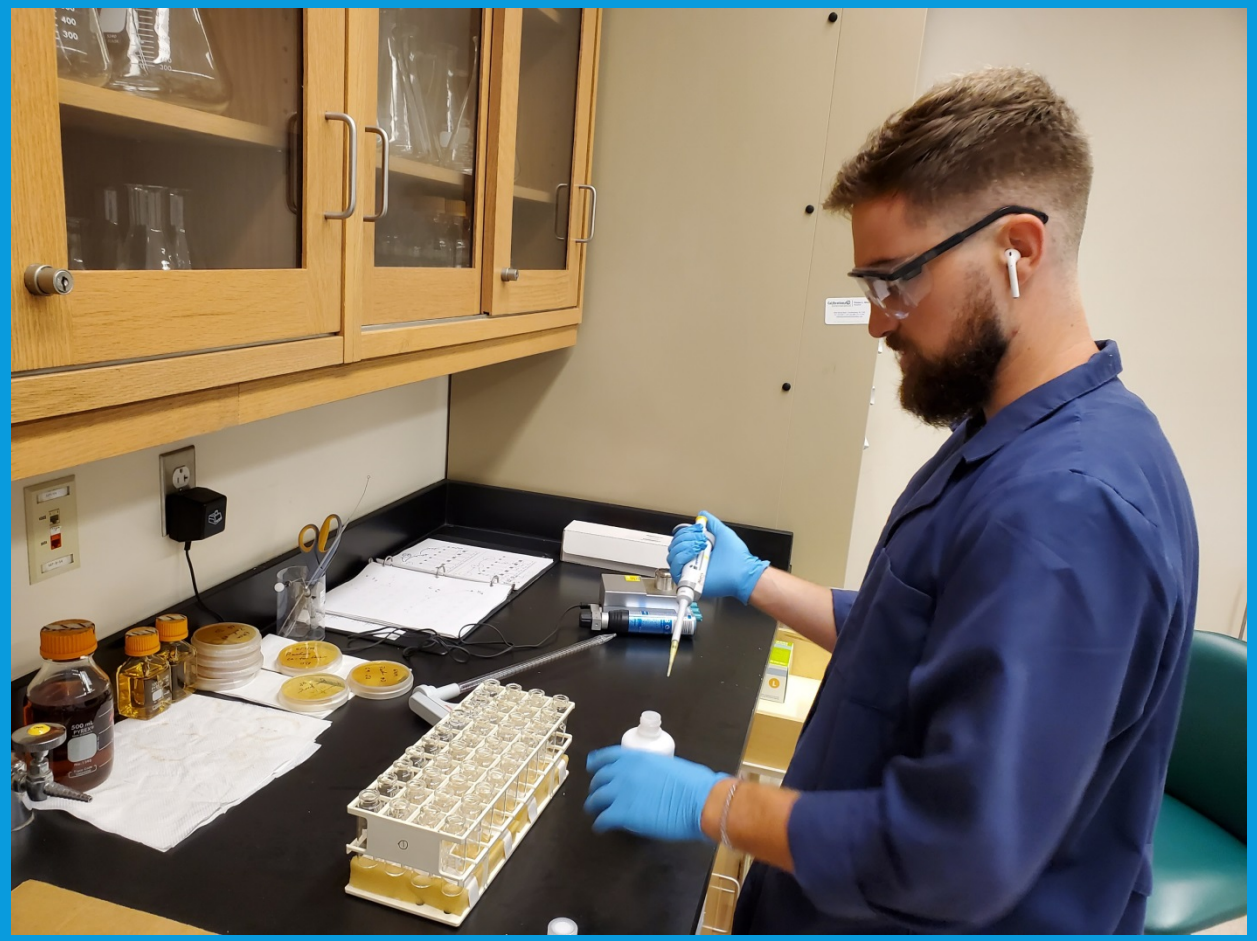
UMCES INTERNSHIP

Summer 2019 - Scott McKinstry

WORKING IN A LAB

- Safety and appropriate lab wear.
- Understanding of materials and equipment used.
- Mindfulness of others in the lab.
- Communication about supplies and equipment.



CLEANLINESS & NEATNESS

YAY

NAY

OTHER OPPORTUNITIES

- Bird Walks
- Ecology Readings
- AMJV
- Lab Events

INTERNSHIP RESEARCH

- Identification of sources of nitrate (NO_3) in rivers during storm events.

- Isotopic composition differences between sources of NO_3 measured using the denitrifier method and IRMS.

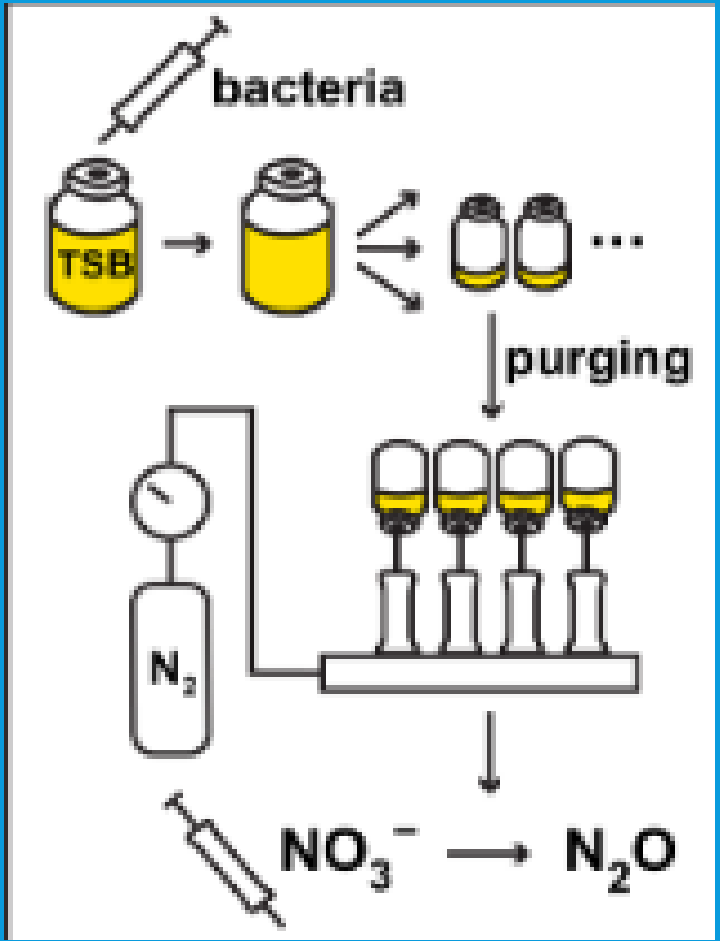
WHY WE CARE

- Excess NO_3 pollution from upland watersheds contributes to algal blooms and the formation of dead zones in the Chesapeake Bay. (Kemp et al. 2005)

- Understanding the sources of NO_3 can allow us to take steps to decrease the amount of nitrogen entering the Bay.

https://mde.maryland.gov/programs/Water/HA/Pages/index.aspx

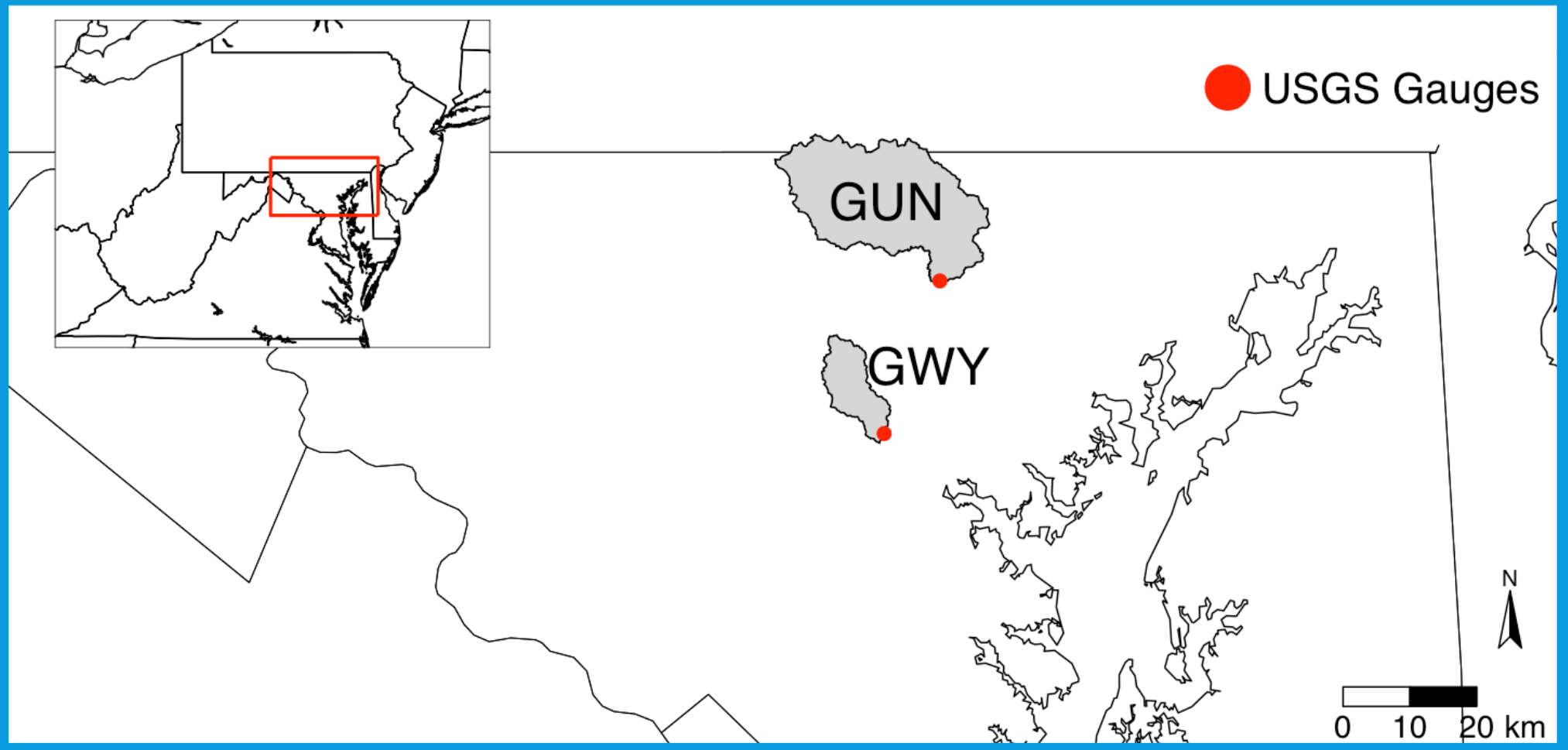
DENITRIFIER METHOD



Soto et al. 2015

- First, the bacteria are grown on shaker table overnight.
- Next, the bacteria are mixed with a nitrate-free broth and injected into vials.
- The vials are then placed on a "purging" rack, where helium is entered into the vials and any atmospheric gases (N_2 and O_2) are emitted.
- Lastly, the samples collected from the storm events are added into the vials and bacteria convert NO_3 to nitrous oxide (N_2O).

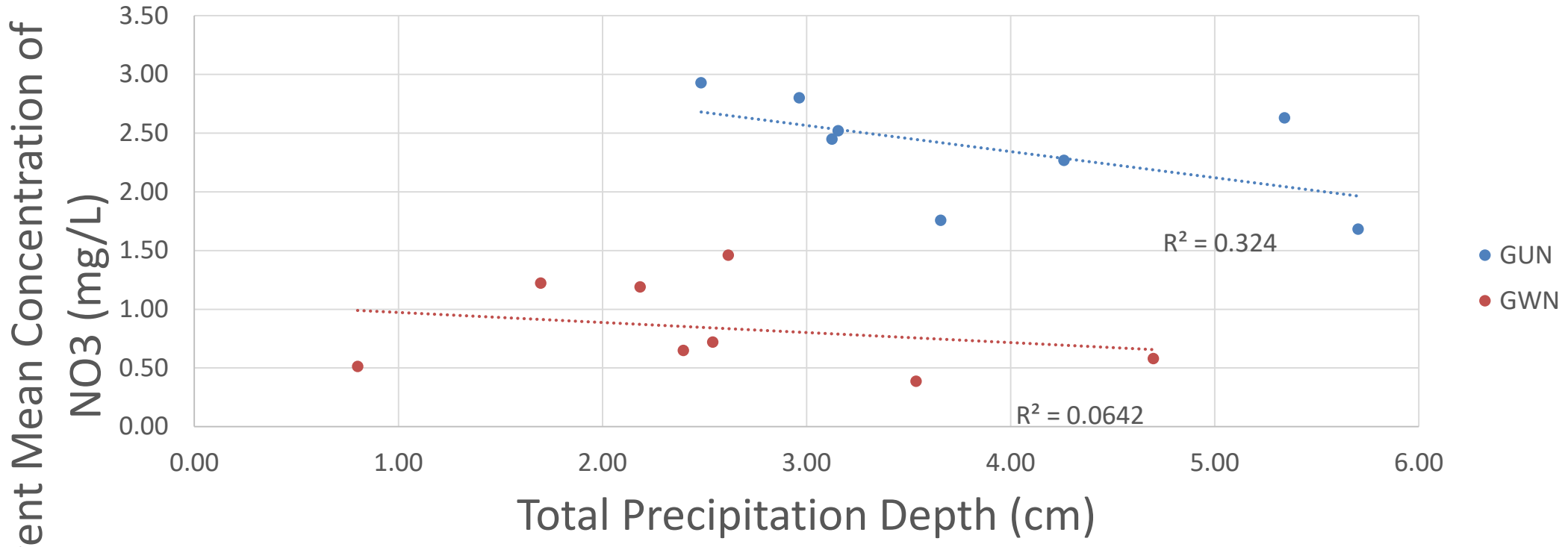
WATERSHEDS



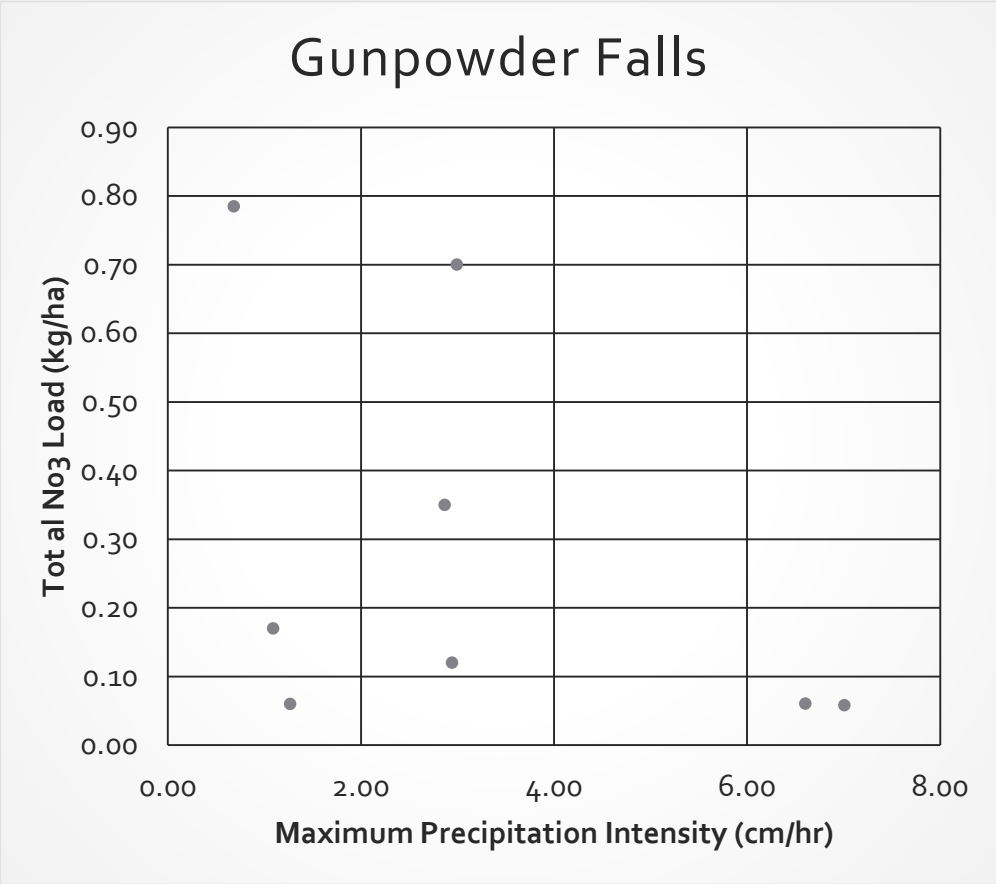
RESEARCH QUESTION

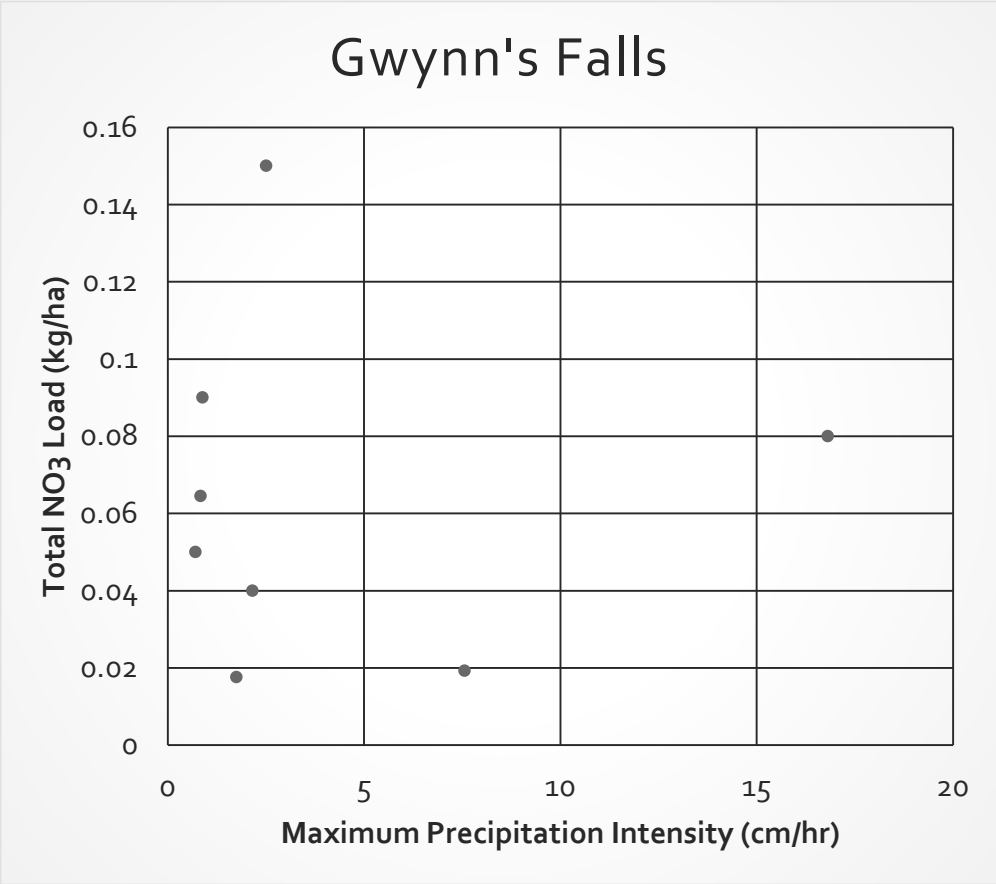
- Does the size of the storm have a correlation with the concentration of total and atmospheric NO_3?

Total Precipitation Depth (cm) vs. Event Mean Concentration (mg/L)

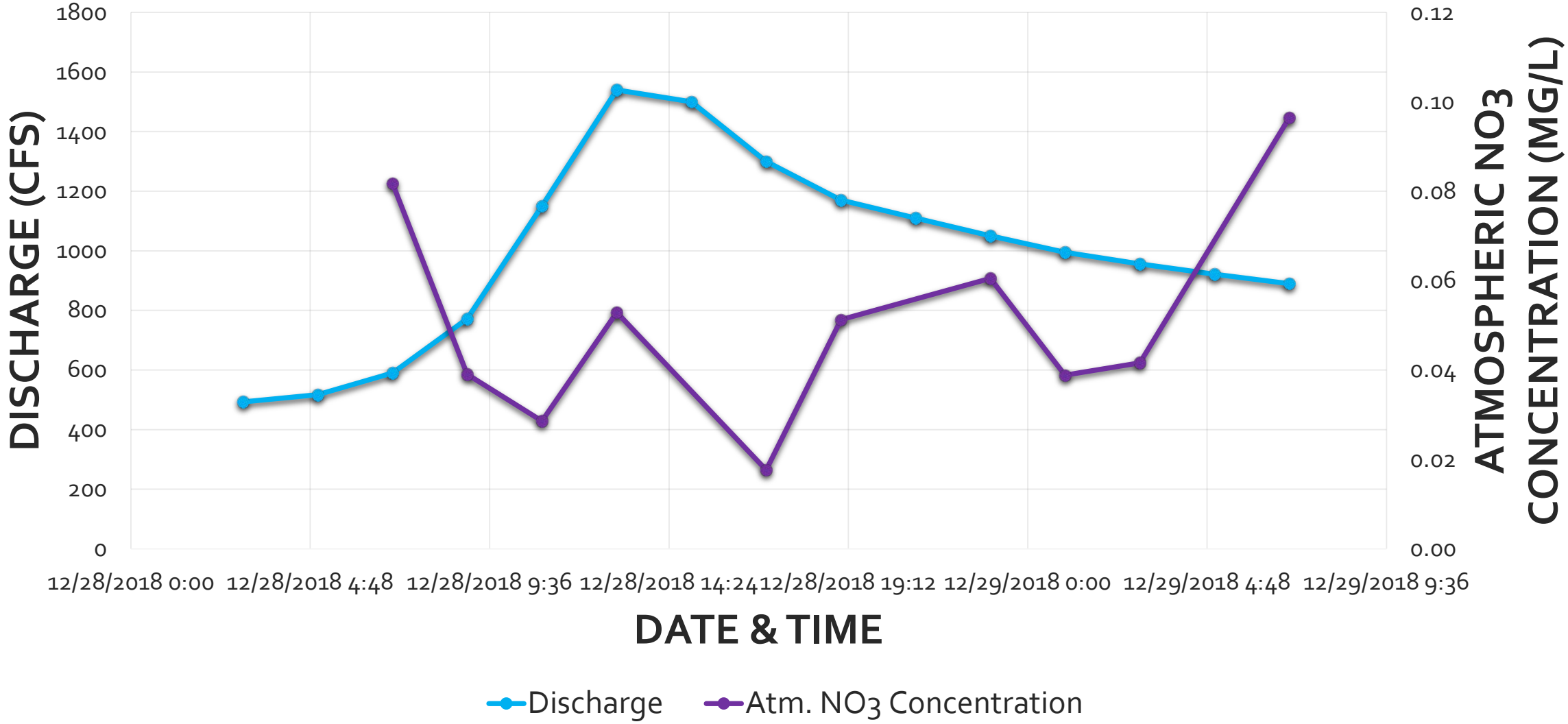


TOTAL NO_3 LOAD (KG/HA) VS. MAX PRECIPITATION INTENSITY(CM/HR.)

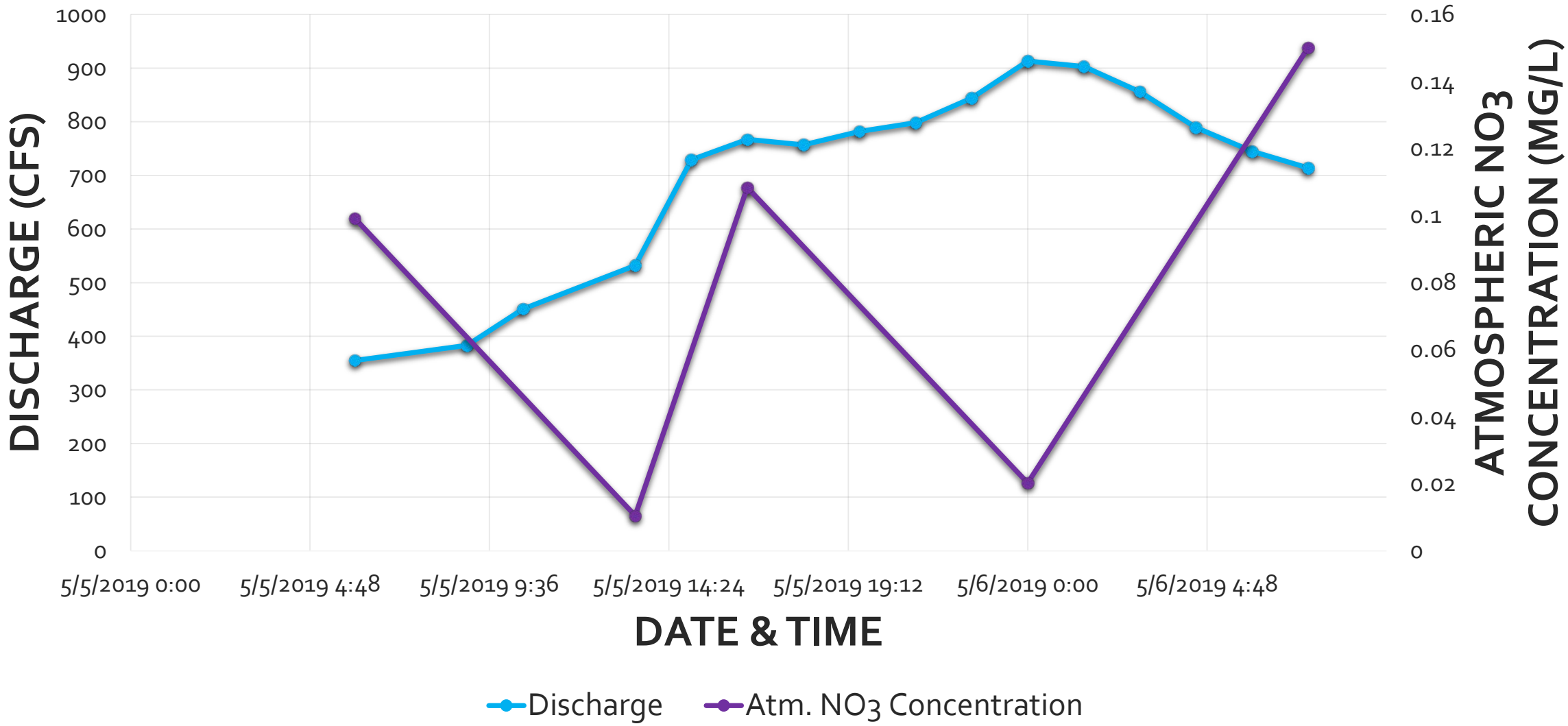




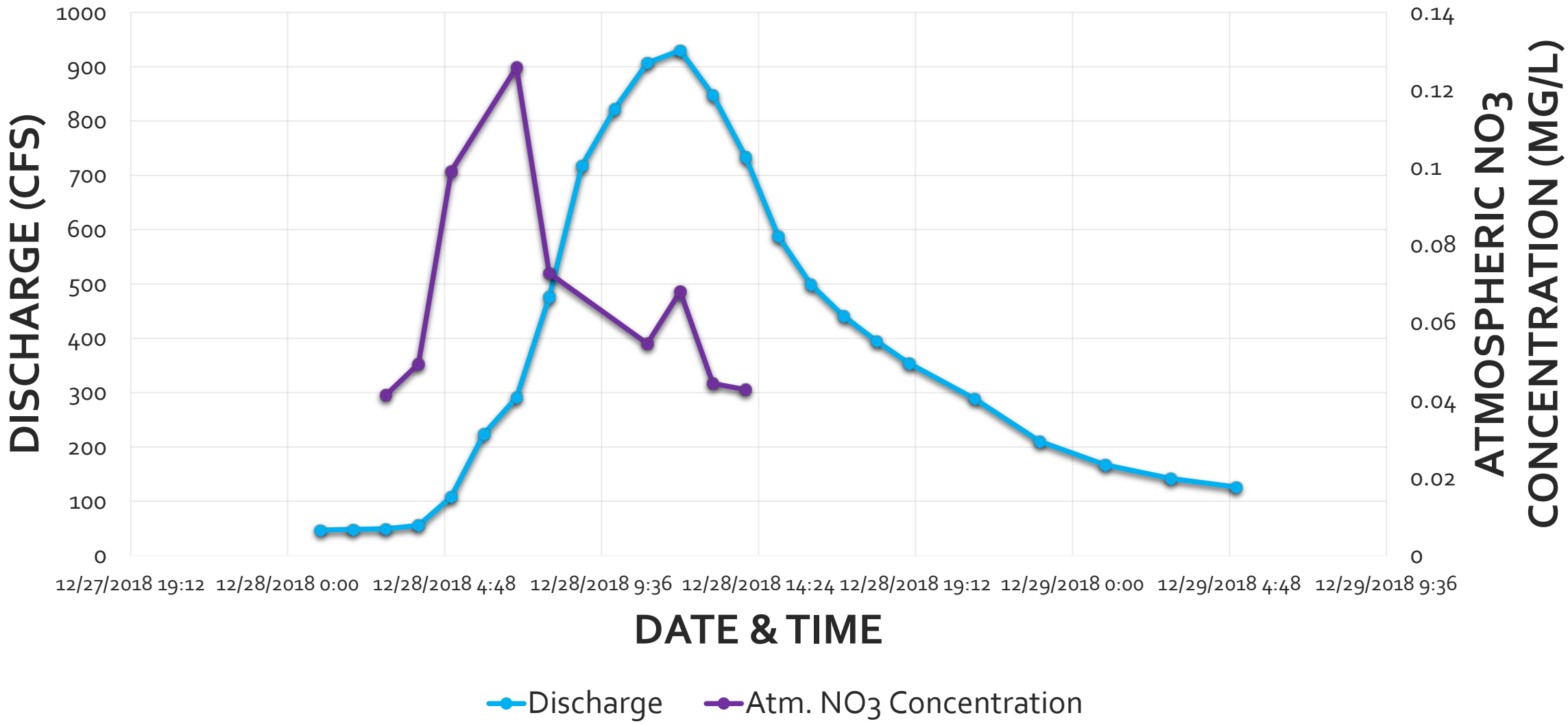
Gunpowder Falls - Storm Event 3



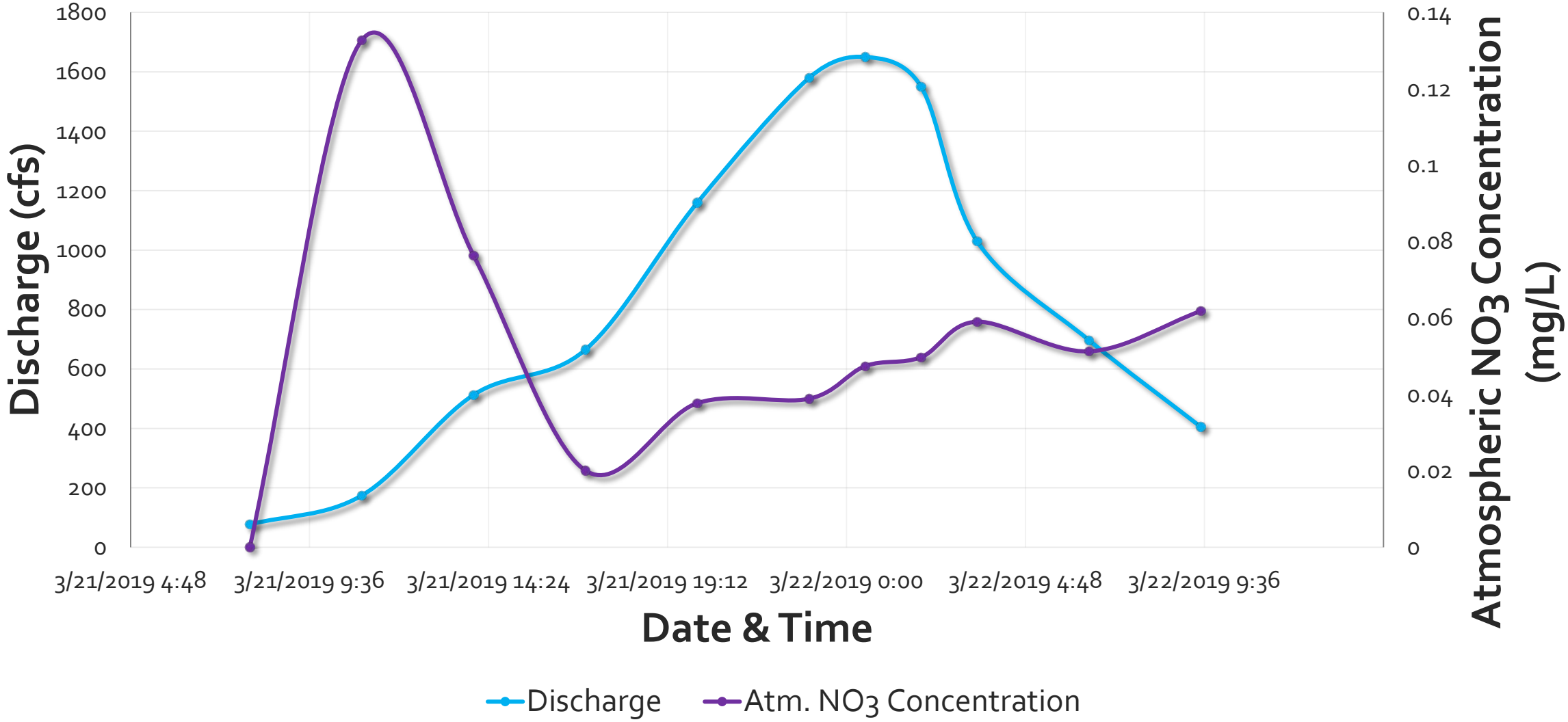
Gunpowder Falls – Storm Event 6



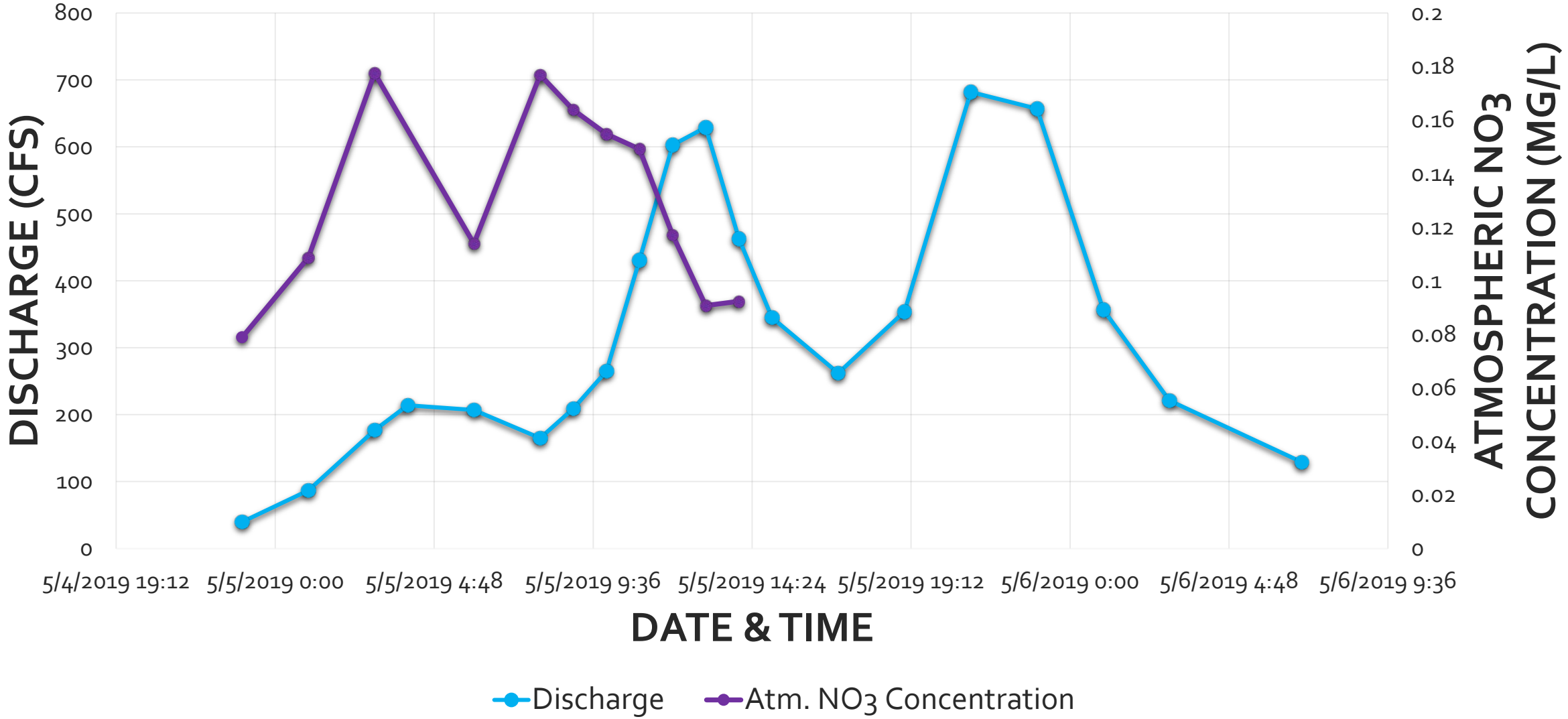
Gwynn's Falls – Storm Event 3



Gwynn's Falls – Storm Event 5



Gwynn's Falls - Storm Event 6



CONTINUING RESEARCH

- Currently waiting on isotope data from remaining storm samples.
- More data will help us better understand the relationship between storm size and sources of nitrate.
- Insight on relationships between the urban and rural watersheds.

SPECIAL THANKS TO:

- Joel Bostic
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