

Water Quality in a Retention Pond During a Storm Event

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Background Information

Retention Pond:

A pond created to “retain” the increased runoff once land is developed.

Purpose of retention ponds:

- to release the increased water volume into natural streams at a lower flow
- to reduce sediment and nutrient loads in water through sedimentation

- In James City County all land development plans are required to have a storm water management plan.
- Retention Ponds are currently the most popular management plan option.





Research Question:

Do retention ponds improve water quality during storm events?

Hypothesis:

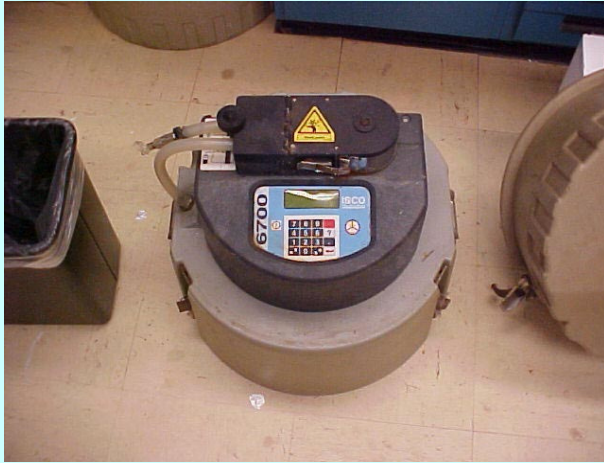
Water quality will decrease upon entering the retention pond.

Ironbound Village Retention Pond

- Wet Pond
- New Development dominated by single family houses and small office buildings
- In the College Creek Watershed
- Built in 2001



Methods



- Collected water samples during storms using ISCO Automated Water Samplers placed at both the inflow and outflow areas.
- Inflow machines were turned on once storms were detected
- Outflow machines were connected to flow meters
- After storms all samples were analyzed in the lab for:
 - Conductivity
 - Fecal Coliform
 - TSS
 - Ammonium
 - Nitrate/Nitrite
 - Phosphate

Limitations

- Very little rainfall events
- Problems occurred with correctly setting up machines
- Collected concurrent inflow and outflow data for only 1 storm event at 1 retention pond
- The pond has had major design problems

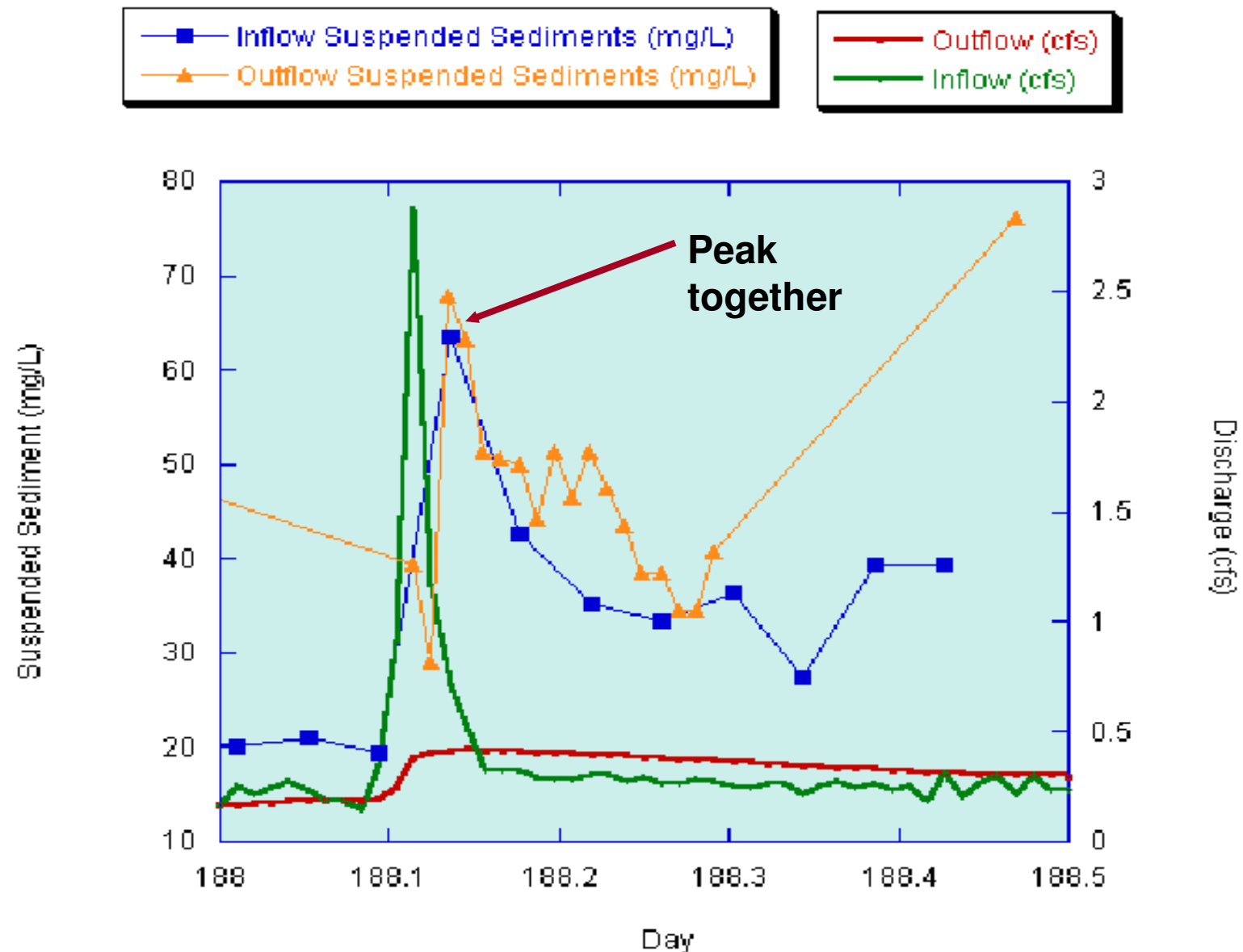


Results

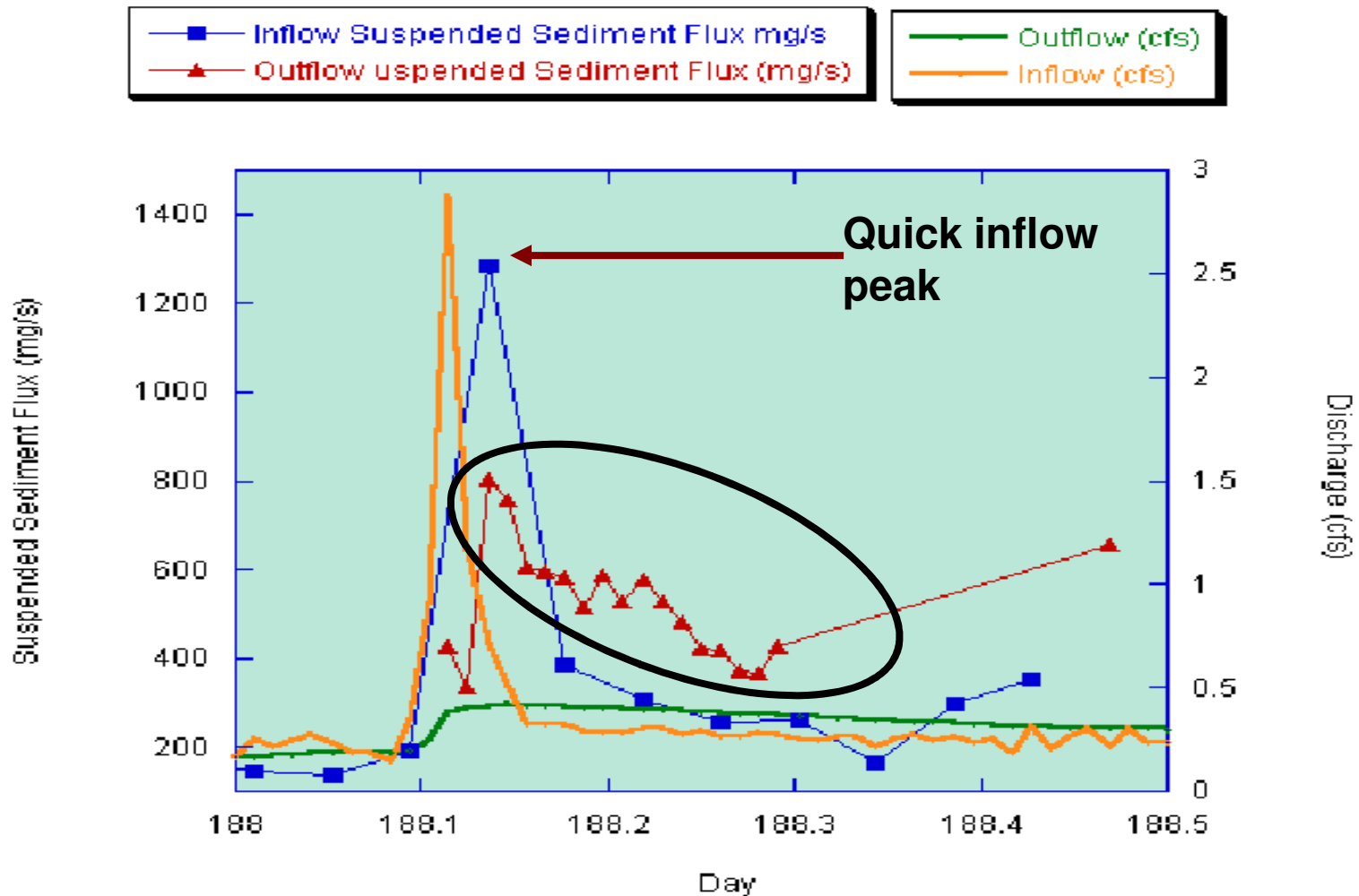
- Coliform tests showed NO fecal coliform present in the pond
- Conductivity of the inflow always above the outflow
- Percent organic matter show no real pattern
- Total dissolved phosphate are higher in the outflow than inflow



Suspended Sediments



Suspended Sediments (cont.)

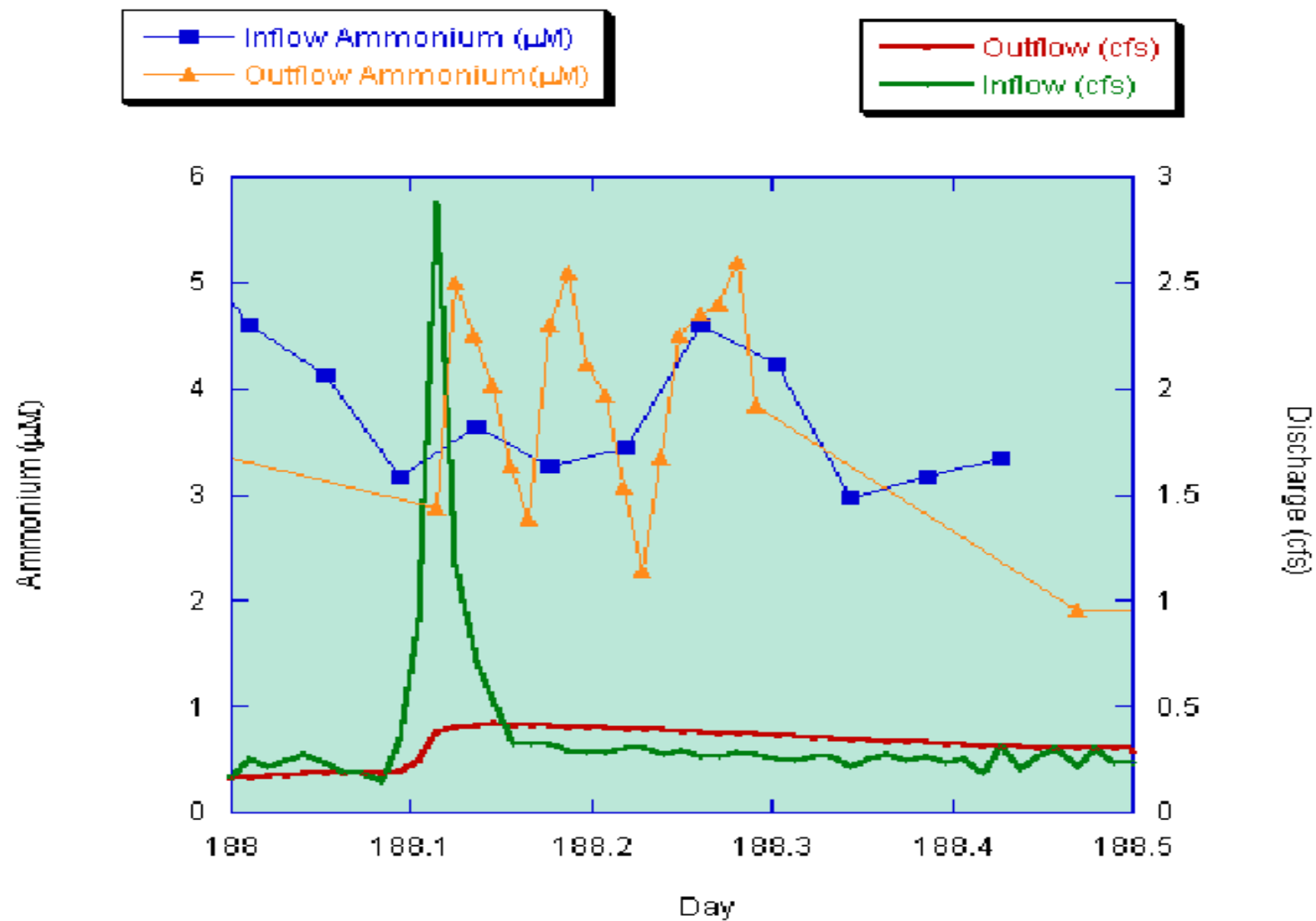


Inflow brought in: 11763 g

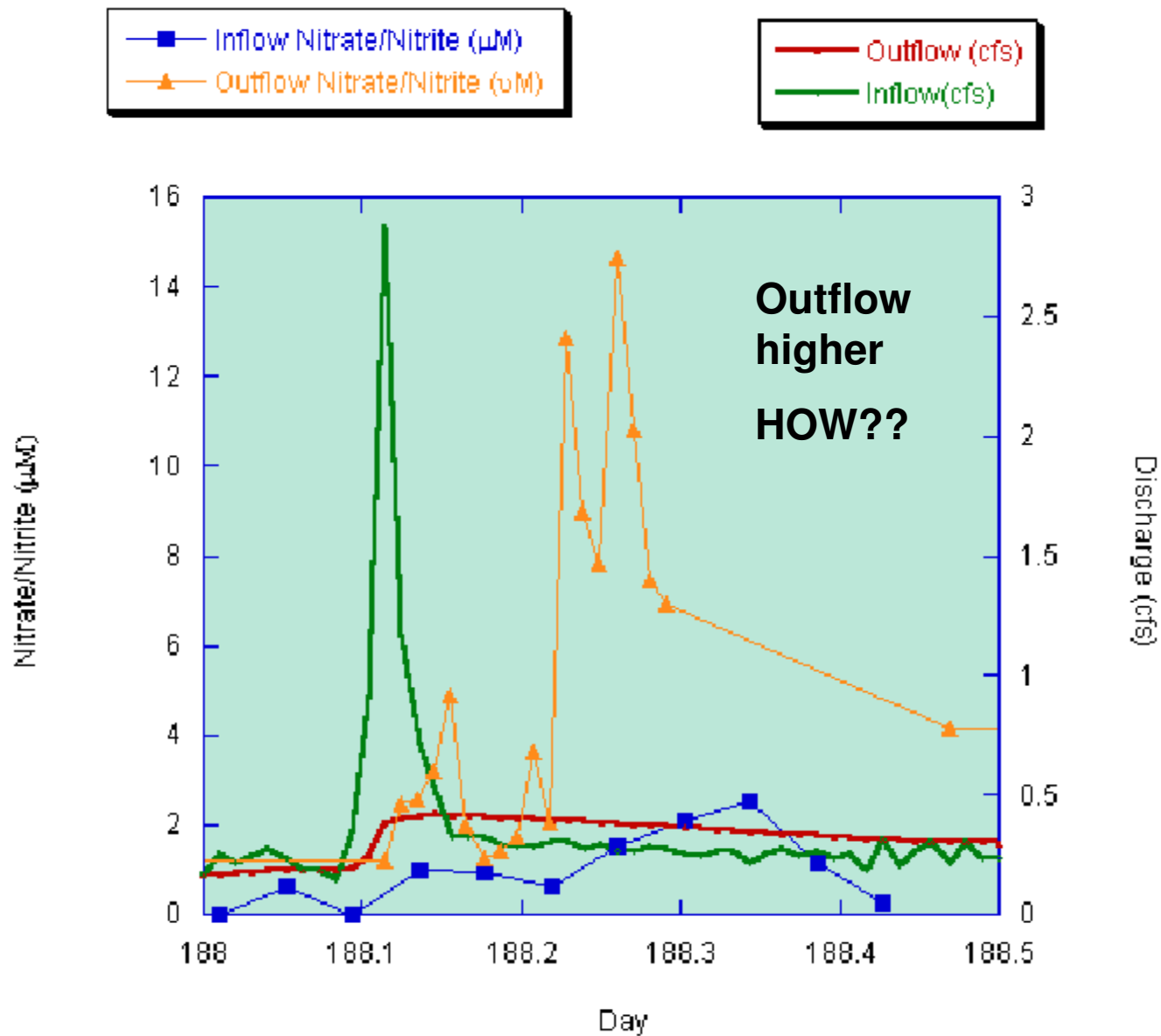
Pond Adding: 2847 g

Outflow released: 14610 g (32 lbs.)

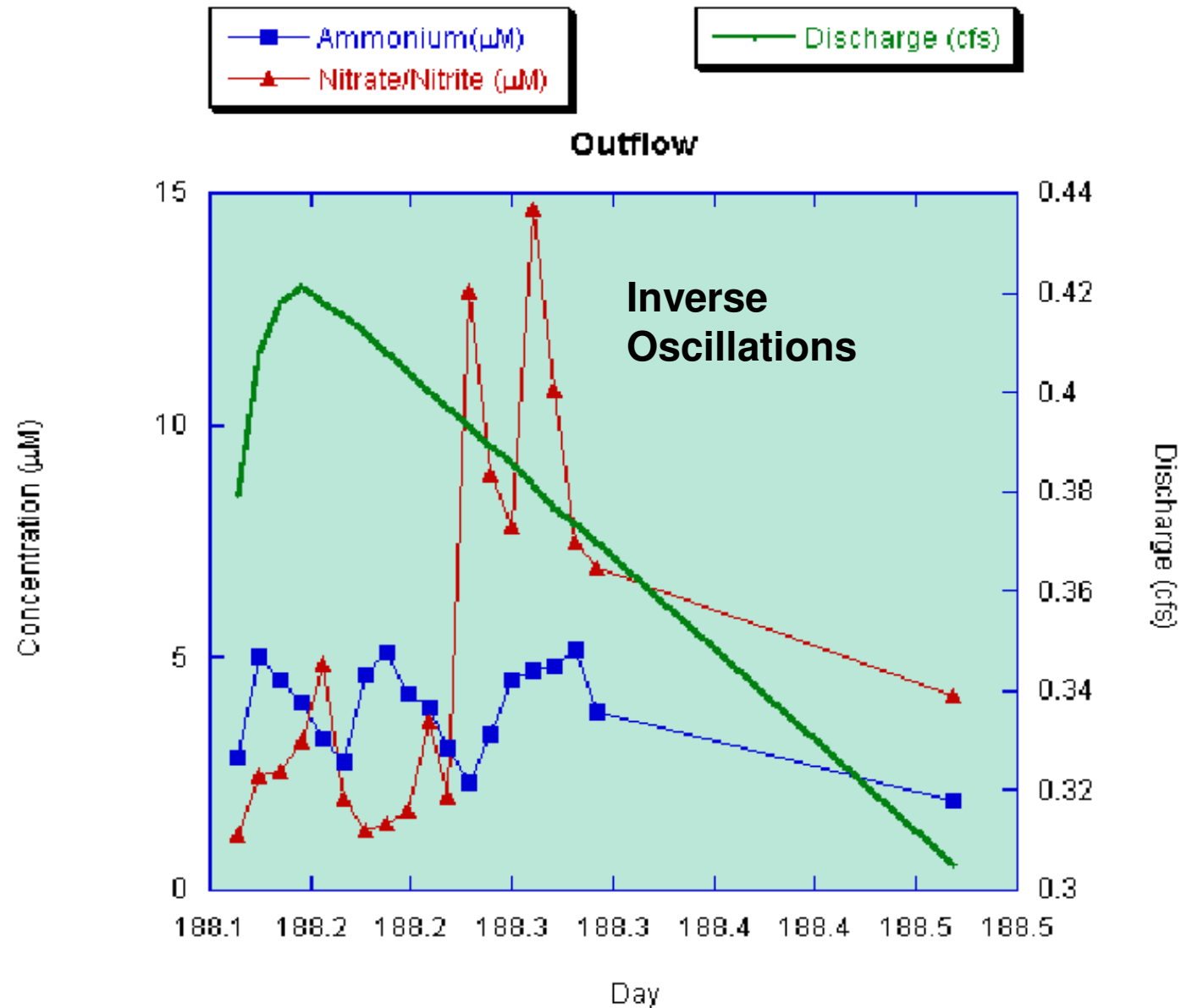
Ammonium



Nitrate/Nitrite



Ammonium and Nitrate/Nitrite



So does Ironbound work??

NO!

- The main purpose of retention ponds is to reduce suspended sediment loads in runoff water; however, Ironbound increases suspended sediment loads.
- The increased suspended sediments is creating nitrification in the pond.

Future Research

- Allow the study to cover a longer time period to increase the chances of more rainfall events.
- Connect the ISOCO's to rain gauges to actuate inflow samplers.
- Look at a greater number of retention ponds.

A green tree frog is perched on a green leaf. To the left of the frog is a thick black cable. To the right is a tan, ribbed container. The background is a light-colored, textured surface.

Acknowledgements

- Randolph Chambers with his endless advise, positive attitude, weather watching, and driving to the ponds.
- Gregory Hancock for helping set up the project and giving me his flow data.
- Timothy Russell, Portia Ross, Lee Corbet for driving me at all hours of the day to the pond.
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