INTRODUCTION AND BACKGROUND
Excess sediment in surface water is a primary pollutant in Tennessee, streams. Precipitation and turbidity are usually correlated, and a lag (time of concentration) generally exists between onset of precipitation and the stream's response. This research analyzes precipitation and turbidity at the hourly timescale to calculate this lag for Sinking Creek (HUC14-06010103000325) in Johnson City, TN (Figure 1). The 15.7 km (9.8 mi) stream has forested headwaters and flows through agricultural and urban lands before flowing into a sinkhole. The study reach is in a recently restored wetlands 365 m (1200 ft) downstream of Sinking Creek's largest tributary (Catbird Creek), which is sediment impaired. Soil: loam to silt loam and show evidence of frequent flooding. Geology: Cambrian-Ordovician Knox Group carbonates (limestone & dolomite). Climate: Humid Subtropical (Köppen Cfa) with average annual rainfall of 111 cm (44 in) and snowfall of 20 cm (8 in). Monthly average temperature ranges from 27°C (86°F) in July to -3°C (26°F) in January.

METHODS
Methods are outlined in the flow chart below (Figure 2). Field data collection was conducted 10-22-15 to 11-5-15 (Figure 3). Water samples were analyzed for turbidity at the ETSU Geosciences Hydrology Lab. Statistical analyses were completed in SPSS 22.

1. Field Data Collection
   - Collect precipitation data with Onset RO2 rain gauge (5 mins).
   - Collect 300 mL water samples with ISCO7/12 sampler (hourly).
   - Measure stream discharge daily using hand-held flow meter.

2. Laboratory Analysis
   - Retrieve water samples daily.
   - Measure turbidity in lab using HI-Scientific DRT-15CE turbidimeter.
   - Enter all data in Excel spreadsheet for analysis.

3. Statistical Analysis
   - Calculate precipitation accumulation and intensity.
   - Calculate cross-correlation statistics in SPSS 22.0.

RESULTS
- Rainfall: The rain gauge captured 3.3 cm (1.3 in) of rain in 3 separate events.
- Discharge: Three elevated discharge events were related to rainfall.
- Turbidity: The majority of the turbidity readings were between .12 to .16 NTU with a range of .06 NTU to .48 NTU. Higher values were recorded after rainfall events.
- Environmental parameters: Air temperature ranged from a low of 0.2°C (32.6°F) to a high of 34°C (93°F) with a daytime average of 20°C (68°F) and a nighttime average of 11°C (52°F). Water temperature ranged from a low of 12.7°C (55°F) to a high of 16.9°C (62.5°F).

SUMMARY AND CONCLUSION
While previous studies identified a correlation between turbidity and rainfall, this study quantifies the rainfall-turbidity lagged response for a small karst stream in a humid subtropical climate. Turbidity in Sinking Creek exhibits an approximately 3 hour lag between onset of rain and an increase in turbidity.

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