

# Catawba River Nutrient Study



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N.C. Division of Water Resources  
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# Talking Points

- Study Origin and Study Area Refinement
- Study Concept
- Existing Data
- Data So Far
- Next Steps



# Catawba River Nutrient Study Origin

- Session Law 2017-209, House Bill 56
- Section 12 states:

*The Division of Water Resources of the Department of Environmental Quality shall conduct a water quality sampling program for nutrients along the mainstem of the Catawba River, which includes sampling for nutrients above, in, and below each major tributary of the Catawba River. No later than October 1, 2018, the Division shall report the results of the study to the Environmental Review Commission.*

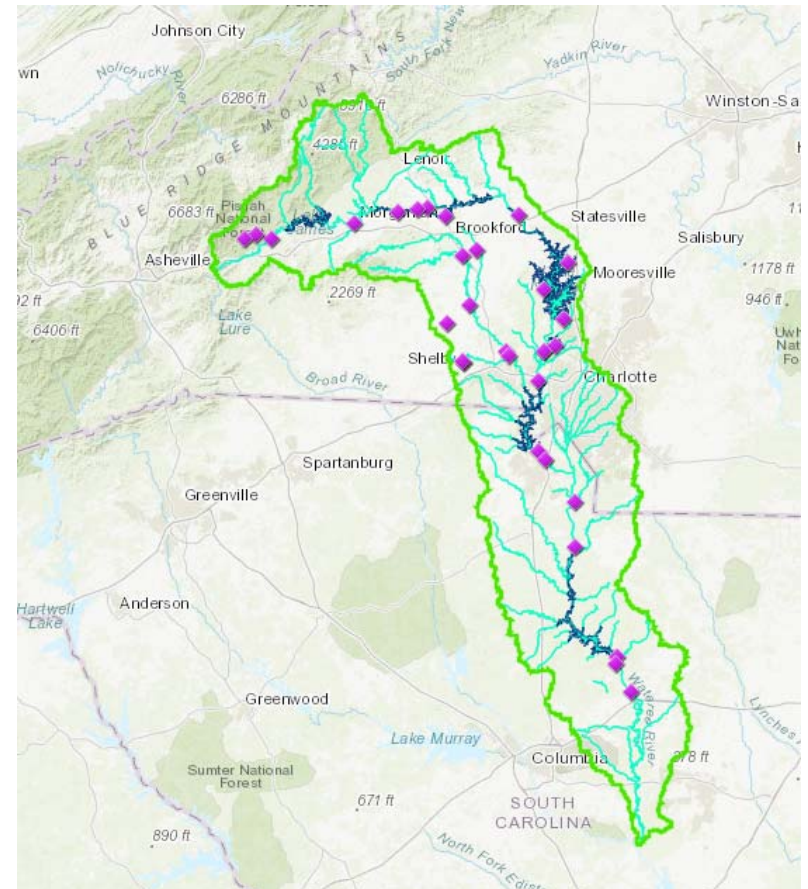


**FEDERAL REGISTER**  
The Daily Journal of the United States Government



# Study Area

- Catawba River watershed is big.
- NC portion is approximately 225 miles long, and the watershed covers approximately 3,300 square miles.
- Watershed includes a variety of land uses including agriculture, forests, urban and suburban areas.



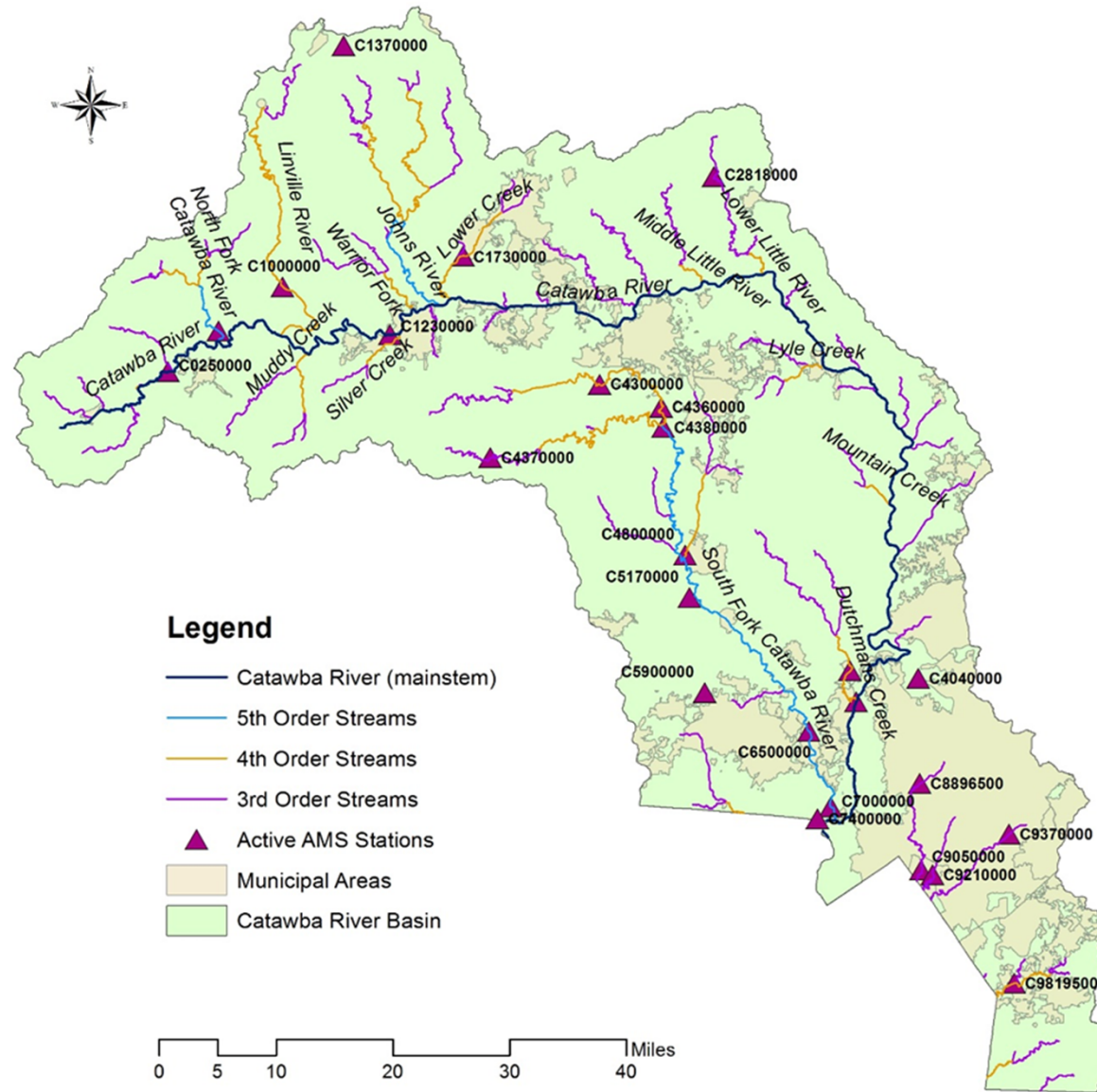
# Major Tributaries

- “Major tributary” analysis
- Conducting upstream, downstream, and instream monitoring on major tributaries could be labor and cost intensive.

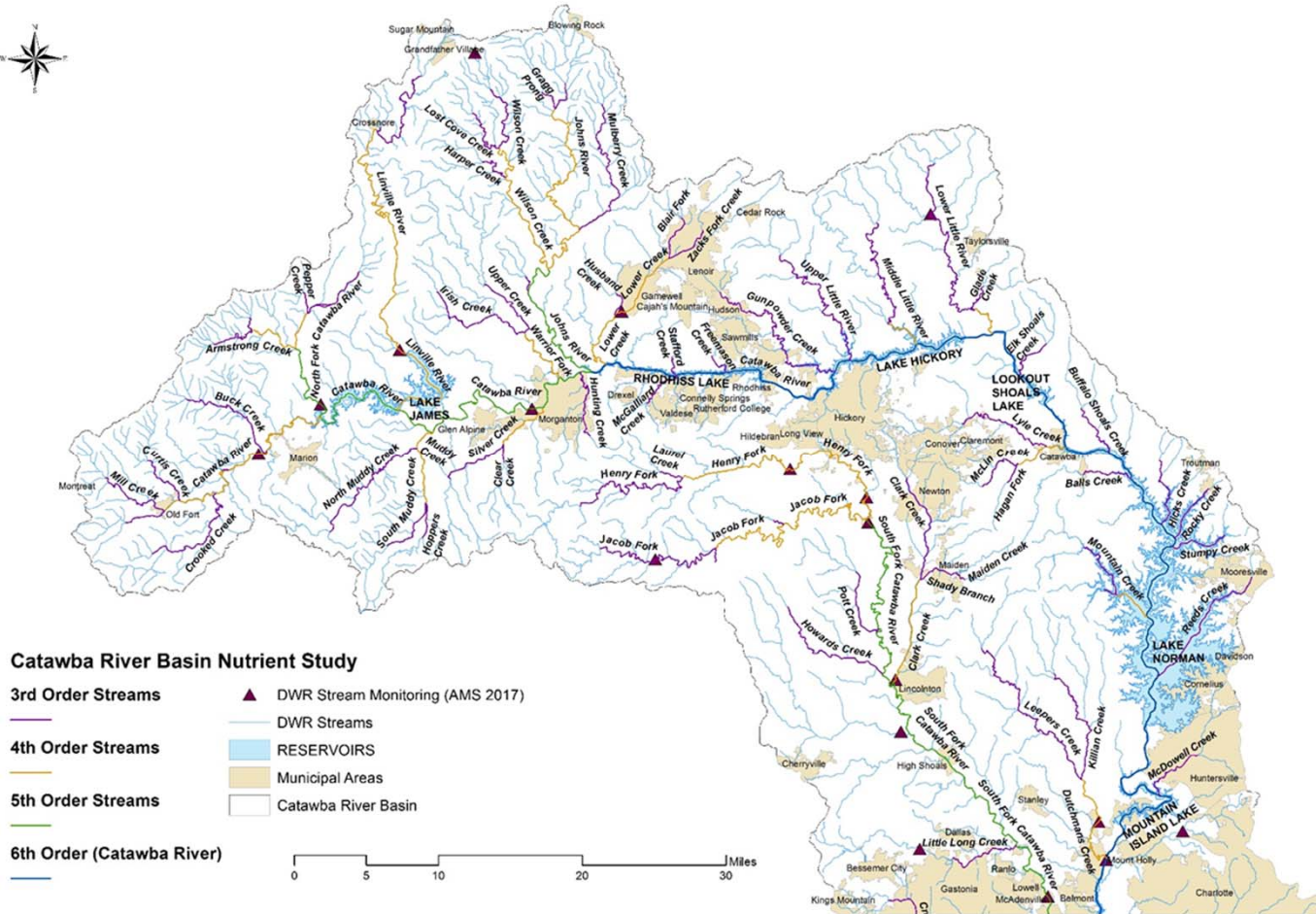
Stream Order	Number of Tributaries	Mean Drainage Area (sq. mi.)	Number of Stations
5 <sup>th</sup>	3	318	9
4 <sup>th</sup>	10	84	30
3 <sup>rd</sup>	18	23	54



# Tributaries and Existing Monitoring Stations



# Study Area Refinement



Map compiled by NC DWR Water Sciences Section, Oct. 17, 2017



# Study Concept

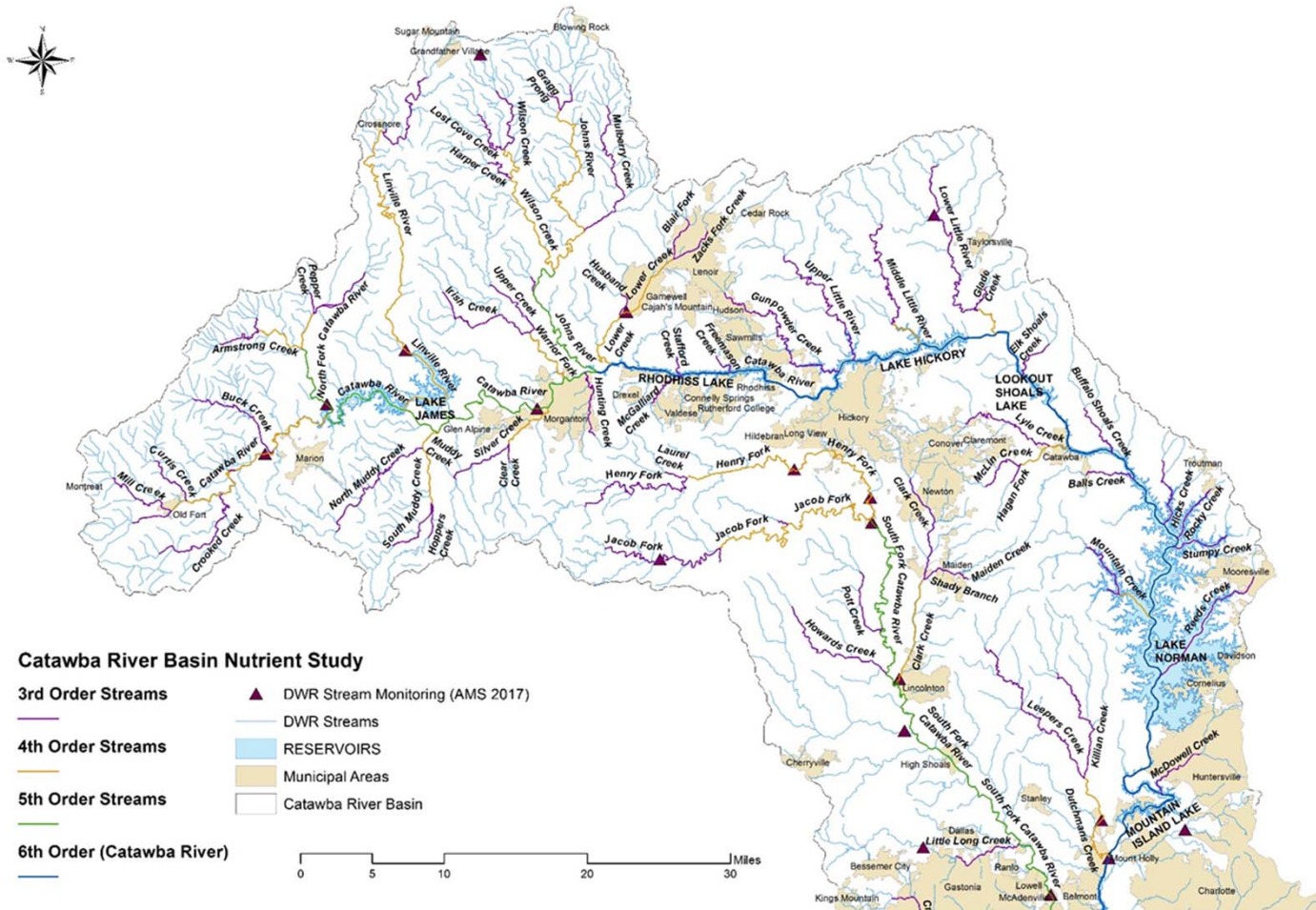
- Look at existing data and land uses
  - Ambient Monitoring System, past nutrient studies, municipalities, etc.
- Identify data gaps and hotspots
- Look for opportunities to expand monitoring
- Determine potential nutrient sources



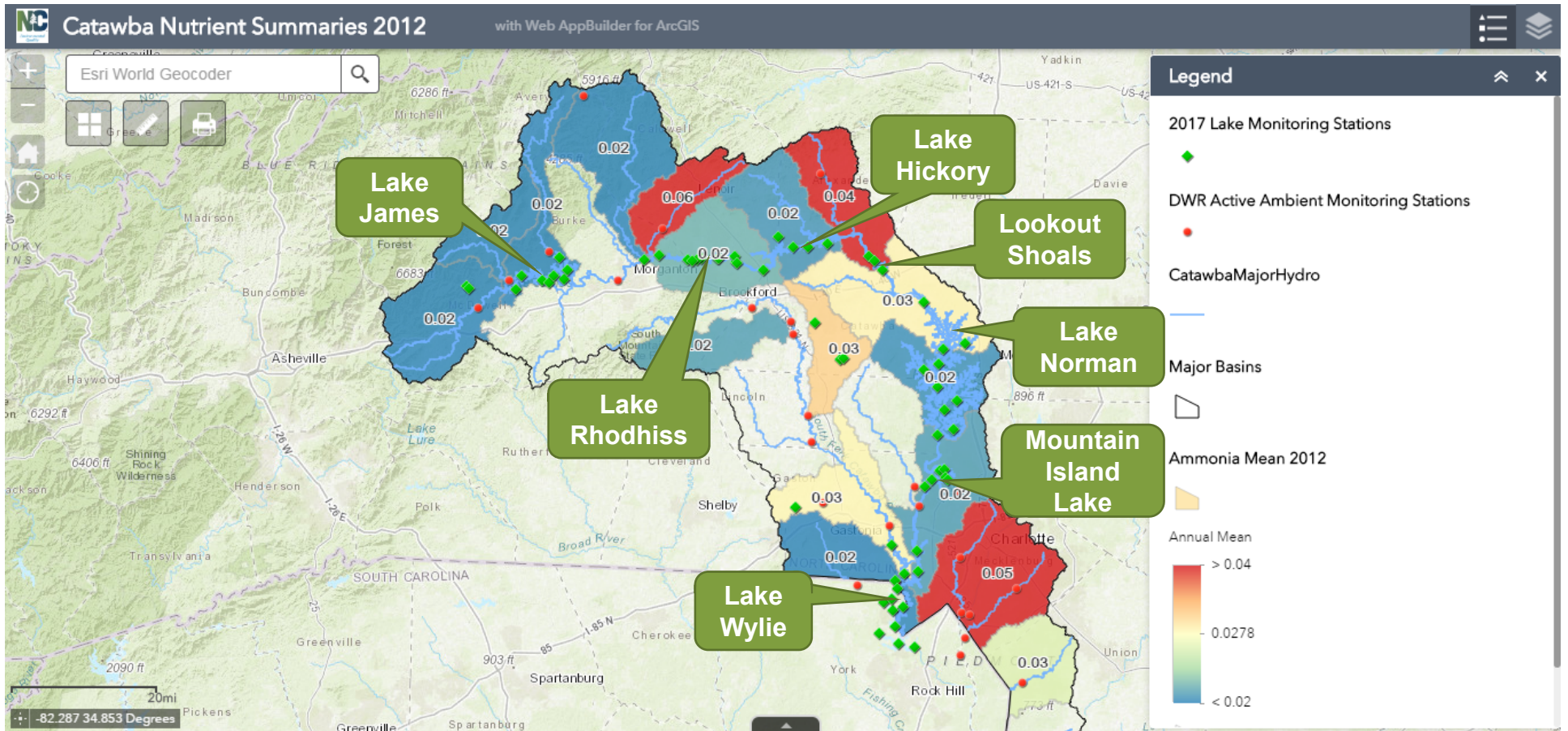


# Existing Data

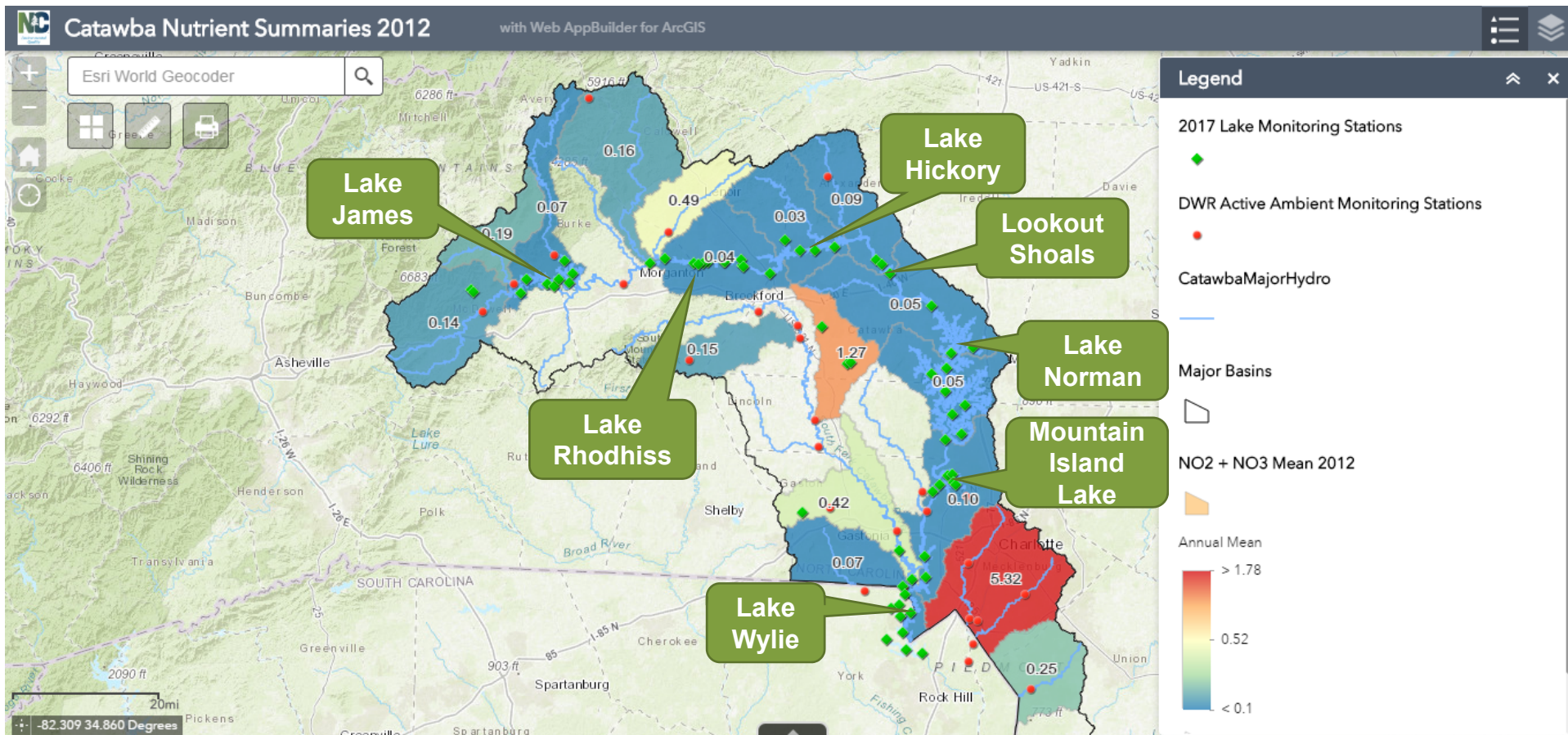
- AMS stations



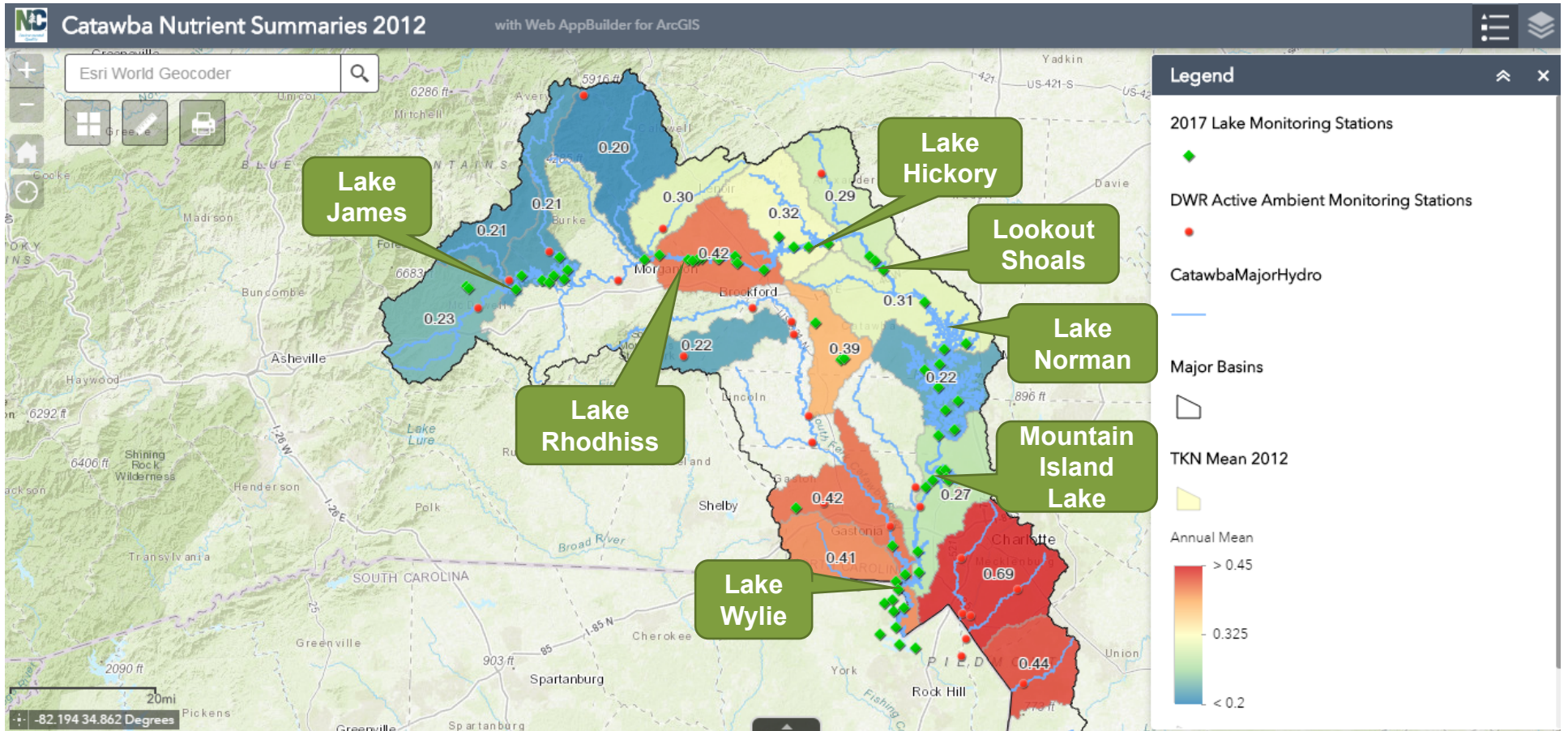
# Ammonia Means for 2012



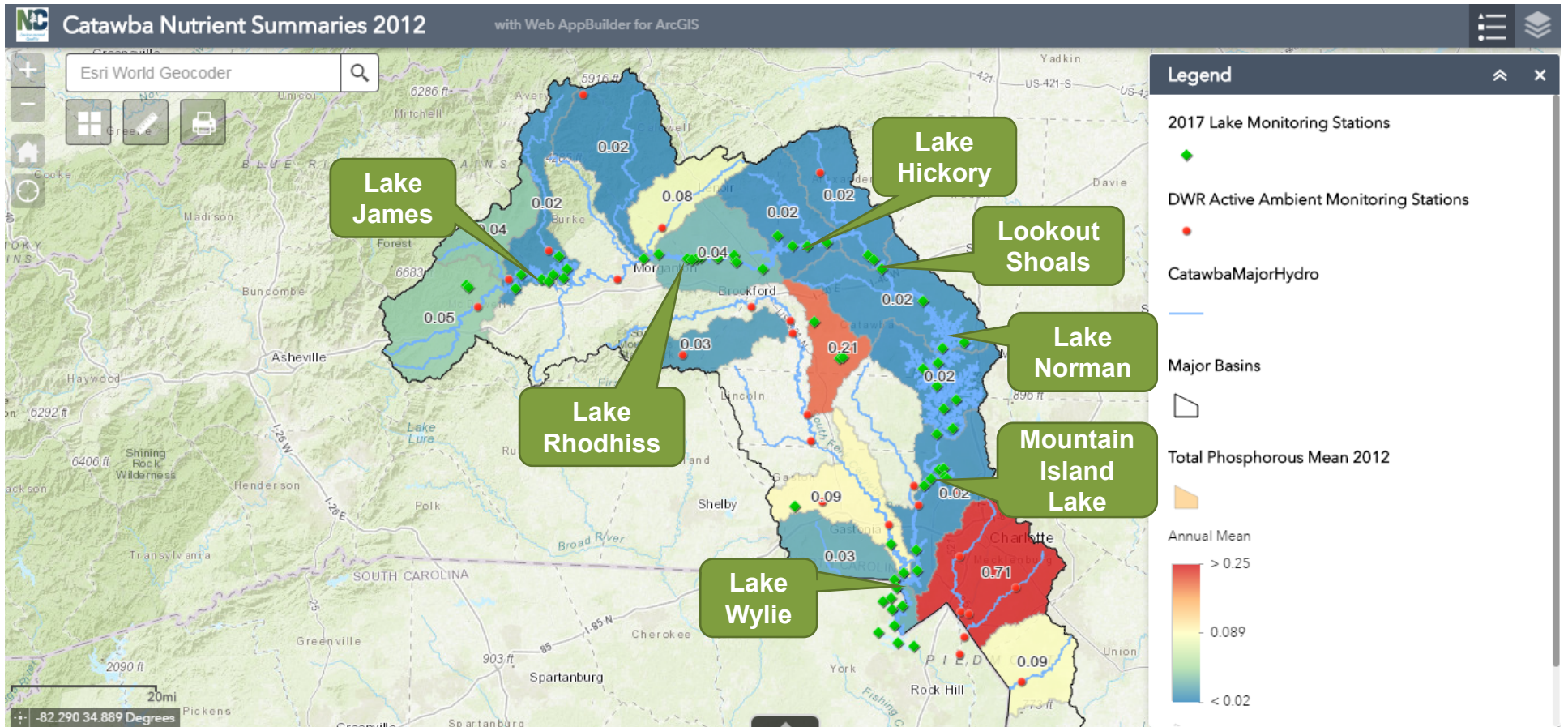
# NO<sub>2</sub> + NO<sub>3</sub> Means for 2012



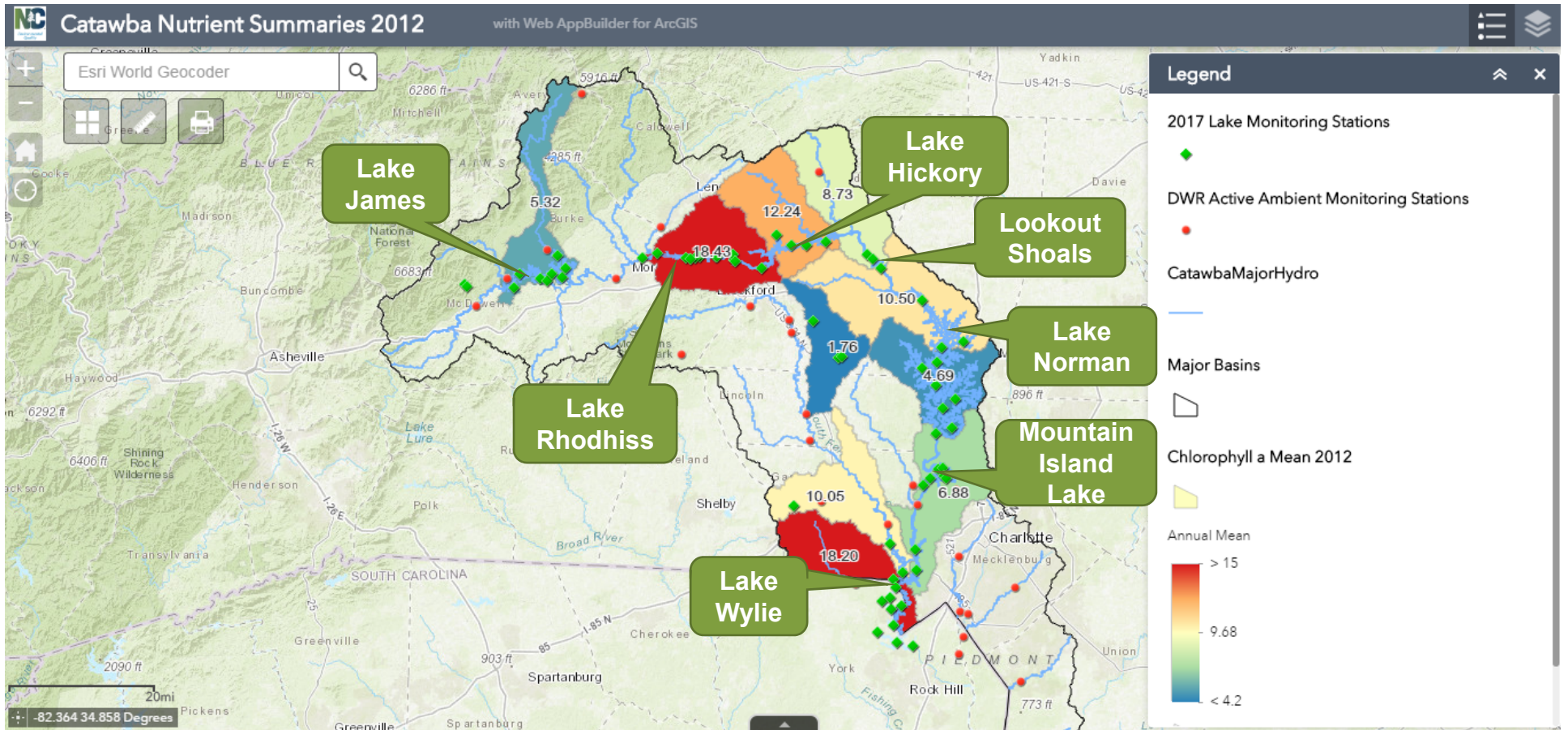
# TKN Means for 2012



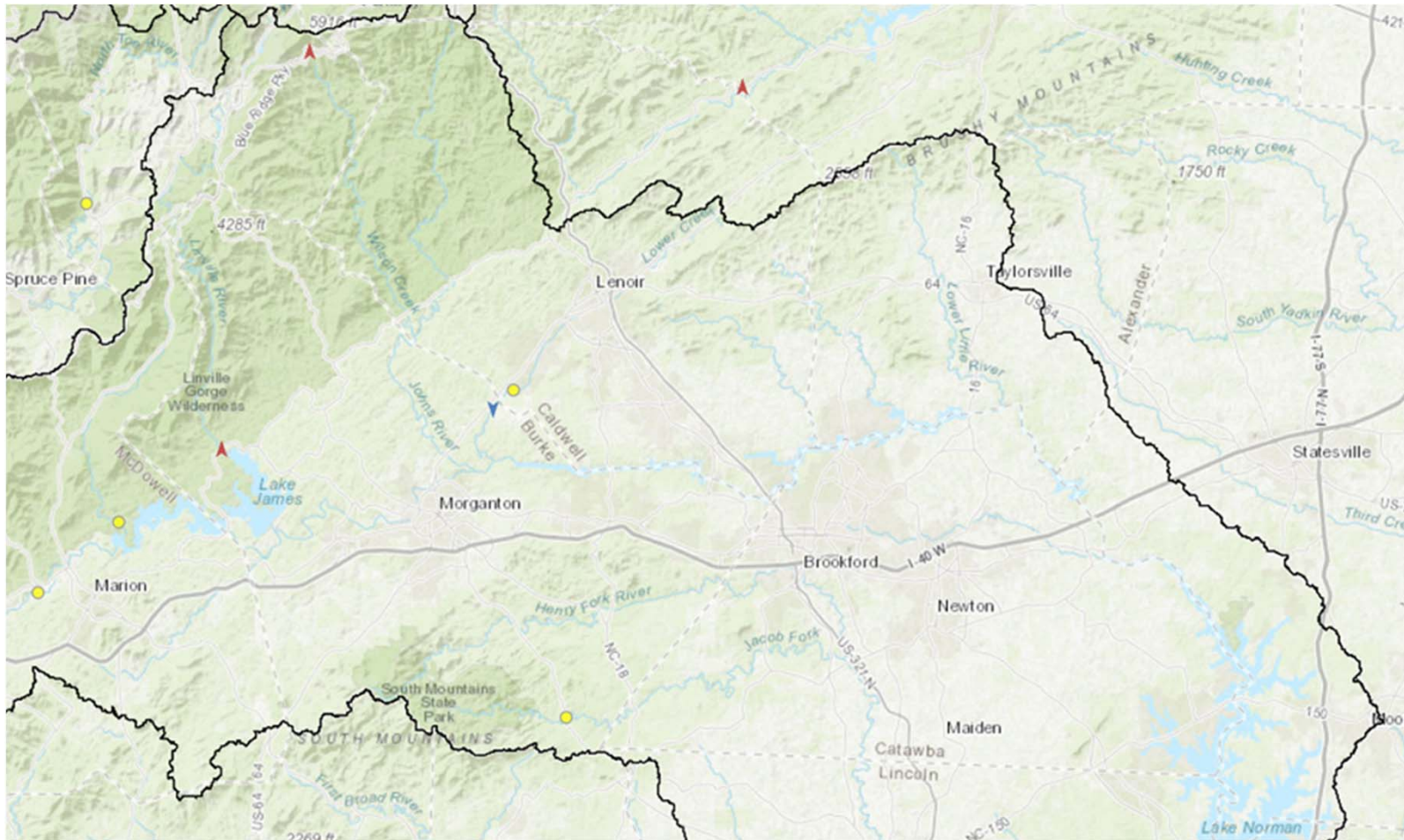
# Total Phosphorous Means for 2012



# Chlorophyll a Means for 2012



# Trend Data for Ammonia



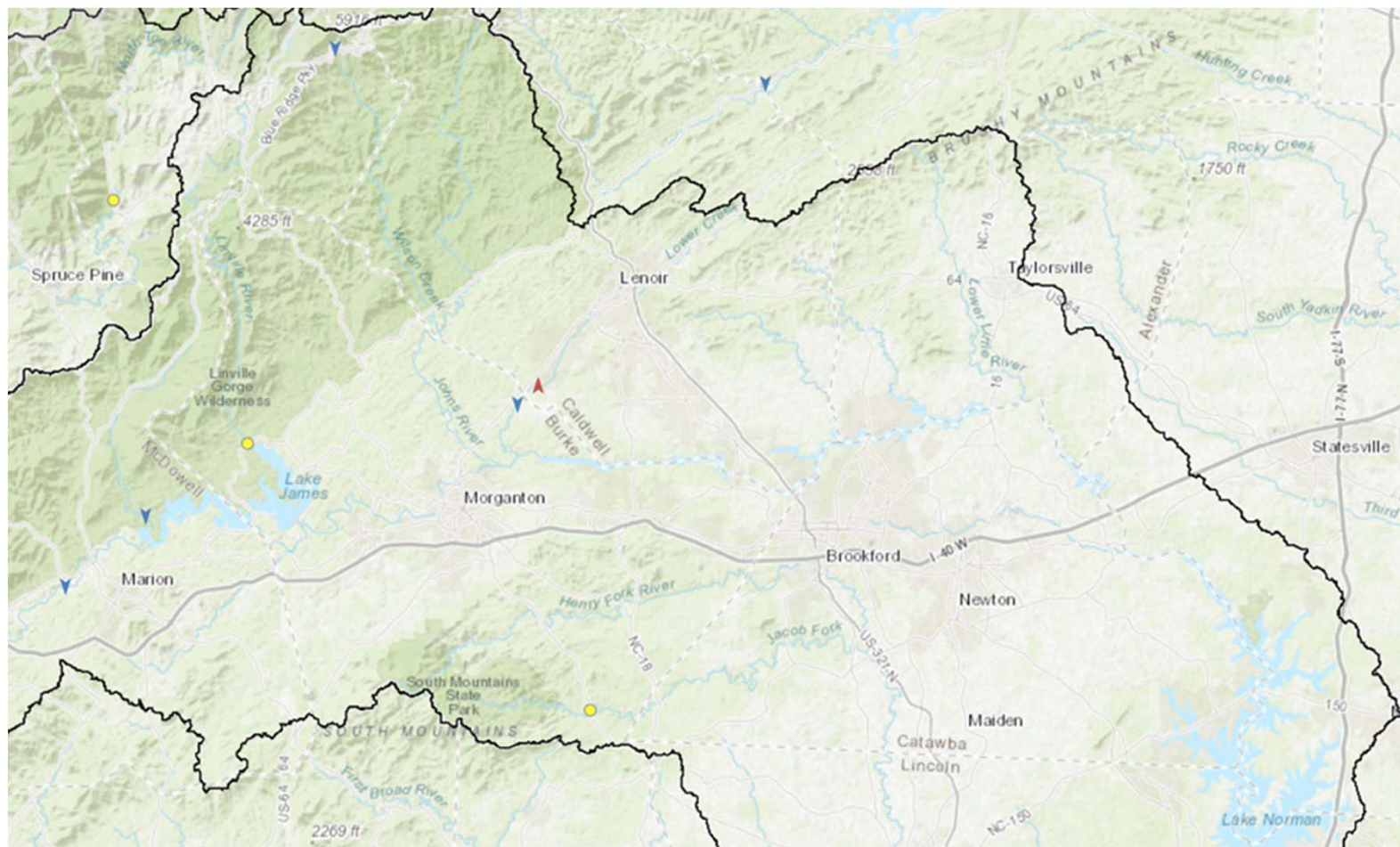
▼ Downward trend

▲ Upward trend

● No significant trend



# Trend Data for $\text{NO}_2 + \text{NO}_3$

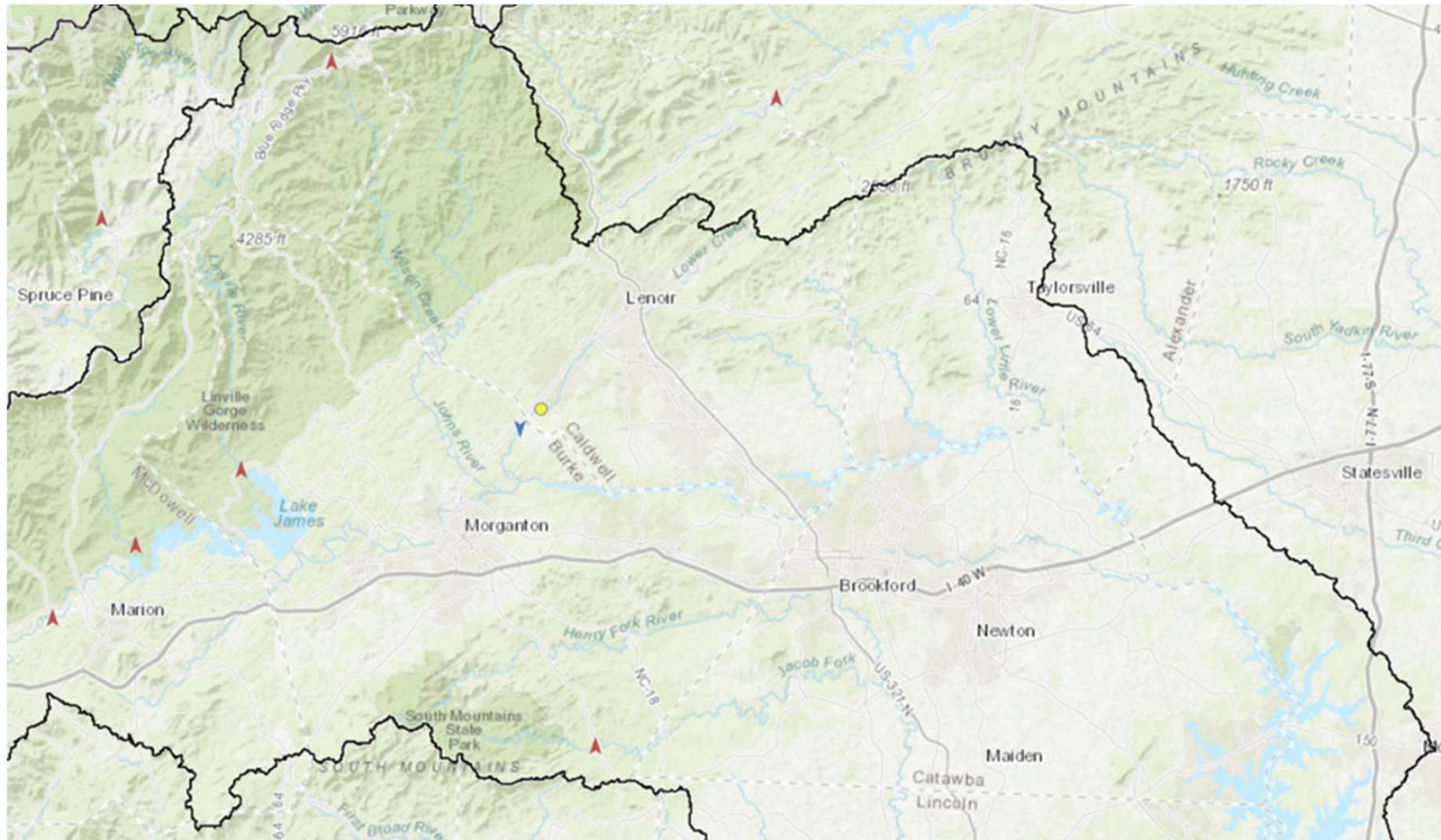


▼ Downward trend    ▲ Upward trend    ● No significant trend





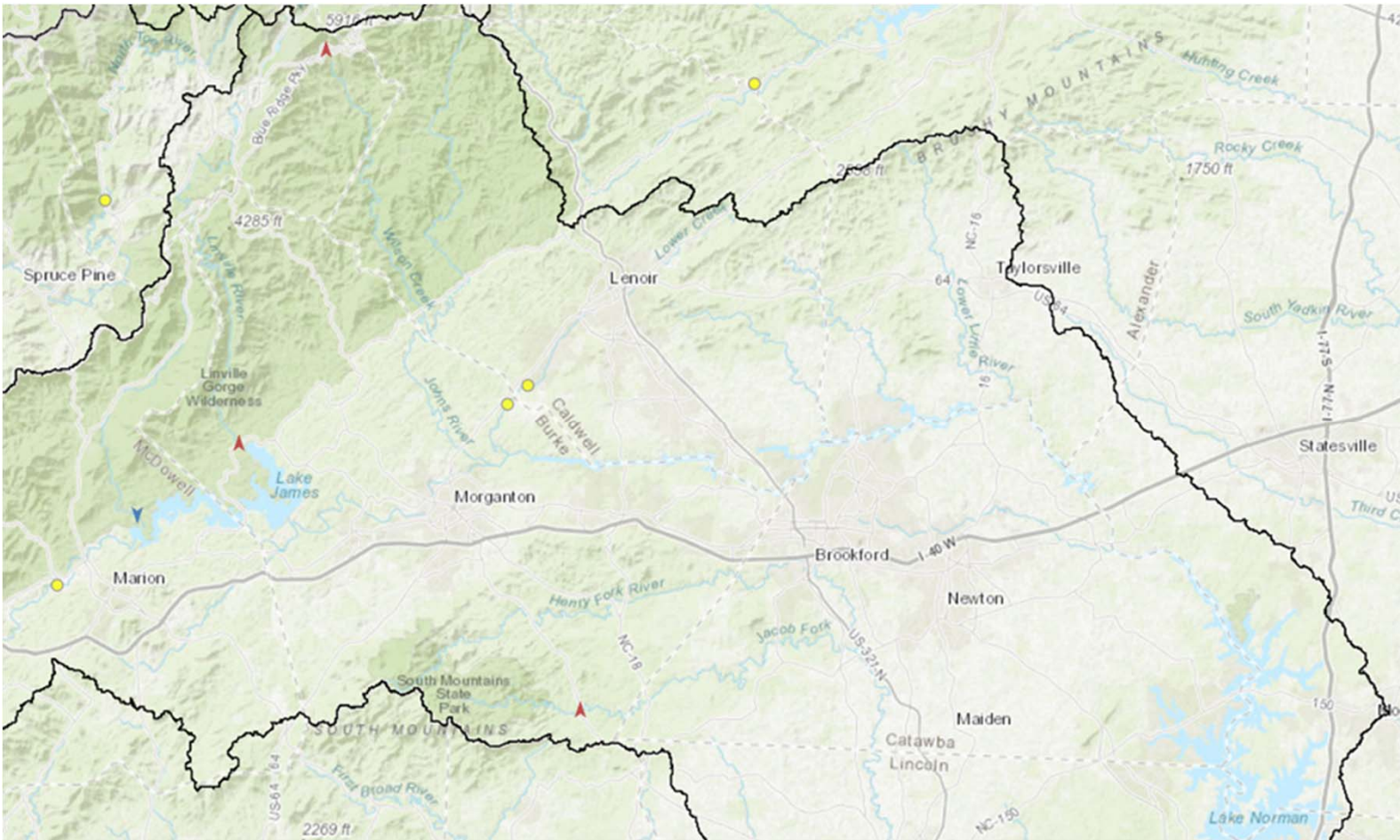
# Trend Data for TKN



▼ Downward trend    ▲ Upward trend    ● No significant trend



# Trend Data for TP



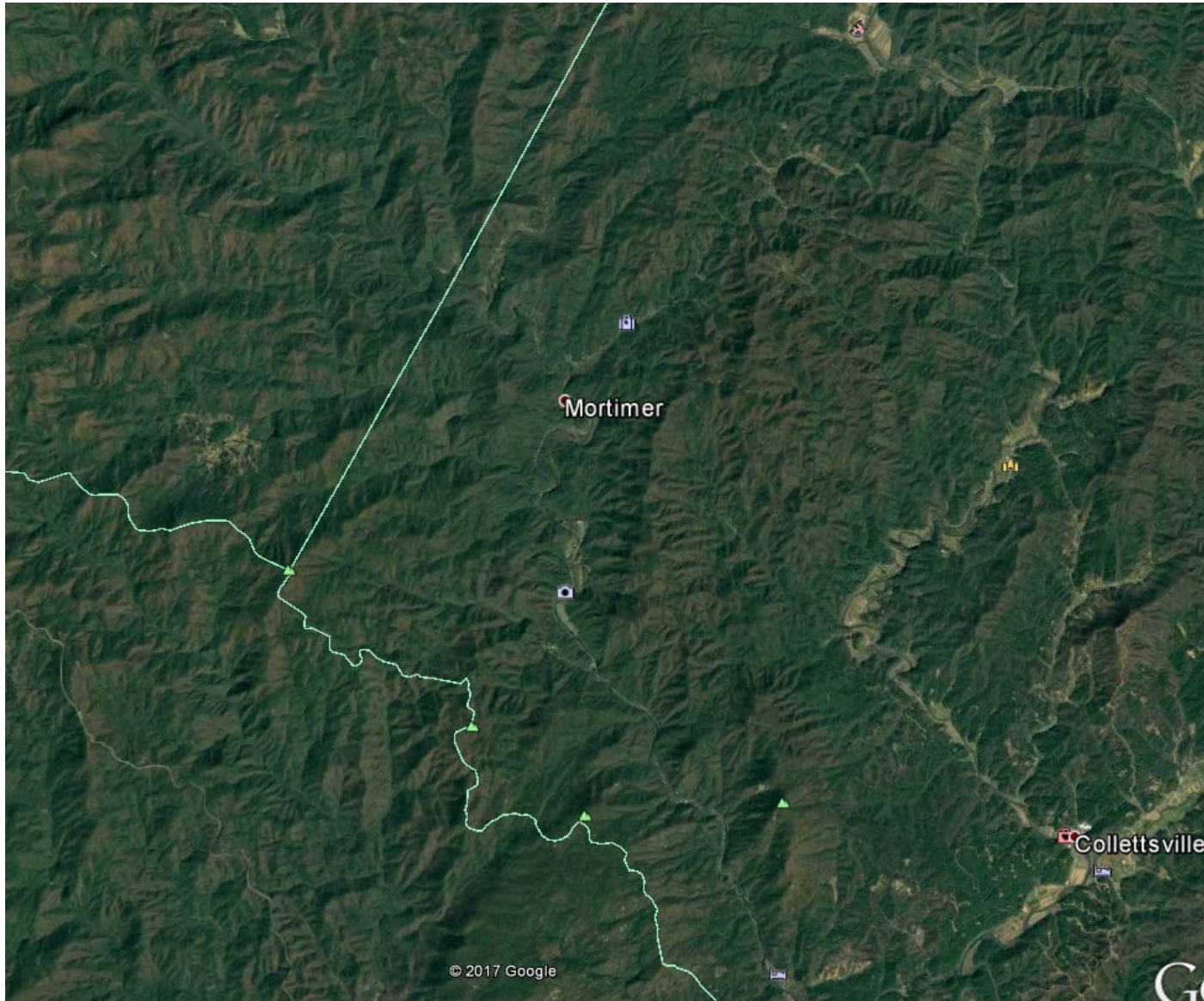
▼ Downward trend    ▲ Upward trend    ● No significant trend



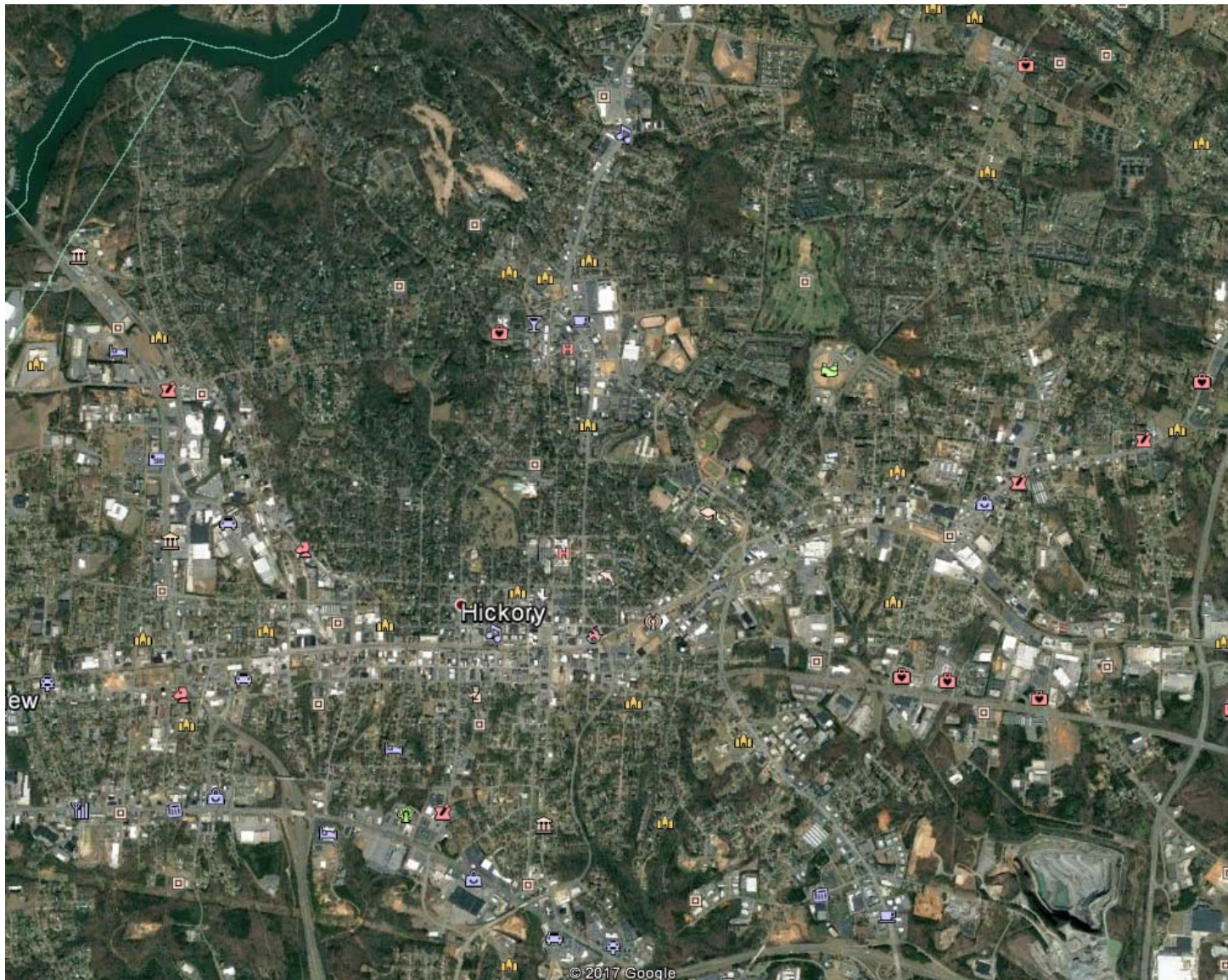
# Land Use Types: Agriculture



# Land Use Types: Forests

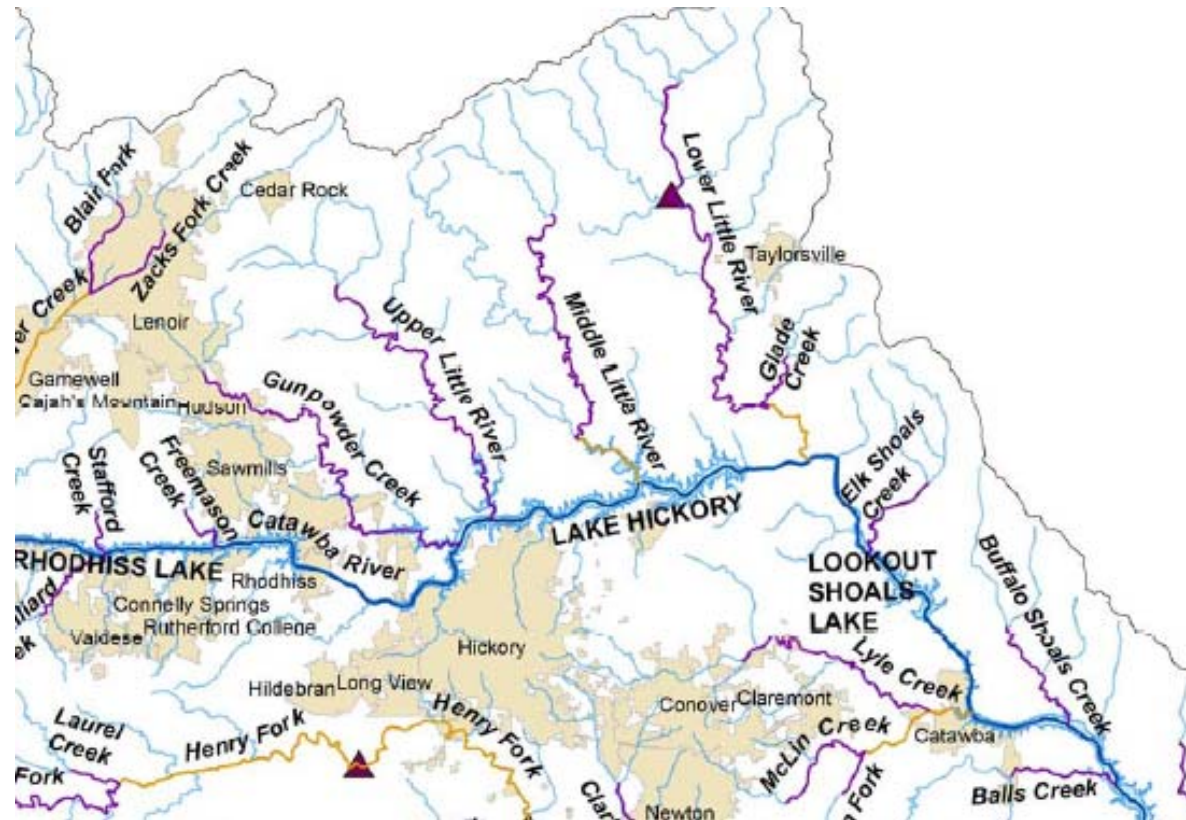


# Land Use Types: Urban/Suburban



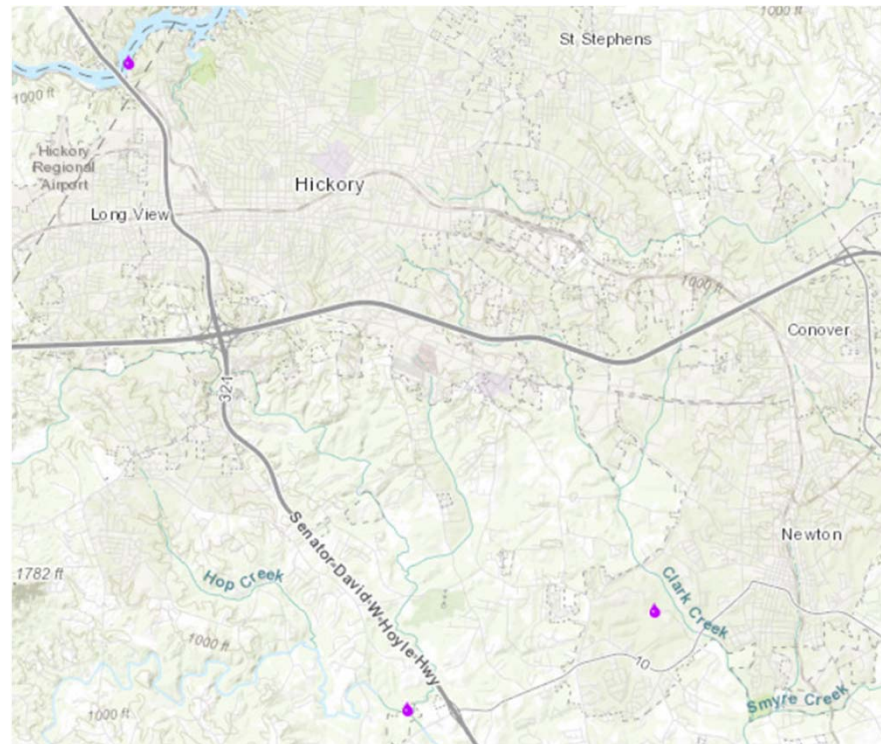
# Next Steps: Data Gaps

- Limited data for mainstem watershed between Rhodhiss Lake and Lake Norman.
- Not all stations have nutrient monitoring

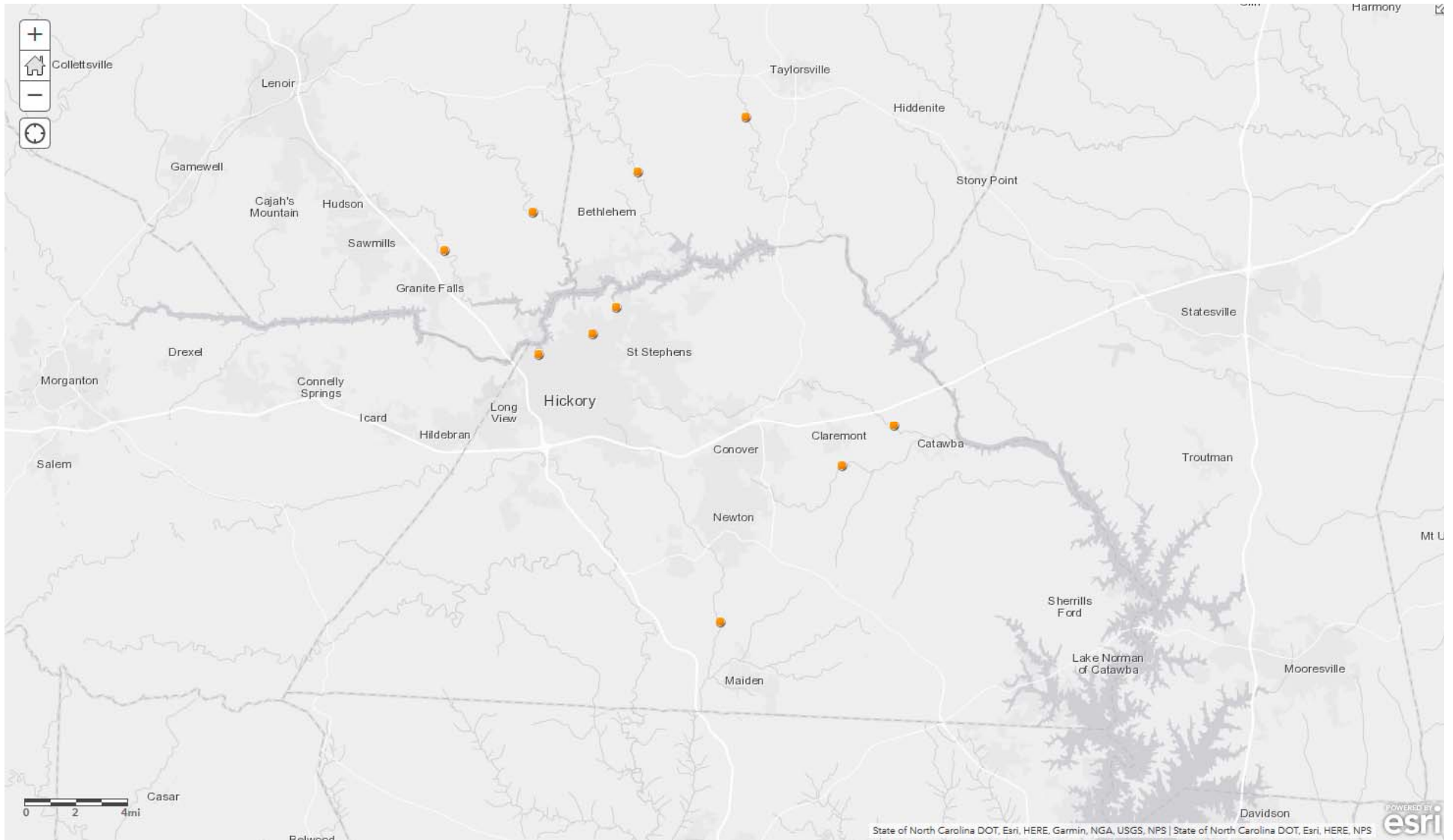


# New Stations and Data

- Ten new monitoring stations
  - Upper, Middle, and Lower Little Rivers, Gunpowder Creek, Horseford Creek, Falling Creek, Lyle Creek, McLin Creek, and Clark Creek
- Monitoring data from water intakes at City of Hickory and City of Newton.
- Began monitoring nutrients at all Catawba stations.

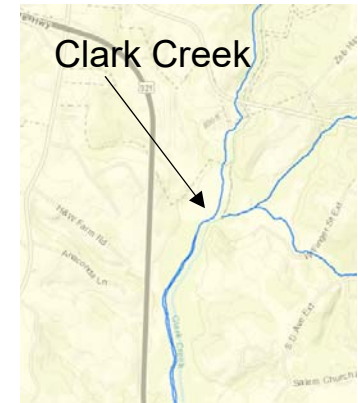
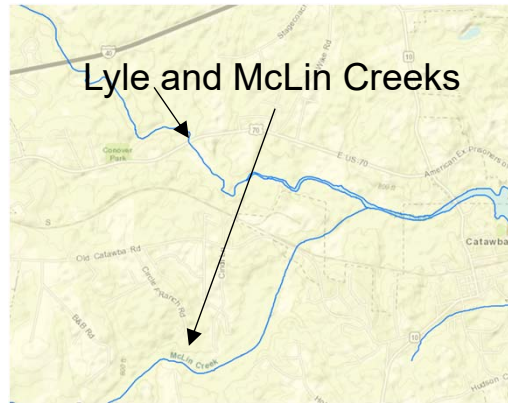
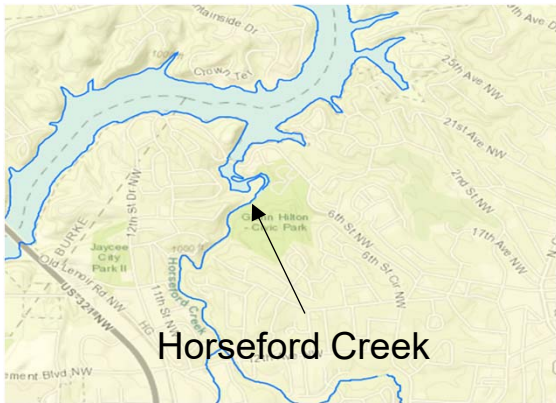
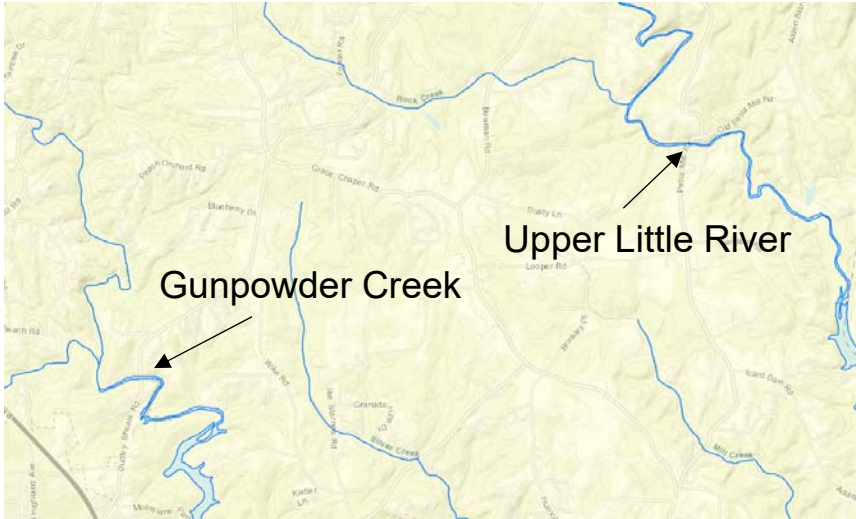


# New Monitoring Station Locations



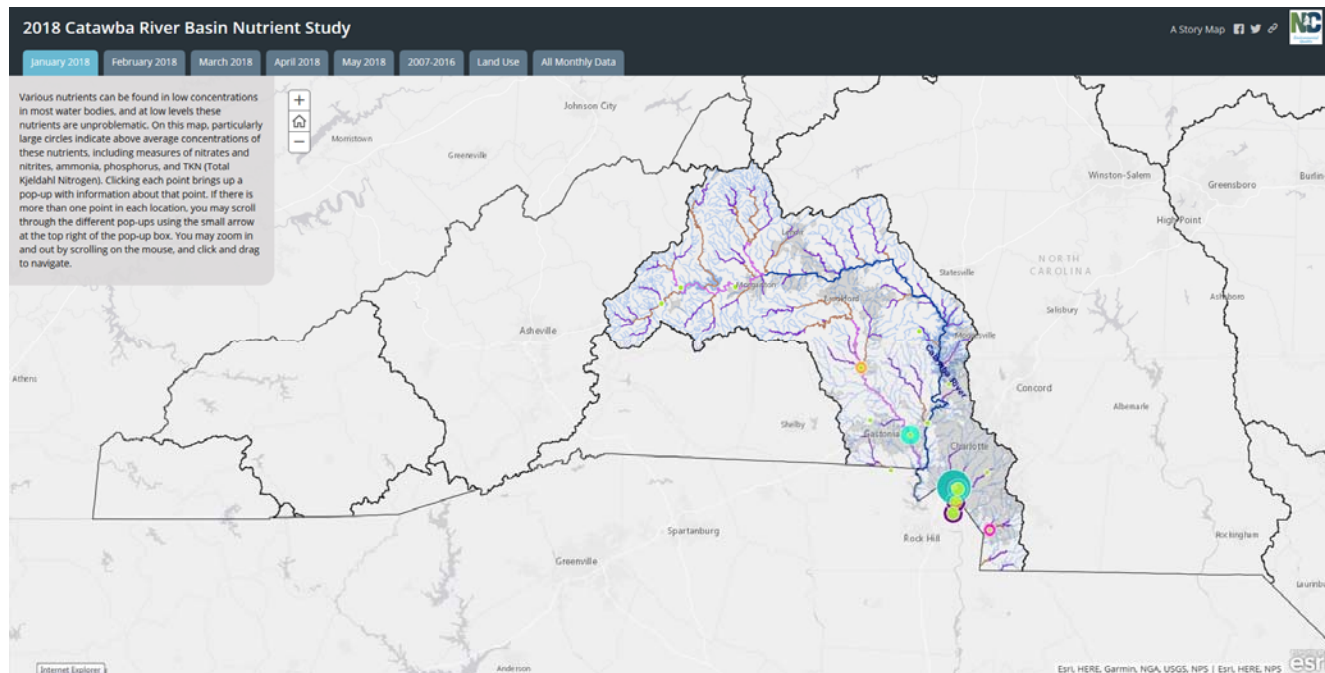


# New Monitoring Station Locations



# Catawba Nutrient Study Story Map

- Data presented in a story map for enhanced understanding of results and locations.
- Catawba Nutrient Study:  
<https://ncdenr.maps.arcgis.com/apps/MapSeries/index.html?appid=fd48cb721ea2455682c10d79c397659c>



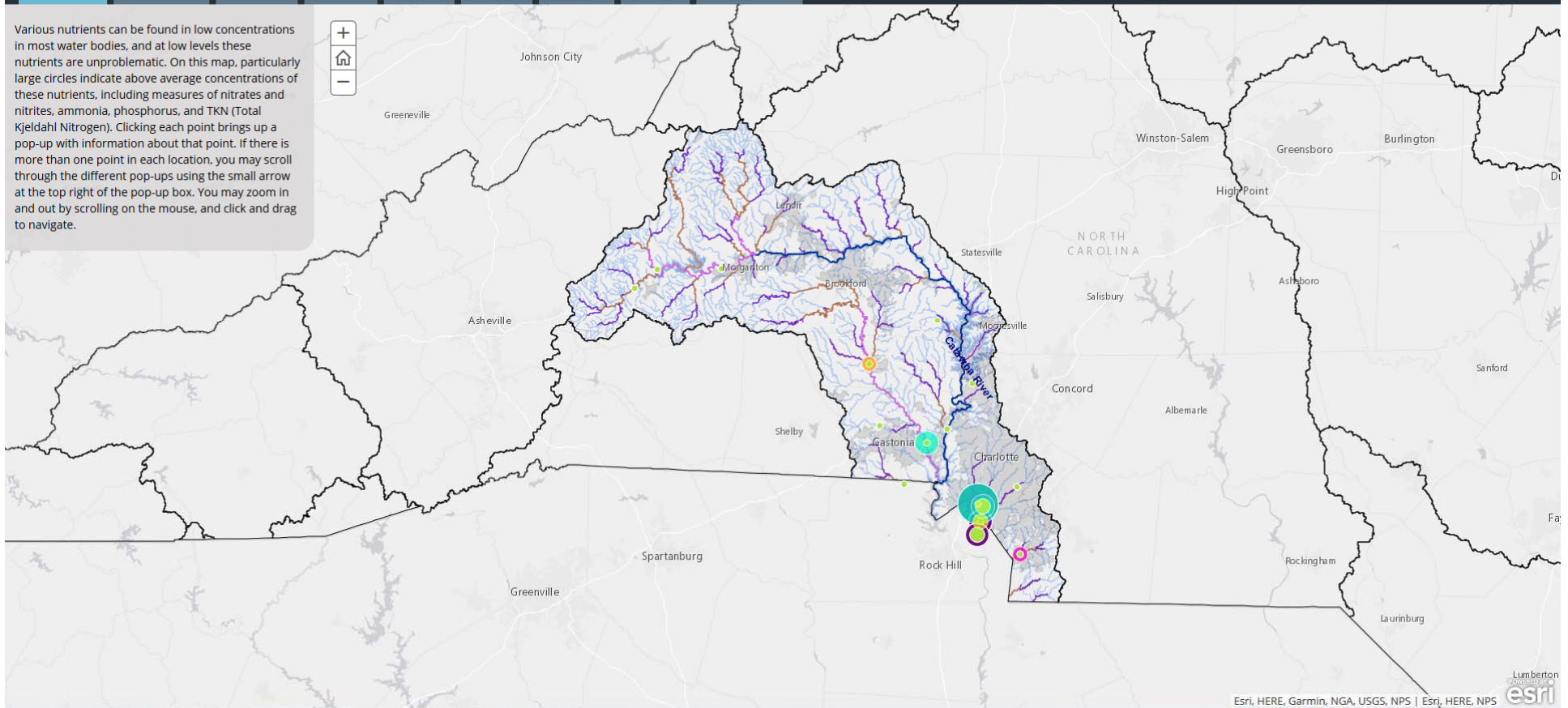
# Catawba Nutrient Study Story Map

## 2018 Catawba River Basin Nutrient Study

A Story Map    

[January 2018](#) [February 2018](#) [March 2018](#) [April 2018](#) [May 2018](#) [June 2018](#) [2007-2016](#) [Land Use](#) [All Monthly Data](#)

Various nutrients can be found in low concentrations in most water bodies, and at low levels these nutrients are unproblematic. On this map, particularly large circles indicate above average concentrations of these nutrients, including measures of nitrates and nitrites, ammonia, phosphorus, and TKN (Total Kjeldahl Nitrogen). Clicking each point brings up a pop-up with information about that point. If there is more than one point in each location, you may scroll through the different pop-ups using the small arrow at the top right of the pop-up box. You may zoom in and out by scrolling on the mouse, and click and drag to navigate.



Esri, HERE, Garmin, NGA, USGS, NPS | Esri, HERE, NPS 



# Catawba Nutrient Study Story Map

## 2018 Catawba River Basin Nutrient Study

A Story Map    

January 2018 February 2018 March 2018 April 2018 May 2018 June 2018 2007-2016 Land Use All Monthly Data

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### Ammonia (mg/L) Feb 2018

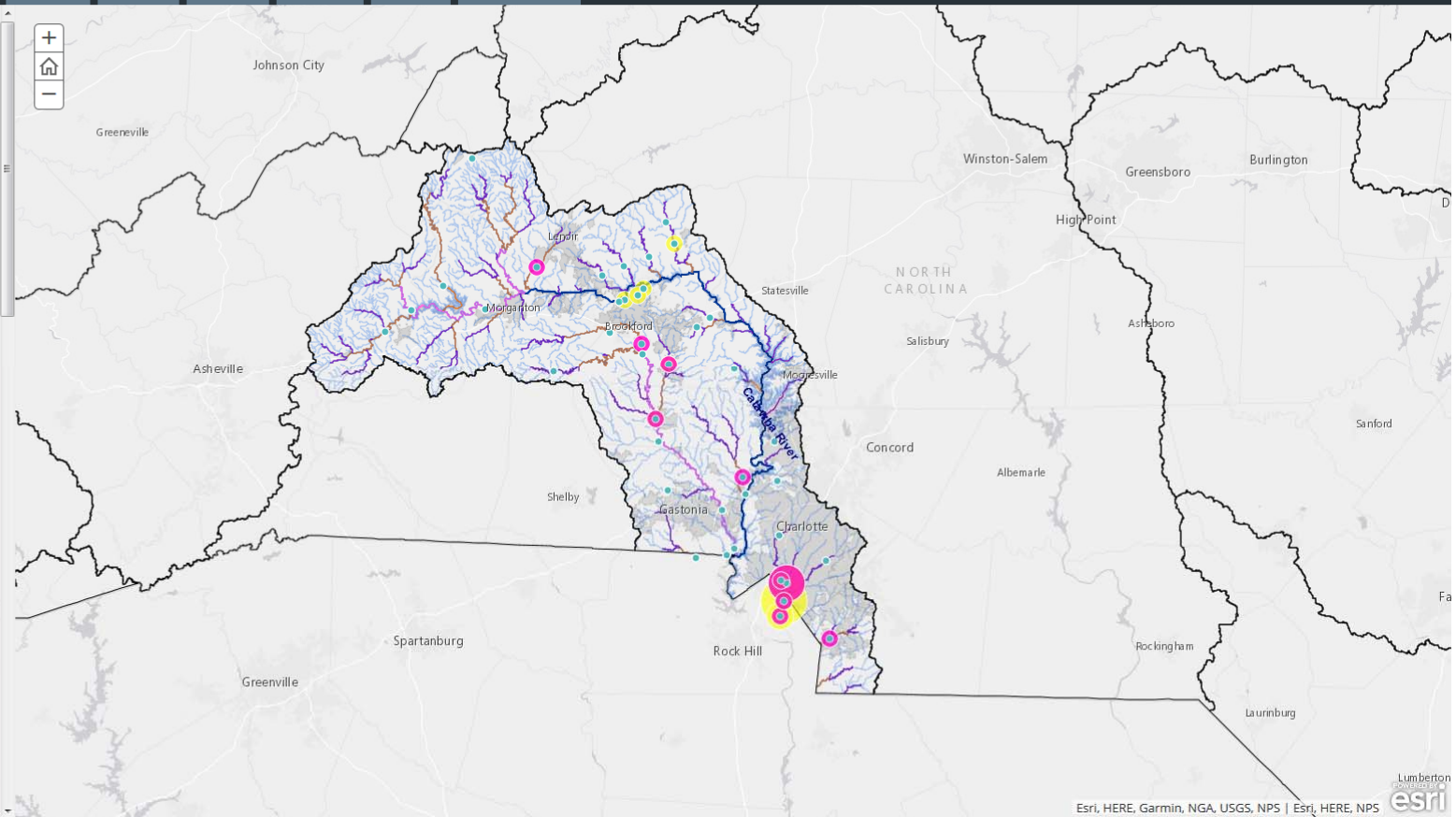
Median

-  > 0.4 - 0.5
-  > 0.3 - 0.4
-  > 0.2 - 0.3
-  > 0.1 - 0.2
-  < 0.02 - 0.1

### Total P (mg/L) Feb 2018

Median

-  > 1.5 - 2
-  > 1 - 1.5
-  > 0.5 - 1



Esri, HERE, Garmin, NGA, USGS, NPS | Esri, HERE, NPS  

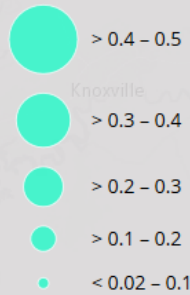


# Catawba Nutrient Study Story Map

zoom in and out by scrolling on the mouse, and click and drag to navigate.

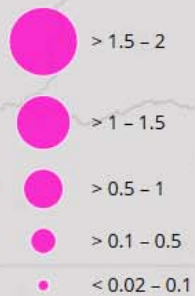
## Ammonia (mg/L) Feb 2018

Median



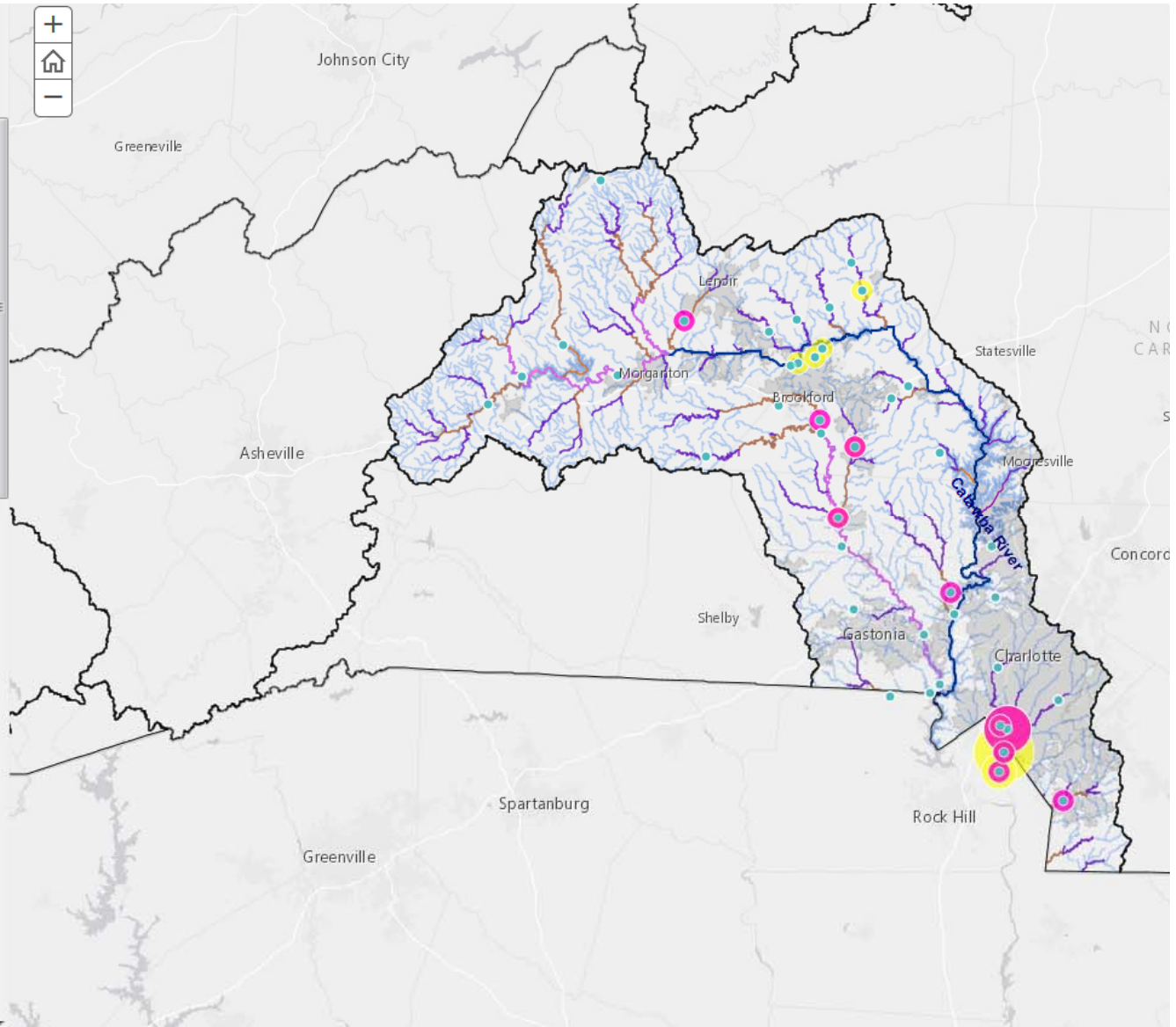
## Total P (mg/L) Feb 2018

Median




## Nitrate+Nitrite (mg/L) Feb 2018

Median



# Catawba Nutrient Study Story Map

## 2018 Catawba River Basin Nutrient Study

A Story Map    

January 2018 February 2018 March 2018 April 2018 May 2018 June 2018 2007-2016 **Land Use** All Monthly Data

This map shows all NPDES permitted facilities (2018), non-discharge permitted facilities (2014), and animal operations (2016) in the Catawba River Basin. The background represents USGS land cover (2011) throughout the basin, each color represents a different type of land use, as shown in the legend below. Clicking each point on the map brings up a pop-up with information about that point. If there is more than one point in each location, you may scroll through the different pop-ups using the small arrow at the top right of the pop-up box. You may zoom in and out by scrolling on the mouse, and click and drag to navigate.

### NPDES Permits Feb 2018

- Major
- Minor

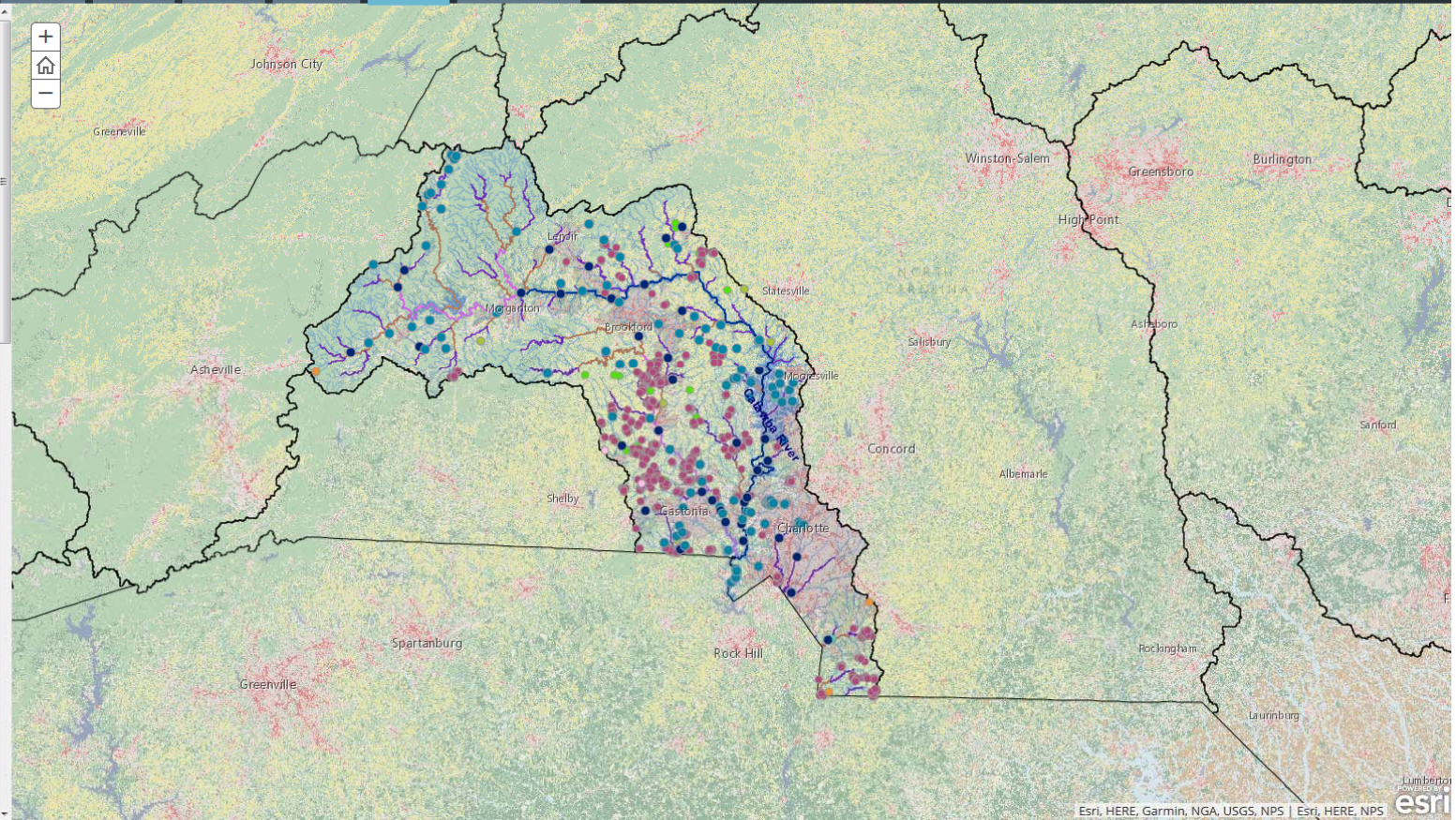
### Non-Discharge Permits Jun 2014

- Land Application of Residual Solids (503)
- Reclaimed Water
- Wastewater Irrigation
- Land Application of Residual Solids (503 Exempt)
- Single-Family Residence Wastewater Irrigation
- Other Non-Discharge Wastewater

### Animal Operations Feb 2016

- Cattle State COC
- Swine State COC

### DWR Stream Classifications






Esri, HERE, Garmin, NGA, USGS, NPS | Esri, HERE, NPS  





# Catawba Nutrient Study Story Map

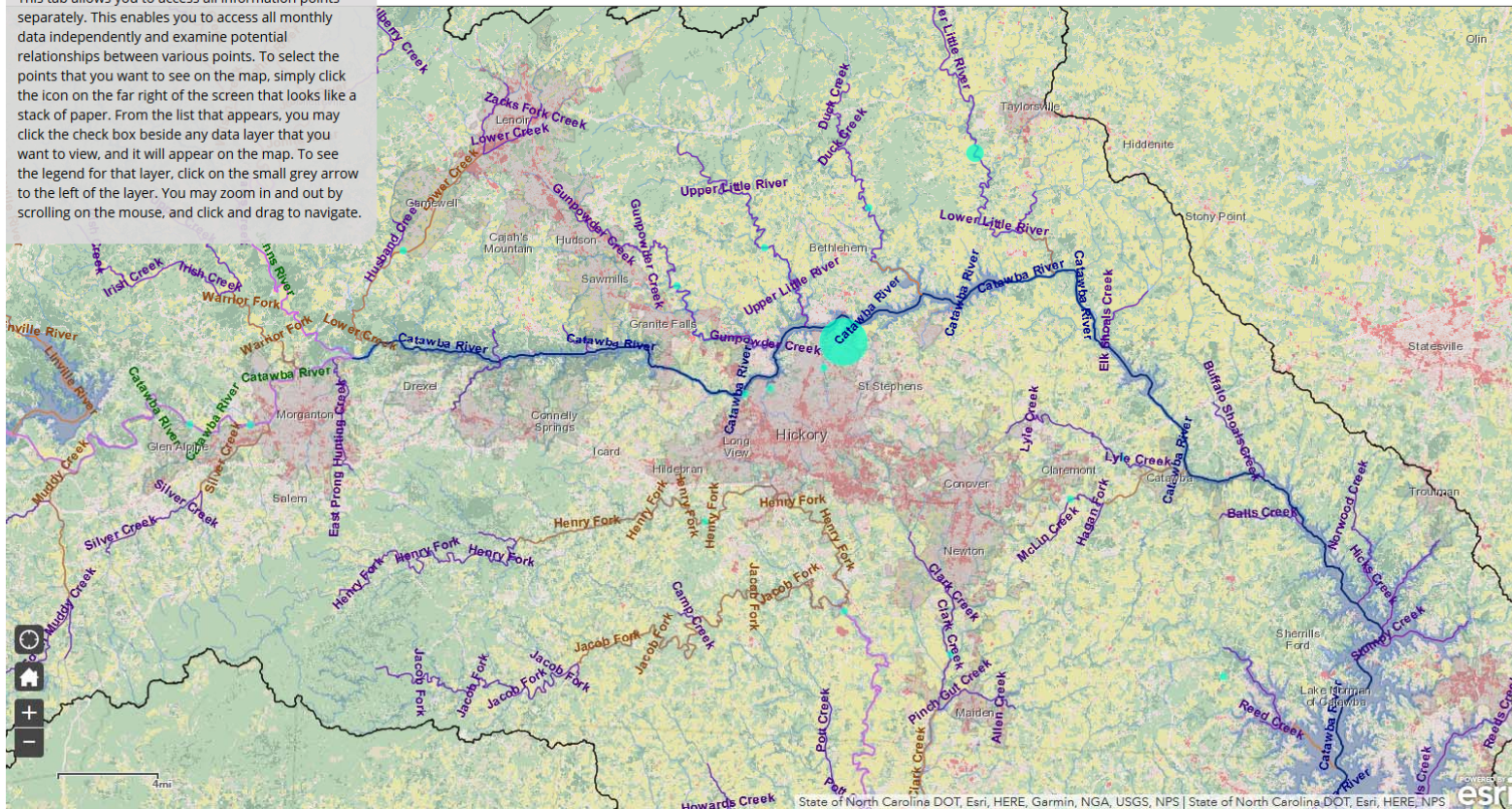
## 2018 Catawba River Basin Nutrient Study

A Story Map   



- January 2018
- February 2018
- March 2018
- April 2018
- May 2018
- June 2018
- 2007-2016
- Land Use
- All Monthly Data

This tab allows you to access all information points separately. This enables you to access all monthly data independently and examine potential relationships between various points. To select the points that you want to see on the map, simply click the icon on the far right of the screen that looks like a stack of paper. From the list that appears, you may click the check box beside any data layer that you want to view, and it will appear on the map. To see the legend for that layer, click on the small grey arrow to the left of the layer. You may zoom in and out by scrolling on the mouse, and click and drag to navigate.



### Layer List

#### Operational layers

- TKN (mg/L) June 2018
- Nitrate+Nitrite (mg/L) June 2018
- Ammonia (mg/L) June 2018
- Total P (mg/L) June 2018
- Ammonia (mg/L) May 2018
- TKN (mg/L) May 2018
- Total P (mg/L) May 2018
- Nitrate+Nitrite (mg/L) May 2018
- Ammonia (mg/L) Apr 2018
- TKN (mg/L) Apr 2018
- Nitrate+Nitrite (mg/L) Apr 2018
- Total P (mg/L) Apr 2018
- TKN (mg/L) Mar 2018
- Ammonia (mg/L) Mar 2018
- Nitrate+Nitrite (mg/L) Mar 2018
- Total P (mg/L) Mar 2018
- Ammonia (mg/L) Feb 2018
- Total P (mg/L) Feb 2018
- Nitrate+Nitrite (mg/L) Feb 2018





# Next Steps

- Monthly monitoring at new stations from February to August 2018.
- Investigating isotopic, genetic tracking, and fluorescence analyses for identifying sources of nutrients.
- Report on results due October 2018.



# Questions?

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