Nutrient Loading in Neuse River Basin: Update Through 2015

LNBA/NRCA 2016 Wastewater Treatment Plant Operators Training Workshop

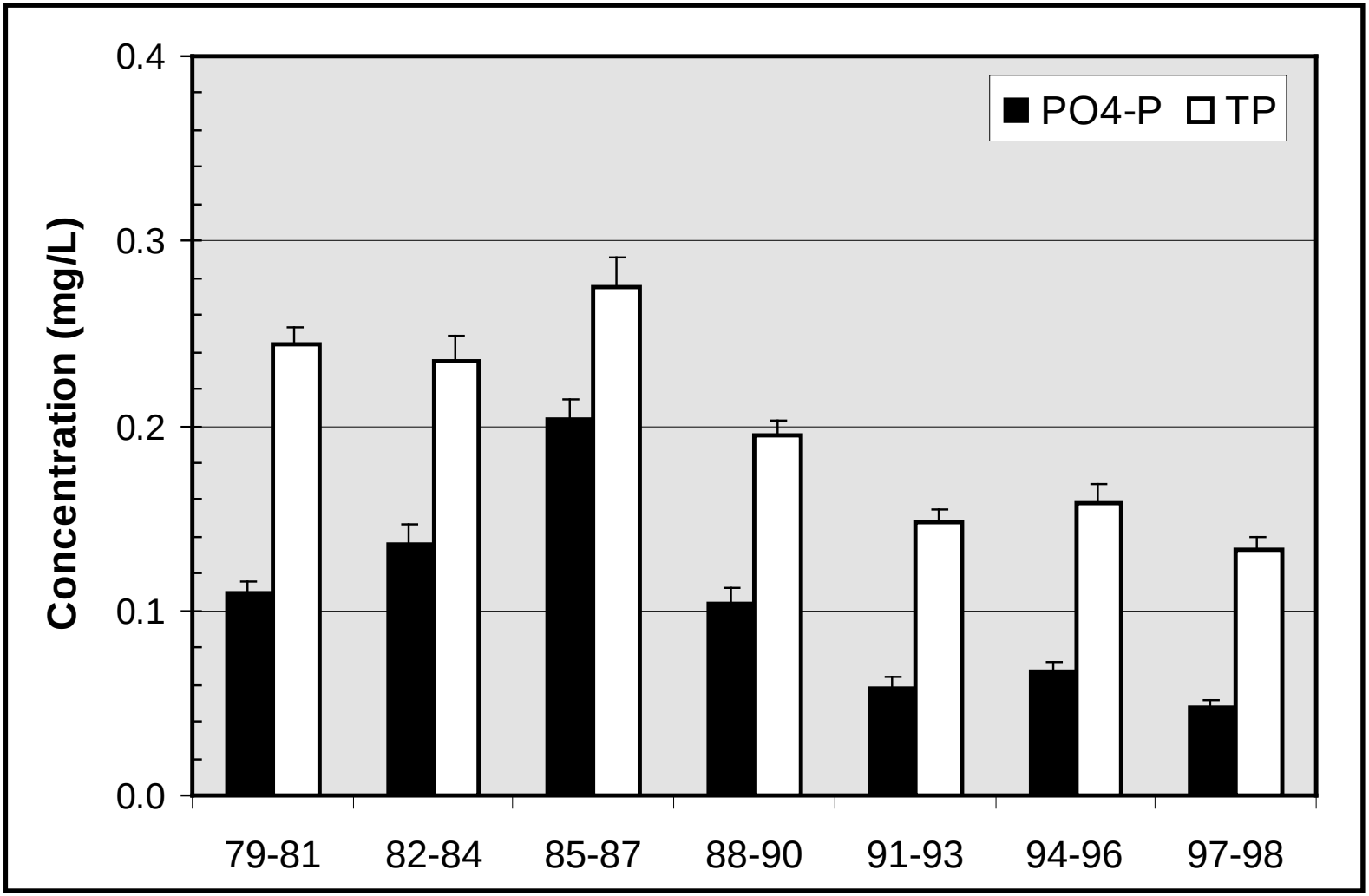
July 26, 2016 and July 28, 2016

Agenda for Presentation

1. Background on Problem
2. Description of Data Analysis Approach Used to Evaluate Problem
3. Trends in Nutrient Loads
4. Feedback on Key Questions

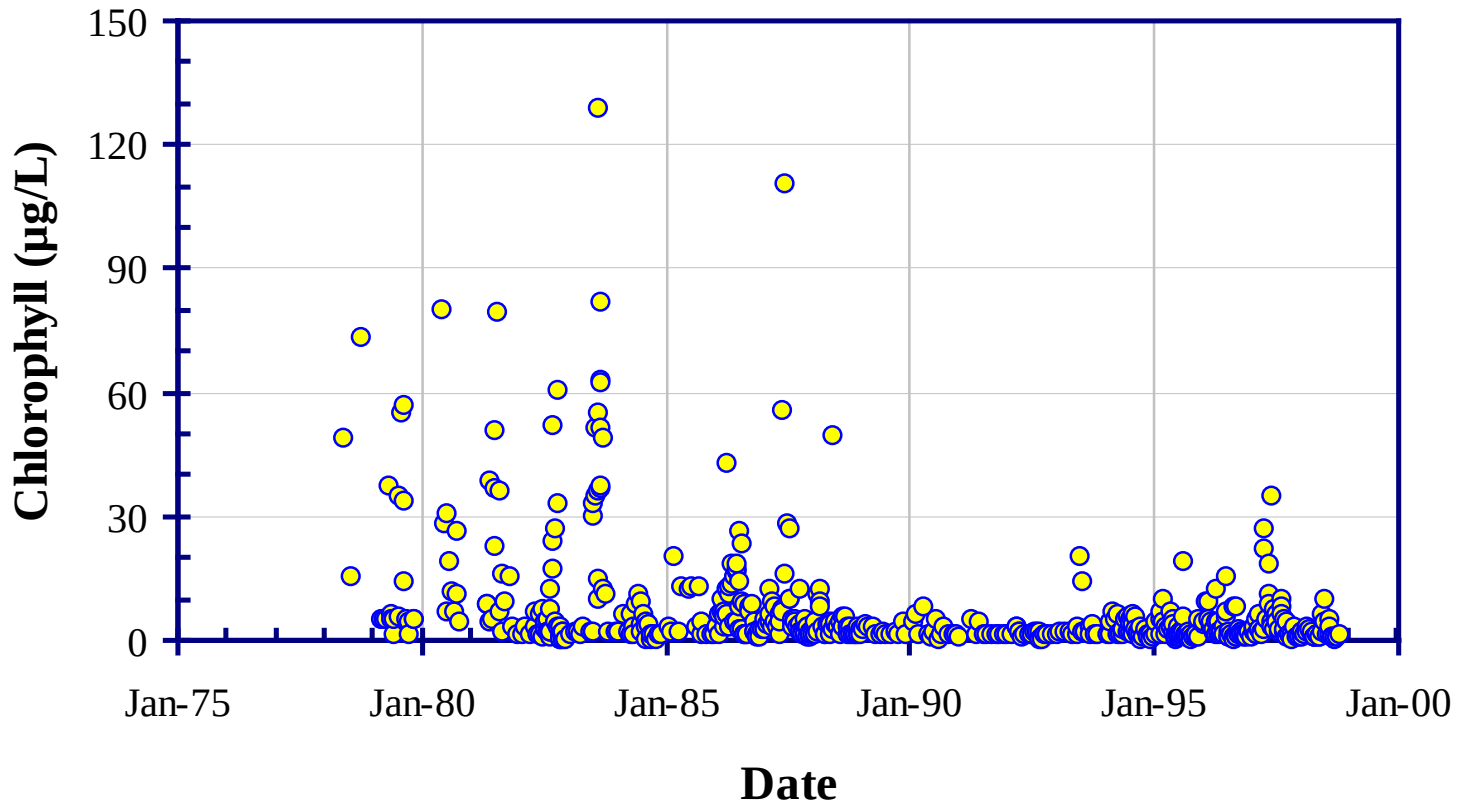
Background on Problem

Management Response – Reduce P



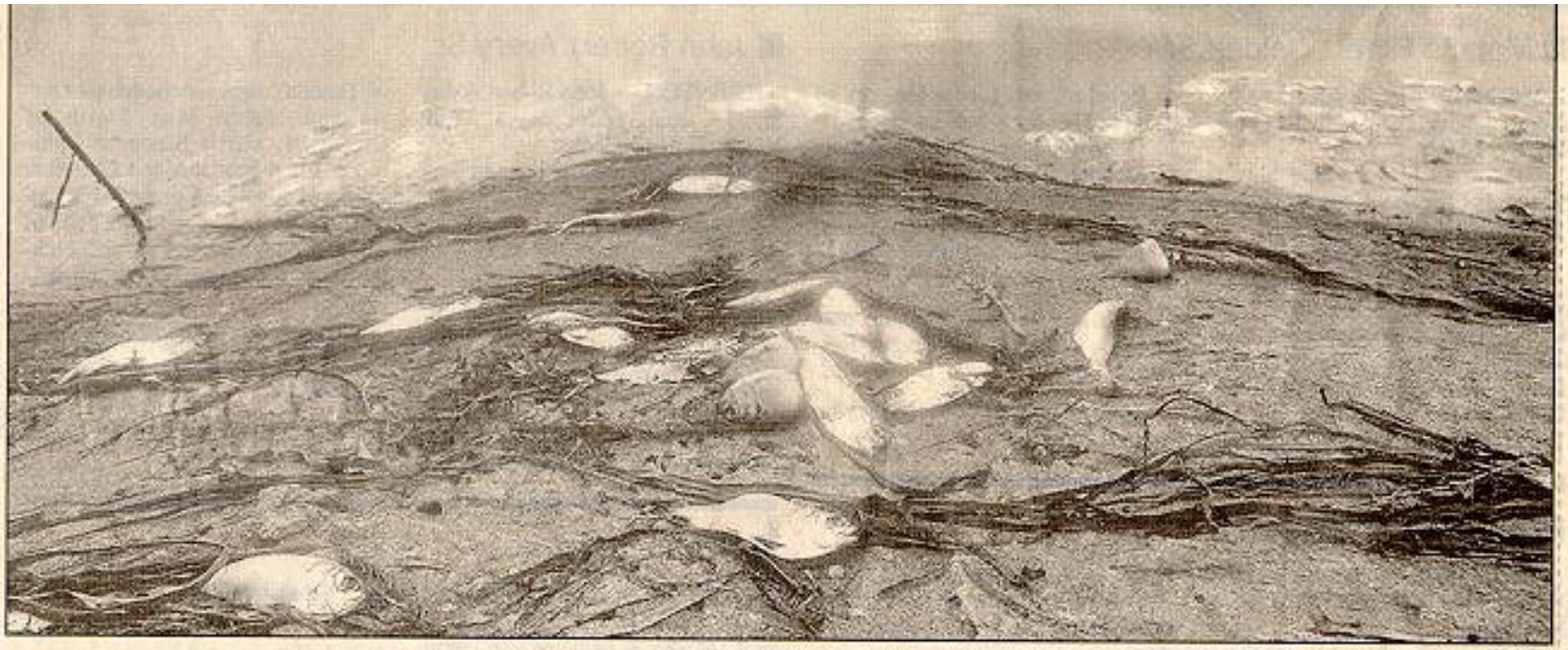
Location = Neuse River Upstream of New Bern

Management Result – Algae Reduced



Location = Neuse River Upstream of New Bern

Meanwhile Further Downstream



Charlie Peek/Sun Journal

Thousands of fish three- to five-inches long died and were washed ashore at Green Springs on the Neuse River Wednesday. This is the latest in a series of fish kills this summer that have plagued the area.

Latest fish kill covers 13 miles along Neuse

By Erick Gill
Sun Journal Staff

Tens of thousands of dead fish

bly tens of thousands" of fish were found dead Wednesday.

"It was very difficult to tell how many," Moore said. "I wouldn't say

said reports of small fish kills have been ringing in at the Neuse River Foundation since last week.

"We've had reports since Tuesday

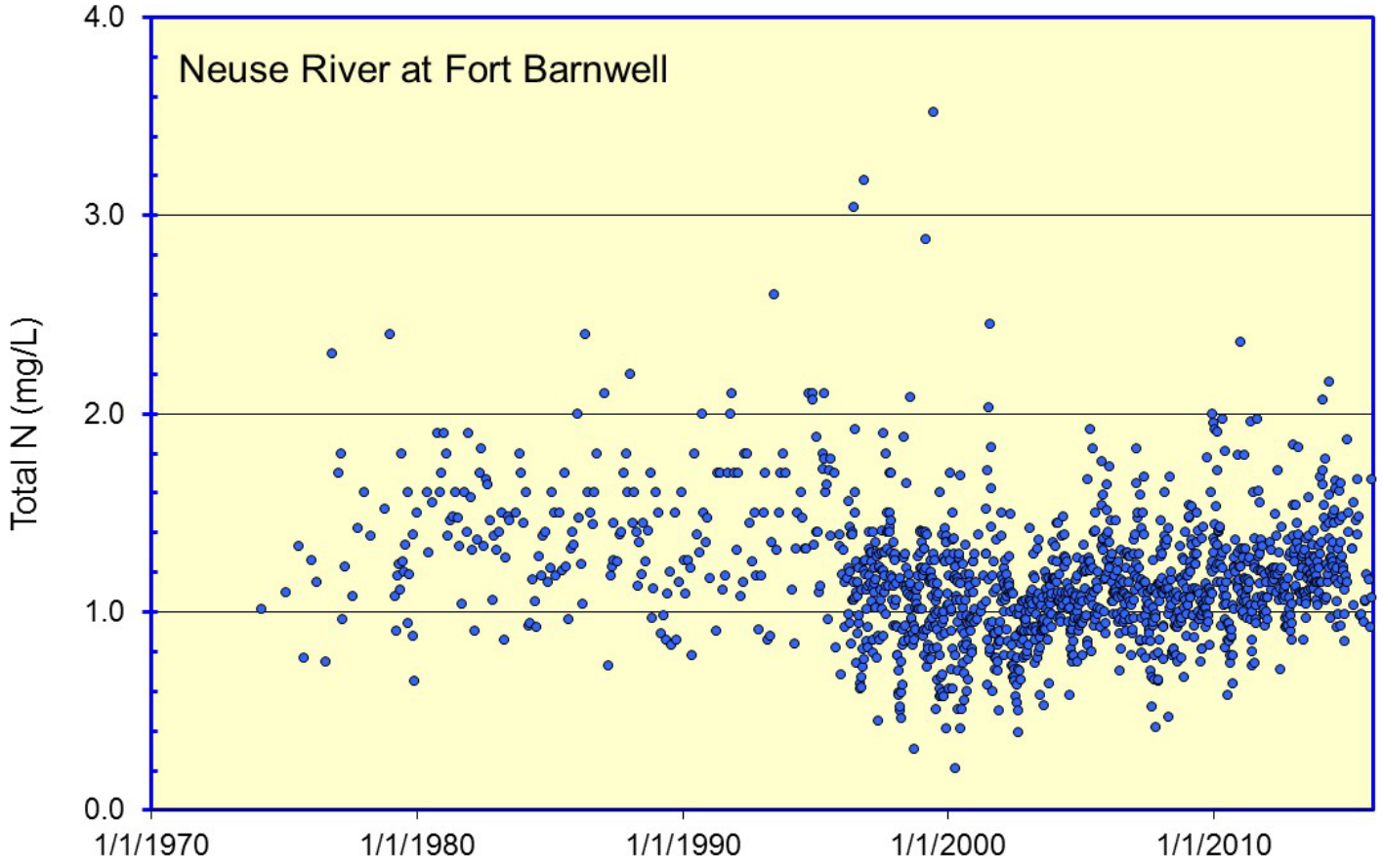
He also said there were about 30 dead fish per yard scattered from Carolina Pines to Slocum Creek.

Meanwhile Further Downstream

Additional Management Actions

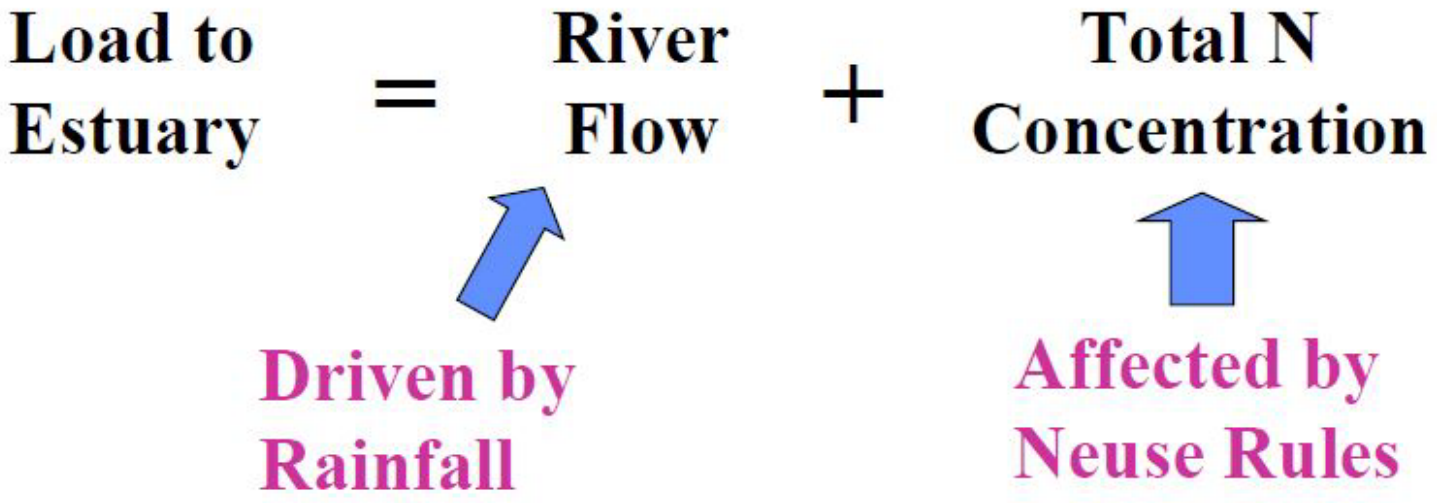
1. **Overall Target – Reduce Total Nitrogen Loading to Neuse Estuary by 30%**
2. **Point Source Reduction – 30%**
3. **Agricultural Reduction – 30%**
4. **Stormwater Programs**
5. **Land Development Not Increase Nitrogen Export**
6. **Maintain Existing Riparian Buffers**

Determining Success . . .



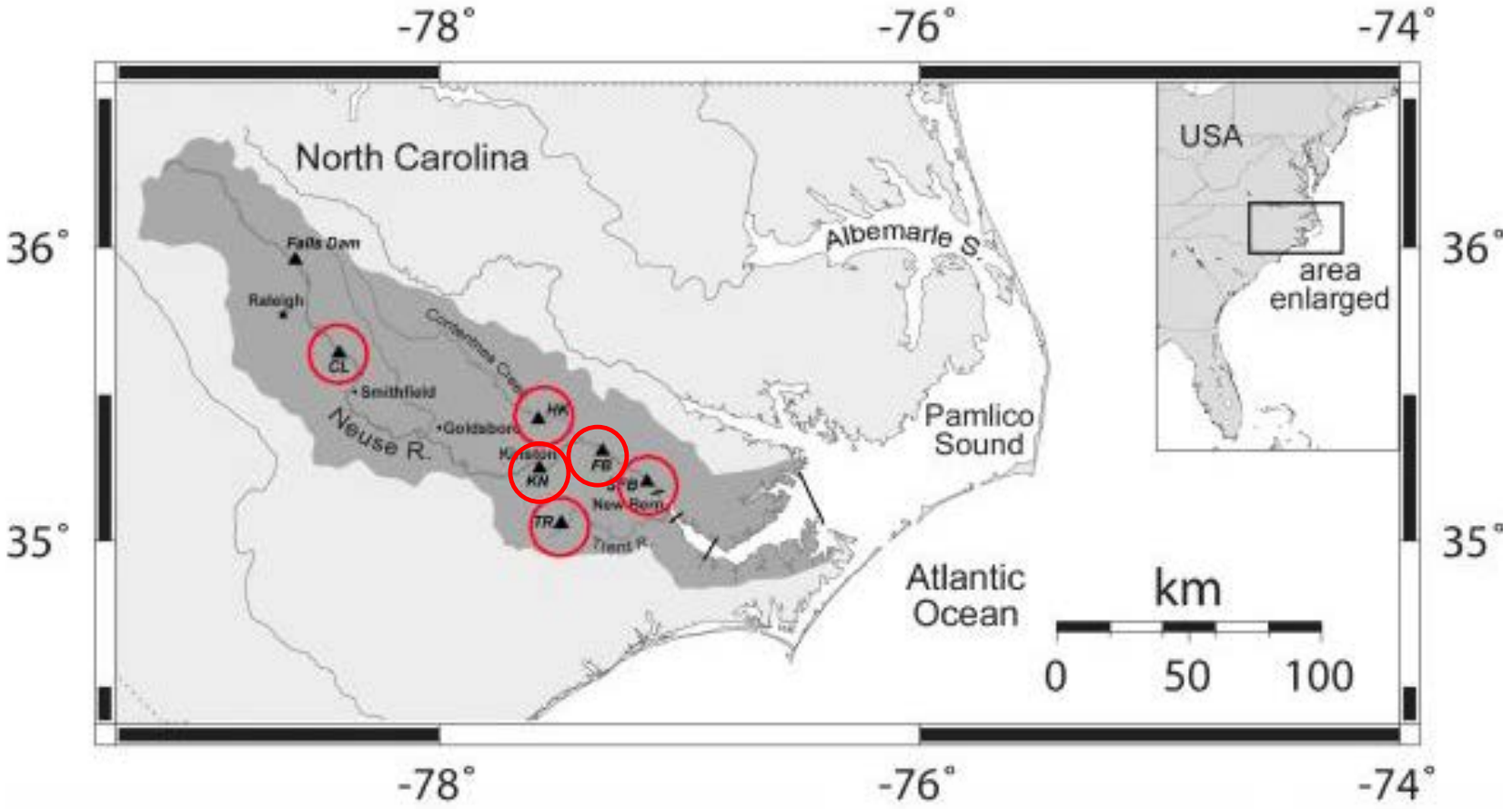
Simple on Paper But Challenging with Data

Trend Analysis Description



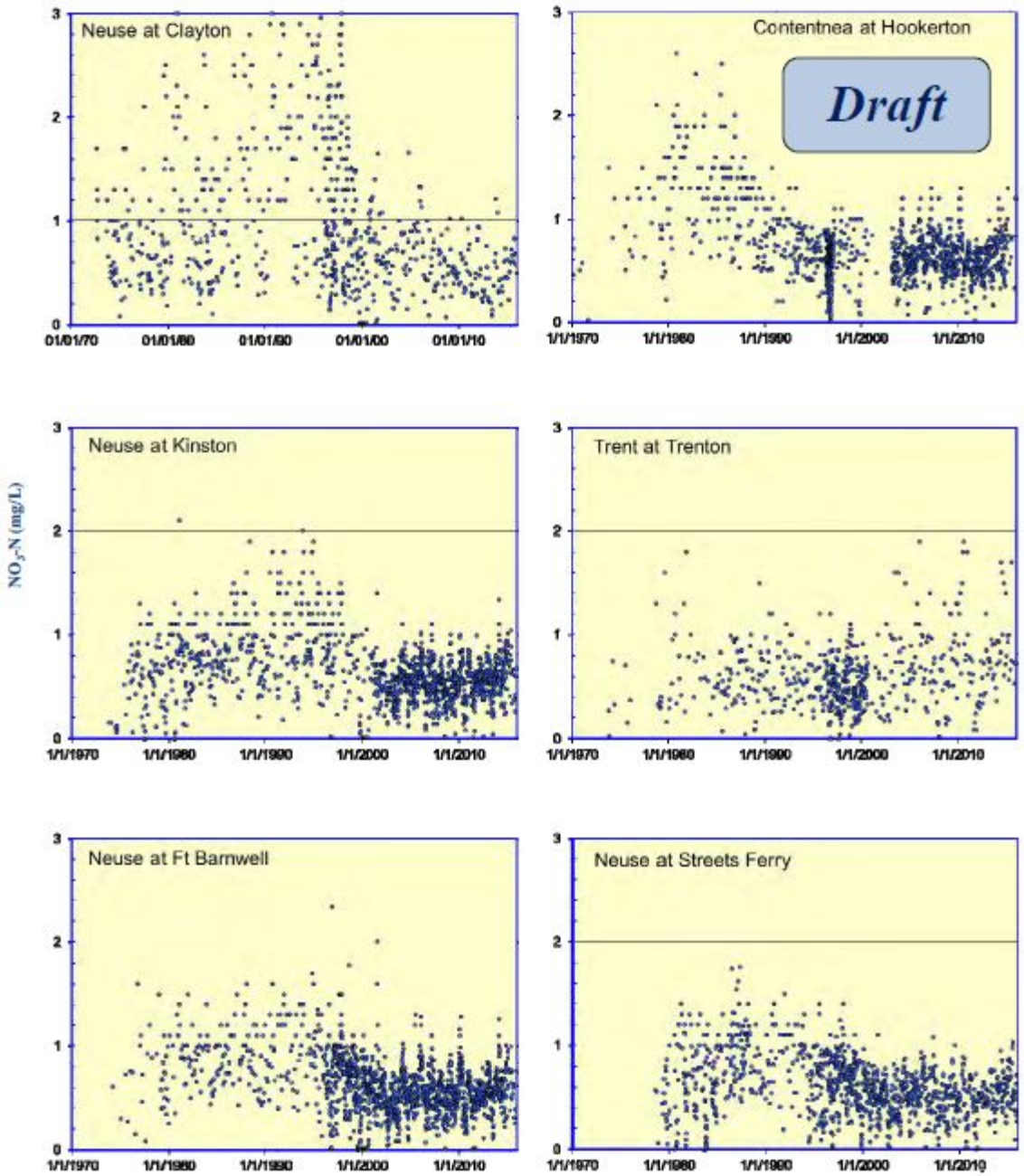
- Organize data by low, middle, and high flows – compare averages by management period.
- Focus on **Change in Concentration** by **Flow Range** as indicator of management success through TMDL

Key locations in the Neuse R. Basin



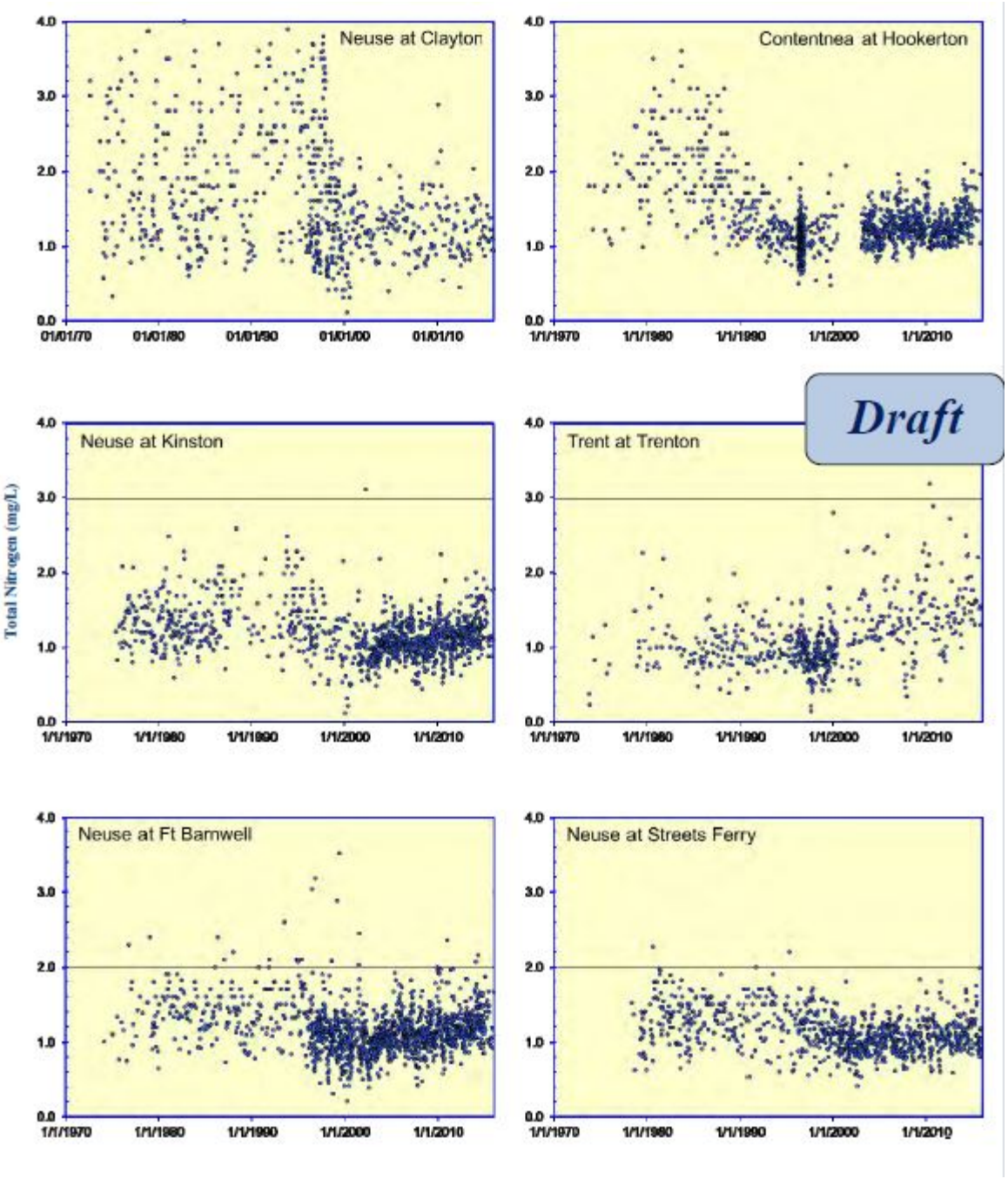
Objectives for Data Analysis

1. **Has the Nitrogen Loading Changed?**
   - Long-Term Average Flow Conditions
   - Estimated Actual Nitrogen Loads
2. **Do Trends in Nitrogen Loads Differ for Low versus High Flows?**
3. **Do Trends in Nitrogen Loads Differ by Region of the Neuse River Basin?**
4. **How Does Cumulative Changes Compare with the TMDL 30% Reduction?**



Nitrate Data By Location

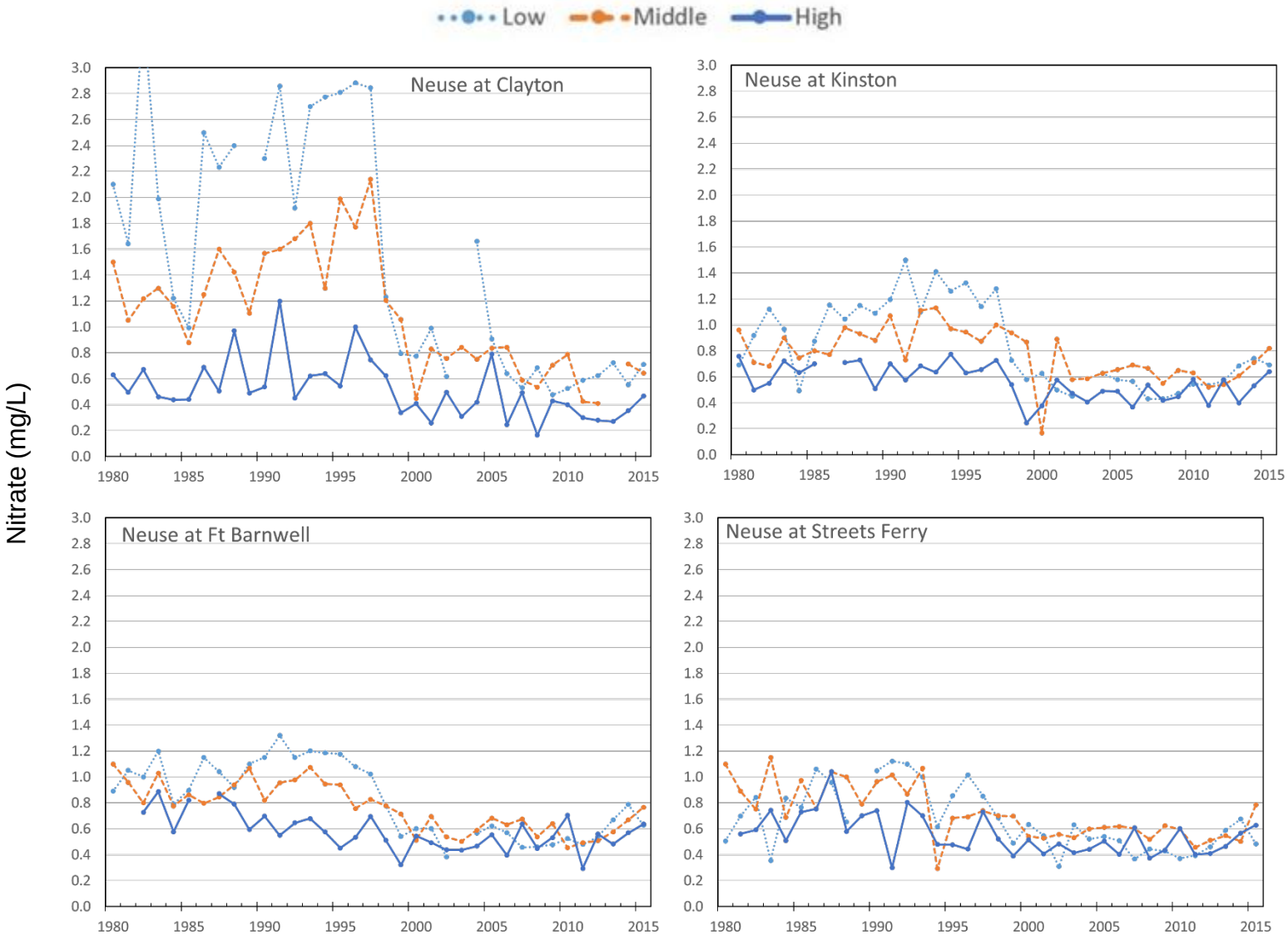
1970-2015



Total N Data by Location

1970-2015

Annual Averages by Flow Condition



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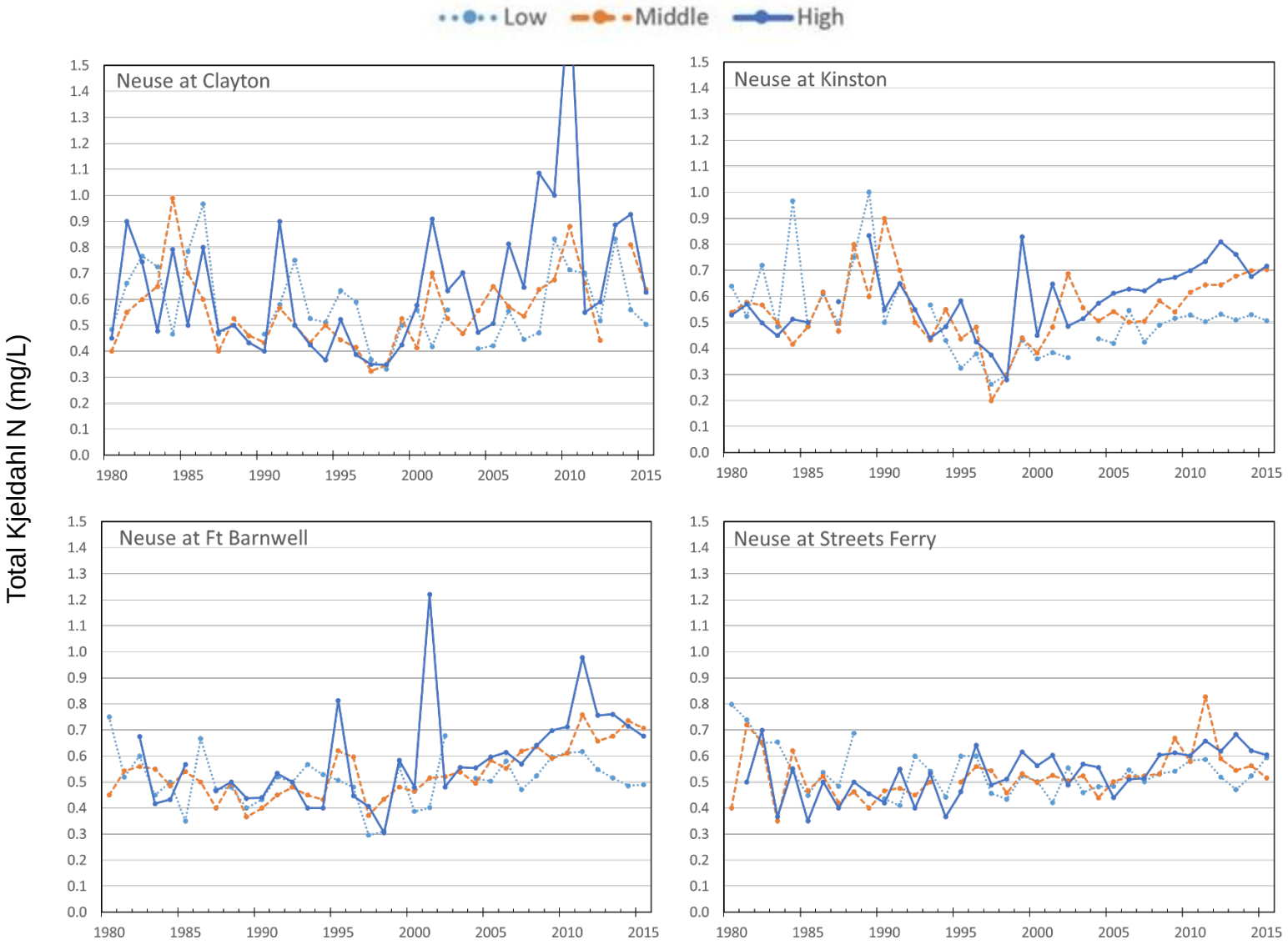

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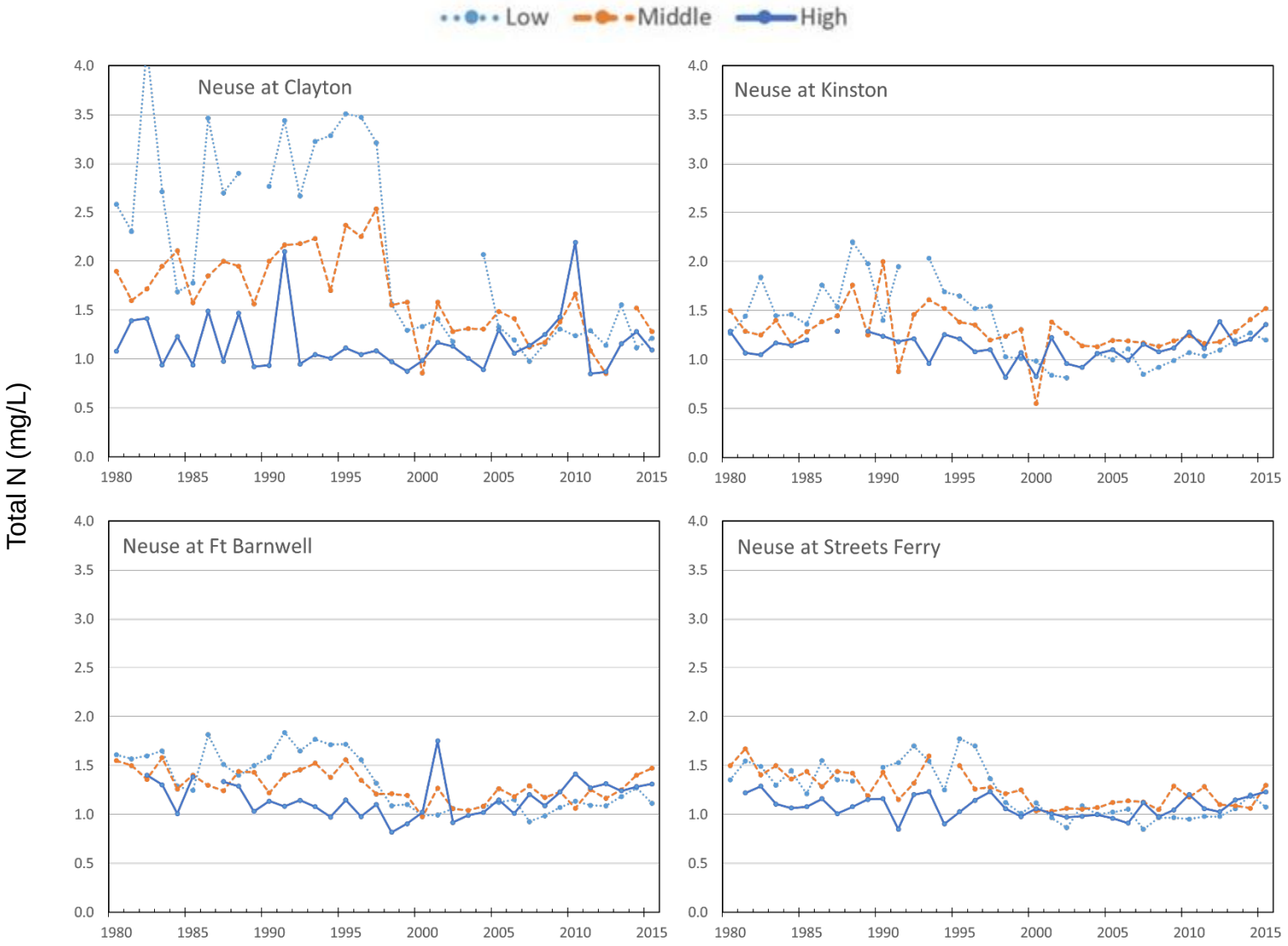
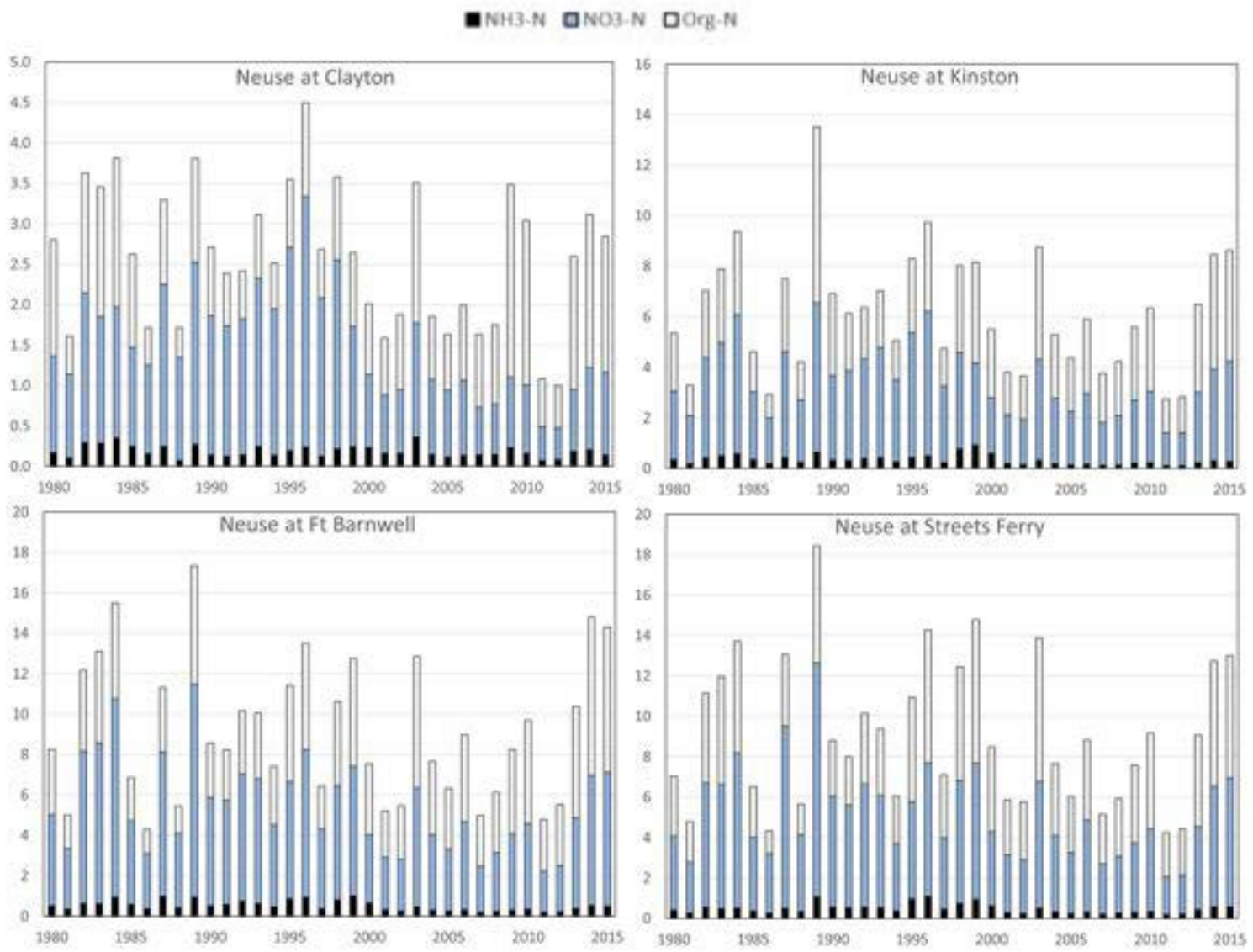
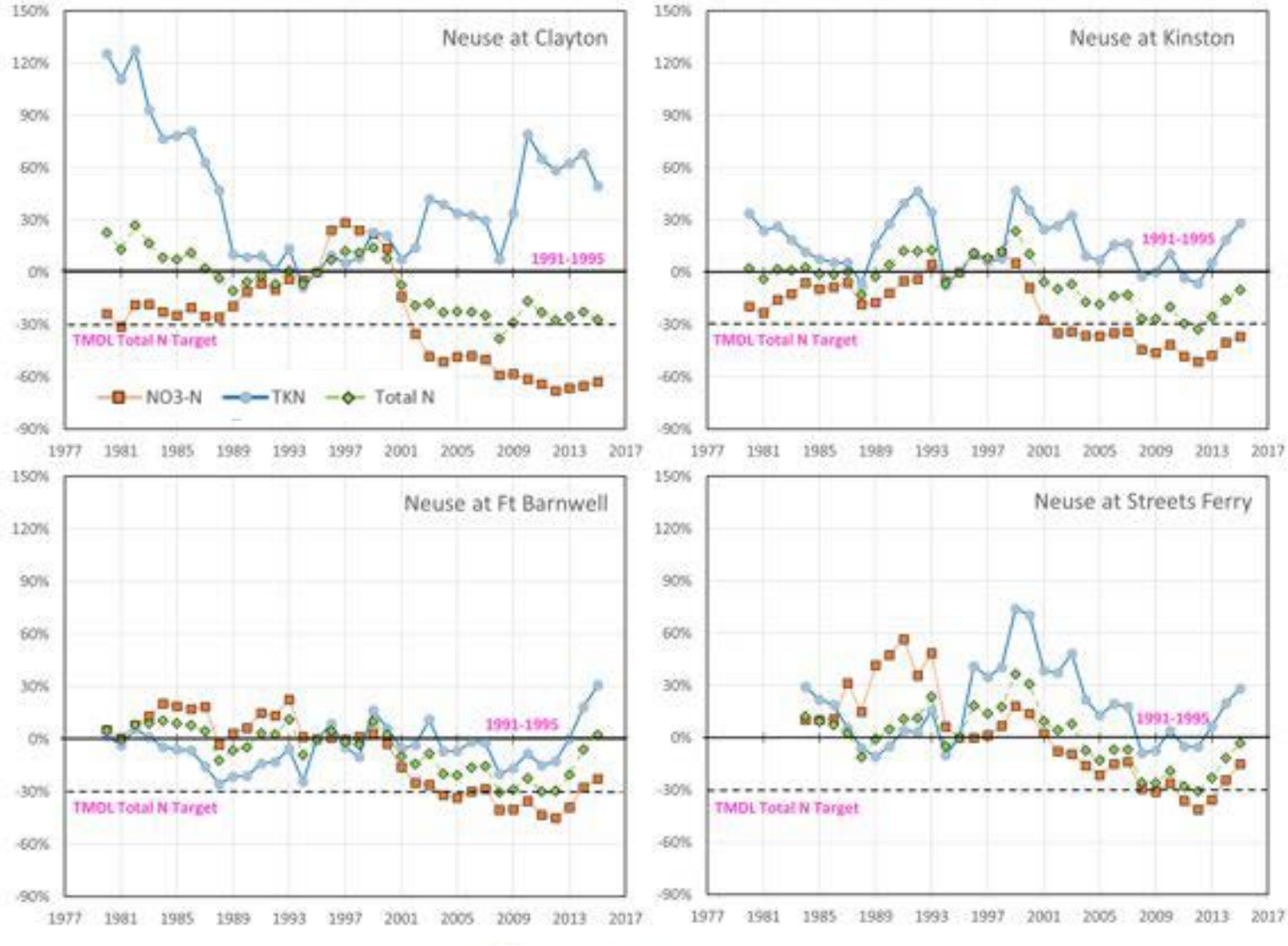


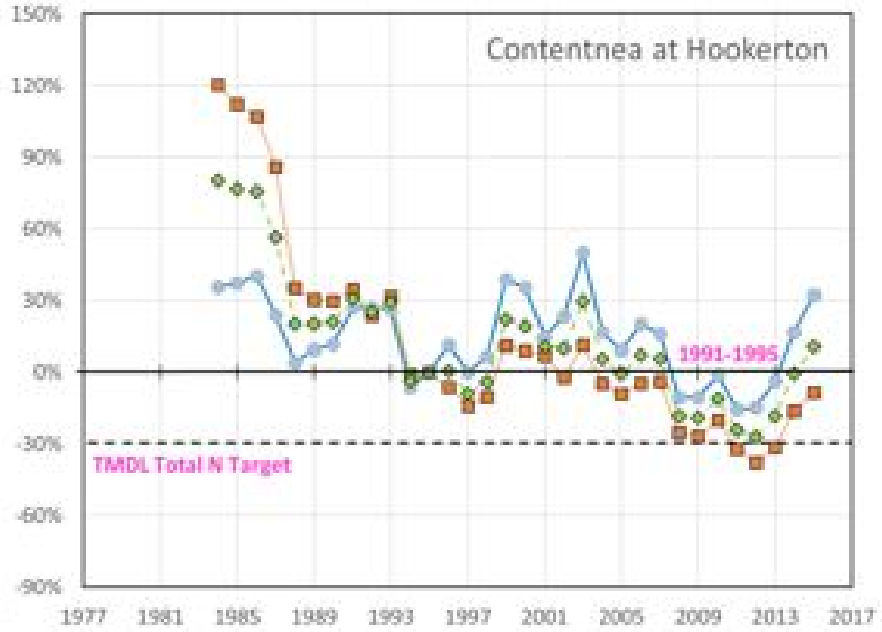
Annual Loadings by N Fraction

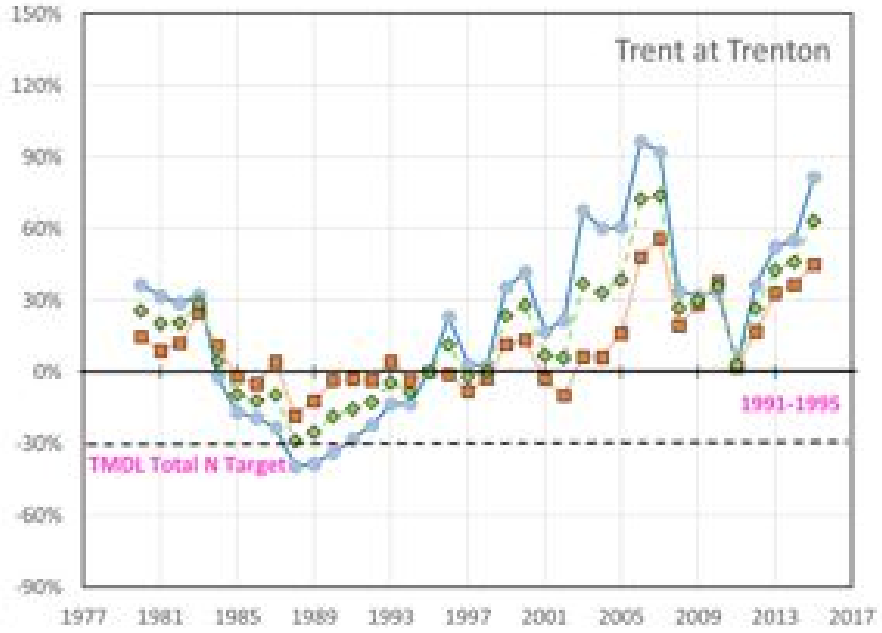


Flow-Normalized Nitrogen Reductions

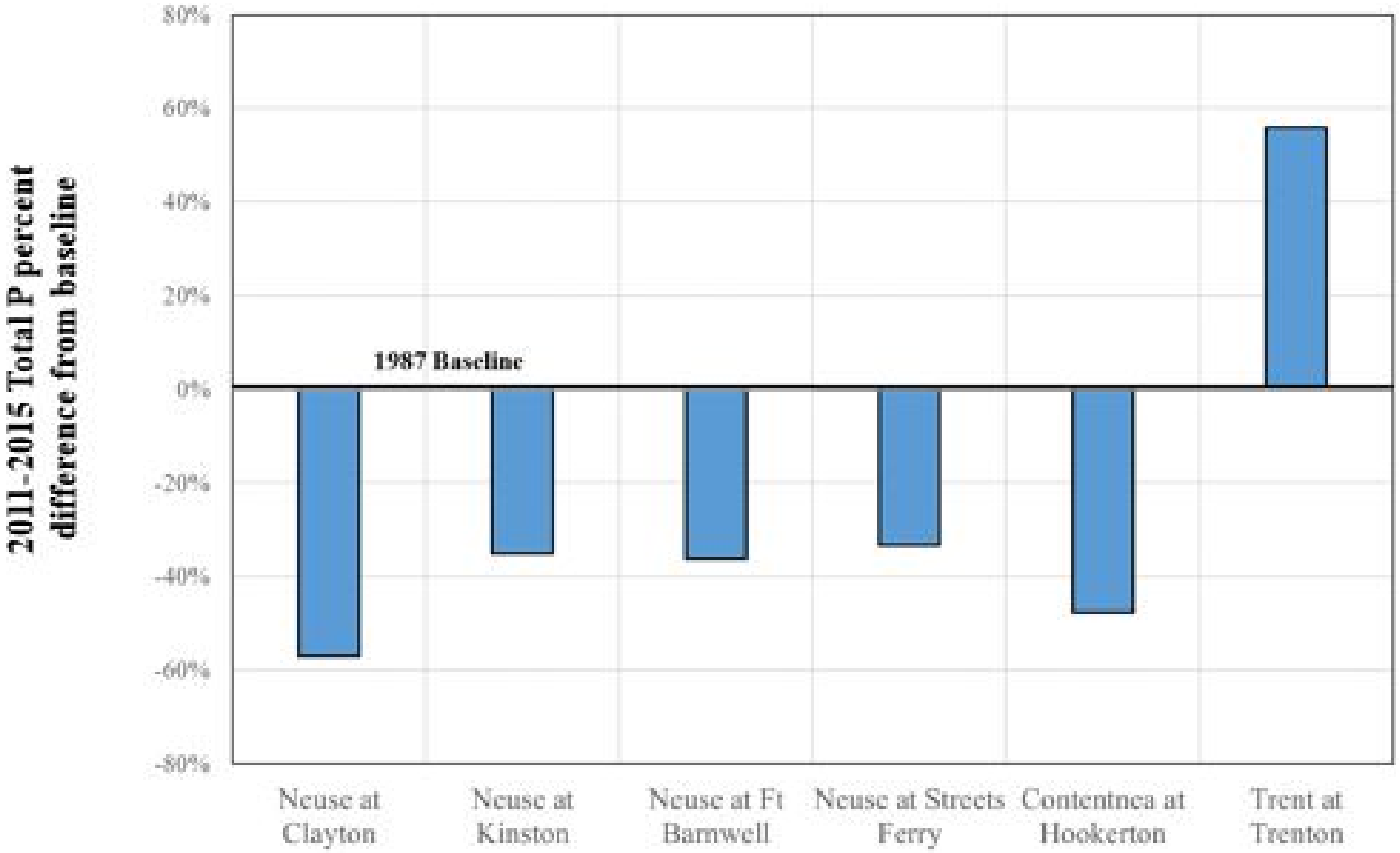


Flow Normalized Nitrogen Reductions for Tributaries





Conclusion: 2015 Update



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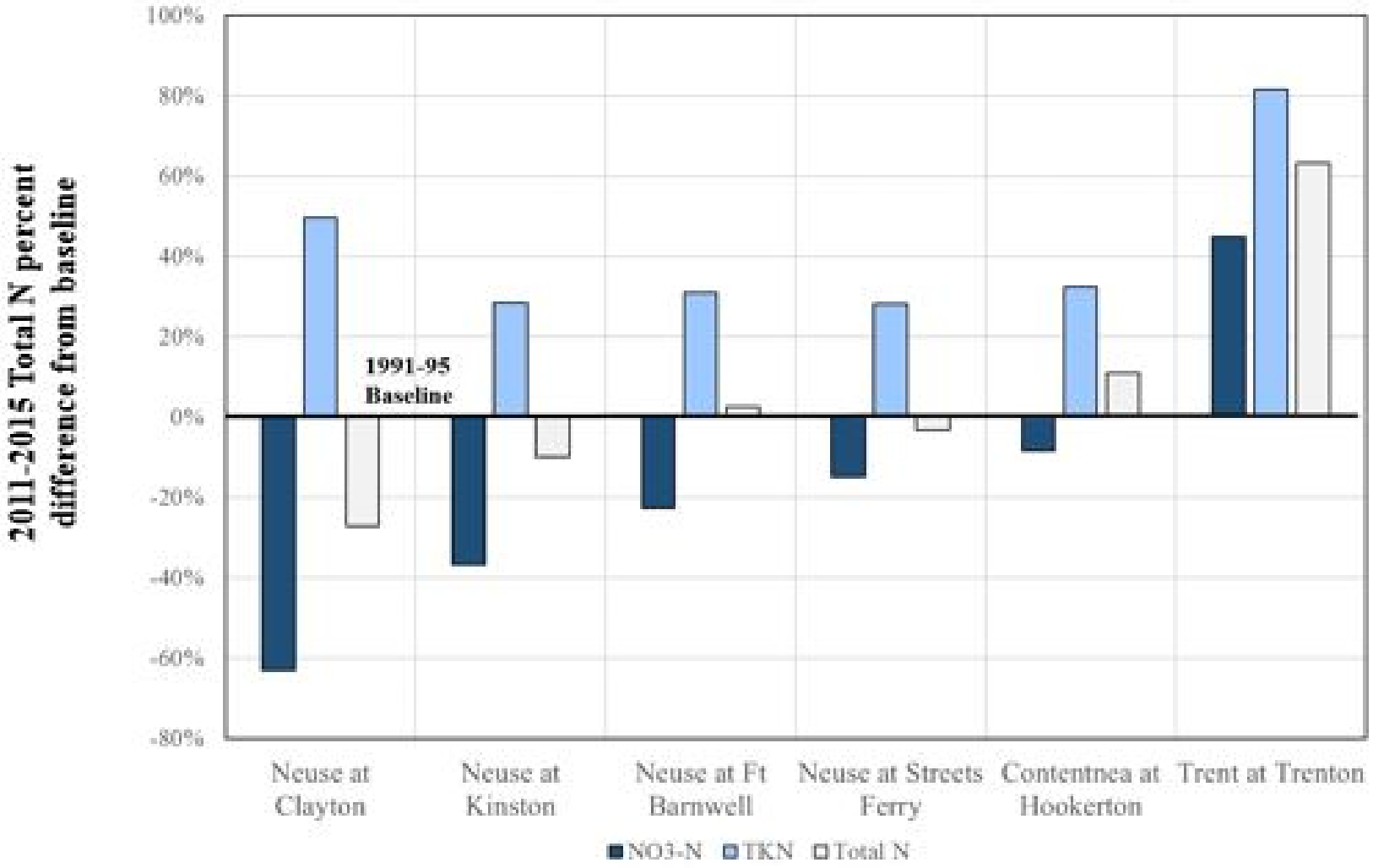

Objectives for Data Analysis

1. Has the Nitrogen Loading Changed?

- Long-Term Average Flow Conditions – reductions vary by N fraction with reductions mainly in nitrate; recent increases negate much of initial reductions
- Estimated Actual Nitrogen Loads

Period	TN Load (10^6 lbs/yr)	Comment
1991-1995	9.26	Baseline
1995-1999	12.23	Maximum
2008-2012	6.27	Minimum
2011-2015	8.69	Last 5 years
TMDL Target	6.48	70% of 1991-1995

Objectives for Data Analysis

2. **Do Trends in Nitrogen Loads Differ for Low versus High Flows?** **Yes. Trends depends on the parameter. TKN pattern needs to be compared with turbidity.**

3. **Do Trends in Nitrogen Loads Differ by Region of the Neuse River Basin?** **Yes. Largest change in upper basin associated with point source reductions.**

4. **How Does Cumulative Changes Compare with the TMDL 30% Reduction?** **Varies by rainfall. Most recent only has 6% reduction.**