

TALE OF TWO TRADING PROGRAMS FOR ONE RIVER

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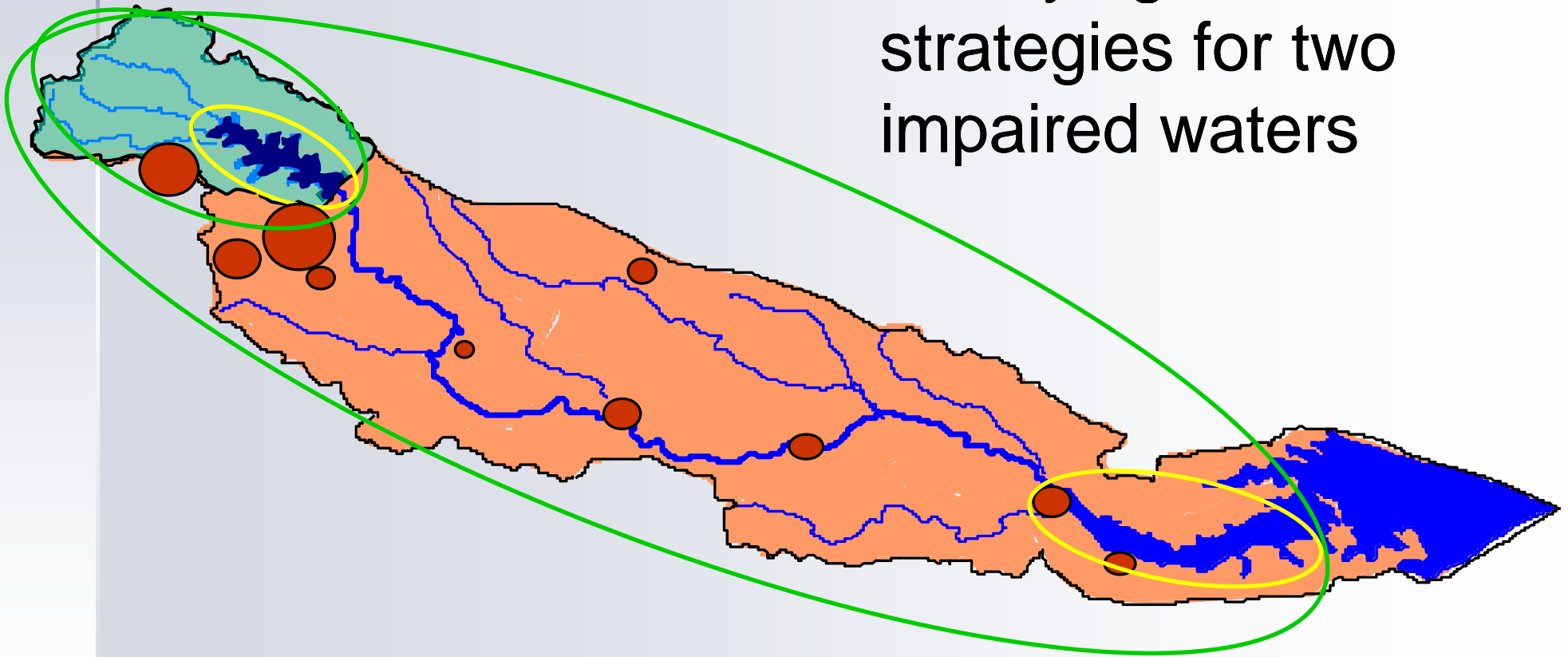
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Neuse River & Falls Lake

Overlying nutrient strategies for two impaired waters



Neuse River Basin Statistics

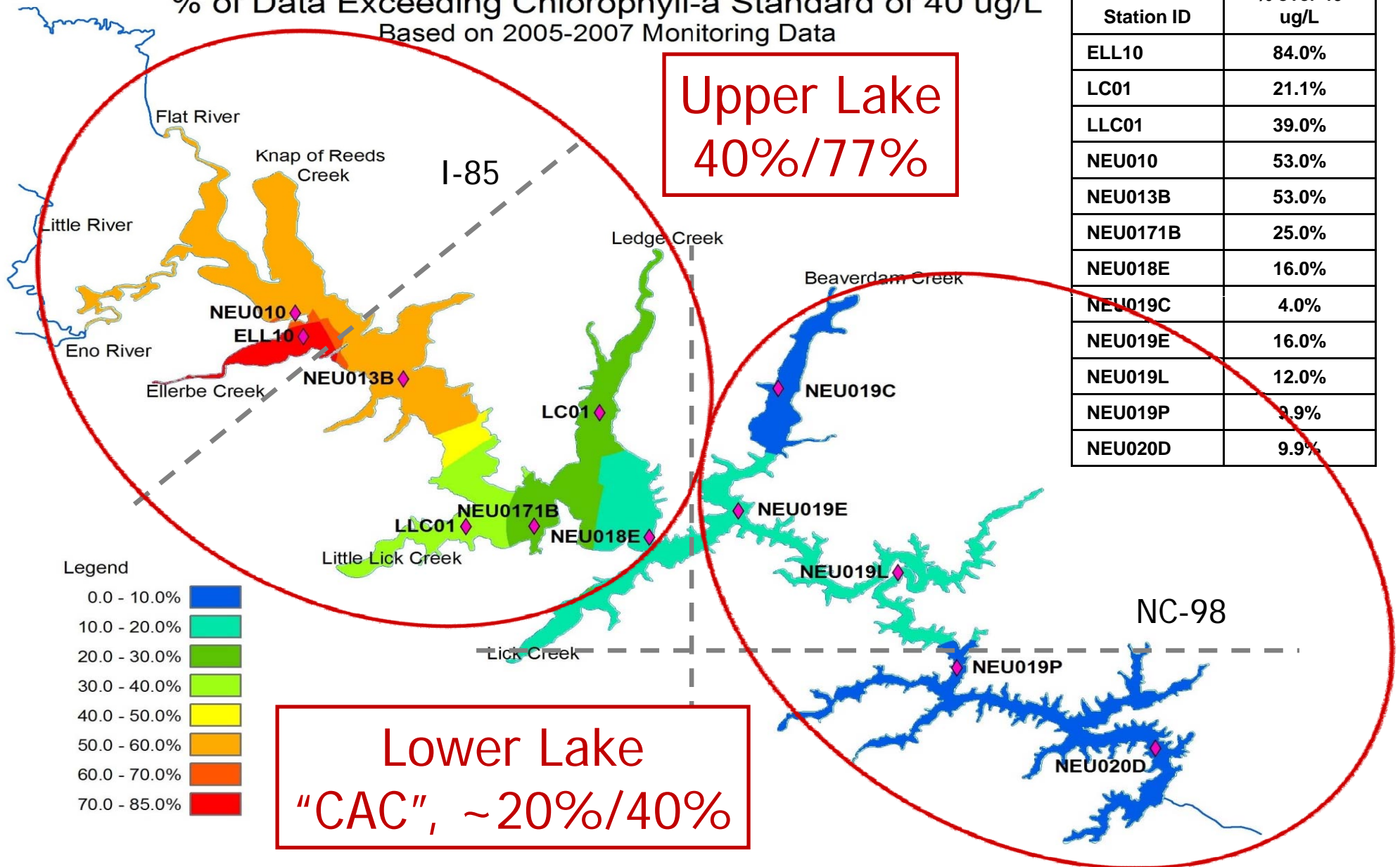
- **6,200 square miles.**
- **3,500 miles of fresh water streams.**
- **200 miles long, Roxboro to the Pamlico Sound.**
- **371,000 estuarine/saltwater acres.**
- **Broad, shallow estuary with an average depth of 15 feet.**

Two Nutrient Strategies

- **1997 Neuse Estuary TMDL**
 - Allocation to Point Sources
 - Point Source Trading per Rule: 15A NCAC 2B .0234(9)
- **2010 Falls Lake Nutrient Mgmt Strategy**
 - Two Stages:
 - (1) 2011 – 2021: 20% TN and 40% TP
 - (2) 2021 – 2035: 40% TN and 77% TP
 - New Development –**achieve stage 2 NOW**
 - Full Trading allowed including point to nonpoint
 - Existing Development
 - (A) Back to 2006 loading level by 2021
 - (B) Achieve **Stage 2** in 5 yr measures **by 2041**

Falls Lake Impairment, Reduction Goals

% of Data Exceeding Chlorophyll-a Standard of 40 ug/L
Based on 2005-2007 Monitoring Data



1997 Neuse Rules

- Overall goal – **30% reduction in TN** loading of the estuary.
- Goal set without allocations of TN among nonpoint sources.
- Point sources:
 - Total point source TN allocation (Neuse Rules): **1,640,000 lbs.**
 - Budget allocated among existing NPDES permit discharges.
 - Small point sources (permit flows <0.5 mgd) have no TN limits.
 - DMRs measure compliance.
- Non-point sources:
 - **No allocation or budget by source.**
 - BMPs, buffers, and MS4 programs in some, but not all locales.
 - Reductions in TN are not measured.
- Trading allowed between point sources.

The NRCA

- **The Neuse River Compliance Association**
 - **Point Source trading organization created in 2002**
 - **Permit NCC000001 issued Dec 2002**
 - **Group Compliance Permit, ltd to TN**
 - **Limits are annual mass limits**
- **Limits in effect on Jan. 1 are in effect for the full calendar year**
- **Limits are revised annually, if needed**

NRCA's Role Under The Neuse Rules

- **Holder of NPDES permit NCC000001 which consolidates TN allocation of all 20 members.**
- **NRCA TN allocation in 2011 = 72% of Point Sources.**
- **NRCA members can make annual transfers of TN within the total TN limit allocated in Permit NCC000001.**
- **Members exempted from compliance with their individual TN allocation if NRCA complies with its allocation.**
- **Permit violations for both the NRCA and any member exceeding its allocation, if NRCA allocation is exceeded.**

NRCA's Nitrogen Reduction History

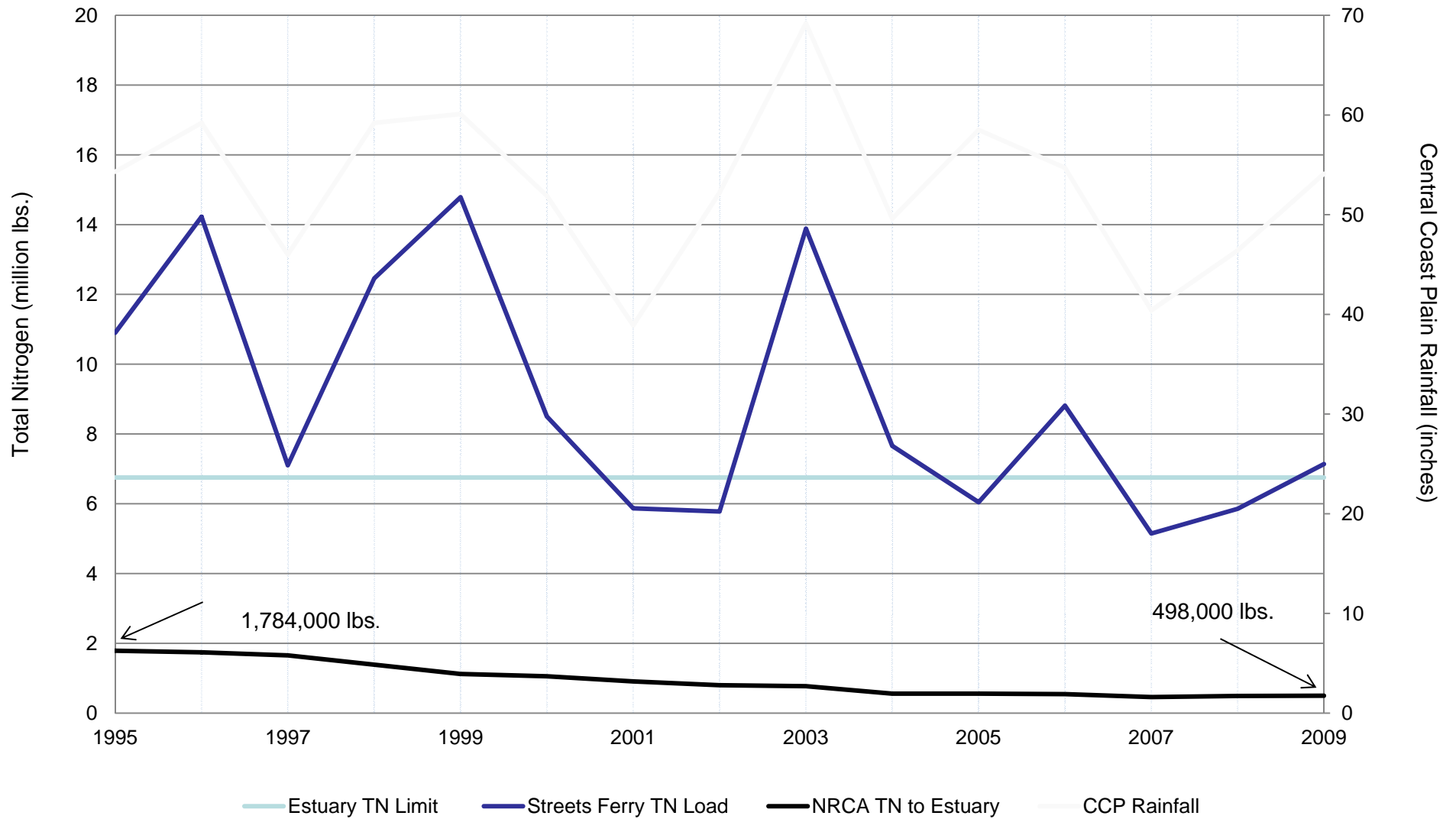
Year	Estuary TN Delivery (Lbs.)	Average Daily Flow (gallons/day)	Average Estuary TN Delivery Conc. (mg/L)	Neuse Basin Population
1995	1,784,000	80,000,000	7.3	~ 1,100,000
2000	1,055,000	83,000,000	4.2	1,320,790
2010	584,000	102,000,000	1.9	1,687,463

**** TN reduction of approx. 70% with a population increase > 50%.
COST TO ACCOMPLISH = \$300M.**

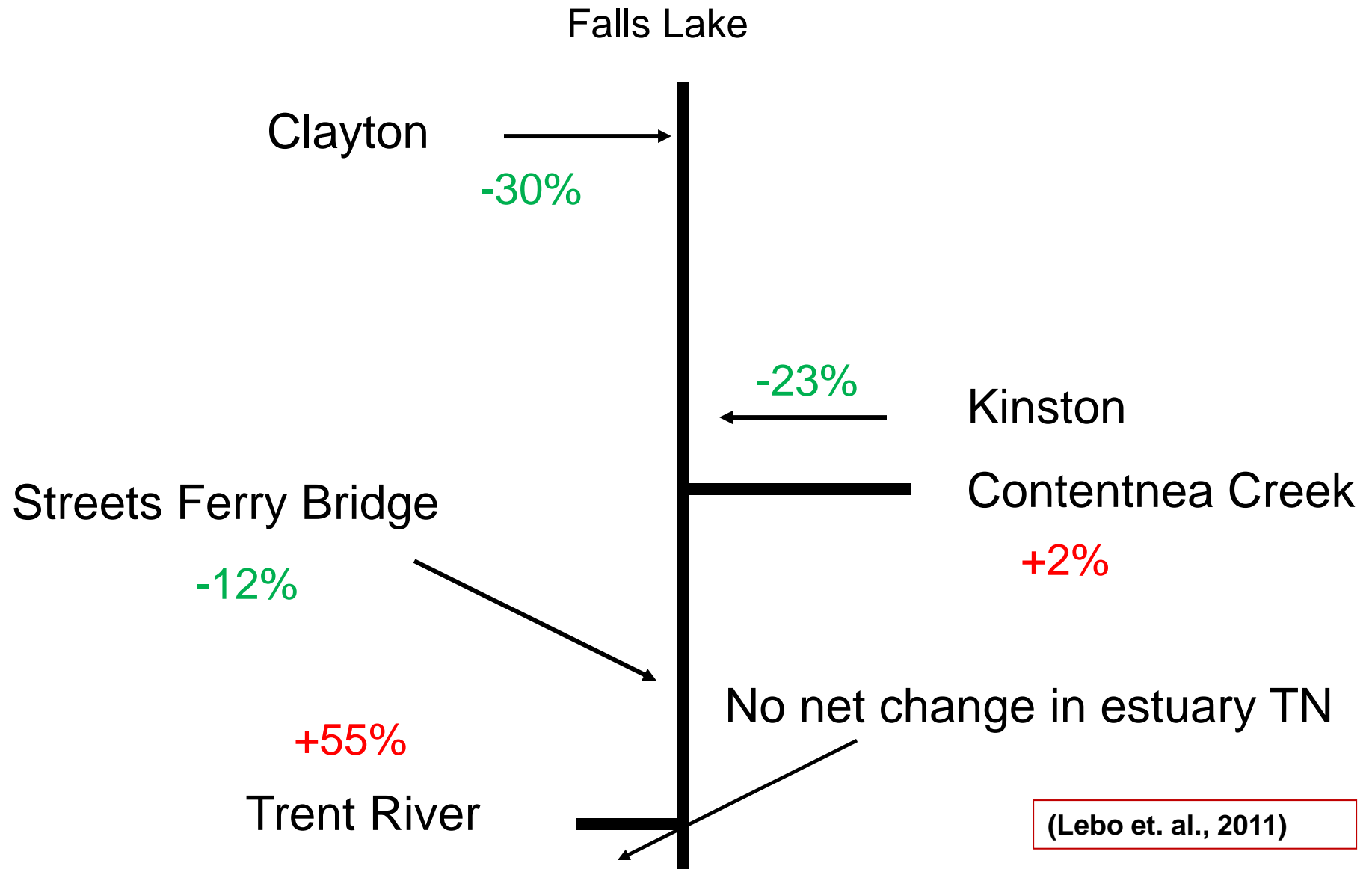
NRCA Nitrogen Trades

- **7 Sales of TN and 18 Leases of TN.**
- **NRCA holds an allocation and leases it.**
- **NRCA revenues pay for monitoring.**
- **Progress Energy/Duke used lease for TN produced by NOx reduction.**

Total Nitrogen Loading at Streets Ferry



Watershed TN Pattern – Compared to 1991-95



Research -- Little Progress on Goal

- **10 yrs of Neuse Rules =**
 - **No less TN delivered to the estuary.**
 - **30% “In stream” TN reduction from urbanized area.**
 - **70% reduction by major point sources.**
 - **36% increasing to 49% reduction (2010) by ag vs 30% goal. Ag tool does not capture CAFO impacts.**
- **CAFOs not in ag budget.**
 - **Growth in poultry CAFOs. 2-3M lbs/yr additional N.**
 - **6.4M lbs/yr ammonia in basin.**
- **\$840k in monitoring/research by LNBA/NRCA**
- **Legacy Nitrogen?**

“Aquifer hydraulics, and the multi-decade legacy of non-point-source pollution”

Presented at 2012 NC Nutrient Forum

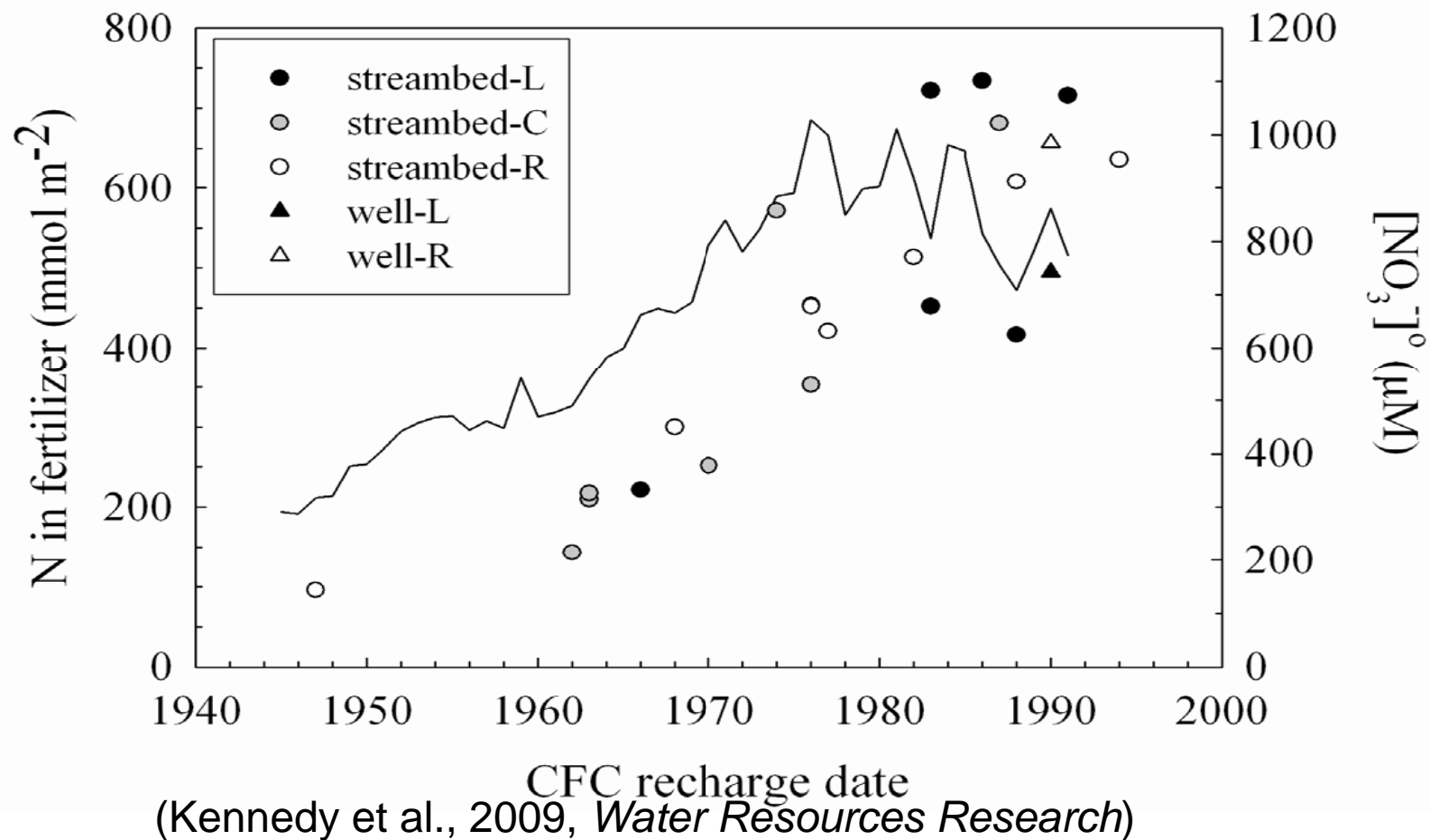
- **Dr. David Genereux**, Marine, Earth, & Atmospheric Sciences, and Water Resources Research Institute
- N.C. State University
- and **Collaborators**: Helena Mitasova (NCSU), Reide Corbett (ECU), Niel Plummer (USGS), Kip Solomon (Univ. of Utah)
Grad Students: Troy Gilmore, Matt Burnette, Scott Becker, Casey Kennedy (PhD 2008, NCSU), Scott Leahy (MS 2007, NCSU), Brad Elkins (MS 2007, ECU) **Funding**: USDA, NSF

Prof. David Genereux, NC State University, May 2012

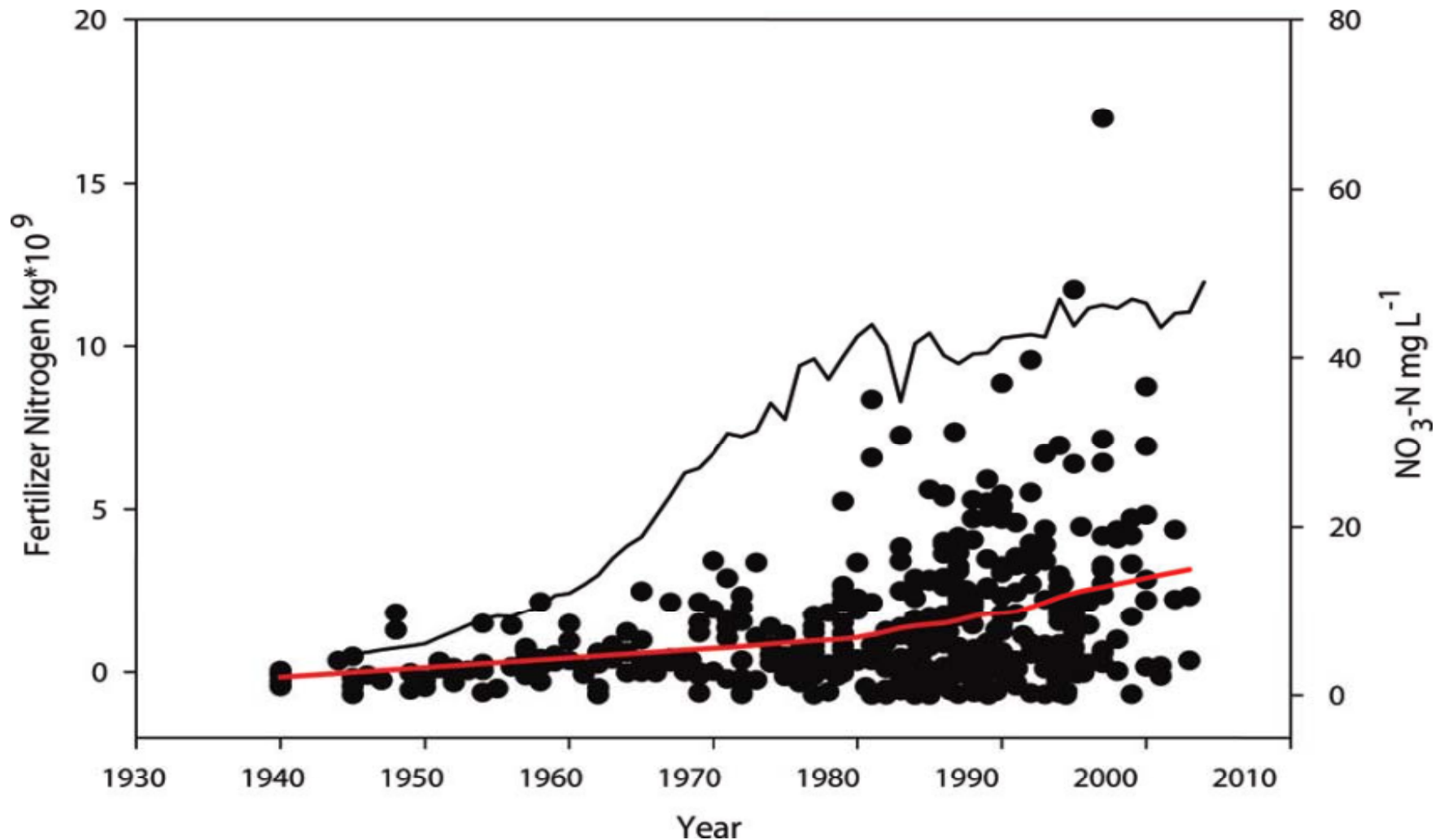
Main Points

- most of the water in streams and rivers comes from groundwater
- at any given time, the groundwater discharging into a typical coastal plain stream ranges in age from a few years to several decades
- thus, at any given time, the N concentrations in streams and rivers represent the legacy of past (up to 50 years or more), not just present, N use
- practical implication: persistence and patience on a decadal time scale may be important when evaluating the effects of N management practices on surface water quality

N Use, and Initial $[\text{NO}_3^-]$ vs. Time West Bear Creek Watershed, NC



N Use, and Initial $[\text{NO}_3^-]$ vs. Time 20 Watersheds Across the US



(Puckett et al., 2011, *Environmental Science & Technology*)

Falls Lake Trading Context

- **Full trading authorized per EMC approval of credits**
- **Point source allocations \neq NPDES permit flows**
- **Only BMP stormwater credits available**
- **Nutrient SAB/EMC to set credit values**
- **New development needs trading NOW**
 - **Local ordinances implemented 7/1/12**
 - **Double BMPs not enough**
 - **Buy credits from bank to meet reductions**
 - **One small bank**

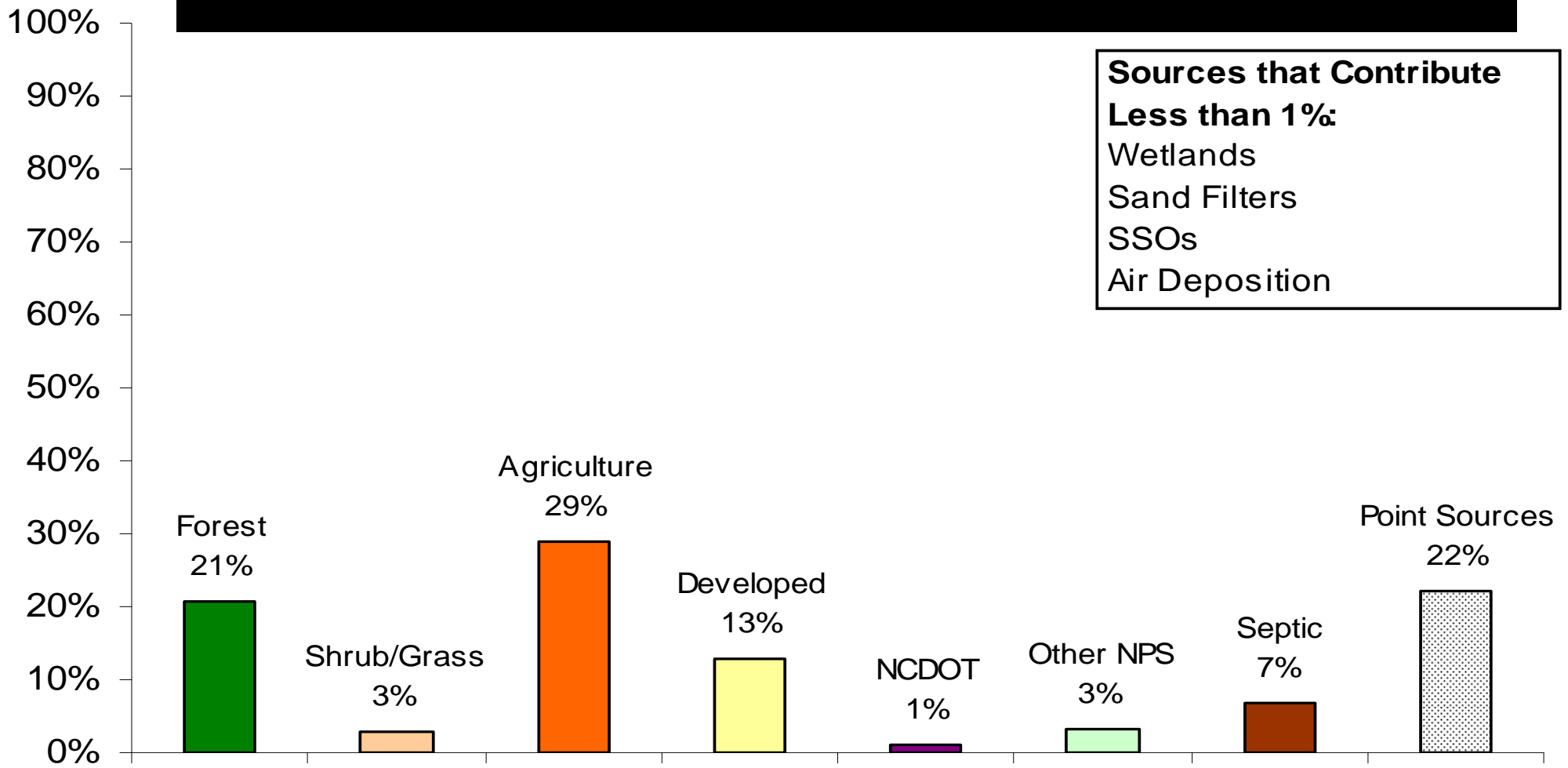
Falls Lake Trading (cont'd)

- **Existing Development**
 - Local inventory due 1/15/13
 - DWQ model ordinance due 7/15/13
 - Local program effective 1/15/14
 - Restore to 2006 loading by 1/15/21
- **Discharging septic systems**
 - 7% of TN load
 - Authorized by General Permit
 - No credit values set or imminent

**2006 Estimated Total Nitrogen Delivered Load (kg/d)
From The Five Upper Watersheds**

**Sources that Contribute
Less than 1%:**

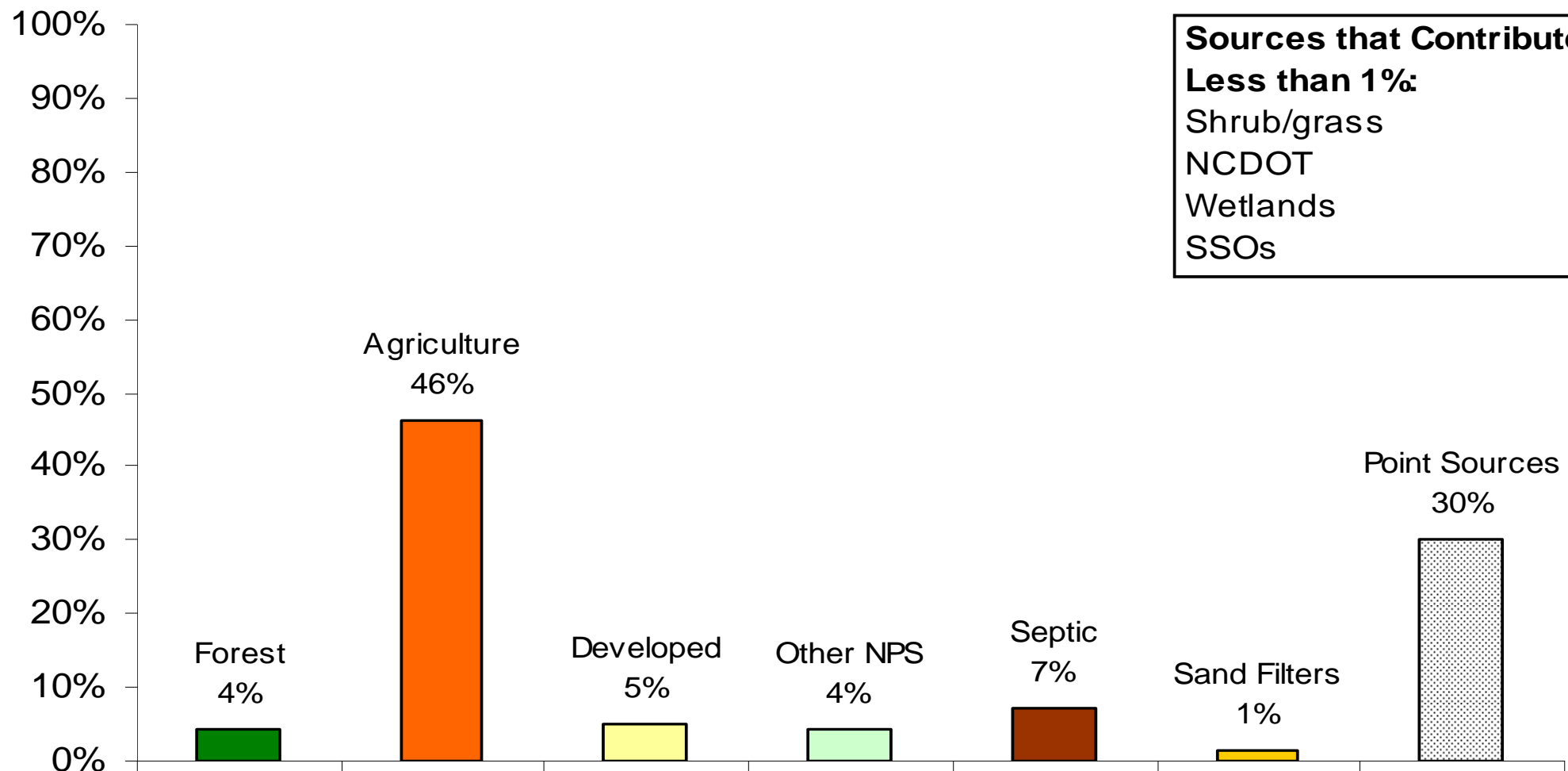
Wetlands
Sand Filters
SSOs
Air Deposition



Total = 1018 kg/day

2006 Estimated Total Phosphorus Delivered Load (kg/d) From The Five Upper Watersheds

**Sources that Contribute
Less than 1%:**
Shrub/grass
NCDOT
Wetlands
SSOs



Total = 95 kg/day



Low Hanging Fruit



- **Stage 2 = Upper Falls Lake watershed at 2.2 lb/ac/yr TN and 0.33 lb/ac/yr TP**
- **Stage 1 only time trading equals cheaper**
- **Heavy concentration of discharging septics due to Triassic Basin soils and old permits**
- **2 BMPs ≠ compliance by New Development**
- **Discharging septic tanks = low hanging fruit a/k/a prickly pears and green persimmons**

Nutrient SAB – SL 2009-216

- **Vets proposed trading credits**
- **Created for Jordan Lake TMDL only**
- **Expanded to all nutrient credit review**
- **2 scientists, 2 locals, 1 DOT, 1 enviro**
- **Proposes credits to EMC**
- **Spent 1st year on RFP for Jordan relook**
- **Jordan years behind Falls in trading need**

Lessons from the Tale of Two Trading Programs

- **KISS**, too many hurdles = failure or at least delay
- **Skin in the Game** (TMDL) - monitor and research
- **Seat at the Big Table** – active basin/NPDES assn.
- **More is Better** – excess sources vs reduction goal essential
- **Murphy's Law**– e.g. do legacy nutrients have an allocation in the TMDL budget?
- **Whose on 1st?** - whose ox is gored when your trades/improvements get used up by new uncontrolled sources? CAFOs and legacy TN