

Neuse River Compliance Association: A Success Story but What Does the Future Hold

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Nutrient Removal and Recovery



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Topics for Today's Presentation

- Intro to Neuse River Basin
- History of Neuse Nutrient Management Strategy Development
- Development of LNBA and NRCA
- Achievements / Successes to Date
- Challenges to Date
- Challenges Ahead

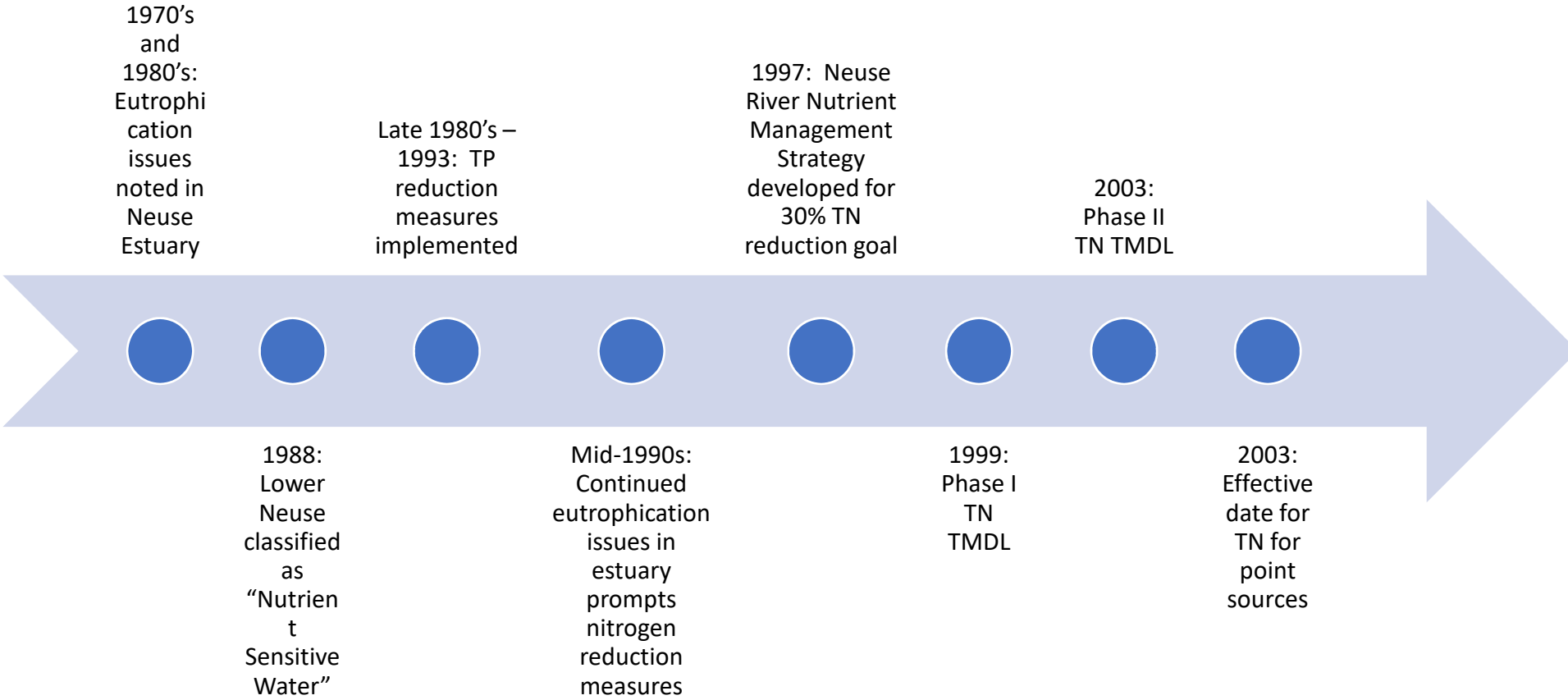
Neuse River Basin



Neuse River Basin Statistics

- 6,200 square miles.
- 3,400 miles of fresh water streams.
- 200 miles long, Roxboro to the Pamlico Sound.
- 371,000 estuarine/saltwater acres in a broad, shallow estuary with an average depth of 15 feet.

Drivers / Timeline for Development of Nutrient Reduction Measures



Lower Neuse River Basin Association[®] (LNBA)

- Created in 1994 as a monitoring and information sharing organization.
- 501(c)3 non-profit corporation; 18 NPDES Permit members.
- MOA with DWR, monitors water quality at 46 sites (\$92,000 annually).
- Provides funds and other assistance to:
 - ModMon Estuary Monitoring Program.
<http://www.unc.edu/ims/neuse/modmon>
 - FerryMon Monitoring Program.
 - FluorMod Research Program (“cutting edge” technology to potentially identify organic nitrogen by its source).
- Provides technical resources:
 - annual operator training
 - waste water plant optimization

Lower Neuse Basin Association/Neuse River Compliance Association Membership

Town of Apex

Town of Benson

Town of Cary

Town of Clayton

Contentnea MSD

Town of Farmville

Dupont-Kinston

Duke Energy Progress

Town of Fuquay-Varina

Aqua, North Carolina

South Granville Water and Sewer Authority

Craven County

City of Goldsboro

Town of Havelock

Johnston County

Town of Kenly

Town of LaGrange

City of New Bern

City of Raleigh

City of Wilson


City of Kinston

Marine Corp Air Station - Cherry Point

Utilities, Inc.

As the Newly Formed LNBA Began Its Work:

1995 - Total Nitrogen delivery by the LNBA members to the Neuse Estuary was 1,784,000 lbs. at a flow of 83.8 MGD equaling 7.3 mg/L concentration.



During the summer of 1995 there were massive fish kills in the Neuse Estuary sparking public outcry and a call for action.

Neuse Estuary TMDL TN Allocations (NC DENR, DWQ 1999)

Category	TN Allocation (Mlbs/year)
Point Source	1.64
Nonpoint Sources:	5.12 (Total)
Agricultural	3.09
Urban	0.39
Open Water	0.26
Forest (Background)	1.38
Total	6.76

1997 Neuse Management Strategy

- Overall goal – 30% reduction in TN loading of the estuary from mean 1991 -1995 baseline.
- Goal established without a model to allocate TN among all sources.
- Point sources:
 - Total point source TN allocation (Neuse Rules): 1,640,000 lbs. Point source allocations were calculated based on the 1995 permitted flow times 3.7 mg/L. The Total Estuary TMDL Budget: 6.75 million lbs.
 - Budget allocated among existing NPDES permit discharges.
 - Small point sources (permit flows <0.5 mgd) have no TN limits.
- Non-point sources (no allocated TN budget):
 - No allocation or budget by source.
 - BMPs, buffers, and MS4 programs in some, but not all locales.
 - Reductions in TN are not measured.
- The strategy (or rules) allowed for a nitrogen trading association for point sources because of inequities in total nitrogen allocations for individual permit holders. The effective date for point source compliance with the rules was January 1, 2003.

NRCA's Operational Procedures

Members assessed penalty if their individual TN allocation is exceeded.

Up to 80% of penalty eligible for refund if timely correction of reason for allocation exceedence.

Members able to lease or sell nitrogen allocation to other members without NRCA approval.

Members cannot lease or sell nitrogen outside of the NRCA.

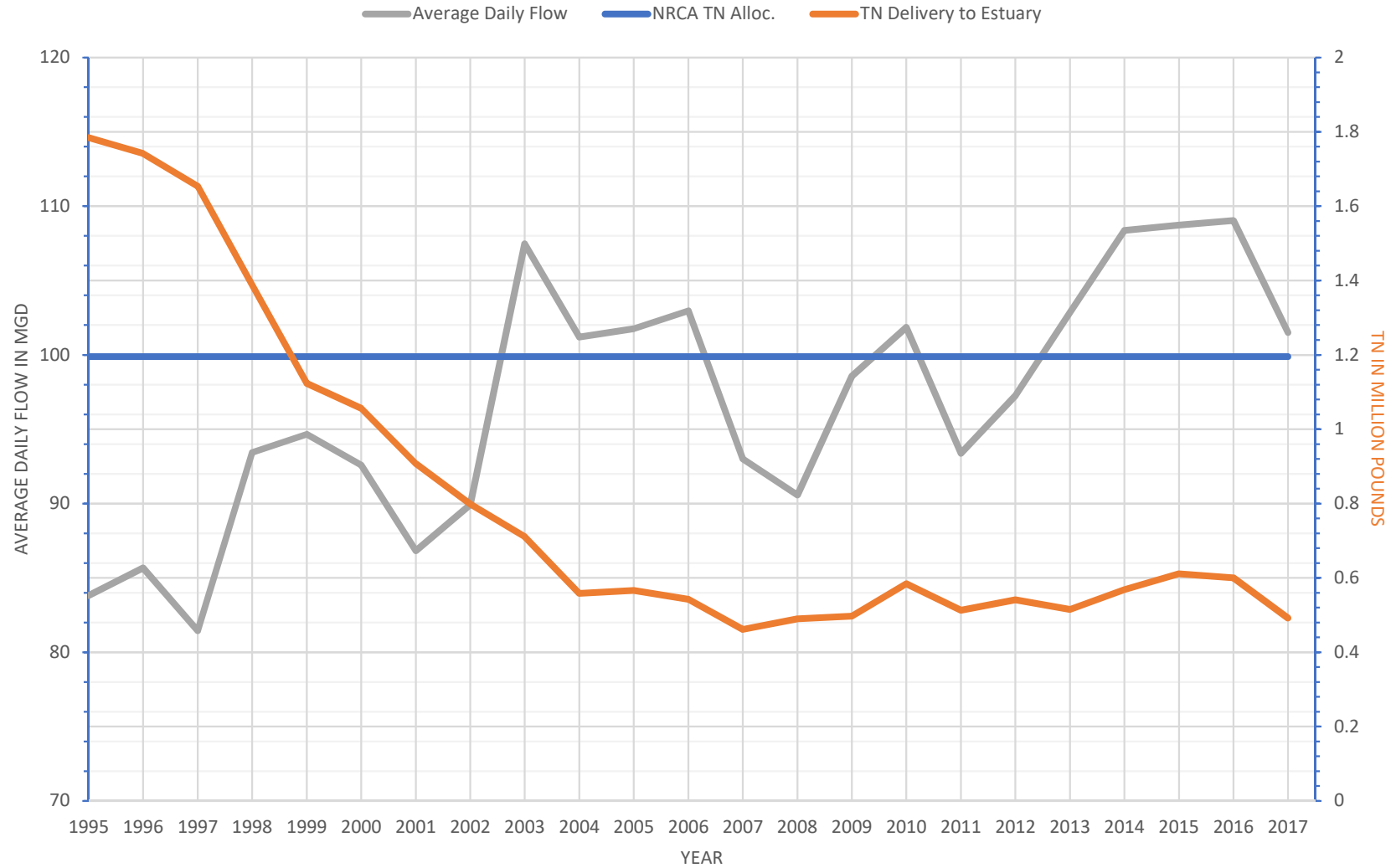
Members' investment to reduce TN exceeds \$400,000,000.

Total Nitrogen Reductions

Year	Estuary TN Delivery (Lbs.)	Average Daily Flow (gallons/day)	Average Estuary TN Delivery Conc. (mg/L)	Neuse Basin Population
1995	1,784,000	83,800,000	7	~ 1,100,000
2000	1,055,000	83,000,000	4.2	1,320,790
2014	568,387	108,359,000	1.72	~ 1,850,000

** TN reduction of approx. 70% with a population increase > 50%.

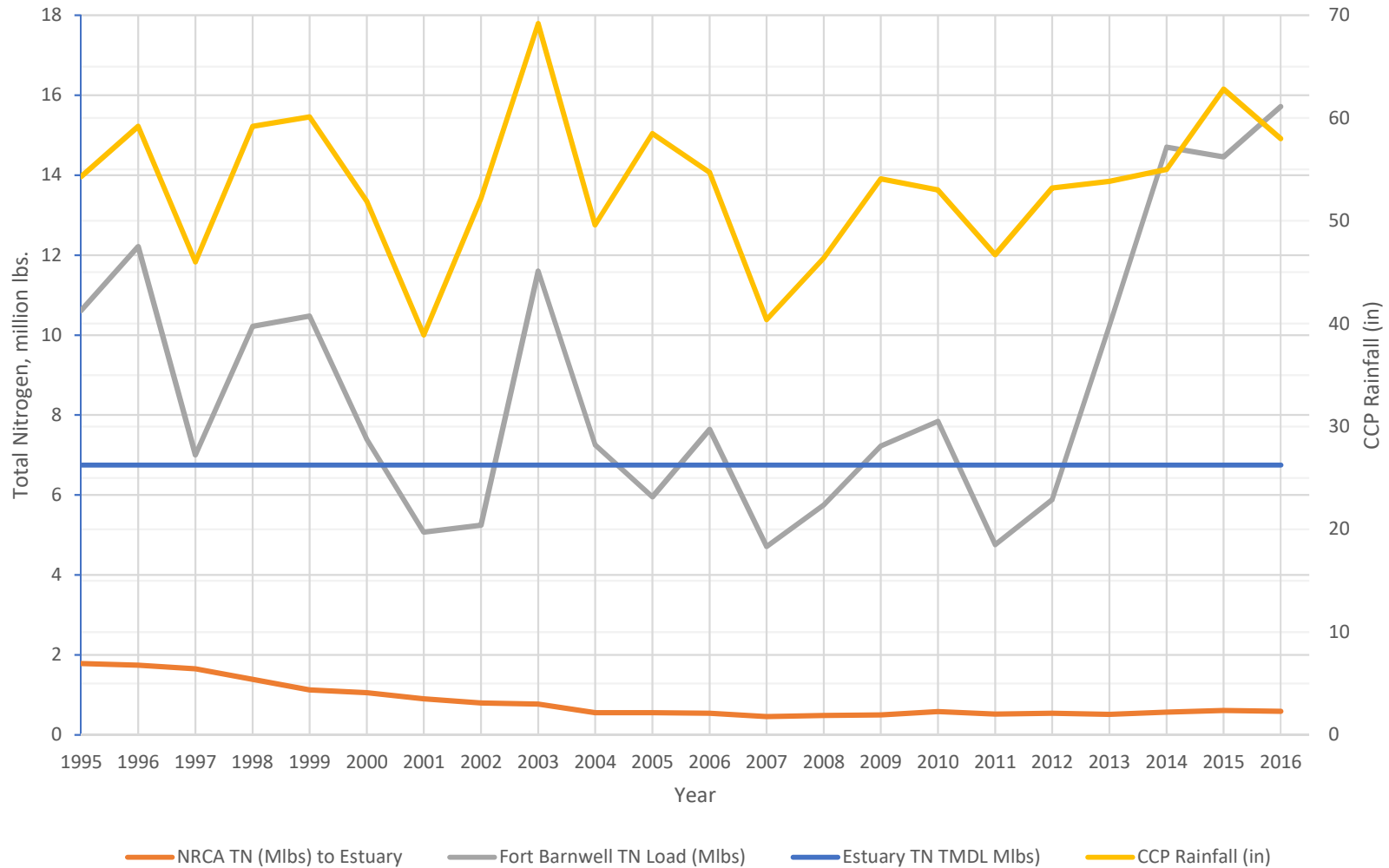
NRCA TN Delivery to Neuse Estuary & Average Daily Flow



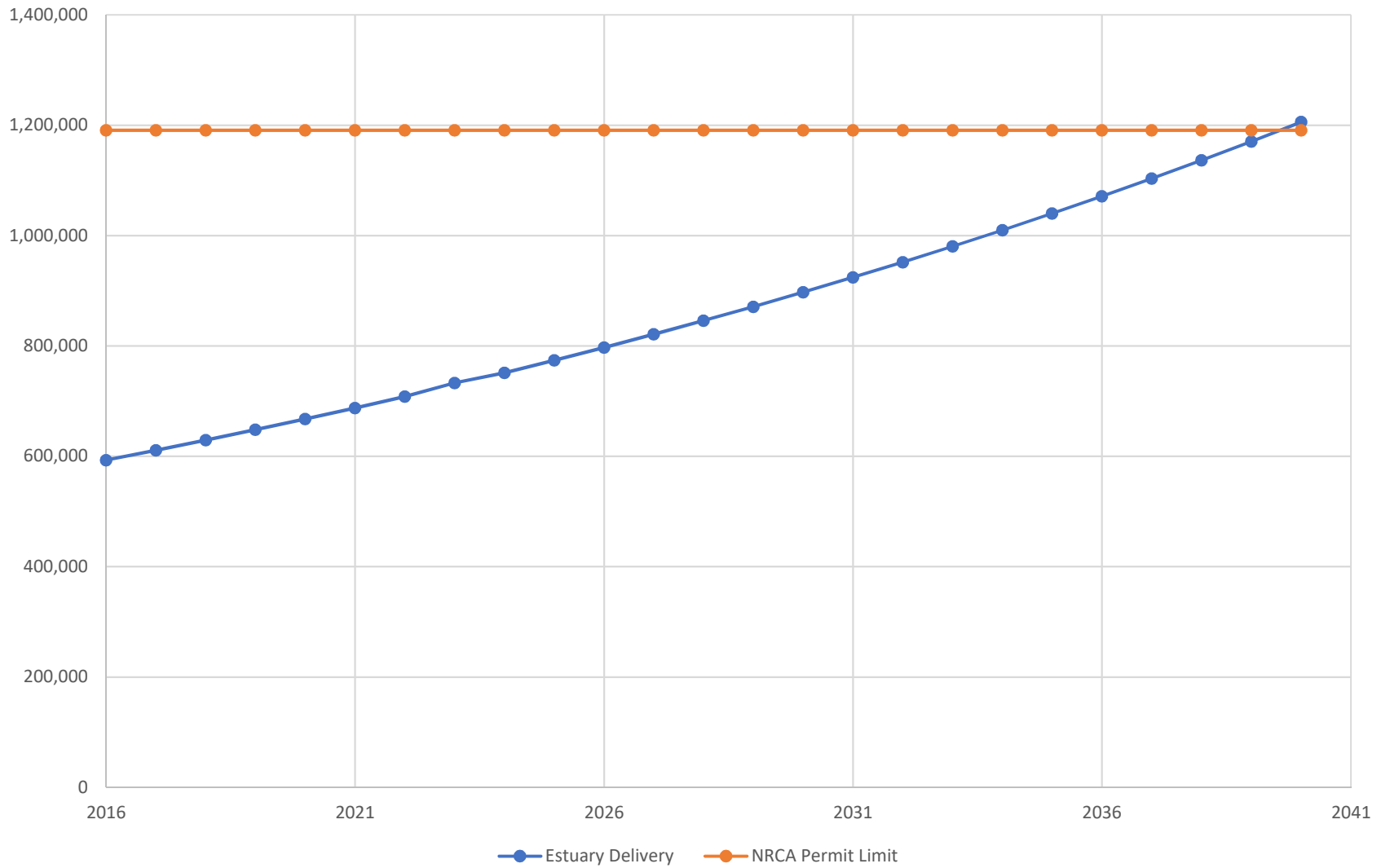
Total Nitrogen Reductions vs. Permitted Flow

- The Permitted Flow in 1995 for the NRCA Membership = 178.070 MGD.
- The Permitted Flow at the end of 2017 for the NRCA membership = 181.080 MGD.
- The Capital Investment in the Member's Resource Recovery Facilities through 2014 = \$429 million.

Total Nitrogen Load at Fort Barnwell, Station J7850000



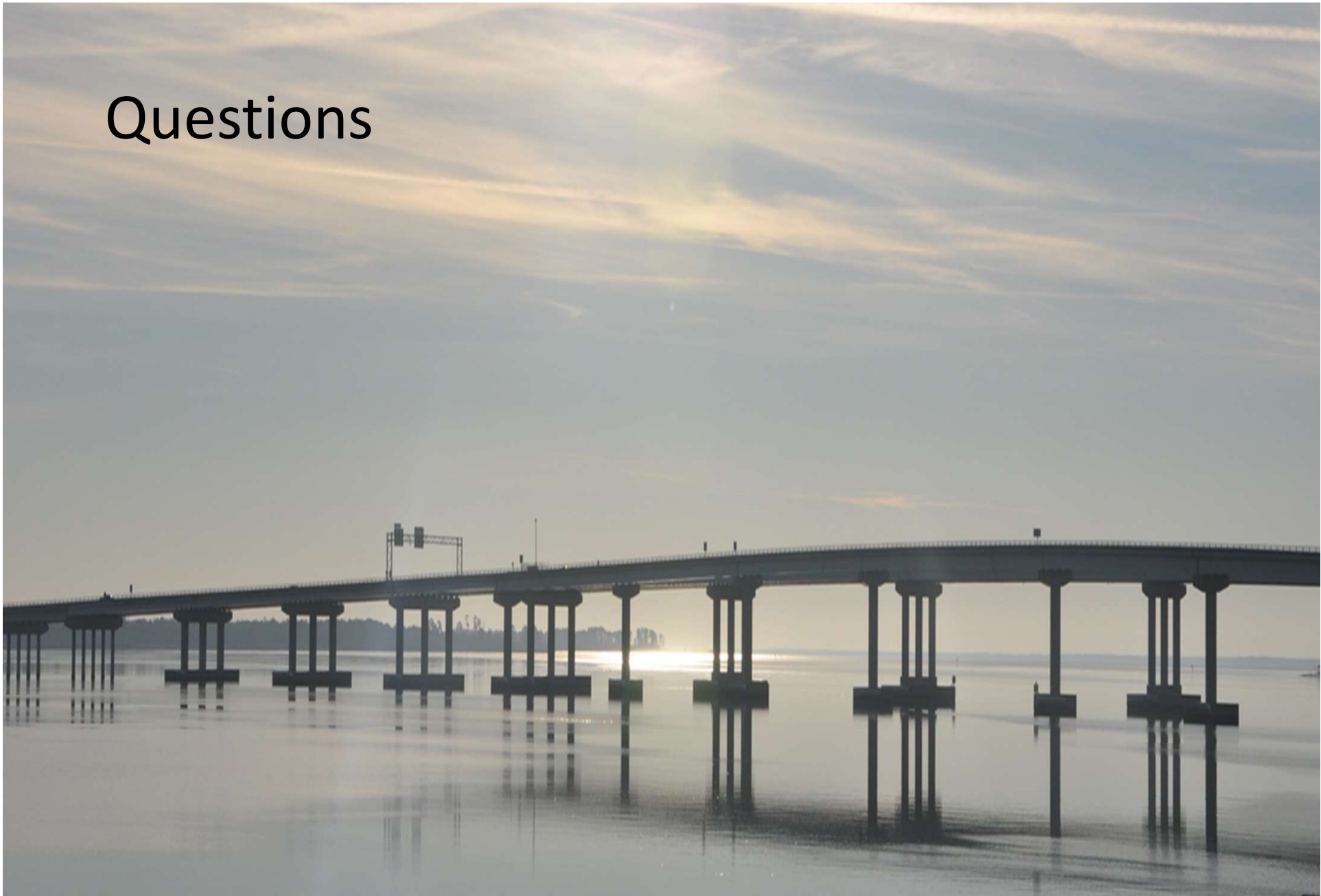
NRCA TN Delivery with 3% Increase in TN Discharge



What the Future Holds?

- Increase in Short Term Leases (1 to 10 year terms) in the NRCA.
- Point Source Purchasing Non-Point Source Nutrient Credits. This is not a viable option under the current rules. Requires purchasing credits at 200% of the credit rate times 30 years. 10 MGD expansion or new facility will cost \$136 Million in offset payments.

Questions



Bullpen

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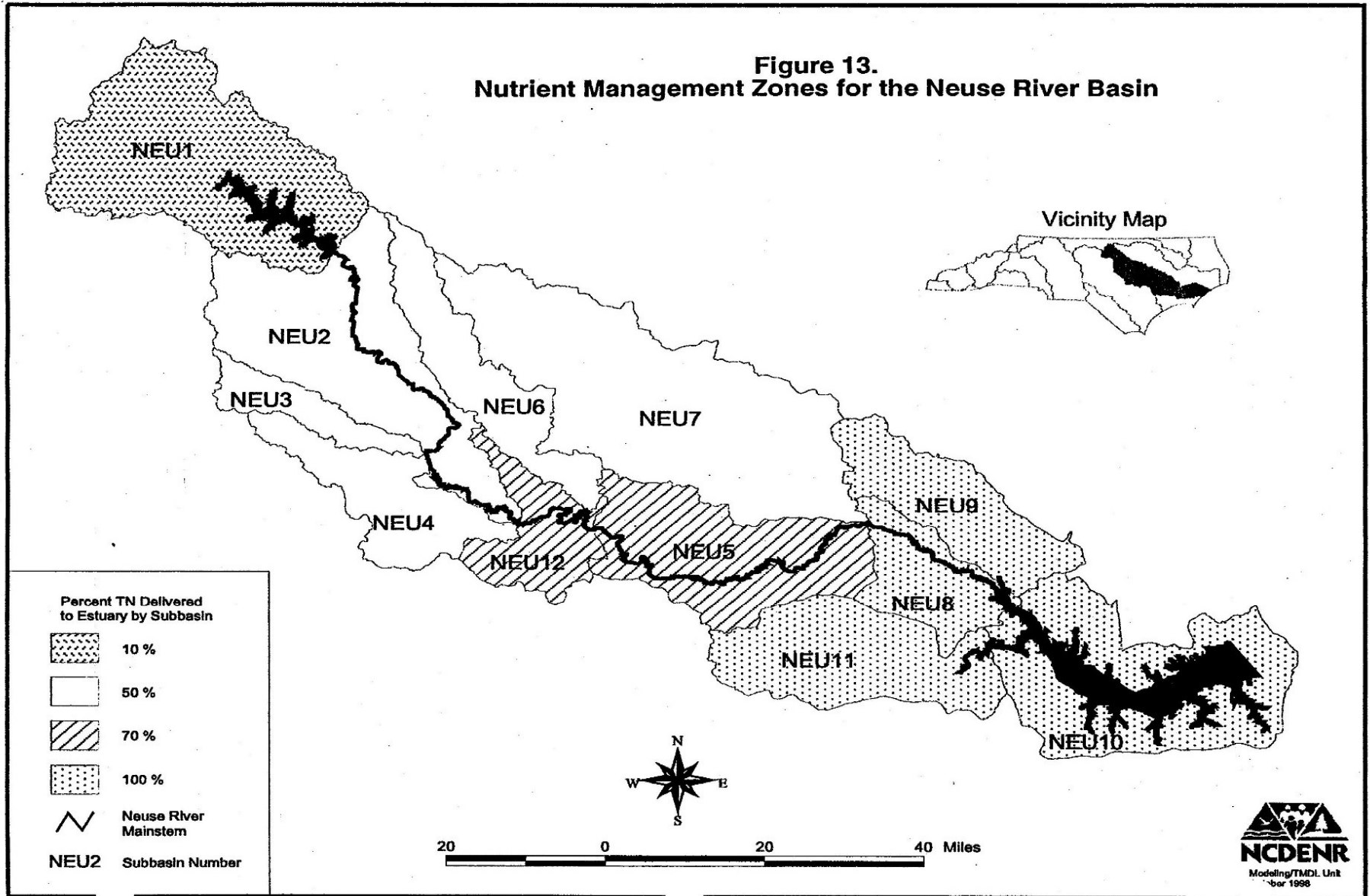
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Neuse Basin Transport Zones

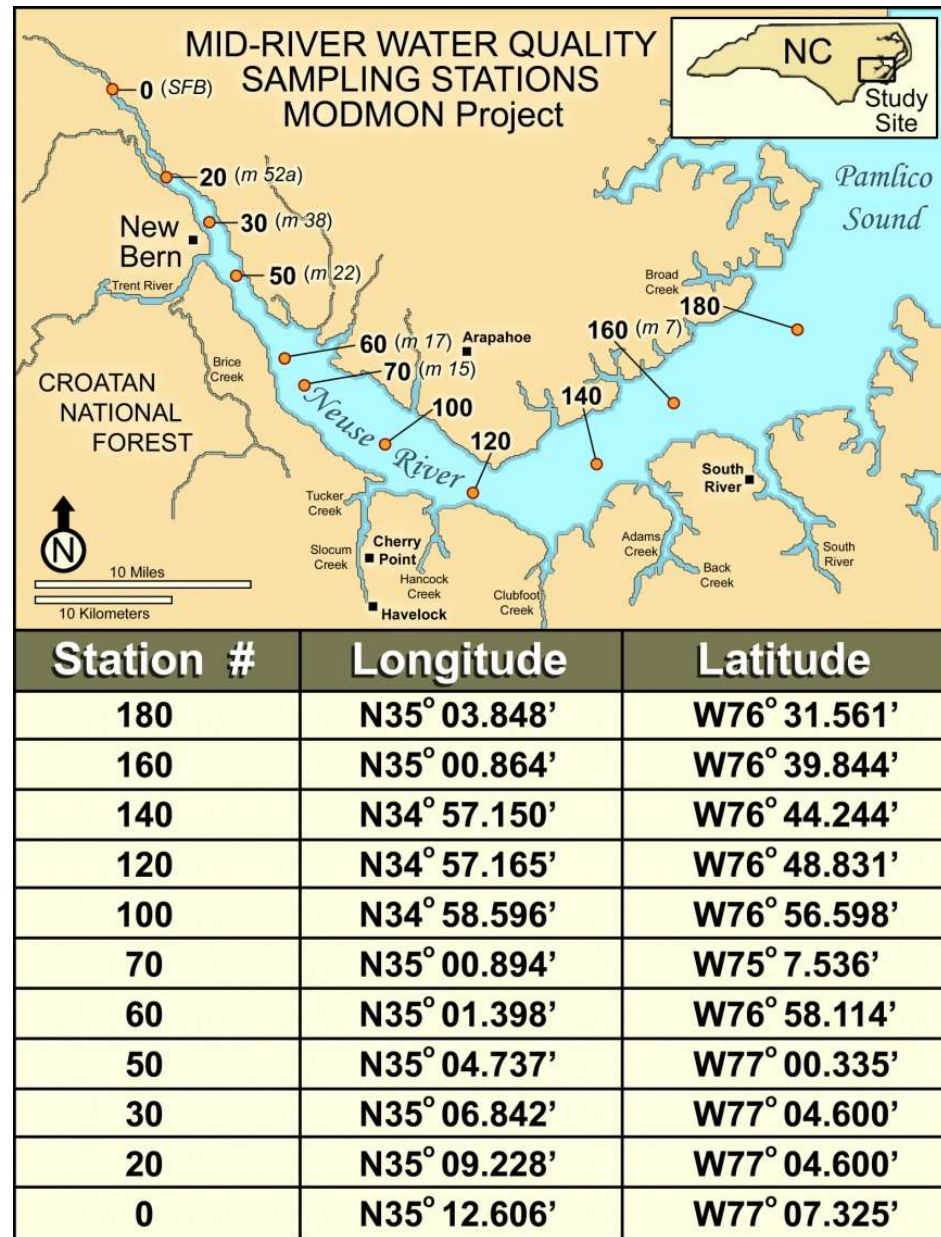
Figure 13.
Nutrient Management Zones for the Neuse River Basin



Falls Lake Dam



Neuse River Estuary Monitoring - MODMON



NRCA Trades, Leases and Sales

NRCA Nitrogen Transactions (Sales/Leases)					
Date: 2/14/18					
Year	Type of Nitrogen Transaction	Seller/Leasor	Buyer/Leasee	Estuary Lbs. of Nitrogen *	Cost per Pound
2017	Lease	Contentnea MSD	CWS, Inc.	7,000	\$ 5.00
	Lease	NRCA	Craven County	50	9.00
	Lease	Dow-Dupont	Craven County	307	4.00
2016	Lease	Contentnea MSD	Town of LaGrange	1,000	\$ 4.00
	Lease	NRCA	Craven County	50	9.00
2015	Lease	Contentnea MSD	Aqua, N.C., Inc.	750	\$ 4.00
	Lease	Contentnea MSD	Town of LaGrange	1,300	4.00
	Lease	NRCA	Craven County	50	9.00
2014	Lease	Contentnea MSD	Aqua, N.C., Inc.	4,000	\$ 4.00
	Lease	Contentnea MSD	Town of LaGrange	1,300	4.00
	Lease	NRCA	Craven County	50	9.00
2013	Lease	NRCA	CWS Systems, Inc.	1,000	\$ 9.00
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2012	Sale	SGWASA	City of Raleigh, N.C.	2,445	330.00
	Lease	NRCA	Progress Energy	9,000	\$ 9.00
2010	Lease	Dupont - Kinston	Aqua, N.C., Inc.	1,200	4.00
	Lease	Johnston County, N.C.	Town of Kenly, N.C.	1,577	8.18
	Lease	Dupont - Kinston	Contentnea MSD	15,000	4.00
	Sale	UNIFI, LLC, Kinston, N.C.	Contentnea MSD	3,500	4.00
	Lease	NRCA	Progress Energy	9,000	\$ 9.00
2009	Lease	Dupont - Kinston	Aqua, N.C., Inc.	2,500	4.00
	Lease	Johnston County	Town of Kenly, N.C.	1,745	8.18

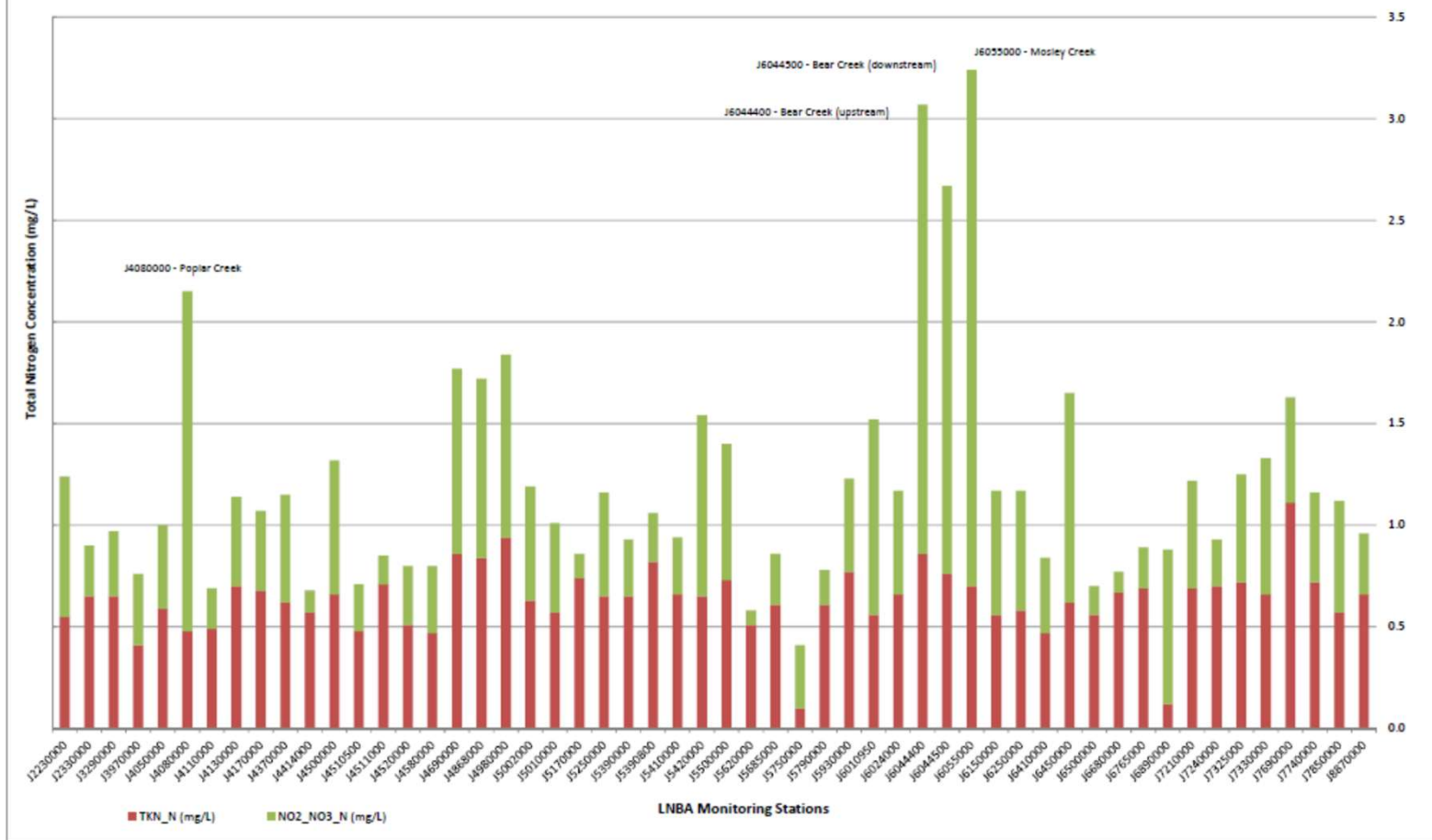
TN Allocation Table

Table 1
Sorted by Zone
and Type

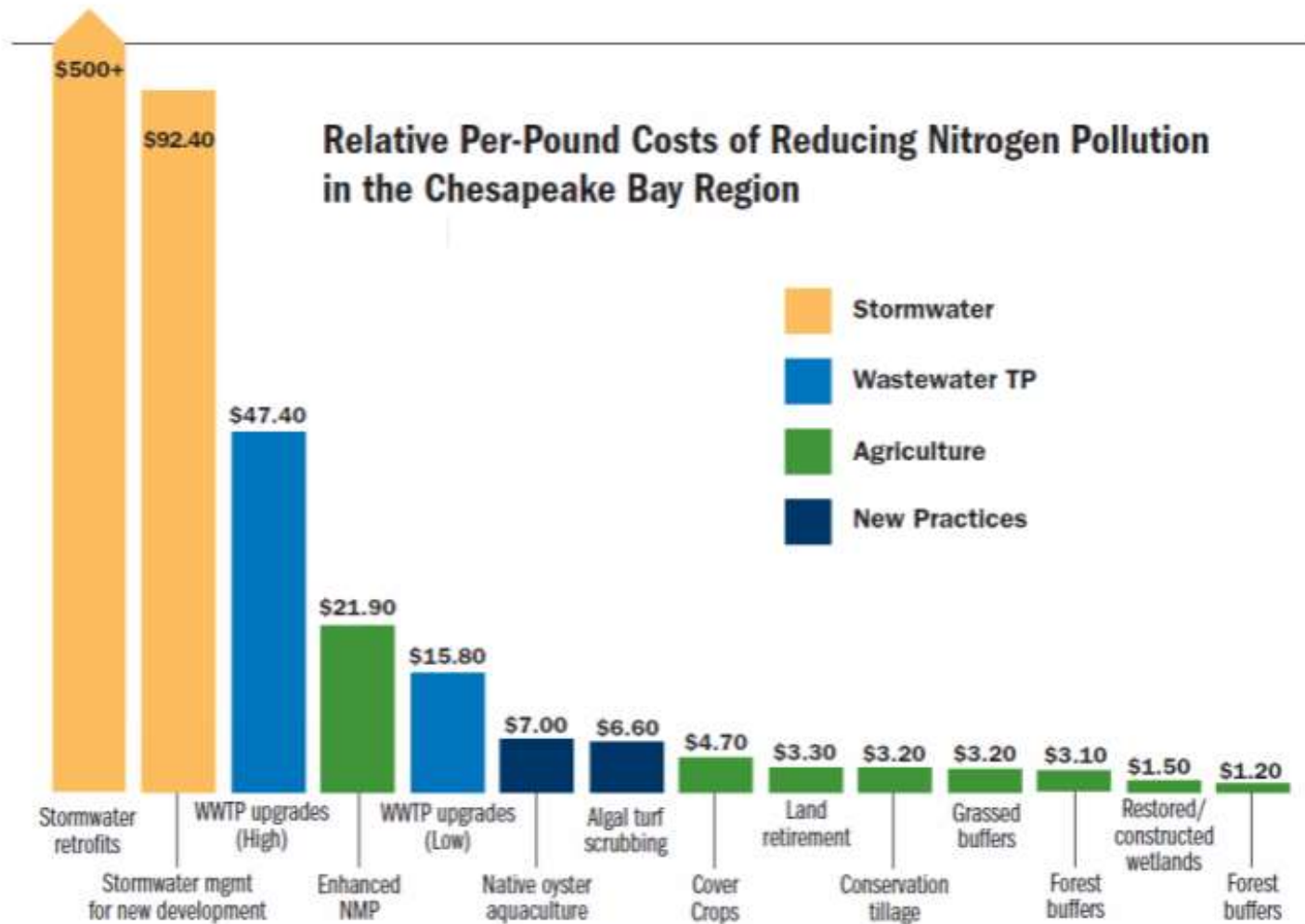
TOTAL NITROGEN (TN) ALLOCATIONS Neuse River Basin - Wastewater Discharges Baseline Values

NPDES Permit No.	Permittee & Facility (1995)	1995 Permitted Flow (MGD)	TN Allocations (lb/yr)		
			At End-of-Pipe	At Estuary	
ZONE 1 - 10% TRANSPORT					
Large Dischargers					
1	NC0023841	DURHAM, NORTH WTR. RECLAM. FAC	20.0	334,851	33,485
2	NC0026824	DHR-JOHN UMSTEAD HOSPITAL WWTP	3.5	58,599	5,860
3	NC0026433	HILLSBOROUGH, TOWN-WWTP/ORANGE	3	50,228	5,023
			443,678	44,368	
Small Dischargers					
1	NC0037869	ARBOR HILLS MHP	0.006	121	12
2	NC0058785	BIBLE BAPTIST CHURCH	0.003	61	6
3	NC0022853	DURHAM PRODUCTS/ ENO SEWAGE FAC	0.015	303	30
4	NC0024520	G & S ASSOCIATED-DBA DAYS INN	0.018	364	36
5	NC0043389	GORMAN BAPTIST CHURCH	0.004	81	8
6	NC0049662	HEATER UTIL-HAWTHORNE	0.25	5,055	506
7	NC0063614	HEATER UTIL-WILDWOOD SUBD	0.1	2,022	202
8	NC0059099	LAKE RIDGE AERO PARK	0.016	324	32
9	NC0043001	MT. SYLVAN UNITED METHODIST CH.	0.002	40	4
10	NC0036471	PERSON CO SCH - HELENA ELEM.	0.008	162	16
11	NC0051071	ALL YOUTH ATHLETIC, INC.	0.002	40	4
12	NC0056731	SEDGEFIELD DEV.CORP-GRANDE OAK	0.0068	137	14
13	NC0081752	WILLOWHAVEN COUNTRY CLUB ***	0.0019	38	4
			8,749	875	
ZONE 1 TOTAL			452,427	45,243	
ZONE 2 - 50% TRANSPORT					
Large Dischargers					
1	NC0029033	RALEIGH, CITY-NEUSE RIVER WWTP	60.00	675,790	337,895
2	NC0023906	WILSON WWTP, TOWN OF	14.00	157,684	78,842
3	NC0064564	RIVER DELL UTILITIES, INC.	0.75	8,447	4,224
4	NC0030716	CENTRAL JOHNSTON COUNTY WWTP	4.99	56,203	28,102
5	NC0060330	CAROLINA WTR. SERV.-WHITE OAK S	0.5	5,632	2,816
6	NC0064556	RIVER DELL UTILITIES, INC. #2	0.50	5,632	2,816
7	NC0064050	APEX, TOWN-WWTP/MIDDLE CREEK	3.60	40,547	20,274
8	NC0020389	BENSON WWTP, TOWN OF	3.00	33,790	16,895
9	NC0065102	CARY-SOUTH WWTP, TOWN OF	16.00	180,211	90,105
10	NC0048879	CARY-NORTH WWTP, TOWN OF	12.00	135,158	67,579
11	NC0025453	CLAYTON WWTP, TOWN OF	1.90	21,400	10,700
12	NC0029572	FARMVILLE WWTP, TOWN OF	3.50	39,421	19,711
13	NC0066516	FUQUAY-VARINA	6.00	67,579	33,790
14	NC0064891	KENLY NEW WWTP, TOWN OF	0.63	7,096	3,548
15	NC0020842	SNOW HILL WWTP, TOWN OF	0.50	5,632	2,816
16	NC0030759	WAKE FOREST, TOWN-SMITH CRK WW	6.00	67,579	33,790
17	NC0079316	ZEBULON TOWN OF-LITTLE CREEK	1.85	20,837	10,418
18	NC0001376	BURLINGTON IND., WAKE PLANT	5.00	48,879	24,440
			1,577,517	788,758	

2017 LNBA Monitoring Stations Total Nitrogen Annual Average Concentrations



Costs per pound vary over 4 orders of magnitude



Source: World Resources Institute

January 2010

