New Development Stormwater Nutrient Control Requirements in North Carolina

Briefing to Chesapeake Trading Workgroup

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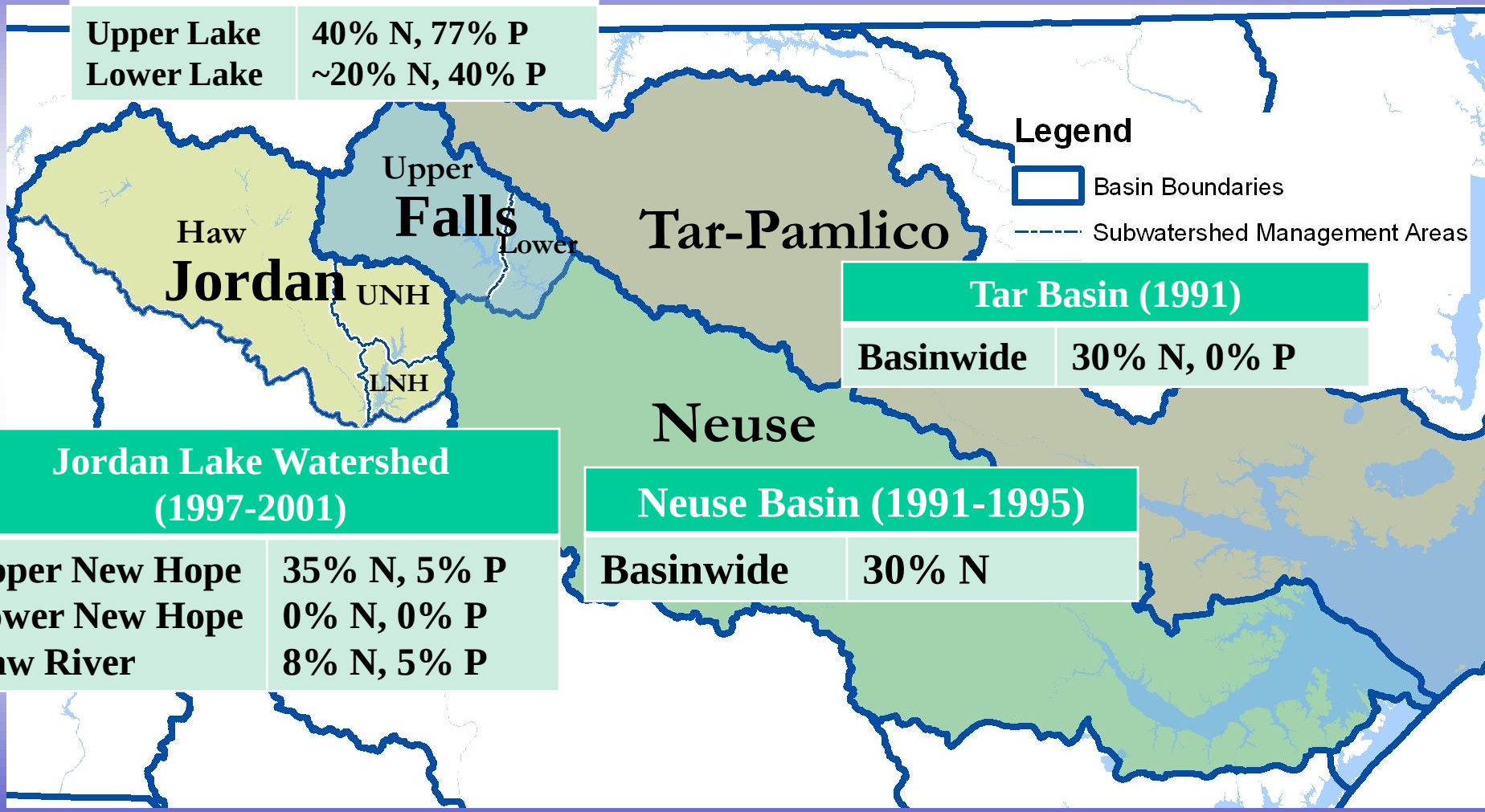
NC Nutrient Management Strategies

COASTAL	FRESHWATER
Chowan - 1981	Randleman - 1997
New -1991	Jordan - 2009
Neuse -1998	Falls - 2011
Tar-Pamlico -2001	PENDING: High Rock

Shared Features of Nutrient Strategies

- Collaborative stakeholder processes
- Watershed/waterbody-specific
  - Response model-based goals
  - Significant sources
- Minimize inequities
  - Same relative reductions all sources vs. baseline
  - "Fair, reasonable, proportionate"
  - Maximize options, cost-effectiveness
- Adaptive
  - Dual accounting – compliance & instream

Goals for Major Nutrient Strategies



Falls Lake Watershed (2006)	
Upper Lake	40% N, 77% P
Lower Lake	~20% N, 40% P

Tar Basin (1991)	
Basinwide	30% N, 0% P

Jordan Lake Watershed (1997-2001)	
Upper New Hope	35% N, 5% P
Lower New Hope	0% N, 0% P
Haw River	8% N, 5% P

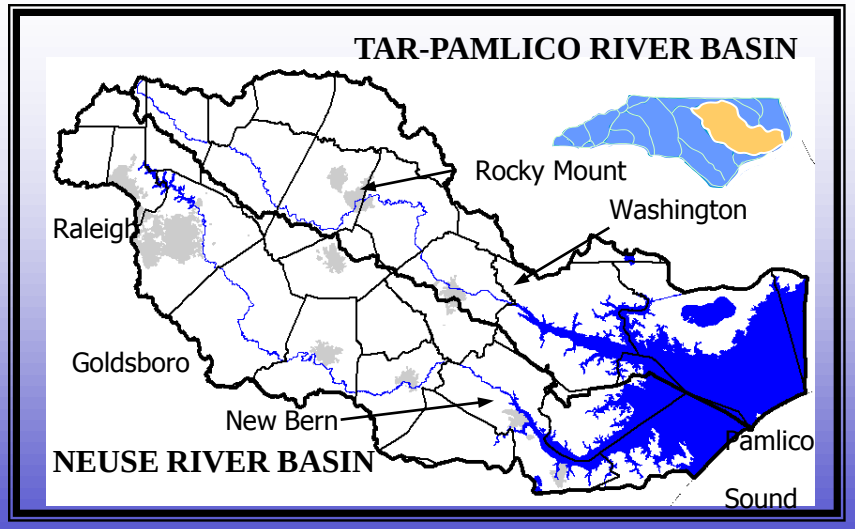
Neuse Basin (1991-1995)	
Basinwide	30% N

(Year) = baseline period on which goals are based

Neuse and Tar-Pamlico Strategies

First ‘comprehensive’ nutrient regulations in NC

- Wastewater discharges
- New Development stormwater
- Agriculture
- Riparian areas protection
- Fertilizer management
- Nutrient offset fees



Jordan and Falls Rules

Purpose and Scope

Wastewater Discharges

Stormwater- New Development

Stormwater- Existing Development

Agriculture

Stormwater - State and Federal Entities

Riparian Buffer Protection

Trading

New Development Stormwater Rules

- Local governments administer
- Disturbance thresholds
- N&P loading rate targets
- Redevelopment option – goal %'s vs. pre
- Offsite options: EEP, private banks, self
- Peak rate match 1 yr/24 hr
- Phase II treatment thresholds, WSW impervious ceilings

Loading Rate Targets & Onsite Requirements Compared

Watershed	Strategy Goals (% N/P)	N/P Targets (lb/ac/yr)	N/P Offsite Thresholds (lb/ac/yr)
Neuse	30	3.6	6/10
Tar-Pamlico	30/0	4.0/.40	6/10
Jordan • Upper New Hope • Haw • Lower New Hope	 35/5 8/5 0/0	 2.2/.82 3.8/1.43 4.4/.78	6/10 1 BMP onsite minimum
Falls	40/77	2.2/.33	≥ 50% onsite ≥ 30% onsite < 1 ac ≥30% onsite downtown redevelopment

Calculating Loading Rate Targets

- Calculation:
  - Area-weighted avg. LR ‘developable’ lands in watershed
    - crop, pasture, forest (less conserved forest)
  - Less goal percent
- Assumes land is developed in watershed proportions over time
- Redevelopment – site-specific goal %’s off pre-development (or take rate targets)

Offsite Options

- NC Ecosystem Enhancement Program
  - (originally DOT mitigation banking)
- Private offset banks
  - Since 2007
  - Since 2009 - primacy by HU
  - 2011 - unsuccessfully sought legislation to access state restoration funds via CWMTF
- Self-secured reductions
- Vast majority to date – riparian buffer restoration
  - Issue – load reduction credit overvalued, requires revision

Current EEP Offset Rates

Watershed	Nitrogen ($/lb)	Phosphorus ($/lb)
Neuse HU's 030202 02-04	$12.28	n/a
Neuse 03020201 below Falls	$21.64	n/a
Neuse Falls	$21.64	$134.28
Tar-Pamlico	$14.86	$134.28
Jordan	$21.64	$134.28

EEP Actual Cost Method

$$ActualCostRate = \frac{ActualCosts_{PresentDay}}{TotalPoundsOffset_{PresentDay}} + AdjustmentFactor$$

$$ActualCosts_{PD} = ProjectCosts_{PD} + AdministrativeCosts_{PD}$$

Completed Projects
Terminated Projects
Existing Projects in Process

Staff
Supplies
Rent

- All costs adjusted to present day
- General and special rate areas
- Adjust ≥ annually, ≤ quarterly
- New areas - highest rate until 2 projects in design

EEP Example Calculation
Tar-Pamlico Nitrogen Rate

Tar Pamlico Nitrogen Rate	Amount
Actual ProgramPounds	158,678.27
Total Actual Existing Project Cost	$691,726.07
Total Actual Admin Cost	$174,914.33
Future Project Cost	$65,851.29
Total Actual Program Cost	$932,491.69
Actual Cost Per Pound	$5.88
Program Receipts	$721,065.76
Total Pounds $_{\text{Present Day}}$	158,678.27
Total Project Cost$_{\text{Present Day}}$	$899,258.94
Total AdminCost $_{\text{Present Day}}$	$174,914.33
Program Cost $_{\text{Present Day}}$	$1,074,173.26
Avg.Cost$_{\text{Present day}}$	**$6.77**

%Difference Cost & Receipts	22.67%

$$ActualCostRate = \frac{ActualCosts_{PresentDay}}{TotalPoundsOffset_{PresentDay}} + AdjustmentFactor$$

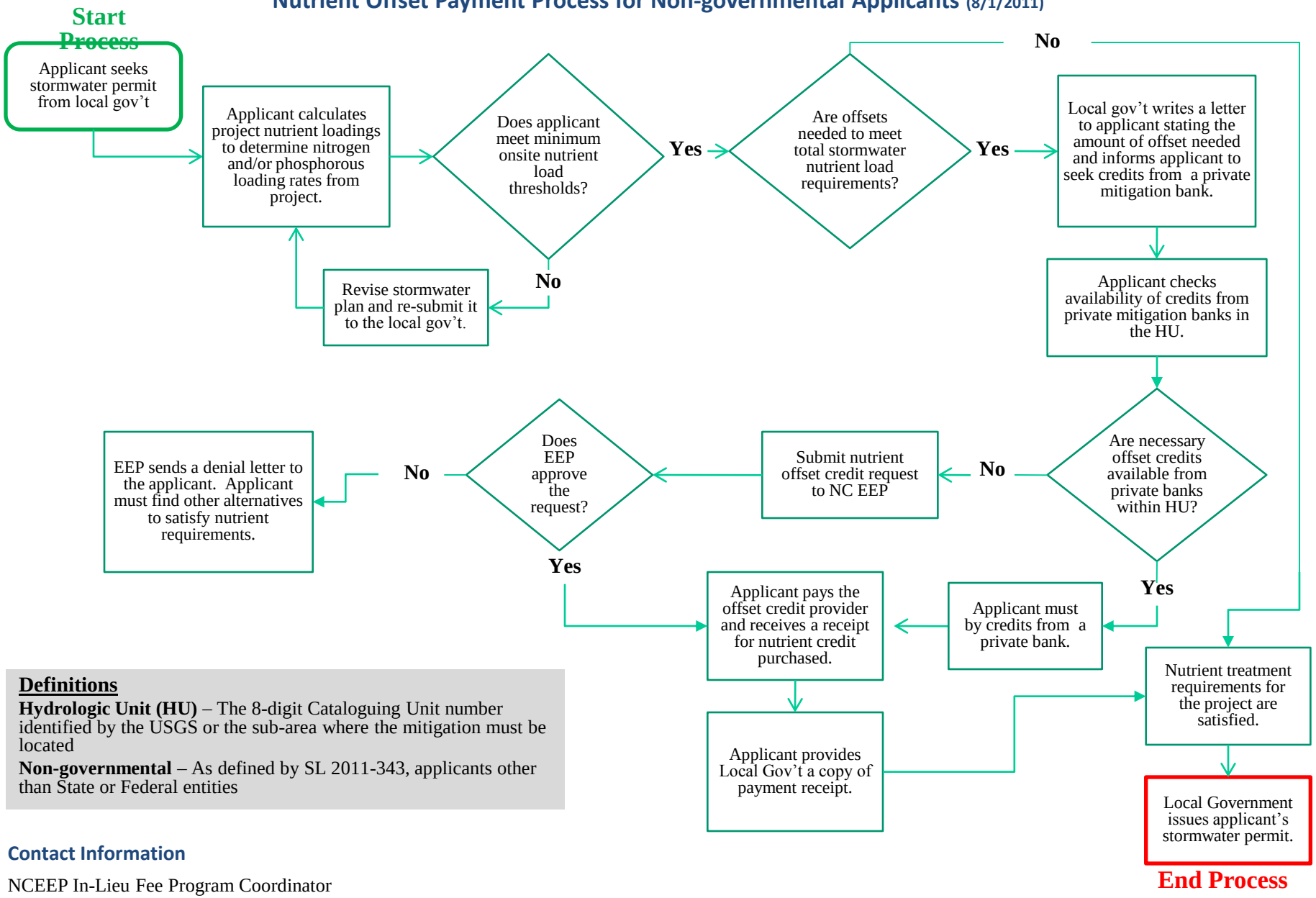
= $6.77 + $6.61

= $13.38

ACM RATE	$13.38

Note – EEP has still under collected $211,425.93 for N and $54,920.34 for P.

Nutrient Offset Payment Process for Non-governmental Applicants (8/1/2011)



Definitions

Hydrologic Unit (HU) – The 8-digit Cataloguing Unit number identified by the USGS or the sub-area where the mitigation must be located

Non-governmental – As defined by SL 2011-343, applicants other than State or Federal entities

Contact Information

NCEEP In-Lieu Fee Program Coordinator
919-716-1921 (Mon-Thurs)
kelly.williams@ncdenr.gov
http://portal.ncdenr.org/web/eep/nutrient-offset-request-process

Information on the availability of private nutrient banks can be found at: http://portal.ncdenr.org/web/wq/swp/ws/401/certsandpermits/mitigation.

More Information

Nutrient Strategies – DWQ NPS Program

http://portal.ncdenr.org/web/wq/ps/nps

NC Ecosystem Enhancement Program

http://portal.ncdenr.org/web/eep/home

Strategy Staff Contacts

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Jordan jason.t.robinson@ncdenr.gov 807-6439

Tar-Pam, Offsets michael.herrmann@ncdenr.gov 807-6442

Credit Yield Estimation Method
Riparian Buffer Restoration

Formula developed ~1998 by DWQ, WRP

- Originally for riparian wetland restoration in Neuse Basin

Benefit Type	Nitrogen Reduction (lb/ac/yr)
Treatment of NPS throughput	62.5
Footprint land use change	9.9
Overbank flooding	3.3
Total	76
30-yr Total	2,273

Umbrella Offset Process Rule

- EEP, other offset projects – payment for credit
- Where rules allow option
- Geographic – 8 digit + specified subwatersheds + delivery differences (Jordan)
- Pay for 30 years
- Proof of purchase for development permit
- Credit exclusive to payer

Approval standards

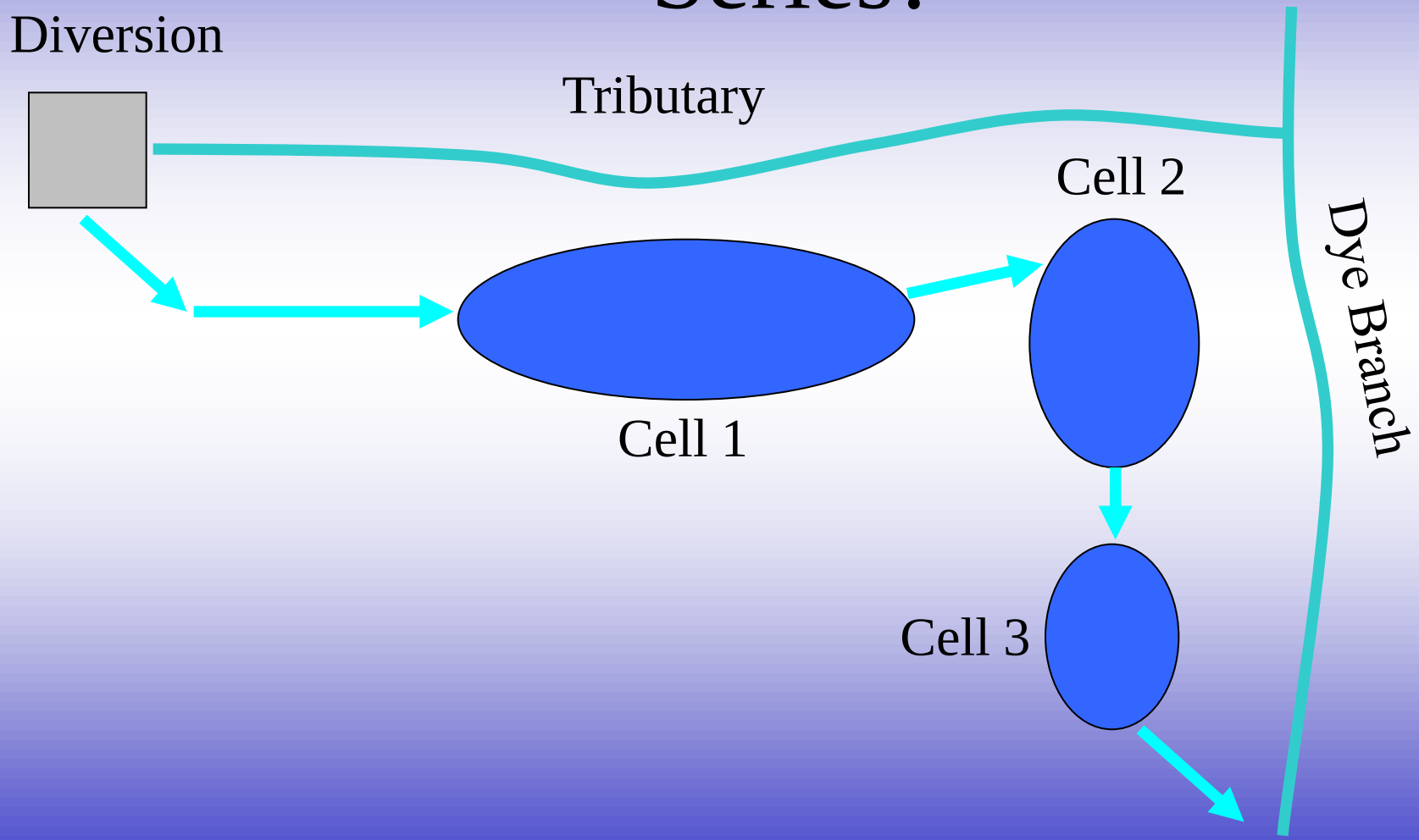
- No double-counting
- Lifetime financial assurance
- Credit ledgers
- Site review, lifetime access
- Instrument : location, boundaries, area served, drainage conditions, type of measure, calculations, legal protection, parties, plan, as-built, performance bond, success criteria, m&m

Trading Rules, Jordan and Falls

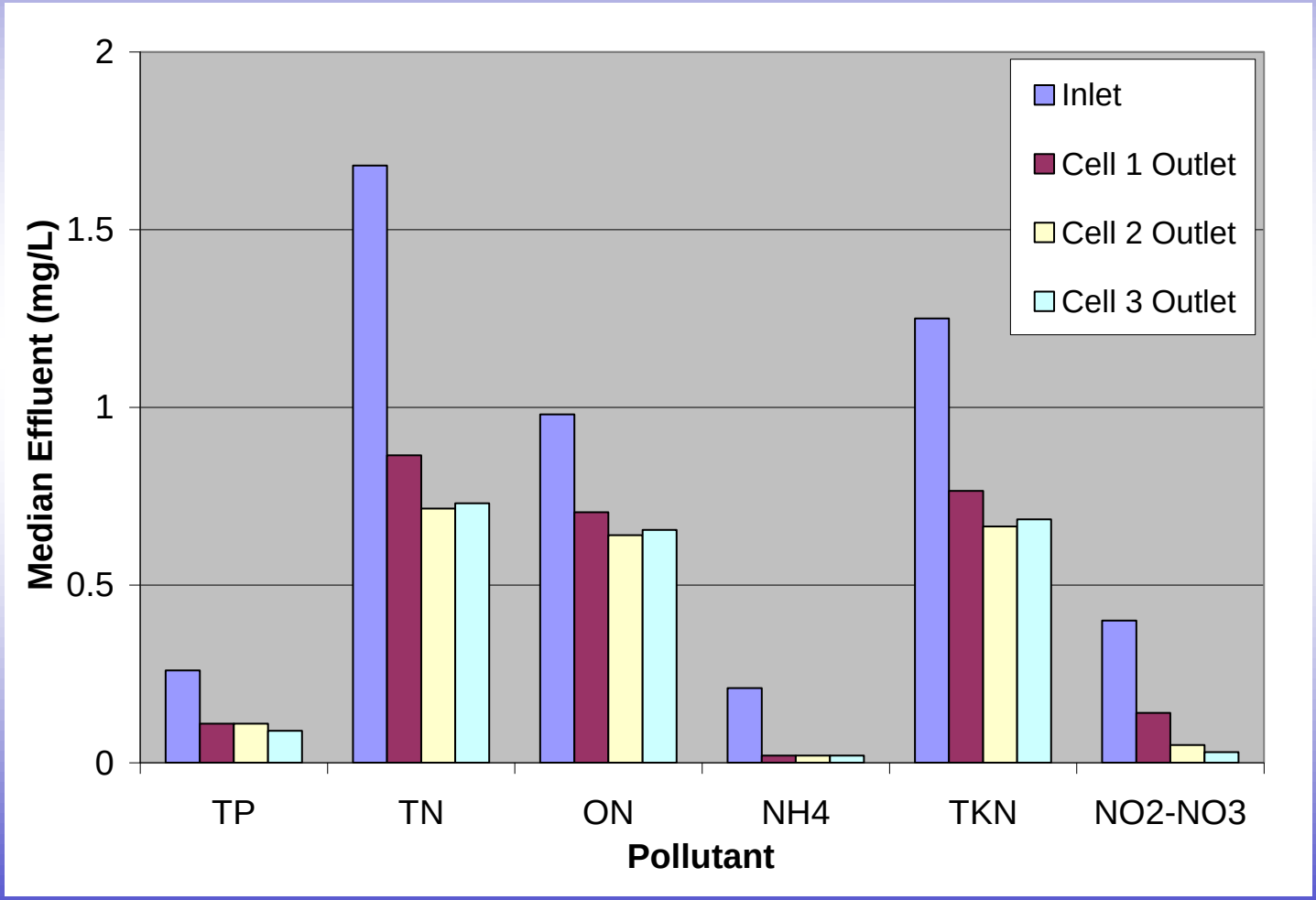
Provide potential for trading across any sources

- 'Onsite' prerequisites
- Geographic restrictions
- DWQ approval criteria
  - Not double-counted
  - Characterize measures w/ adequate engineering, science, accounting
  - Account for magnitude & duration of reduction, uncertainty, delivery differences, timing
  - Provide for achievement and maintenance
  - Track & report credits
  - No hot spots

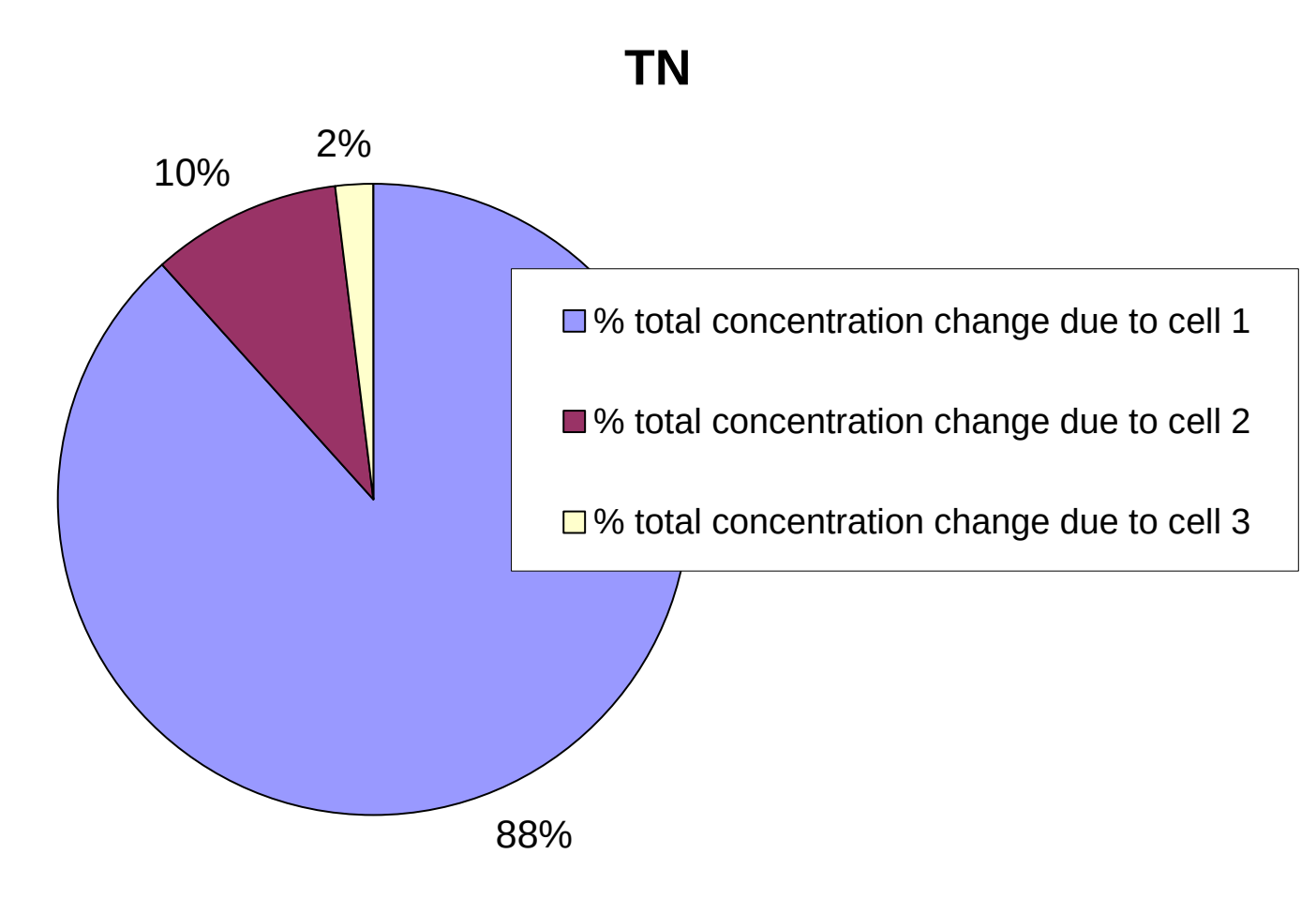
Are % Removals Appropriate in Series?



Results

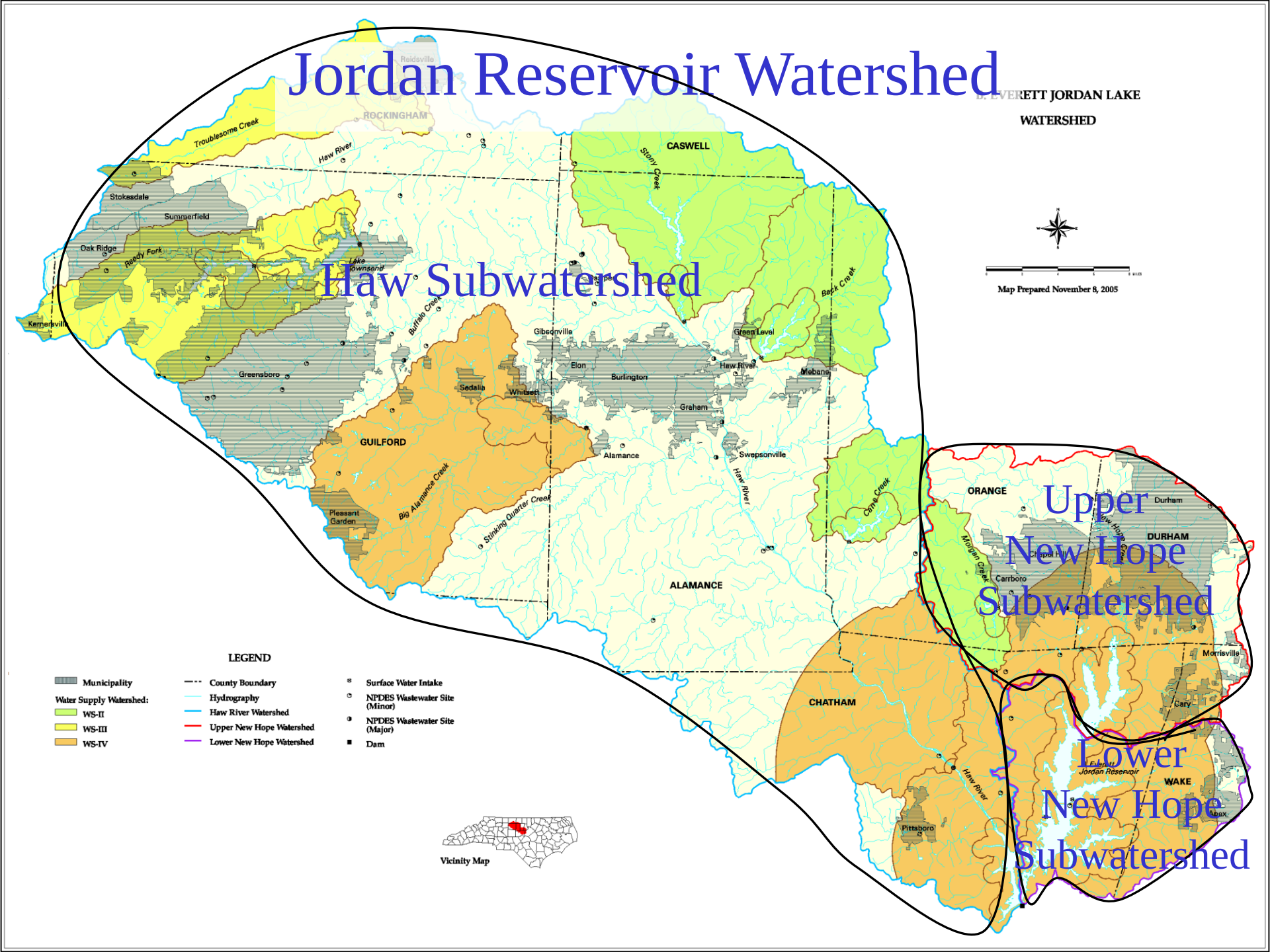

Median Effluent (mg/L)
2
1.5
1
0.5
0
Inlet
Cell 1 Outlet
Cell 2 Outlet
Cell 3 Outlet
TP
TN
ON
NH4
TKN
NO2-NO3
Pollutant

Results

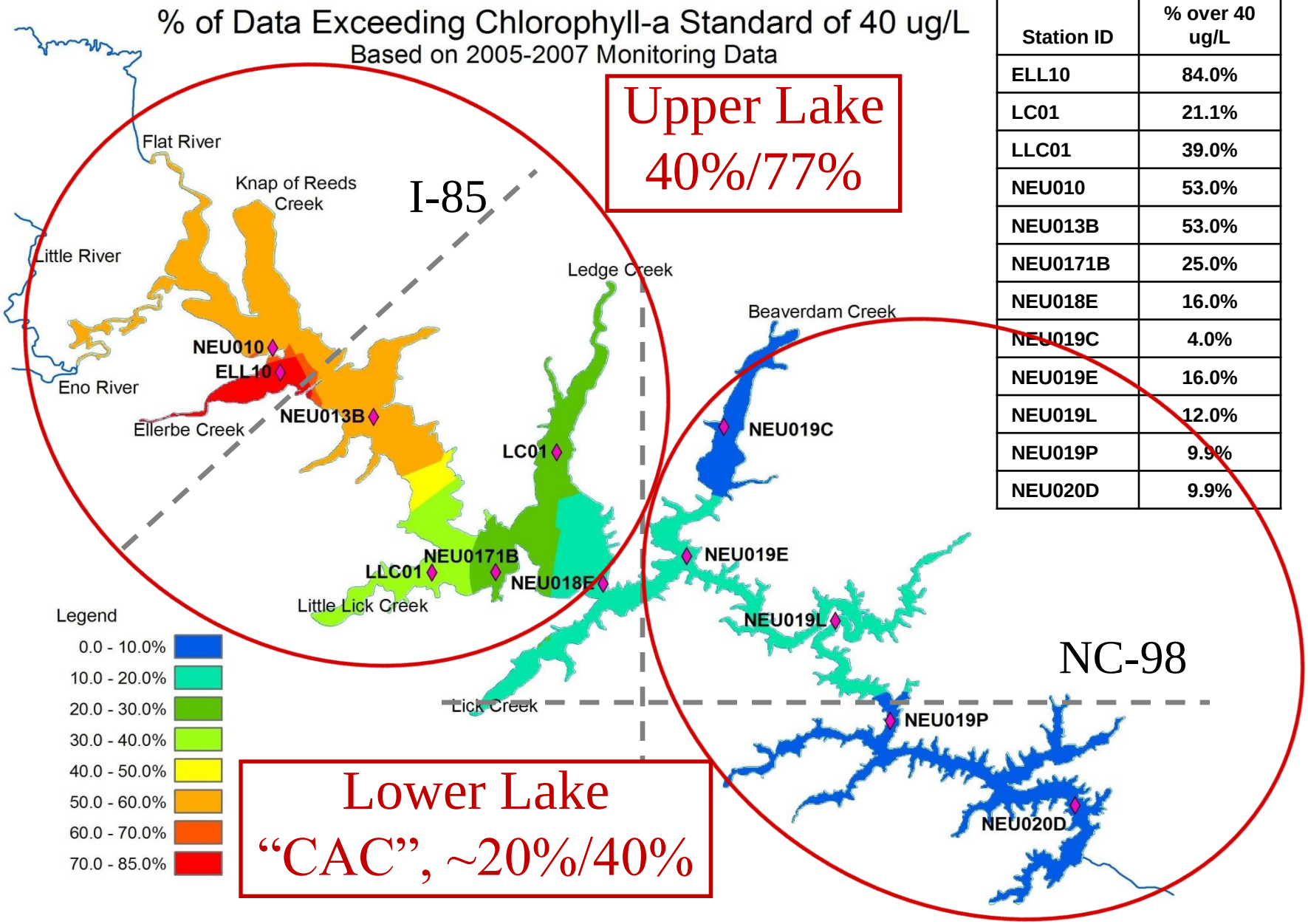

TN
2%
10%
88%
% total concentration change due to cell 1
% total concentration change due to cell 2
% total concentration change due to cell 3

BMP EMCs

BMPs	TN EMC (mg/L)	TP EMC (mg/L)
Bioretention with IWS	0.95	0.12
Bioretention without IWS	1	0.12
Dry Detention Pond	1.2	0.2
Grassed Swale	1.21	0.258
Green Roof	1.08	0.15
Level Spreader, Filter Strip	1.2	0.154
Permeable Pavement	1.44	0.39
Sand Filter	0.92	0.14
Water Harvesting*	1.08	0.15
Wet Detention Pond	1.01	0.113
Wetland	1.08	0.117


Jordan Reservoir Watershed
B. EVERETT JORDAN LAKE
WATERSHED
Haw Subwatershed
Upper
New Hope
Subwatershed
Lower
New Hope
Subwatershed
Map Prepared November 8, 2005
ROCKINGHAM
CASWELL
GUILFORD
ALAMANCE
ORANGE
DURHAM
CHATHAM
WAKE
Troublesome Creek
Haw River
Stony Creek
Stokesdale
Summerfield
Oak Ridge
Reedy Fork
Lake Townsend
Buffalo Creek
Back Creek
Gibsonville
Green Level
Elon
Burlington
Haw River
Graham
Mebane
Sedalia
Whitsett
Greensboro
Alamance
Swepsonville
Pleasant Garden
Big Alamance Creek
Stinking Quarter Creek
Cane Creek
Morgan Creek
New Hope Creek
Durham
Carrboro
Morrisville
Cary
Jordan Reservoir
Pittsboro
Apex
LEGEND
Municipality
Water Supply Watershed:
WS-II
WS-III
WS-IV
County Boundary
Hydrography
Haw River Watershed
Upper New Hope Watershed
Lower New Hope Watershed
Surface Water Intake
NPDES Wastewater Site (Minor)
NPDES Wastewater Site (Major)
Dam
Vicinity Map

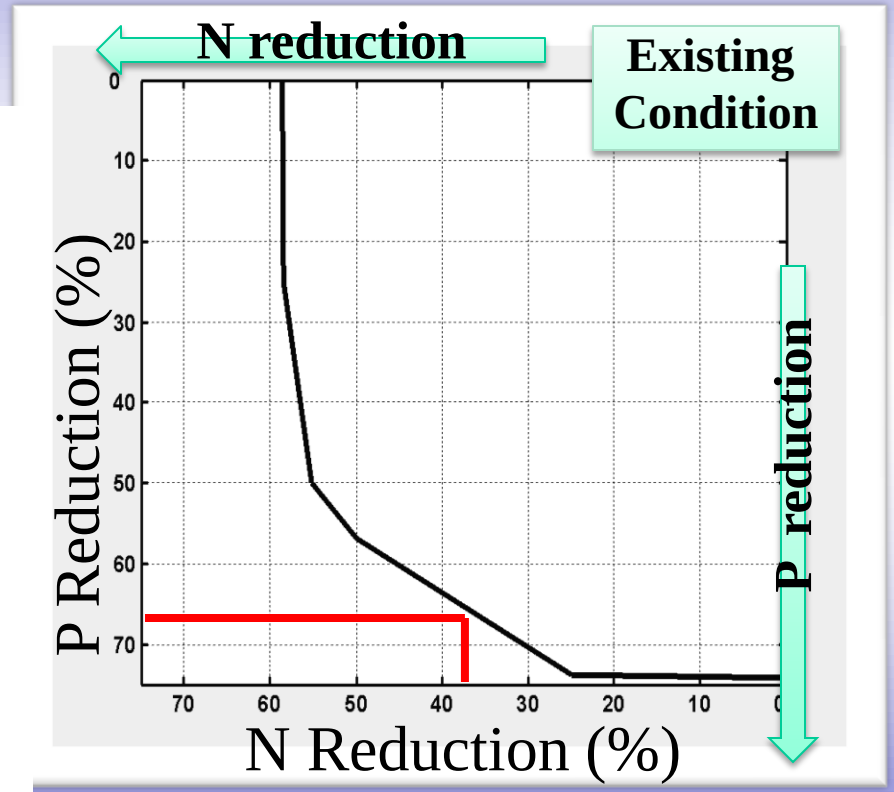
Falls Lake Impairment, Reduction Goals



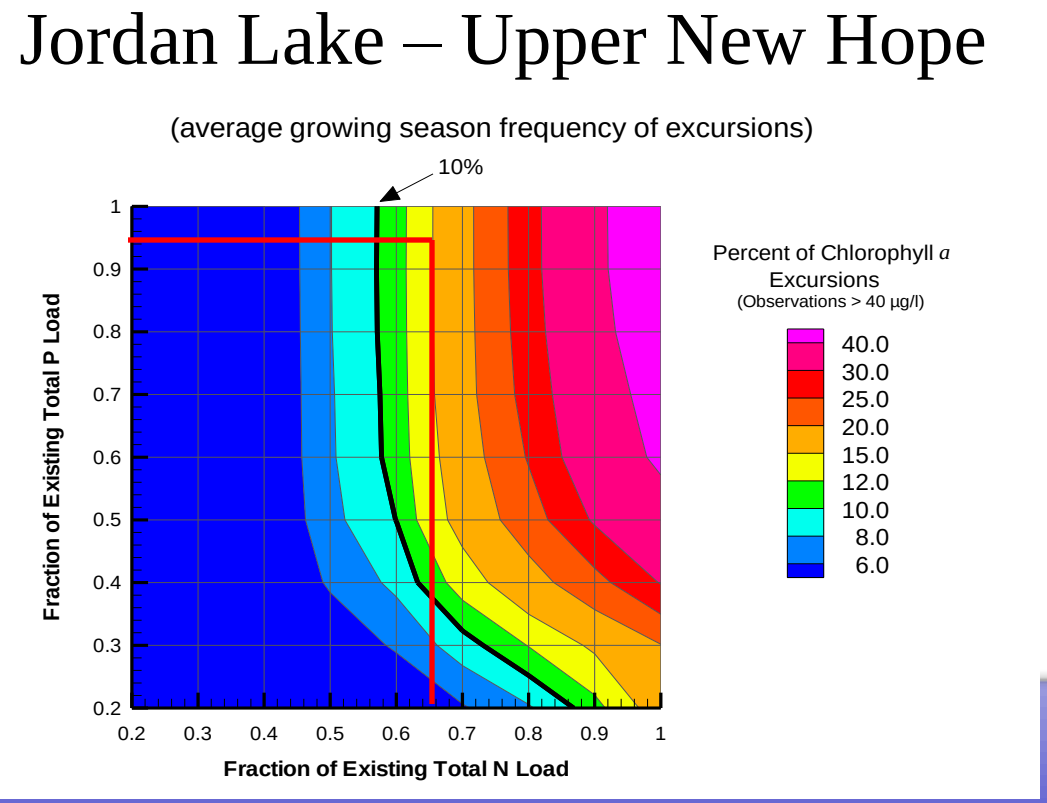
Station ID	% over 40 ug/L
ELL10	84.0%
LC01	21.1%
LLC01	39.0%
NEU010	53.0%
NEU013B	53.0%
NEU0171B	25.0%
NEU018E	16.0%
NEU019C	4.0%
NEU019E	16.0%
NEU019L	12.0%
NEU019P	9.9%
NEU020D	9.9%

Target-Setting with Stakeholders
Lake Model N/P Reduction Response Curves

Falls Lake



Jordan Lake – Upper New Hope



Jordan, Falls Frameworks Compared

	Jordan	Falls
Goals (N/P)	Upper New Hope 35%/5% Lower New Hope 0%/0% Haw 8%/5%	Stage I: CAC (some rules 20%/40%) Stage II: Upper 40%/77%
Staged Implementation	Existing Development only (the rest single stage): I: programmatic measures II: load-reduction plans toward 8%/5% goals II+: revise UNH plans -> 35%	I: All sources implement, watershed -wide II: Upper watershed sources, under adaptive review
Full Implementation Timeframe	All other rules – NLT 2018 Existing Development –tbd	Stage I – 2020 Stage II – 2035+ Existing Development – tbd

Jordan, Falls Rules Compared

	Jordan	Falls
Rules Effective	Aug 2009	Jan 2011
New Development	2.2 – 4.4 lb N/ac/yr .78 – 1.43 lb P/ac/yr Onsite: 1 BMP minimum	2.2 lb N/ac/yr .33 lb P/ac/yr Onsite: ≥ 50% reduction need
Existing Development Stormwater	I: Aug 2010 II: UNH - June 2015* Haw, LNH - June 2018* II+: UNH - June 2024* * Lake monitoring trigger	n/a I: Jan 2014 June 2015 (EMC-approved) II: Jan 2021 + every 5 yrs.
Wastewater	P: 2010; .23-.66 mg/l N: 2016-2018; 3.0-5.4 mg/l	I , 2016: P .33-.46, N 3.0–3.6 II , 2035: P .06, N 1.13 mg/l
Agriculture	2015 (collective) 2018 (individual if nec.)	I: 2020 (collective 20%/40%) II: 2026 (indiv buffers if nec.) 2035 (collective 40%/77%)

Wastewater Discharges .0270

- Goal loads allocated to 45 existing WWTPs
- Individual N, P load allocations (lb/yr)
- Compliance dates: 2009 (P), 2016 (N)
- Options:
  - group compliance
  - allocation trading

Agriculture Requirements

- Collective compliance stage (county level)
- Oversight committee
- Annual cropland accounting
- Contingent individual requirements
- Reductions via
  - Reduced N rates
  - Cost shared BMPs
  - Crop shifts
  - Land loss