

# ***Lick Creek Watershed Restoration Plan***

Stakeholder Meeting 2

March 7, 2007

# Agenda

- 3:00**     ***Welcome and Introductions***
- 3:10**     ***Announcements***
- 3:15**     ***Establish Group Charter and Meeting Schedule\****
- 3:40**     ***Lick Creek Water Quality Monitoring (Dan Line, NCSU)***
- 4:10**     ***Watershed Characterization (Chris Dreps)***
- 4:30**     ***Lick Creek Watershed Management Goals (part 2)***
- 5:00**     ***Adjourn***

\* Decision Item

*Next meeting—May 9, 3:00 – 5:30*

# *Announcements*

# *Lick Creek Group Charter*

# *Ground Rules*

- A. Make every effort to attend the meetings, and send alternates when possible.
- B. Treat each other with respect at all times and put personal differences aside
- C. Stick to the topics on the agenda, be concise, and not repeat themselves.
- D. Speak one at a time.
- E. Work as team players and share all relevant information.
- F. Ask if they do not understand.
- G. Openly voice any disagreement with other members.
- H. Look for mutually beneficial solutions.
- I. Follow through on their commitments.
- J. Share information discussed in meetings with the group they are representing.
- K. Encourage free thinking and sharing of all ideas.
- L. Commit to issues in which they have an interest.
- M. When submitting technical documents, make every attempt to present objective, unbiased information.

# *Stakeholder Meeting Schedule*

Meeting 1: Stakeholder introductions, introduction to the Lick Creek Watershed, provide an overview of the watershed restoration planning process, discuss goals (January 2007).

Meeting 2: Review water monitoring scoping-level analysis, monitoring plan, and land use analysis; establish watershed management goals and discuss objectives (March 2007).

Meeting 3: Review fieldwork findings and discuss prioritization criteria (April or May 2007).

Meeting 4: Review subwatershed-level assessment. Discuss fieldwork and restoration project prioritization criteria (June 2007).

Meeting 5: Review Watershed Treatment Model. Establish prioritization criteria (August 2007).

Meeting 6: Review Critical Lands Protection Analysis. Establish criteria for prioritizing land protection projects (October 2007).

Meeting 7: Review and revise initial restoration and preservation priorities; review and revise long-term monitoring recommendations (December 2007).

Meeting 8: Discuss comprehensive watershed management strategies (January 2008).

Meeting 9: Discuss comprehensive watershed management strategies (February 2008).

Meeting 10: Review Draft Lick Creek Watershed Restoration Plan. (April 2008).

# *Watershed Planning Group*

Project Partners

Community Stakeholder Group

Technical Team/Committees

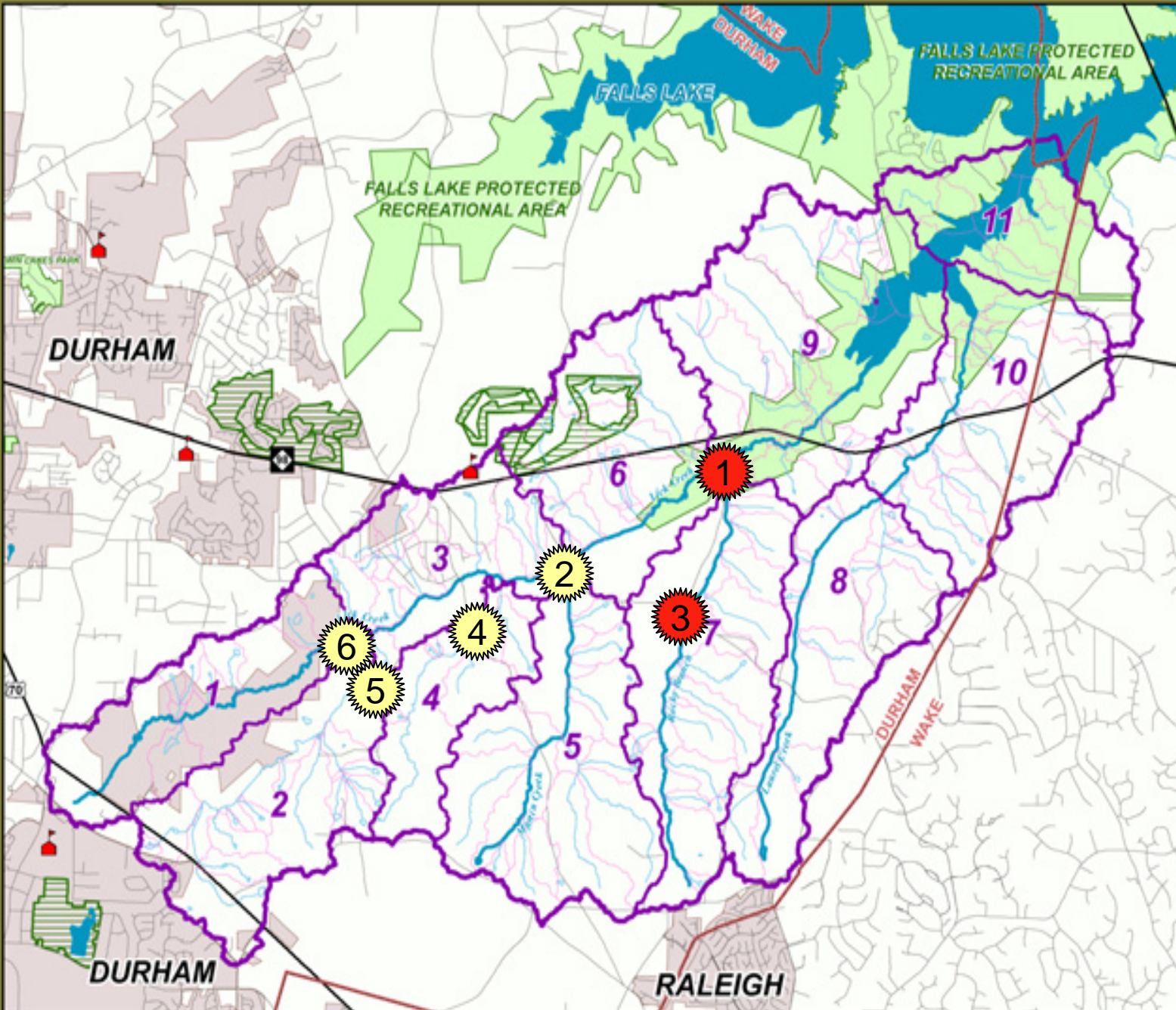


# *Lick Creek Monitoring*

D. Line, D. Penrose, and B.  
Culberson  
NC State University  
Biological & Ag Engineering



# Lick Creek Major Subwatersheds



### LEGEND

- Municipal Boundaries
- County Line
- Major Roads
- Streets
- Watershed Boundary
- Major Subwatersheds
- Catchments
- Water Bodies
- Major Streams
- Minor Streams
- Parks & Protected Lands
- Golf Course
- Schools



Upper Neuse River Basin Association  
 Triangle J Council of Governments  
 Geographic Information Systems  
 11/15/2006

0 0.5 1 Mile

# Monitoring Plan

- Purpose: synoptic survey
- Site location rationale
  - Characterize drainage areas
  - Accessibility
  - Cost
- Flow regime: storm vs baseflow
- Water quality indicators
  - Water chemistry and/or physical properties
  - Biological: benthic macroinvertebrates, pathogens
- Covariates: discharge and rainfall

# LC Monitoring Plan

- Water chemistry

- Baseflow grab for N, P, TSS, turbidity, and metals
- Baseflow measurements of DO, Temp, Cond, pH
- Storm sampling for N, P, TSS, turbidity, and metals

- Biological

- Benthic macroinvertebrates
- E coli in grab samples indicator of pathogens

- Covariates

- rainfall and discharge

# Details of Monitoring Plan

- Grab sampling

  - 1 sample/month 4 sites (LC2, LC4, LC5, LC6)

  - Analysis: NH<sub>3</sub>, NO<sub>3</sub>, TKN, TP, TSS, turbidity, FC, and metals (Cu, Pb, Zn)

- Storm sampling

  - 2 storms 4 sites (LC2, LC4, LC5, LC6)

  - Analysis: NH<sub>3</sub>, NO<sub>3</sub>, TKN, TP, TSS, turbidity, and metals (Cu, Pb, Zn)

- Macroinvertebrates

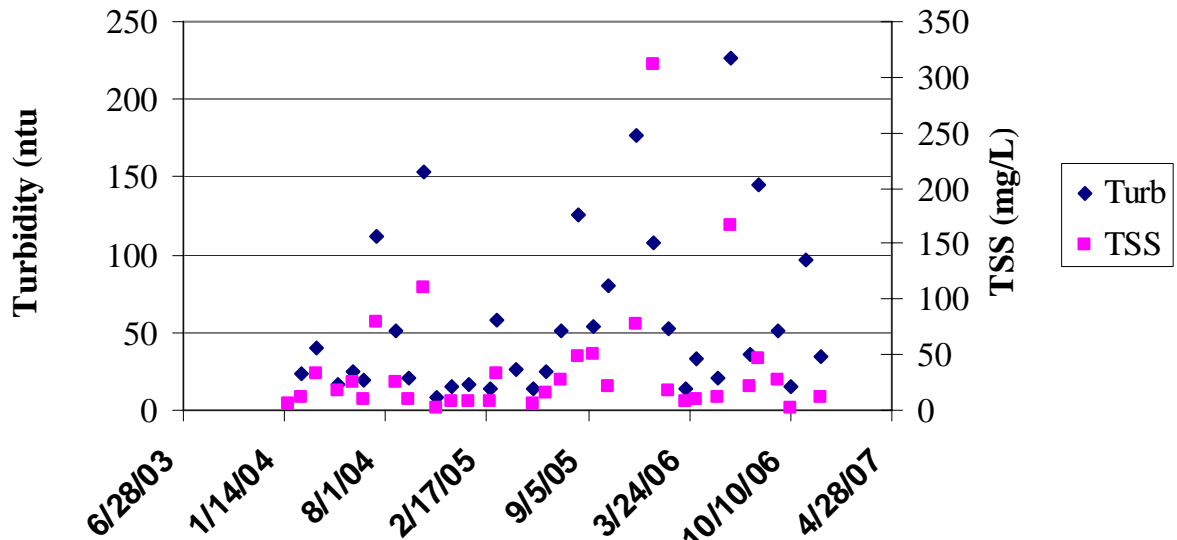
  - 2 times per year, different season

# Macroinvertebrates (bugs)

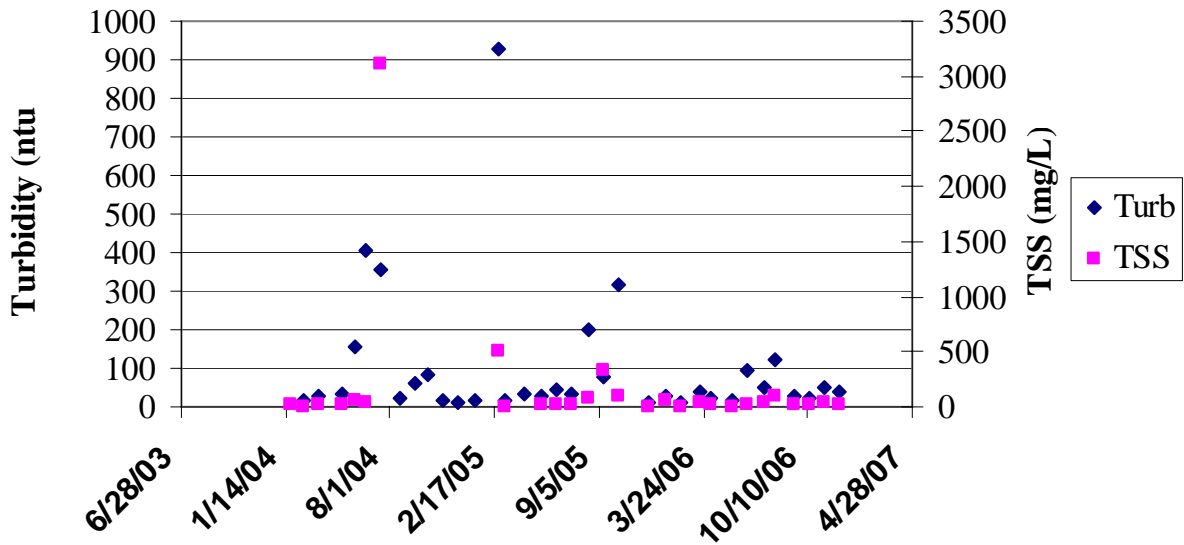
- February sampling event (preliminary)
  - Bugs are stressed- not many sensitive or insensitive species. Probably reflects the ecoregion (Triassic basin), development pressure, and/or recent (within 2-3 yrs) draught

# Durham Monitoring Data at LC1 & LC3

### LC1-Southview Rd

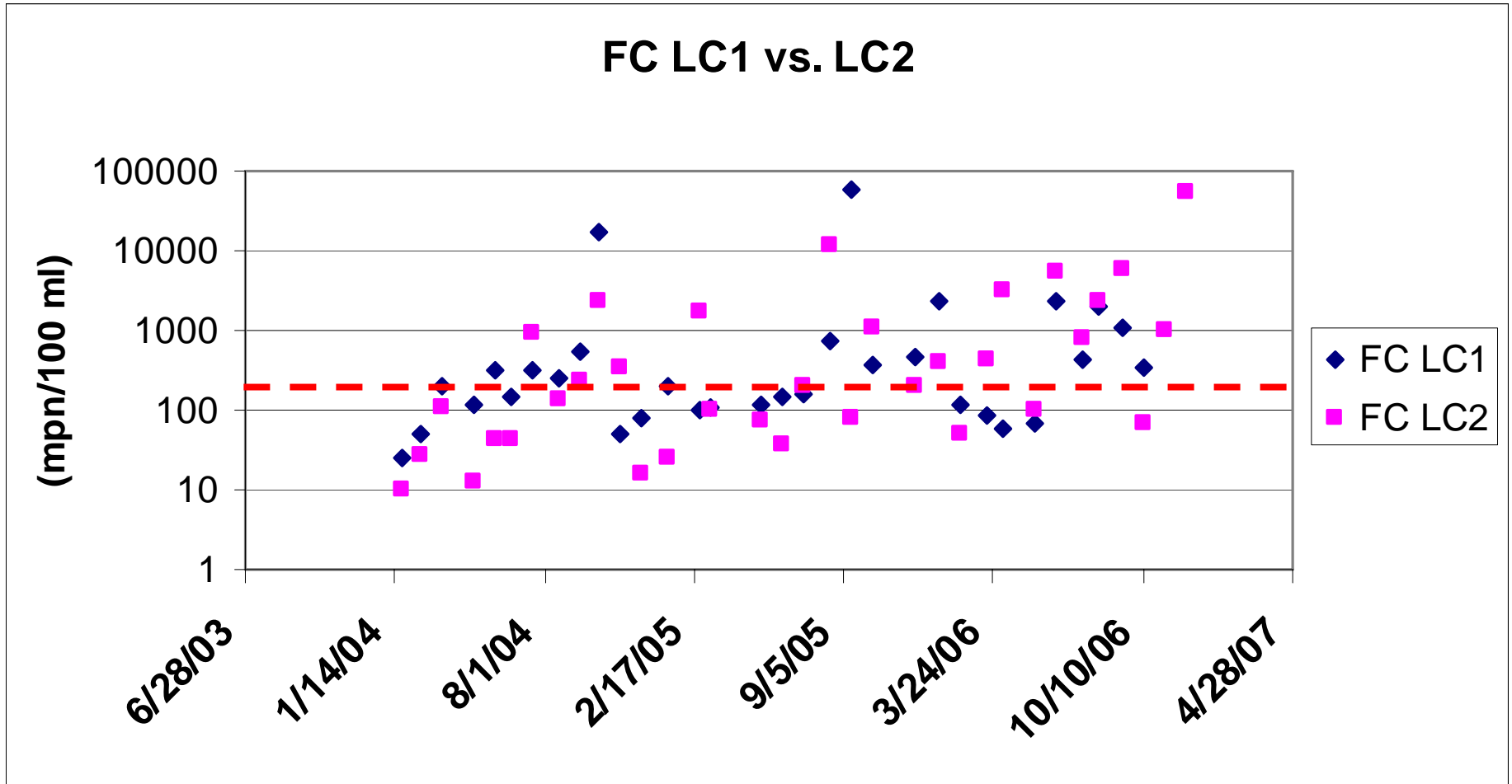


### LC2- Rocky Branch at Kemp Rd





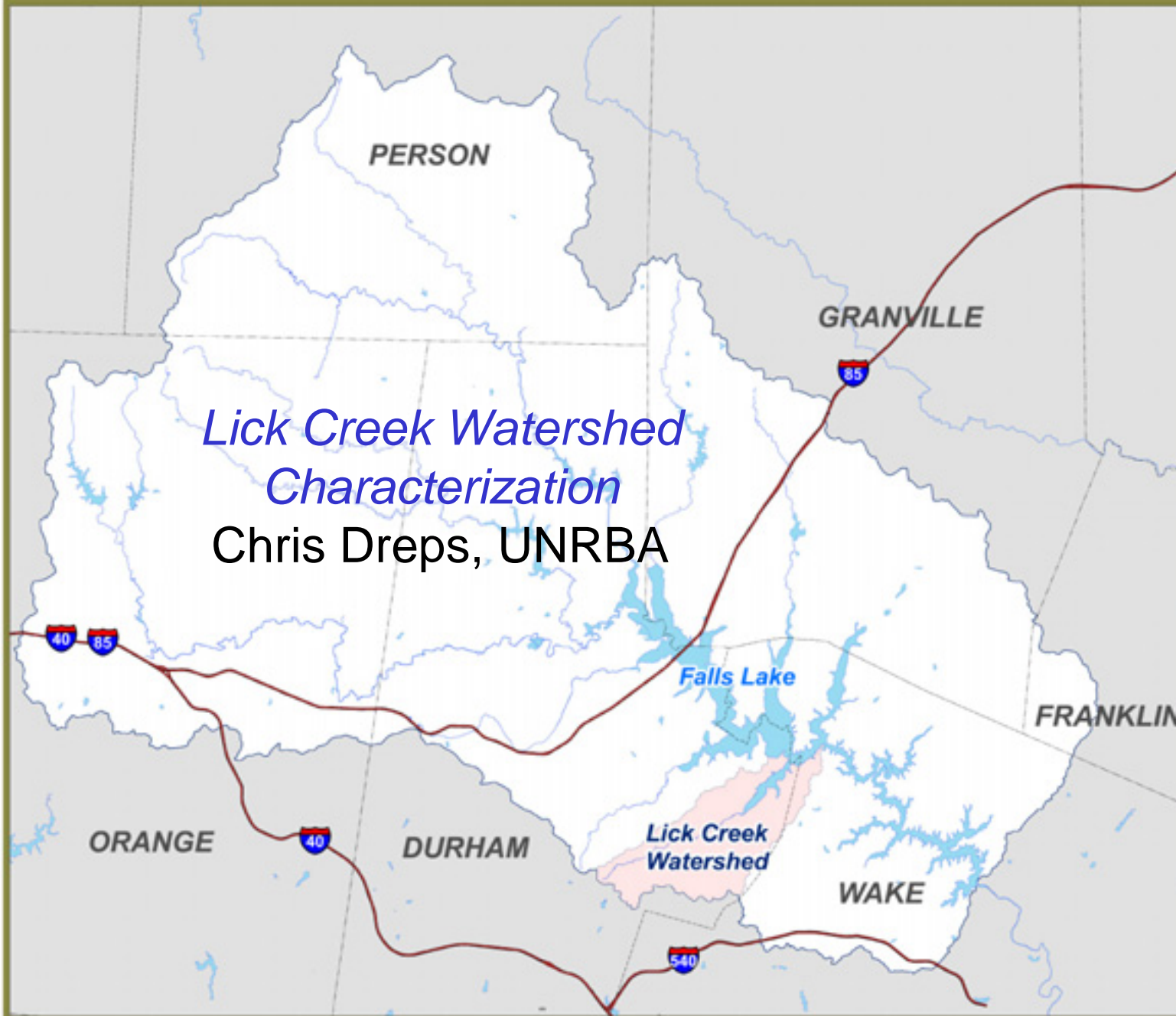
# Fecal Coliform Bacteria



# Summary

- Sample major drainage areas
  - Base and stormflow sampling
  - N, P, metals, TSS, and e coli
  - Discharge
- 
- Assess where greatest pollutant load originating to focus protection/restoration efforts

# Lick Creek Watershed Location in the Upper Neuse River Basin



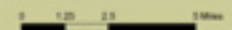
*Lick Creek Watershed  
Characterization*  
Chris Dreps, UNRBA

## Legend

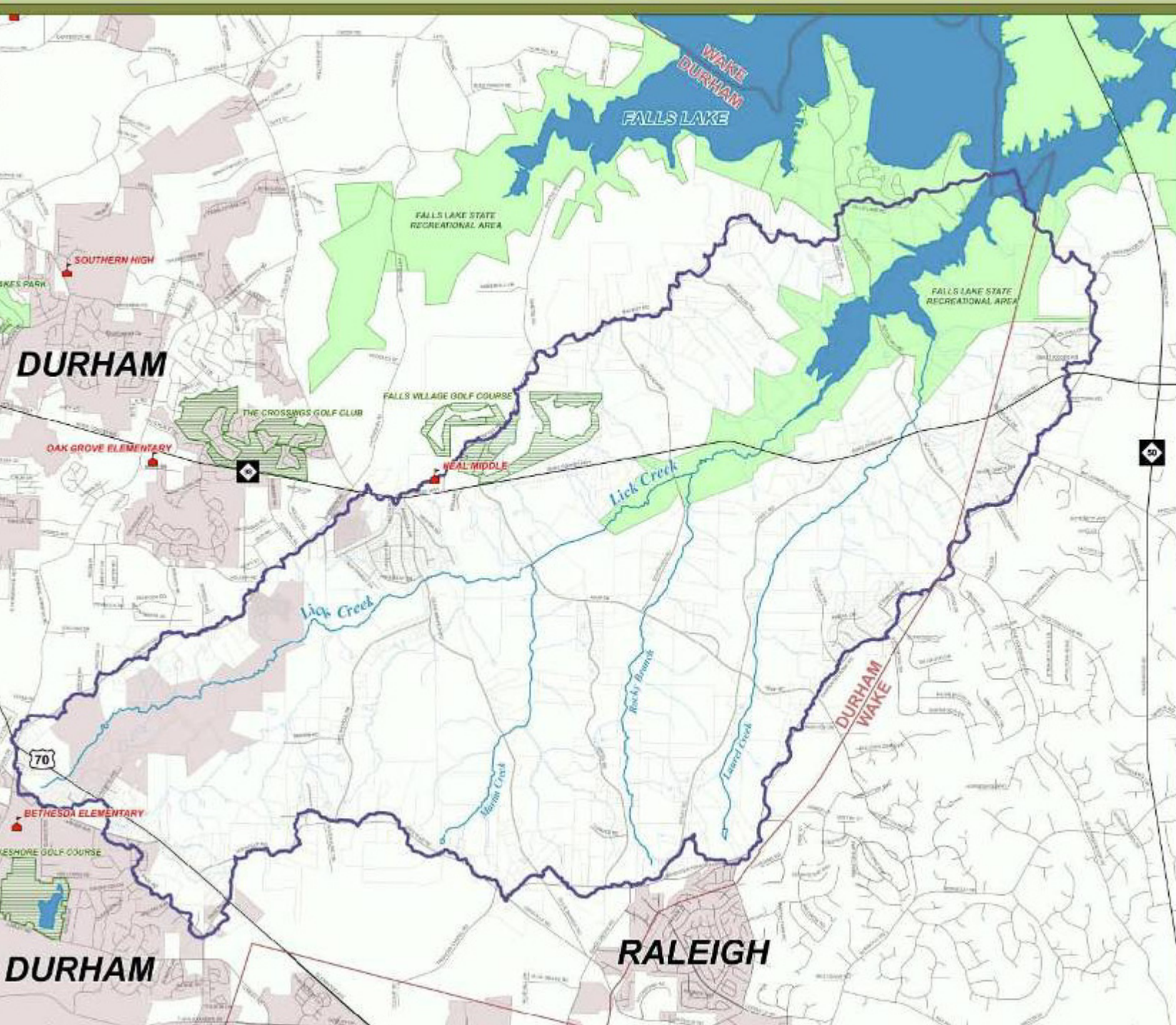
- County Boundaries
- Municipalities
- Interstate
- Upper Neuse River Basin
- Lick Creek Watershed
- Surface Water
- Major Streams



Upper Neuse River Basin Association  
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Geographic Information Systems  
3/7/2007







**LEGEND**

- Municipal Boundary
- County Line
- Major Roads
- Streets
- Watershed Boundary
- Water Bodies
- Major Streams
- Minor Streams
- Parks & Protected
- Golf Course
- Lick Creek Parcels
- Schools

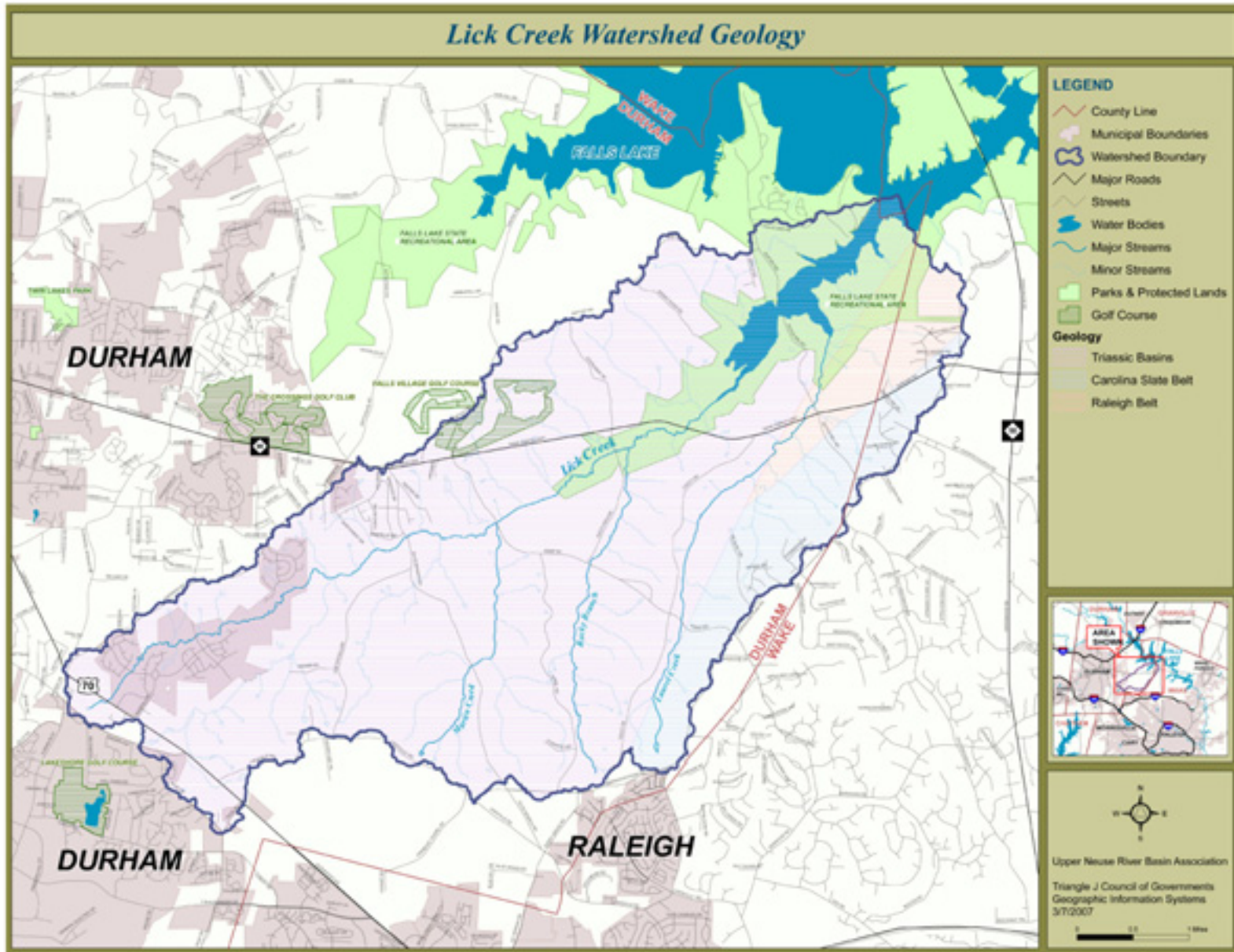


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# Watershed Geology





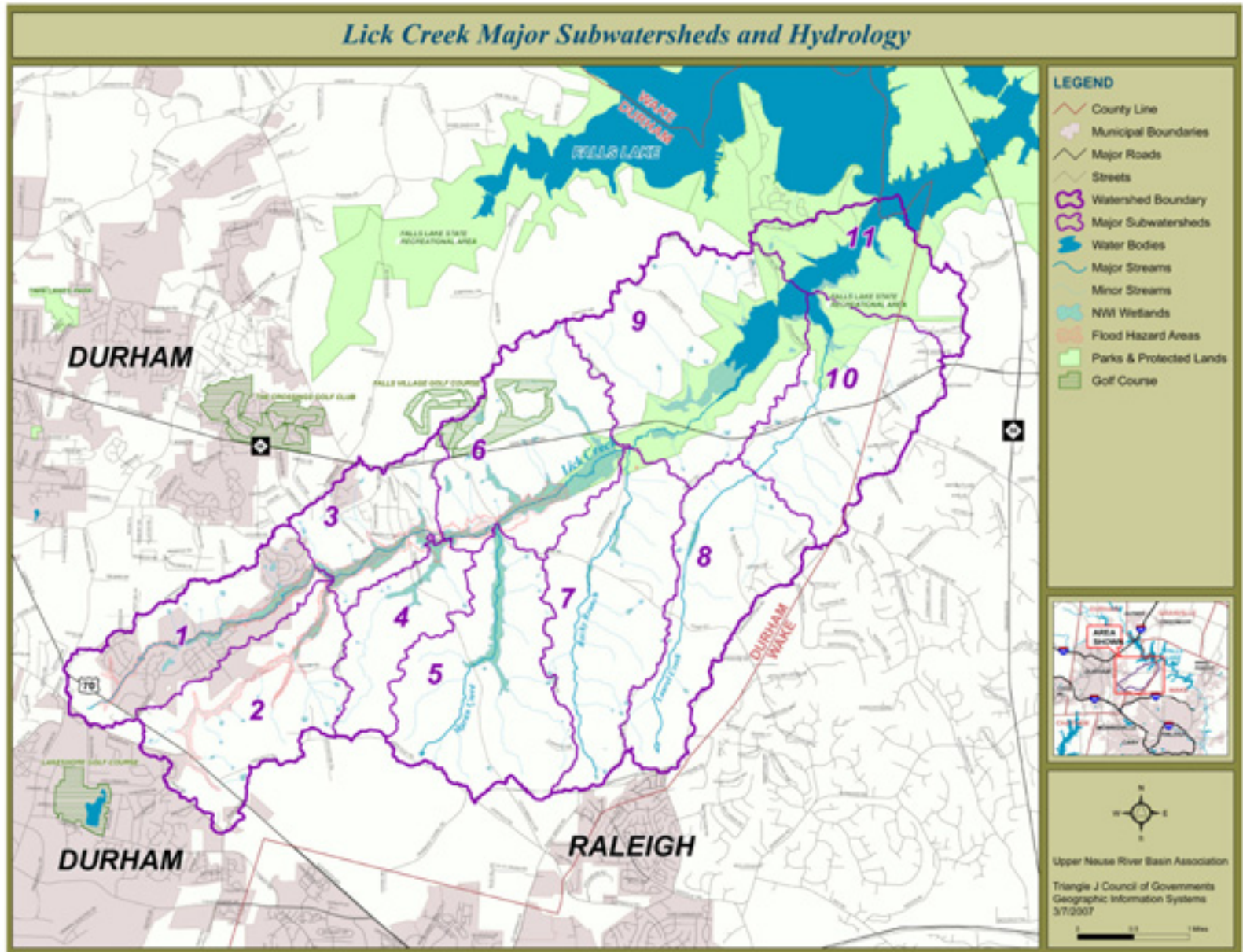
# *Watershed Geology and Hydrology*



2007/02/15

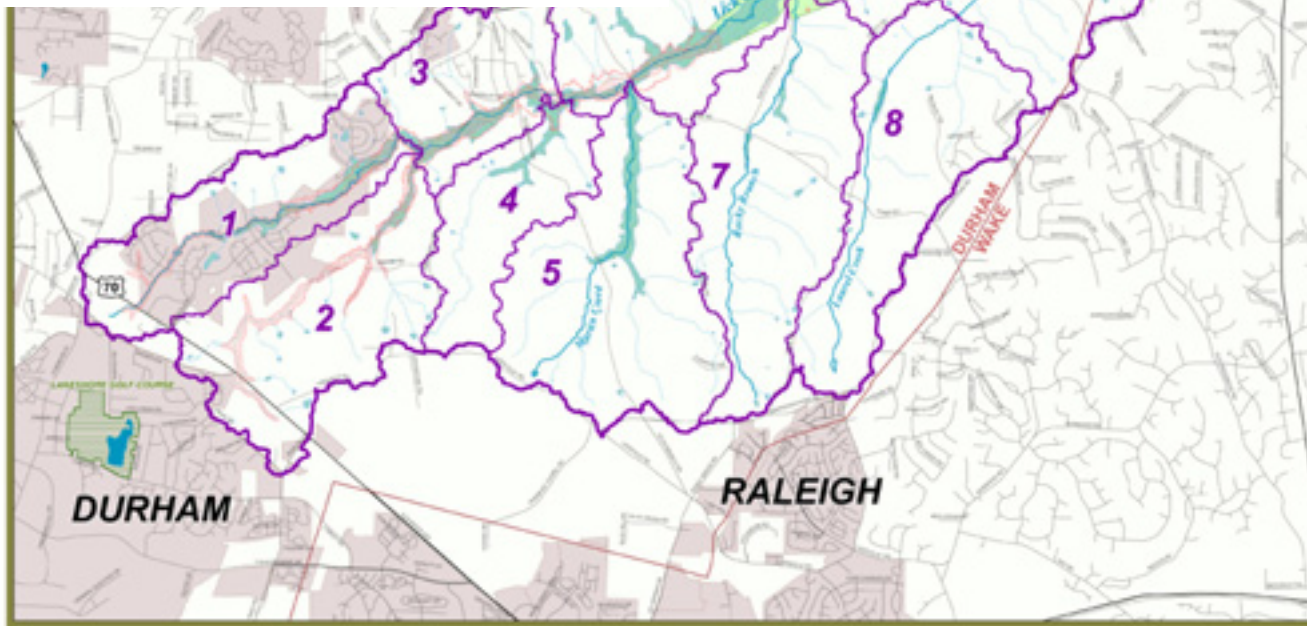
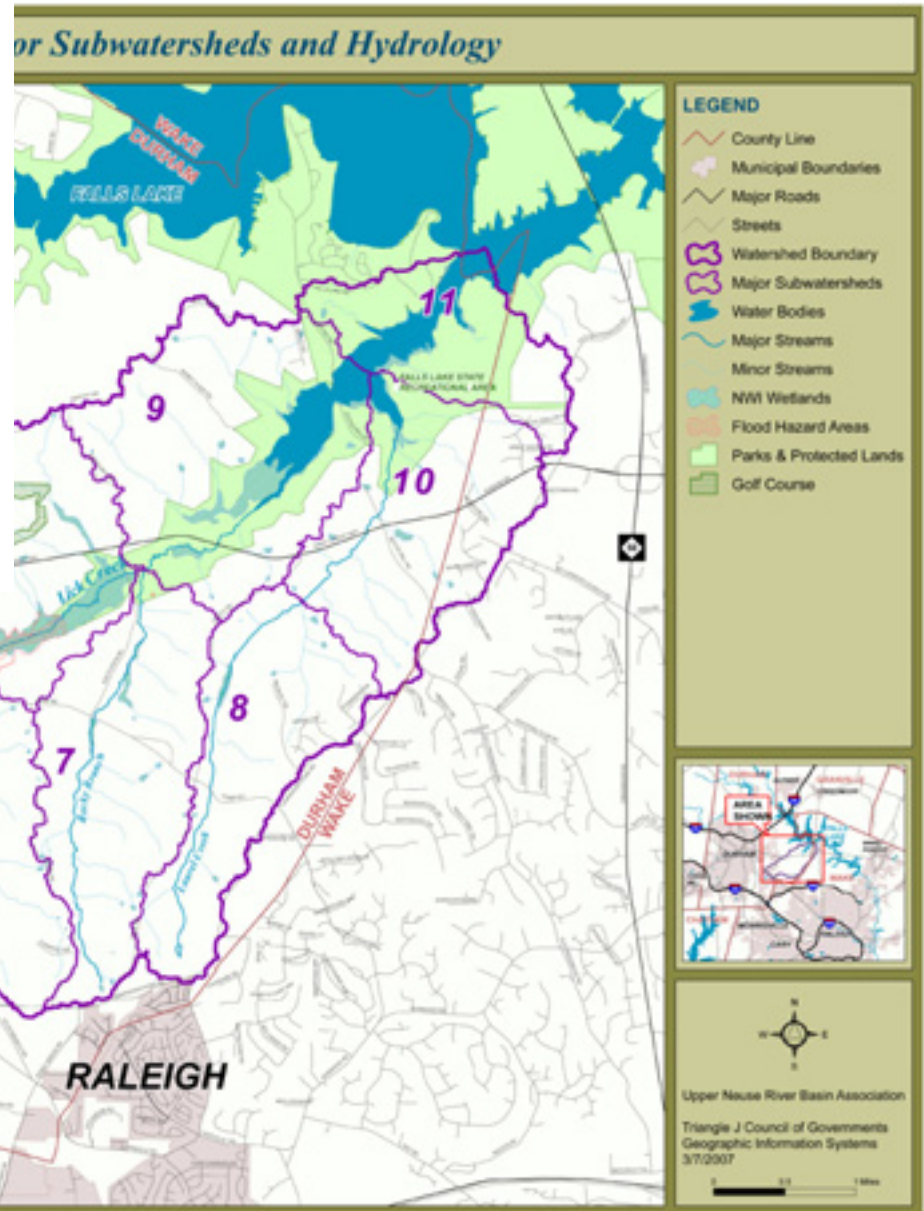


# Watershed Hydrology



# Watershed Hydrology

Subwatershed Number	Total area	
	(acres)	(miles <sup>2</sup> )
1	1501	2.34
2	757	1.18
3	1079	1.69
4	1310	2.05
5	698	1.09
6	1600	2.50
7	1551	2.42
8	1294	2.02
9	1959	3.06
10	1430	2.23
11	881	1.38
<b>Total Area</b>	<b>14,059</b>	<b>22.0</b>





# *Watershed Geology and Hydrology*

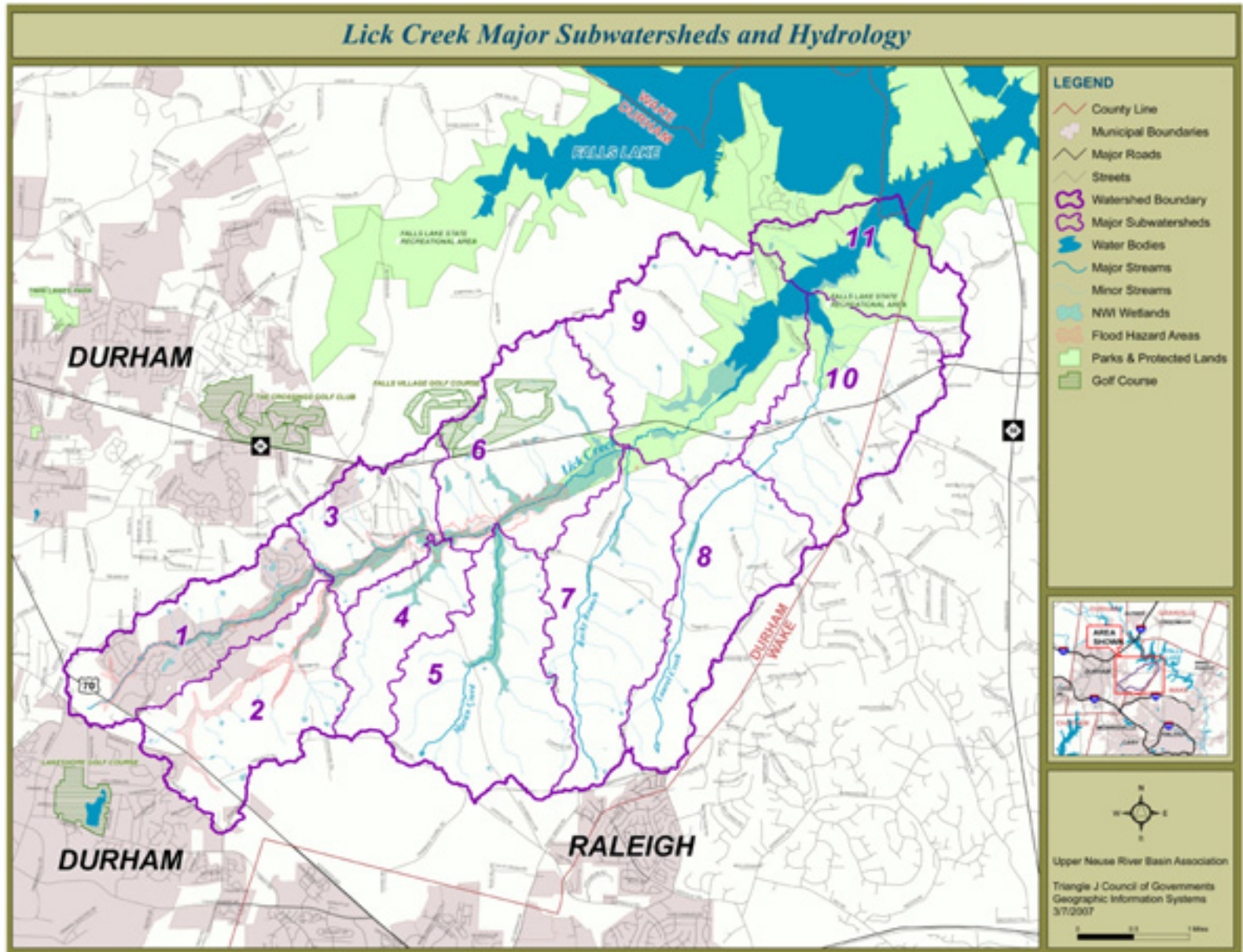


**Subwatershed 7, Rocky Branch**



**Subwatersheds 8 & 10, Laurel Creek**

# Watershed Hydrology



# Watershed Hydrology

Wetland Type	Total area (acres)
<b>(PUBH):</b> Palustrine, unconsolidated bottom, permanently flooded, impounded includes all nontidal wetlands dominated by trees, shrubs, and emergents, mosses or lichens or wetlands lacking such vegetation but that are less than 20 acres, do not have an active wave-formed or bedrock shoreline feature, and have at low water a depth less than 6.6 feet in the deepest part of the basin. Farm ponds comprise the majority of these wetlands in Lick Creek.	56
<b>(L1UBHh)</b> Lacustrine, Limnetic wetlands and deepwater habitats created by the Falls Lake Reservoir or other impoundment.	285
<b>(PFO1A &amp; PFO1C)</b> Palustrine, forested, broad-leaved deciduous, temporarily flooded. These are the primary floodplain wetlands of Lick Creek.	481
<b>PEM1Ah (PEM1Fh, PEM1Ch)</b> Palustrine, emergent, temporarily (seasonally) flooded wetlands upstream of the Falls Lake Reservoir.	110
<b>(PSS1)</b> Palustrine, shrub-scrub wetlands in Lick Creek floodplains.	47
<b>Total NWI Wetlands in Lick Creek</b>	<b>979</b>

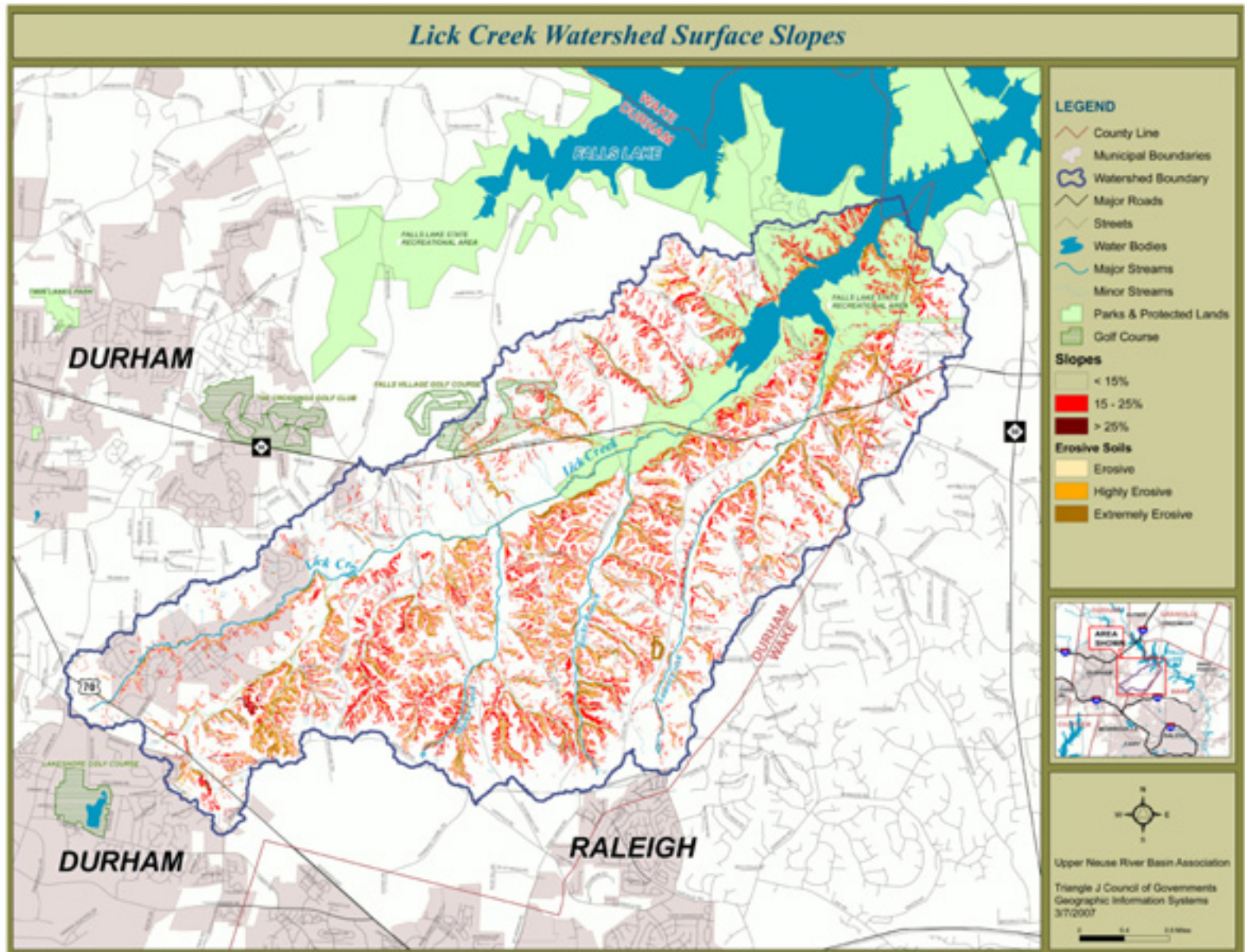


# *Watershed Hydrology*



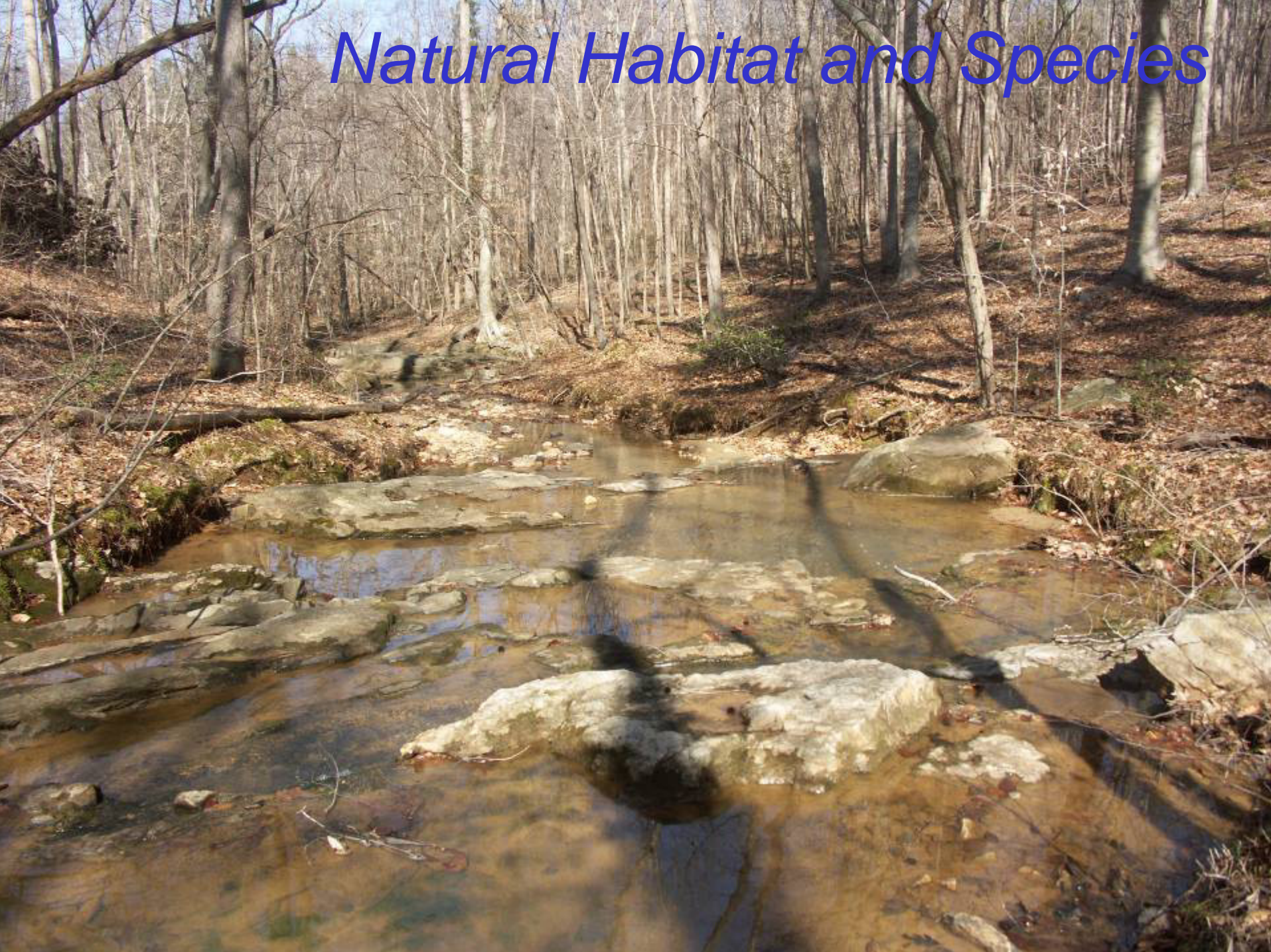


# Watershed Soils and Slopes



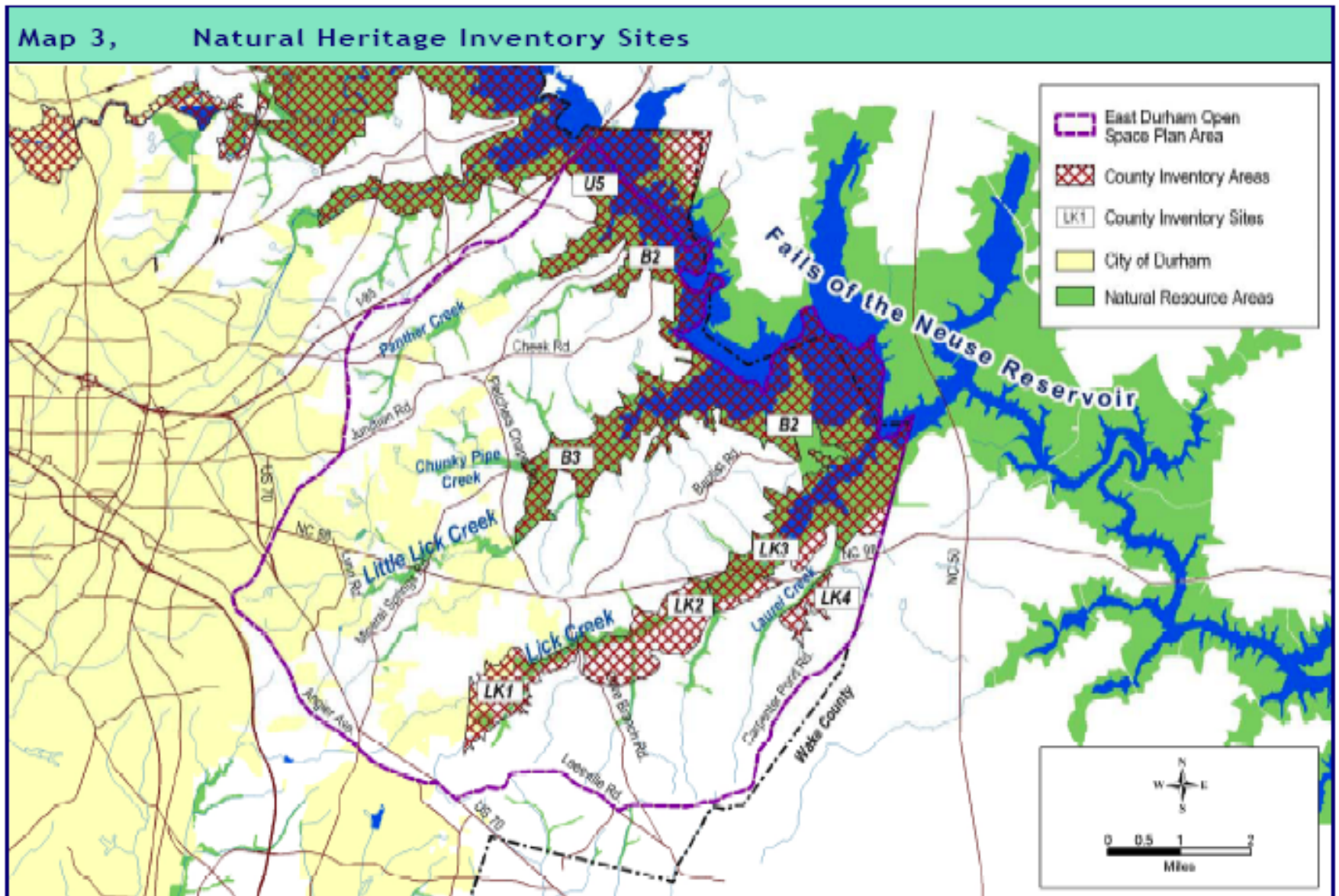


# *Natural Habitat and Species*





# Natural Habitat and Species



(Source: East Durham Open Space Plan)

# *Natural Habitat and Species*



(Source: [James Harding](http://animaldiversity.ummz.umich.edu) (<http://animaldiversity.ummz.umich.edu>))



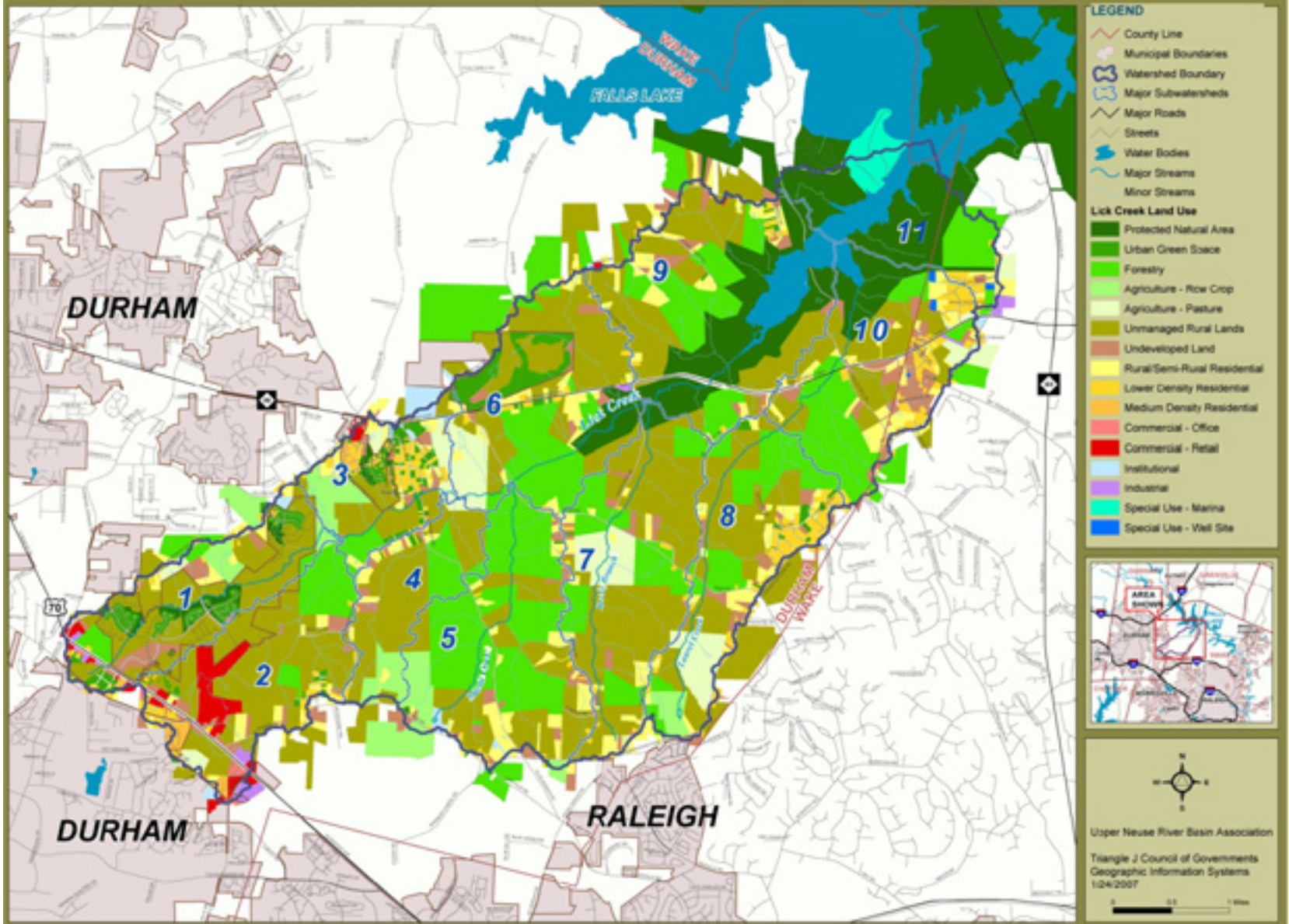
# *Natural Habitat and Species*



(Source: Jenkins, R.E and N.M. Burkhead. 1993. Freshwater Fishes of Virginia. American Fisheries Society, Bethesda, Maryland. Found at <http://www.cnr.vt.edu/efish/families/carolinadart.html>)

# Watershed Land Use

## Lick Creek Watershed Existing Land Use Analysis



# Watershed Land Use

Land Use Category	Acres	Square Miles	Percent Total Land Use
<b>Protected Natural Area</b> (US ACE Land, Common Open Space in subdivisions)	1,425	2.23	10.1
<b>Urban Green Space</b> (Cemetaries, City Parks, Golf, Undeveloped lots <2 acres)	396	0.62	2.8
<b>Forestry Lands</b>	2,994	4.68	21.3
<b>Agricultural Row Crop and Pasture</b>	900	1.41	6.4
<b>Medium Density Residential</b>	36	0.06	0.3
<b>Low-Medium Density Residential</b> (0.125-0.25 acre)	22	0.03	0.2
<b>Low-Density Residential</b> (0.25-0.5 Acre)	47	0.07	0.3
<b>Very Low Density Residential</b> (0.5-2 Acre)	454	0.71	3.2
<b>Semi-Rural Residential</b> (2-3 Acres)	193	0.30	1.4
<b>Rural Residential</b> (3-10 Acres)	673	1.05	4.8
<b>Unmanaged Rural Lands</b> (Vacant, Undeveloped, or Residential Parcels >10 Acres)	5,153	8.05	36.7
<b>Undeveloped Land</b> (Vacant Land < 10 Acres)	623	0.97	4.4
<b>Institutional</b>	45	0.07	0.3
<b>Industrial</b>	30	0.05	0.2
<b>Commercial Retail and Office</b>	169	0.26	1.2
<b>Falls Lake Water Surface</b>	363	0.57	2.6
<b>Special Use: Marina</b>	71	0.11	0.5
<b>Special Use: Well Sites</b>	10	0.02	0.1
<b>Road Right-of-Way</b> (Local roads, US 70 and NC 98)	454	0.71	3.2
<b>Total Land Use Area Excluding Road Rights-of-Way</b>	13,605	21.26	96.8
<b>Total Watershed Area</b>	14,059	21.97	100.0

(Source: GIS coverage of August 2006 Durham City/Co. and Sep. 2006 Wake Co. parcels)

# Point Sources of Pollution

Sub-watershed	Area (Acres)	Total Buildings*	With Sewer**	With On-Site WW**	Sand Filter Systems**
1	1501	74	24	50	4 (1)
2	757	88	13	75	2 (0)
3	1079	240	118	122	24 (0)
4	1310	23	0	23	2 (0)
5	698	61	0	61	11 (0)
6	1600	63	4	59	1 (0)
7	1551	51	0	51	6 (0)
8	1294	134	0	134	5 (0)
9	1959	57	0	57	12 (0)
10	1430	155	0	155	12 (12)
11	881	30	0	30	(0)
<b>Total Area</b>	<b>14,059</b>	<b>976</b>	<b>159</b>	<b>817</b>	<b>79 (13)</b>

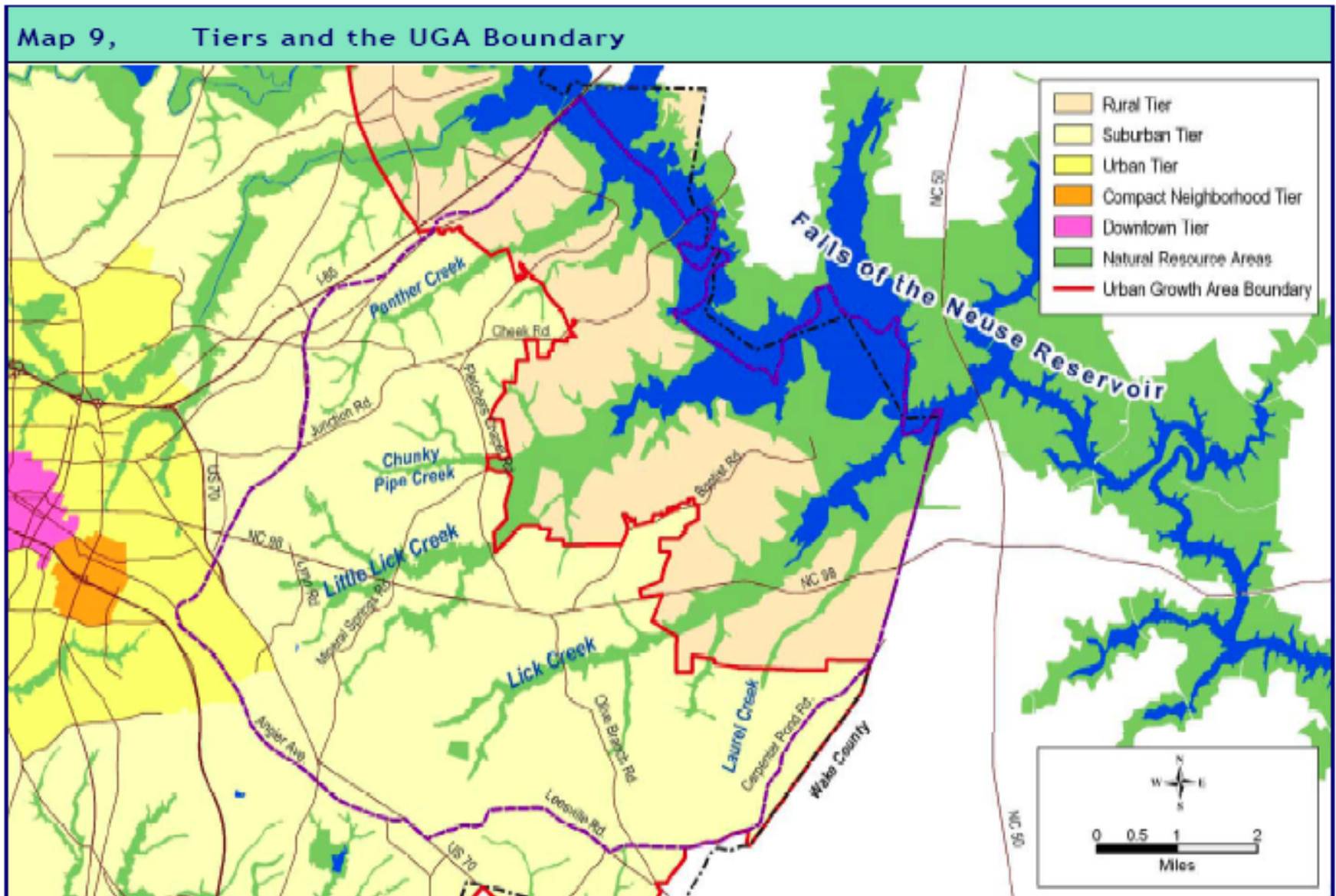
(Source: GIS coverage of August 2006 Durham City/Co. and Sep. 2006 Wake Co. parcels, and Durham County GIS coverage of sand filter household systems)

\*Parcels with building values were assumed to have buildings with wastewater disposal needs

\*\*Parcels in City are assumed to have municipal sewer service; those outside city are assumed to treat wastewater with on-site wastewater systems

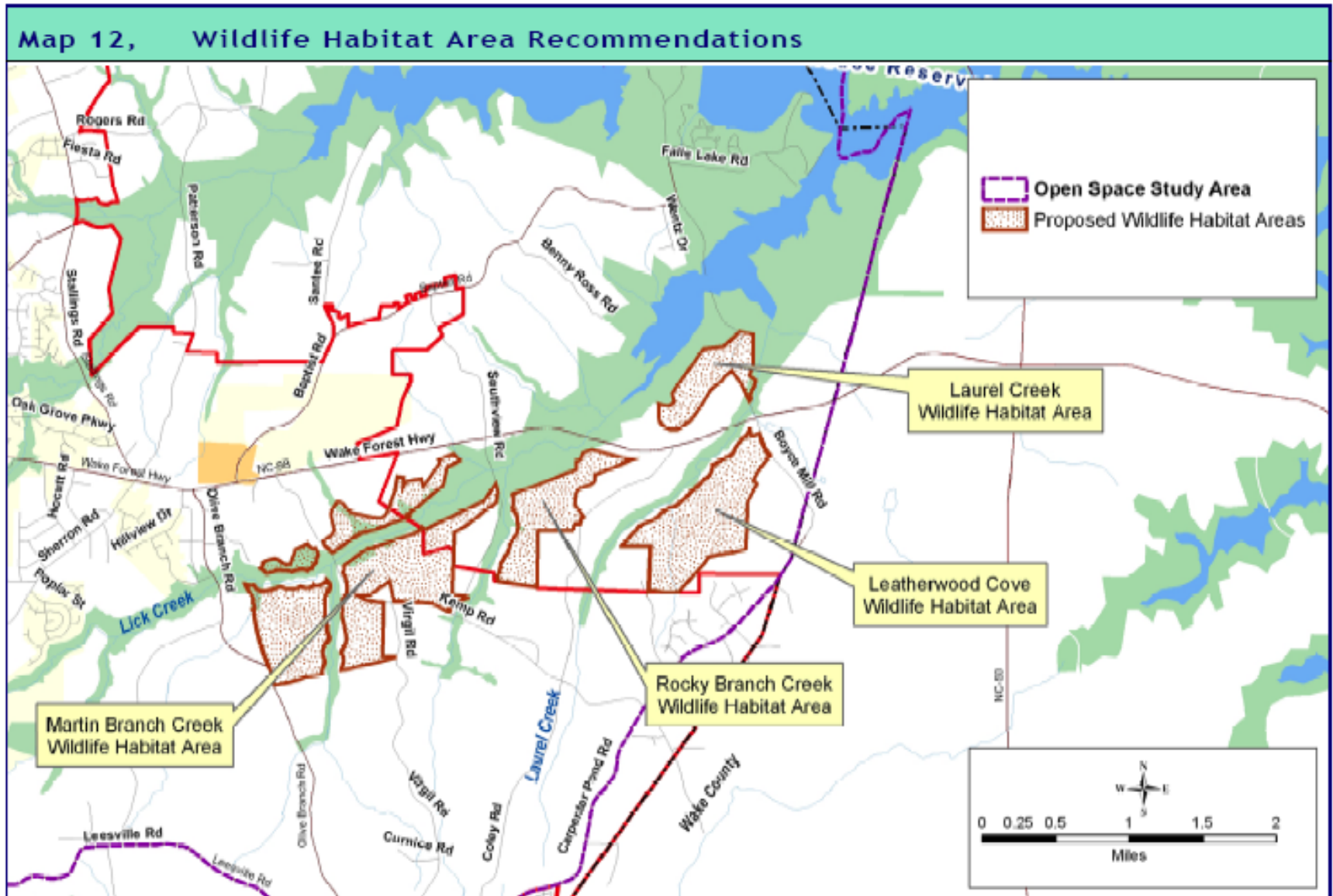


# Future Land Use?



(Source: East Durham Open Space Plan)

# Future Land Use?



(Source: East Durham Open Space Plan)

*Lick Creek Watershed  
Management Goals  
(part 2)*

# *Lick Creek Restoration Driving Forces*

- Lick Creek's 303(d) listing as an "impaired water body" that will possibly require a federally-regulated Total Maximum Daily Load (TMDL) process (Restoring habitat and water quality).
- The Falls Lake Nutrient Management Strategy, driven by the federal TMDL process and a new state law (protecting drinking water, fishing, and recreation).
- The Durham Comprehensive Plan and UDO, which plan for suburban development in Lick Creek.
- The goal of Open Space in the East Durham Plan.



# *Envisioning the watershed...*

Questions:

1. What do you want the watershed to be like in 20 years?
2. How does this match the list of driving forces I have provided?

# *Setting management goals...*

Small groups:

1. Review “straw man” goals
2. How does each goal match the list of driving forces I have provided?
3. Which goals belong on our draft watershed goals list?

*Adjourn*