Lick Creek Watershed Restoration Plan

Stakeholder Meeting 3

May 9, 2007

Agenda

3:00 Welcome and Introductions

3:05 Announcements

3:10 Watershed Restoration Goals*

3:45 Review of Lick Creek Fieldwork Findings

5:30 Adjourn

* Decision Item

Next meeting:
June 20, 3:00 – 5:00
Rollingview Community Center

-Review subwatershed-level assessment.
-Discuss restoration project prioritization criteria.

Announcements

Lick Creek Watershed Management Goals (part 3)

Lick Creek Restoration Driving Forces

Primary Drivers:

- NC Division of Water Quality “impaired” listing of Lick Creek
- NC DWQ Falls Lake Nutrient Management Strategy

Other (secondary) Drivers:

- The Durham Comprehensive Plan and UDO
- The East Durham Open Space Plan.

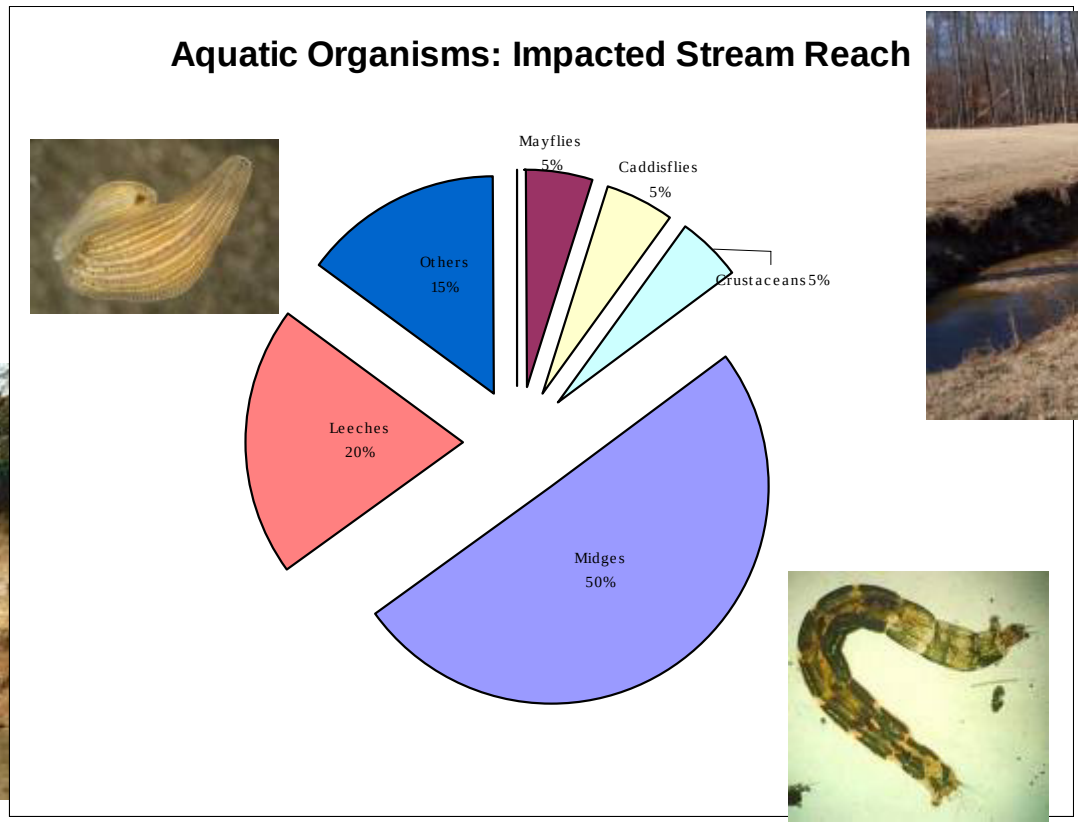
Goals and Objectives

Goal: General statement of purpose or intent

Objective: Precise statement of specific action that needs to be done (measurable by indicators)

Lick Creek Restoration Goals

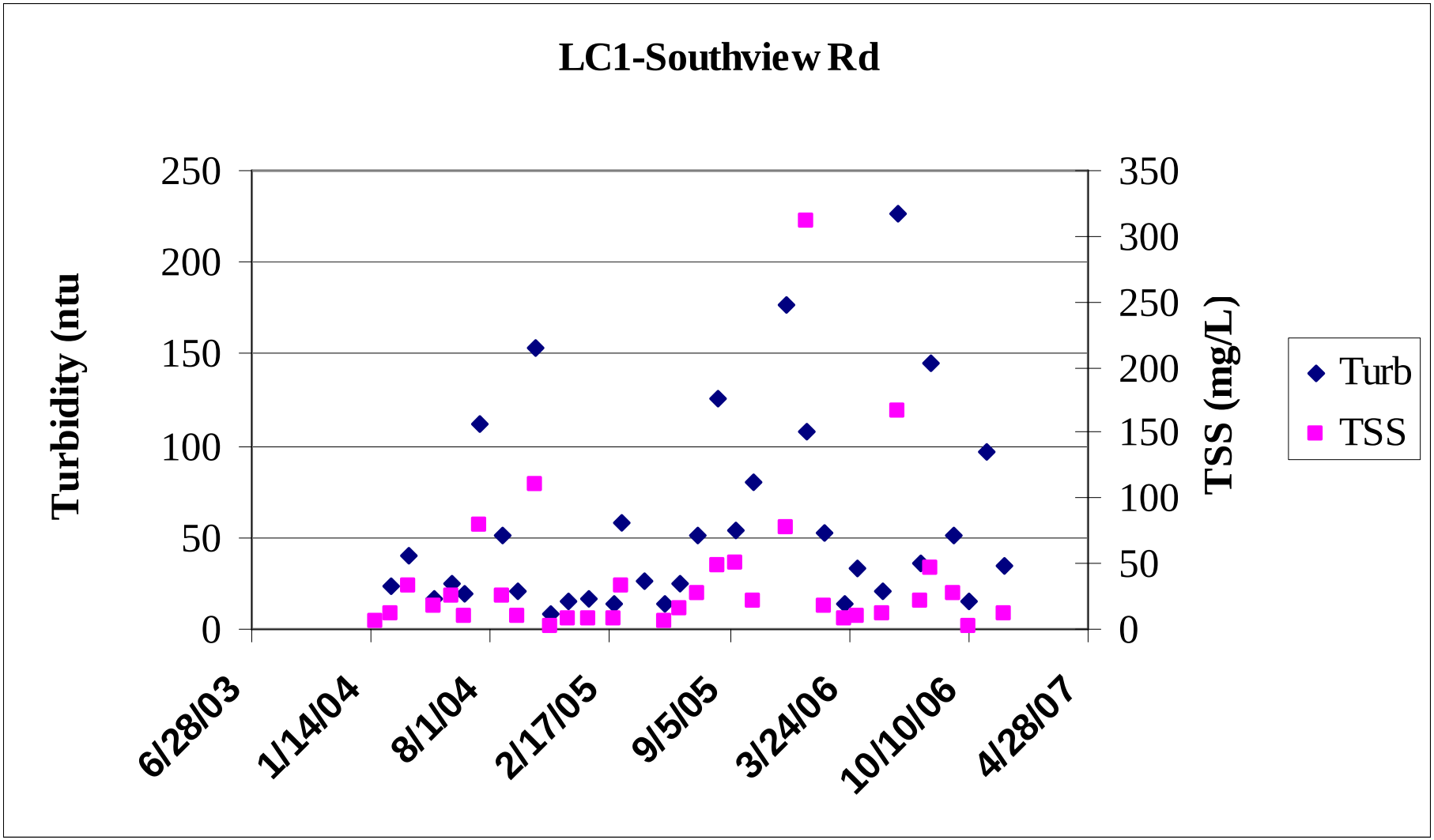
GOAL 1: Develop a hypothesis about the causes of biological impairment in Lick Creek and recommend approaches to addressing impairment status



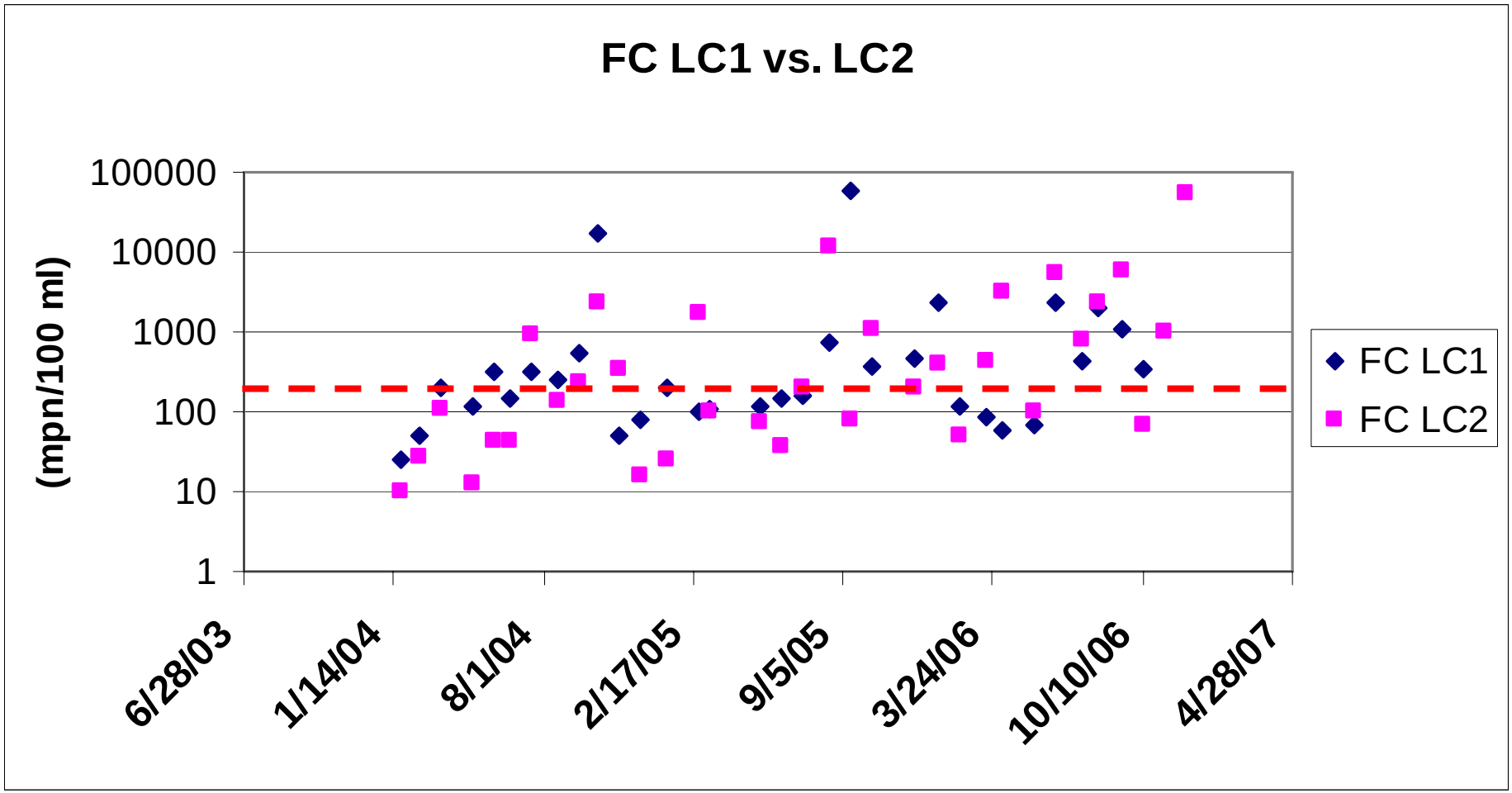
Lick Creek Restoration Goals

GOAL 2: Identify pollutants and their sources that may be impairing aquatic habitat and water quality in Lick Creek *(water quality is not impaired currently).* Suspected pollutants include dissolved oxygen (and biochemical oxygen demand), fecal coliform and turbidity.

Sediment


LC1-Southview Rd
Turbidity (ntu
TSS (mg/L)
250
200
150
100
50
0
350
300
250
200
150
100
50
0
6/28/03
1/14/04
8/1/04
2/17/05
9/5/05
3/24/06
10/10/06
4/28/07
Turb
TSS

Fecal Coliform Bacteria

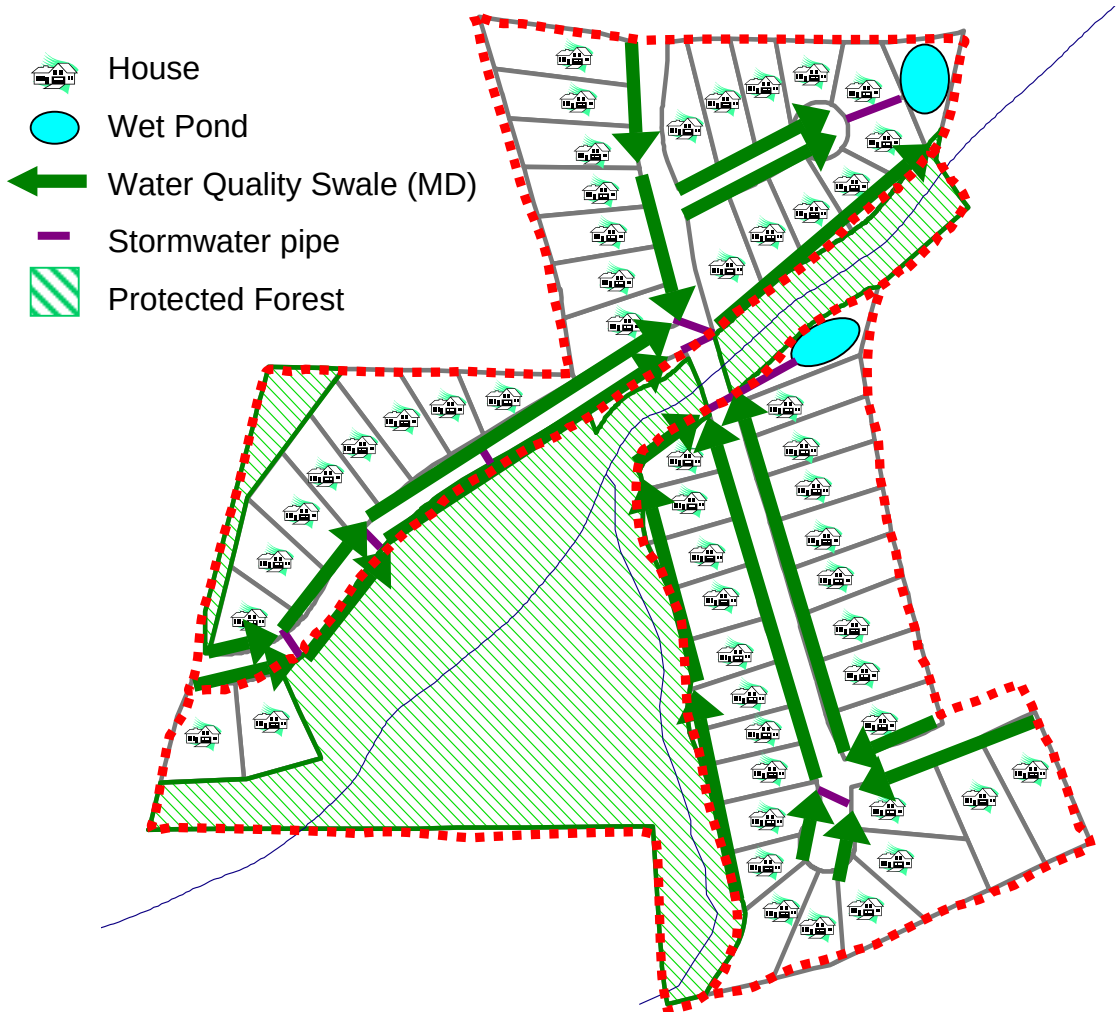


Lick Creek Restoration Goals

GOAL 3: Develop strategies for reducing, and maintaining at levels meeting water quality standards, the pollutants identified in Goal 2.

Lick Creek Restoration Goals

GOAL 4: Mitigate future changes to watershed hydrology and water quality.



Stakeholder Interests

- **Clean water**
- **Whatever animal life that belong in the watershed will be there**
- **Good hydrology**
- **Wildlife habitat connectivity (will still exist)**
- **Natural topography (developed sites exhibiting natural topography)**
- **Development for nearby job centers**
- **Agriculture still being practiced in Lick Creek**
- **Harmonious multi-use of watershed**
- **Healthy riparian areas**

Additional goals

How are the project goals and these interests compatible?

Additional goals?

Lick Creek Fieldwork Findings (Sally Hoyt, Center for Watershed Protection)

Field Work Purpose

- Evaluate conditions and identify restoration opportunities
- In the stream corridor and uplands

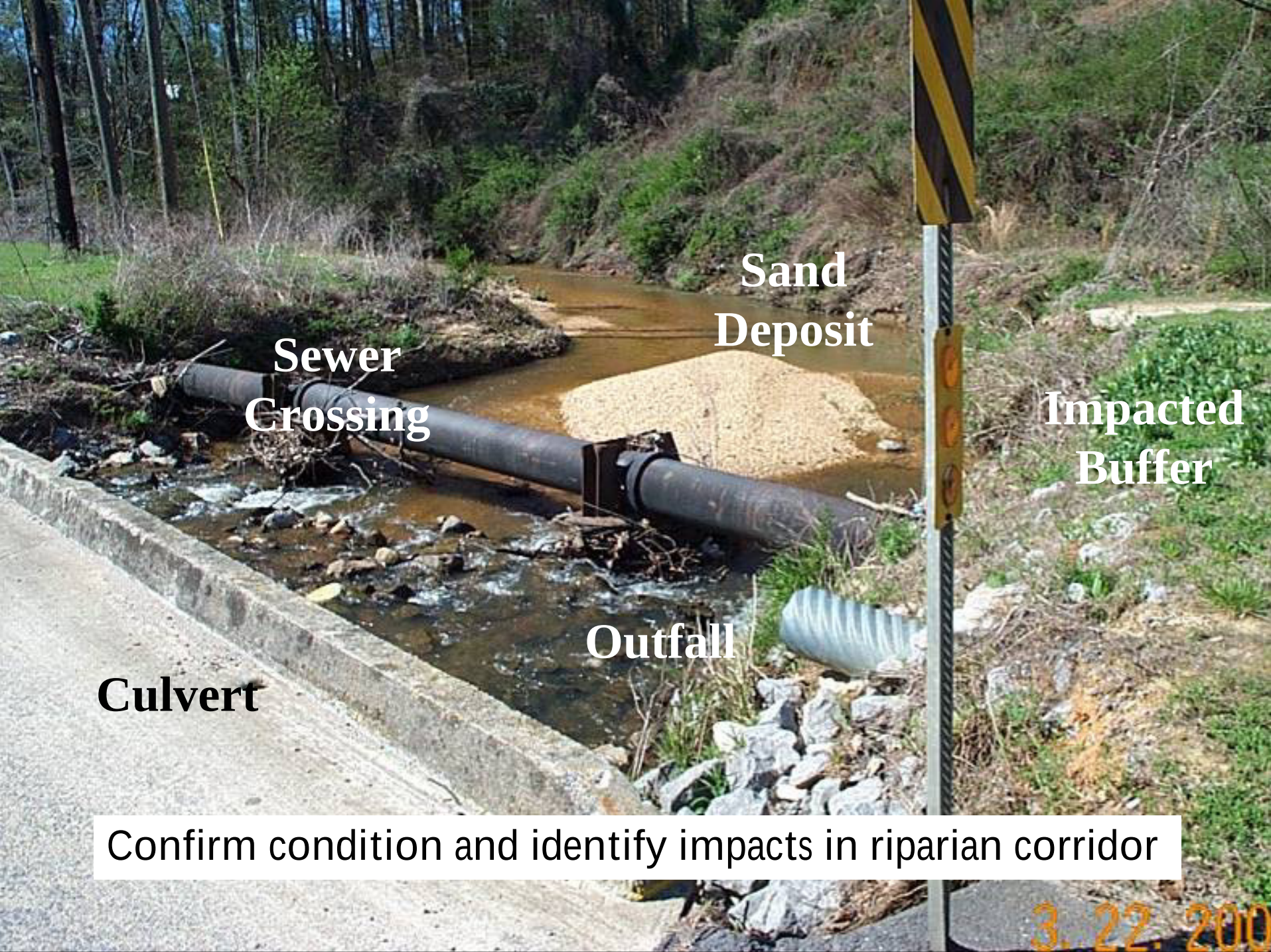
Field Work Partners

- Center for Watershed Protection (CWP)
- Upper Neuse River Basin Association (UNRBA)
- City of Durham Stormwater Services Water Quality and Plan Review groups
- Durham County Stormwater and Erosion Control Division
- NC Ecosystem Enhancement Program


The Big Picture

Stream Work

- Walk stream corridor
- Focus on headwater streams
- Look at those most likely to have impacts necessitating restoration
- Also, a representative look at other areas
- Assessment focused on ID of restoration ops
- Assessment focuses on geomorphology, in-stream habitat, and riparian conditions



Confirm condition and identify impacts in riparian corridor


Envision buffer reforestation…


Or sometimes buffer reforestation is a no-brainer!

Possible Stream Corridor Restoration Options

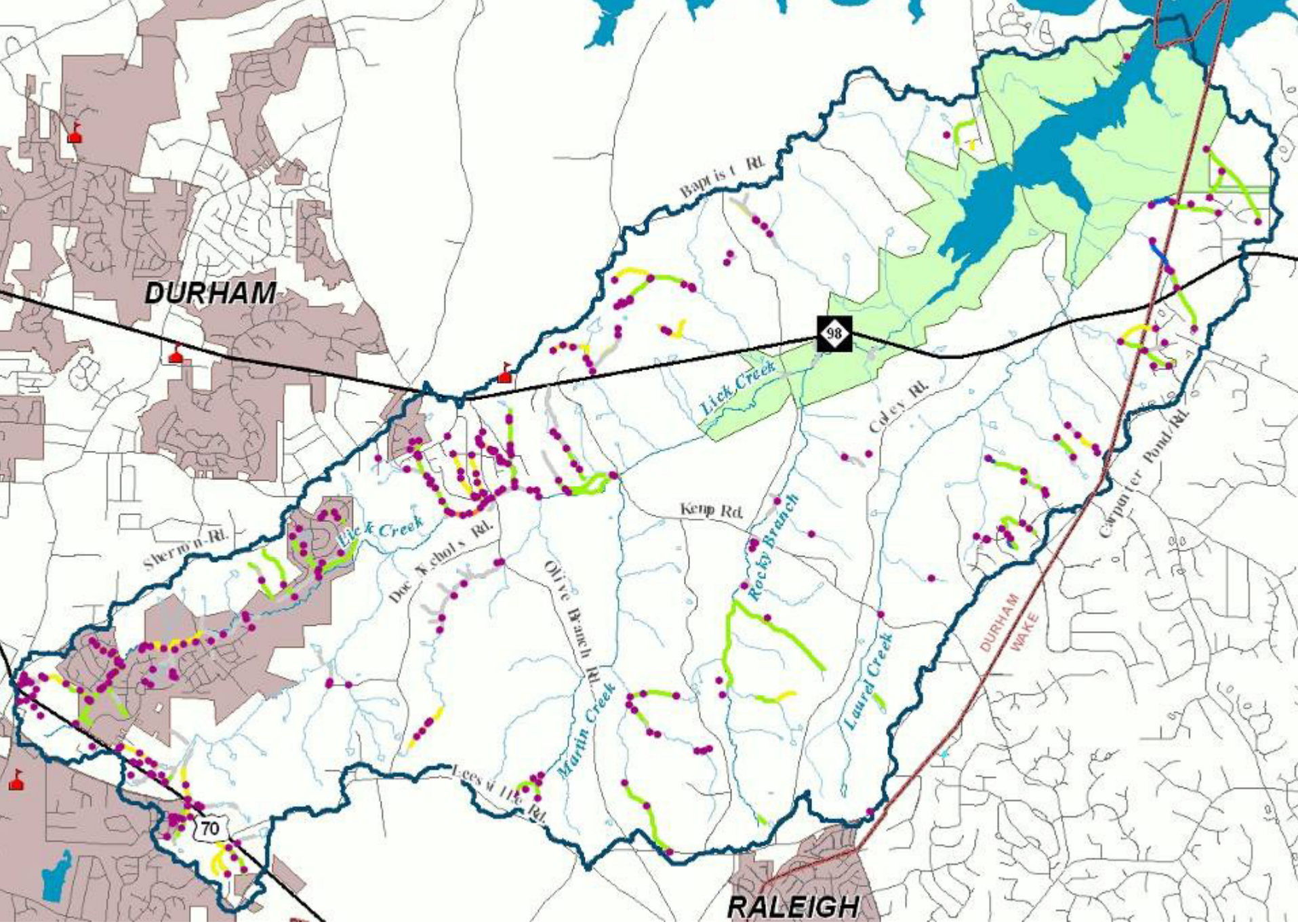
- Buffer plantings
- Illicit discharge elimination
- Bank stabilization
- Repairs

Upland Work

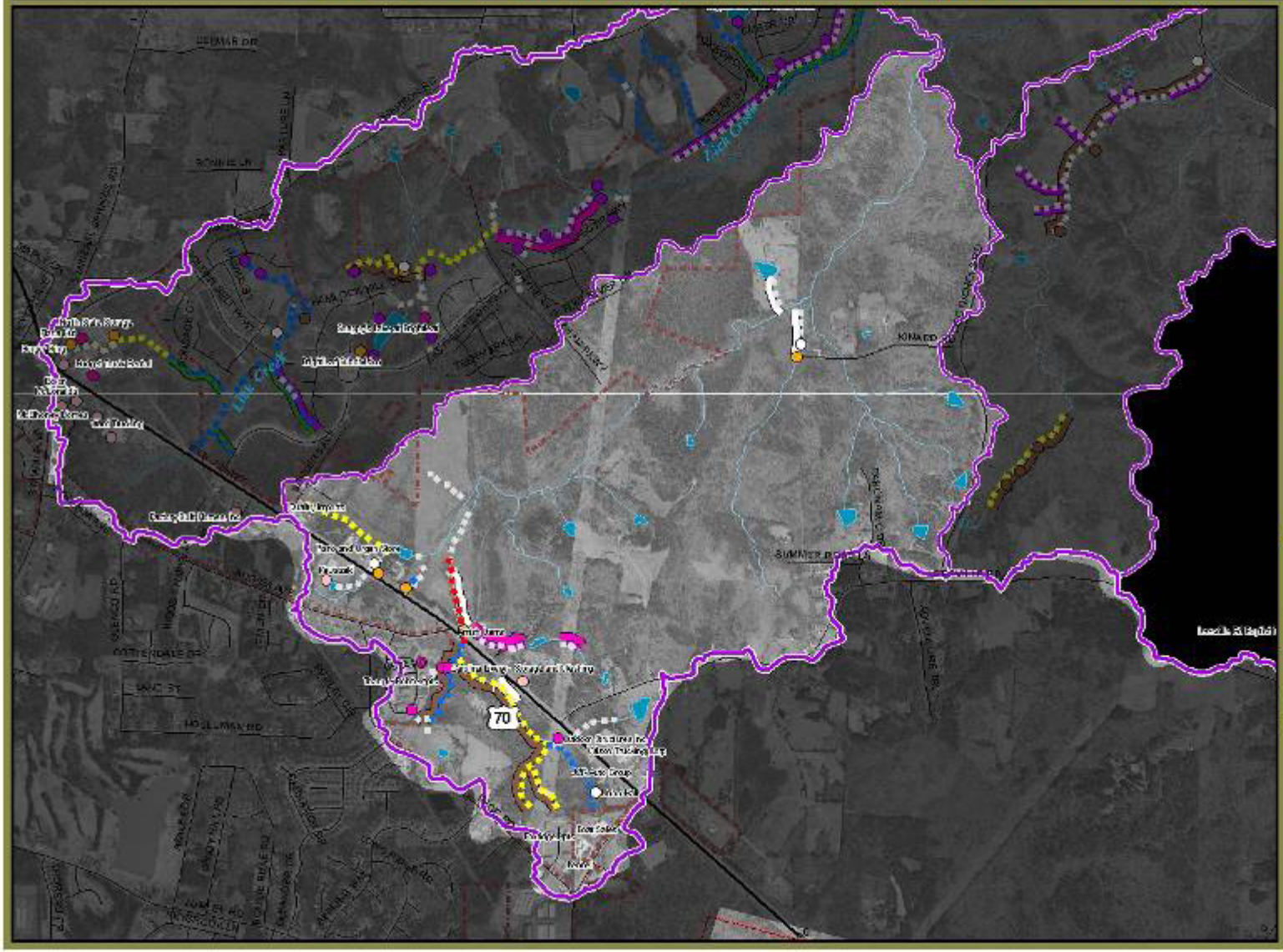
- Pre-identified potential retrofit locations based on maps.
- Visited outfalls, existing stormwater areas.
- Visited all potential hotspots in the watershed – marina, gas stations, junkyards, auto repair shops, restaurants

Possible Upland Area Restoration Options

- Stormwater retrofits
- Pollution prevention
- Reforestation


DURHAM
RALEIGH
98
70
Baptist Rd.
Lick Creek
Coles Rd.
Carpenter Pond Rd.
Kemp Rd.
Sherron Rd.
Lick Creek
Doc Nichols Rd.
Olive Branch Rd.
Rocky Branch
Martin Creek
Laurel Creek
Lees Mill Rd.
DURHAM
WAKE

Lick Creek Stream Conditions & Impacts: Subwatershed 2



Overall Conditions

- Many Lick Creek tributaries are in good shape from a geomorphic perspective.
- Though this stream is biologically impaired, the impairment may be attributed to sparse in-stream habitat created by the geology and historic impacts.
- Few potential restoration opportunities were found.

Historic Impacts

Wolman, M.G., 1967. A cycle of sedimentation and erosion in urban river channels. *Geografiska Annaler* 49(a).

M. GORDON WOLMAN

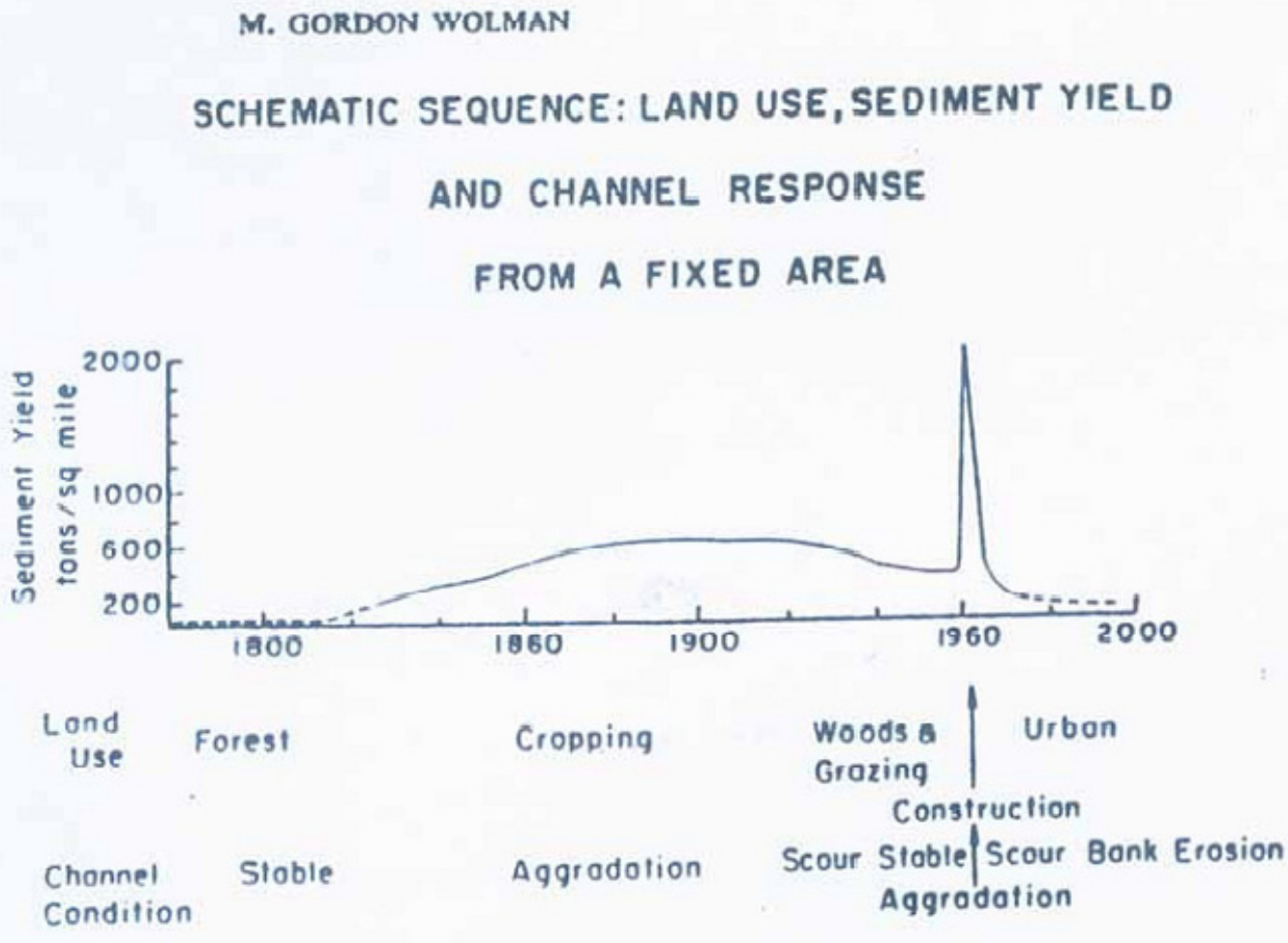


Figure 1. The cycle of land use changes, sediment yield, and channel behavior in a Piedmont region beginning prior to the advent of extensive farming and continuing through a period of construction and subsequent urban landscape.

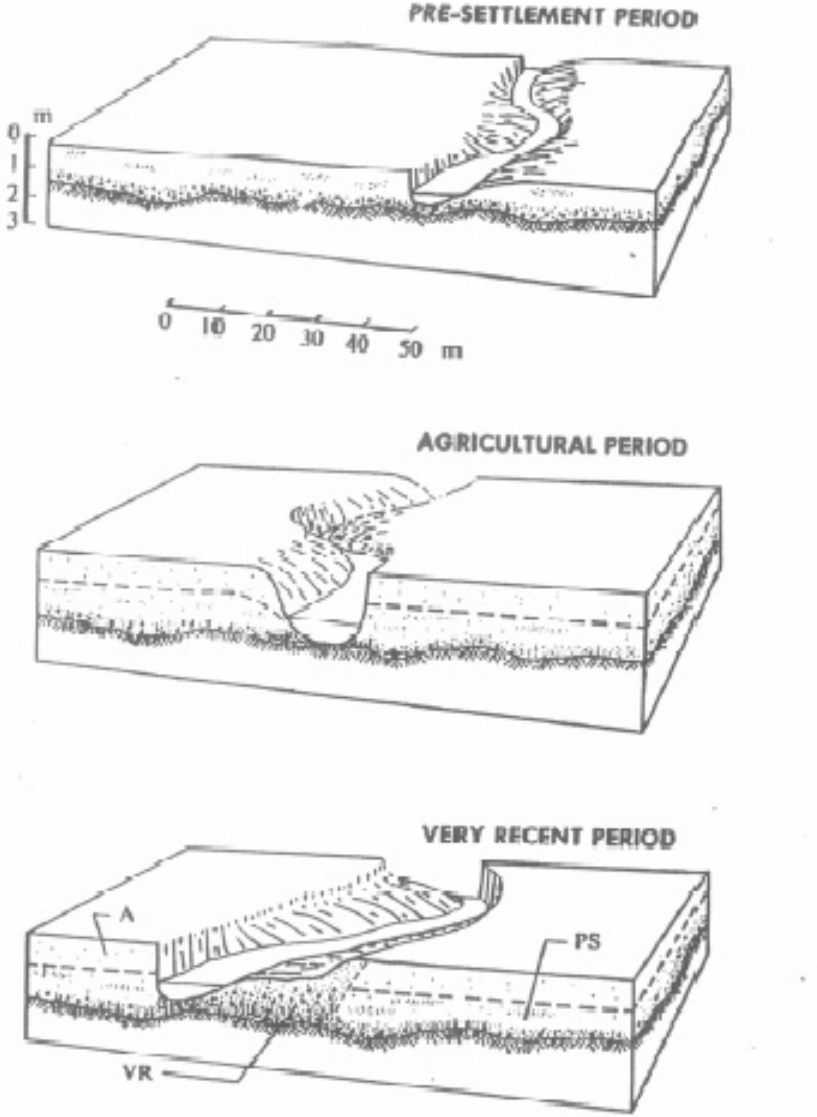


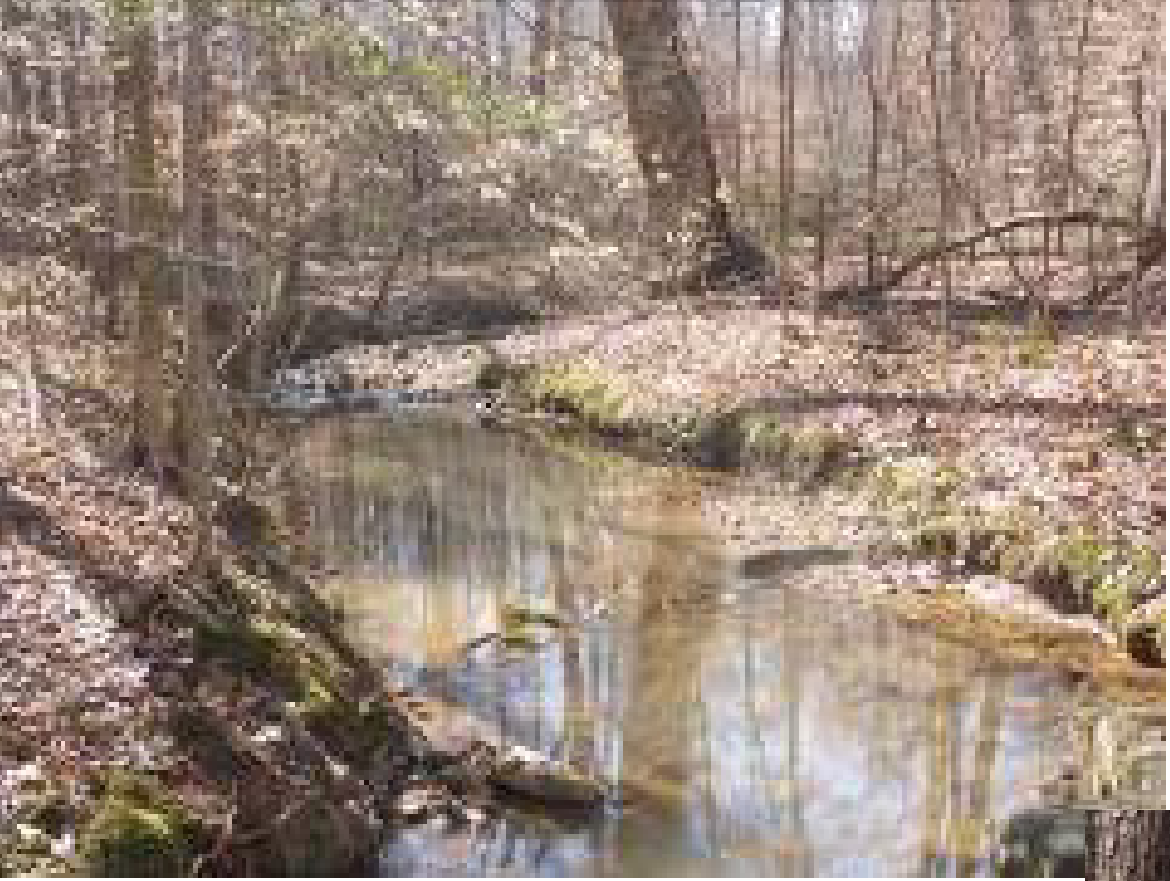
Fig. 7. Flood plain development model. Schematic representation of three-stage development of Maryland Piedmont flood plains. Pre-settlement period (PS): undisturbed stream in natural regime. Agricultural period (A): excessive upland erosion and flood plain sedimentation. Very Recent period (VR): reduced sediment load, reworking of flood plain sediment and redeposition of coarsest sediment as new, lower flood plain level.

Jacobson, R.B. and Coleman, D.J., 1986. Stratigraphy and recent evolution of Maryland Piedmont Flood Plains. *American Journal of Science* 286:617-637.

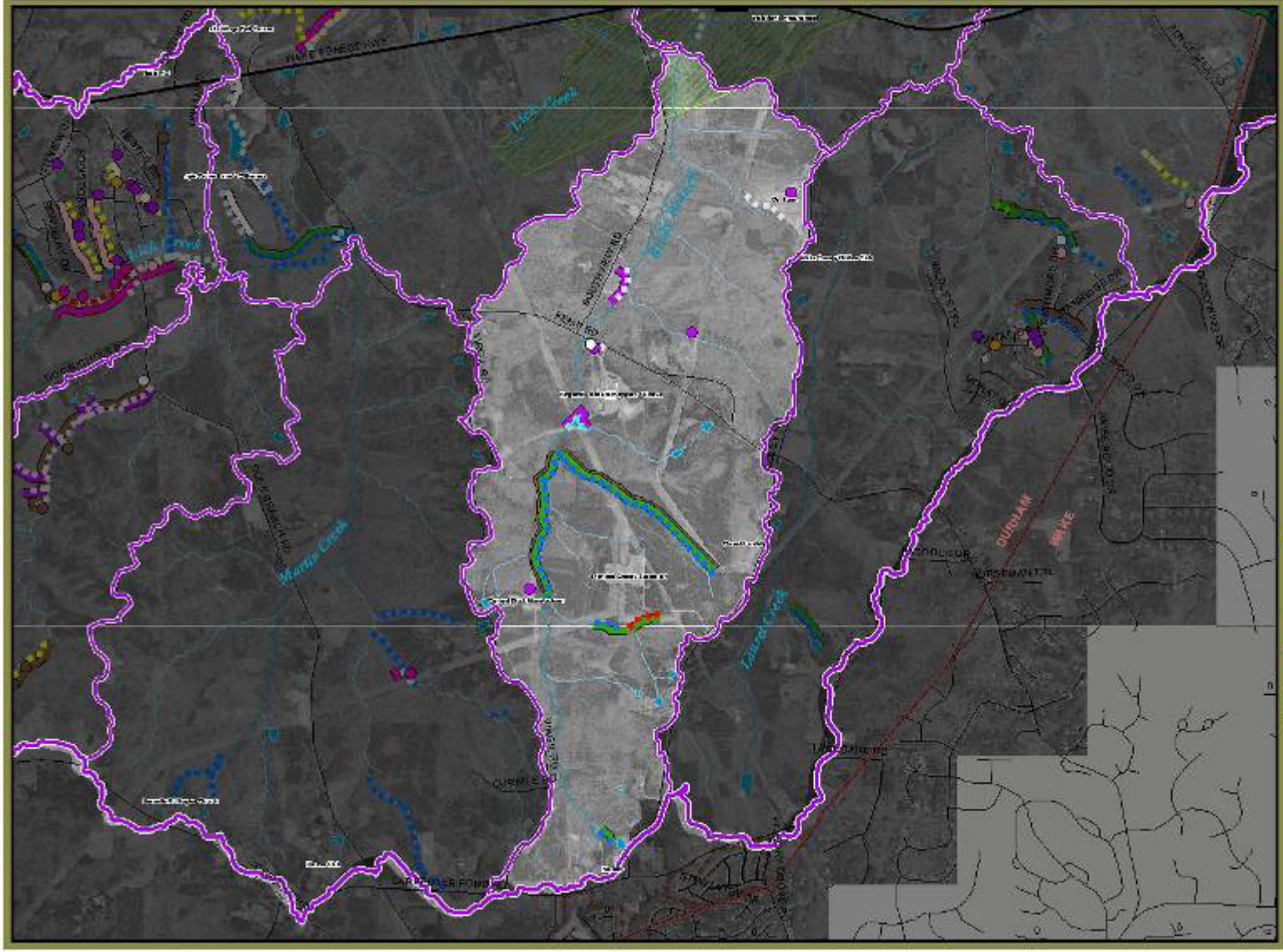
TABLE 2

Calculated percentage increases in discharge of 2 yr recurrence flood (Q_{w2}) over Pre-settlement background level for given percentage forest cover for three time periods. Calculation based on regression model from Walker (1971)

Time period	% forest	Q_{w2} % of Pre-settlement
Pre-settlement	100	—
Agricultural	20	189
Very Recent	40	144



Lick Creek Stream Conditions & Impacts: Subwatershed 7



LEGEND

- County Line
- City Limit
- Major Road
- Street
- Parks/Open Space

Lick Creek Study Area

- Watershed
- Subwatershed

Surface Water

- Water Body
- Major Stream
- Minor Stream

Project Type

- Major Restoration
- Volunteer Restoration
- Enforcement
- Repair
- Protection
- Diabase
- Outreach and Education

Reach Conditions

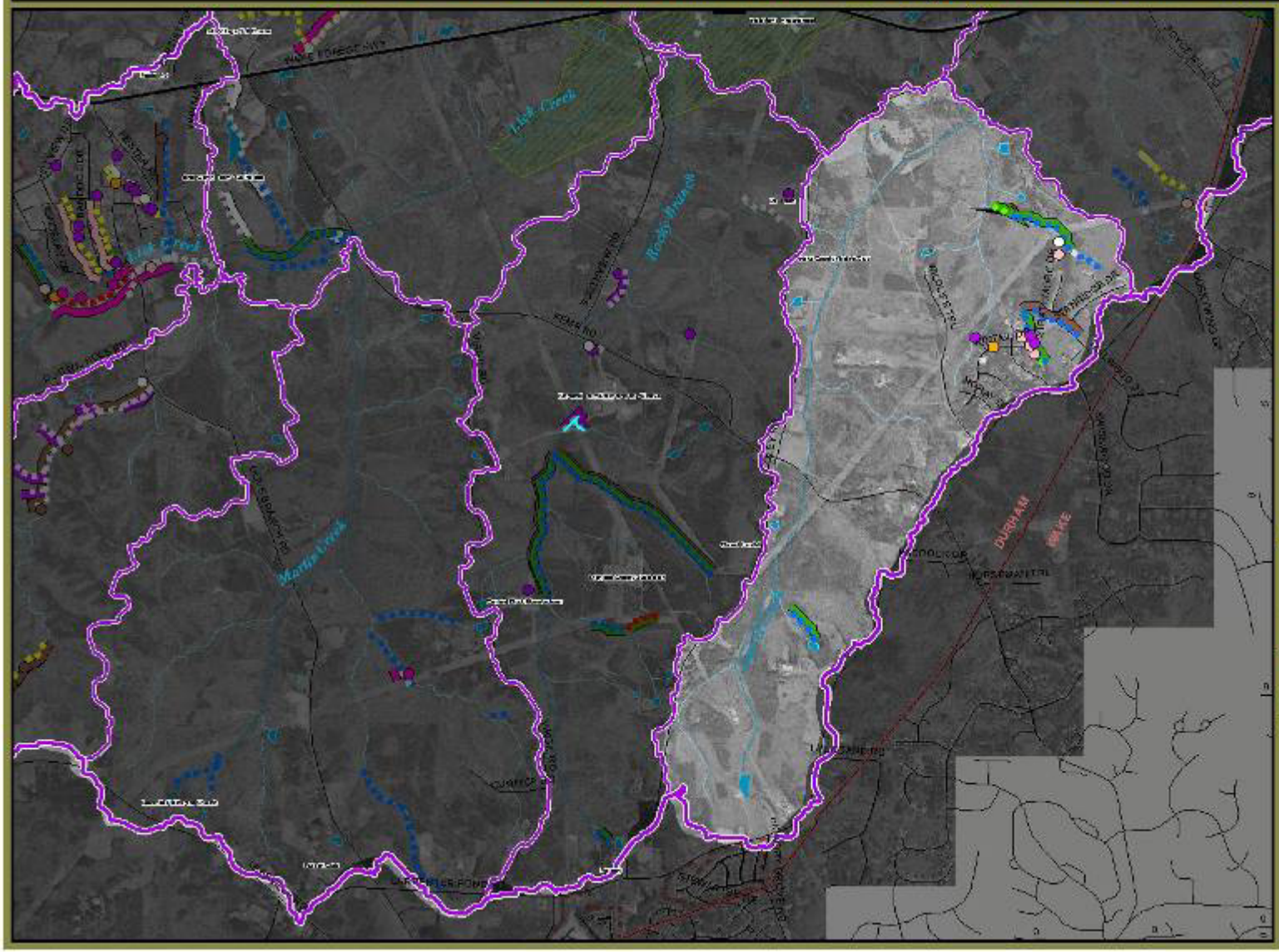
Not Scored | Poor | Fair | Good | Excellent

N
W
E
S

Upper Neuse River Basin Association
Triangle J Council of Governments
Geographic Information Systems
5/8/07

0 0.2 0.5 Miles

Lick Creek Stream Conditions & Impacts: Subwatershed 8



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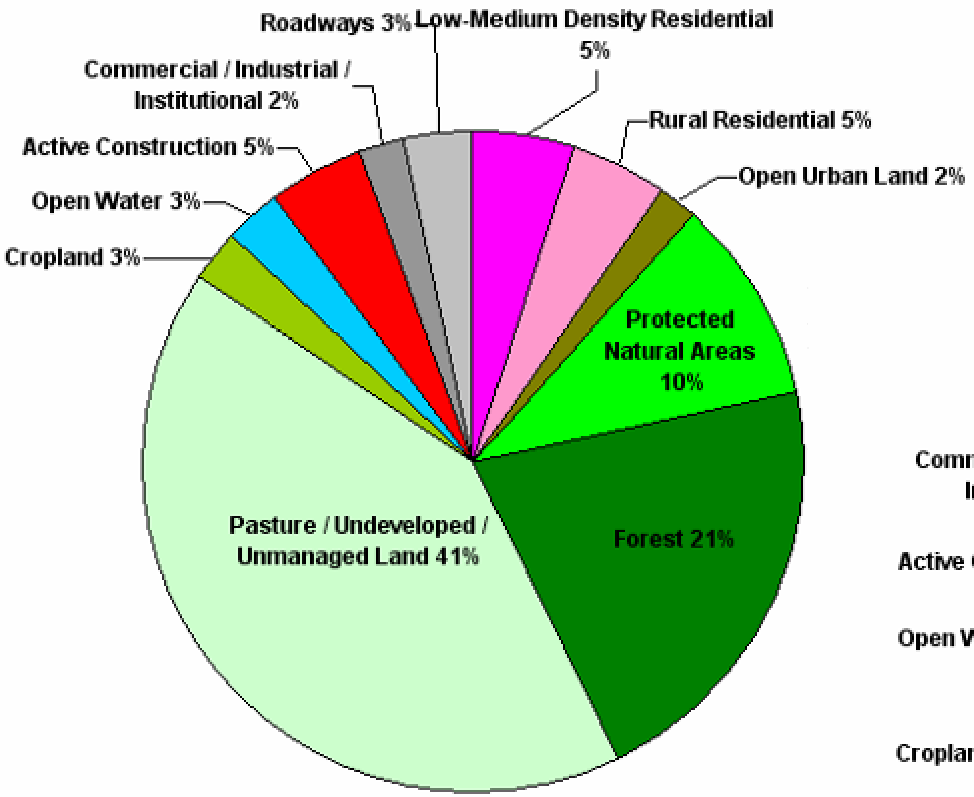
0 0.2 0.5 Miles

Overall Conditions (cont.)

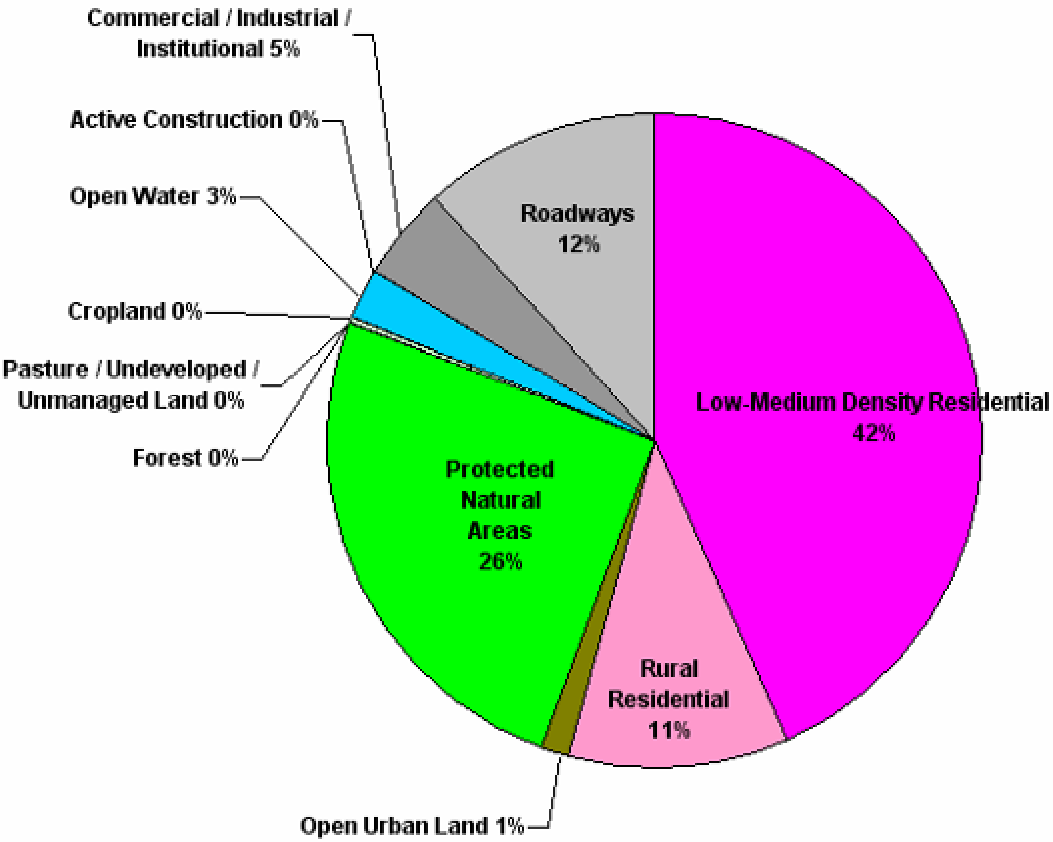
- Conversely, many impacts from ongoing construction activities were found.
- These activities are impacting existing good quality streams and wetlands.
- The focus of the Lick Creek Restoration Plan should therefore be to prevent future impacts and to preserve high quality areas.
- A few restoration activities will complement the overall “prevention” strategy.


FOWLER
FOWLER

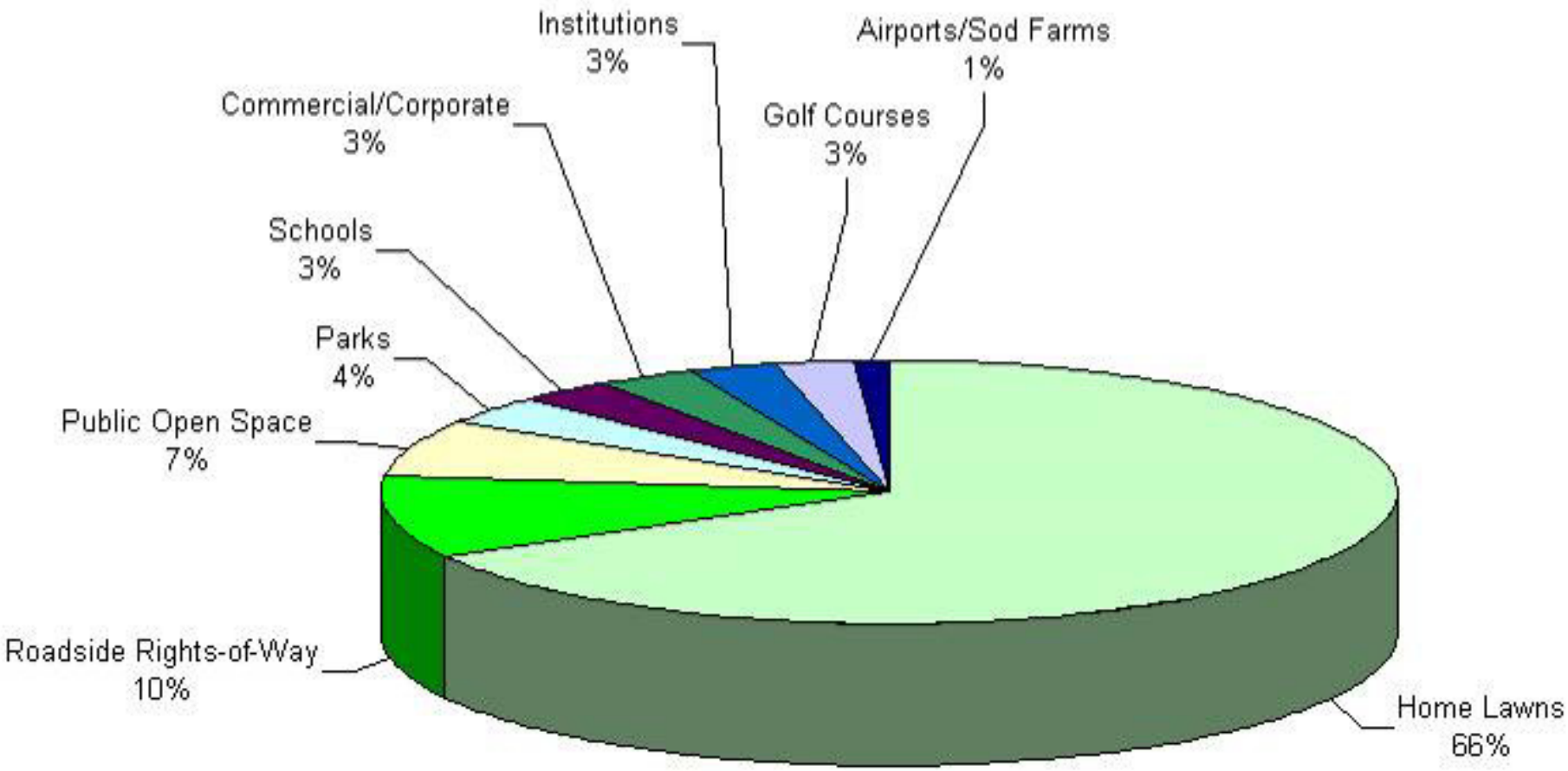
Existing Land Use



Future Land Use



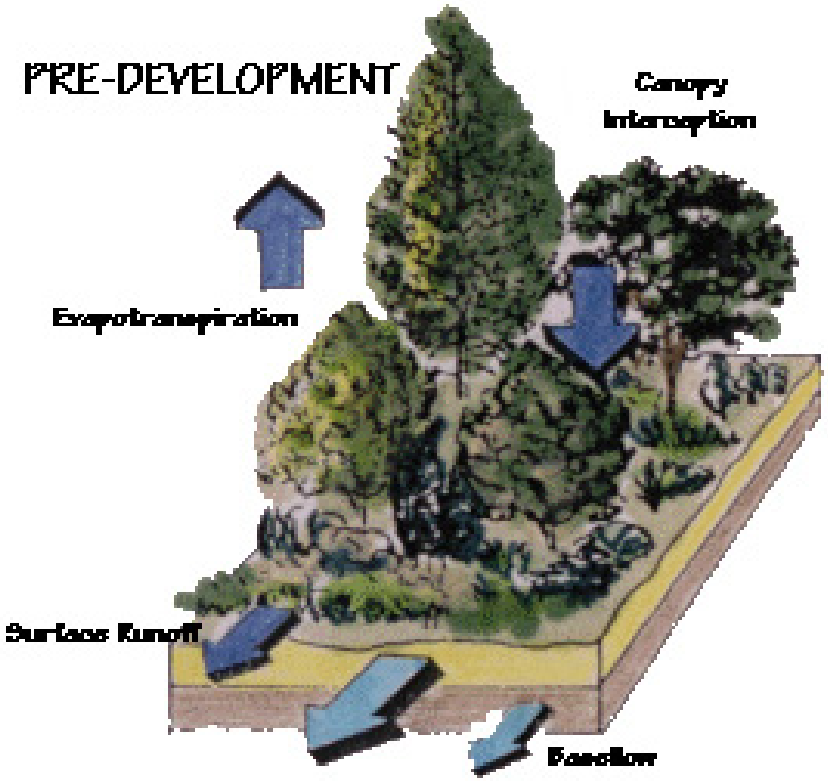
Distribution of Turf Cover in Suburban Watersheds



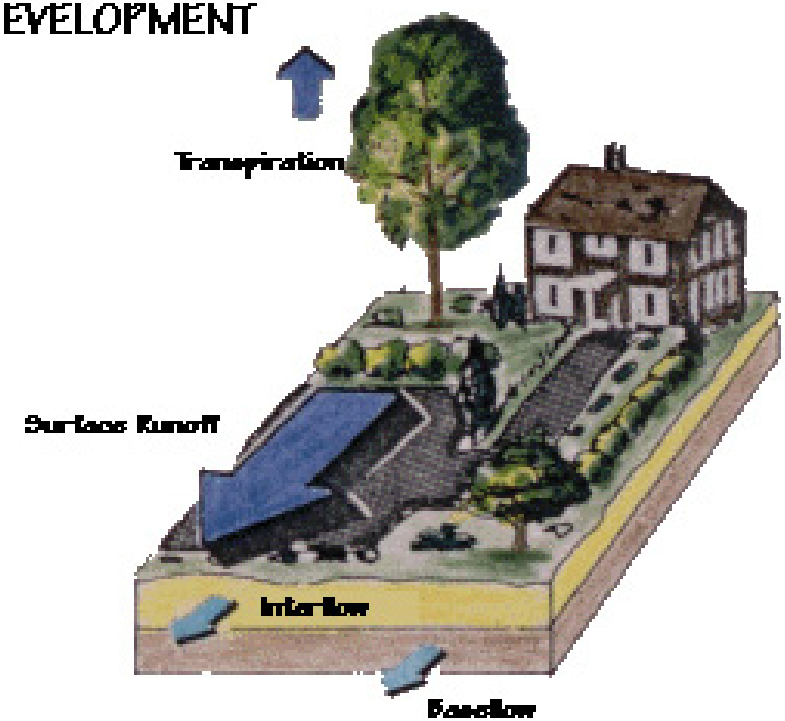
Source: MTC (1996), VASS (1998) and PTC (1989)

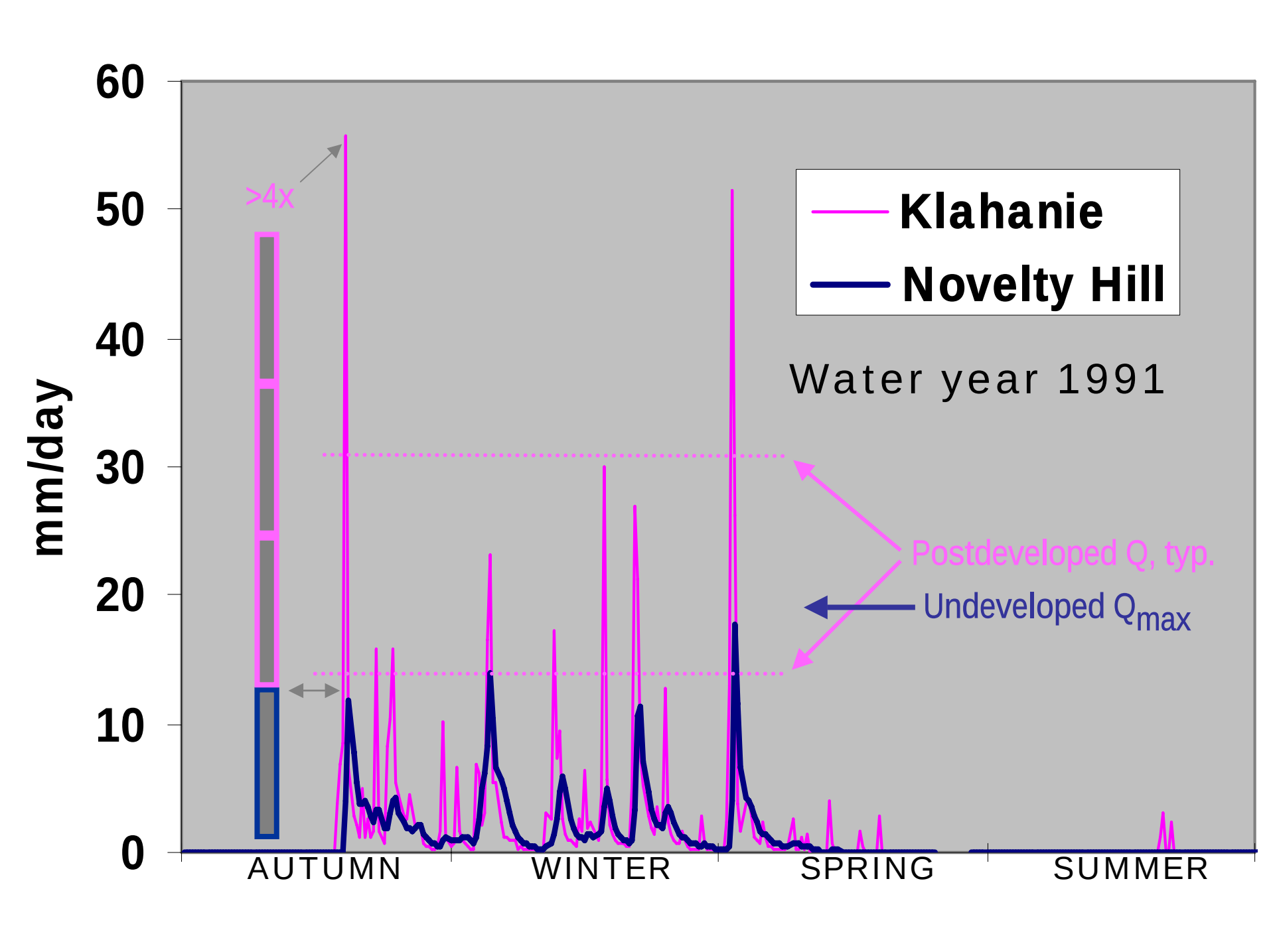
WATER BALANCE

PRE-DEVELOPMENT



POST-DEVELOPMENT

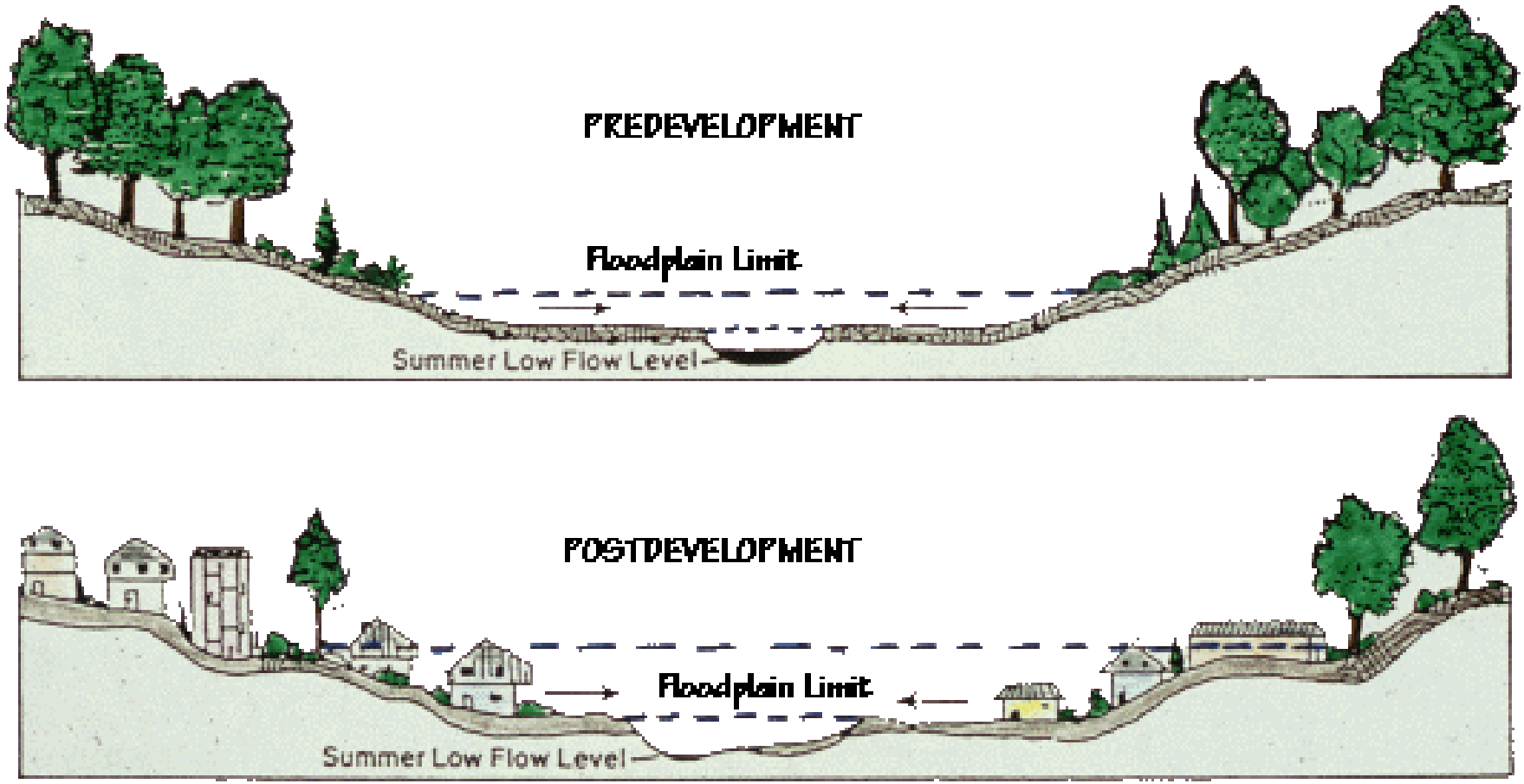



60
50
40
30
20
10
0
mm/day
>4x
Klahanie
Novelty Hill
Water year 1991
Postdeveloped Q, typ.
Undeveloped Q_{max}
AUTUMN
WINTER
SPRING
SUMMER

The Stream and Its Floodplain
Before and After Development

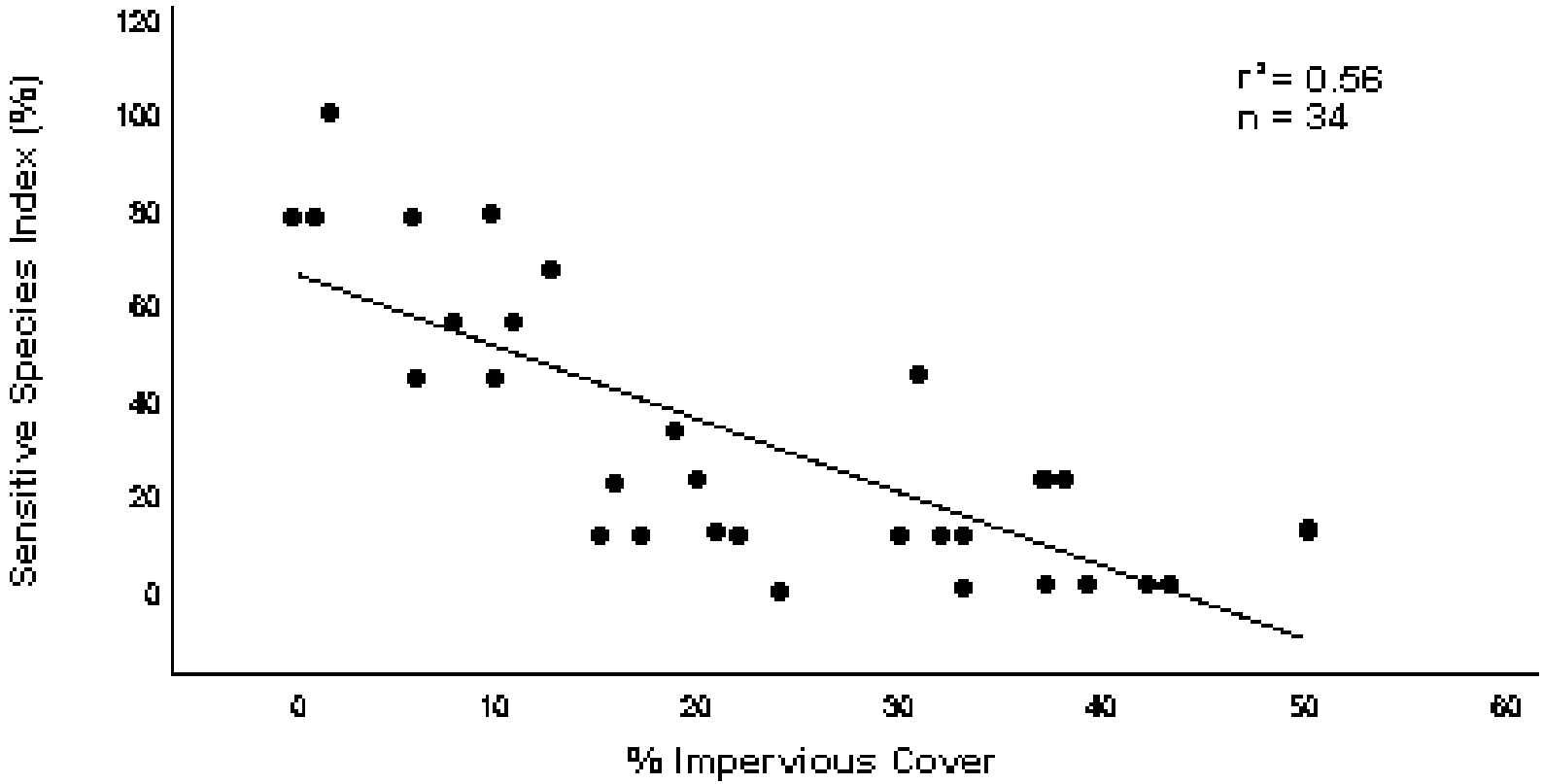
(Dornan Schueler 1987)

Response of Stream Geometry

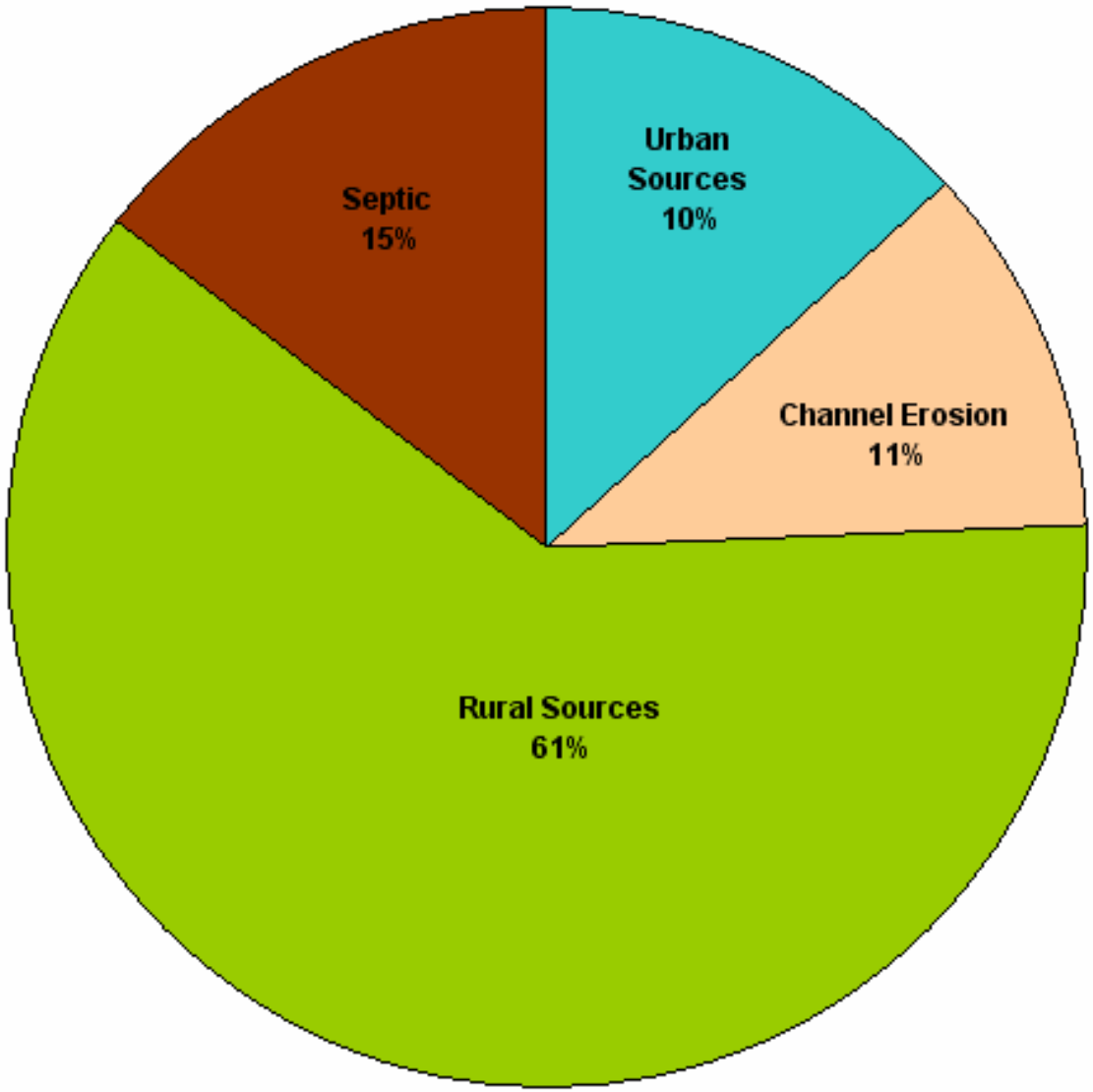


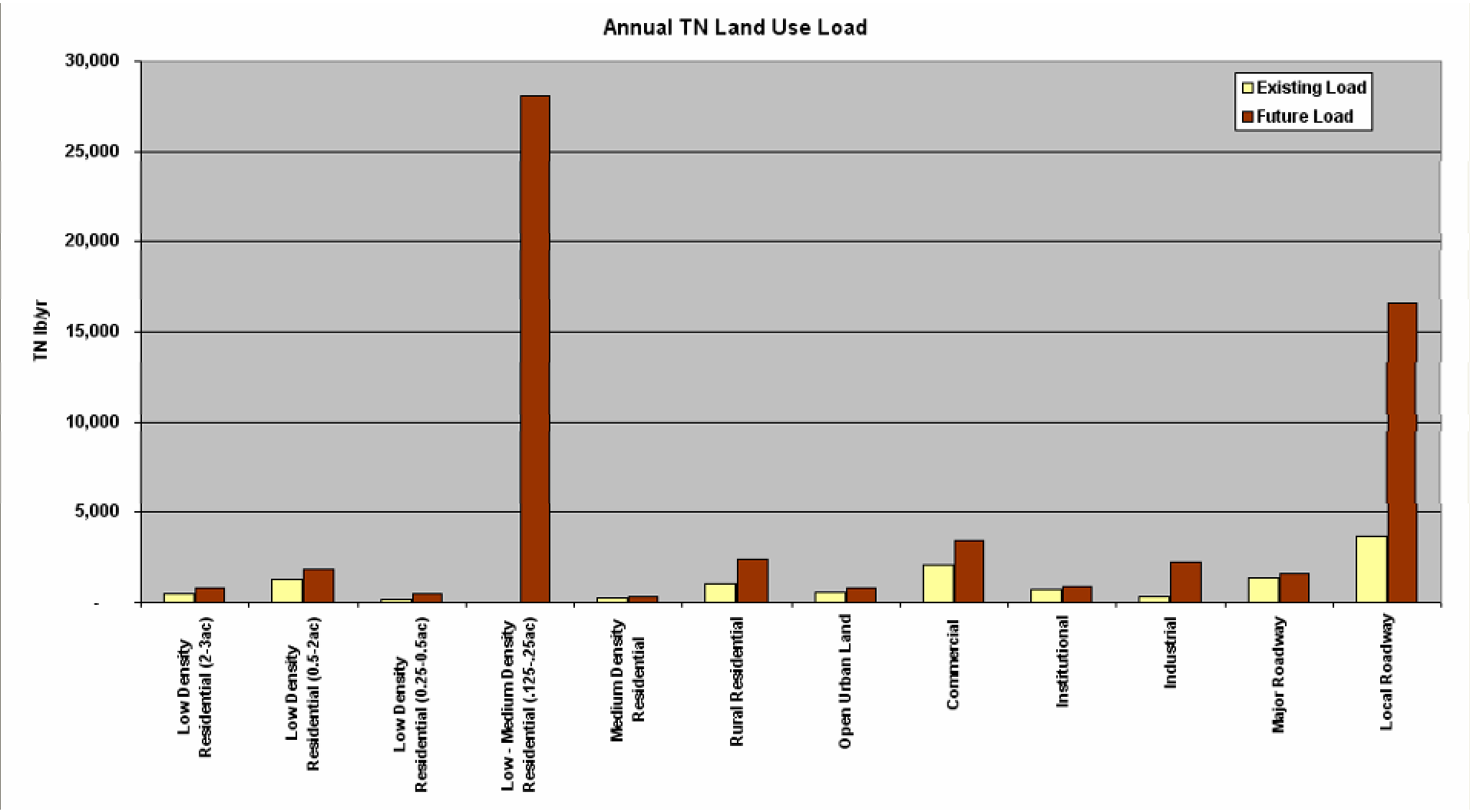
Impervious Cover Impacts on Aquatic Biota (Sensitive Species)

(Source: Maxted and Shaver, 1997)

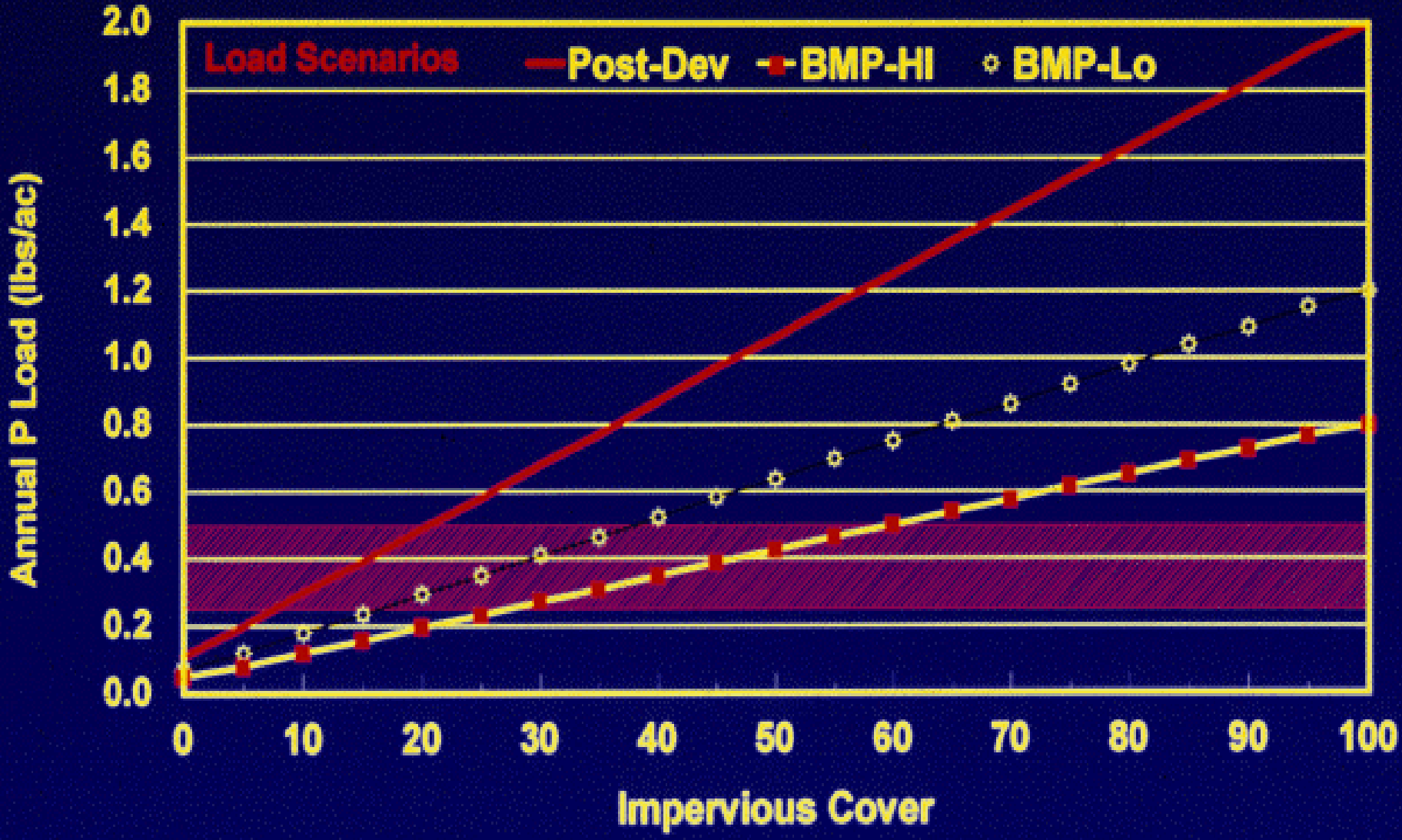


Existing TN Sources




Annual TN Land Use Load
TN lb/yr
30,000
25,000
20,000
15,000
10,000
5,000
-
Existing Load
Future Load
Low Density Residential (2-3ac)
Low Density Residential (0.5-2ac)
Low Density Residential (0.25-0.5ac)
Low - Medium Density Residential (.125-.25ac)
Medium Density Residential
Rural Residential
Open Urban Land
Commercial
Institutional
Industrial
Major Roadway
Local Roadway

The Effect of Impervious Cover on Urban Phosphorus Load Under Several Scenarios



Recent & future development-related impacts

1. Erosion and sediment control enforcement
2. Agriculture exemption abuse regarding erosion and sediment control regulations
3. Allowable standards for post-construction stormwater management

Stream and wetland conditions

4. Buffer rule enforcement
5. Protection of high ecological value streams and wetlands

Restoration possibilities

8. Major projects
9. Volunteer projects
10. Outreach and education

1. Erosion and sediment control enforcement

Agriculture exemption abuse

Post-construction stormwater management

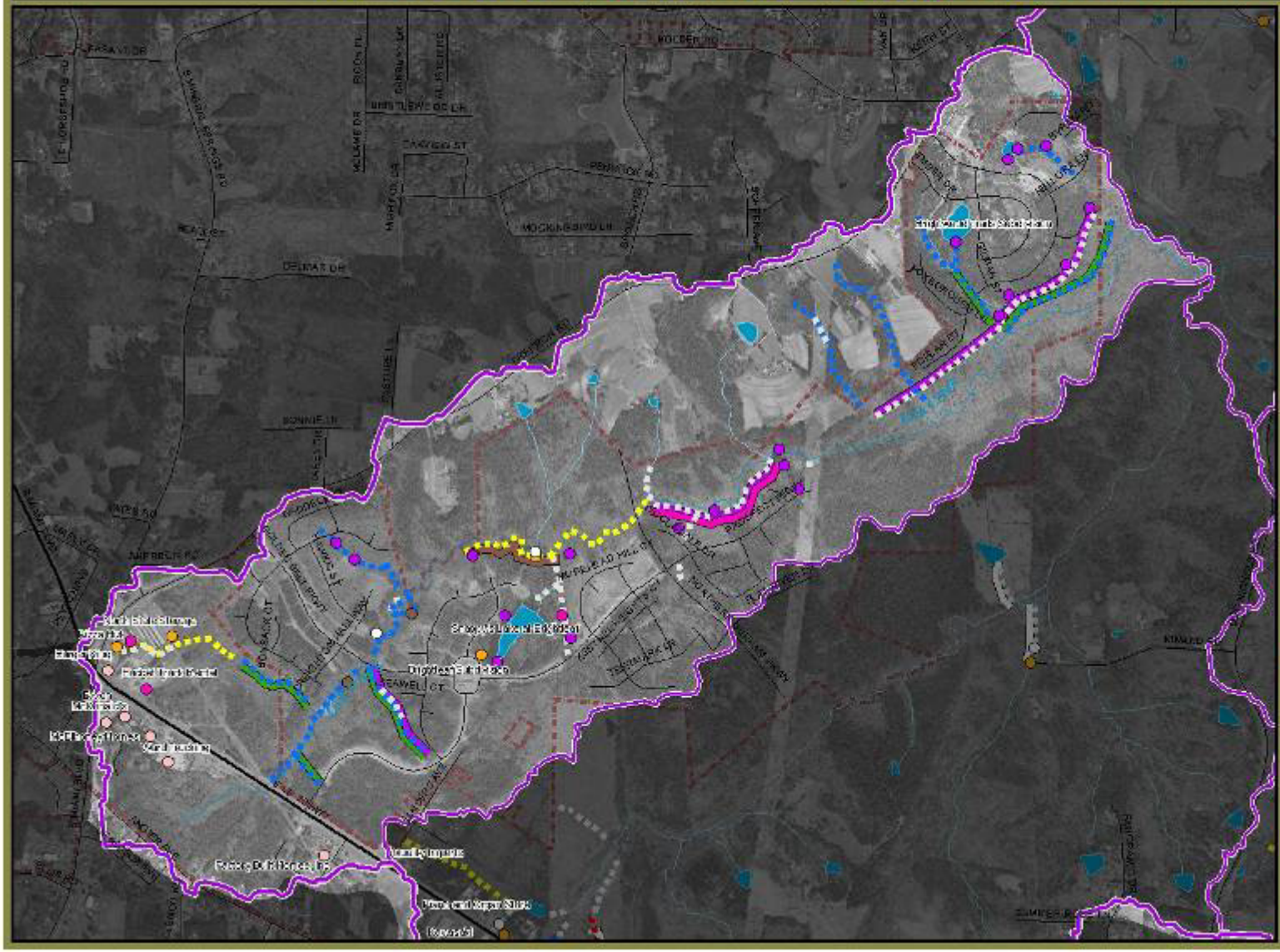

27 12:01PM

Source: City of Portland, OR

Protection of streams and wetlands

Restoration Projects

Lick Creek Stream Conditions & Impacts: Subwatershed 1



LEGEND

County Line
City Limit
Major Road
Street
Parks/Open Space

Lick Creek Study Area
Watershed
Subwatershed

Surface Water
Water Body
Major Stream
Minor Stream

Project Type
Major Restoration
Volunteer Restoration
Enforcement
Repair
Protection
Disease
Outreach and Education

Reach Conditions
Not Scored
Poor
Fair
Good
Excellent

N
W
E
S

Upper Neuse River Basin Association
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0 0.2 0.4 Miles

Outreach and Education

Conclusion

- We can provide stormwater treatment to approx. 25 acres of existing development.
- We can revegetate up to 1 of stream bank.
- The rest? Protecting lands, best management during development, best management practices after development.

Adjourn