

# Recommendations for Riparian Buffer Requirements

Section 304 of the Watershed Protection Ordinance



*Photo of Haw River by Elaine Chiosso*

*Chatham County Environmental Review Board  
20 August 2007*

# ERB Members

Allison Weakley (Chair) – Biologist

Elaine Chiosso (Vice-Chair) – Exec. Director, Haw River Assembly

Michael Dunn (Secretary) – Educator and Naturalist, NC Museum of Natural Sciences

John Alderman - Aquatic Biologist

Tara Alden - Soil Scientist / Attorney

Connie Allred – Biologist

Raj Butalia - GIS analyst / Environmental Scientist

Dr Hal House - Environmental Scientist

Dr Sonny Keisler – Political Scientist / Developer

Dr Steve Wing - Environmental Epidemiologist

# Some background on our recommendations...



- Board of Commissioners (BoC) requested ERB begin work in March 2007
- Only Section 304 (*Riparian Buffer Requirements*) of larger Watershed Protection Ordinance

# Our recommendations are based on...

- Existing language in Section 304
- Proposed language that went to public hearing in January 2007
- Collective knowledge of and research by the ERB



# Our recommendations are also based on input received from...



- Citizens
- Trail advocates
- Development community
- State agency staff
- Dr. Jim Gregory,  
NC State University

# Some of many references used in development of recommendations...

- DWQ. 2005. **Identification Methods for the Origins of Intermittent and Perennial streams**, Version 3.1. NC Department of Environment and Natural Resources, Division of Water Quality, Raleigh, NC. [Accessed online on 15 May 2007 at [http://www.co.chatham.nc.us/dept/planning/planning\\_dept/watershed\\_review\\_board/supporting\\_documents/cases/Amendments\\_1-16-07\\_PH/Articles/NC\\_Stream\\_ID\\_Manual.pdf](http://www.co.chatham.nc.us/dept/planning/planning_dept/watershed_review_board/supporting_documents/cases/Amendments_1-16-07_PH/Articles/NC_Stream_ID_Manual.pdf)]
- 2006a. **The Value of Intermittent Streams in North Carolina: A Summary**. NC Department of Environment and Natural Resources, Division of Water Quality, Raleigh, NC. [Accessed online on 15 May 2007 at [http://www.aswm.org/fwp/summary\\_of\\_intermittent\\_streams\\_in\\_nc.pdf](http://www.aswm.org/fwp/summary_of_intermittent_streams_in_nc.pdf)]
- 2006b. **NC Wetland Assessment Method (WAM) Draft User Manual, v.5**. NC Department of Environment and Natural Resources, Division of Water Quality, Raleigh, NC. [Accessed online on 18 June 2007 at <http://h2o.enr.state.nc.us/ncwetlands/documents/NCWAMDUMv5.pdf>]
- See also:
- WAM presentation to EMC by John Dorney at [h2o.enr.state.nc.us/admin/emc/2007/documents/05wqc06.ppt](http://h2o.enr.state.nc.us/admin/emc/2007/documents/05wqc06.ppt)
  - Public Notice for 60-day comment period on draft WAM (ends July 25, 2007)  
[h2o.ehnr.state.nc.us/ncwetlands/documents/PublicNoticeNCWAMversion2.0.doc](http://h2o.ehnr.state.nc.us/ncwetlands/documents/PublicNoticeNCWAMversion2.0.doc)
- Gilliam, J.W. 1994. Riparian wetlands and water quality. *J. Environmental Quality* 23:896–900.
- McNaught, David et al. 2003. **Riparian Buffers: Common Sense Protection of North Carolina's Water**. Environmental Defense, Raleigh, NC. [Accessed online 30 December 2006 at [http://www.environmentaldefense.org/documents/2758\\_NCbuffers.pdf](http://www.environmentaldefense.org/documents/2758_NCbuffers.pdf)]
- NC WRC. 2002. **Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality**. North Carolina Wildlife Resources Commission, Raleigh, NC. [Accessed 31 December 2006 at [http://216.27.49.98/pg07\\_WildlifeSpeciesCon/pg7c3\\_impacts.pdf](http://216.27.49.98/pg07_WildlifeSpeciesCon/pg7c3_impacts.pdf)]
- NJ DER. 2005. **Riparian Buffer Conservation Zone Model Ordinance**. New Jersey Department of Environmental Protection, Division of Watershed Management. [Accessed online on 15 May 2007 at: <http://www.state.nj.us/dep/watershedmgt/DOCS/pdfs/StreamBufferOrdinance.pdf>]
- NRC 2002. *Riparian Areas: Functions And Strategies For Management*. National Academy Press, Washington, D.C. 428 pp.
- Wenger, Seth J. 1999. **A review of the scientific literature on riparian buffer width, extent and vegetation**. Athens: Institute of Ecology Office for Public Service and Out-reach, University of Georgia. 59 pp.
- and Laurie Fowler. 2000. **Protecting stream and river corridors: Creating effective local riparian buffer ordinances**. Carl Vinson Institute of Government, University of Georgia. 68 pp.
- US Army Corps of Engineers (US ACoE). 1987. **Corps of Engineers Wetlands Delineation Manual**. Wetlands Research Program, Environmental Laboratory, US Army Corps of Engineers, Vicksburg, MS.

## The Environmental Review Board (ERB) recommendations for Riparian Buffers balance:

- water quality and wildlife habitat preservation  
*with*
- concerns for public safety, economics and recreation

These recommendations pertain to new development activities in buffers only – existing development, agriculture and silviculture in buffers areas are exempt

# Purpose and Intent

- (a) *To ensure* environmentally sound use of the County's water and land resources,
- (a) *To protect* the drinking water, recreational, economic, and human health values inherent in well managed water resources,
- (b) *To preserve* the biological integrity of riparian and aquatic ecosystems, and
- (c) *To help maintain* forested riparian buffers throughout the County.





# What is a riparian buffer?

- An undisturbed, naturally vegetated area adjacent to a water body (stream, river, lake, wetland, etc.) that is fully or partially protected from human disturbances and thus is able to safeguard the water body from pollution and habitat degradation.

# How Do Buffers Protect Water Quality?

Vegetation  
**filters** pollutants  
in surface runoff

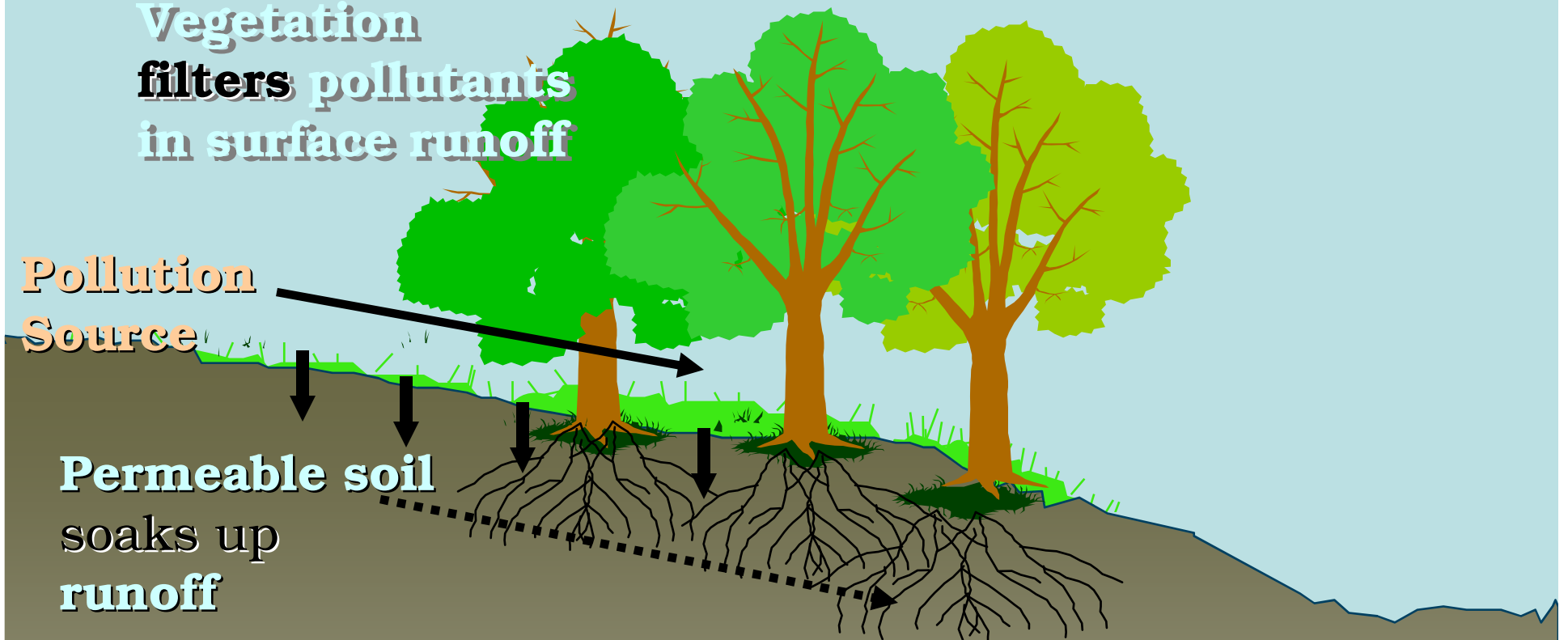
Pollution  
Source

Permeable soil  
soaks up  
runoff

Roots of vegetation absorb  
subsurface nutrients.

**Riparian Buffer = Filter + Sponge**

Source: DWQ



# Forested riparian buffers...

- Reduce pollutants and filter runoff,



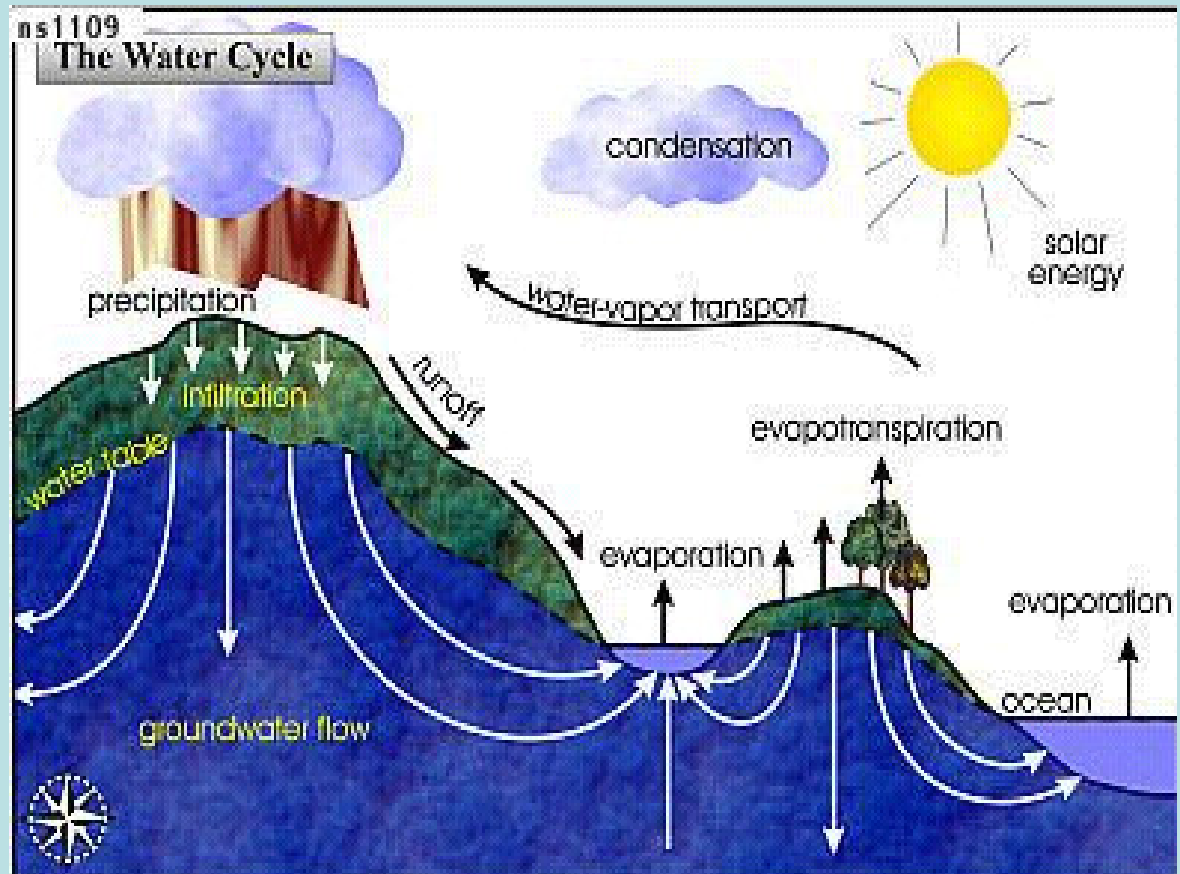
# Forested riparian buffers...

- Help maintain water and air temperature by providing shade,
- Help sustain natural channel morphology,
- Stabilize stream banks,
- Help reduce flood severity,



# Forested riparian buffers...

- Facilitate the exchange of groundwater and surface water,



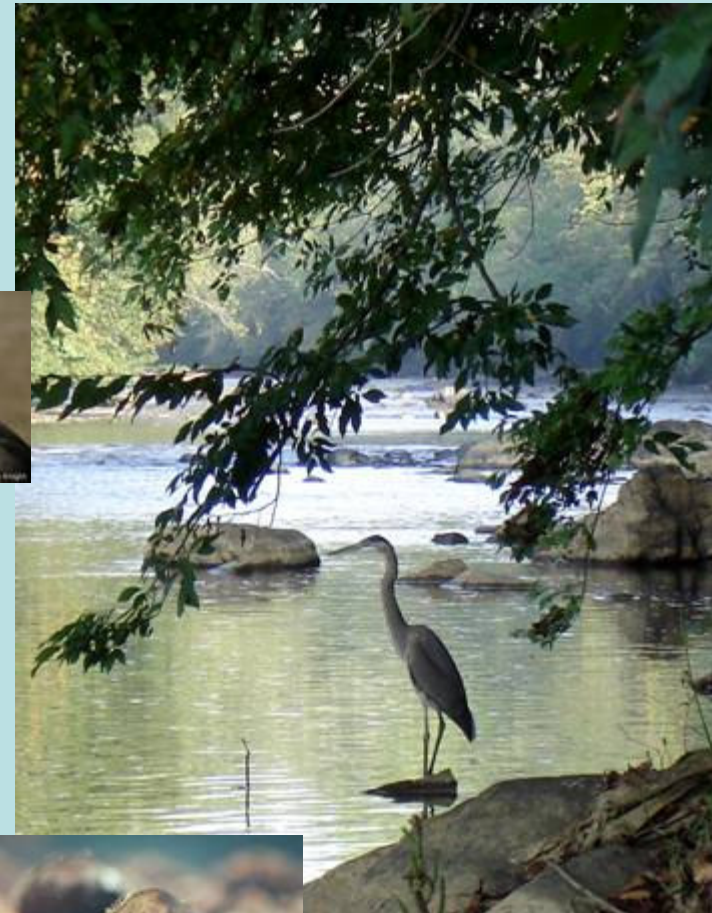
# Forested riparian buffers...

- Provide most of the organic carbon and nutrients necessary to support aquatic food webs,
- Provide sources of large woody debris for stream channels,



# Forested riparian buffers...

- Provide important wildlife habitat, and
- Protect riparian plant communities.



# Our riparian buffer recommendations...

- Strengthen the original language
- Clarify the methods used to identify streams and wetlands
- Provide definitions for stream types, wetlands, etc.
- Include protection for headwater streams

North Carolina  
Division of Water Quality

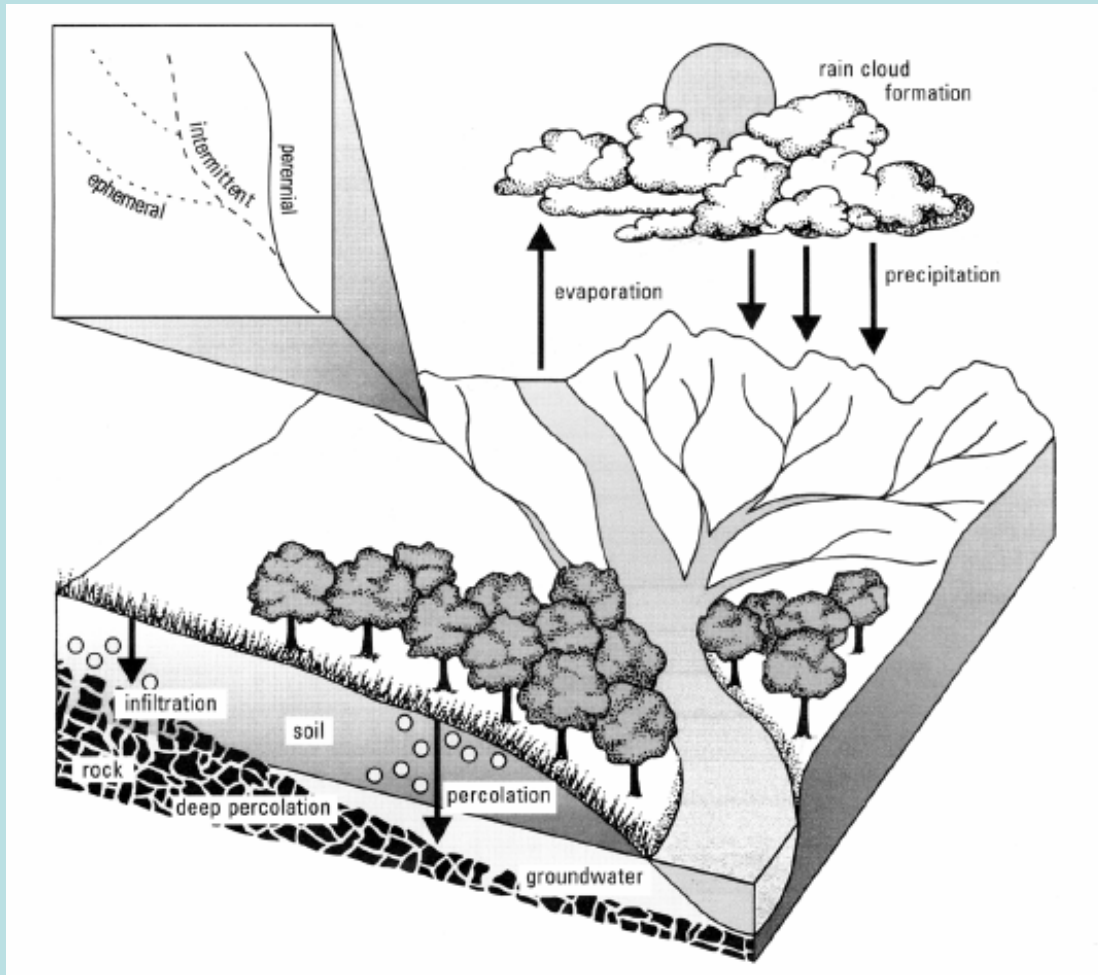
**Identification Methods  
for the Origins of  
Intermittent and Perennial streams**

Version 3.1  
Effective Date: February 28, 2005





# Importance of headwater streams



- About 75-85% of total stream length in a watershed occurs in headwater streams

# Our recommendations...

- Incorporate techniques to mitigate impacts
- Specify how to measure buffers
- Provide greater review of stream determinations

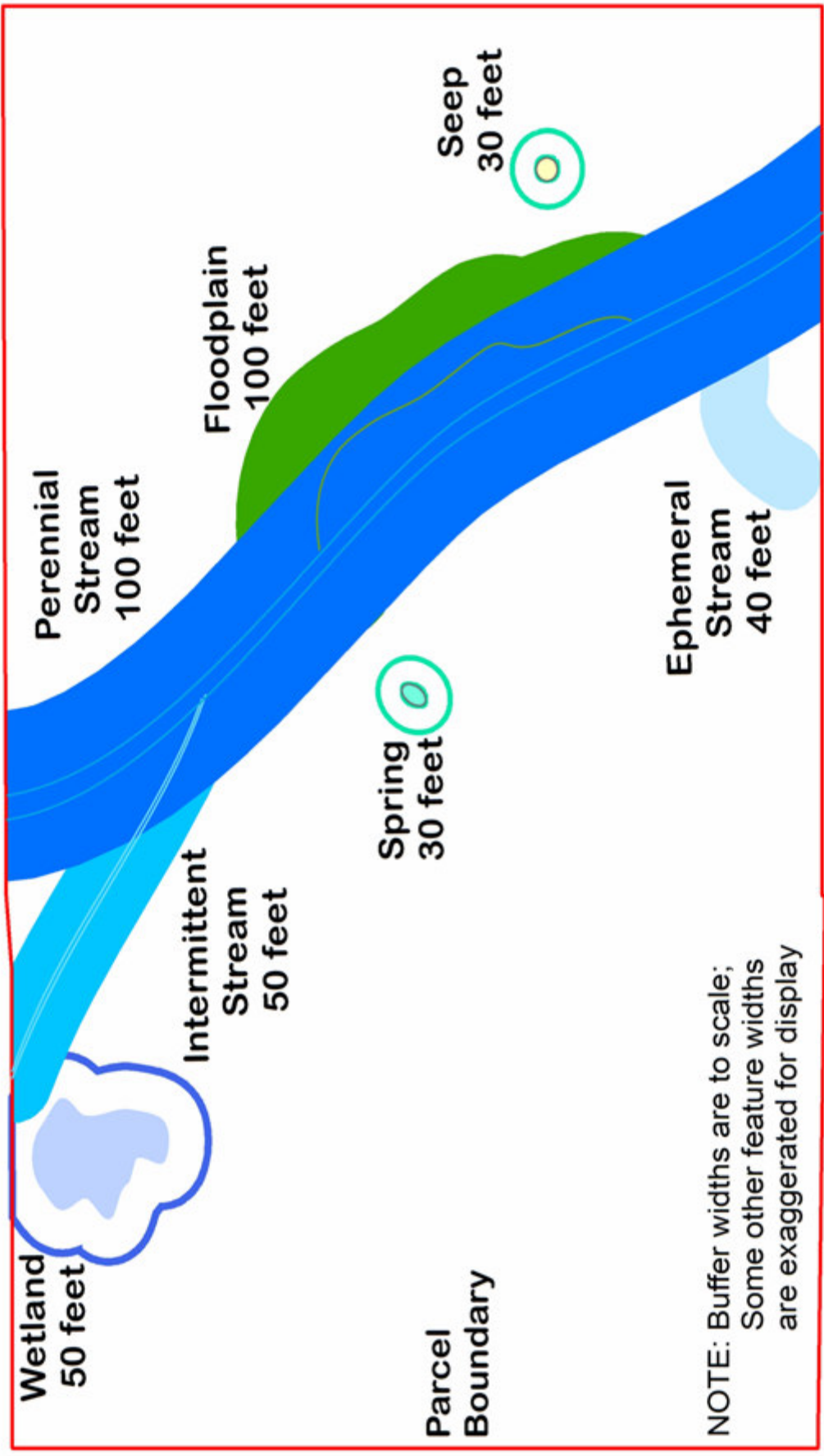


- Ensure that buffers are clearly marked before construction begins
- Include system to track environmental protection during construction

# Recommendations for buffer width requirements

- Perennial – 100 feet
- Intermittent – 50 feet
- Ephemeral streams – 40 feet
- Springs and seeps – 30 feet
- Wetlands – 50 feet

# Proposed Streams and Wetland Buffer Widths



NOTE: Buffer widths are to scale;  
Some other feature widths  
are exaggerated for display



# Allowed Structures and Uses

- Water dependent structures
- Signs and lighting for safety purposes
- Crossings (roads, utilities, etc.), but with restrictions and specific requirements
- Stream restoration projects



# Prohibited structures and uses

- Wastewater treatment and disposal
- Hazardous or toxic substances
- Landfills
- Constructed stormwater features
- Motor powered vehicles (except emergency and utility)



# Summary of other recommendations to avoid a loss of effectiveness in protecting streams

- Trails allowed within buffer, but require Management Plan and follow specific criteria
- Crossings must minimize impact
  - Bridging or open bottom culverts
  - Fill and bridge support structures should not restrict overland flow into floodplain
- Fill should not be allowed within 100-yr. floodplain
- Direct stormwater discharge not allowed in buffer
- Natural revegetation of buffers (with native plants)
- Invasive plants may be removed

# Some important distinctions about our recommendations...

- Pertain to *development only* (not to forestry and agriculture)
- Rely on *field-delineated* streams, wetlands, and other water bodies (not on USGS topo maps or soils maps)
- Delineations follow established methodologies to identify streams and wetlands





# Importance of Ephemeral streams

Originally proposed language  
buffered ephemeral streams with  
10-25+ acres drainages

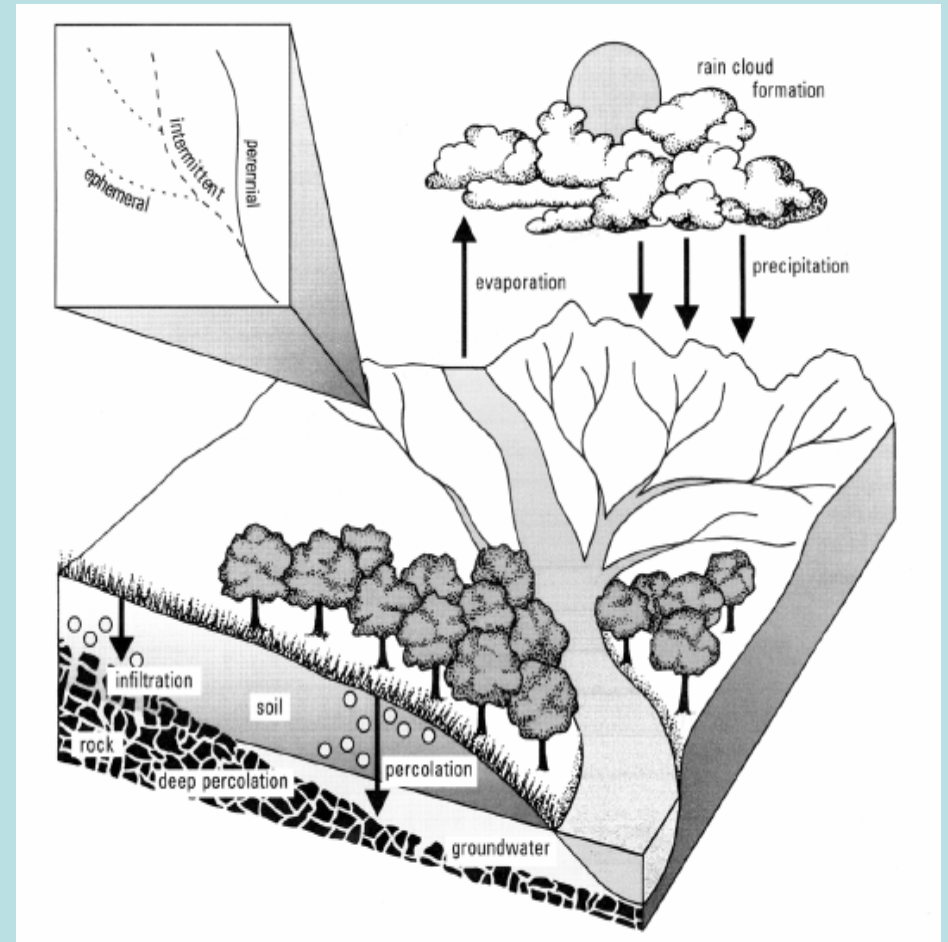
Our recommendation:

- Forty (40) feet buffer around ephemeral streams,
- Beginning at the point draining at most 4 acres.

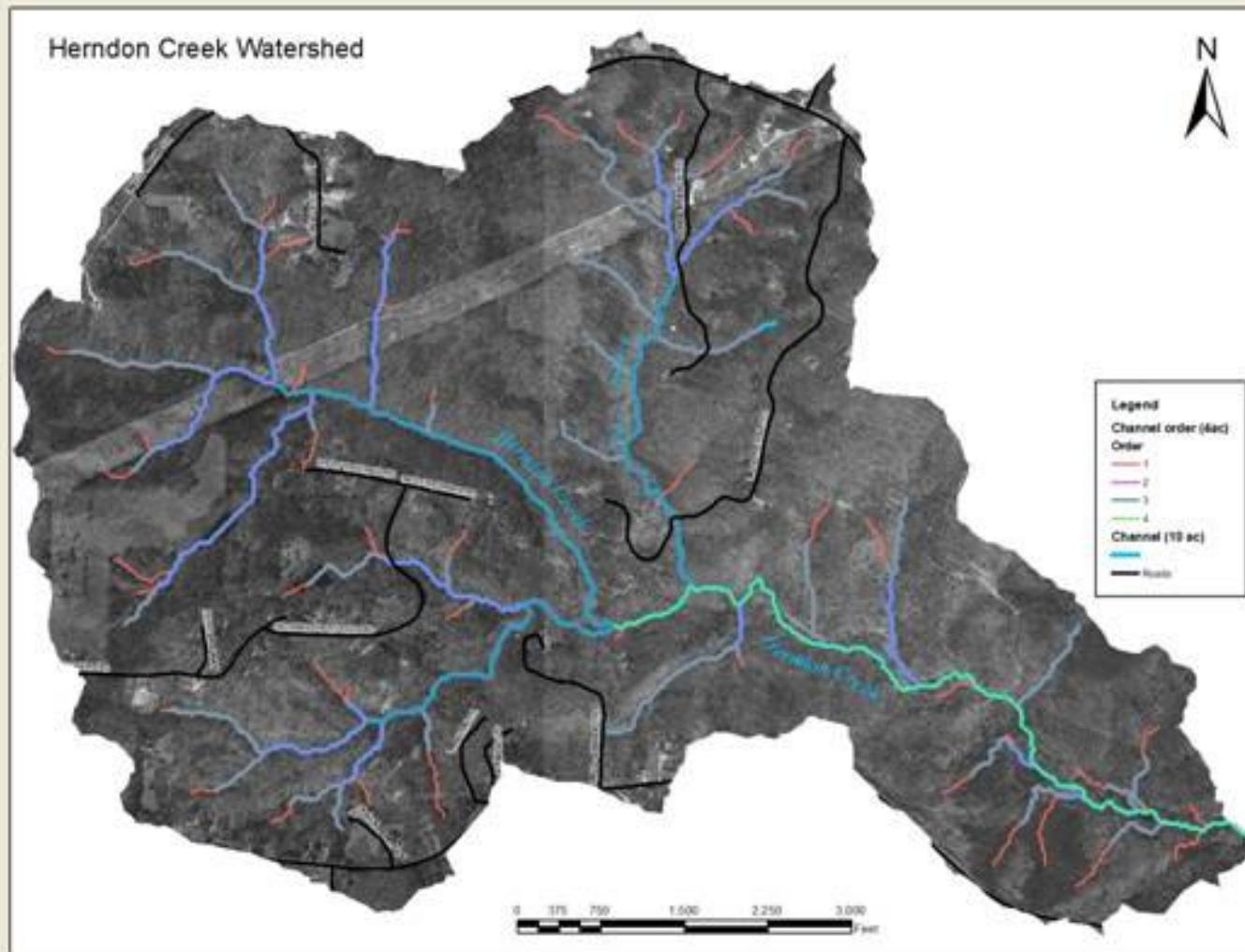
Recommendations for 4 acre  
drainage based upon:

- DWQ research and input
- ERB research, stream mapping and field work

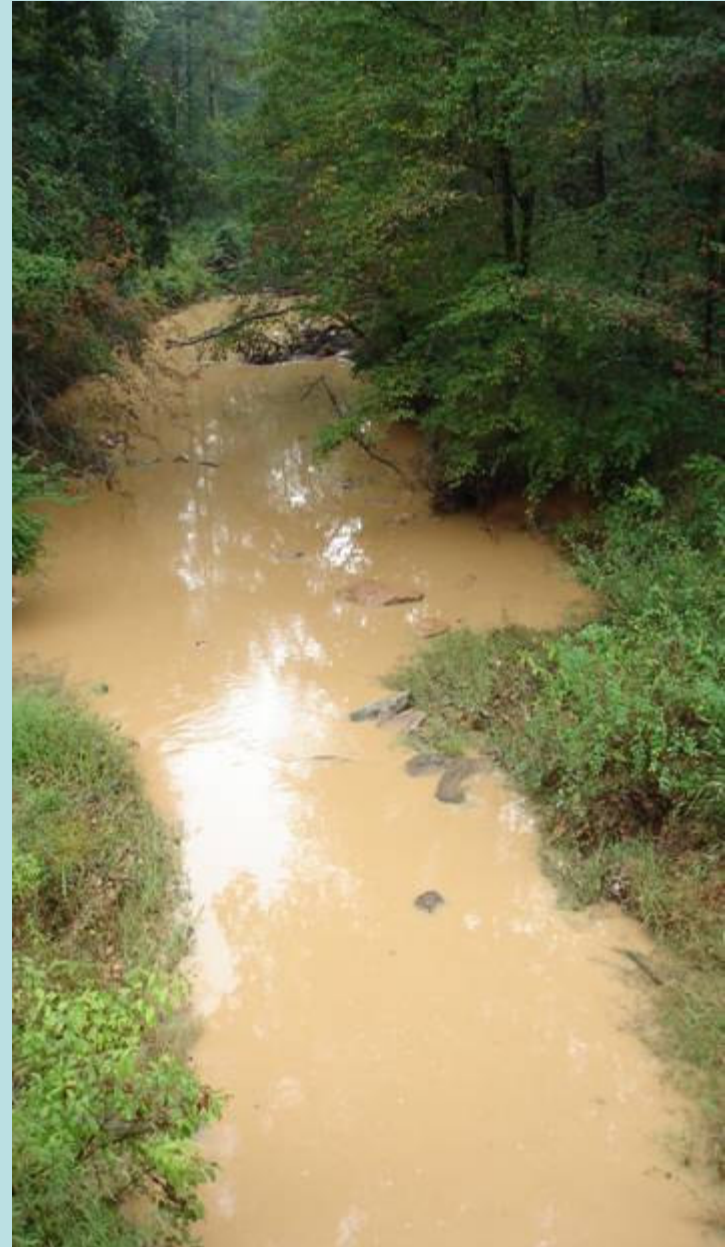
Suggest using LiDAR as screening  
tool and identification aid



*Intermittent and perennial streams in the Carolina Slate Belt of Chatham can begin in drainages as small as 4 acres*



**Without protection these streams, including ephemeral streams, become conduits for flooding and sediment.**



# Trails within Riparian Buffers

- Original language proposed for Section 304 allowed only walking trails and paved biking trails within buffers.
- Revised language allows walking, biking and horse trails.
- A Management Plan will be required for trails within buffers.
- The Plan should include a minimum of the following:
  - existing site conditions
  - Need and purpose (including intended use)
  - design details
  - Justification
  - Responsible entity for trail construction and maintenance
  - Short and long-term impacts
  - Proposed mitigation

**NOTE: BUFFER REGULATIONS/TRAIL LANGUAGE PERTAINS TO DEVELOPMENT ACTIVITIES ONLY.**

# Trails within Riparian Buffers: Some Specific Criteria

- Impacts should be avoided and/or mitigated
- Horse and mountain bike trails allowed in outer 1/3 of buffer only
- Crossings should minimize intrusion in buffer and not impact stream
- Trails should not closely follow streams for a significant distance





END

# Forested riparian buffers

- Reduce pollutants and filter runoff,
- Improve air quality and lower ozone levels,
- Maintain stable water flows,
- Help sustain natural channel morphology,
- Help maintain water and air temperature by providing shade,
- Stabilize stream banks,
- Provide most of the organic carbon and nutrients necessary to support aquatic food webs,
- Provide sources of sufficient large woody debris for stream channels,
- Help reduce flood severity,
- Facilitate the exchange of groundwater and surface water,
- Provide important wildlife habitat, and
- Protect riparian plant communities.



# Definitions of Terms

Bankfull - The bankfull stage corresponds to the discharge which fills a stable alluvial channel to the elevation of the active floodplain. This discharge is morphologically significant because it identifies the point where the active channel stops and the floodplain begins. In other words, it represents the breakpoint between the processes of channel formation and floodplain formation.

Buffer- a natural or vegetated area through which stormwater runoff flows in a diffuse manner so that the runoff does not become channelized and which provides for infiltration of the runoff and filtering of pollutants. The buffer shall be measured horizontally from the top of the stream bank or from the normal pool elevation of an impoundment.

Channel- a natural water-carrying trough eroded vertically into low areas of the land surface by erosive action of concentrated flowing water or a ditch or canal excavated for the flow of water.

Development- any land-disturbing activity which adds to or changes the amount of impervious or partially impervious cover on a land area or which otherwise decreases the infiltration of precipitation into the soil.

Ephemeral (stormwater) stream- a feature that carries only stormwater in direct response to precipitation with water flowing only during and shortly after precipitation events. An ephemeral stream may or may not have a well-defined channel, the aquatic bed is always above the water table, and stormwater runoff is the primary source of water. An ephemeral stream typically lacks the biological, hydrological, and physical characteristics commonly associated with continuous or intermittent conveyance of water.

Existing development- for projects that do not require a State permit, shall be defined as those projects that are built, or those projects that at a minimum have established a vested right under North Carolina zoning law as of the effective date of Chatham County's Water Supply Watershed Protection Ordinance, or such earlier time that other Chatham County ordinances shall specify, based on at least one of the following criteria:

1. substantial expenditures of resources (time, labor, money) based on a good faith reliance upon having received a valid Chatham County approval to proceed with the project, or
2. having an outstanding building permit in compliance with G.S. 153A- 344.1 or G.S. 160A-385.1, or
3. having an approved site specific or phased development plan in compliance with G.S. 153A-344.1 or G.S. 160A-385.1.

For projects that require a State permit, such as landfills, NPDES wastewater discharges, land application of residuals, and road construction activities, existing development shall be defined as those projects that are built or those projects for which a State permit was issued prior to {DATE}.

Intermittent stream- a well defined channel that contains water for only part of the year, typically during winter and spring when the aquatic bed is below the water table. The flow may be heavily supplemented by stormwater runoff. An intermittent stream often lacks the biological and hydrological characteristics commonly associated with the continuous conveyance of water.

Perennial stream- a well-defined channel that contains water year round during a year of normal rainfall with the aquatic bed located below the water table for most of the year. Groundwater is the primary source of water for a perennial stream, but it also carries stormwater runoff. A perennial stream exhibits the typical biological, hydrological and physical characteristics commonly associated with continuous conveyance of water.

Wetlands - "waters" as defined by G.S. 143-212(6) and are areas that inundated or saturated by an accumulation of surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands do generally include swamps, marshes, bogs and similar areas. Wetlands classified as waters of the State are restricted to waters of the United States as defined by 33 CFR 328.3 and 40 CFR 230.3.

## Summary of Buffer Requirements:

1. **The buffer shall be no less than one hundred (100) feet around all perennial streams, measured horizontally from top of the bank, or the full extent of the 1% annual chance flood hazard areas**
2. **At least fifty (50) feet, around all intermittent streams, measured horizontally from top of bank, (including the intermittent stream origin).**
3. **At least fifty (50) feet, measured from the delineated boundary, around all wetlands.**
4. **At least forty (40) feet around ephemeral streams, not otherwise identified as an intermittent or perennial streams, beginning at the point draining at most 4 acres.**
5. **At least thirty (30) feet around springs and seeps.**
6. **Before construction activities begin, the riparian buffer shall be clearly marked.**
7. **If 25 percent or more of the canopy trees within the buffer areas has been harvested within the last 7 years, required buffer widths for all stream types must be doubled in width.**

## Summary of Allowed Structures and Uses in the Riparian Buffer

- Permitted water dependent structures.
- Signs and lighting as necessary for safety at crossings.
- Crossings that are perpendicular to stream flow. Direct discharge of road or driveway ditch runoff into riparian buffers is not allowed.
- Water and sewer lines are not allowed within the riparian buffer areas of perennial streams unless no practicable alternative exists. The preferred methodology for crossings are (1) by attaching to bridges as permitted by NCDOT or private bridge owner; or (2) by directional boring under the riparian buffer and perennial stream.
- New petroleum and gas pipelines use directional boring technologies.
- State or federally permitted stream restoration projects.

**To avoid a loss of effectiveness in protecting streams, the stream buffer shall remain in native, forested, undisturbed vegetation, except as provided below.**

- **Buildings shall be set back at least ten (10) feet from the buffer.**
- **Crossings by roads, streets, driveways, culverts, railroads, intakes, docks, utilities, bridges or other facilities shall be designed to minimize the amount of intrusion into the buffer.**
- **Fill is not allowed within the 1% annual chance flood hazard areas**
- **Bents or other support structures for bridges are not allowed within the bankfull area of perennial streams, except where necessary on the Haw and Deep Rivers.**
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- **For roads, streets, driveways and railroads, bridging is the preferred crossing method associated with perennial streams.**
- **Bridging is required for crossing perennial streams with a bankfull width greater than 10 feet.**
- **Open bottomed culverts may be allowed for crossing perennial streams with a bankfull width less than 10 feet or for crossing intermittent streams.**
- **Fill required for bridges and culverts must not restrict overbank flows of floodwaters during a 25 year (or smaller) storm event. Additional open bottomed culverts within the “floodplain” may be required to ensure natural flows during such storm events.**
- **Direct discharge of road or driveway ditch runoff into riparian buffers is not allowed.**

- **Natural regeneration of native forest vegetation and planting of trees, shrubs, or ground cover plants to enhance the riparian buffer shall be allowed provided that soil disturbance is minimized.**
- **Agricultural and silvicultural field drains and ditches shall be restored to natural conditions**
- **Invasive species listed by the North Carolina Botanical Garden may be physically removed from the buffer.**
- **Water oriented recreational facilities, such as boat or fishing piers, shall require an approved use permit from the Watershed Administrator with review from the Environmental Review Board (ERB).**

**Trails may be allowed within buffers upon proper submission, review, and approval of a Management Plan by the ERB (and Watershed Review Board). The Plan should include, at a minimum, the following:**

- a. Existing site conditions (including the status of the protected area)
- b. Needs and purpose (including intended use)
- c. Trail location based on site survey
- d. Design details
- e. Justification
- f. Responsible entity for design, implementation, maintenance and access control
- g. Short and long-term impacts (e.g., future trail relocations) should be identified
- h. Proposed mitigation

# Specific Criteria for Trails in Buffers

- Impacts should be avoided/mitigated to the extent possible.
- Horse and/or mechanical vehicle traffic is prohibited in wetland areas or in areas with soils particularly prone to compaction or erosion.
- Reductions in the width of the buffer shall be balanced by corresponding increases in the buffer elsewhere on the same property.
- Applicant must submit documentation that issuance of an exception will not result in a reduction in water quality, a significant change in hydrology, or significantly impact the integrity of buffer.
- Trails may not parallel streams for a significant distance in the one third (1/3) of the buffer closest to the stream.
- Crossings shall be designed to minimize the amount of intrusion into the buffer
- Fording creeks is prohibited - trail crossings must have foot bridges that do not impact stream.
- Mountain bike and horse trails allowed only in outer 1/3 of buffer; crossings allowed (but see above).
- One trail in any section of buffer only (can be multipurpose).



# Procedures

All **development plans associated with riparian corridor conservation**, including maps and GIS data layers of delineated streams and buffers, **must be submitted by the County Planner to the Environmental Review Board (ERB), NC Wildlife Resources Commission, and NC Natural Heritage Program** for project review. Recommendations provided by State agencies shall be transferred to the ERB to help ensure timely processing by the ERB.

The name, phone and FAX number(s), and mailing and e-mail address of a **development project official (DPO)** who is responsible for all environmental commitment oversights must be provided to the County Planner.

# Future work suggested for the ERB

- Review the entire Watershed Protection Ordinance – impervious surface thresholds, fees and enforcement, etc.
- Review Erosion and Sedimentation Control Ordinance
- Consider Stormwater Ordinance
- Overall watershed planning