

# Riparian Forest Buffer

## USDA Riparian Forest Buffer Conservation Practice Job Sheet

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Natural Resources Conservation Service (NRCS)

April 1997

Landowner \_\_\_\_\_



### Definition

A riparian forest buffer is an area of trees and shrubs located adjacent to streams, lakes, ponds, and wetlands.

### Purpose

Riparian forest buffers of sufficient width intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. Woody vegetation in buffers provides food and cover for wildlife, helps lower water temperatures by shading waterbody, and slows

out-of-bank flood flows. In addition, the vegetation closest to the stream or waterbody provides litter fall and large woody debris important to aquatic organisms. Also, the woody roots increase the resistance of streambanks and shorelines to erosion caused by high water flows or waves. Some species established or managed in a riparian forest buffer can be managed to provide timber, wood fiber, and horticultural products.

### Where used

Buffers are located by permanent or intermittent streams, lakes, ponds, wetlands, and seeps. Many of these areas have year-round or seasonal beneficial

... a CORE  
conservation  
practice

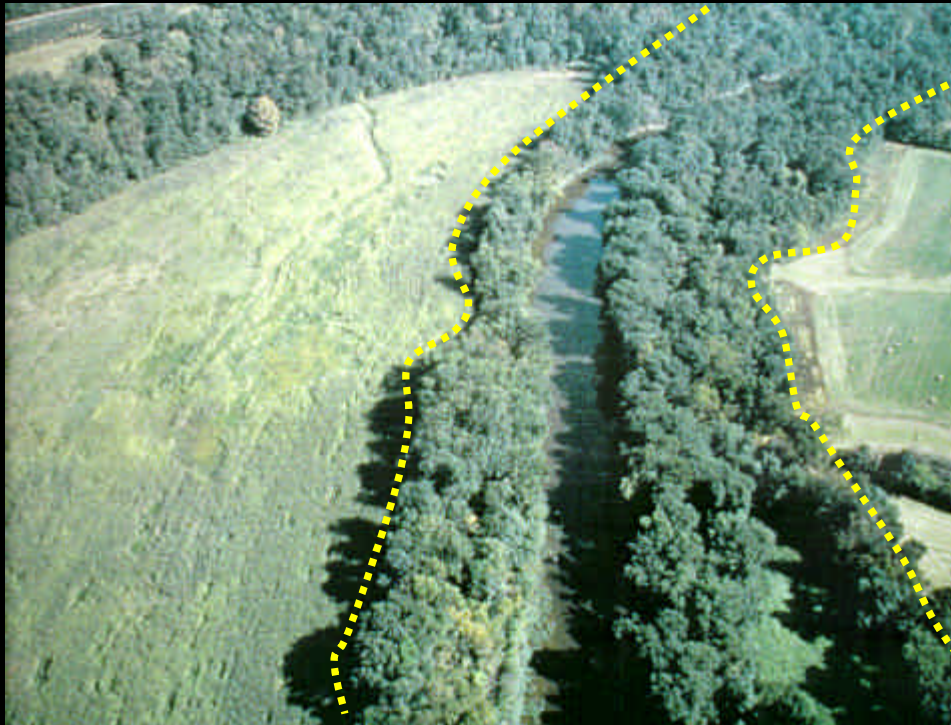
# Presentation Objectives

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- Define riparian forest buffer
- Describe benefits and functions
- Explain basic design considerations
- Complete a design exercise

# Riparian Forest Buffer

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A riparian forest buffer is an area of trees and shrubs located adjacent to streams, lakes, ponds, and wetlands.

# Benefits and Functions

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- Intercepts sediment, nutrients, pesticides and other materials in surface runoff
- Reduces nutrients and other pollutants in shallow sub-surface water flow
- Provides food and cover for wildlife including beneficial insects
- Lowers water temperatures by shading
- Slows out-of-bank flood flows

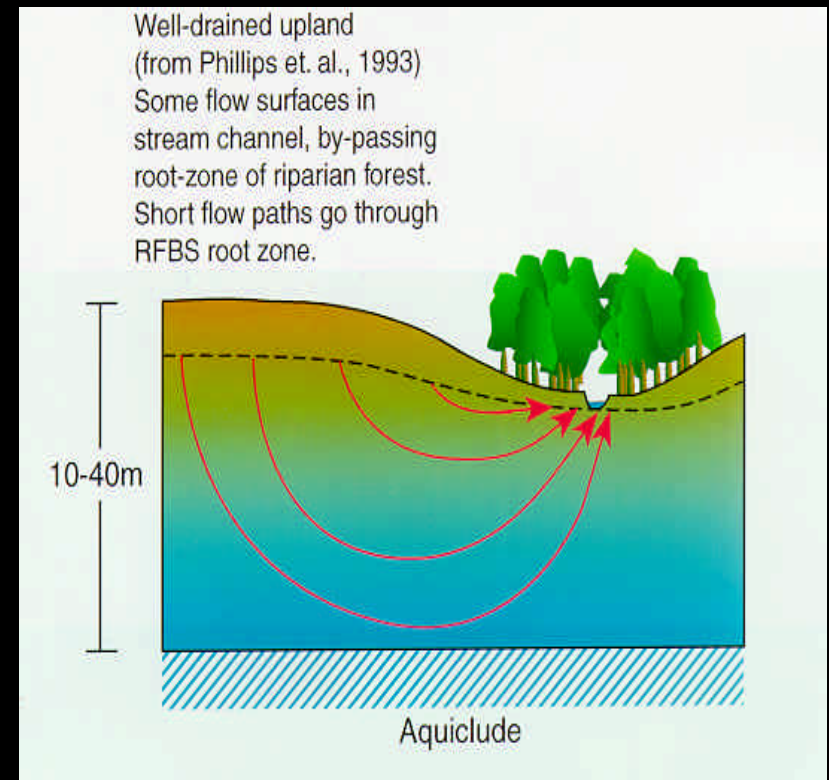
## Benefits and Functions - con't ...

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- Provides litter fall and large woody debris needed by aquatic organisms
- Tree and shrub roots increase bank and shoreline stability
- Diversifies farm enterprise - timber, wood fiber, horticultural products
- Improves aesthetics, land values, reduces taxes in some locales

# Limitations

- May intercept only part of subsurface flow pollutants
- Undesirable animals and plants may be attracted
- Cropping acreage reduced
- Requires additional management (forest/tree)
- Marketing infrastructure needed for tree products



# Design

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## ■ Location

Riparian forest buffers are located adjacent to permanent or intermittent streams, lakes, ponds, wetlands, and seeps. The natural or irrigated potential for the site must support woody plants (trees or shrubs)

# Design

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- **Layout - “*configuration*” or “*extent*”**
  - Investigate the natural potential or historical extent of the riparian zone ... then factor in current-day changes to hydrology and water tables
  - For streams, one or both sides may need treatment



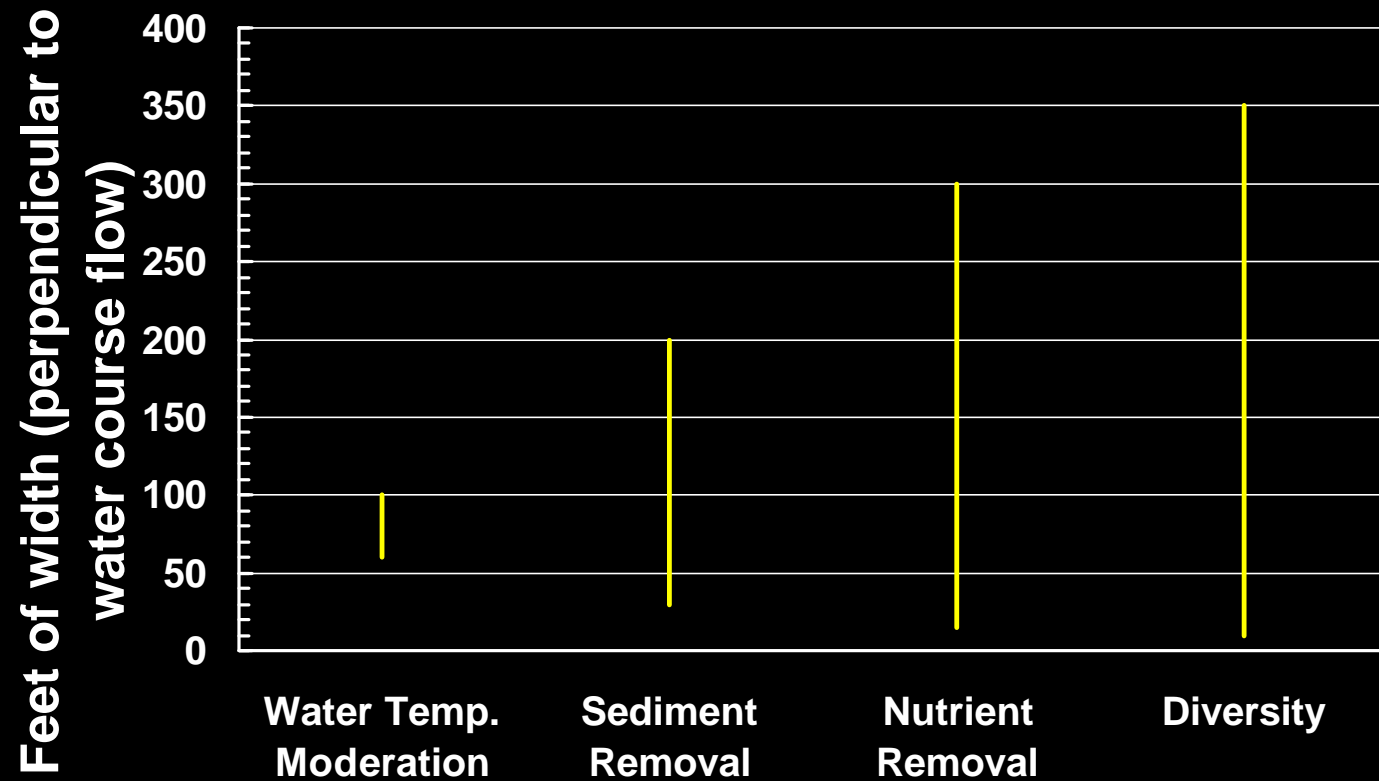
# Design

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## ■ Layout - “*width*”

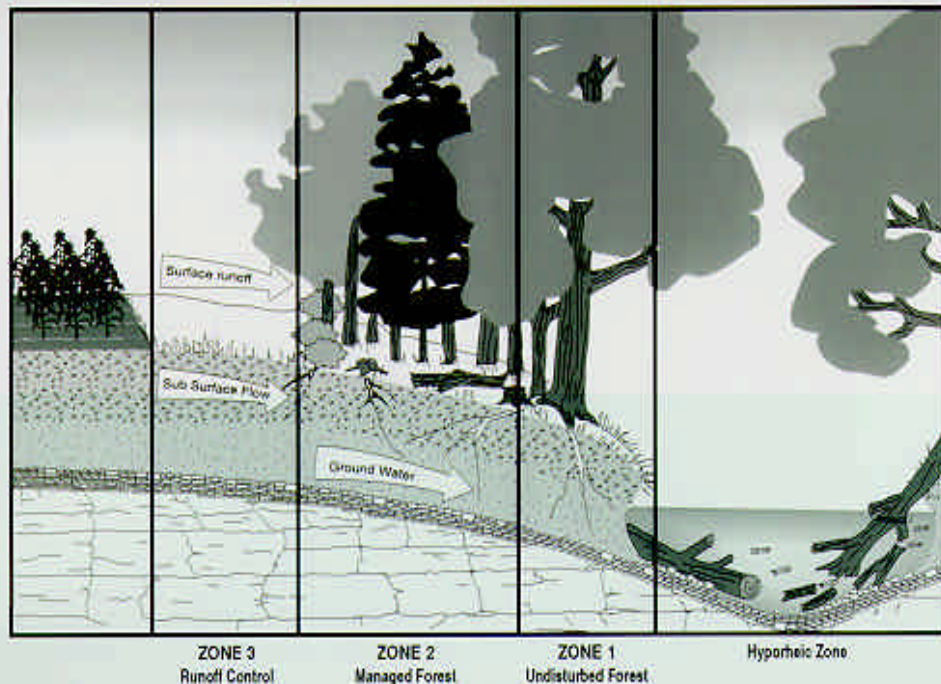
- *Width* is measured perpendicular to the shoreline or streambank (on the horizontal) , begins at the normal water line, and extends to the riparian-upland ecotone as indicated by year-long or seasonal soil wetness, geomorphology, or floodplain topography.

# Generalized buffer widths ...



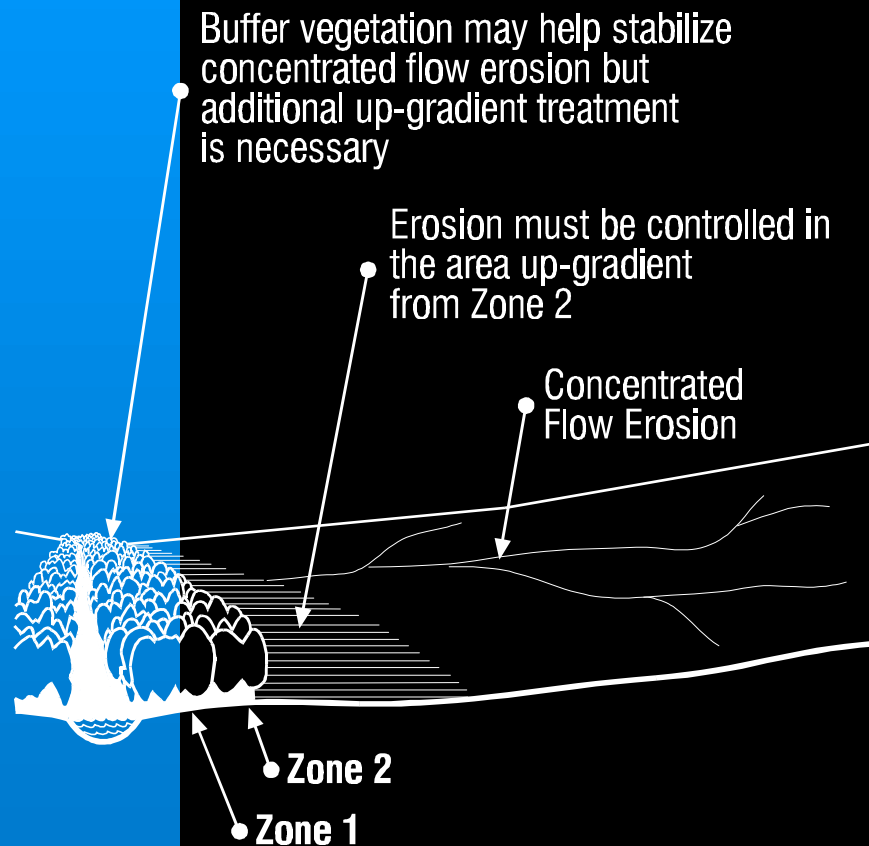
(Castelle et al, 1994)

# Minimum widths ... Three-Zone Concept



- **Zone 1  $\geq$  15 feet** (habitat/shade)
- **Zone 2  $\geq$  20 feet** (water quality)
- **Zone 1+2  $\geq$  35'** (small streams)
- **Zone 1+2  $\geq$  30% of floodplain or 100'** (large streams)

## Design - zone 3 ... a buffer's buffer



- An area created to control concentrated flow or mass soil erosion that would degrade zones 1 and 2
- A variety of practices may apply such as *Critical Area Planting*, *Mulching*, *Use Exclusion* and, last but not least, *Filter Strip*

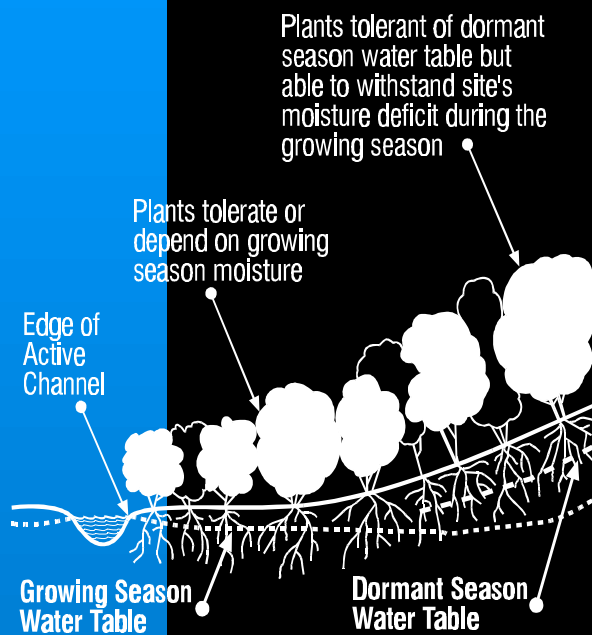
# Design

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## ■ Layout - “*length*” and “*area*”

- *Length* is measured parallel to the shoreline or bank and can be set minimally at two times its width (based on total of both sides)
- Consider extending to the full length of the water body, water course, or ownership ... or beyond to connect forest-to-forest
- *Area* (acreage) is a function of average *length* and *width*

# Plant materials - species selection



- Adapted to site and purpose
- Locally native; compatible growth and shade tolerances
- Specialty species for specific needs
- Consider natural regeneration
- Multiple functions



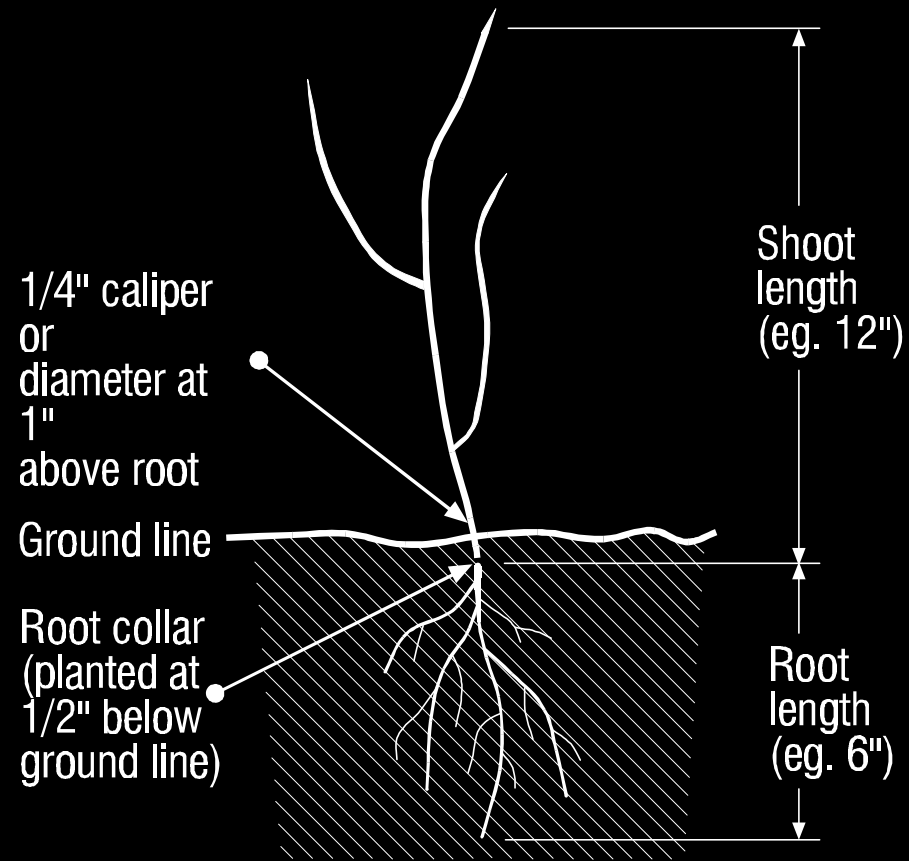
## Plant materials - stock, handling ...

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- Stock can be bareroot, container, cuttings ...
- Sufficient size to establish during first season
- Shrubs <10' ht. at 20 yrs = 3-6' spacing
- Shrubs/trees 10-25' ht. = 5-8' spacing
- Trees >25' ht. = 8-12' spacing
- Plant during optimum period of soil moisture and temperature

# Plant materials information

- Can hand or machine plant as long as roots are properly positioned and “firmed up”



Shoot-to-root ratio is 12" to 6" or 2:1



## Site preparation

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- Woody plants will rarely survive and establish quickly if planted or naturally regenerated in competitive vegetation
- Individual planting sites must be free of obstructions to allow proper planting
- Can use hand, machine or chemical removal of competitive vegetation and debris
- Restrict disturbance of between-plant areas

## Temporary storage

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- Make no assumptions about planting stock -- thoroughly check for dry roots, mold, pests, excessive temperatures
- Arrange with vendor to replace damaged stock
- Keep roots moist, cool (34-38° F in temperate climates); synchronize delivery and out planting; plant as soon as possible
- Use a heel-in bed for longer temporary storage

## **Operation and maintenance**

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- **Keep the buffer working ... for functionally and for products**
- **Periodic, close-up inspections**
- **Replacement of dead or dying stock**
- **Continued use exclusion, prescribed grazing, etc.**
- **Consider harvesting for maintaining plant/forest vigor and function**

# Buffers must be part of the system!

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- **Cropland** - e.g., filter strip, nutrient management, pest management, tillage, wildlife practices
- **Grazing land** - e.g., prescribed grazing, pasture and hay planting, filter strip, nutrient management, use exclusion, fencing, trough or tank, wildlife practices
- **Bank stabilization** - e.g., streambank and shoreline protection, critical area planting, use exclusion, fencing, wildlife practices

## **Consider the system needs**

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*of the following scenes/sites --*

*Consider ...*

- *can one practice do the job?*
- *are multiple functions valuable?*
- *if so, what are the core practices?*

# One practice? Multiple values? Core practices?

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*Site 1*

*Build a  
system!*

# One practice? Multiple values? Core practices?

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*Site 2*

*Build a  
system!*

# One practice? Multiple values? Core practices?

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*Site 3*

*Build a  
system!*



# One practice? Multiple values? Core practices?

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Site 4

*Build a  
system!*

# One practice? Multiple values? Core practices?

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*Site 5*

*Build a  
system!*

# One practice? Multiple values? Core practices?

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*Site 5 - three years later*

*Build a  
system!*

## Summary

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- *Riparian forest buffers* help protect soil, improve air and water quality, enhance habitat and aesthetics, conserve biodiversity, increase economic diversity
- *Conservation buffers* allow farmers and ranchers to express their commitment to conservation