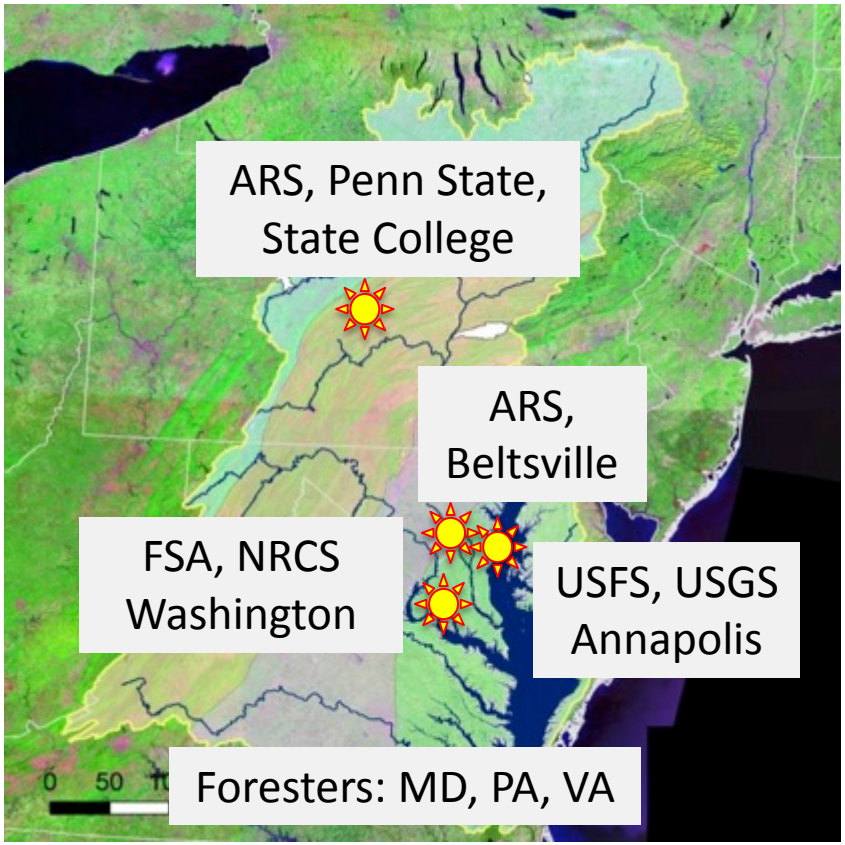
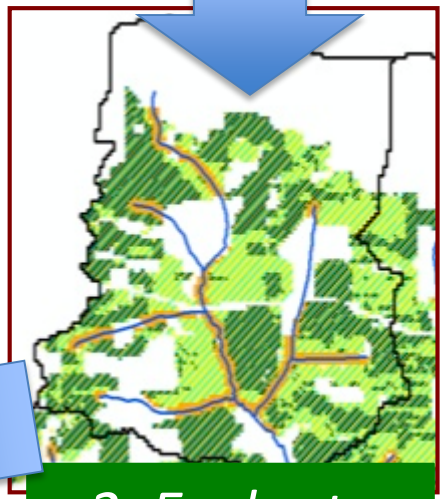
Performance of CRP Buffers in Chesapeake Watershed



1. Survey sites



2. Evaluate

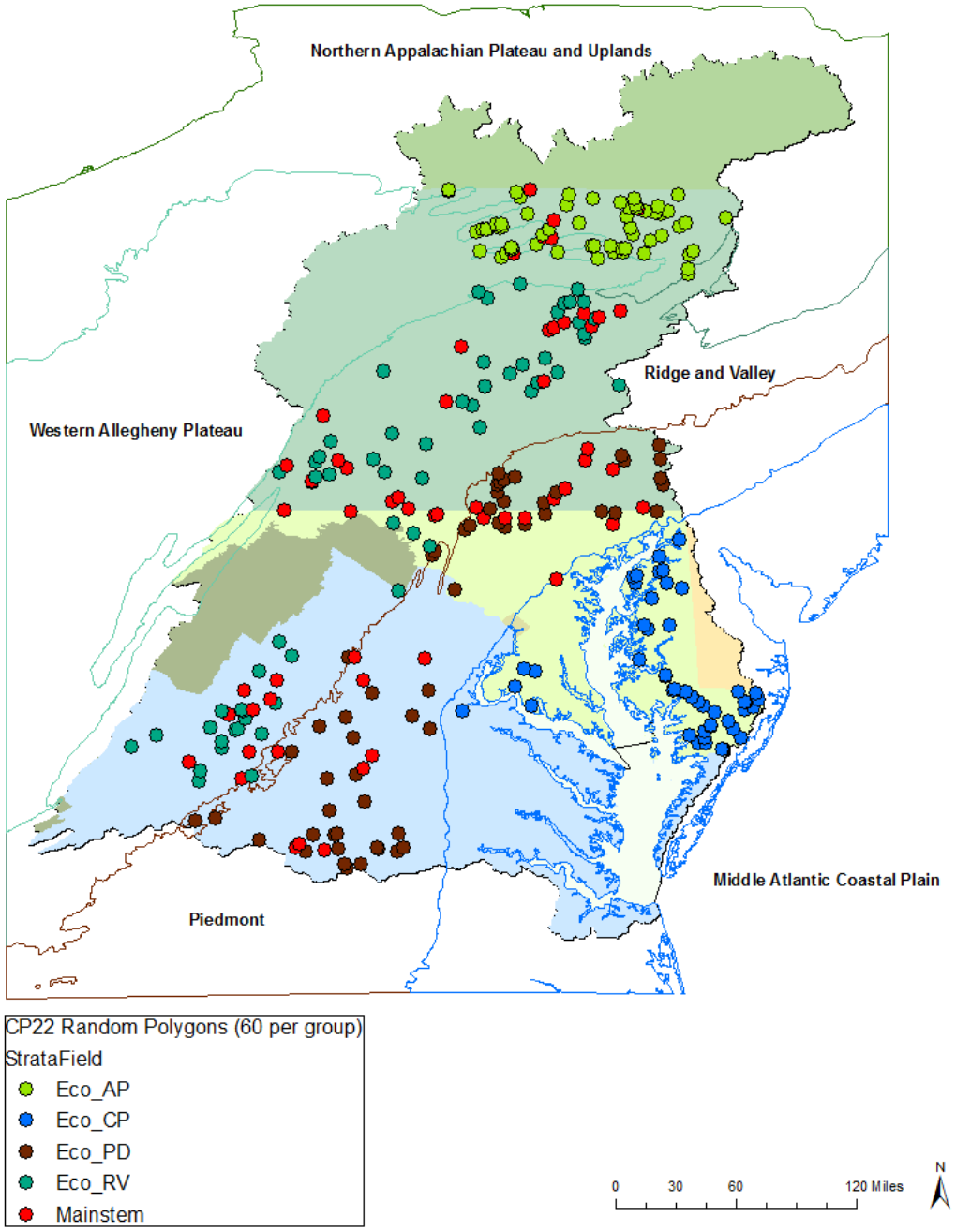
Soil & Water Assessment Tool SWAT

3. Extrapolate

USDA

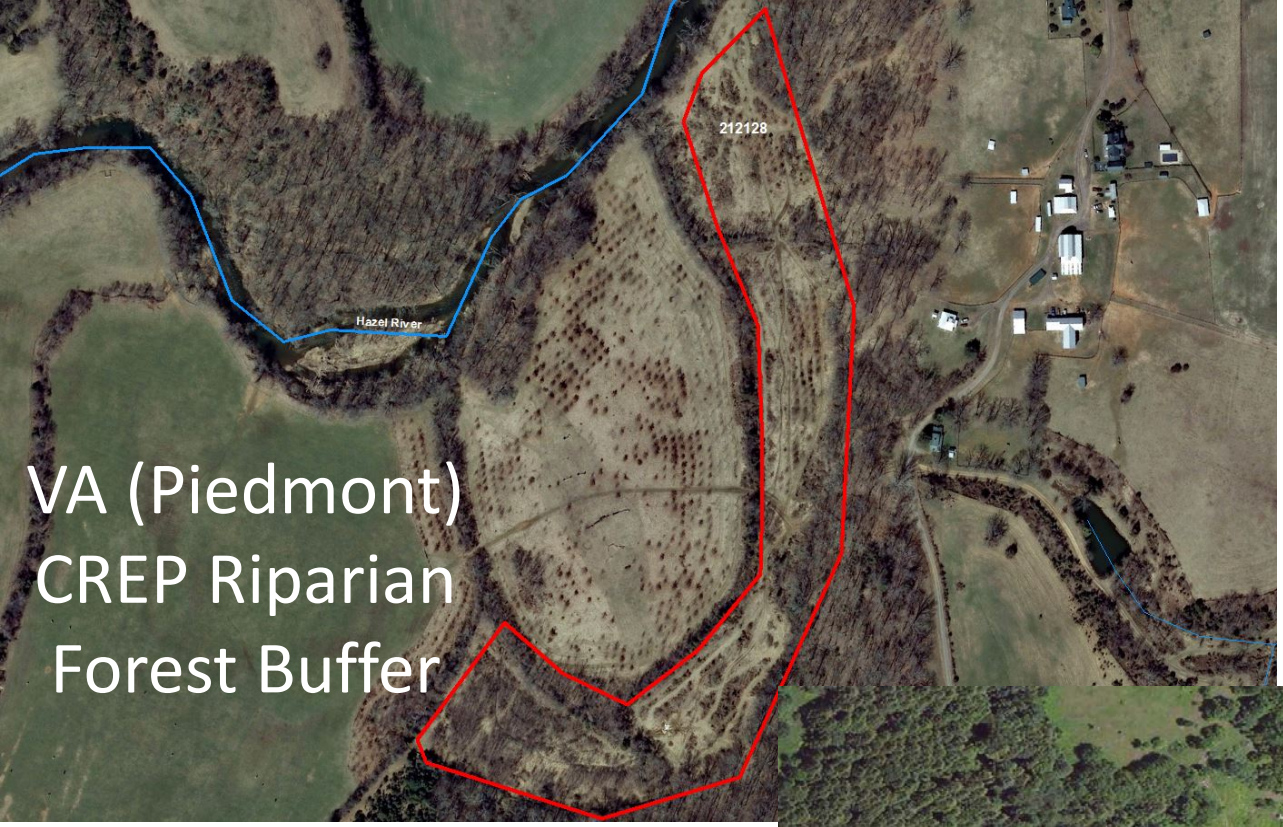
ASSESSMENT

CRP is 30 CREP



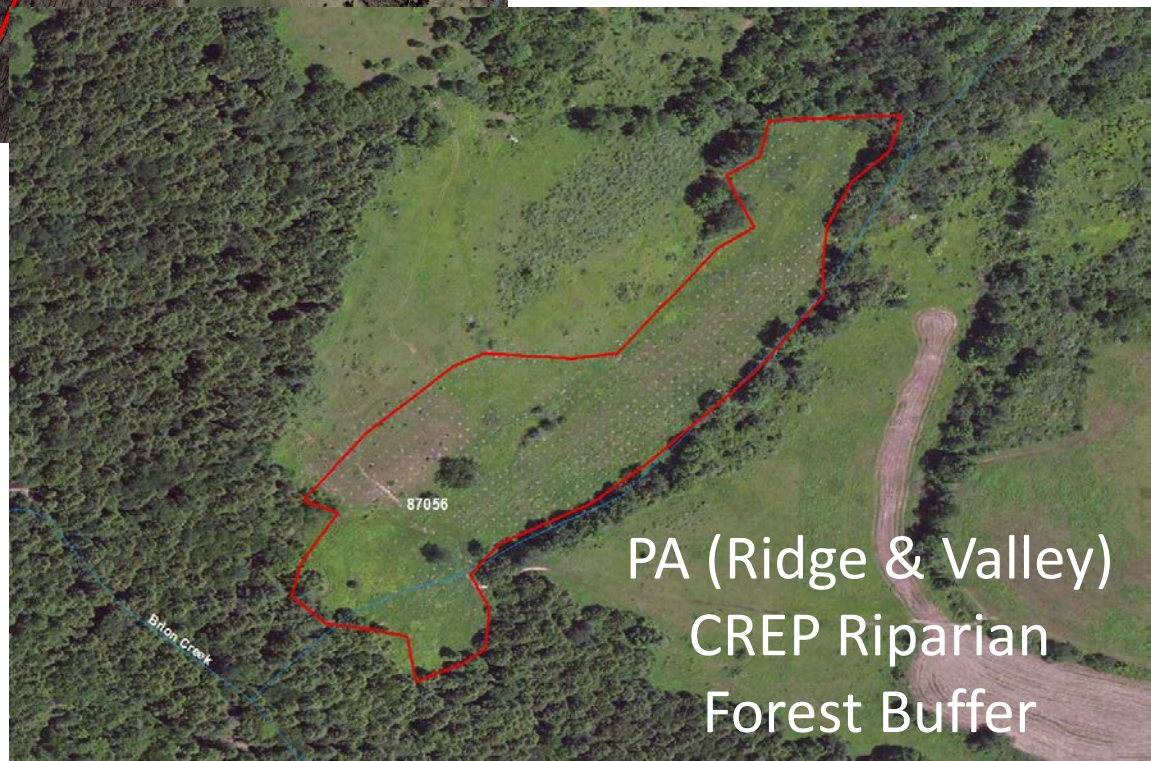
Stream Wetland, Riparian Index :

- 150 riparian forest buffers
- Evaluated by state forestry personnel (MD, VA, PA)
- Average 5.0 ac (mainstem averaging 6.0 ac)
- Most projects next to stream/ditch (83%), remainder within 10 to 100 m of stream



VA (Piedmont)
CREP Riparian
Forest Buffer

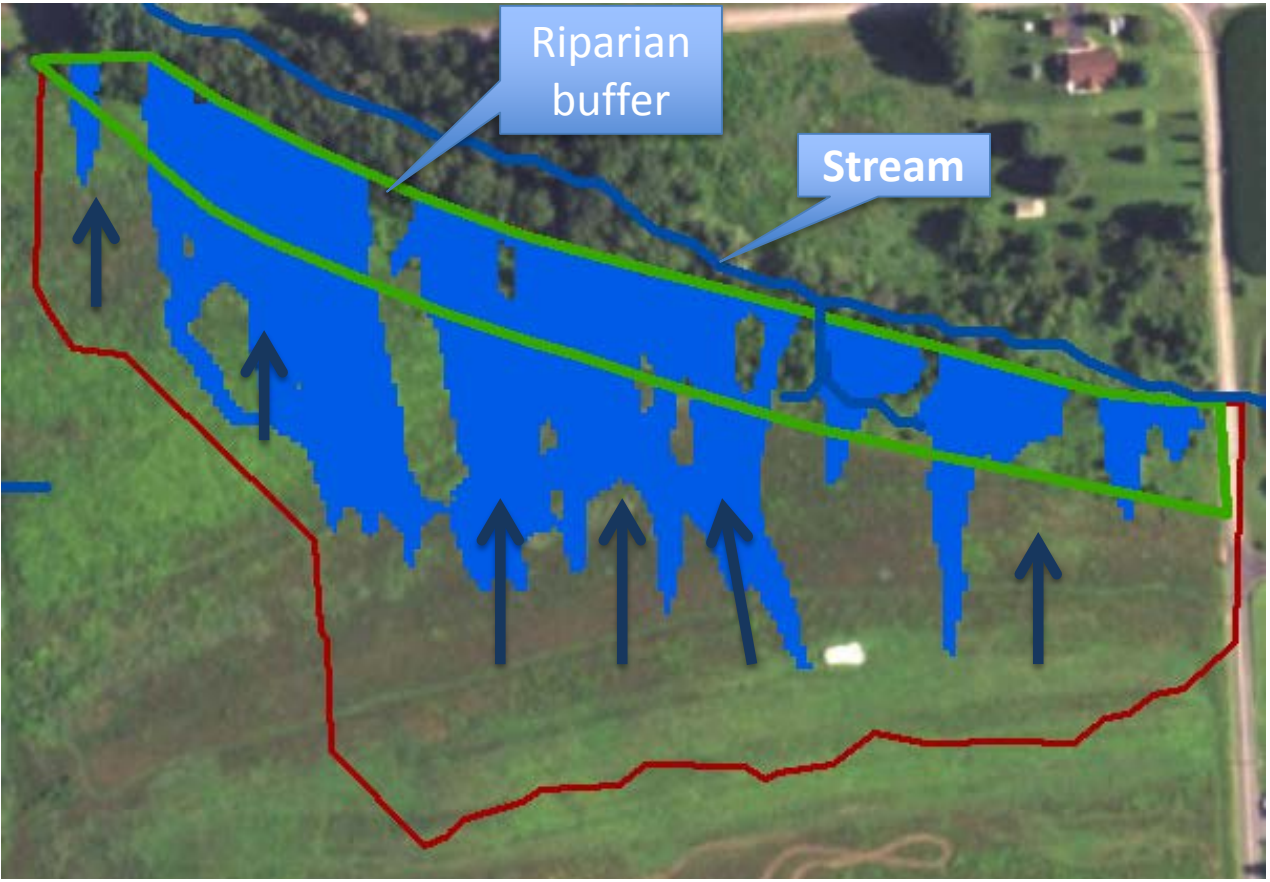
Every site
is unique



PA (Ridge & Valley)
CREP Riparian
Forest Buffer

MD (Coastal Plain) CREP Riparian Forest Buffer

Have CREP riparian buffers been located in the best place for water quality protection?

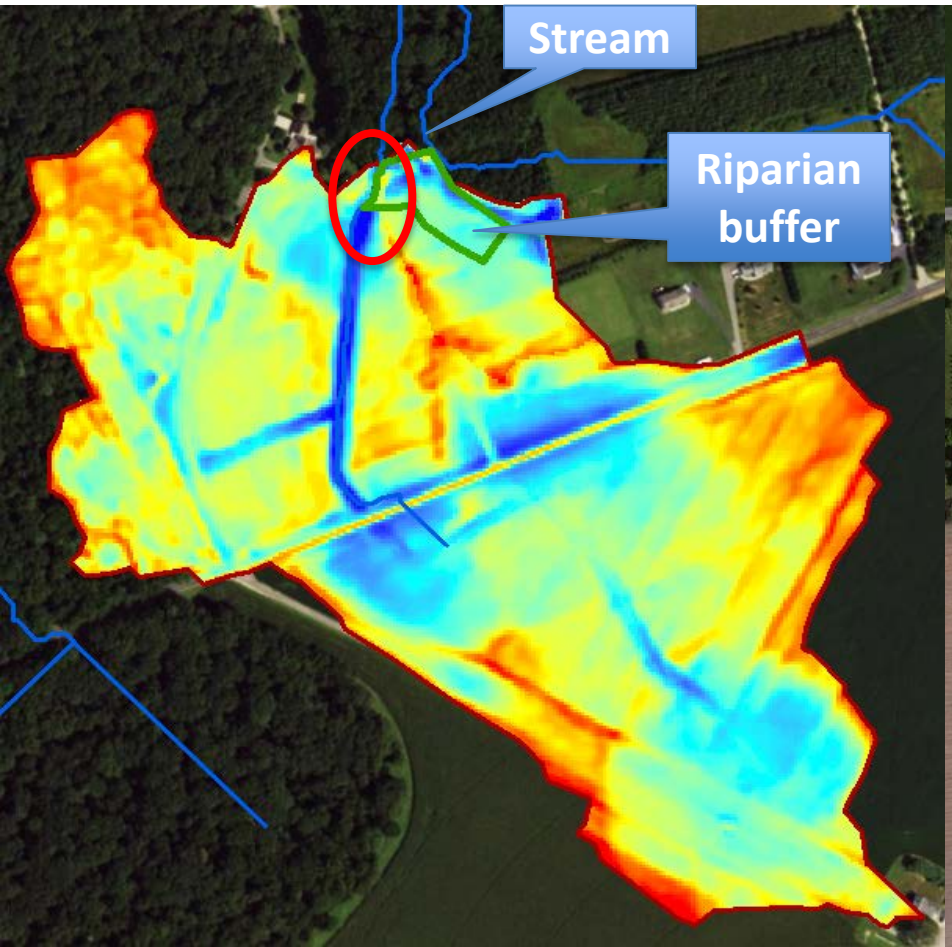


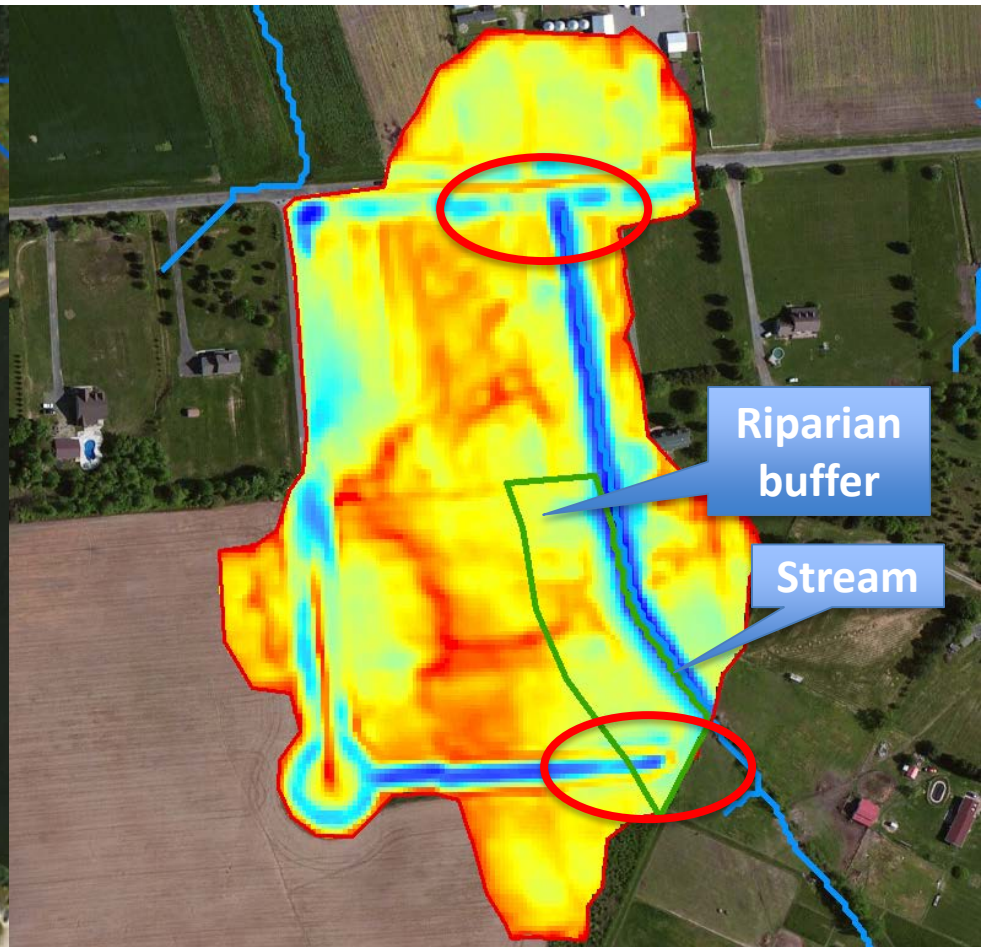
IDEAL

- Overland flow occurring mainly as sheet flow
- Distributed across riparian buffer

“Bypass flow”
Ditches/swales bypass riparian buffers

very prevalent on coastal plain



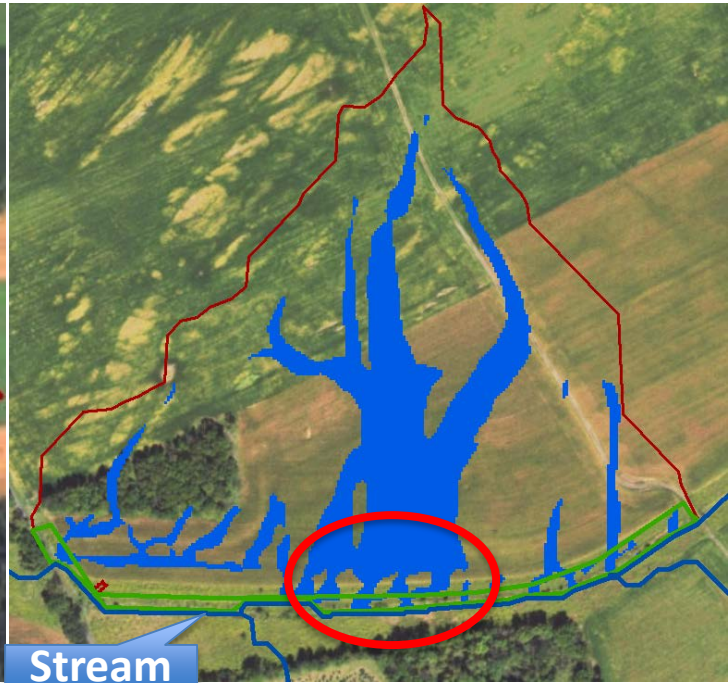


Runoff filtration may not have been a priority

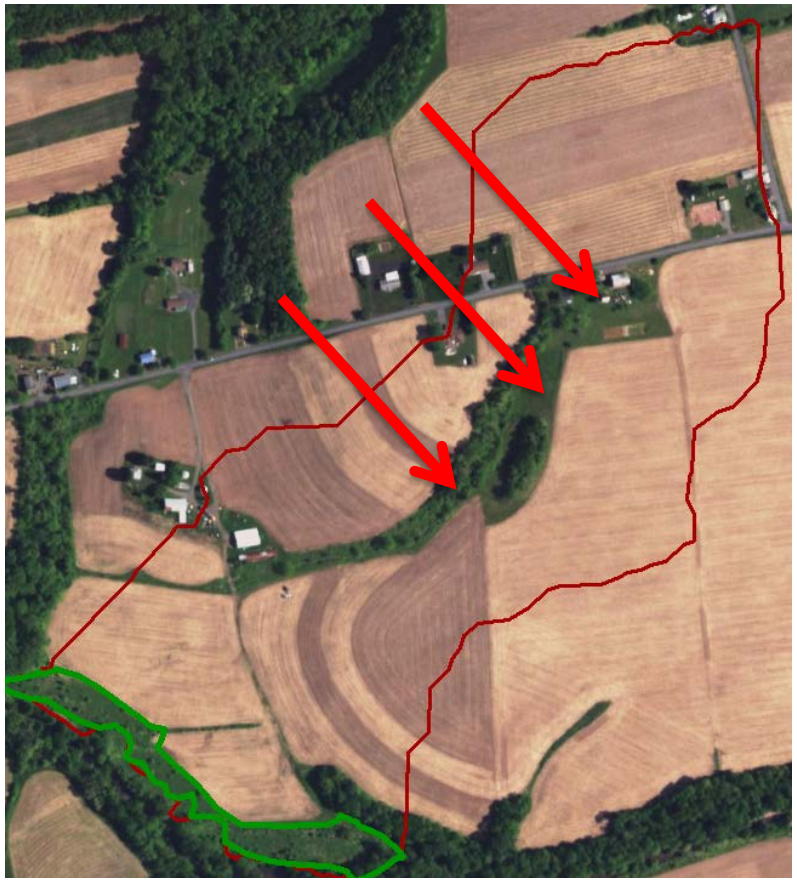
buffers outside of major flow path in landscape

- Flow concentrated at end of riparian buffer

- Flow concentrated at center of the riparian buffer



Potential for corrective action

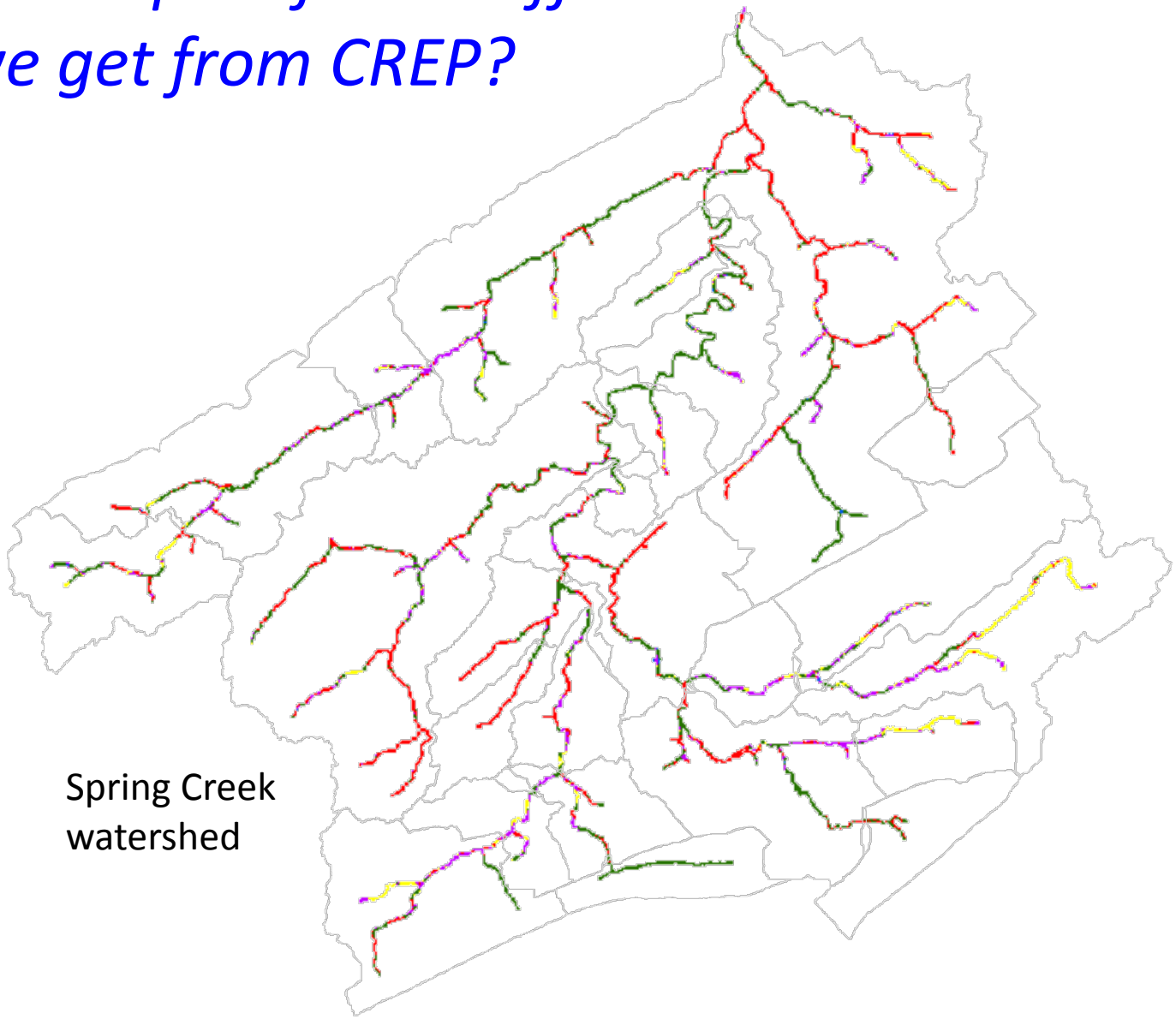


- Better placement of riparian buffer
- Optimize buffer to contributing area ratio
- Implement grassed waterways in concentrated flowpaths
- Create wetlands associated with riparian buffer
- Incorporate grassed waterways and two-stage ditches in overall conservation plan

Modeling buffer effectiveness

What can we expect from buffers?

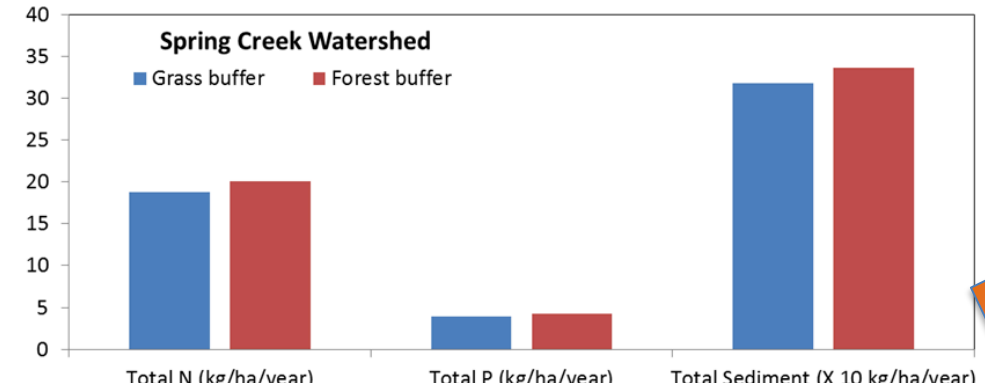
What do we get from CREP?

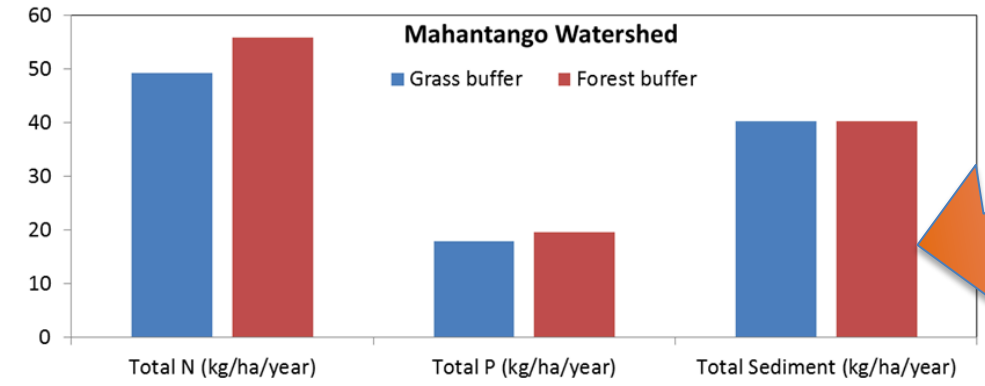


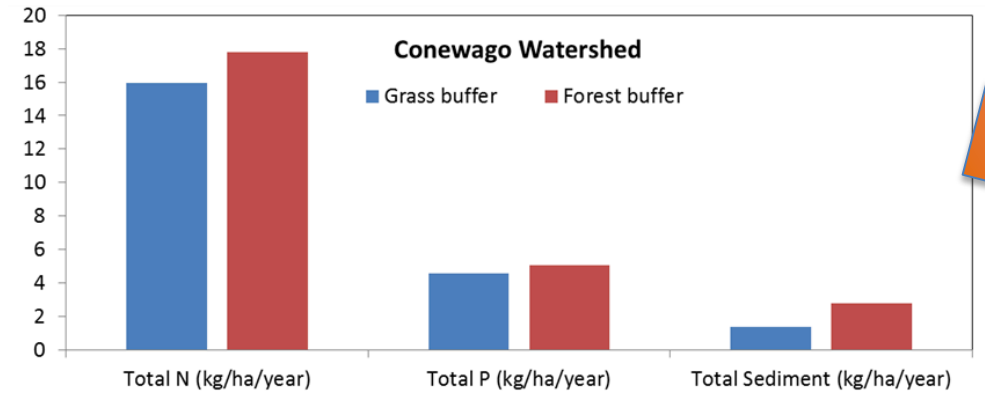
Spring Creek watershed

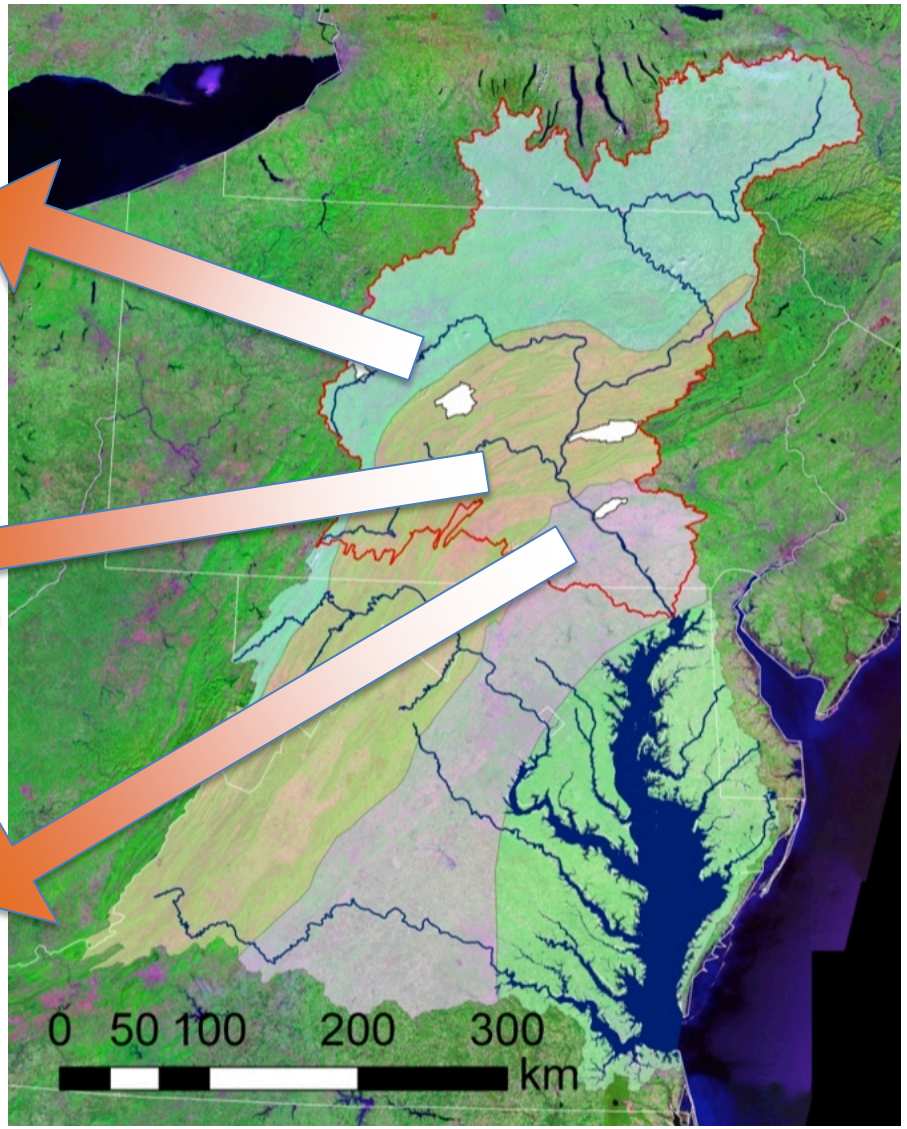
Modeling buffer effectiveness

Soil Water Assessment Tool

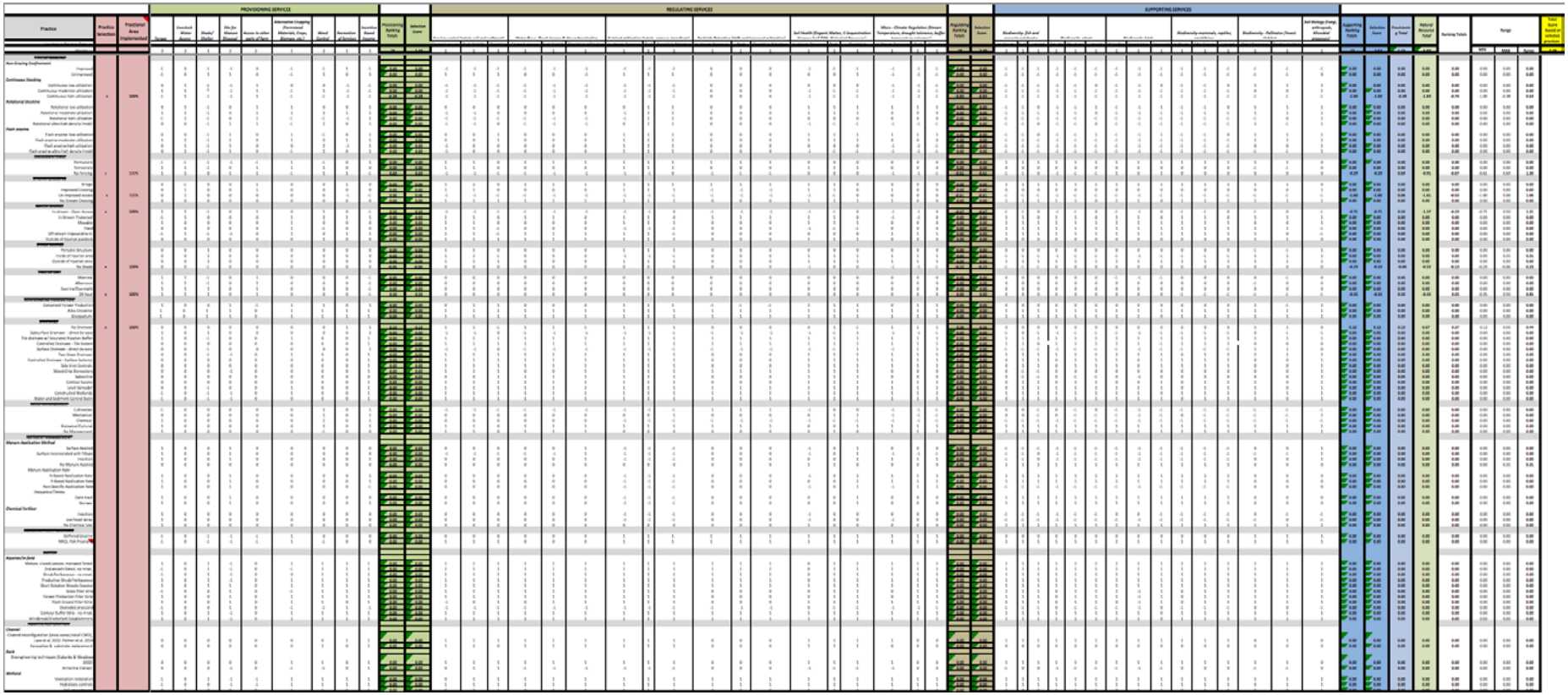








Production and Conservation Trade-off (PaCT) assessment tool



Seeking to better understand the trade-offs associated with different forms of management practices on ecological and economic outcomes

Ecosystem Services Considerations

PROVISIONING SERVICES							
Forage	*Water*	*Shade*	*Weed control*	*Manure spreading*	*other parts of farm*	*Recreational services*	*Incentive Based Income*

REGULATING SERVICES											
Erosion control (retain soil and sediment)			*Water flows, flood storage & desynchronization*			*Nutrient mitigation (retain, remove, transform)*			*Soil Health and Climate regulation - source & sink for carbon*		
Channel	Bank	Floodplain	Channel	Bank	Floodplain	Channel	Bank	Floodplain	Channel	Bank	Floodplain

SUPPORTING SERVICES											
Biodiversity- fish and macroinvertebrates			*Biodiversity-plants*			*Biodiversity-Birds*			*Biodiversity-mammals, reptiles, amphibians*			*Biodiversity: Pollinator/Insect Sp.*	
In-stream	Bank	Upland	Aquatic	Structural	Upland	Waterbird	Edge Species	Grassland	In-stream	Edge Soecies	Upland	Floral Resources	Nesting Habitat

PACT Application

Examples from the Riparian Zone

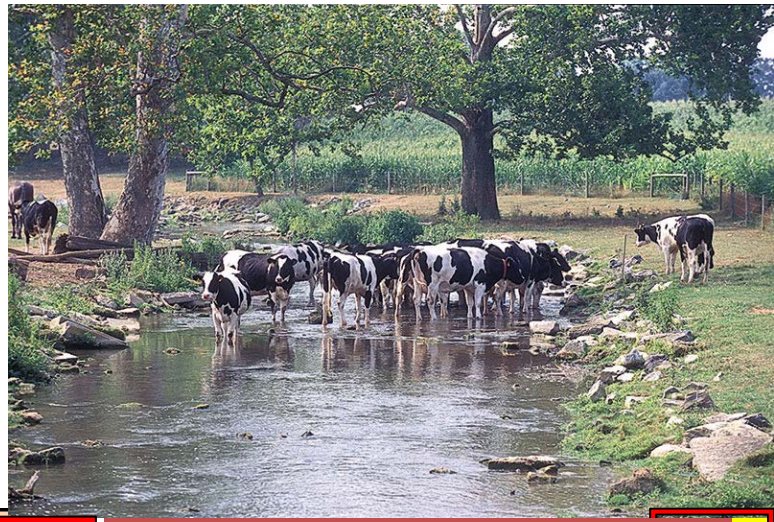
Example 1

Continuously grazed, high utilization operation with a degraded streambank, un-restricted livestock access to the creek.

PACT Application

Examples from the Riparian Zone

Degraded grassland buffer



Practice	Practice Selection	Fractional Area Implemented	Selection Score	Provisioning Totals	Natural Resource Totals
Location in Riparian Zone =>					
Weght			1.33	0.93	0.56
BUFFER					
Riparian/In-field					
Mature Closed Canopy - **MANAGED**			0.00	0.00	0.00
Mature Closed Canopy - **NO mngt.**			0.00	0.00	0.00
Shrub/herbaceous - **NO mngt.**			0.00	0.00	0.00
Productive Shrub/Herbaceous			0.00	0.00	0.00
Short Rotation Woody Coppice			0.00	0.00	0.00
Grass filter strip			0.00	0.00	0.00
Forage Production Filter Strip			0.00	0.00	0.00
Flash Grazed Filter Strip			0.00	0.00	0.00
Degraded grassland	x	100%	-0.73	-0.40	-1.68
Contour Buffer Strip - no mngt.			0.00	0.00	0.00
Windbreak/Shelterbelt Establishment			0.00	0.00	0.00
CROPPING SYSTEM					
Corn-Soy Rotation			0.00	0.00	0.00
Grain - Forage (Dairy)			0.00	0.00	0.00
Perennial Forage			0.00	0.00	0.00
Woody Biomass			0.00	0.00	0.00
Herbaceous Biomass			0.00	0.00	0.00
Alley Cropping			0.00	0.00	0.00
Silvopasture			0.00	0.00	0.00
TILLAGE					
Conventional Tillage			0.00	0.00	0.00
Reduced Tillage			0.00	0.00	0.00
Subsoiling			0.00	0.00	0.00
No Till			0.00	0.00	0.00
SOIL MANAGEMENT					
Cover Crops			0.00	0.00	0.00

Scenario 1: Over grazed

Benefits:

- Stream Water Access
- Ease of Management
- Ease of Maintenance
- Maximized grazing area

Cons:

- Degraded water quality
- Degraded Habitat
- Degraded Animal Health
- Poor
- Degr
- ....

Provisioning Totals	Natural Resource Totals
0.93	0.56

PACT Application

Examples from the Riparian Zone

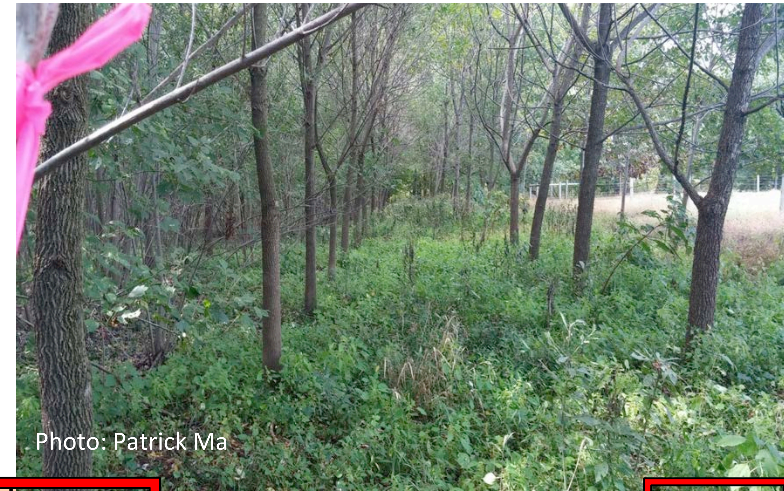
Example 2: CREP Riparian Forest Buffer

Mature CREP riparian forest buffer practice with complete removal of livestock from riparian corridor (100ft from top of bank). CP-21 and CP-22 with proportional area estimated. No vegetation management.

PACT Application

Examples from the Riparian Zone

15 year old Forested Buffer
Exclusion Fence
No Livestock in Riparian Zone



Scenario 2: CREP

Benefits:
- Optimized Habitat
- Water quality improvements
- Natural Ecosystem processes
- Erosion mitigation enhanced
- Grassed waterway

Cons:
- Unmanaged concentrated flows
- Enhanced nutrient cycling through leaf senescence
- unmanaged
- Removal of … potential

Provisioning Totals	Natural Resource Totals
0.00	4.89

Provisioning Totals	Natural Resource Totals
0.00	4.89
0.00	0.00
-0.20	1.94
0.00	0.00
0.00	0.00
0.00	0.00
-0.25	1.46
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

TILLAGE

SOIL MANAGE

Scenario 1: Over grazed

Benefits:
- Stream Water Access
- Ease of Management
- Ease of Maintenance
- Maximized grazing area

Cons:
- Degraded water quality
- Degraded Habitat
- Degraded Animal Health
- Poor
- Degra
- ….

Provisioning Totals	Natural Resource Totals
0.93	0.56

peter.kleinman@ars.usda.gov