

A National Scale Model to Support USDA Conservation Policy and Planning

Mike White & Many Others

USDA/ARS

Federal NRCS

Texas A&M University & Agrilife Extension

Texas State NRCS

Conservation Effects and Assessment Project

- CEAP I - Overall Objectives
 - Predict benefit of USDA conservation programs
 - 3.7 billion/yr
 - Assess benefits of present and future US conservation policy
- Technical Details
 - US scale
 - SWAT & APEX modeling system
 - 2,200 subbasins, 47 years
- Essentially Finished



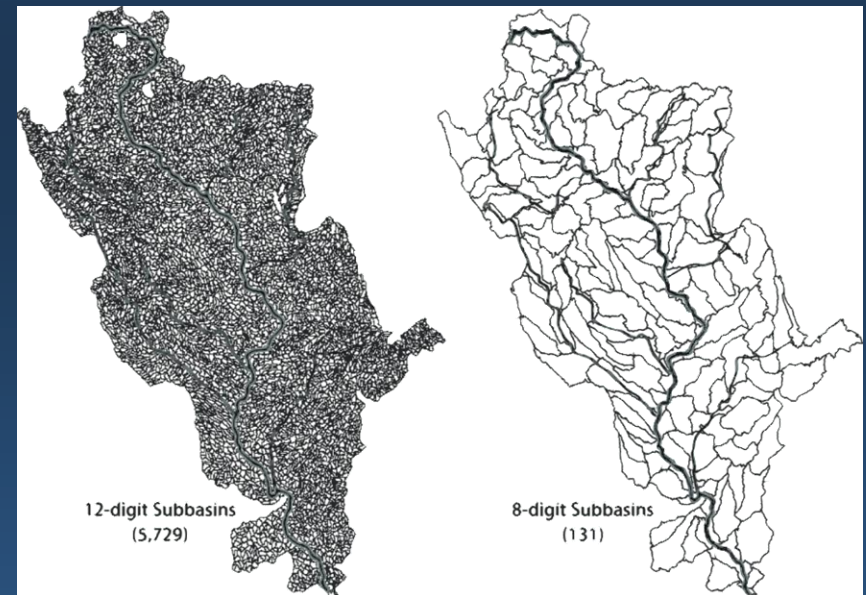
Beyond Original Objectives

- CEAP's other uses
 - Congressional and Cabinet level inquiries concerning pollutant fate and transport
 - Analysis for BP settlement distribution
 - Farm Bill development
- Requested but can't do
 - Local watershed conservation planning and assessment
 - Customized scenarios



The Next Generation CEAP II

- More spatial resolution
 - 40x
- More localized processes
 - Floodplains
 - HRU connections
 - Gullies
- APEX and SWAT+



A Few Aspects of a Much Larger Project

- SWAT Input Data
 - Climate
 - Management
- Restructuring Model Output for Decision Support Tools

US Climate

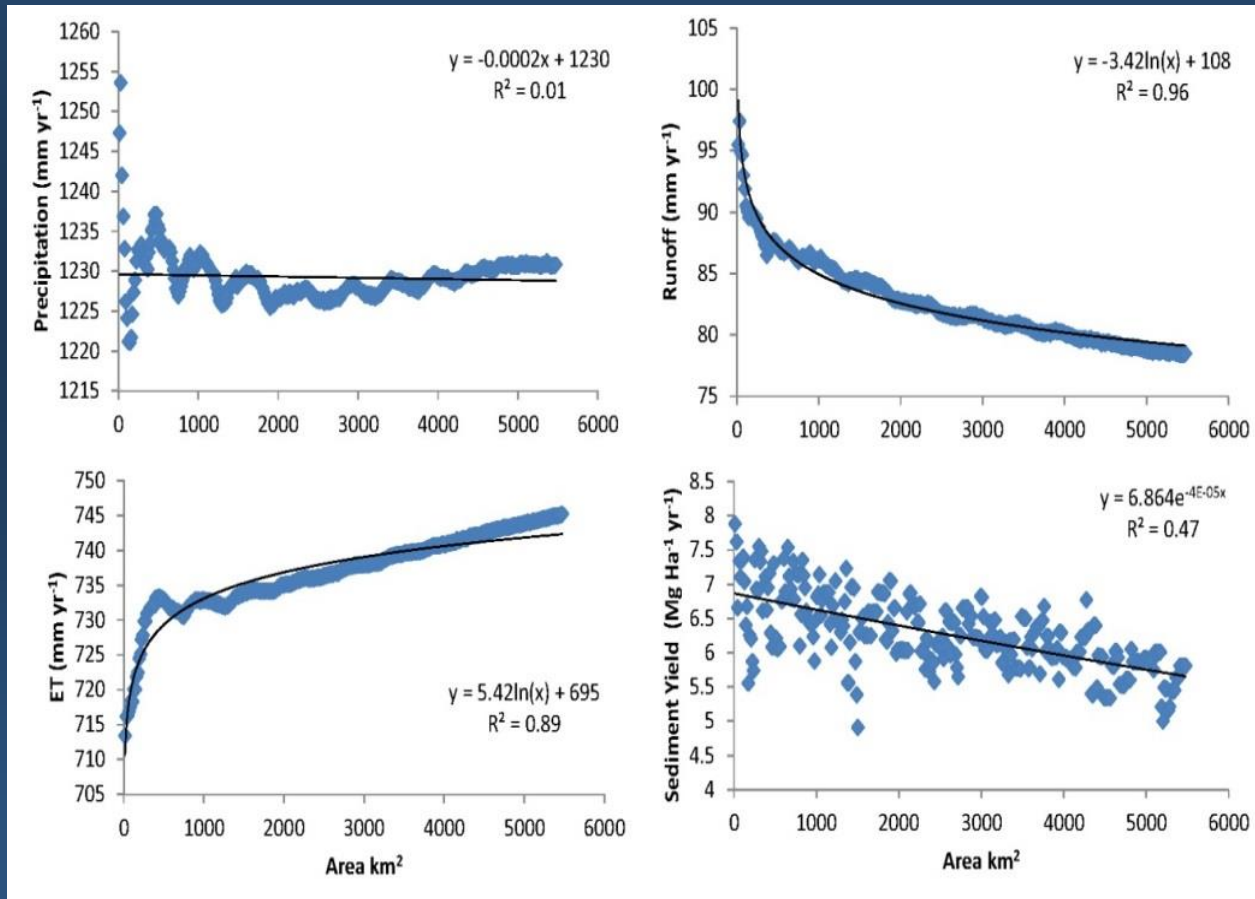
- NOAA GHCN daily station data
 - 12,000 stations
 - Patched nearly seamless (1900-2013)
 - SWAT, ArcSWAT, and APEX formats
 - Stations by HUC12
- Submitted Pub
- Data online

<http://ceap.brc.tamus.edu/>



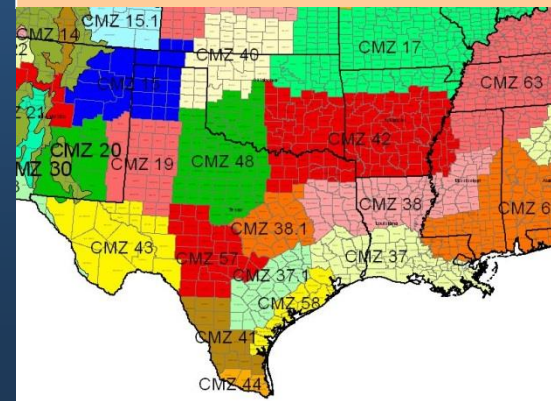
Gridded Sources

- Gridded vs Station
 - Average is not necessarily representative



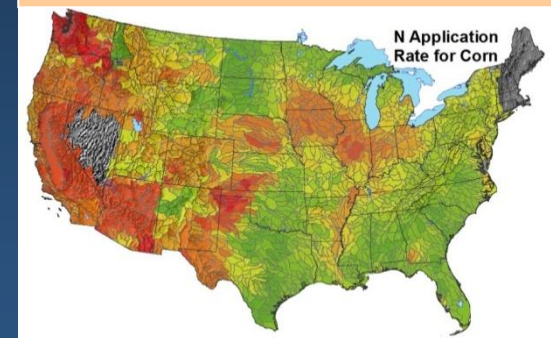
US Management

RUSLE2 Crop Schedules



Estimate PHU Crop/County

Fertilizer Census Yield Based



**Converter
Checker**

**Add Operations
QAQC**



SWAT Format

- Submitted Pub, data online
- Used in multiple projects

<http://ceap.brc.tamus.edu/Swat>

Grassland, Soil and Water Research Laboratory, Temple, TX

Scenarios for Decision Support Tools

- Web based
 - No time for simulation
- Flexible
 - No fixed scenarios
- Uncertainty
 - Some measure

Distilling Model

- Export Coefficients
 - Describe loads from landscape
 - Various landuses
 - Conservation levels



-
- Delivery Ratios
 - Instream processes
 - Reservoirs



What are Export Coefficients?



0.5
KG/HA



1.5
KG/HA



2.5
KG/HA



0.1
KG/HA

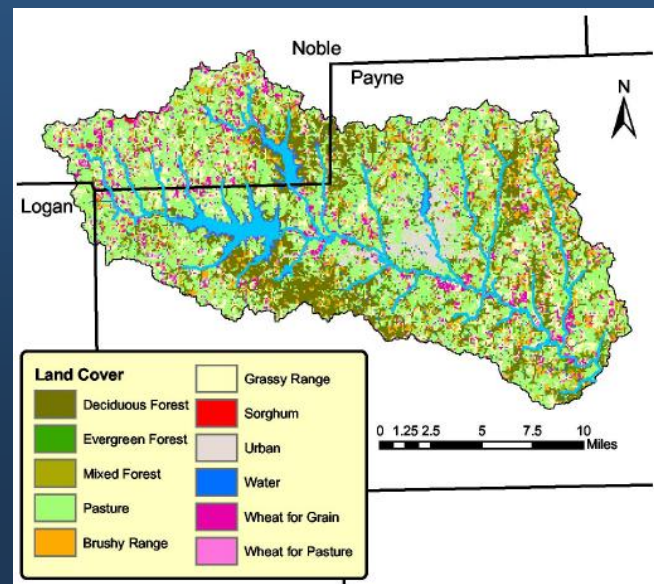


4.0
KG/HA

- Estimated mass loss per unit area per year

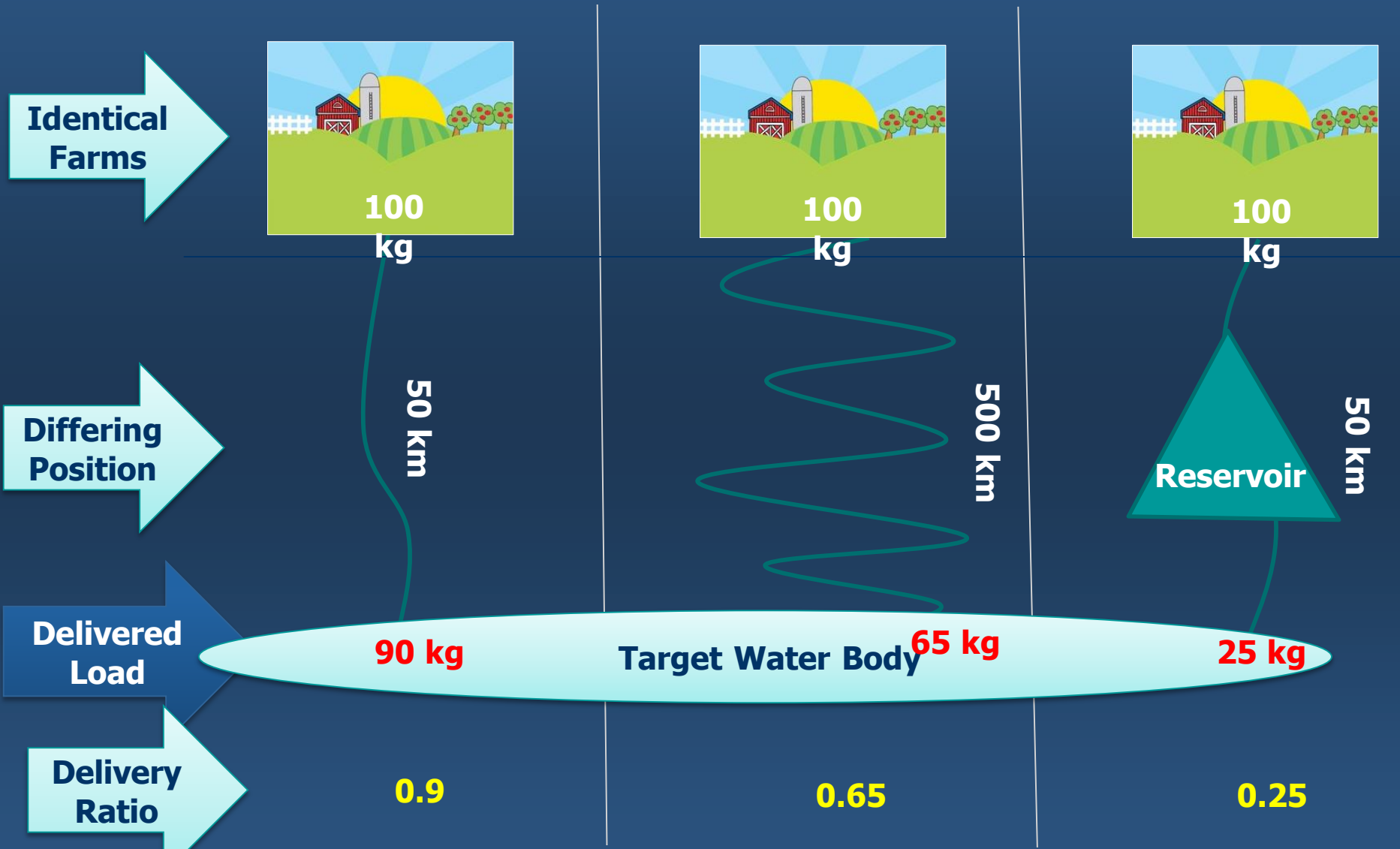
Example Use Watershed Load

- Easy to apply
- $\text{Area} * \text{EC} = \text{Load}$

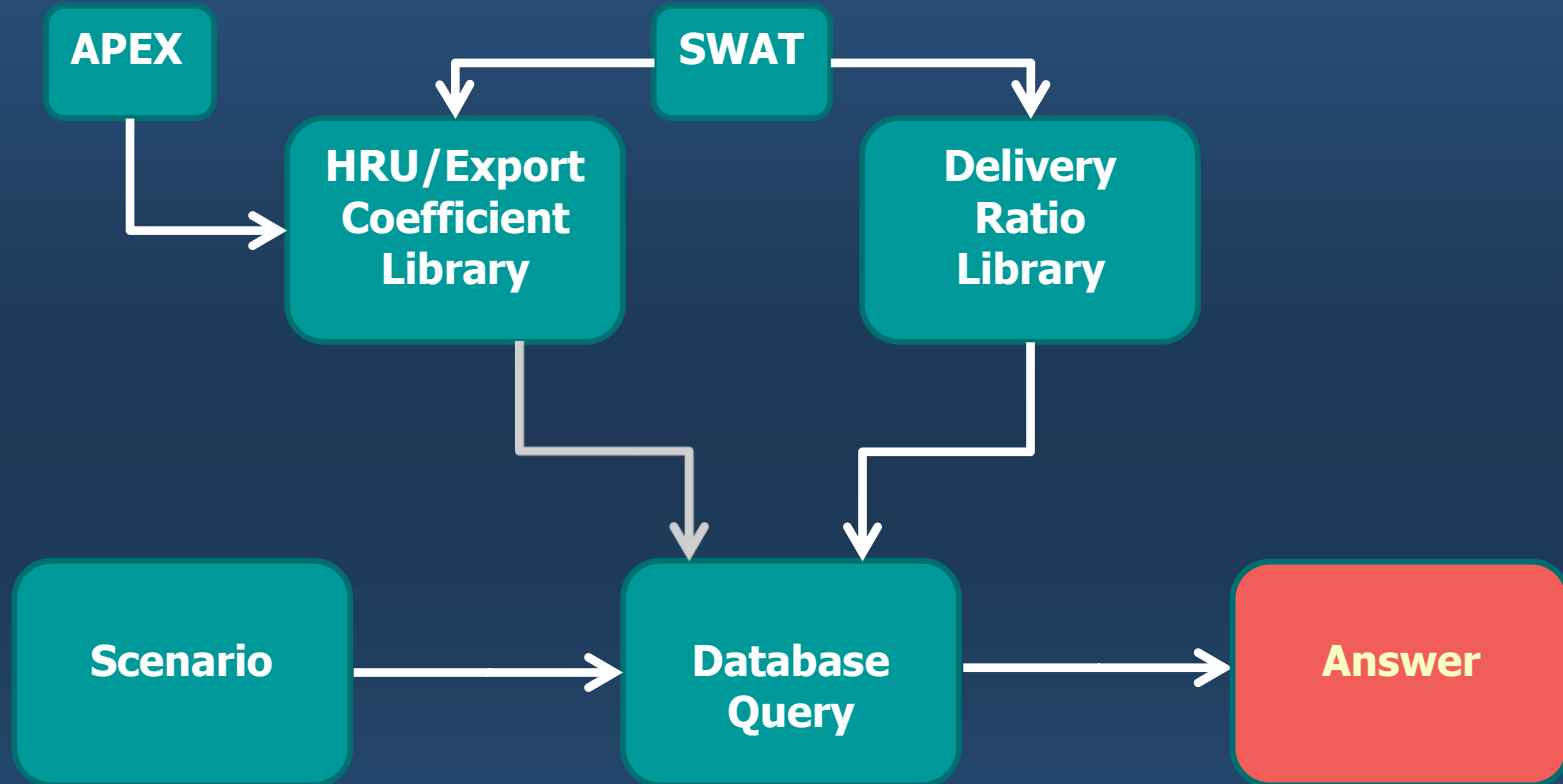


landuse	Area (ha)	Export Coeff (kg/ha/yr)	Load (kg/yr)
Forest	3500	0.1	350
Urban	500	4	2000
Corn	1000	2.5	2500
Grassland	5000	0.5	2500
Total Watershed	10000	-	7350

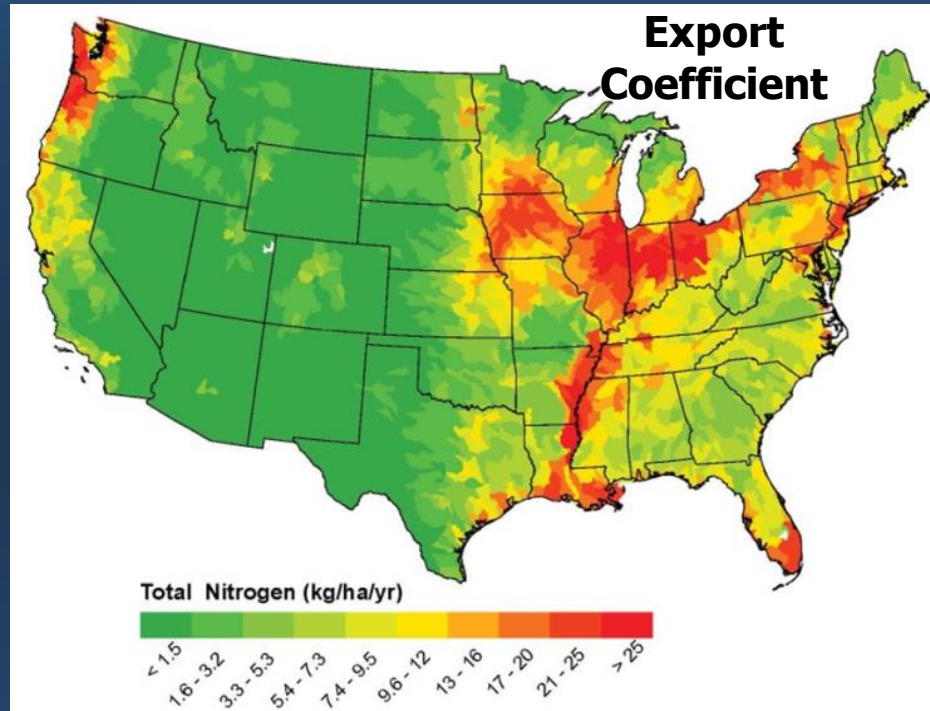
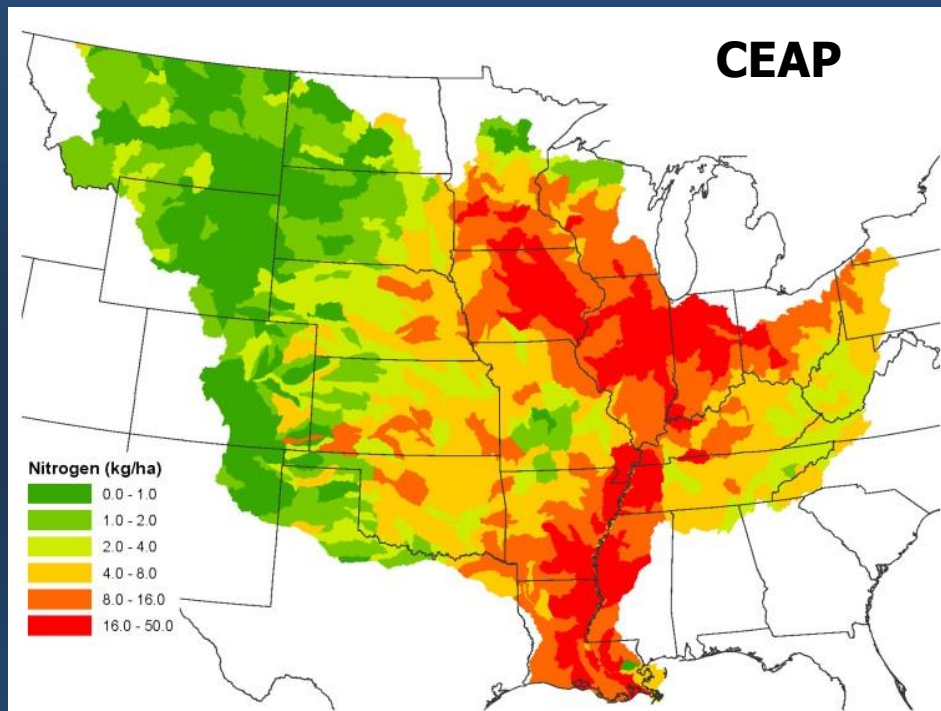
Delivery Ratio



Models Becomes a Database



EC Compared with CEAP



Eco-region

Texas Blackland Prairies

Watershed Characteristics

Watershed Area-sq mi

Tributary Length-mi

Channel Slope %

Landuse Distribution

Rangeland (%)

Cropland (%)

Urban (%)

Forest (%)

Pasture/Hay (%)

Sum

Prediction Type

Precip

Runoff

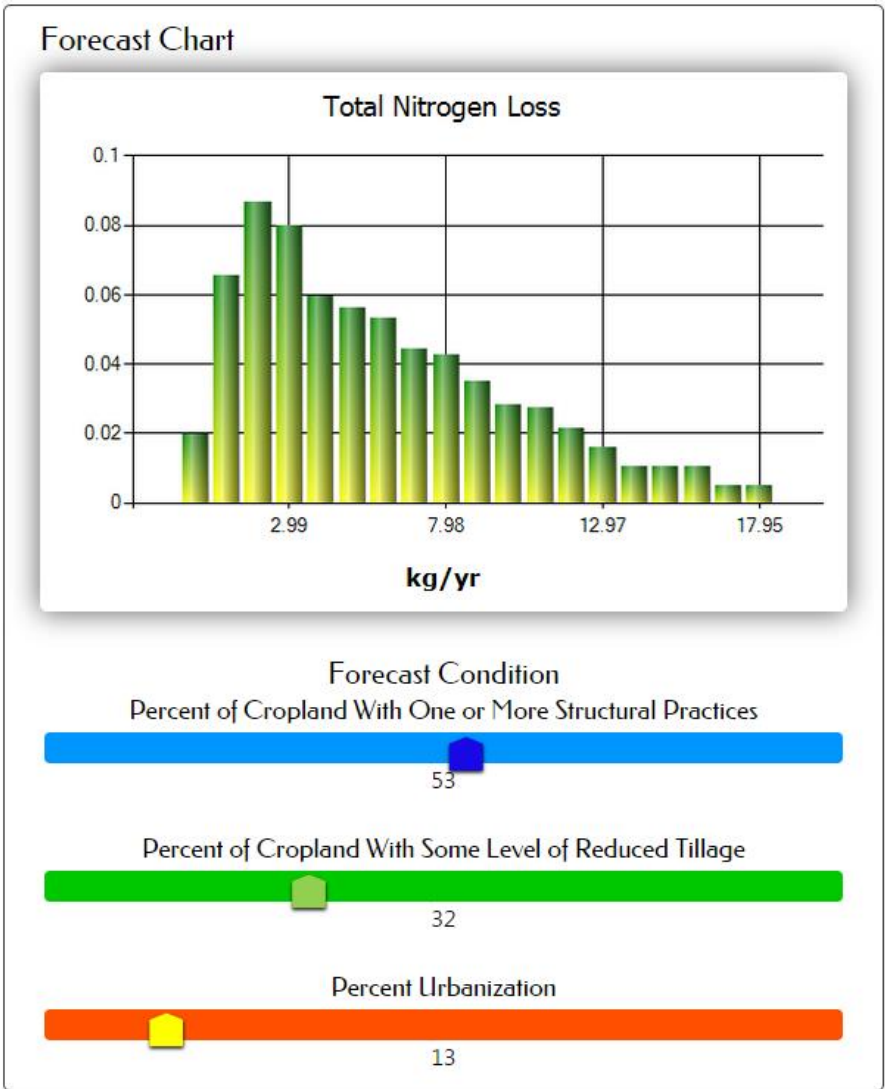
Water Yield

Sediment

Nitrogen

Phosphorus

Specify Watershed characteristics and Landuse distribution then select a Prediction type.



Annual Averages

Edge of Field Average

10th: 2.09 kg/yr
50th: 6.70 kg/yr
 90th: 14.15 kg/yr
Average: 7.54 kg/yr

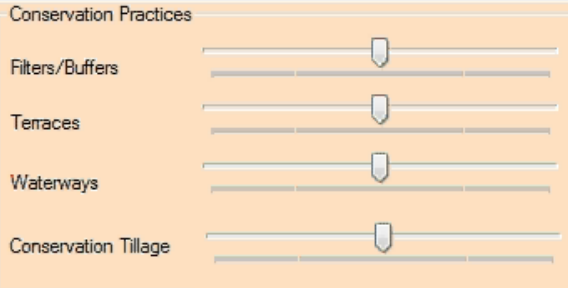
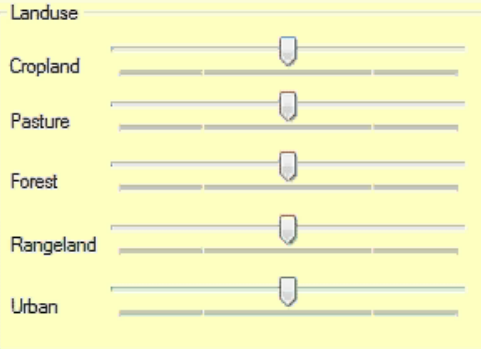
Delivered From Watershed

10th: 2.04 kg/yr
50th: 6.54 kg/yr
 90th: 13.80 kg/yr
Average: 7.36 kg/yr

HUC 8 Scenario Tool

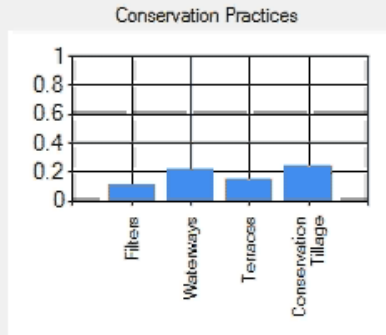
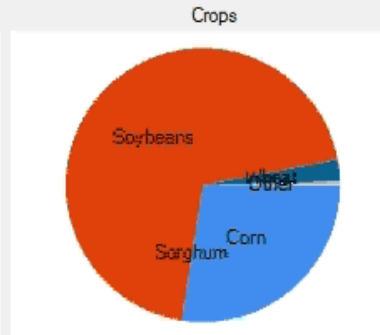
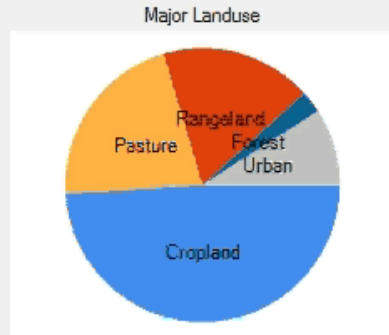
HUC 8 Realtime Scenario Tool

HUC 8

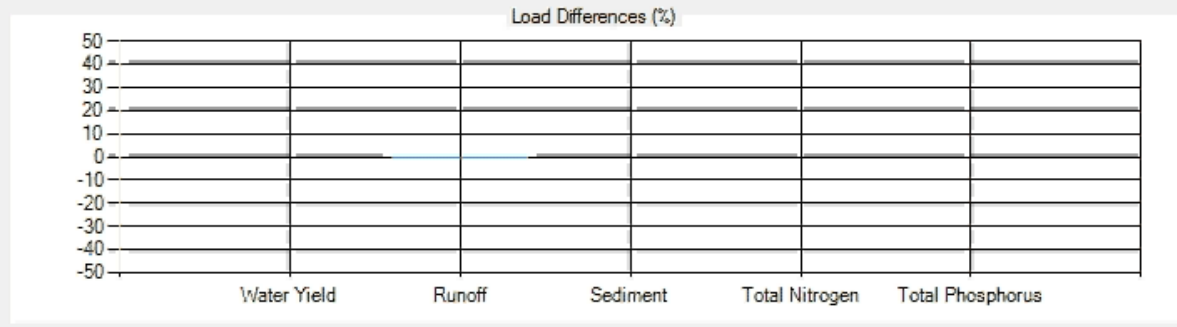
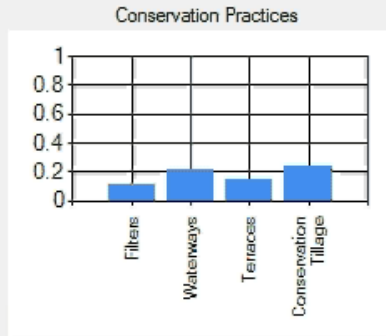
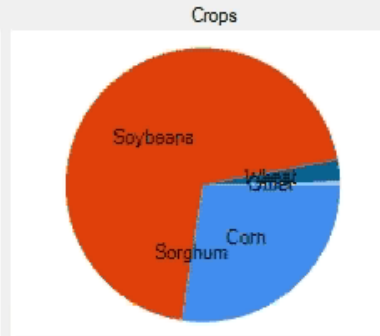
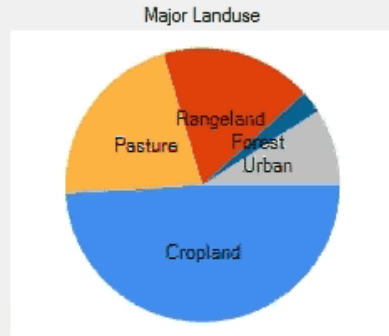


Reset

Current Condition



Scenario



Quick Load Estimation Tool

Home | ceap.brc.tamus.edu

Quick Load Estimating Tool

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Modify HUC Attributes... 07140101

Reset Sliders

Landuse

Cultivated Crops

Conservation Practices

Filter Strips

Terraces

Waterways

Conservation Tillage

Lead Differences at 50th Percentile

Current Condition

Major Landuse

Cropland	12%	Pasture	29%
Forest	40%	Urban	18%

Crops

Corn	55%	Winter/Wheat	1%
Soybeans	41%	OtherCrops	1%

Conservation Practices

Filter Strips	12%	Terraces	11%
Waterways	18%	Conservation Tillage	40%

Water Yield (mm/yr): 25.7

Sediment (Mg/ha/yr): 3,023.5

Nitrogen (kg/ha/yr): 155.5

Phosphorus (kg/ha/yr): 0.4

Scenario

Major Landuse

Cropland	12%	Pasture	29%
Forest	40%	Urban	18%

Crops

Corn	55%	Winter/Wheat	1%
Soybeans	41%	OtherCrops	1%

Conservation Practices

Filter Strips	12%	Terraces	11%
Waterways	18%	Conservation Tillage	40%

Water Yield (mm/yr): 24.1

Sediment (Mg/ha/yr): 2,893.5

Nitrogen (kg/ha/yr): 148.1

Phosphorus (kg/ha/yr): 0.3

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Questions / Comments