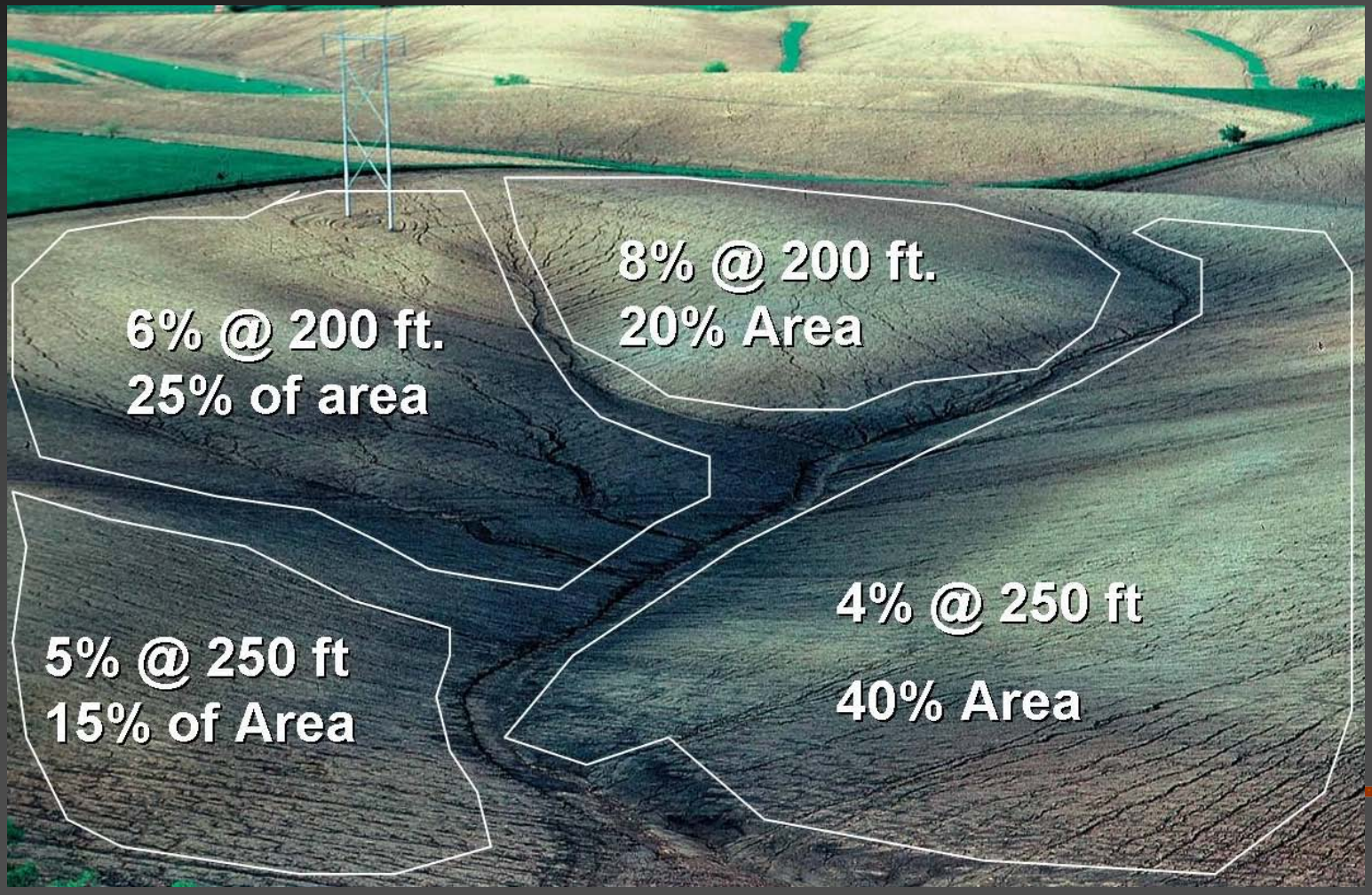
RUSLE2 – a hybrid field-scale conservation planning tool

- Robust statistical calibration
- Processed-based sediment transport

- Average annual soil loss and sediment yield
  - Historical and design storms
  - Tillage erosion

- Extensive NRCS database
  - Soil Conditioning Index
  - Fuel Use Calculations

RUSLE2 computes sheet and rill erosion, not concentrated flow erosion



RUSLE2 Version 2.0.4.0 (Mar 6 2011)

File Database Edit View Options Tools Window Help

Auto update

Profile: Cropland\base Columbia, MO

STEP 1: Choose location to set climate: Location: Missouri\Boone county average (Columbia)

STEP 2: Choose soil type: Soil: By texture\silt loam\silt loam (l-m OM, m perm)

STEP 3: Set slope topography: Slope length (horiz), m: 46 Avg. slope steepness, %: 6.0

STEP 4: Select and modify management: Base management: Cropland\ continuous cropping\corn\112bu ac spring plow

STEP 5: Set supporting practices:

Contouring: a up-and-down slope

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Results

Soil loss for cons. plan, Mg/ha/yr: 46

Sediment delivery, Mg/ha/yr: 46

Info: ARS Core Data
Columbia, MO
Major reference profile used in the validation and calibration of RUSLE2 and to make comparisons with the USLE and RUSLE1

Template

Finished calculating

R2_ARS ARS basic; simple slope moses 2011

RUSLE2 Version 2.0.4.0 (Jul 23 2010)

File Database Edit View Options Tools Window Help

Auto update

Profile: Cropland\base Columbia, MO*

corn

Add break | Erase break

Manage
Soil
Topo

0. 5. 10. 15. 20. 25. m 30. 35. 40. 45. 50.

0. 1. 2. 3.

Detachment on slope, Mg/ha/yr 46
Soil loss erod. portion, Mg/ha/yr 46
Soil loss for cons. plan, Mg/ha/yr 46
Sediment delivery, Mg/ha/yr 46

Enrichment, fraction 1.1

Crit. slope length, m 45.7

Location: Missouri\Boone county average (Columbia)

Slope length (horiz), m 45.7
Avg. slope steepness, % 6.0

Adjust res. burial level: Normal res. burial
Surf. res. cov. values: Surf. cover

General yield level: Base yield
Adjust yields: Yields

Soil: ...t loam\silt loam (l-m OM, m perm)

Adjust ext. res. additions: Residue inputs

Adjust rock cover: Adjust rock cover

Management: Cropland\ continuous cropping\corn\112bu ac spring plow

Tillage translocation | Subsurface drainage | Align of open off segments | General composite segment info | Erosion by day | Erosion by period | Erosion by operation
Erosion by year | Residue values | USLE/RUSLE1 factor values | Sediment distribution | Sediment results by flow path | Sediment by segment | Info
Soil | Topography | Management | Contouring/Strips/Barriers | Diversion/terrace, sediment basin | Storm sequence | Forage results

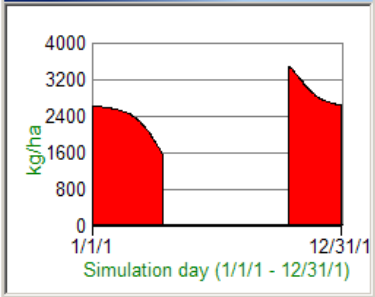
Harvest Period Outputs

Num.	Start date, m/d/y	Length removal, days	Length rest, days	Harvest, Mg/ha	Avg. harv. rate, AU/ac	Quality, fraction	Age, days	Shortfall, Mg/ha
1								

Avg. ann. forage harvest, Mg/ha 0
Avg. forage age, days 0
Total shortfall, Mg/ha 0

Simulation day, m/d/y	Live biomass, kg/ha	Standing res mass, kg/ha	Total standing mass, kg/ha	Forage shortfall, kg/ha/day
1/1/1	0	2650	2650	0
1/2/1	0	2650	2650	0
1/3/1	0	2650	2650	0
1/4/1	0	2650	2650	0

Standin...



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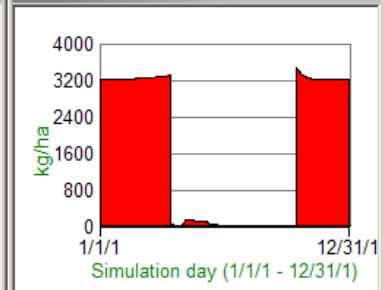
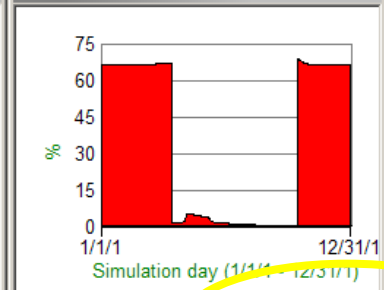


Net surf...



Finished calculating

R2_ARS_Science | ARS Science May2010 | moses 201

RUSLE2 Version 2.0.4.0 (Jul 23 2010)

File Database Edit View Options Tools Window Help

Auto update

Profile: Cropland\base Columbia, MO*

corn

Add break | Erase break

Manage
Soil
Topo

0. 5. 10. 15. 20. 25. m 30. 35. 40. 45. 50.

0. 1. 2. 3.

Detachment on slope, Mg/ha/yr 2.7
Soil loss erod. portion, Mg/ha/yr 2.7
Soil loss for cons. plan, Mg/ha/yr 2.7
Sediment delivery, Mg/ha/yr 2.7

Enrichment, fraction 1.0

Crit. slope length, m 45.7

Location: Missouri\Boone county average (Columbia)

Slope length (horiz), m 45.7
Avg. slope steepness, % 6.0

Adjust res. burial level: Normal res. burial
Surf. res. cov. values: Surf. cover

General yield level: Base yield
Adjust yields: Yields

Soil: ...t loam\silt loam (l-m OM, m perm)

Adjust ext. res. additions: Residue inputs

Adjust rock cover: Adjust rock cover

Management: Cropland\ continuous cropping\corn\no-till 112 bu

Tillage translocation | Subsurface drainage | Align of oper on segments | General composite segment info | Erosion by day | Erosion by period | Erosion by operation
Erosion by year | Residue values | USLE/RUSLE1 factor values | Sediment distribution | Sediment results by flow path | Sediment by segment | Info
Soil | Topography | Management | Contouring/Strips/Barriers | Diversion/terrace, sediment basin | Storm sequence | Forage results

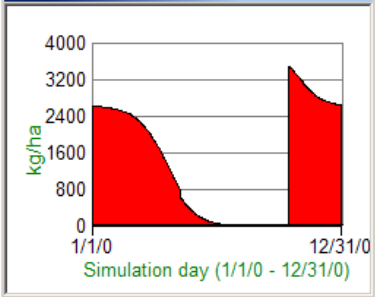
Harvest Period Outputs

Num.	Start date, m/d/y	Length removal, days	Length rest, days	Harvest, Mg/ha	Avg. harv. rate, AU/ac	Quality, fraction	Age, days	Shortfall, Mg/ha
1								

Avg. ann. forage harvest, Mg/ha 0
Avg. forage age, days 0
Total shortfall, Mg/ha 0

Simulation day, m/d/y	Live biomass, kg/ha	Standing res mass, kg/ha	Total standing mass, kg/h	Forage shortfall, kg/ha/day
1/1/0	0	2650	2650	0
1/2/0	0	2650	2650	0
1/3/0	0	2650	2650	0
1/4/0	0	2650	2650	0

Standin...



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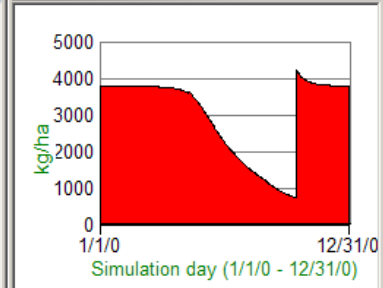

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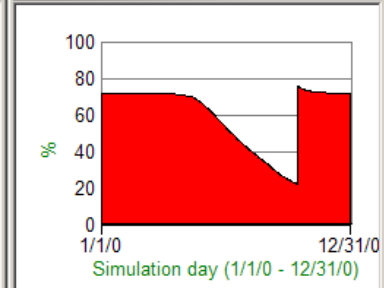


Finished calculating

R2_ARS_Science | ARS Science May2010 | moses 201

RUSLE2 Version 2.0.4.0 (Jul 23 2010)

File Database Edit View Options Tools Window Help

Auto update

Profile: Cropland\base Columbia, MO*

corn

Add break | Erase break

Manage
Soil
Topo

0. 5. 10. 15. 20. 25. 30. 35. 40. 45. 50. m

0. 1. 2. 3.

Detachment on slope, Mg/ha/yr 0.56
Soil loss erod. portion, Mg/ha/yr 0.56
Soil loss for cons. plan, Mg/ha/yr 0.56
Sediment delivery, Mg/ha/yr 0.56

Enrichment, fraction 1.0

Crit. slope length, m 45.7

Location: Missouri\Boone county average (Columbia)

Slope length (horiz), m 45.7
Avg. slope steepness, % 6.0

Adjust res. burial level: Normal res. burial
Surf. res. cov. values: Surf. cover

General yield level: Base yield
Adjust yields: Yields

Soil: ...t loam\silt loam (l-m OM, m perm)

Adjust ext. res. additions: Residue inputs

Adjust rock cover: Adjust rock cover

Management: Cropland\ continuous cropping\corn\no-till 224 bu ac

Tillage translocation | Subsurface drainage | Align of open off segments | General composite segment info | Erosion by day | Erosion by period | Erosion by operation
Erosion by year | Residue values | USLE/RUSLE1 factor values | Sediment distribution | Sediment results by flow path | Sediment by segment | Info
Soil | Topography | Management | Contouring/Strips/Barriers | Diversion/terrace, sediment basin | Storm sequence | Forage results

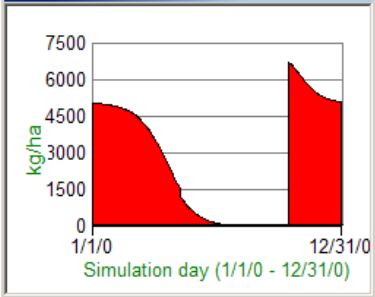
Harvest Period Outputs

Num.	Start date, m/d/y	Length removal, days	Length rest, days	Harvest, Mg/ha	Avg. harv. rate, AU/ac	Quality, fraction	Age, days	Shortfall, Mg/ha
1								

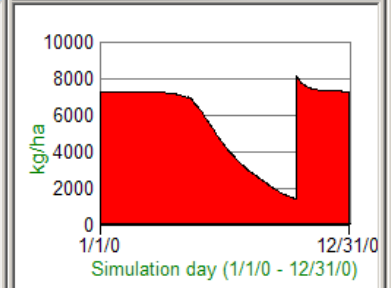
Avg. ann. forage harvest, Mg/ha 0
Avg. forage age, days 0
Total shortfall, Mg/ha 0

Simulation day, m/d/y	Live biomass, kg/ha	Standing res mass, kg/ha	Total standing mass, kg/h	Forage shortfall, kg/ha/day
1/1/0	0	5100	5100	0
1/2/0	0	5090	5090	0
1/3/0	0	5090	5090	0
1/4/0	0	5090	5090	0

Standin...



Total sur...



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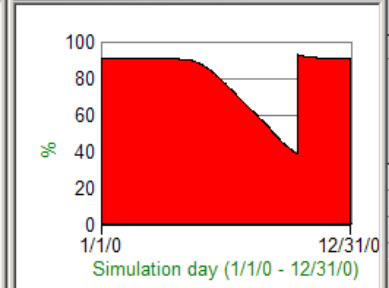

Finished calculating

R2_ARS_Science | ARS Science May2010 | moses 201

RUSLE2 Version 2.0.4.0 (Jul 23 2010)

File Database Edit View Options Tools Window Help

Auto update

Profile: Cropland\base Columbia, MO*

corn

Add break | Erase break

Manage
Soil
Topo

0. 5. 10. 15. 20. 25. 30. 35. 40. 45. 50. m

0. 1. 2. 3.

Detachment on slope, Mg/ha/yr 4.5
Soil loss erod. portion, Mg/ha/yr 4.5
Soil loss for cons. plan, Mg/ha/yr 4.5
Sediment delivery, Mg/ha/yr 4.5

Enrichment, fraction 1.0

Crit. slope length, m 45.7

Location: Missouri\Boone county average (Columbia)

Slope length (horiz), m 45.7
Avg. slope steepness, % 6.0

Adjust res. burial level: Normal res. burial
Surf. res. cov. values: Surf. cover

General yield level: Base yield
Adjust yields: Yields

Soil: ...t loam\silt loam (l-m OM, m perm)

Adjust ext. res. additions: Residue inputs

Adjust rock cover: Adjust rock cover

Management: Cropland\ continuous cropping\corn\no-till 224 bu ac remove residue

Tillage translocation | Subsurface drainage | Align of oper on segments | General composite segment info | Erosion by day | Erosion by period | Erosion by operation
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Soil | Topography | Management | Contouring/Strips/Barriers | Diversion/terrace, sediment basin | Storm sequence | Forage results

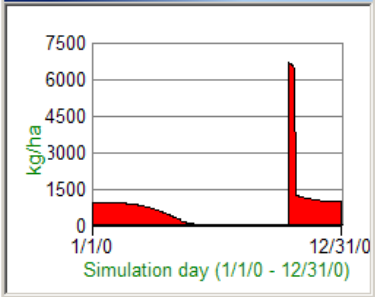
Harvest Period Outputs

Num.	Start date, m/d/y	Length removal, days	Length rest, days	Harvest, Mg/ha	Avg. harv. rate, AU/ac	Quality, fraction	Age, days	Shortfall, Mg/ha
1								

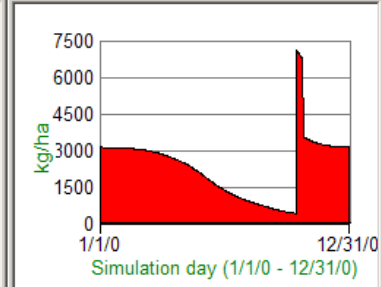
Avg. ann. forage harvest, Mg/ha 8.4
Avg. forage age, days 0
Total shortfall, Mg/ha 0

Simulation day, m/d/y	Live biomass, kg/ha	Standing res mass, kg/ha	Total standing mass, kg/h	Forage shortfall, kg/ha/day
1/1/0	0	1020	1020	0
1/2/0	0	1020	1020	0
1/3/0	0	1020	1020	0
1/4/0	0	1020	1020	0

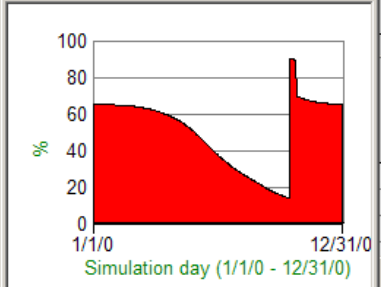
Standin...



Total sur...



Net surf...



Finished calculating

R2_ARS_Science | ARS Science May2010 | moses 201

RUSLE2 Version 2.0.4.0 (Jul 23 2010)

File Database Edit View Options Tools Window Help

Auto update

Profile: Cropland\convx concv Columbia 6 percent, MO*

corn

Add break | Erase break

Manage
Soil
Topo

0. 5. 10. 15. 20. 25. 30. 35. 40. 45. 50. m

0. 1. 2. 3.

Detachment on slope, Mg/ha/yr 4.9
Soil loss erod. portion, Mg/ha/yr 5.5
Soil loss for cons. plan, Mg/ha/yr 4.2
Sediment delivery, Mg/ha/yr 1.8

Enrichment fraction 1.2

Crit. slope length, m 45.7

Location Missouri\Boone county average (Columbia)

Slope length (horiz), m 45.7
Avg. slope steepness, % 6.0

Adjust res. burial level Normal res. burial
Surf. res. cov. values Surf. cover

General yield level Base yield
Adjust yields Yields

Soil ...t loam\silt loam (l-m OM, m perm)

Adjust ext. res. additions Residue inputs

Adjust rock cover Adjust rock cover

Management Cropland\ continuous cropping\corn\no-till 224 bu ac remove residue

Soil | Topography | Management | Contouring/Strips/Barriers | Diversion/terrace, sediment basin | Storm sequence | Forage results
Erosion by year | Residue values | USLE/RUSLE1 factor values | Sediment distribution | Sediment results by flow path | Sediment by segment | Info
Tillage translocation | Subsurface drainage | Align of oper on segments | General composite segment info | Erosion by day | Erosion by period | Erosion by operation

Segment output

Composite segment management	Composite segment soil	Composite segment steepness, %	Comp slope length to bottom of seg (horiz), m	Detach, Mg/ha/yr	Sed. load per width, kg/m/yr	Soil loss, Mg/ha/yr	Soil loss / Adj. T
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt loam\silt loam (l-m OM, m perm)	1.3	4.57	1.1	0.522	1.1	0.18
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt loam\silt loam (l-m OM, m perm)	3.8	9.14	2.6	1.71	2.6	0.41
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt loam\silt loam (l-m OM, m perm)	7.5	13.7	5.0	4.01	5.0	0.77
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						
...land\ continuous cropping\corn\no-till 224 bu ac remove residue	...\silt						

Detach, ...

Mg/ha/yr
13 10 7.5 5 2.5 0
1 2 3 4 5 6 7 8 9 10
Composite segment (1 - 10)

Sed. loa...

kg/m/yr
20 16 12 8 4 0
1 2 3 4 5 6 7 8 9 10
Composite segment (1 - 10)

Soil loss, ...

Mg/ha/yr
12 6 0 -6 -12 -18
1 2 3 4 5 6 7 8 9 10
Composite segment (1 - 10)

Finished calculating

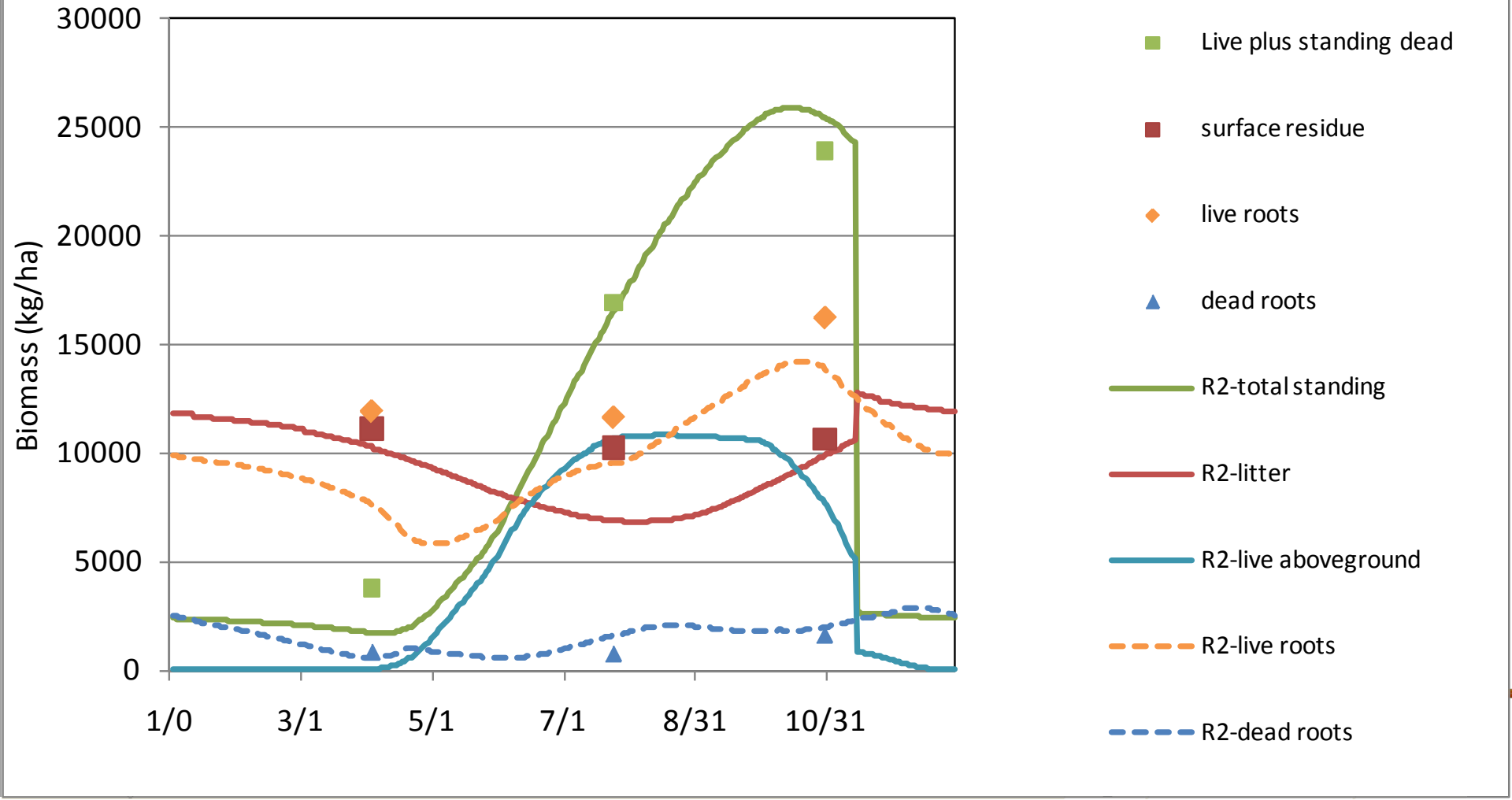
R2_ARS_Science | ARS Science May2010 | moses 201

RUSLE2 Version 2.0.4.0 (Mar 6 2011)

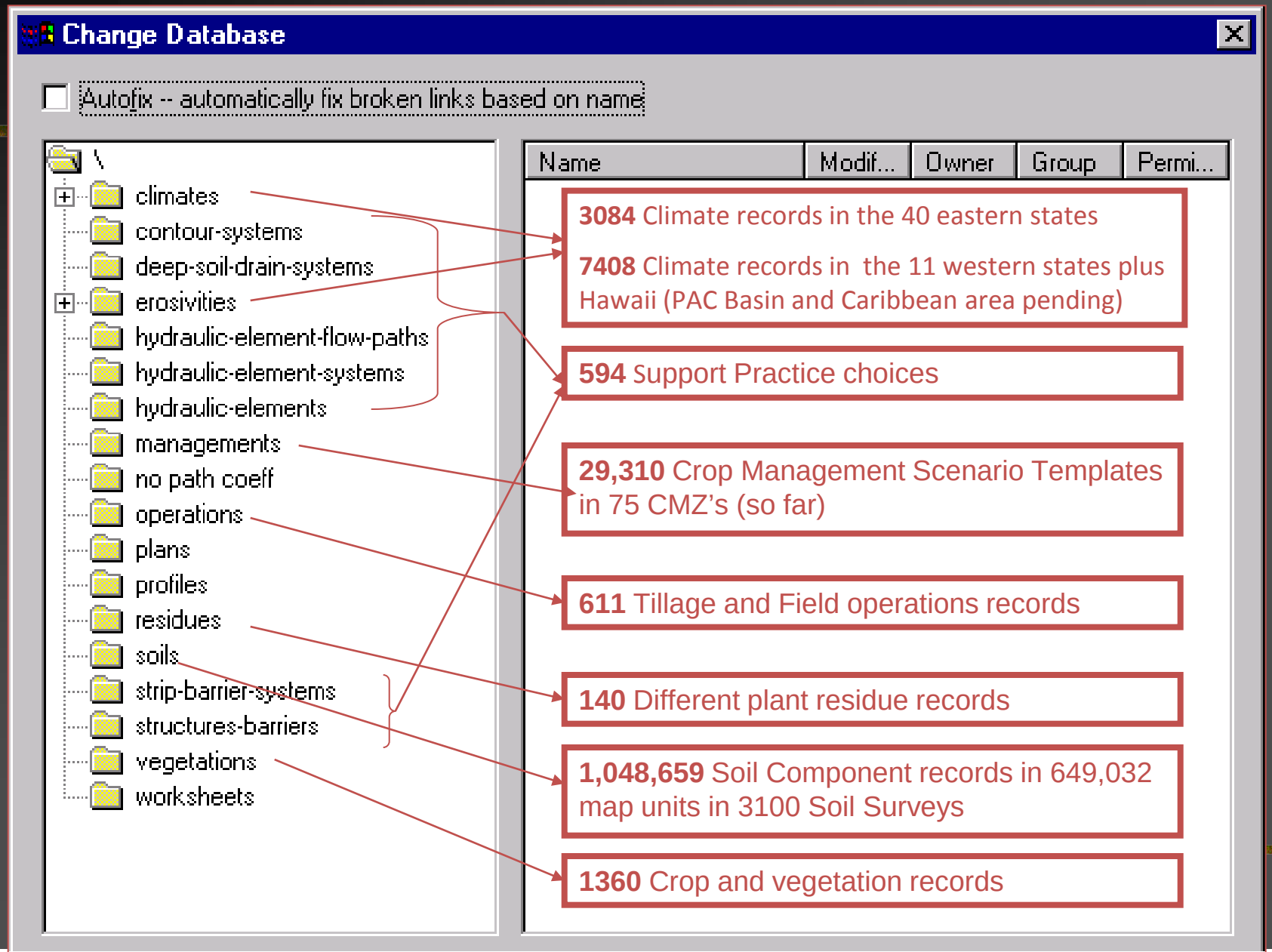
Agriculture, Ecosystems and Environment 136 (2010) 177–184

Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

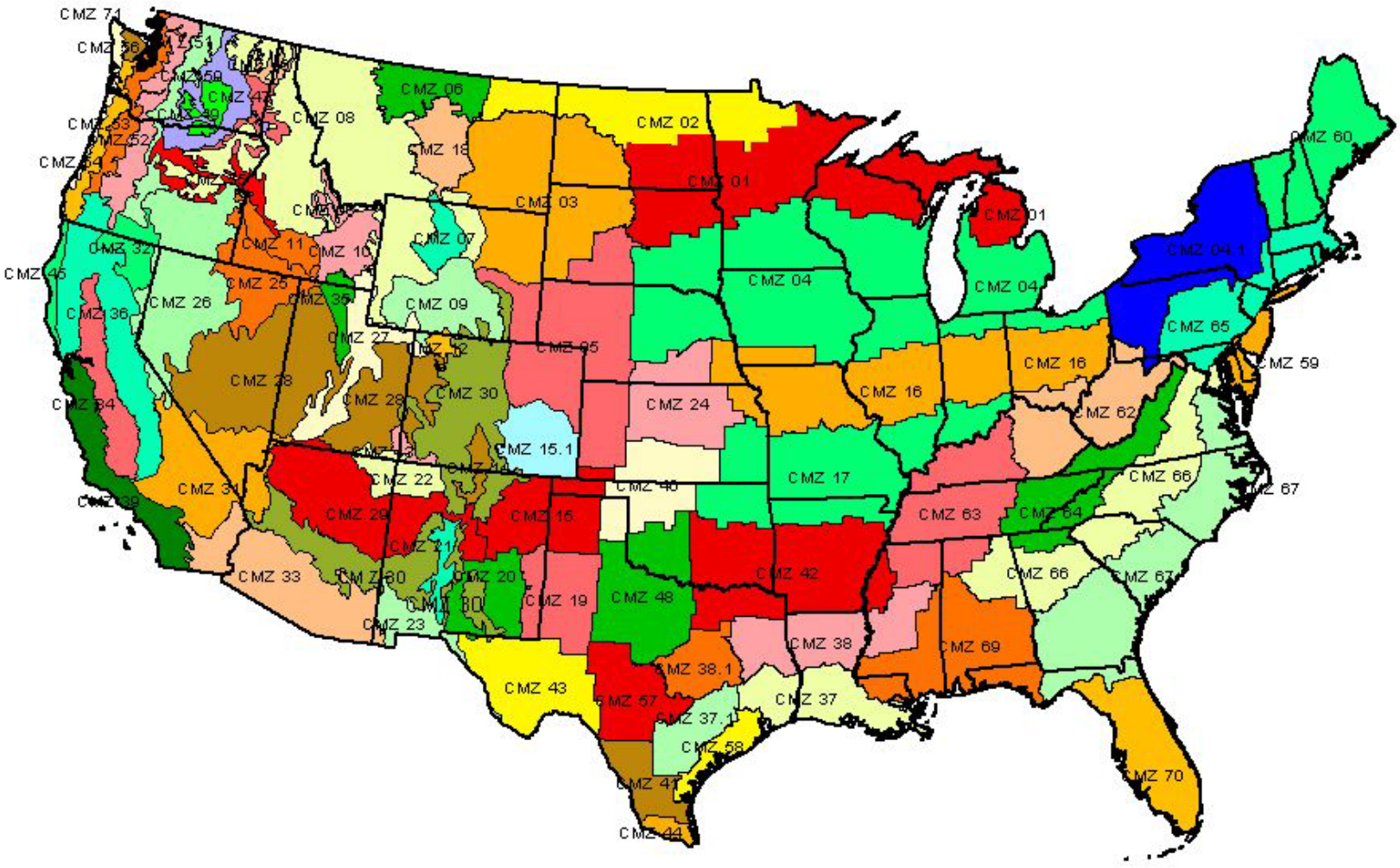


Extensive NRCS RUSLE2 database (Jan 2011)



RUSLE2 NRCS Management Database

Crop Management Zones



Proposed Forage Production Zones

RUSLE2 Version 1.38.6.0 (Dec 18 2009)

File Database Edit View Options Tools Window Help

Auto update

Change Database

Autofix – automatically fix broken links based on name

- managements
  - CMZ 04
  - CMZ 04.1
  - CMZ 16
  - CMZ 63
    - a.Single Year/Single Crop Templates
      - Corn, Grain
      - Corn,Silage
      - Cotton
      - Crops With Manure
      - Forage and Hayland, Southern-CMZ63
      - Forage, Grazing
      - Forage, Hay
      - Forage, Pasture Planting/Mgt
      - Grazing and Haying, Lower Midsouth
        - Alfalfa
        - Bermudagrass
        - Bermudagrass, overseeded
        - Crabgrass or short millet
        - Crabgrass or short millet dbl crop systems
        - Forage sorghum dbl crop systems
        - Forage sorghums
        - Grazed small grains
        - Kentucky Bluegrass
        - Native grass mixtures
        - Old World Bluestems
        - Switchgrass
        - Tall Fescue
        - Tall Fescue mixes
      - Grazing and Haying, Upper Midsouth
      - Other
      - Small Grain
      - Small Grain, Northern-CMZ63
      - Soybeans
      - Soybeans, Northern-CMZ63
      - Tobacco

Name	Modified	Owner	Group	Permi
Bermudagrass, common, continuous grazing, sustainable	10/28/2009 11:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, common, continuous overgrazing	10/28/2009 11:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, common, rotational grazing 1 to 4 days	10/28/2009 11:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, common, rotational grazing 5 to 10 days	10/28/2009 11:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, common, severe overgrazing	10/28/2009 11:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, Improved, continuous grazing	10/28/2009 10:...	dave.lightle	R2_NRCS_Sta_A...	
Bermudagrass, Improved, continuous grazing, OK part	10/28/2009 10:...	dave.lightle	R2_NRCS_Sta_A...	
Bermudagrass, Improved, continuous grazing, TX, LA part	10/28/2009 10:...	dave.lightle	R2_NRCS_Sta_A...	
Bermudagrass, Improved, rotational grazing 1 to 4 days	07/09/2009 02:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, Improved, rotational grazing 5 to 10 days	07/09/2009 02:...	Dave.Lightle	R2_NRCS_Sta_A...	RWCD
Bermudagrass, Improved, seasonal grazing	10/28/2009 10:...	dave.lightle	R2_NRCS_Sta_A...	

Admin... Close

For Help, press F1

Summary

- RUSLE2 is a hybrid field-scale conservation planning tool with extensive data bases.
- RUSLE2 has been used by NRCS for 9 years to determine if there are water erosion and/or soil condition concerns, to develop conservation plans, and as a screening tool for program eligibility.
- RUSLE2 is being optimized for linkage with an ephemeral gully erosion model in a GIS application that will allow delineation of “management zones” meeting conservation objectives.