

***NRCS PLANNING PROCESS***  
***AND***  
***THE WIND EROSION PREDICTION SYSTEM: WEPS***



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**WIND EROSION PREDICTION SYSTEM  
NRCS RELEASE WEPS 1.3.9 AND 1.5.43 (CEE APPROVAL PROCESS 10/16/2016)  
SUPPORT THE CONSERVATION PLANNING PROCESS**

- BENCHMARK INVENTORY AND RESOURCE ASSESSMENT
- RESOURCE CONCERNS AND OBJECTIVES FROM THE BENCHMARK
- ALTERNATIVE SYSTEM:
  - DEVELOPMENT, EVALUATE, IMPLEMENT, FOLLOW UP

# ***WEPS INTERFACE INPUTS***

## **BENCHMARK SCENARIO FIELD INVENTORY AND USER INPUTS:**

FIELD GEOMETRY AND WIND BARRIERS

LOCATION: STATE AND COUNTY

CLIMATE DATABASE CLIGEN AND WIND DATABASE WINDGEN USE BY WEPS

SOIL MAP UNIT COMPONENT: SOIL DATA ACCESS – SSURGO DATA DRIVEN

MANAGEMENT ROTATION MANAGEMENT: OPERATION SEQUENCE AND VEGETATION:

NRCS CROP AND OPERATION DATABASE RECORDS

## **WEPS SIMULATION INPUT ADJUSTMENTS:**

SURFACE COVER ROCK FRAGMENTS

SLOPE

WATER EROSION ESTIMATES FROM CURRENT WATER EROSION MODEL

MANAGEMENT: MANAGEMENT TEMPLATES AVAILABLE FOR CUSTOMIZATION TO MATCH INVENTORY

YIELD GOALS FOR CROPS IN ROTATION (FOR CALIBRATED RUNS AND MANUAL CALIBRATION

ROW ORIENTATION

ESTABLISHED PLANT POPULATION PLANNED

# ***WEPS INTERFACE INPUTS***

## **EXAMPLE: IOWA NON IRRIGATED BENCHMARK SCENARIO INVENTORY**

- SPRING WHEAT-CORN ROTATION
- CROP ROTATION TILLAGE MANAGEMENT:
- NON-IRRIGATED, 160 ACRE SQUARE FIELD
- NO WIND BARRIERS
- SOIL: DICKINSON LOAM
- LOCATION: STORY COUNTY, IOWA

# IOWA BENCHMARK: CROP ROTATION TILLAGE MANAGEMENT SYSTEM WEPS 1.3.9 USED FOR THIS CROP SYSTEM EXAMPLE

MCREW(Management Crop Rotation Editor for WEPS)

File Edit View Configure Tools Help

Years in Rotation: 2

Rotation : C:\Users\Joel.Poore\Documents\My WEPS Files\Project.wpj\Webinar benchmark example.man

Date	Operation Name	Crop or Residue	Row/Ridge Dir. (Deg.)	Flat Residue Applied (lb/acre)
Apr 02, 01	Disk, tandem light finishing		0	
Apr 10, 01	Seedbed conditioner, coulter caddy, coil tine har. rolling bskt		0	
Apr 15, 01	Drill or air seeder single disk openers 7-10 in spac	Wheat, spring 7...	0	
May 25, 01	Sprayer, post emergence	weed residue; ...		250.00
Aug 02, 01	Harvest, killing crop 50pct standing stubble			
Aug 24, 01	Fert applic. surface broadcast			
Sep 03, 01	Disk, tandem heavy primary op		0	
Sep 12, 01	Chisel, st. pt. 12 in deep		0	
Apr 10, 02	Disk, tandem light finishing		0	
Apr 15, 02	Seedbed conditioner, coulter caddy, coil tine har. rolling bskt		0	
Apr 20, 02	Planter, double disk opnr, fluted coulter	Corn, grain	0	
Apr 25, 02	Sprayer, pre-emergence	weed residue; ...		100.00
Jun 07, 02	Sprayer, post emergence and fert. tank mix	weed residue; ...		250.00
Oct 10, 02	Harvest, row crop, 50pct standing stubble			
Oct 21, 02	Disk, tandem heavy primary op		0	
Oct 23, 02	Chisel, st. pt. 12 in deep		0	

# IOWA BENCHMARK: BASIC SIMULATION RESULTS

<b>Erosion</b>						
<b>Period</b>	<b>Crop/Residue</b>	<b>Gross Loss</b> t/ac	<b>Net Soil Loss From Field ( t/ac )</b>			
			<b>Total Creep/Salt.</b>	<b>Suspen.</b>	<b>PM10</b>	
Rot. year: 1	Wheat, spring 7in rows	7.4	7.4	3.6	3.8	0.07
Rot. year: 2	Corn, grain	10.8	10.8	4.3	6.5	0.11
Ave. Annual		9.1	9.1	4.0	5.1	0.09

<b>Crop Interval Erosion</b>							
<b>Date Range</b>	<b>Days</b>	<b>Crop</b>	<b>Gross Loss</b> t/ac	<b>Net Soil Loss From Field ( t/ac )</b>			
				<b>Total Creep/Salt.</b>	<b>Suspen.</b>	<b>PM10</b>	
Oct 11, 02 - Aug 02, 01	297	Wheat, spring 7in rows	2.4	2.4	1.0	1.3	0.02
Aug 03, 01 - Oct 10, 02	434	Corn, grain	15.8	15.8	6.9	8.9	0.16

# ***WEPS INTERFACE INPUTS***

## **EXAMPLE: IOWA ALTERNATIVE CROP SYSTEM SCENARIO**

- SPRING WHEAT-WINTER PEA COVER CROP-CORN ROTATION
- CROP ROTATION TILLAGE MANAGEMENT: REDUCED TILL
- NON-IRRIGATED, 160 ACRE SQUARE FIELD
- NO WIND BARRIERS
- SOIL: DICKINSON LOAM
- LOCATION: STORY COUNTY, IOWA

# IOWA ALTERNATIVE: CROP ROTATION TILLAGE MANAGEMENT SYSTEM ADDED AUSTRIAN WINTER PEA COVER CROP AND REDUCED TILLAGE

**MCREW(Management Crop Rotation Editor for WEPS)**

File Edit View Configure Tools Help

Years in Rotation:

Rotation : C:\Users\Joel.Poore\Documents\My WEPS Files\Project.wpj\Webinar CC Pea alternative example.man

Date	Operation Name	Crop or Residue	Row/Ridge Dir. (Deg.)	Flat Residue Applied (lb/acre)
Apr 02, 01	Disk, tandem light finishing		0	
Apr 10, 01	Seedbed conditioner, coulter caddy, coil tine har. rolling bskt		0	
Apr 15, 01	Drill or air seeder single disk openers 7-10 in spac	Wheat, spring 7...	0	
May 25, 01	Sprayer, post emergence	weed residue; ...		250.00
Aug 02, 01	Harvest, killing crop 50pct standing stubble			
Aug 24, 01	Drill or air seeder single disk openers 7-10 in spac	Peas, Austrian ...	0	
Apr 15, 02	Seedbed conditioner, coulter caddy, coil tine har. rolling bskt		0	
Apr 20, 02	Planter, double disk opnr, fluted coulter	Corn, grain	0	
Apr 25, 02	Sprayer, pre-emergence	weed residue; ...		100.00
Jun 07, 02	Sprayer, post emergence and fert. tank mix	weed residue; ...		250.00
Oct 10, 02	Harvest, row crop, 50pct standing stubble			
Oct 21, 02	Disk, tandem heavy primary op		0	
Oct 23, 02	Chisel, st. pt. 12 in deep		0	

## IOWA EXAMPLE ALTERNATIVE: BASIC SIMULATION RESULTS

<b>Erosion</b>						
<b>Period</b>	<b>Crop/Residue</b>	<b>Gross Loss</b> t/ac	<b>Net Soil Loss From Field ( t/ac )</b>			
			<b>Total Creep/Salt.</b>	<b>Suspen.</b>	<b>PM10</b>	
Rot. year: 1	Wheat, spring 7in rows	2.1	2.1	1.0	1.1	0.02
Rot. year: 2	Corn, grain	0.3	0.3	0.1	0.2	Trace
Ave. Annual		1.2	1.2	0.5	0.6	0.01

<b>Crop Interval Erosion</b>							
<b>Date Range</b>	<b>Days</b>	<b>Crop</b>	<b>Gross Loss</b> t/ac	<b>Net Soil Loss From Field ( t/ac )</b>			
				<b>Total Creep/Salt.</b>	<b>Suspen.</b>	<b>PM10</b>	
Oct 11, 02 - Aug 02, 01	297	Wheat, spring 7in rows	2.1	2.1	1.0	1.1	0.02
Aug 03, 01 - Oct 10, 02	434	Corn, grain	0.3	0.3	0.1	0.2	0.00

# WEPS SIMULATION RESULTS: REPORTS AND INTERPRETATION IOWA EXAMPLE

- SOIL QUALITY AND ENERGY USE ESTIMATES: EXAMPLE ALTERNATIVE**

SCI Summary			
<b>Soil Conditioning Index:</b>	0.4	<b>SCI Subfactors</b>	
<b>Energy Calculator:</b>	4.2 gal diesel/ac	<b>OM:</b>	0.69
<b>Average Annual STIR:</b>	85.5	<b>FO:</b>	0.15
<b>Wind Erosion Soil Loss:</b>	1.2 t/ac	<b>ER:</b>	0.54
<b>Water Erosion Soil</b>	0.0 t/ac		

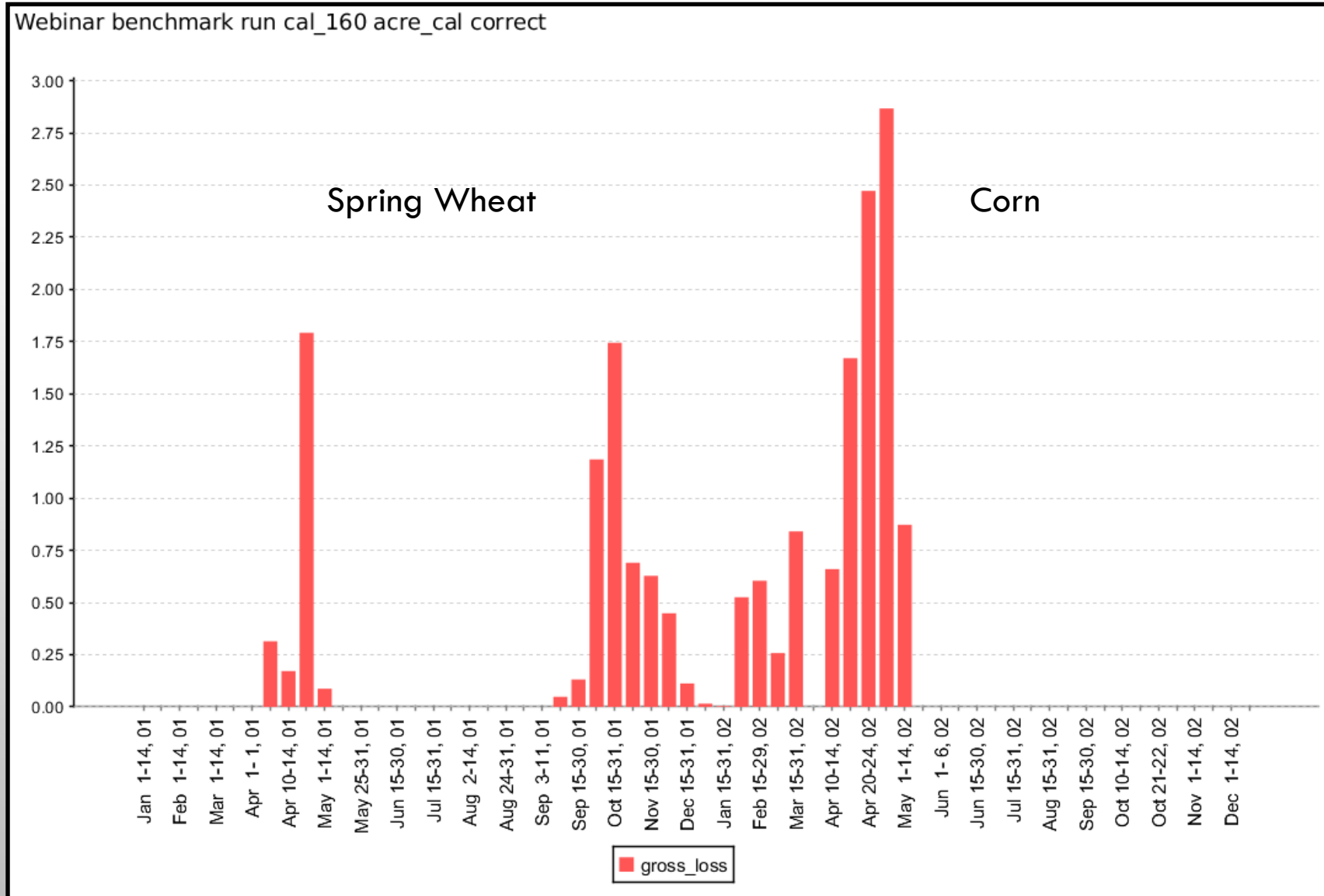
- MULTIPLE RUN MANAGER: COMPARE BENCHMARK AND ALTERNATIVE**

Run Name	Loc	Management Name	Soil Name	Annual Soil Loss				
				Gross (t/ac)	Net Total (t/ac)	Net Creep/Salt (t/ac)	Net Suspension (t/ac)	Net PM10 (t/ac)
Webinar alternative CC	Ru	Webinar CC Pea alternative exam	Dickinson_175_95_L	1.17	1.17	0.53	0.64	0.01
Webinar benchmark run	Ru	Webinar benchmark example	Dickinson_175_95_L	9.07	9.07	3.97	5.11	0.09

- DETAILED REPORTS: BOUNDARY LOSS EVALUATION: EXAMPLE BENCHMARK**

correct		Mass of Soil Passing Indicated Field Boundary											
Client: Storm water management		per Unit Length of Field Border											
Fm: Planning Tr: Fld:		Creep+Saltation				Suspension				PM10			
Management: Webinar benchmark example		↓	←	↑	→	↓	←	↑	→	↓	←	↑	→
Soil: Dickinson_175_95_L		tons/1000ft				tons/1000ft				tons/1000ft			
Date	Operation	□	□	□	□	□	□	□	□	□	□	□	□
Rot. yr: 1		0.8	124.8	68.0	24.8	1.0	118.3	80.4	27.7	0.0	2.1	1.4	0.5
Rot. yr: 2		37.0	44.8	105.0	75.8	59.3	69.2	156.4	106.6	1.0	1.2	2.7	1.8
Ave. Annual		18.9	84.8	86.5	50.3	30.1	93.8	118.4	67.1	0.5	1.7	2.0	1.2

# EVALUATING WEPS EROSION ESTIMATES: IOWA EXAMPLE BENCHMARK DETAILED REPORTS: CRITICAL EROSION PERIODS: CONSERVATION PRACTICE TIMING



## ***BASIC USE OF WEPS BY NRCS***

WEPS IS DESIGNED TO SUPPORT CONSISTENT APPLICATION OF THE CONSERVATION PLANNING PROCESS USED BY NRCS FOR ALL CONSERVATION TECHNICAL AND FINANCIAL ASSISTANCE.

WHEN SHORTCUTS TO THE PLANNING PROCESS OCCUR  
THE VALUE OF NRCS EROSION PREDICTION TOOLS IS NOT FULLY REALIZED

NRCS RELEASE OF WEPS SOFTWARE AND SUPPORTING DATABASES, THE WEPS INTERFACE AND SIMULATION REPORTS ARE MAINTAINED TO SUPPORT CONSERVATION PLANNING.



NRCS WEPS: DESIGNED FOR USE WITH CONSERVATION PLANNING PROCESS.  
PRIMARILY CROP AND PASTURE LAND USE

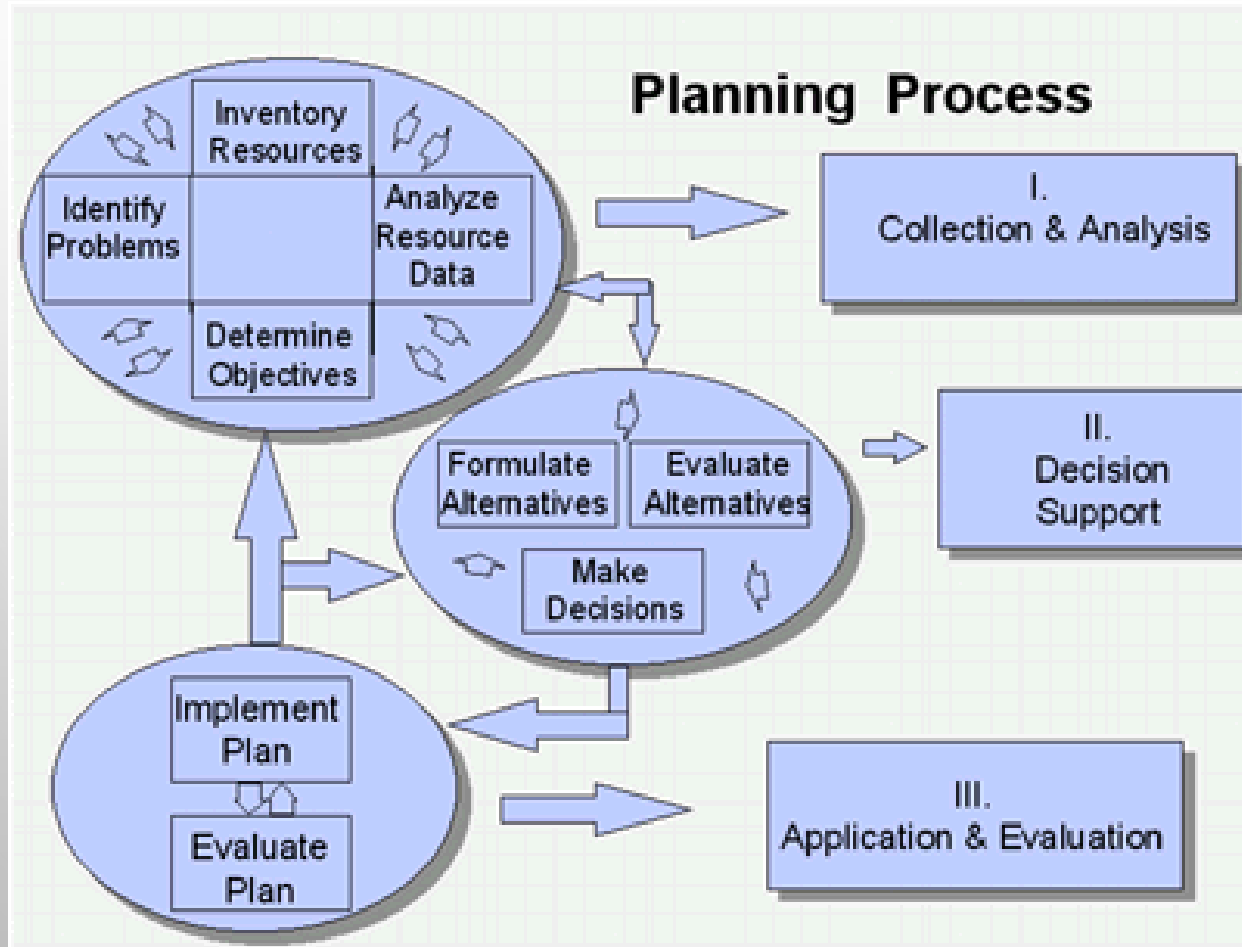
NRCS: ASSIST: PEOPLE CONSERVE NATURAL RESOURCES AND SUSTAINABLE CROP PRODUCTION  
MAINTAIN AND IMPROVE PRIVATE LANDS AND THEIR MANAGEMENT  
IMPLEMENT BETTER LAND MANAGEMENT TECHNOLOGIES  
PROTECT AND IMPROVE WATER QUALITY AND QUANTITY  
EXPLORE OPPORTUNITIES TO DIVERSIFY AGRICULTURAL OPERATIONS  
DEVELOP AND APPLY SUSTAINABLE AGRICULTURAL SYSTEMS

NRCS: TECHNICAL AND FINANCIAL ASSISTANCE INCLUDES:  
CROP SYSTEM INVENTORY, RESOURCE ASSESSMENT, CONSERVATION PRACTICE AND  
SYSTEM DESIGN, PLAN IMPLEMENTATION, RESOURCE MONITORING, FOLLOW-UP AND ADAPTATION

NRCS: CONSERVATION PLANNING PROCESS IMPROVES QUALITY OF:  
EFFECTIVE AND EFFICIENT CONSERVATION PLANS  
AND CONSERVATION PRACTICE STANDARD DESIGN  
EVALUATION: "EFFECTS" OF CONSERVATION PRACTICES AND SYSTEMS

**NRCS WEPS IS DESIGNED TO BE USED WITH THE CONSERVATION PLANNING PROCESS.  
EFFECTIVE CONSULTANTS, PLANNERS, ANY DISCIPLINE, USE A DEFINED PLANNING PROCESS**

**NRCS CONSERVATION PLANNING PROCESS**



**BASIC WEPS APPLICATIONS**



NRCS WEPS IS DESIGNED TO BE USED WITH THE CONSERVATION PLANNING PROCESS  
DEFINE/EVALUATE BENCHMARK CROP SYSTEMS: DESIGN/EVALUATE ALTERNATIVE CROP SYSTEMS

**CROP SYSTEM:** 2 GENERAL GROUPS OF FACTORS

EACH FACTOR CONTAINS MANY VARIABLES

DATABASES INCLUDED WITH A WEPS INSTALL PROVIDE THE FACTOR VARIABLES

**SITE FACTORS:** VARIABLES INCLUDE

CLIMATE: CLIMATE AND WIND DATABASE PARAMETERS

SOILS: SOIL SSURGO PROFILE DATA USED TO POPULATE WEPS IFC FILE

SIMULATION REGION GEOMETRY: GENERAL SHAPE, SIZE ORIENTATION REPRESENTING AN AREA OF INTEREST

**MANAGEMENT FACTORS:** VARIABLES INCLUDE

CROP ROTATION: CROP OR VEGETATION GROWTH PARAMETERS, PLANTING, HARVEST, TERMINATION DATES

RESIDUE TILLAGE MANAGEMENT: OPERATIONS, APPLICATIONS, TILLAGE, RESIDUE MANAGE, IRRIGATION ETC

WIND BARRIERS: VARIABLES HEIGHT, WIDTH, BOUNDARY LOCATION RELATED TO SIMULATION REGION

# WIND EROSION PREDICTION SYSTEM: WEPS

## USER INPUTS REPRESENT THE CROP SYSTEM FOR A SIMULATION

<b>SIMULATION REGION:</b>	FIELD OR AREA OF INTEREST, SIZE, GENERAL SHAPE AND ORIENTATION
<b>CLIMATE DATA:</b>	STATE AND COUNTY LOCATION SELECTION USING DROP DOWN CHOICES
<b>WIND BARRIERS:</b>	VEGETATION DESCRIPTION AND POSITION, OUTSIDE REGION BOUNDARY
<b>SOIL:</b>	SELECTED FOR SIMULATION, USING CURRENT SOIL DATABASE QUERY: SSURGO
<b>MANAGEMENT:</b>	CROP ROTATION, REALISTIC YIELD GOALS, PLANTING AND HARVEST DATES FIELD OPERATION SEQUENCE, ROW ORIENTATION, RESIDUE ADDITIONS, REMOVAL

### **OTHER USER INPUTS AVAILABLE:**

SURFACE ROCK FRAGMENTS >2 MM FIELD OBSERVATION:

SHEET AND RILL EROSION ESTIMATE FROM CURRENT WATER EROSION MODEL

NOTES SECTION

SLOPE FOR PLANNING SOIL

# EXAMPLES: DEMONSTRATE SIMULATION REPORT INFORMATION

## USER INTERFACE: USER SIMULATION INPUTS

WEPS Project: sd training Project

File Run ViewOutput Tools Help

1A1 Beet22, corn200, Bean2100, fultill, IRR vfl, Box Butte co NE\_bench\_cal

Runs Location  
C:\Users\Joel.Poore\Documents\My WEPS Files\Runs

**Client Information**

Client Name: Beet corn bean bench  
Farm No:   
Tract No:   
Field No: bench

**Region**

Shape: Half Circle VW  
Radius: 1268.2 ft  
Area: 58.0 ac  
Orientation: 25.0 °

**Location**

State: NEBRASKA  
County: BOX BUTTE  
Latitude: 42.22 N °  
Longitude: 103.09 W °  
Elevation: 3809 ft  
Cligen: HAY SPRINGS 12 S 28.2 mi  
Windgen: Interpolated (42.21978° N, 103.08567° W)  
[View Map](#)

**Simulation**

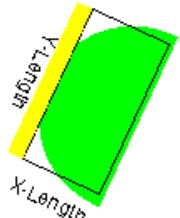
Run Mode: NRCS  
Water Erosion: 3.80 t/ac  
Region Slope: FROM SOIL DB  
Soil DB Value: 0.05 ft/ft  
Rock Fragments: FROM SOIL DB  
Soil DB Value: 0.04 ft<sup>2</sup>/ft<sup>2</sup>

**Notes**

Benchmark management  
58 acres, half circle  
3.8 ton/ac SR erosion estimate

[Edit](#) [Clear](#)

Barriers not to scale



Field shape approximate

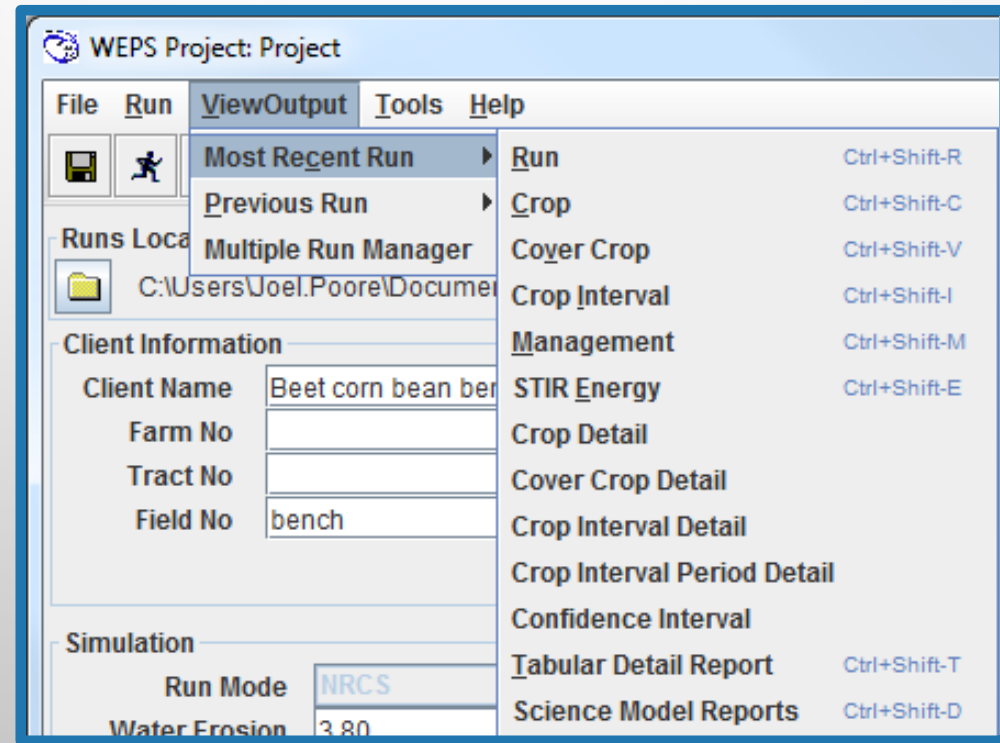
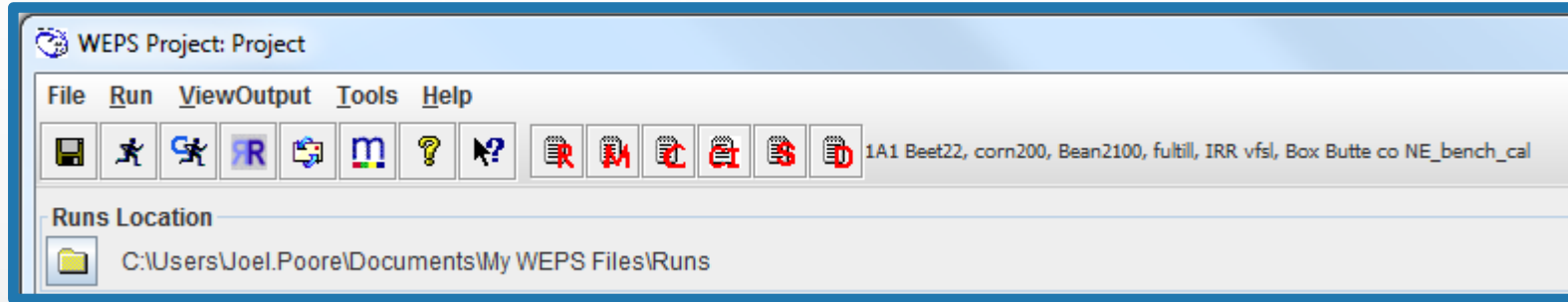
**Barriers**

N none  
 S none  
 E none  
 W none

[Edit Selected Barrier](#)

Man: 1A ag workshop benchmark, beets22, Corn200, dry bean2100 IRR\_calib.man  
Soil: Bridget\_1363\_100\_VFSL

# WIND EROSION PREDICTION SYSTEM: WEPS SIMULATION REPORT INFORMATION PROVIDED FROM EACH SIMULATION USER INTERFACE: TOOL BUTTONS, VIEW OUTPUT DROP DOWN MENU



# WIND EROSION PREDICTION SYSTEM: WEPS SOFTWARE AND DATABASES:

Current NRCS WEPS release is loaded (pushed) on NRCS computers by NRCS IT  
Current NRCS WEPS released available for public download, install and use is available at  
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/weps/software/>

The screenshot shows the top navigation bar of the USDA NRCS website. It includes the USDA logo, the text 'Natural Resources Conservation Service' and 'United States Department of Agriculture'. There are navigation tabs for 'Topics', 'Programs', 'Newsroom', 'Blog', and 'Contact Us'. A search bar is present with a magnifying glass icon. Below the navigation bar, a breadcrumb trail reads: 'You are Here: Home / Technical Resources / Tools & Applications / Wind Erosion (WEPS) / WEPS Software'.

## ☐ Tools & Applications

Water Erosion (RUSLE2)

## ☐ Wind Erosion (WEPS)

WEPS Software

Crop Management Templates

Crops and Operations  
Databases

Climate and Soils Databases

Training Materials

Wind Erosion Equation

## WEPS Software

### WEPS Software: Description and current version download

Wind Erosion Prediction System (WEPS) combines the latest in wind erosion science and technology with databases and computers, to develop what should be a significant advancement in wind erosion prediction technology. WEPS incorporates this new technology and is designed to replace the Wind Erosion Equation WEQ method of wind erosion prediction used by USDA-NRCS.

WEPS is a process-based, continuous, daily time-step model that simulates weather, field conditions, crop growth, hydrology and wind erosion. Saltation, creep, suspension, and PM10 components of wind erosion are simulated and reported for a crop system. WEPS is designed to be used under a wide range of land use conditions in the U.S. and easily adapted to other parts of the world.

### **Current official NRCS release of WEPS:**

WEPS – Wind Erosion Prediction System, is a tool for predicting the effects of management practices and crop rotations on wind erosion for an individual field. The NRCS configuration contains settings designed to support NRCS official programmatic and conservation planning use of WEPS. 12/02/2013.

**Notes:** This version of the WEPS user interface should run properly under either version of Java 1.6 or 1.7. Installation of this newer version replaces an older version but does not delete previous runs.

### **NRCS WEPS TSP configuration software download:**

[weps\\_nrcs\\_1.3.9\\_\(2013-10-30\)](#)

20

CMZ templates converted for WEPS use from RUSLE2  
Available for download from this site as well.

To download: right click on link, save target as, browse to local folder on computer and save. The software can then be installed from the saved folder location.

# WIND EROSION PREDICTION SYSTEM: WEPS

ARS: Wind Erosion Research website: WEPS and general wind erosion support documents, references.

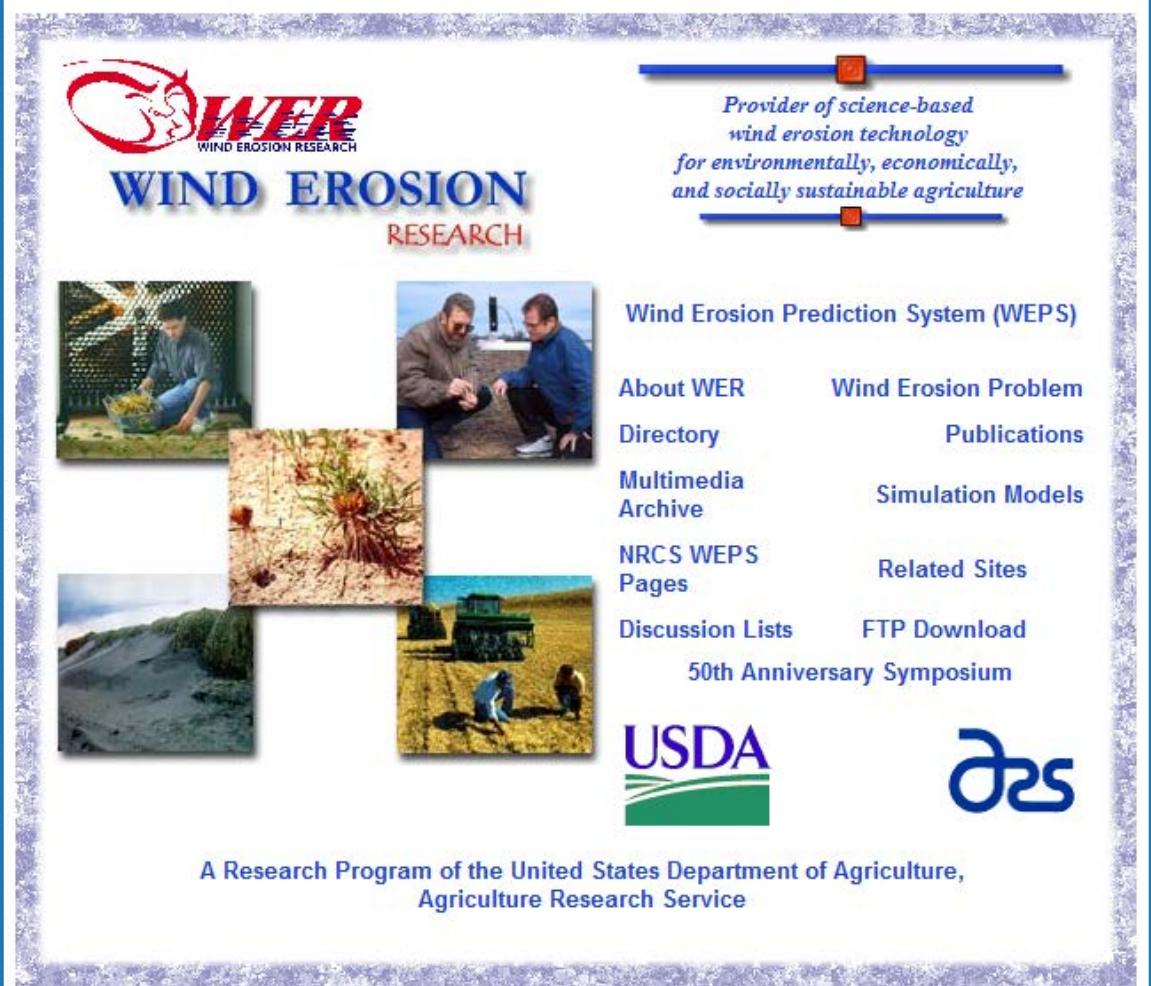
<https://infosys.ars.usda.gov/WindErosion/index.html>

Process based, daily time step model

Developed by ARS: Adapted for use by NRCS

A history of Wind Erosion Prediction Models in the United States Department of Agriculture: The Wind Erosion Prediction System (WEPS), Larry E. Wagner, Aeolian Research 10 (2013).

2.1.	Science model . . . . .
2.1.1.	Hydrology . . . . .
2.1.2.	Plant growth . . . . .
2.1.3.	Decomposition . . . . .
2.1.4.	Soil . . . . .
2.1.5.	Management . . . . .
2.1.6.	Erosion . . . . .
2.2.	Interface . . . . .
2.2.1.	Inputs . . . . .
2.2.2.	Databases . . . . .
2.2.3.	Outputs . . . . .



The image shows the header and navigation menu of the Wind Erosion Research website. At the top left is the logo for WER (Wind Erosion Research) with the text 'WIND EROSION RESEARCH' below it. To the right of the logo is a quote: 'Provider of science-based wind erosion technology for environmentally, economically, and socially sustainable agriculture'. Below the quote is a navigation menu with links: 'Wind Erosion Prediction System (WEPS)', 'About WER', 'Directory', 'Multimedia Archive', 'NRCS WEPS Pages', 'Discussion Lists', '50th Anniversary Symposium', 'Wind Erosion Problem Publications', 'Simulation Models', 'Related Sites', and 'FTP Download'. At the bottom of the menu are the USDA and ARS logos. Below the logos is the text: 'A Research Program of the United States Department of Agriculture, Agriculture Research Service'. The entire header area is framed by a decorative border.

**NEW**

**[NRCS WEPS Pages](#)**

**[About Wind Erosion Research](#)**

**[Video: Soil Erosion by Wind and its Control](#)**

**[History of Wind Erosion Research at Manhattan, KS](#)**

Example Benchmark Crop system, WEPS input: Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated Half circle (58 acres) Box Butte NE, VFSL soil (Bridget series), full tillage Benchmark

The screenshot shows the WEPS Project software interface with the following sections and data:

- Runs Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs
- Client Information:** Client Name: Beet corn bean bench; Farm No: ; Tract No: ; Field No: bench
- Region:** Shape: Half Circle VW; Radius: 1268.2 ft; Area: 58.0 ac; Orientation: 25.0 °
- Location:** State: NEBRASKA; County: BOX BUTTE; Latitude: 42.22 N; Longitude: 103.09 W; Elevation: 3809 ft; Cligen: HAY SPRINGS 12 S 28.2 mi; Windgen: Interpolated (42.21978° N, 103.08567° W)
- Simulation:** Run Mode: NRCS; Water Erosion: 3.80 t/ac; Region Slope: FROM SOIL DB; Soil DB Value: 0.05 ft/ft; Rock Fragments: FROM SOIL DB; Soil DB Value: 0.04 ft²/ft²
- Notes:** Benchmark management; 58 acres, half circle; 3.8 ton/ac SR erosion estimate
- Barriers:** N: none; S: none; E: none; W: none
- Man:** 1A ag workshop benchmark, beets22, Corn200, dry bean2100 IRR\_calib.man
- Soil:** Bridget\_1363\_100\_VFSL

The central map area shows a green half-circle field with a yellow barrier line along one edge. Text on the map includes "Barriers not to scale", "Field shape approximate", and "X-Length".

Following examples using: NRCS WEPS 1.5.43 Scheduled release 10/16/2016

SUGAR BEET, CORN, DRY BEAN, PIVOT IRRIGATED  
BENCHMARK MANAGEMENT  
USED IN THE SIMULATION RUN FOR THIS FIELD

MANAGEMENT REPORT

Start and stop monitor operations:

Based on available water compared to Maximum allowable depletion parameter setting and available water capacity for planning soil, irrigation water is only applied during crop growth.

For some irrigation systems, pre-irrigations can be added for individual applications (available operations) when crops are not growing.

**Management**

1A1 Beet22, corn200, Bean2100, fultill, IRR vfsl, Box Butte co  
NE\_bench\_cal

**Run Date:** Wednesday, August 17, 2016, 08:15 AM  
**Client Name:** Beet corn bean bench  
**Farm No:** --- **Tract No:** --- **Field No:** bench  
**Run Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs  
**Management:** 1A ag workshop benchmark, beets22, Corn200, dry bean2100 IRR\_calib.man  
**Soil:** Bridget\_1363\_100\_VFSL.1fc

**Rotation Summary**

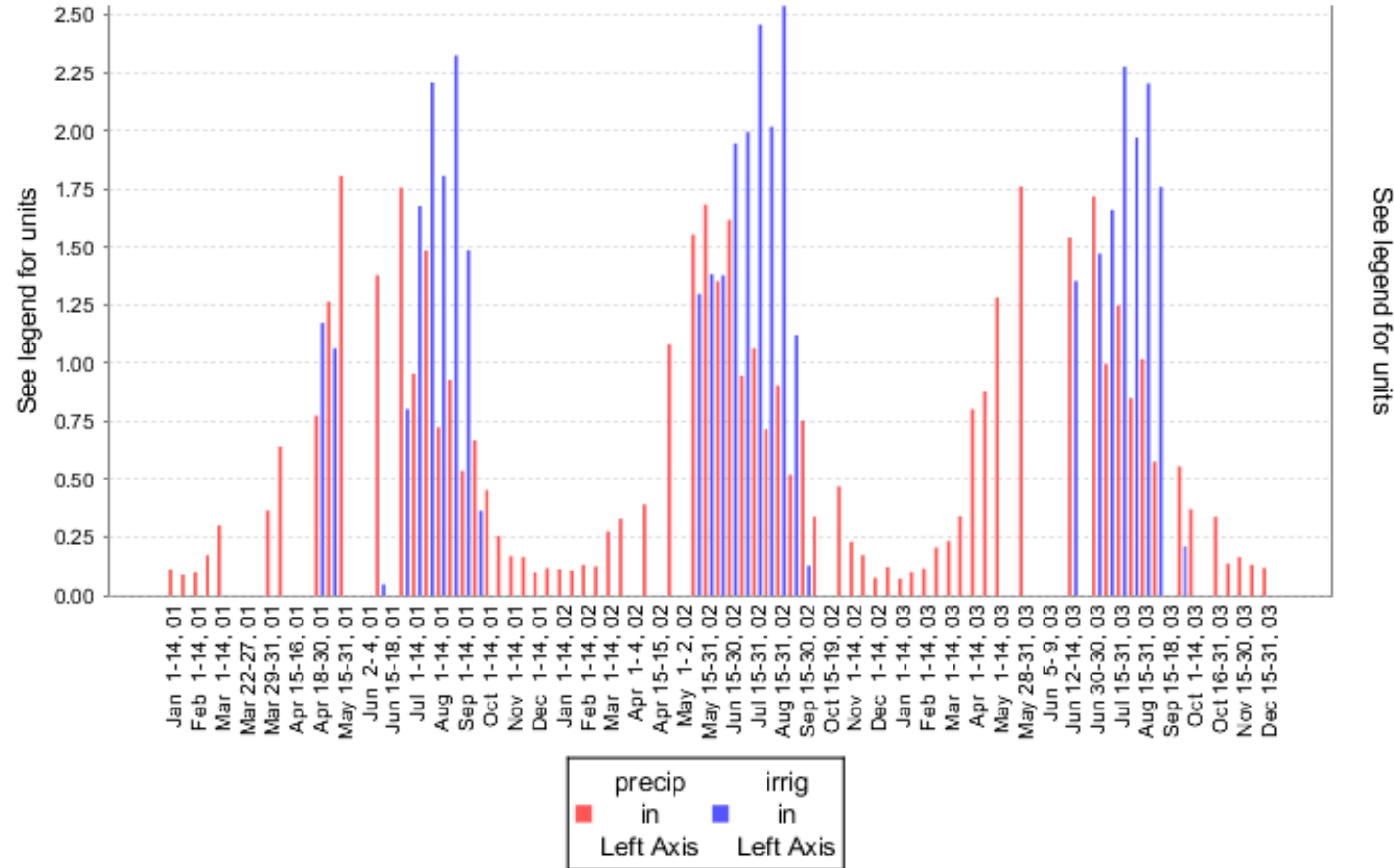
Date	Operation	Crop
Mar 15, 01	Plow, moldboard	
Mar 22, 01	Cultivator, field 6-12 in sweeps	
Mar 28, 01	Cultivator, field, spike points	
Mar 29, 01	Seedbed finisher, fld cult, coil tine har, rolling bskt	
Apr 17, 01	Irrigation, Start Monitor (pivot, linear, wheeline)	
Apr 18, 01	Planter, double disk opnr	Sugarbeet, sugar
Jun 02, 01	Fert applic. side-dress, liquid	
Jun 05, 01	Cultivator, row 1 in ridge	
Jun 19, 01	Cultivator, row 3 in ridge	
Oct 01, 01	Harvest, dig root crops res. buried	Sugarbeet, sugar
Apr 05, 02	Cultivator, field 6-12 in sweeps	
Apr 16, 02	Seedbed finisher, fld cult, coil tine har, rolling bskt	
May 01, 02	Planter, double disk opnr with starter fertilizer	Corn, grain
May 03, 02	Sprayer, pre-emergence	weed residue; 0-3 mo
Jul 01, 02	Fert applic. side-dress, liquid	
Oct 01, 02	Harvest, killing crop 50pct standing stubble	Corn, grain
Oct 15, 02	Graze, stubble or residue 50 pct	
Oct 20, 02	Chisel, st. pt	
Apr 01, 03	Cultivator, field 6-12 in sweeps	
May 28, 03	Seedbed finisher, fld cult, chop, spk har, ring bskt	
Jun 01, 03	Planter, double disk opnr with starter fertilizer	Bean, field, dry
Jun 05, 03	Sprayer, pre-emergence	weed residue; 0-3 mo
Jun 10, 03	Fert applic. side-dress, liquid	
Jun 12, 03	Cultivator, row 1 in ridge	
Jun 30, 03	Cultivator, row 3 in ridge	
Sep 19, 03	Harvest, knife, windrow, combine	Bean, field, dry
Oct 16, 03	Irrigation, Stop Monitor	

# SUGAR BEET, CORN, DRY BEAN, PIVOT IRRIGATED, BENCHMARK 50 SIMULATION YEAR AVE, PRECIPITATION AND IRRIGATION: DETAILED REPORT, 2 WEEK INCREMENTS DURING ROTATION: PLOTTING FUNCTION

## Quick Plot



1A1 Beet22, corn200, Bean2100, fultill, IRR vfsl, Box Butte co NE\_bench\_cal



Benchmark Crop system:  
Run Summary report:

Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, Cal  
 Simulated Yields, average of 50 simulation years,  
 Crop Interval Erosion results for this 3 crop rotation

<b>Crop Interval Erosion</b>							
Date Range	Days	Crop	Gross Loss	Net Soil Loss From Field ( t/ac )			
			t/ac	Total Creep/Salt.	Suspen.	PM10	
Sep 19, 03 - Oct 01, 01	377	Sugarbeet, sugar	17.2	17.2	8.5	8.8	0.23
Oct 01, 01 - Oct 01, 02	365	Corn, grain	9.7	9.7	4.8	4.9	0.13
Oct 01, 02 - Sep 19, 03	353	Bean, field, dry	0.0	0.0	0.0	0.0	0.00

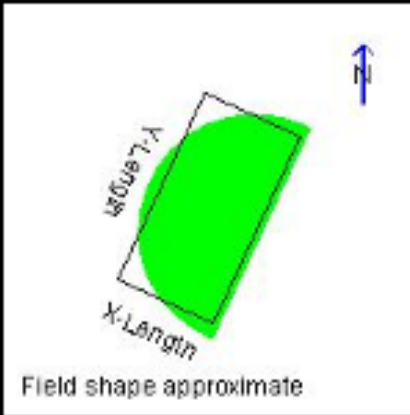
<b>Harvests</b>				
Date	Crop	Residue lb/ac	Harvest Yield	Yield % Moisture
Oct 01, 01	Sugarbeet, sugar	0	22.7 ton/ac	82.0
Oct 01, 02	Corn, grain	10,605	196.1 bu/ac	15.5
Sep 19, 03	Bean, field, dry	2,055	2148.8 lb/ac	16.0

Benchmark Crop system:  
Run Summary report:

Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, calibrated  
 Average annual wind erosion results for rotation and rotation years,  
 Net and Gross Total, Saltation Creep, Suspension, PM10

<b>Run Date:</b>	Wednesday, August 17, 2016, 08:15 AM				
<b>Client Name:</b>	Beet corn bean bench				
<b>Farm No:</b>	---	<b>Tract No:</b>	---	<b>Field No:</b>	bench
<b>Run Location:</b>	C:\Users\Joel.Poore\Documents\My WEPS Files\Runs				
<b>Management:</b>	1A ag workshop benchmark, beets22, Corn200, dry bean2100 IRR_calib.man				
<b>Soil:</b>	Bridget_1363_100_VFSL.ifc				

Location Site Information					
 <p>Field shape approximate</p>	<b>X-Length:</b>	1124.0 ft	<b>Mode:</b>	NRCS	
	<b>Y-Length:</b>	2247.7 ft	<b>Soil Loss Tolerance (T):</b>	5.0 t/ac/yr	
	<b>Radius:</b>	1268.4 ft	<b>Site:</b>	UNITED STATES	
	<b>Area:</b>	58.0 ac		NEBRASKA	
	<b>Elevation:</b>	3809.1 ft		BOX BUTTE	
	<b>Orientation:</b>	25.0 °	<b>Location:</b>	42.21978° N, 103.08567° W	
			<b>Cligen:</b>	HAY SPRINGS 12 S	
			<b>Windgen:</b>	Interpolated (42.21978° N, 103.08567°	

Erosion						
Period	Crop/Residue	Gross Loss t/ac	Net Soil Loss From Field ( t/ac )			
			Total	Creep/Salt.	Suspen.	PM10
Rot. year: 1	Sugarbeet, sugar	19.5	19.5	9.6	9.9	0.26
Rot. year: 2	Corn, grain	7.4	7.4	3.7	3.7	0.10
Rot. year: 3	Bean, field, dry	Trace	Trace	Trace	Trace	Trace
Ave. Annual		9.0	9.0	4.4	4.6	0.12

Benchmark Crop system: Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, calibrated  
**STIR Energy report:** Soil Conditioning Index, Energy and Crop interval erosion  
 Fuel use reported: annual average can convert to rotation total

SCI Summary		
<b>Soil Conditioning Index:</b>	-0.9	<b>SCI Subfactors</b>
<b>Energy Calculator:</b>	6.9 gal diesel/ac	<b>OM:</b> 0.23
<b>Average Annual STIR:</b>	146.7	<b>FO:</b> -0.45
<b>Wind Erosion Soil Loss:</b>	9.0 t/ac	<b>ER:</b> -4.03
<b>Water Erosion Soil</b>	3.8 t/ac	

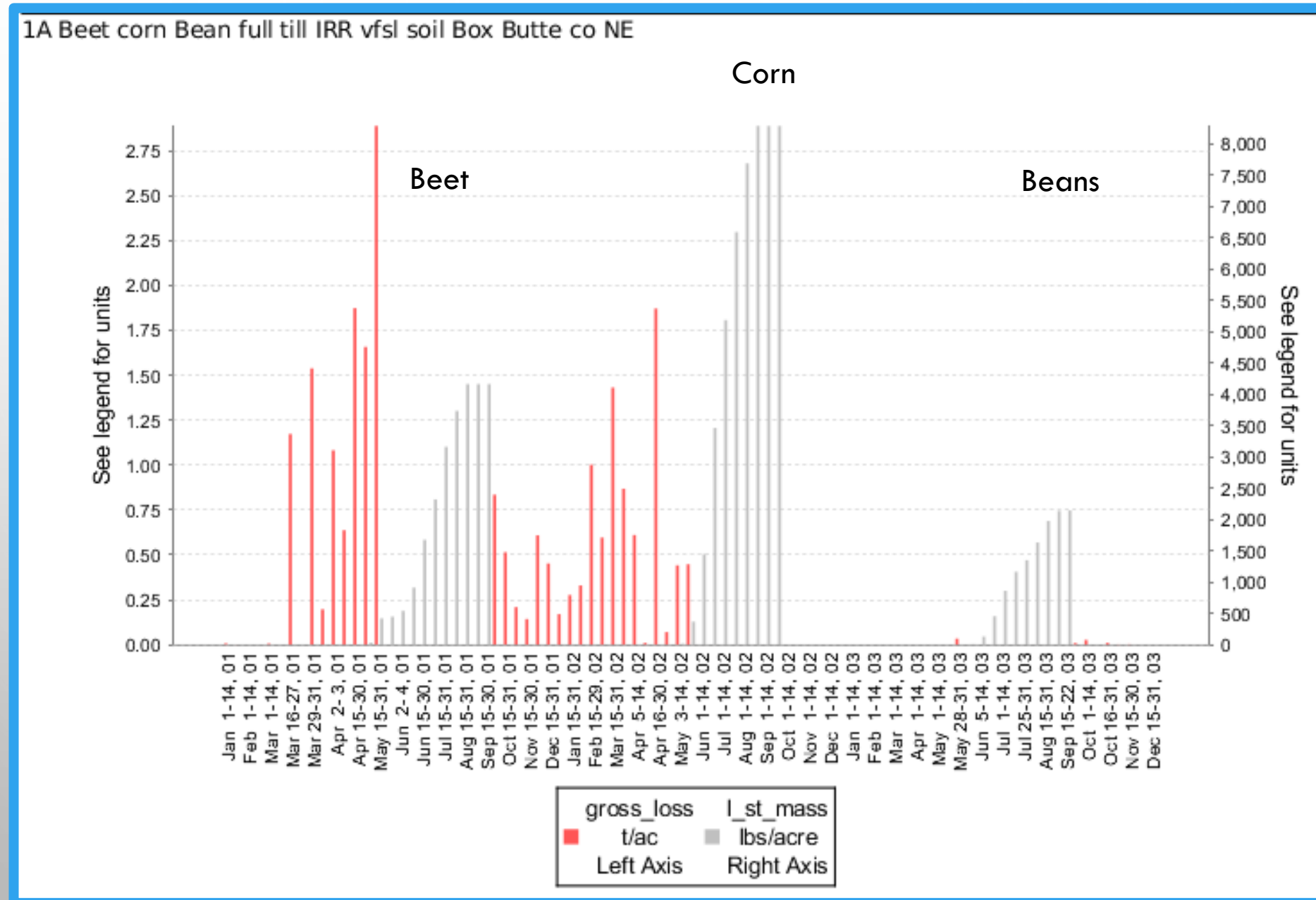
Crop Interval Stir Energy					
Date Range	Days	Crop	Stir	Energy Btu/ac	Cost USD/ac
Sep 19, 03 - Oct 01, 01	377	Sugarbeet, sugar	220.7	1,024,187	29.27
Oct 01, 01 - Oct 01, 02	365	Corn, grain	66.0	523,992	14.98
Oct 01, 02 - Sep 19, 03	353	Bean, field, dry	153.5	1,066,992	30.49

Benchmark Crop system:

Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, calibrated

Detailed reports:

Plotting function: gross erosion and leaf and stem mass, 2 units, 2 axis.



Butte co NE		Mass of Soil Passing Indicated Field Boundary											
Client: bett corn bean benchmark irr		per Unit Length of Field Border											
Fm: Tr: Fld: Bench		Creep+Saltation				Suspension				PM10			
bean irrig_calib_calib													
Soil: Bridget_1363_100_VFSL		tons/1000ft				tons/1000ft				tons/1000ft			
Date	Operation												
Rot. yr: 1		24.9	28.6	64.3	101.5	24.7	29.8	74.9	102.2	0.6	0.8	2.0	2.6
Rot. yr: 2		13.3	19.8	43.2	56.3	19.9	17.8	42.4	56.2	0.5	0.5	1.1	1.5
Rot. yr: 3		0.1	0.1	0.6	0.6	0.1	0.1	0.9	0.5	0.0	0.0	0.0	0.0
Ave. Annual		12.8	16.2	36.0	52.8	14.9	15.9	39.4	53.0	0.4	0.4	1.1	1.3

Sugar beet, Corn Beans Benchmark

**Detailed Reports:** Boundary Loss summary and Erosion details report

Critical erosive wind energy directions:

Simulated Boundary loss tons/1000 ft boundary, Transport and Source factors: crop system

Erosion details:

Saltation creep at sugar beet establishment.

Plant health and vigor concerns? Apr – May.

Greater than crop tolerance to saltation NAM

Run: 1A Beet corn Bean full till IRR vfsl soil Box Butte co NE			Net Soil Loss from Field			
Client: bett corn bean benchmark irr			Average Total	Average Creep and Saltation	Average Suspension	Average PM10
Fm: Tr: Fld: Bench			t/ac	t/ac	t/ac	t/ac
Management: 1A ag workshop beets, Corn, dry bean irrig_calib_calib						
Soil: Bridget_1363_100_VFSL						
Date	Operation	Crop				
Mar 28-28, 01	Cultivator, field, spike points		0.0	0.00	0.00	0.000
Mar 29-31, 01	Seedbed finisher, fld cult, coi		1.5	0.74	0.80	0.019
Apr 1- 1, 01	Irrigation, Start Monitor (pivot,		0.2	0.09	0.11	Trace
Apr 2- 3, 01	Planter, double disk opnr	Sugarbeet, sugar	1.1	0.55	0.54	0.012
Apr 4-14, 01	Sprayer, pre-emergence	weed residue; 0-3	0.6	0.34	0.29	Trace
Apr 15-30, 01			1.9	0.93	0.95	0.025
May 1-14, 01			1.7	0.90	0.76	0.021
May 15-31, 01			2.9	1.28	1.61	0.043
Jun 1- 1, 01			0.0	0.00	0.00	0.000

Potential alternative crop systems might be used to reduce risk to plant productivity and vigor?

Benchmark Crop system:

**Detailed Reports:**

Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, calibrated

Basic Hydrology sub model results ave annual and rotation yr results (inches)

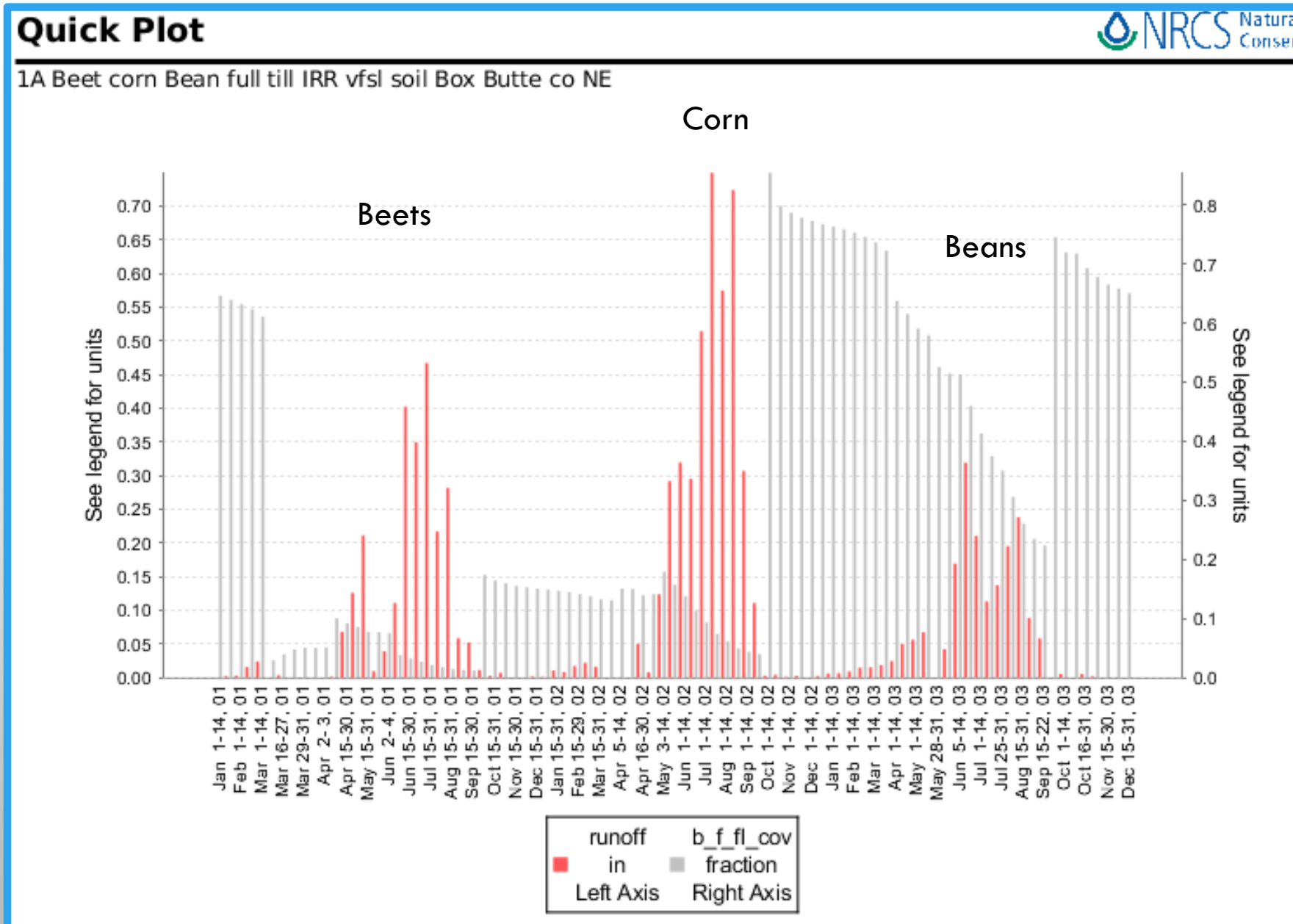
Simulated Precip, Irrigation, Runoff, Drainage, Evaporation, Plant transpiration

Select Report : Crop/Soil Water Information (summary)

NE_alt 1 _cal			format	Crop/Soil Water Information						
Client: Beet corn bean alt1										
Fm: Tr: Fld: Alt1										
irrig_alt1_calib										
Soil: Bridget_1363_100_VFSL			Precip.	Irrigation	Runoff	Drainage	Soil Water	Soil Surface Evap.	Plant Transp.	
Date	Operation	Crop	in	in	in	in	in	in	in	
Rot. yr: 1			15.3	12.6	2.3	2.1	N/A	6.8	19.0	
Rot. yr: 2			15.1	18.7	4.3	0.5	N/A	8.5	18.1	
Rot. yr: 3			15.6	16.9	1.7	2.9	N/A	8.9	18.8	
Ave. Annual			15.3	16.0	2.8	1.8	N/A	8.1	18.7	

# Example Benchmark Calibrated Crop system

**Detailed Reports:** Plotting function, Runoff, Total surface cover.. Timing of conservation needs?



Benchmark Crop system: Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, calibrated

**Crop Report:** Planting to Harvest crop periods:

Mean, Std Dev, Min, Max for several results.

Simulated Yield variability:

Resiliency of the crop system?  
especially for non irrigated systems,

Simulated results statistics: n = 50,

$(\text{Std Dev} / \text{Mean}) * 100 = \text{CV}\%$

Might help understand variability year to year for Yield as well as erosion and other simulation results when comparing systems

## Crop Summary

1A1 Beet22, corn200, Bean2100, fulltill, IRR vfsl, Box Butte co  
NE\_bench\_cal

**Run Date:** Wednesday, August 17, 2016, 08:15 AM  
**Client Name:** Beet corn bean bench  
**Farm No:** --- **Tract No:** --- **Field No:** bench  
**Run Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs  
**Management:** 1A ag workshop benchmark, beets22, Corn200, dry bean2100 IRR\_calib.man  
**Soil:** Bridget\_1363\_100\_VFSL.ifc

### Apr 18, 01 - Oct 01, 01 166d Sugarbeet, sugar

	Dry Yield lb/ac	Harvest Residue lb/ac	Rain in	Irrig in	Initial SWC in	Final SWC in	SWC Change in	Crop Transp in	Yield @ 82.0% ton/ac
<b>Mean:</b>	8,159	0	12.2	13.0	22.6	20.5	-2.1	18.4	23
<b>Std. Dev:</b>	398	0	3.9	1.5	0.5	0.5	0.7	1.1	1
<b>Min:</b>	7,442	0	4.3	9.4	21.7	19.9	-3.9	16.2	21
<b>Max:</b>	9,316	0	26.0	16.5	24.3	22.6	0.3	21.0	26

### May 01, 02 - Oct 01, 02 153d Corn, grain

	Dry Yield lb/ac	Harvest Residue lb/ac	Rain in	Irrig in	Initial SWC in	Final SWC in	SWC Change in	Crop Transp in	Yield @ 15.5% bu/ac
<b>Mean:</b>	9,280	10,605	11.1	16.3	21.2	21.5	0.3	17.8	196
<b>Std. Dev:</b>	584	635	3.5	1.2	0.6	0.8	0.8	0.9	12
<b>Min:</b>	8,133	9,356	6.2	13.4	20.3	19.8	-1.1	16.2	172
<b>Max:</b>	10,596	12,037	20.2	18.3	22.7	22.9	2.2	20.1	224

### Jun 01, 03 - Sep 19, 03 110d Bean, field, dry

	Dry Yield lb/ac	Harvest Residue lb/ac	Rain in	Irrig in	Initial SWC in	Final SWC in	SWC Change in	Crop Transp in	Yield @ 16.0% lb/ac
<b>Mean:</b>	1,803	2,055	8.1	12.9	23.6	22.3	-1.3	16.3	2,149
<b>Std. Dev:</b>	90	98	2.7	0.9	1.3	0.3	1.3	0.9	107
<b>Min:</b>	1,614	1,848	3.0	10.4	20.4	21.6	-5.3	14.7	1,923
<b>Max:</b>	1,957	2,223	17.4	15.1	27.3	23.3	2.1	18.2	2,332

Benchmark Crop system:  
Crop Interval Summary:

Sugar beet 22, Corn 200, Dry Beans 2100, Irrigated, calibrated  
 Simulated variability, Biomass production and hydrology results  
 Good report: comparing crop interval time periods, crop system EFFECTS.

**Sep 19, 03 - Oct 01, 01 377 Days Sugarbeet, sugar**

	Biomass lb/ac	Rain in	Irrig in	Runoff in	Drain in	Evap in	Crop Transp in	Initial SWC in	Final SWC in	SWC Change in	Runoff Loss %	Drainage Loss %	Evap Loss %	Water use Eff. %
<b>Mean:</b>	4,479	15.7	13.0	2.4	0.7	9.0	18.4	22.3	20.5	-1.8	7.6	2.0	29.5	60.9
<b>Std. Dev:</b>	199	4.0	1.5	1.4	0.7	1.1	1.1	0.3	0.5	0.7	3.7	2.0	2.5	5.2
<b>Min:</b>	4,122	7.7	9.4	0.2	0.0	6.8	16.2	21.6	19.9	-3.2	0.6	0.0	23.7	45.7
<b>Max:</b>	5,059	31.0	16.5	7.1	3.9	11.9	21.0	23.3	22.6	0.6	16.8	9.3	35.4	70.7

**Oct 01, 01 - Oct 01, 02 365 Days Corn, grain**

	Biomass lb/ac	Rain in	Irrig in	Runoff in	Drain in	Evap in	Crop Transp in	Initial SWC in	Final SWC in	SWC Change in	Runoff Loss %	Drainage Loss %	Evap Loss %	Water use Eff. %
<b>Mean:</b>	8,285	14.9	16.3	4.2	0.3	8.0	17.8	20.5	21.5	1.0	13.6	0.8	26.6	59.1
<b>Std. Dev:</b>	490	3.6	1.2	1.5	0.7	0.8	0.9	0.5	0.8	0.8	3.8	1.8	2.7	3.7
<b>Min:</b>	7,325	9.2	13.4	2.0	0.0	6.5	16.2	19.9	19.8	-1.0	7.2	0.0	19.6	46.1
<b>Max:</b>	9,386	23.6	18.3	7.8	3.0	10.2	20.1	22.6	22.9	2.7	22.0	8.1	33.3	66.1

**Oct 01, 02 - Sep 19, 03 353 Days Bean, field, dry**

	Biomass lb/ac	Rain in	Irrig in	Runoff in	Drain in	Evap in	Crop Transp in	Initial SWC in	Final SWC in	SWC Change in	Runoff Loss %	Drainage Loss %	Evap Loss %	Water use Eff. %
<b>Mean:</b>	2,139	15.3	12.9	1.6	2.1	7.3	16.3	21.5	22.3	0.8	5.8	7.3	26.9	60.0
<b>Std. Dev:</b>	101	2.9	0.9	1.1	1.5	0.9	0.9	0.8	0.3	0.8	3.4	4.7	2.8	5.7
<b>Min:</b>	1,927	9.4	10.4	0.2	0.0	5.2	14.7	19.8	21.6	-0.6	1.0	0.0	19.2	48.9
<b>Max:</b>	2,311	22.2	15.1	5.4	5.7	9.2	18.2	22.9	23.3	2.6	18.7	18.0	33.3	70.0

SUGAR BEET, CORN, DRY BEAN, PIVOT IRRIGATED

ALTERNATIVE:  
REDUCE TILLAGE AND INSERT COVER CROPS INTO ROTATION:

INTER-SEED TRITICALE FOLLOWING CORN,  
DIRECT SEED SUGAR BEETS INTO TERMINATED COVER CROP

DRILLED TRITICALE CC FOLLOWING DRY BEAN HARVEST

## Management

1A Beet22, corn200, Bean2100, redtil, IRR vfst, Box Butte co  
NE\_alt 1\_cal

<b>Run Date:</b>	Wednesday, August 17, 2016, 07:54 AM		
<b>Client Name:</b>	Beet corn bean alt1		
<b>Farm No:</b>	---	<b>Tract No:</b>	---
		<b>Field No:</b>	Alt1
<b>Run Location:</b>	C:\Users\Joel.Poore\Documents\My WEPS Files\Runs		
<b>Management:</b>	1A ag workshop beets22, Corn200, dry bean2100 irrig_alt1_calib.man		
<b>Soil:</b>	Bridget_1363_100_VFSL.lfc		

### Rotation Summary

Date	Operation	Crop
Mar 29, 01	Sprayer, kill strips	weed residue; 0-3 mo
Apr 16, 01	Sprayer, kill crop	
Apr 17, 01	Irrigation, Start Monitor (pivot, linear, wheelline)	
Apr 18, 01	Planter, double disk opnr	Sugarbeet, sugar
Jun 02, 01	Fert applic. side-dress, liquid	
Jun 05, 01	Cultivator, row 1 in ridge	
Jun 19, 01	Cultivator, row 3 in ridge	
Oct 01, 01	Harvest, dig root crops res. buried	Sugarbeet, sugar
Oct 25, 01	Subsoiler bedder (ripper hipper)	
Apr 16, 02	Seedbed finisher, fld cult, coil tine har, rolling bskt	
May 01, 02	Planter, double disk opnr with starter fertilizer	Corn, grain
May 03, 02	Sprayer, pre-emergence	weed residue; 0-3 mo
Jul 01, 02	Fert applic. side-dress, liquid	
Oct 01, 02	Harvest, killing crop 50pct standing stubble, release cover crop	Corn, grain
Oct 15, 02	Graze, stubble or residue 50 pct	Triticale
May 01, 03	Sprayer, kill crop	
May 30, 03	Seedbed finisher, fld cult, chop, spk har, rlng bskt	
Jun 01, 03	Planter, double disk opnr with starter fertilizer	Bean, field, dry
Jun 05, 03	Sprayer, pre-emergence	weed residue; 0-3 mo
Jun 10, 03	Fert applic. side-dress, liquid	
Jun 12, 03	Cultivator, row 1 in ridge	
Jun 30, 03	Cultivator, row 3 in ridge	
Sep 19, 03	Harvest, knife, windrow, combine	Bean, field, dry
Sep 22, 03	Drill or air seeder single disk openers, + fert. opnrs 7-10 in spac.	Triticale

# SUGAR BEET, CORN, DRY BEAN, PIVOT IRRIGATED

## BENCHMARK AND ALTERNATIVE CONFIDENCE INTERVALS FOR EROSION ESTIMATES BEGIN TO EVALUATE RISKS CONFIDENCE LEVEL

### View output/Confidence Interval report:

n = 50 cycles,

Ave Annual gross loss: 3 yr rotation

Cycle gross loss 50 cycles

90% confidence interval

Benchmark: 8.0 – 15.8 tons/ac, mean: 9 tons/ac

Alternative: 1.6 – 3.9 tons/ac, mean: 1.9 tons/ac

Annual gross loss results during 3 yr rotation

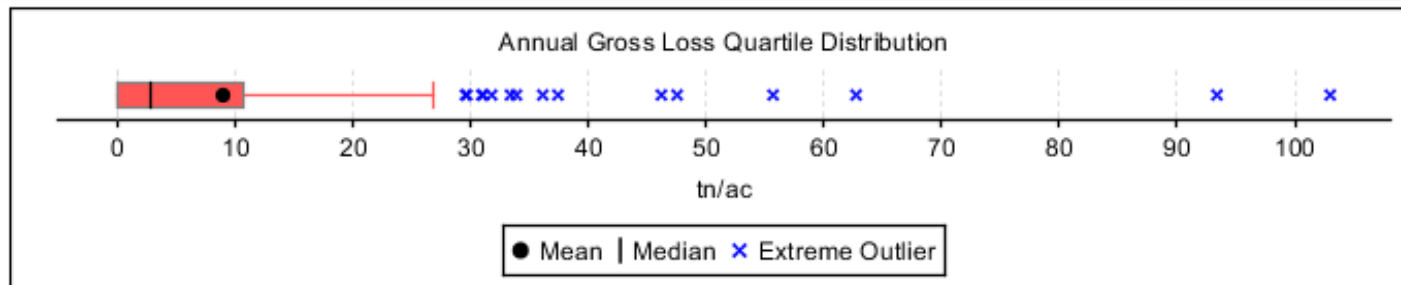
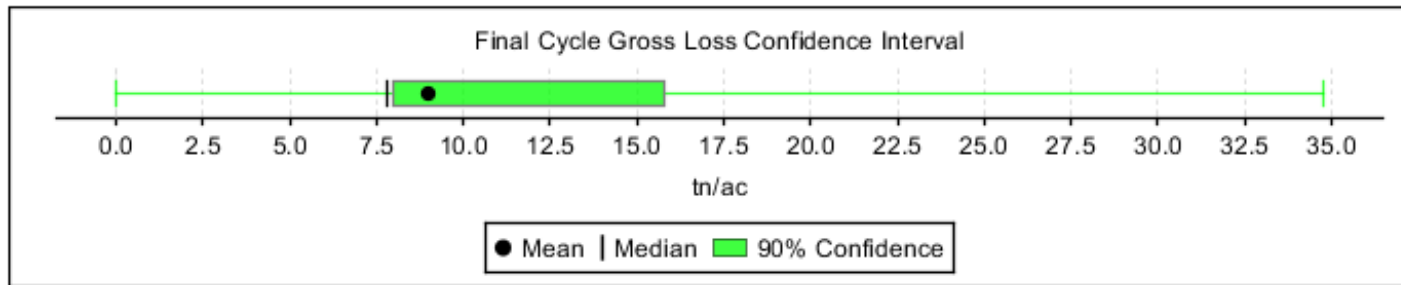
150 total simulation years,

# outliers greater than 2 X Std Deviation

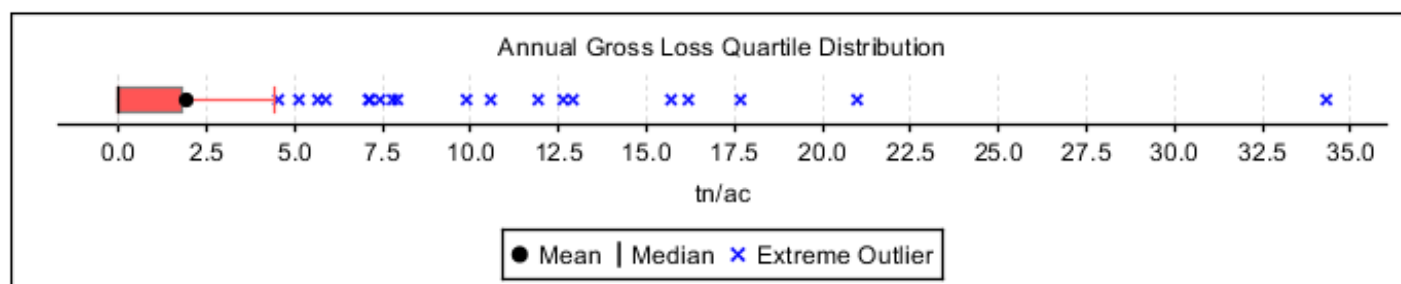
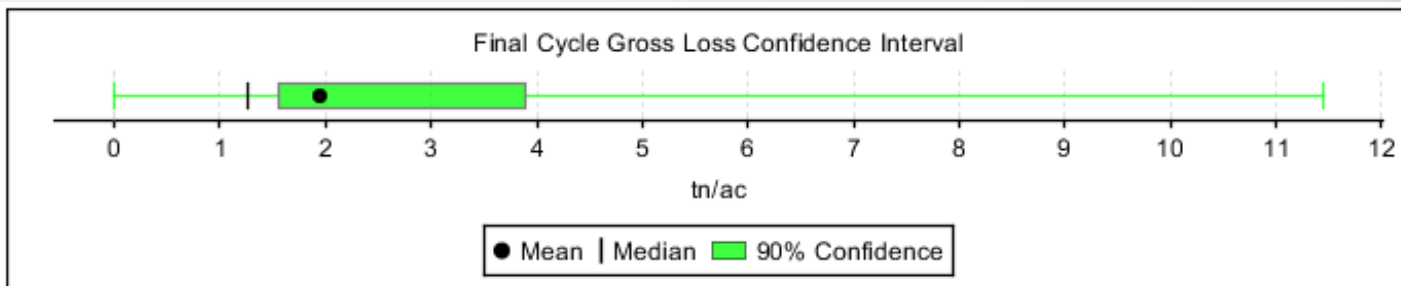
Benchmark: 14 outliers / 150 = 9.3% risk

Alternative: 18 outliers / 150 = 12% risk

## Benchmark crop system simulation



## Alternative crop system simulation



## Benchmark Alternative Simulation Review

### **Sugar Beets, Corn, Dry Bean, Irrigated: common assessment/evaluation**

Erosion	Benchmark	Alternative
Wind Erosion Gross ton/ac average annual	9	1.9
Wind Erosion Net ton/ac average annual	9	1.9
Wind Erosion Saltation Creep, ton/ac average annual	4.4	1
Wind Erosion Suspension, ton/ac average annual	4.6	0.9
Wind Erosion PM10, ton/ac average annual	0.12	0.02
Soil Conditioning Index SCI, rotation	-0.9	0.1
OM subfactor	0.23	0.25
FO subfactor	-0.45	0.22
ER subfactor	-4.03	-0.59
STIR average annual	146.7	78.6
STIR crop interval, Sugar Beets	221	85.1
STIR crop interval, Corn	66	1.1
STIR crop interval, Dry Beans	154	6
Fuel use, rotation gal/ac dfe	20.7	16.8

The Alternative crop system, reduce saltation creep, sugar beet establishment from 3.5 Tons/ac to 0 Tolerance for sugar beets is 0.5 tons/ac during young crop establishment.

Herbaceous wind barriers is a viable alternative for this type of crop system. (under utilized practice), With Variable rate irrigation, Strip cropping will be another potential alternative under pivots

## Benchmark Alternative Simulation Review

Sugar Beets, Corn, Dry Bean, Irrigated

Other potential Benchmark Alternative comparisons, Irrigated systems example:

Soil Profile Hydrology and water use efficiency, calibrated and Irrigated systems		
	Benchmark	Alternative
Precipitation, average annual inches	15.3	15.3
Irrigation, average annual inches (using monitor operation)	14	16.0
Runoff, average annual, inches	2.7	2.8
Drainage, average annual, inches	1	1.8
Evaporation, average annual inches	8.1	8.1
Plant Transpiration, average annual inches	17.5	18.7
Water use efficiency average annual %	60%	59%
Water use inefficiency average annual %	40%	41%

Irrigated crop systems, especially with perfect irrigation scheduling (Start / Stop monitor operations): similar Hydrology and growth comparisons are much more informative for Non-Irrigated crop systems:

EFFECTS of crop systems



QUESTIONS?

# ALABAMA EXAMPLE BENCHMARK CROP SYSTEM: LOWNDES CO AL, BRANTLEY SL, 70 AC AOI, NO WIND BARRIERS, WATER EROSION 2 TON/AC

File Run ViewOutput Tools Help

corn bale res cotton 2 yr non cal, notill AL lowndes co Brantley SLBsFSL\_RF sdb\_calib

Runs Location  
C:\Users\Joel.Poore\Documents\My WEPS Files\Runs

**Client Information**

Client Name: AL corn bale res cotton

Farm No:

Tract No:

Field No: Bench

**Region**

Shape: Square

X-Length: 1746.1 ft

Y-Length: 1746.1 ft

Area: 70.0 ac

Orientation: 0.0 °

**Location**

State: ALABAMA

County: LOWNDES

Latitude: 32.15 N °

Longitude: 86.65 W °

Elevation: 197 ft

Cligen: MONTGOMERY WB AP 17.1 mi

Windgen: Interpolated (32.15479° N, 86.65007° W)

[View Map](#)

**Simulation**

Run Mode: NRCS

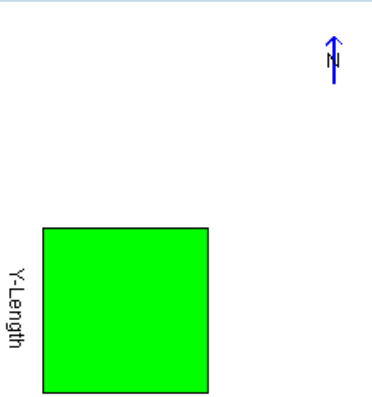
Water Erosion: 2.00 t/ac

Region Slope: FROM SOIL DB

Soil DB Value: 0.25 ft/ft

Rock Fragments: 0.00 ft<sup>2</sup>/ft<sup>2</sup>

Soil DB Value: 0.00 ft<sup>2</sup>/ft<sup>2</sup>



**Barriers**

N none

S none

E none

W none

[Edit Selected Barrier](#)

**Notes**

15/ 3/ 1 Corn, grain  
0.9178

1/ 5/ 2 Cotton, southern upland  
0.7174

[Edit](#) [Clear](#)

**Man** 2 test corn112, cotton 750 cal no tillage, bale corn res\_calib\_calib\_calib\_calib.man

**Soil** Brantley\_BsF\_70\_SL

AL BENCHMARK CROP SYSTEM MANAGEMENT ROTATION INPUT  
 CORN (112 BU/AC), BALE RESIDUE AND COTTON (750 LB/AC) ROTATION

VERY SIMPLE, SOMEWHAT INCOMPLETE ROTATION MANAGEMENT PROVIDED

BE AS COMPLETE AND REPRESENTATIVE AS POSSIBLE FOR THE CROP SYSTEM

MCREW(Management Crop Rotation Editor for WEPS)

File Edit View Tools Help

Years in Rotation: 2

Rotation : C:\Users\Joel.Poore\Documents\My WEPS Files\Project.wpj\2 test corn112, cotton 750 cal no tillage, bale corn res\_calib\_c

Date	Operation Name	Crop or Residue	Row/Ridge Dir. (Deg.)
Feb 21, 01	Sprayer, kill crop		
Mar 15, 01	Planter, double disk opnr	Corn, grain	0
Oct 01, 01	Harvest, killing crop 50pct standing stubble		
Oct 02, 01	Shred residue, 6 inch stubble		0
Oct 03, 01	Rake or windrower		
Oct 04, 01	Bale straw or residue		
Apr 10, 02	Sprayer, kill crop		
May 01, 02	Planter, double disk opnr	Cotton, souther...	0
Nov 15, 02	Harvest, cotton and shred		

# AL BENCHMARK CROP SYSTEM, WITH AND WITHOUT 20 YR DECIDUOUS TREE BORDERS N, S, E, W

## BENCHMARK SIMULATED WIND EROSION ESTIMATES: RUN SUMMARY REPORT

Barrier effect reduced simulated gross wind erosion:  
21.4 ton/ac to 12.7 ton/ac: same management  
(Net Boundary loss 7.1 ton/ac)

User input in WEPS user interface

**Barriers**

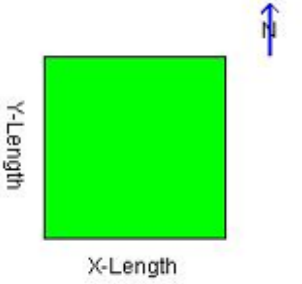
N Trees 3r decd 20yr leafon ▼

S Trees 3r decd 20yr leafon ▼

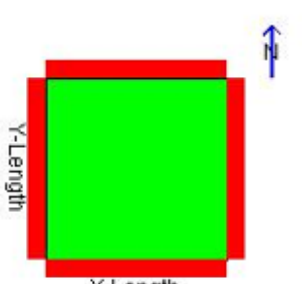
E Trees 3r decd 20yr leafon ▼

W Trees 3r decd 20yr leafon ▼

Edit Selected Barrier

Location Site Information		
	<b>X-Length:</b> 1746.1 ft	<b>Mode:</b> NRCS
	<b>Y-Length:</b> 1746.1 ft	<b>Soil Loss Tolerance (T):</b> 5.0 t/ac/yr
	<b>Area:</b> 70.0 ac	<b>Site:</b> UNITED STATES ALABAMA LOWNDES
	<b>Elevation:</b> 196.9 ft	<b>Location:</b> 32.15479° N, 86.65007° W
	<b>Orientation:</b> 0.0 °	<b>Cligen:</b> MONTGOMERY WB AP
		<b>Windgen:</b> Interpolated (32.15479° N, 86.65007° W)

Erosion						
Period	Crop/Residue	Gross Loss t/ac	Net Soil Loss From Field ( t/ac )			
			Total	Creep/Salt.	Suspen.	PM10
Rot. year: 1	Corn, grain	4.6	4.6	1.7	3.0	0.08
Rot. year: 2	Cotton, southern upland	38.2	38.2	13.1	25.2	0.66
Ave. Annual		21.4	21.4	7.4	14.1	0.37

Location Site Information		
	<b>X-Length:</b> 1746.1 ft	<b>Mode:</b> NRCS
	<b>Y-Length:</b> 1746.1 ft	<b>Soil Loss Tolerance (T):</b> 5.0 t/ac/yr
	<b>Area:</b> 70.0 ac	<b>Site:</b> UNITED STATES ALABAMA LOWNDES
	<b>Elevation:</b> 196.9 ft	<b>Location:</b> 32.15479° N, 86.65007° W
	<b>Orientation:</b> 0.0 °	<b>Cligen:</b> MONTGOMERY WB AP
		<b>Windgen:</b> Interpolated (32.15479° N, 86.65007° W)

Erosion						
Period	Crop/Residue	Gross Loss t/ac	Net Soil Loss From Field ( t/ac )			
			Total	Creep/Salt.	Suspen.	PM10
Rot. year: 1	Corn, grain	2.7	1.5	0.1	1.5	0.04
Rot. year: 2	Cotton, southern upland	22.6	12.7	0.3	12.4	0.34
Ave. Annual		12.7	7.1	0.2	6.9	0.19

SIMULATION REPORT: STIR SCI ENERGY REPORT AND RUN SUMMARY REPORT

**Stir Energy**



AL example Lowndes Co, Brantley SL, barriers corn cotton benchmark

**Run Date:** Wednesday, July 27, 2016, 10:58 AM  
**Client Name:** AL corn bale res cotton  
**Farm No:** --- **Tract No:** --- **Field No:** Bench  
**Run Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs  
**Management:** 1A SE AL benchmark example\_calib.man  
**Soil:** Brantley\_BsF\_70\_SL.ifc

**SCI Summary**

<b>Soil Conditioning Index:</b>	-0.4	<b>SCI Subfactors</b>
<b>Energy Calculator:</b>	3.2 gal diesel/ac	<b>OM:</b> -0.62
<b>Average Annual STIR:</b>	3.4	<b>FO:</b> 0.97
<b>Wind Erosion Soil Loss:</b>	7.1 t/ac	<b>ER:</b> -2.59
<b>Water Erosion Soil</b>	2.0 t/ac	

**Crop Interval Erosion**

Date Range	Days	Crop	Gross Loss t/ac	Net Soil Loss From Field ( t/ac )		
				Total Creep/Salt.	Suspen.	PM10
Nov 15, 02 - Oct 01, 01	320	Corn, grain	0.0	0.0	0.0	0.00
Oct 01, 01 - Nov 15, 02	410	Cotton, southern upland	25.3	14.2	0.4	13.9 0.38

**Harvests**

Date	Crop	Residue lb/ac	Harvest Yield	Yield % Moisture
Oct 01, 01	Corn, grain	6,077	108.2 bu/ac	15.5
Nov 15, 02	Cotton, southern upland	3,510	783.0 lb/ac lint	7.5

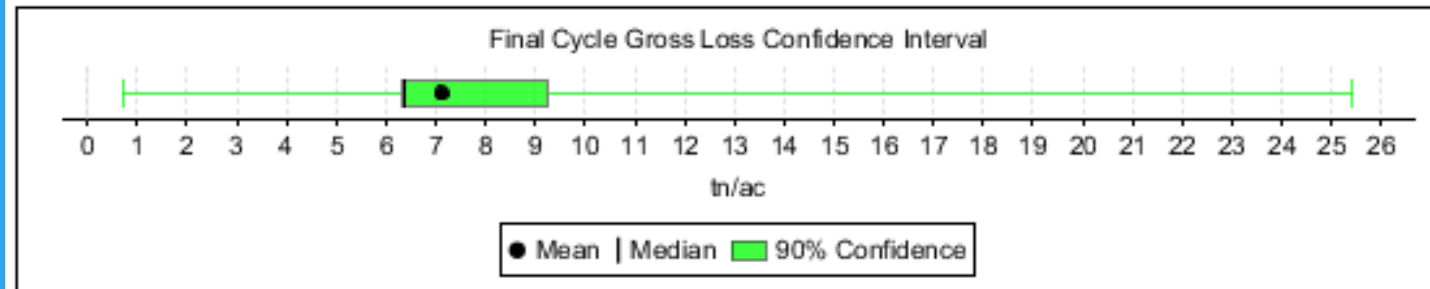
# AL BENCHMARK CROP SYSTEM, WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W SIMULATION REPORT: CONFIDENCE INTERVAL: N=50, EROSION ESTIMATES

## Confidence Interval



AL example Lowndes Co, Brantley SL, barriers corn cotton benchmark

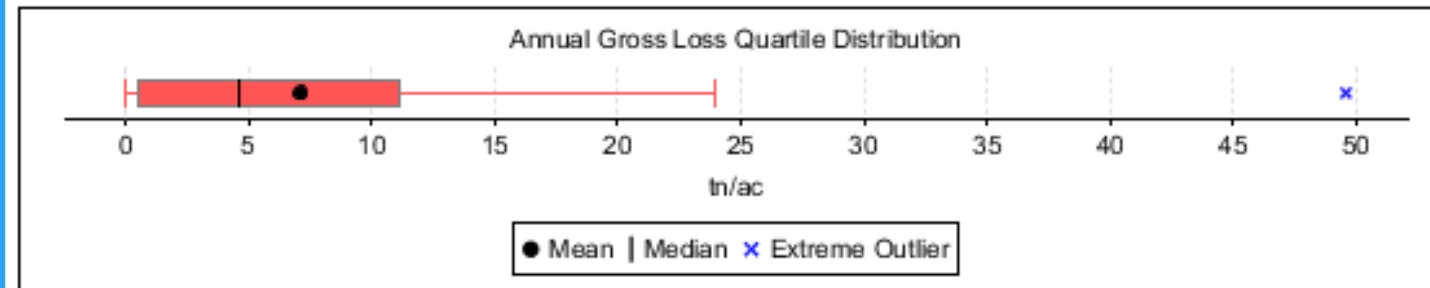
**Run Date:** Wednesday, July 27, 2016, 10:58 AM  
**Client Name:** AL corn bale res cotton  
**Farm No:** --- **Tract No:** --- **Field No:** Bench  
**Run Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs  
**Management:** 1A SE AL benchmark example\_calib.man  
**Soil:** Brantley\_BsF\_70\_SL.ifc



## Confidence Interval



AL example Lowndes Co, Brantley SL, barriers corn cotton benchmark



AL BENCHMARK CROP SYSTEM, WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W

SIMULATION REPORT: **CROP SUMMARY: PLANTING TO HARVEST PERIOD**

N=50, NIRR, "CROP PERIODS":

REDUCING YIELD VARIABILITY CAN BE A MAJOR EFFECT OF ALTERNATIVE CROP SYSTEMS.

Benchmark Simulated Yield CV%: Corn: 18, Cotton: 15

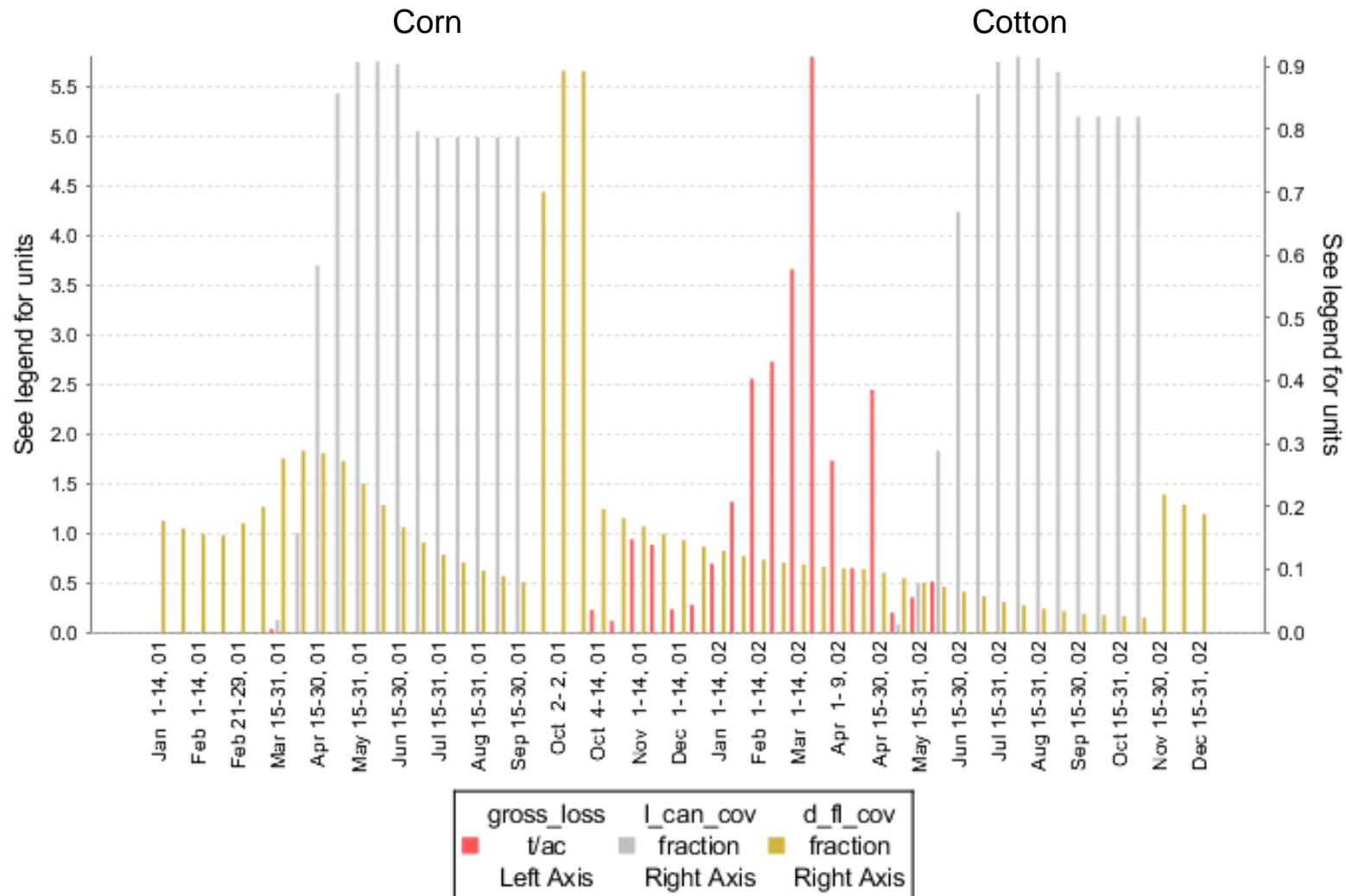
<b>Mar 15, 01 - Oct 01, 01 200d Corn, grain</b>									
	<b>Dry Yield</b> lb/ac	<b>Harvest Residue</b> lb/ac	<b>Rain</b> in	<b>Irrig</b> in	<b>Initial SWC</b> in	<b>Final SWC</b> in	<b>SWC Change</b> in	<b>Crop Transp</b> in	<b>Yield</b> @ 15.5% bu/ac
<b>Mean:</b>	5,119	6,077	28.8	0.0	22.8	21.7	-1.1	12.0	108
<b>Std. Dev:</b>	920	1,001	7.1	0.0	1.4	1.6	2.2	1.9	19
<b>Min:</b>	3,026	3,800	12.5	0.0	20.4	17.6	-5.9	7.2	64
<b>Max:</b>	7,150	8,287	46.8	0.0	25.8	25.3	2.4	15.8	151
<b>May 01, 02 - Nov 15, 02 198d Cotton, southern upland</b>									
	<b>Dry Yield</b> lb/ac	<b>Harvest Residue</b> lb/ac	<b>Rain</b> in	<b>Irrig</b> in	<b>Initial SWC</b> in	<b>Final SWC</b> in	<b>SWC Change</b> in	<b>Crop Transp</b> in	<b>Yield</b> @ 7.5% lb/ac lint
<b>Mean:</b>	1,881	3,510	23.7	0.0	21.7	19.8	-1.9	12.5	783
<b>Std. Dev:</b>	279	487	4.8	0.0	1.1	1.9	2.3	2.0	116
<b>Min:</b>	1,277	2,455	13.8	0.0	20.1	16.4	-6.7	8.3	532
<b>Max:</b>	2,432	4,473	32.0	0.0	25.6	24.5	4.2	16.9	1,012

AL BENCHMARK CROP SYSTEM, WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W  
 DETAILED REPORTS: PLOT FUNCTION: TEMPORAL VARIABILITY: TARGETED TREATMENTS?

**Quick Plot**



AL example Lowndes Co, Brantley SL, barriers corn cotton benchmark



# AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W

**DETAILED REPORTS:** CONSIDER ROW ORIENTATION AND FIELD WIND BARRIER DIRECTION

PREDOMINANT EROSIIVE WIND EROSION DIRECTION: USE THE SIMULATION RESULTS.

WHAT IS THE CRITICAL WIND DIRECTION(S) FOR THIS CROP SYSTEM?

\*\* TONS/1000 FT OF BOUNDARY

Select Report: Boundary Loss (summary)

barriers corn cotton benchmark		Mass of Soil Passing Indicated Field Boundary											
Client: AL corn bale res cotton		per Unit Length of Field Border											
Fm: Tr: Fld: Bench		Creep+Saltation				Suspension				PM10			
Management: 1A SE AL benchmark example_calib		↓	←	↑	→	↓	←	↑	→	↓	←	↑	→
Soil: Brantley_BsF_70_SL													
Date	Operation	tons/1000ft				tons/1000ft				tons/1000ft			
Rot. yr: 1		0.0	0.0	1.6	0.5	5.3	1.9	33.1	17.9	0.1	0.1	0.9	0.5
Rot. yr: 2		1.3	1.0	5.7	4.2	77.9	34.5	213.1	172.3	2.1	0.9	5.8	4.7
Ave. Annual		0.7	0.5	3.7	2.4	41.6	18.2	123.1	95.1	1.1	0.5	3.3	2.6

# AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W

## DETAILED REPORTS: WITHIN FIELD EROSION SUMMARY PLANNING ALTERNATIVE SYSTEMS WITHIN FIELD WIND BARRIERS SYSTEMS: WIND BARRIERS APPLIED, CROP STRIP WIDTH BETWEEN, SHELTERED REGIONS

Select Report : Within-Filed Erosion (summary)

benchmark			Within Field									
Client: AL corn bale res cotton			Wind Erosion Activity									
Fm: Tr: Fld: Bench			Saltating Emission Region			Deposition Region			High Flux Region		Sheltered Region	
Management: 1A SE AL benchmark example_calib			Soil Loss	Field Area		Soil Deposition	Field Area		Field Area		Field Area	
Soil: Brantley_BsF_70_SL				t/ac	acres		fraction	t/ac	acres	fraction	acres	fraction
Date	Operation	Crop	t/ac	acres	fraction	t/ac	acres	fraction	acres	fraction	acres	fraction
Rot. yr: 1			3.5	37	0.53	25.7	5	0.07	4	0.06	23	0.34
Rot. yr: 2			20.4	35	0.50	136.0	5	0.07	7	0.10	23	0.32
Ave. Annual			11.3	35	0.51	76.7	5	0.07	7	0.10	23	0.33

Each simulation Region: 30 X 30 calculation regions: Whole field simulation: 70 acre field  
 With field shape, size and orientation known, this is useful for designing effective wind barrier systems

# AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W

DETAILED REPORTS: PLANT PRODUCTIVITY AND VIGOR CONCERN? - NO  
 SALTATION DURING CROP ESTABLISHMENT: TIMING OF PLANT DAMAGE RISK  
 FOR AL EXAMPLE: DOES NOT TO BE A PRIMARY CONCERN FOR COTTON

Select Report :

Field Loss (details) ▼

benchmark			Wind Erosion				
Client: AL corn bale res cotton			Average Total Gross Soil Loss	Net Soil Loss from Field			
Fm: Tr: Fld: Bench				Average Total	Average Creep and Saltation	Average Suspension	Average PM10
Management: 1A SE AL benchmark example_calib			t/ac				
Soil: Brantley_BsF_70_SL				t/ac	t/ac	t/ac	t/ac
Date	Operation	Crop	t/ac				
Feb 15-29, 02			2.7	1.5	Trace	1.50	0.041
Mar 1-14, 02			3.7	2.0	Trace	1.96	0.054
Mar 15-31, 02			5.8	3.3	0.11	3.19	0.087
Apr 1- 9, 02			1.7	1.0	Trace	0.98	0.027
Apr 10-14, 02	Sprayer, kill crop		0.6	0.4	Trace	0.36	Trace
Apr 15-30, 02			2.4	1.4	Trace	1.37	0.037
May 1-14, 02	Planter, double disk opnr	Cotton, southern up	0.2	0.1	0.00	0.12	Trace
May 15-31, 02			0.4	0.2	Trace	0.22	Trace
Jun 1-14, 02			0.5	0.3	Trace	0.31	Trace

AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W  
 DETAILED REPORTS: HYDROLOGY AVERAGE ANNUAL SUMMARY:

Select Report : Crop/Soil Water Information (summary)

benchmark			Crop/Soil Water Information						
Client: AL corn bale res cotton			Precip.	Irrigation	Runoff	Drainage	Soil Water	Soil Surface Evap.	Plant Transp.
Fm: Tr: Fld: Bench									
Management: 1A SE AL benchmark example_calib									
Soil: Brantley_BsF_70_SL									
Date	Operation	Crop	in	in	in	in	in	in	in
Rot. yr: 1			50.9	0.0	7.8	19.0	N/A	12.2	12.0
Rot. yr: 2			50.4	0.0	7.5	16.0	N/A	14.2	12.5
Ave. Annual			50.6	0.0	7.7	17.5	N/A	13.2	12.3

Average Annual efficiency and inefficiency for the crop system

**WUE:** 12.3 in transpiration / 50.6 in Precip. = 24.1%

**LOSSES:** 38.4 in runoff, drainage, evaporation losses / 50.6 in Precip. = 75.9%

Compare Benchmark and Alternative relative results?

Initial and ending SWC is tracked and can be considered as well (water storage efficiency concept)

# AL BENCHMARK CROP SYSTEM, WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W

## CROP INTERVAL SUMMARY

<b>Nov 15, 02 - Oct 01, 01 320 Days Corn, grain</b>														
	<b>Biomass</b>	<b>Rain</b>	<b>Irrig</b>	<b>Runoff</b>	<b>Drain</b>	<b>Evap</b>	<b>Crop Transp</b>	<b>Initial SWC</b>	<b>Final SWC</b>	<b>SWC Change</b>	<b>Runoff Loss</b>	<b>Drainage Loss</b>	<b>Evap Loss</b>	<b>Water use Eff.</b>
	lb/ac	in	in	in	in	in	in	in	in	in	%	%	%	%
<b>Mean:</b>	4,797	47.4	0.0	6.6	16.3	10.4	12.0	19.7	21.7	2.1	14.1	35.5	23.4	27.0
<b>Std. Dev:</b>	771	8.1	0.0	2.7	4.7	1.0	1.9	2.0	1.6	2.5	4.3	6.0	3.4	5.1
<b>Min:</b>	3,042	25.2	0.0	1.2	5.9	7.4	7.2	16.4	17.6	-4.3	3.6	20.1	17.4	17.4
<b>Max:</b>	6,504	65.4	0.0	13.0	25.8	12.5	15.8	24.5	25.3	7.3	22.6	45.9	34.1	39.2

<b>Oct 01, 01 - Nov 15, 02 410 Days Cotton, southern upland</b>														
	<b>Biomass</b>	<b>Rain</b>	<b>Irrig</b>	<b>Runoff</b>	<b>Drain</b>	<b>Evap</b>	<b>Crop Transp</b>	<b>Initial SWC</b>	<b>Final SWC</b>	<b>SWC Change</b>	<b>Runoff Loss</b>	<b>Drainage Loss</b>	<b>Evap Loss</b>	<b>Water use Eff.</b>
	lb/ac	in	in	in	in	in	in	in	in	in	%	%	%	%
<b>Mean:</b>	3,040	53.7	0.0	8.7	18.4	16.0	12.5	21.7	19.8	-2.0	15.4	32.8	29.0	22.8
<b>Std. Dev:</b>	417	8.6	0.0	2.9	4.3	1.5	2.0	1.6	1.9	2.3	3.6	4.4	3.1	4.4
<b>Min:</b>	2,132	31.5	0.0	2.9	9.2	12.3	8.3	17.6	16.4	-7.5	6.9	21.3	22.9	14.5
<b>Max:</b>	3,863	69.0	0.0	15.7	27.9	20.9	16.9	25.3	24.5	3.1	23.9	40.9	39.7	36.5

Potential help with water quality and quantity concerns?  
 Alternative systems: reduce runoff, drainage, and or evaporation?  
 Practices that might do that?

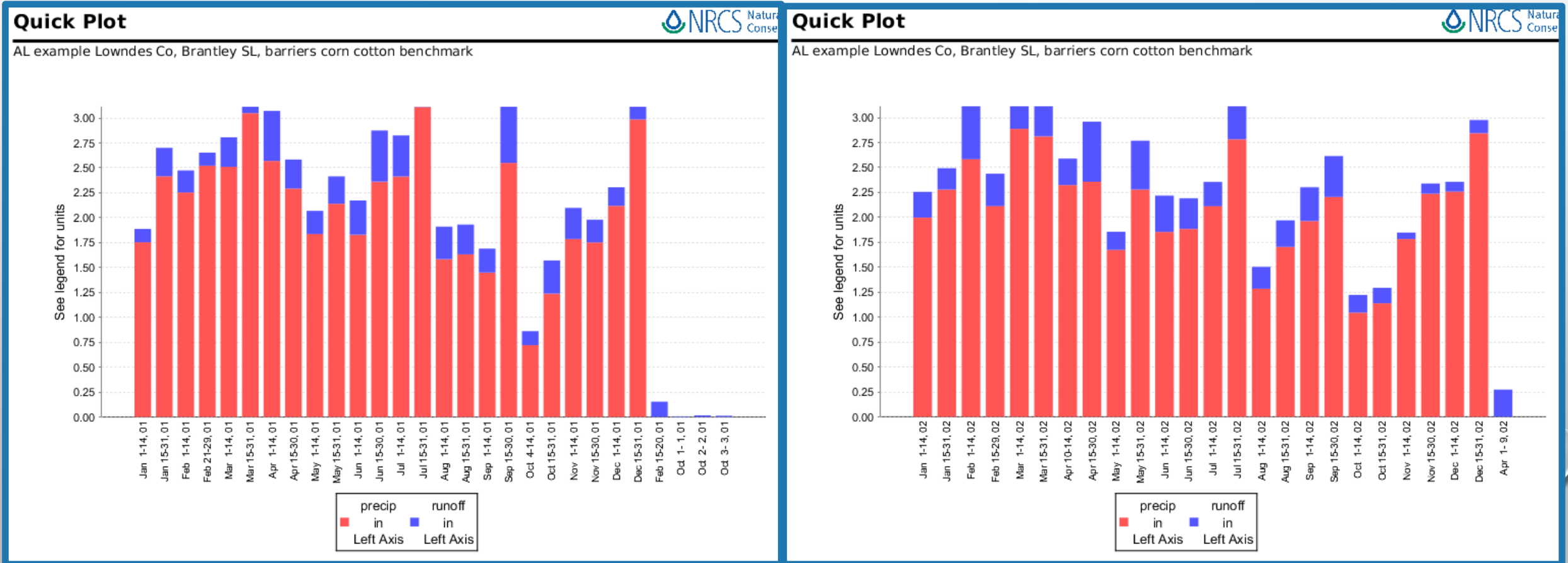
Crop Intervals  
 Water use Efficiency: Corn, 27%; Cotton, 23%  
 Water use Inefficiency: Corn, 73%; Cotton, 77%

# AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W SIMULATION REPORT: DETAILED REPORTS TEMPORAL VARIABILITY AND PATTERNS, HELP TARGET APPROPRIATE PRACTICES AND WHEN?

## STACKED PRECIPITATION AND RUNOFF

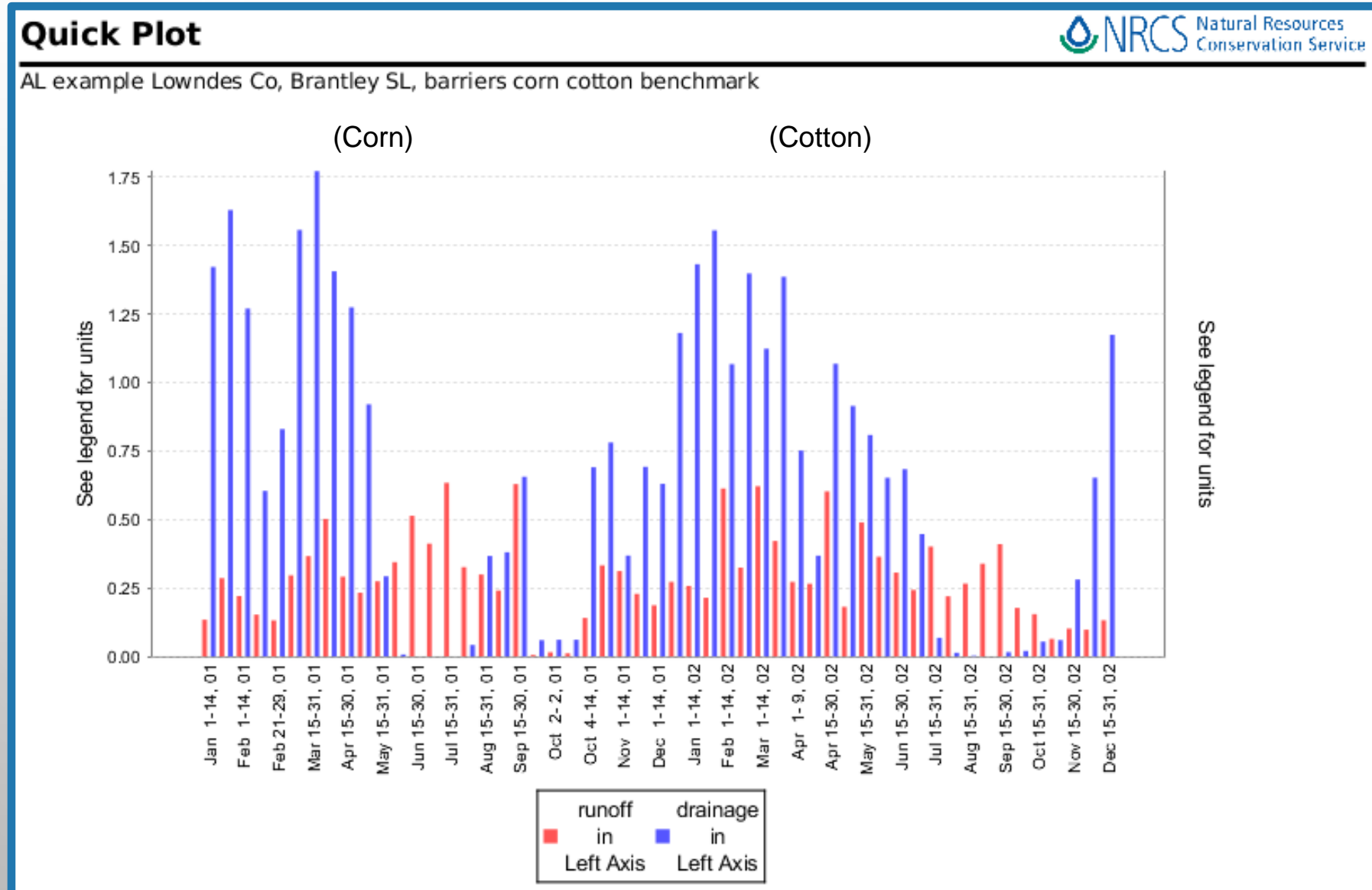
Year 1 (Corn)

Year 2 (Cotton)



# AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W DETAILED REPORTS: DESIGN ALTERNATIVE CROP SYSTEMS?

## TEMPORAL PATTERN RESOURCE CONCERNS: SIMULATED RUNOFF AND DRAINAGE ESTIMATES.



# AL BENCHMARK CROP SYSTEM WITH 20 YR DECIDUOUS TREE BORDERS N, S, E, W

Consistent reporting of WEPS simulation Results  
 Designed to improve Benchmark resource  
 assessment and alternative crop system design.

Make quantitative comparison  
 Benchmark Alternative crop systems

Resource assessment Benchmark  
 Evaluate alternatives: make decision

Simulation Results	units	Benchmark	Alternative
Wind Erosion total			
Saltation Creep			
Suspension			
PM10			
STIR (CI and ave)			
SCI			
Runoff			
Drainage			
Evaporation			
Water Storage efficiency			
Water use efficiency			
Water losses inefficiency			
Confidence Interval and Risk			
CV% (Yield and residue)			
Others			

EXAMPLE  
SNAP BEAN WINTER WHEAT  
RHODE ISLAND BENCHMARK

TILLAGE, 2 YR, FSL, NIRR  
PROV CO RI, TREE BARRIER – N

FIELD GEOMETRY:  
45 ACRE, SQUARE, NS ORIENTATION

**STIR ENERGY REPORT:**

DOCUMENT THE ROTATION  
MANAGEMENT FOR THE SIMULATION.

REPRESENT CLIENT INVENTORY  
INFORMATION

Date	Operation	Fuel	Stir	Energy Btu/ac	Cost USD/ac
Apr 01, 01	Plow, moldboard	Diesel	65.0	235,579	6.73
Apr 15, 01	Disk, tandem secondary op	Diesel	32.5	60,466	1.73
Apr 30, 01	Fert applic. surface broadcast	Diesel	0.1	20,205	0.58
Apr 30, 01	Disk, tandem light finishing	Diesel	19.5	50,439	1.44
Apr 30, 01	Planter, double disk opnr	Diesel	2.4	55,378	1.58
May 01, 01	Sprayer, pre-emergence	Diesel	0.1	16,314	0.47
May 15, 01	Sprayer, insecticide post emergence	Diesel	0.1	16,314	0.47
Jun 05, 01	Sprayer, fungicide	Diesel	0.1	16,314	0.47
Jul 05, 01	Harvest, killing crop 50pct standing stubble	Diesel	0.1	192,774	5.51
Sep 01, 01	Disk, tandem heavy primary op	Diesel	39.0	94,441	2.70
Sep 02, 01	Fert applic. surface broadcast	Diesel	0.1	20,205	0.58
Sep 05, 01	Cultivator, field 6-12 in sweeps, coil tine har	Diesel	28.4	120,933	3.46
Sep 10, 01	Cultipacker, roller	Diesel	35.6	78,127	2.23
Sep 15, 01	Drill or airseeder, double disk opener, fert openers	Diesel	13.8	54,180	1.55
Oct 16, 01	Sprayer, post emergence and fert. tank mix	Diesel	0.1	16,314	0.47
May 15, 02	Sprayer, post emergence	Diesel	0.1	16,314	0.47
Jun 01, 02	Sprayer, fungicide	Diesel	0.1	16,314	0.47
Jul 20, 02	Harvest, killing crop 50pct standing stubble	Diesel	0.1	192,774	5.51
Aug 20, 02	Sprayer, post emergence	Diesel	0.1	16,314	0.47
Sep 17, 02	Disk, tandem light finishing	Diesel	19.5	50,439	1.44
Oct 29, 02	Chisel, st. pt. 12 in deep	Diesel	62.4	138,594	3.96
			<b>Total / ac</b>	1,478,733	42.26
			<b>Total</b>	319.7	66,529,941
					1,901.42

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE.

## RUN SUMMARY, BASIC WIND EROSION RESULTS, TOTAL NET AND GROSS LOSS

<b>Erosion</b>						
Period	Crop/Residue	Gross Loss t/ac	Net Soil Loss From Field ( t/ac )			
			Total Creep/Salt.	Suspen.	PM10	
Rot. year: 1	Bean, green snap mech harv	18.3	17.2	4.6	12.6	0.51
Rot. year: 2	Wheat, winter	0.2	0.2	Trace	0.1	Trace
Ave. Annual		9.3	8.7	2.3	6.4	0.26

<b>Crop Interval Erosion</b>							
Date Range	Days	Crop	Gross Loss t/ac	Net Soil Loss From Field ( t/ac )			
				Total Creep/Salt.	Suspen.	PM10	
Jul 20, 02 - Jul 05, 01	350	Bean, green snap mech harv	11.1	10.5	2.9	7.6	0.31
Jul 05, 01 - Jul 20, 02	380	Wheat, winter	7.4	6.9	1.8	5.1	0.21

<b>Harvests</b>				
Date	Crop	Residue lb/ac	Harvest Yield	Yield % Moisture
Jul 05, 01	Bean, green snap mech harv	2,382	7932.8 lb/ac	90.0
Jul 20, 02	Wheat, winter	3,996	39.0 bu/ac	10.9

<b>Barriers</b>				
Location	Type	Height ft	Width ft	Porosity %
North	<mod> Trees 2r decd 20yr leafon	25.0	40.0	48.0

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE DETAILED REPORTS: BOUNDARY LOSS SUMMARY

## CRITICAL WIND ENERGY DIRECTION FROM SIMULATED EROSION RESULTS

Tabular Detail Report - RI benchmark snap bean WW till, charlton fsl Prov co, North barrier 2 yr correct.wjr

Select Report: **Boundary Loss (summary)**

Prov co, North barrier 2 yr correct		Mass of Soil Passing Indicated Field Boundary											
Client: Rhode Island		per Unit Length of Field Border											
Fm: Tr: Fld: Bench		Creep+Saltation				Suspension				PM10			
winter wheat40 till bench 2yr correct_calib													
Soil: Charlton_CdA_30_FSL													
Date	Operation	tons/1000ft				tons/1000ft				tons/1000ft			
Rot. yr: 1		73.5	17.1	0.1	57.5	145.9	38.2	84.3	136.9	5.9	1.6	3.5	5.5
Rot. yr: 2		0.4	0.0	0.0	1.1	0.9	0.0	0.5	3.0	0.0	0.0	0.0	0.1
Ave. Annual		37.0	8.5	0.1	29.3	73.4	19.1	42.4	70.0	3.0	0.8	1.8	2.8

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE. WITHIN FIELD EROSION SUMMARY REPORT: SPATIAL VARIABILITY

FIELD GEOMETRY: 45 ACRE, SQUARE, NS ORIENTATION

FIELD AREAS: SALTATION EMISSION, DEPOSITION, HIGH FLUX, SHELTERED AREA  
USEFUL REPORT FOR DESIGNING WIND BARRIER SYSTEMS

Tabular Detail Report - RI benchmark snap bean WW till, charlton fsl Prov co, North barrier 2 yr correct.wjr

Select Report : **Within-Filed Erosion (summary)**

barrier 2 yr correct			Within Field									
Client: Rhode Island			Wind Erosion Activity									
Fm: Tr: Fld: Bench			Saltating Emission Region			Deposition Region			High Flux Region		Sheltered Region	
2yr correct_calib			Soil Loss t/ac	Field Area		Soil Deposition t/ac	Field Area		Field Area		Field Area	
Soil: Charlton_CdA_30_FSL				acres	fraction		acres	fraction	acres	fraction	acres	fraction
Date	Operation	Crop	t/ac	acres	fraction	t/ac	acres	fraction	acres	fraction	acres	fraction
Rot. yr: 1			8.9	31	0.68	41.9	1	0.03	7	0.16	6	0.13
Rot. yr: 2			1.9	32	0.70	8.6	1	0.02	9	0.21	3	0.07
Ave. Annual			4.5	31	0.68	21.1	1	0.03	7	0.16	6	0.13

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE RUN SUMMARY, BASIC ENERGY AND SOIL CONDITIONING INDEX IDEAS FOR AN ALTERNATIVE MANAGEMENT

## Run Summary



RI benchmark snap bean WW till, charlton fsl Prov co, North  
 barrier 2 yr correct

### SCI Summary

<b>Soil Conditioning Index:</b>	-1.1	<b>SCI Subfactors</b>	
<b>Energy Calculator:</b>	5.9 gal diesel/ac	<b>OM:</b>	-0.44
<b>Average Annual STIR:</b>	159.8	<b>FO:</b>	-0.58
<b>Wind Erosion Soil Loss:</b>	8.7 t/ac	<b>ER:</b>	-3.61
<b>Water Erosion Soil</b>	3.0 t/ac		

### Crop Interval Stir Energy

Date Range	Days	Crop	Stir	Energy Btu/ac	Cost USD/ac
Jul 20, 02 - Jul 05, 01	350	Bean, green snap mech harv	202.2	869,130	24.84
Jul 05, 01 - Jul 20, 02	380	Wheat, winter	117.5	609,603	17.42

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE DETAILED REPORT, HYDROLOGY SUMMARY

CAN AN ALTERNATIVE MANAGEMENT SYSTEM BE DEVELOPED TO  
REDUCE DRAINAGE OR RUNOFF LOSSES?

Tabular Detail Report - RI benchmark snap bean WW till, charlton fsl Prov co, North barrier 2 yr correct.wjr

Select Report: Crop/Soil Water Information (summary)

barrier 2 yr correct			Crop/Soil Water Information						
Client: Rhode Island			Precip.	Irrigation	Runoff	Drainage	Soil Water	Soil Surface Evap.	Plant Transp.
Fm: Tr: Fld: Bench									
2yr correct_calib									
Soil: Charlton_CdA_30_FSL									
Date	Operation	Crop	in	in	in	in	in	in	in
Rot. yr: 1			46.6	0.0	5.3	24.0	N/A	11.2	6.5
Rot. yr: 2			47.2	0.0	5.5	24.0	N/A	6.7	10.5
Ave. Annual			46.9	0.0	5.4	24.0	N/A	8.9	8.5

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE CROP INTERVAL SUMMARY, HYDROLOGY

SNAP BEAN CROP INTERVAL APPEARS TO HAVE A VERY LOW WATER USE EFFICIENCY

## Crop Interval Summary



RI benchmark snap bean WW till, charlton fsl Prov co, North barrier 2 yr correct

**Run Date:** Monday, July 11, 2016, 02:49 PM  
**Client Name:** Rhode Islnd  
**Fam No:** --- **Tract No:** --- **Field No:** Bench  
**Run Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs  
**Management:** Snap beans8100early, sp, z65 winter wheat40 till bench 2yr correct\_calib.man  
**Soil:** Charlton\_CdA\_30\_FSL.ifc

### Jul 20, 02 - Jul 05, 01 350 Days Bean, green snap mech harv

	Biomass lb/ac	Rain in	Irrig in	Runoff in	Drain in	Evap in	Crop Transp in	Initial SWC in	Final SWC in	SWC Change in	Runoff Loss %	Drainage Loss %	Evap Loss %	Water use Eff. %
<b>Mean:</b>	2,382	44.9	0.0	4.8	27.4	9.0	5.3	17.4	15.8	-1.7	10.1	58.2	19.9	11.8
<b>Std. Dev:</b>	405	7.9	0.0	2.9	6.7	1.2	1.3	1.4	0.5	1.5	5.6	6.7	3.8	3.4
<b>Min:</b>	1,374	27.0	0.0	0.6	14.2	6.3	2.5	14.3	14.7	-5.0	1.5	44.5	11.6	4.7
<b>Max:</b>	3,310	60.4	0.0	13.9	41.5	12.5	7.8	20.4	16.9	1.3	27.1	72.0	26.9	20.1

### Jul 05, 01 - Jul 20, 02 380 Days Wheat, winter

	Biomass lb/ac	Rain in	Irrig in	Runoff in	Drain in	Evap in	Crop Transp in	Initial SWC in	Final SWC in	SWC Change in	Runoff Loss %	Drainage Loss %	Evap Loss %	Water use Eff. %
<b>Mean:</b>	3,474	48.7	0.0	6.0	20.5	8.9	11.7	15.8	17.4	1.6	12.1	42.9	19.3	25.6
<b>Std. Dev:</b>	623	8.7	0.0	4.1	6.0	1.2	2.7	0.5	1.4	1.4	6.7	7.5	4.0	7.7
<b>Min:</b>	2,293	29.6	0.0	0.2	5.1	5.6	6.7	14.7	14.3	-1.4	0.5	17.2	10.9	12.9
<b>Max:</b>	4,764	67.4	0.0	19.6	32.5	11.2	17.1	16.9	20.4	4.8	31.5	57.1	29.5	53.0

# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE

## CROP SUMMARY REPORT: (CLIMATE VARIABILITY AND YIELD VARIABILITY)

Crop Summary : RI benchmark snap bean WW till, charlton fsl Prov co, North barrier 2 yr correct.wjr

barrier 2 yr correct

**Run Date:** Monday, July 11, 2016, 02:49 PM  
**Client Name:** Rhode Island  
**Farm No:** --- **Tract No:** --- **Field No:** Bench  
**Run Location:** C:\Users\Joel.Poore\Documents\My WEPS Files\Runs  
**Management:** Snap beans8100early, sp, z65 winter wheat40 till bench 2yr correct\_calib.man  
**Soil:** Charlton\_CdA\_30\_FSLifc

**Apr 30, 01 - Jul 05, 01 66d Bean, green snap mech harv**

	Dry Yield lb/ac	Harvest Residue lb/ac	Rain in	Irrig in	Initial SWC in	Final SWC in	SWC Change in	Crop Transp in	Yield @ 90.0% lb/ac
<b>Mean:</b>	793	2,382	7.5	0.0	18.6	15.8	-2.9	5.3	7,933
<b>Std. Dev:</b>	148	405	3.1	0.0	1.2	0.5	1.2	1.3	1,481
<b>Min:</b>	422	1,366	2.6	0.0	16.8	14.7	-6.0	2.5	4,222
<b>Max:</b>	1,131	3,311	14.7	0.0	22.2	16.9	-0.3	7.8	11,325

**Sep 15, 01 - Jul 20, 02 308d Wheat, winter**

	Dry Yield lb/ac	Harvest Residue lb/ac	Rain in	Irrig in	Initial SWC in	Final SWC in	SWC Change in	Crop Transp in	Yield @ 10.9% bu/ac
<b>Mean:</b>	2,086	3,996	39.6	0.0	18.4	17.4	-1.0	11.7	39
<b>Std. Dev:</b>	467	740	7.7	0.0	1.7	1.4	2.0	2.7	9
<b>Min:</b>	1,200	2,593	23.6	0.0	16.8	14.3	-6.8	6.7	22
<b>Max:</b>	3,053	5,529	60.3	0.0	24.7	20.4	2.4	17.1	57

Yield CV%,  
Snap Beans: 19

Winter Wheat: 23

Could an alternative system have a lower CV%?

Improve resiliency to changes in weather?

SNAP BEAN WINTER WHEAT  
RHODE ISLAND BENCHMARK EXAMPLE

2 CROP YEAR ROTATION

CONFIDENCE INTERVAL REPORT:  
EROSION RISK,

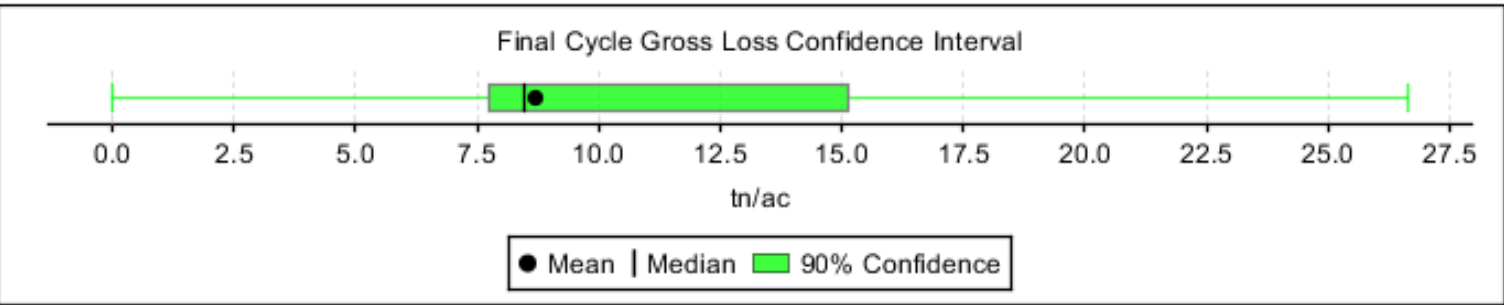
AVERAGE ANNUAL 90% CONFIDENCE

INDIVIDUAL CROP YEAR  
RISK OF EXTREME OUTLIERS

## Confidence Interval

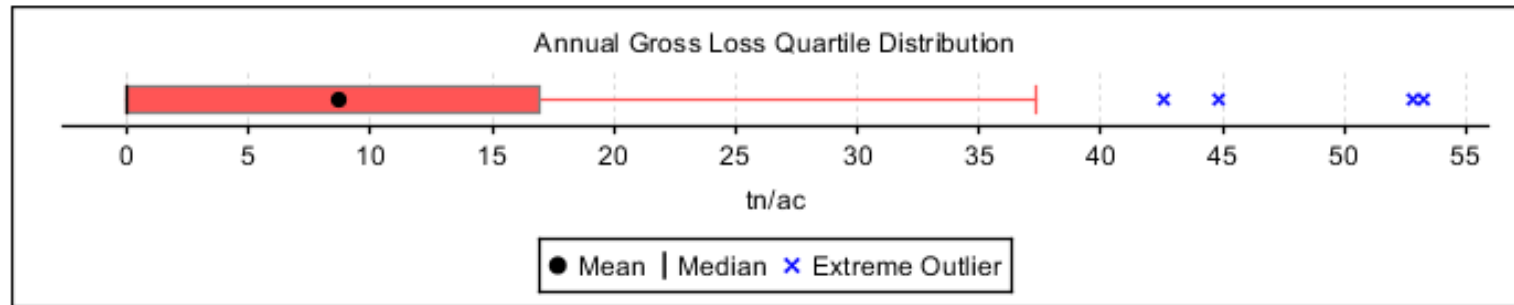
RI benchmark snap bean WW till, charlton fsl Prov co, North  
barrier 2 yr correct

<b>Run Date:</b>	Monday, July 11, 2016, 02:49 PM		
<b>Client Name:</b>	Rhode Islnd		
<b>Farm No:</b>	---	<b>Tract No:</b>	---
<b>Run Location:</b>	C:\Users\Joel.Poore\Documents\My WEPS Files\Runs		
<b>Management:</b>	Snap beans8100early, sp, z65 winter wheat40 till bench 2yr correct_calib.man		
<b>Soil:</b>	Charlton_CdA_30_FSLifc		



## Confidence Interval

RI benchmark snap bean WW till, charlton fsl Prov co, North  
barrier 2 yr correct

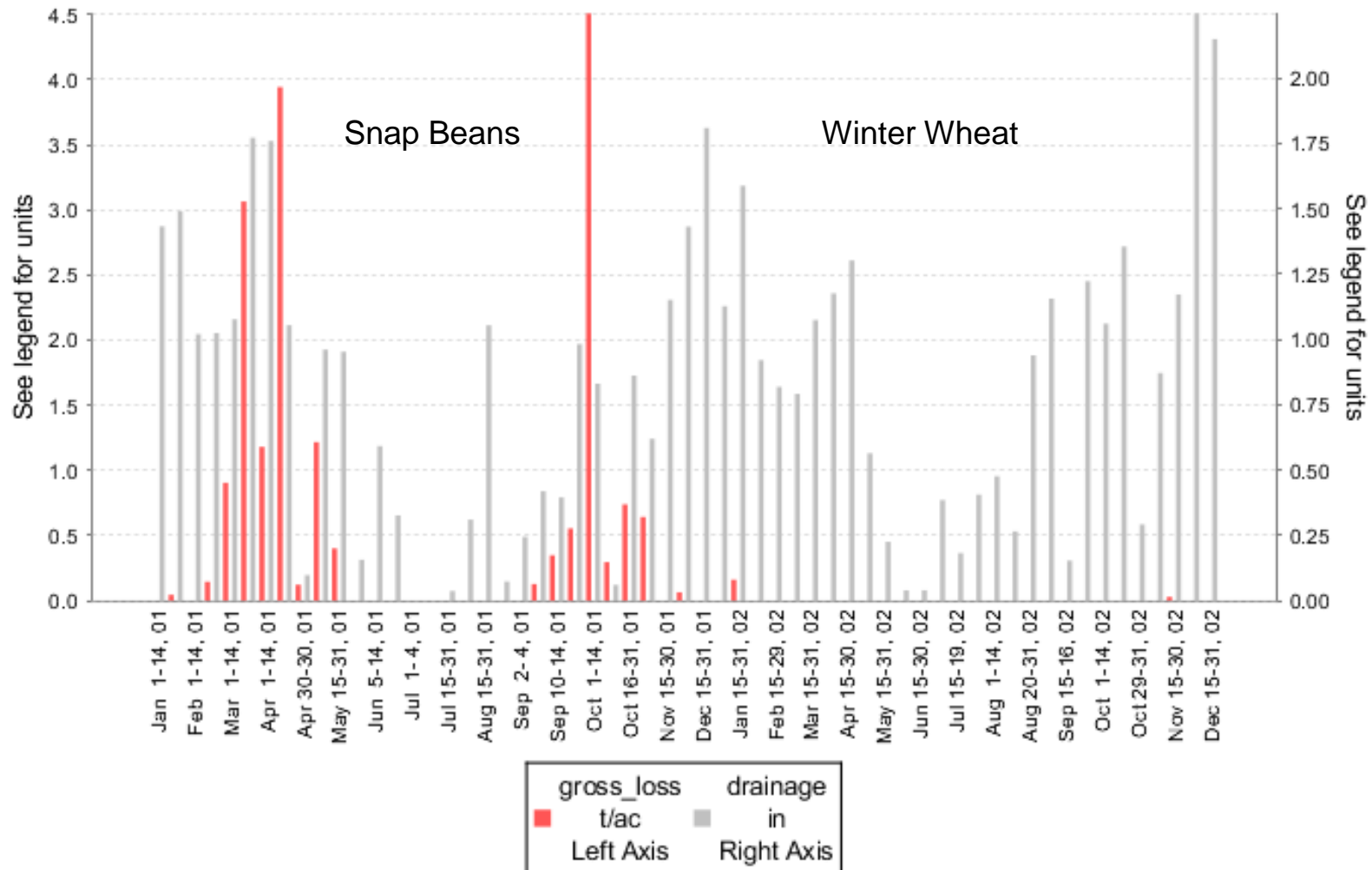


# SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE DETAILED REPORT: PLOTTING FUNCTIONS

## Quick Plot



RI benchmark snap bean WW till, charlton fsl Prov co, North barrier 2 yr correct



## SNAP BEAN WINTER WHEAT RHODE ISLAND BENCHMARK EXAMPLE

Consistent reporting, WEPS simulation Results  
Designed to improve Benchmark resource  
assessment and alternative crop system design

Develop and compare alternatives to  
benchmark crop system

Simulation Results	units	Benchmark	Alternative
Wind Erosion total			
Saltation Creep			
Suspension			
PM10			
STIR (CI and ave)			
SCI			
Runoff			
Drainage			
Evaporation			
Water Storage efficiency			
Water use efficiency			
Water losses inefficiency			
Confidence Interval and Risk			
CV% (Yield and residue)			
Others			

# SIMULATION EXAMPLES COMPARING BENCHMARK AND ALTERNATIVE CROP SYSTEMS

CONSISTENT WEPS REPORTING 1.3.9 AND 1.5.43 UPDATE  
WITH CLEAR OBJECTIVES AND SIMULATION DESIGN  
WEPS CAN BE USED EFFECTIVELY AND EFFICIENTLY AS A DECISION MAKING TOOL

Ave annual Wind Erosion tons/ac for rotation  
Ave annual Saltation Creep, Suspension, PM10  
Soil conditioning Index: Rotation  
Soil Tillage Intensity Rating STIR crop interval  
Rotation Fuel use estimate gal/ac  
Saltation Creep during crop emergence  
Predominant erosive Wind direction and timing  
90% confidence interval for Total Wind Erosion

Ave annual Runoff, drainage, evaporation estimate ac in  
SOC loss est: Suspension loss and SOC enrichment ratio  
Rotation period with highest erosion risk (30 days)  
Plot of canopy and Residue cover %  
Plot of canopy, Residue cover % and Total Wind Erosion  
Optimum crop system specific cover crop termination timing  
Potential Erosion Index development and applications  
Soil Organic Matter level relationships to Soil Productivity

Thank You: The example crop system scenarios were designed to demonstrate expanded simulation reports available with the Wind Erosion Prediction System WEPS: Process based daily time step model used by NRCS. I hope the information can be used for continued improvement in the quality of conservation plans that you and your clients develop.

Joel Poore