Pesticide Root Zone Model Field and Orchard Crop Metadata for OP Scenarios

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INTRODUCTION

A fundamental construct for using data in any number of electronic environments, whether they are databases, models, or the World Wide Web, is to have an understanding of the data or information that make up its essential parts. Metadata is literally the "data about data." Metadata is the information used by a variety of groups to design, create, describe, preserve, and use information resources and systems. The crucial, non pesticide specific elements of each Pesticide Root Zone Model (PRZM) field and orchard scenario is recorded as a means of preserving an authoritative and reproducible record of the design, construct, and source of each element of the scenario.

In general, the information assembled to created each scenario will have three basic features: content, context, and structure; all of which are reflected through metadata. The data content relates to what each scenario contains or is about and is intrinsic to the field or orchard being modeled. Content reflects the element by which the designer authenticates and completes the content of the field or orchard scenario. For example, content is the date of a crop's maturation, the organic content of a particular soil, or the rate at which snow melts in the location of the scenario. Contexts are those aspects associated with the scenario's creation, such as the how or from where the soil characteristics were selected, where the weather station is located, or what cropping practices were chosen and why. The structure relates to the associations within and among the individual parameters that make up the scenario. An example of the structure would be the relationship of the depth of the total soil profile to the individual soil horizons. All three aspects of metadata are essential components of a scenario and have been captured and described in following pages.

In short, in an environment where immediate access to underlying information used to govern the construct of a PRZM field or orchard scenario, metadata:

- certifies the authenticity and degree of completeness of the scenario's content;
- establishes and documents the context of the scenario's content;
- identifies the structural relationships that exist between and within a parameter of the scenario;
- provides an access point for a diverse range of users of the scenario; and
- assembles electronically the information the developer might have ordinarily provided in a physical reference.

The following descriptions of each PRZM field and orchard scenario used in the assessment of drinking water exposures derived from surface water sources reflect the basic principles of establishing administrative and descriptive "metadata." However, it remains vitally important to understand that metadata is the "data about the data" and acting as umbrellas to this information are the established Agency procedures for ensuring the quality of that information. This is accomplished through the basic tenants of Quality Assurance and Quality Control in the selection of parameters that constitutes the field and orchard scenario.

These scenarios were developed specifically for the organophosphate (OP) cumulative assessment. They were developed with the objective of representing use for the OP's and not necessarily for representing a national high end exposure. However, each of these OP scenarios has been evaluated in the context of it's national representativeness and where appropriate, designated as a "standard scenario". Each of the scenario descriptions that follows distinguish between those developed specifically for, or deemed to be a standard scenario and those developed for the OP cumulative assessment which are not “standard” and should only be used when necessary for a particular assessment.

Meteorological stations for individual scenarios have been selected based on proximity to the area represented by each scenario. A list of available weather stations containing the required data for PRZM can be found at http://www.epa.gov/ceampubl/tools/metdata/index.htm). If a more geographically distant station was chosen to represent a scenario, the choice of the more distant station is documented in the metadata for each file.

Users should note that several existing scenarios incorporate irrigation into the scenario and as such have been parameterized for either over-canopy or under-canopy irrigation. A number of other scenarios indicate in the metadata file that a significant portion of the crop in the geographic area identified utilize irrigation. To date, EFED has not incorporated irrigation into these scenarios. EFED is currently evaluating a standardized approach for determining when a scenario should include irrigation and this will be reflected in future revisions to these scenarios.

There are a number of input parameters which are generally not documented in this metadata file. Many of these represent parameter flags which are default values and do not change from scenario to scenario. Others are captured in the scenario file and have not been transferred to the metadata file. Finally, there are others (such as parameters for furrow irrigation) which are not currently used. A listing of the parameters which are generally not captured in this metadata file are listed below in table 1. Future updates to the metadata will include these parameters when applicable.

Table 1. Input parameters not typically recorded in metadata.

Record #	Variable Name	Variable Full Name
1	TITLE	Title of Input File
2	HTITLE	File Description
3	DSN (x5)	DSN (x5)
3	IPEIND	Flag-Pan Factor
9	GDUSLEC	Day of month to start USLEC and Manning's N factor
9	GMUSLEC	Month to start USLEC and Manning's N factor
9	HTMAX	Max Canopy Ht
9	ICNCN	ICNCN-Crop Number
9	NUSLEC	Number of USLEC factors (up to 32)
11	IYREM	Integer year of crop emergence
11	IYRMAT	Integer year of crop maturation
11	IYRHAR	Integer year of crop harvest
20	BDFLAG	Flag-Bulk Density
20	BIOFLG	Flag-Biodegradation
20	HSWZT	Flag-Drainage
20	IDFLAG	Flag-ThermalCond/HeatCapacity
20	ITFLAG	Flag-Soil Temp Sim

Table 1. Input parameters not typically recorded in metadata.		
Record #	**Variable Name**	**Variable Full Name**
20	KDFLAG	Flag-Soil Adsorption Coeff
20	MOC	Flag-Method of Characteristics
20	THFLAG	Flag-FC and WP
28	BT	Bottom Width of Furrow
28	EN	Manning's N for Furrow
28	Q0	Flow Rate of Water Entering Furrow
28	SF	Slope of Furrow
28	X2	Length of Furrow
28	XFRAC	Location of the Furrow
28	ZRS	Side Slope of Furrows
29	HF	Infiltration Suction Parameter
29	KS	Sat Hyd Cond
34	AD	Soil Drainage param
34	ADL	Lateral Soil Drainage
34	DISP	Hydrodynamic Solute Disp Coeff
40	CFLAG	Flag-Conversion
40	ILP	Flag-Initial Pest.Level

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CALIFORNIA ALFALFA (Northern and Southern)

The field used to represent alfalfa production in California is located in San Joaquin County in the Central Valley, although the crop is grown throughout the Central Valley and as far south as the Imperial Valley. According to the 1997 Census of Agriculture, California is ranked 1st in pounds of alfalfa hay harvested and among the top 10 in acres planted. Alfalfa is a perennial crop, planted early in the year and maintained under continuous cultivation on a 4- to 5-year cycle at which time a new crop is planted.. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; nearly all alfalfa is irrigated in California by flooding. Cuttings range from 3 to 5 per year under most conditions. Alfalfa prefers well-drained soil with a pH near neutral. Root systems rarely exceed 2 feet in California and cuttings occur when the plant reaches a height of approximately 30 inches. The soil selected to simulate the field is a benchmark soil, Sacramento clay. Sacramento clay, is a very-fine, smectitic, thermic Cumulic Vertic Endoaquolls. These soils are often used for alfalfa cultivation providing the water table is low. Sacramento clay is a poorly to very poorly drained, slowly permeable soil with very slow to slow runoff. These soils formed in fine textured alluvium of mixed origin and are of moderate extent. They are generally found in level basins at elevations near sea level to 60 feet. The soil is typical of soils used for a variety of row crops, rice, safflower and alfalfa. Sacramento clay is a Hydrologic Group D soil.

The Fresno, California meteorological station is selected for this scenario. As noted above, the scenario represents San Joaquin County, and more broadly the Central Valley. Although there are geographically closer meteorological stations to San Joaquin County, Fresno is located in the center of the Central Valley and is more representative of Central Valley alfalfa production.

Table 1. PRZM 3.12 Climate and Time Parameters for San Joaquin County, California - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Fresno, CA (W93193)
Ending Date	December 31, 1990	Meteorological File - Fresno, CA (W93193)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0 cm C^{-1}	PRZM Guidance (July, 2004). Snow not expected to occur or accumulate and persist for more than a day in San Joaquin or Fresno Counties. http://www.weather.gov/climate (NOWData)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Joaquin County, California - Alfalfa		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.20 tons EI^{-1*}	NRI - Average value listed for the soil series Sacramento
USLE LS Factor (USLELS)	0.30	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.00	NRI - Average value listed for the soil series Sacramento
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2%	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Irrigation Type (IRTYP)	4 (Flood/Under Canopy)	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085 Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Leaching Factor (FLEACH)	0.1	Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Maximum Rate at which Irrigation is Applied (RATEAP)	0.062 cm hr^{-1}	Irrigation Guidance for developing PRZM Scenario, Table 1; (June 15, 2005). For CN = 88 and f = 0.1
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for San Joaquin County, California - Alfalfa		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA. 2001)
Initial Surface Condition (ISCOND)	1	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Meteorological File - Fresno, CA (W93193)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	60 cm	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085, indicated that useful roots go only to 2 ft. Parameter value is representative of area but may be inconsistent with different alfalfa scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	100	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Soil Surface Condition After Harvest (ICNAH)	1	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Date of Crop Emergence (EMD, EMM, IYREM)	16/01	Value set to approximate planting cycle. Alfalfa is planted once every five years with multiple cuttings in every year
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/12	Value set to approximate planting cycle. Alfalfa is planted once every five years with multiple cuttings in every year
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/12	Value set to approximate planting cycle. Alfalfa is planted once every five years with multiple cuttings in every year
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	90, 88, 89	Gleams Manual Table H-4, Pasture/Range, Non-CNT, Poor (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, A01OCOCM; Orchard, cover alley, Mulch till, Olympia, WA (USDA, 2000)
USLE C Factor (USLEC)	0.046 - 0.221	RUSLE Project; A01OCOCM; Orchard, cover alley, Mulch till, Olympia, WA. Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Sacramento Soil Parameters for San Joaquin County, California - Alfalfa		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	176 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 157 cm (HORIZN = 3) 1 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.43 g $\cdot$cm^{-3} (HORIZN = 1, 2) 1.29 g $\cdot$cm^{-3} (HORIZN = 3) 1.48 g $\cdot$cm^{-3} (HORIZN = 4)	
Initial Water Content (THETO)	0.42 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1, 2) 0.44 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =3) 0.39 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4 cm (HORIZN = 2) 1 cm (HORIZN = 3) 1 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.42 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 1, 2) 0.44 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 3) 0.39 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.36 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 1,2,3) 0.3 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 4)	
Organic Carbon Content	1.77% (HORIZN = 1,2)	

(OC)	0.84% (HORIZN = 3,4)	

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA CORN (Northern)

The field used to represent corn production in California is located in Stanislaus/San Joaquin Counties in the Central Valley, although the crop is grown in other areas of the state. According to the 1997 Census of Agriculture, California is not among the top twenty corn producing states in the U.S. The crop is generally planted the early Spring (April) and harvested from July thru August. Continuous corn is practice is much of the region, however, rotation with other crops does occur. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. The crop is rarely grown under irrigation. The soil selected to simulate the field is a Madera loam. Madera loam is a, fine, smectitic, thermic Abruptic Durixeralfs. These soils are often used for dry farmed grains as well as for irrigated cropland such as alfalfa, almonds, grapes, oranges, rice and tomatoes. Madera loam is a well to moderately well drained, very slowly permeable, medium to very slow runoff soil formed in old alluvium derived from granite rock sources. They are on undulating low terraces with slopes of 0 to 9 percent. They are generally found at elevations of less than 250 feet above sea level and are known for the formation of vernal pools during the winter months. The soils are extensive in MLRA 17. Madera loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for San Joaquin County, California - Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0 cm C^{-1}	PRZM Guidance (July, 2004). Snow not expected to occur or accumulate and persist for more than a day in San Joaquin or Sacramento Counties. http://www.weather.gov/climate (NOWData)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Joaquin County, California - Corn

Parameter	Value	Source
Method to Calculate	4 (MUSS)	PRZM Manual (EPA, 1998)

Erosion (ERFLAG)		
USLE K Factor (USLEK)	0.34 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA. 1985)
USLE LS Factor (USLELS)	0.79	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.4 (EPA 2004).
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	4.5%	Mid-point of slope range for soils series Madera (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for San Joaquin County, California - Corn

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Default value (EPA 2004).
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Meteorological File - Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	90 cm	Median value (60-120 cm) (Table 5-9. EPA 1998).
Maximum Canopy Coverage (COVMAX)	100	Taken from IL corn. Also consistent with default value cited in guidance (EPA 2004).
Soil Surface Condition After Harvest (ICNAH)	3	The corn stubble is typically left in place until the next crop. Also, PRZM Scenario Guidance (Rev., July 2004), default.
Date of Crop Emergence (EMD, EMM, IYREM)	01/04	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)

Date of Crop Maturity (MAD, MAM, IYRMAT)	27/07	Based on 110 day maturation for CA Field Corn; http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html
Date of Crop Harvest (HAD, HAM, IYRHAR)	08/09	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table H-4, Fallow = Fallow SR/CT, poor condition; Cropping and Residue = Row Crop SR/CT/Poor (USDA, 1990)
Manning's N Value (MNGN)	0.023	RUSLE Project, C21CGBDC- Sacramento corn conventional tillage (USDA, 2000)
USLE C Factor (USLEC)	0.018 - 0.611	RUSLE Project; C21CGBDC- Sacramento corn conventional tillage. Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Madera Soil Parameters for San Joaquin County, California - Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 40 cm (HORIZN = 3) 38 cm (HORIZN = 4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1, 2, 3) 1.6 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.223 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1, 2) 0.226 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3) 0.163 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =4)	

Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4 cm (HORIZN = 2) 5 cm (HORIZN = 3) 2 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.223 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1, 2) 0.226 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3) 0.163 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.083 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1,2) 0.186 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3) 0.073 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 4)	
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.29% (HORIZN = 3) 0.174% (HORIZN = 4)	

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA SUGAR BEETS (Northern and Southern)

The field used to represent sugar beet production in California is located in the Central Valley, which includes the following counties: Colusa, Fresno, Glenn, Kern, Kings, Madera, Mariposa, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Tulare, and Yolo. The major production areas are in the Kalmuth Basin and Imperial Valley. According to 1997 Census of Agriculture, California ranked 4th among producers of sugar beets in the U.S.. Sugar beets are planted almost every month somewhere in the state and are generally grown in rotation. Production concentrates on heavy clay and clay loam soil and are irrigated by both furrow or sprinkler systems. Areas between rows of plants may or may not be maintained. Row spacing is generally 30-inches. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less.

The soil selected to simulate the field is Ryde clay loam. This soil type was selected because: 1) clay loam soils were recommended by an extension agent as growing approximately 90% of sugarbeet crops in the Central Valley (personal conversation with Kurt Hembree, 2/28/06), 2) the Ryde series is a benchmark soil series (USDA 1999), 3) Ryde clay loam has expected yields of 27 tons/irrigated acre (USDA 2006), and 4) this soil is hydrologic group C. The data utilized to parameterize the soil characteristics of Ryde clay loam were selected from San Joaquin county, which is located in the Central Valley. Ryde clay loam is a fine-loamy, mixed, superactive, thermic Cumulic Endoaquolls. This soil is used mainly for irrigated crop land; producing sugarbeets, as well as wheat, alfalfa, irrigated pasture, tomatoes, filed corn and safflower. The Ryde series is very deep, poorly drained, and formed in alluvium from mixed rock sources and decomposed vegetative matter. The soil series is extensive in MLRAs 16 and 17.

The Fresno California meteorological station was selected for this scenario. As noted above, this scenario represents a large geographic area. Based on the USDA 2002 census of agricultural, the top sugar beet producing counties in California (in order by harvested tons) are Imperial, Fresno, Merced, and Kern counties. The Fresno meteorological station was selected for this scenario since it is generally in the geographic center of the Central Valley, and also the geographically closest station to the top sugar beet producing counties. Although there are closer meteorological stations to San Joaquin County (used for soil parameters), Fresno is located in the center of the Central Valley and is more representative of large geographic extent of sugar beet production areas.

Table 1. PRZM 3.12 Climate and Time Parameters for Central Valley, California - Sugar beets		
Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Fresno, CA (W93193)
Ending Date	December 31, 1990	Meteorological File - Fresno, CA (W93193)
Pan Evaporation Factor (PFAC)	0.75	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that sugar beets are grown on western side of Central Valley.
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that last snowfall was in 1970.
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Central Valley, California - Sugar beets		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	Ryde Clay Loam, map symbol 230 (USDA 2006).
USLE LS Factor (USLELS)	0.30	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.0	Per QA/QC Guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998); Consultation 08/08/2001 with Kurt Hembree, UC Cooperative Extension Office, Fresno County, indicated that sugarbeets are grown on the western side of the Central Valley (Type I).
Slope (SLP)	2%	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that sugarbeets are grown in beds in leveled fields with slopes of <2%.
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag	2 (cropping	Based on recommendations from farm advisors for general

(IRFLAG)	period only)	flooding for crop irrigation
Irrigation Type (IRTYP)	4 (Furrow)	Sugarbeets in California are irrigated either by furrow or sprinkler. (USDA Crop Profile, 1999). Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Leaching Factor (FLEACH)	0.1	Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005). Default value for furrow irrigation.
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Most farm advisors in CA said water is always applied to crops before 50% depletion.
Maximum Rate at which Irrigation is Applied (RATEAP)	0.034 cm hr^{-1}	Irrigation Guidance for developing PRZM Scenario (June 15, 2005); Table 3 for furrow irrigation, and Table 1 for CN = 86 and f = 0.
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Central Valley, California - Sugar beets

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that sugar beets are kept clear of residues to help control pests and diseases.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Fresno, CA (W93193)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM, Table 5.4 (EPA, 1998) PRZM Guidance, rev. July 2004
Maximum Active Root Depth (AMXDR)	90 cm	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that sugarbeets roots are concentrated in top 3 feet of soil and can extract moisture throughout that depth. Value may be inconsistent with different sugar beet scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	100	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that canopy in the spring is 100%, but from July on, it declines to approx. 70%. This apparently is for spring-planted beets that are harvested in the fall. There are also fall-planted beets that are harvested in the spring

Soil Surface Condition After Harvest (ICNAH)	1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County indicated that sugar beet fields are kept clear of residues to help control pests and diseases.
Date of Crop Emergence (EMD, EMM, IYREM)	01/02	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/05	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table H-4, Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project; C21SUSUC Sacramento climate station, Conventional tillage, no cover (USDA, 2000)
USLE C Factor (USLEC)	0.015 - 0.769	RUSLE Project; Variable with date, C21SUSUCSacramento climate station, Conventional tillage, no cover (USDA, 2000)

Table 4. PRZM 3.12 Exeter Fine Sandy Loam Soil Parameters for Central Valley, California - Sugar beets

Parameter	Value	Verification Source
Total Soil Depth (CORED)	160 cm	Ryde Clay Loam, map symbol 230 (USDA 2006).
Number of Horizons (NHORIZ)	3 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 51 cm (HORIZN = 2) 99 cm (HORIZN = 3)	Ryde Clay Loam, map symbol 230 (USDA 2006).
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1) 1.4 g $\cdot cm^{-3}$ (HORIZN = 2) 1.08 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.359 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1) 0.359 cm^3-H_2O $\cdot cm^{-3}$-soil	

	(HORIZN =2) 0.292 cm^3-H_2O ·cm^{-3}-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 3 cm (HORIZN = 2) 3 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.359 cm^3-H_2O ·cm^{-3}-soil (HORIZN =1) 0.359 cm^3-H_2O ·cm^{-3}-soil (HORIZN =2) 0.292 cm^3-H_2O ·cm^{-3}-soil (HORIZN =3)	
Wilting Point (THEWP)	0.255 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1) 0.255 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 2) 0.143 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3)	Adjusted using the relationship %OC = 0.6x%Organic Matter (Doucette 2000)
Organic Carbon Content (OC)	3.48% (HORIZN = 1) 3.48% (HORIZN = 2) 0% (HORIZN = 3)	

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Personal Communication with Kurt Hembree Extension Agent, Fresno County. February 28, 2006.

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FLORIDA SWEET CORN

The field used to represent sweet corn production in Florida is located in Palm Beach County in Southeast Florida, although sweet corn production occurs throughout Florida. According to the 1997 Census of Agriculture, Florida is the major producer of fresh market sweet corn in the U.S. Sweet corn is extensively grown on “muck soils” (approximately 75%). Typical planting distances are 30 inches between rows and 6 to 8 inches between plants. Sweet corn in Florida is produced using several types of irrigation systems. The soil selected to simulate the field is a Riviera sand. Riviera sand is a loamy, siliceous, active, hyperthermic Arenic Glossaqualfs. These soils are often used for truck crop (including sweet corn) and citrus production. Riviera sand is a deep, poorly drained, slow runoff, slowly to very slowly permeable soil that formed in stratified marine sandy and loamy sediments on the Lower Coastal Plain. These soil are generally found on broad, low flats and in depressions and have slopes generally less than 2 percent. The soil is of moderate extent. Riviera sand is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Palm Beach County, Florida - Sweet Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - West Palm Beach, FL (W12844)
Ending Date	December 31, 1990	Meteorological File - West Palm Beach, FL (W12844)
Pan Evaporation Factor (PFAC)	0.78	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	No appreciable snow accumulation occurs in this part of Florida
Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Palm Beach County, Florida - Sweet Corn

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.03 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.20	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m

		(default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.0	PRZM Manual Table 5.6 (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Palm Beach County, Florida - Sweet Corn

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Field are fallow prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Meteorological File - West Palm Beach, FL (W12844)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Manual, Table 5.4 from (EPA 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Median value (60-120 cm) (Table 5-9. EPA 1998).
Maximum Canopy Coverage (COVMAX)	100	Taken from IL corn. Also consistent with default value cited in guidance (EPA 2004).
Soil Surface Condition After Harvest (ICNAH)	3	Plant residues are left behind until later in the year when tilled for next series of crops; rarely cucumbers.
Date of Crop Emergence (EMD, EMM, IYREM)	16/10	http://ipmwww.ncsu.edu/opmppiap/subcrp.htm southern sweet corn cultivation cycle is generally between January and June; Maturation 64-90 days from seeding to harvest; Harvest occurs over a period of weeks to several months. Values set to cover rainy season Oct - Feb.
Date of Crop Maturity (MAD, MAM, IYRMAT)	05/01	
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/01	

Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table H-4, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.011	RUSLE Project; UC0BGBGC; Green Beans, conventional tillage; Tampa, FL (USDA, 2000)
USLE C Factor (USLEC)	0.162 - 0.938	RUSLE Project; Variable with date, UC0BGBGC; Green Beans, conventional tillage; Tampa, FL (USDA, 2000)

Table 4. PRZM 3.12 Riviera Soil Parameters for Palm Beach County, Florida - Sweet Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 62 cm (HORIZN = 2) 28 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) [http://www.statlab.iastate.edu/soils/ssl/)](http://www.statlab.iastate.edu/soils/ssl/) Ed Russell (USDA-NRCS, Fresno)
Bulk Density (BD)	1.65 g $\cdot$cm^{-3} (HORIZN = 1,2) 1.7 g $\cdot$cm^{-3} (HORIZN = 3)	
Initial Water Content (THETO)	0.073 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1,2) 0.211 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2) 4 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.073 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 1,2) 0.211 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 3)	
Wilting Point	0.023 cm^3-H_2O $\cdot$cm^{-3}-soil	

(THEWP)	(HORIZN = 1,2) 0.091 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

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MINNESOTA ALFALFA

The field used to represent alfalfa production in Minnesota is located in Polk County in the Red River Valley, however, alfalfa is produced throughout the state. According to the 1997 Census of Agriculture, Minnesota ranked 6th in production of alfalfa in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, planted early in the year and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; very little alfalfa is irrigated in Minnesota because of soil conditions and the depth at which roots may grow (up to 20 feet) help make alfalfa drought tolerant. Cuttings range from 2 to 4 per year and most growers harvest alfalfa when the stand is at 10 percent bloom. Most farmers take the last cutting of the season between mid-August and mid-September. Alfalfa prefers well-drained soils with a pH near neutral (pH 6.7-6.9). The soil selected to simulate the field is a benchmark soil, Bearden silty clay loam. Bearden silty clay loam, is a fine-silty, mixed, superactive, frigid Aeric Calciaquolls. These soils are nearly all under cultivation to small grains, especially alfalfa, and row crops (sugar beets). Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. These soils formed in calcareous silt loam and silty clay loam lacustrine sediments. They are generally found on glacial lake plains at elevations from 650 to 2000 feet above mean sea level on slopes of 0 to 3 percent. Bearden silty clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Polk County, Minnesota - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Fargo, ND (W14914)
Ending Date	December 31, 1990	Meteorological File - Fargo, ND (W14914)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm $^{\circ}C^{-1}$	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Polk County, Minnesota - Alfalfa

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)

USLE K Factor (USLEK)	0.28 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.25	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	0.60	Set according to guidance (EPA, 2004)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Polk County, Minnesota - Alfalfa

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting. Http://pestdata.ncsu.edu/cropprofiles
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum soil depth. Roots may grow to 20 feet (USDA 2000). Parameter value may be inconsistent with different alfalfa scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	100	Dr. Mohamed Kahn; NDSU (701) 231-8596; Larry Smith U of MN (218) 281-8602.
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth Http://pestdata.ncsu.edu/cropprofiles
Date of Crop Emergence	01/06	Usual Planting and Harvesting Dates for U.S. Field

(EMD, EMM, IYREM)		Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/08	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/08	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	85, 81, 83	Gleams Manual Table H-4, Close-seed legumes SR/poor; Cropping and Residue = Close-seed legumes, SR/good condition (USDA, 1990)
Manning's N Value (MNGN)	0.110	RUSLE Project, F86HLHLC; Hay, Legumes, Conventional tillage, Glasgow, MN (USDA, 2000)
USLE C Factor (USLEC)	0.001 - 0.010	RUSLE Project; F86HLHLC; Hay, Legumes, Conventional tillage, Glasgow, MN (USDA, 2000)

Table 4. PRZM 3.12 Bearden Soil Parameters for Polk County, Minnesota - Alfalfa

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	Data from PIC (Bird et al. 1992; Burns et al., 1992), also NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base Horizons with top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	Data from PIC (Burns et al., 1992) NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 $g \cdot cm^{-3}$ (HORIZN = 1,2) 1.5 $g \cdot cm^{-3}$ (HORIZN = 3) 1.8 $g \cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.292 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3) 0.285 cm^3-H_2O $\cdot cm^{-3}$-soil	

	(HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4.0 cm (Horizon = 2) 3.0 cm (HORIZN = 3) 4.0 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.377 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1,2) 0.292cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3) 0.285 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1,2) 0.132 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3) 0.125 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 4)	
Organic Carbon Content (OC)	4.060% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 1984. Usual Planting and Harvesting Dates for U.S. Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 2000. Crop Profile for Alfalfa in Minnesota. U.S. Department of Agriculture, NSF Center for Integrated Pest Management. Information from the website: http://www.ipmcenters.org/cropprofiles/.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH CAROLINA ALFALFA (Western)

The field used to represent alfalfa production in North Carolina is located in Western North Carolina. According to the 1997 Census of Agriculture, North Carolina is not a major producer of alfalfa (not among the top 20 producing states) in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, planted early in the year and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; alfalfa is not irrigated in North Carolina. Cuttings range from 2 to 4 per year. Most farmers take the last cutting of the season in September. Alfalfa prefers well-drained soils with a pH near neutral (pH 6.7-6.9). The soil selected to simulate the field is a Helena sandy loam. Helena sandy loam, is a fine, mixed, semiactive, thermic, Aquic Hapludults. Much of these soils are under cultivation in tobacco, corn soybeans, small grains, and vegetable. Helena sandy loam is a very deep, moderately well drained, slowly permeable soil with medium to rapid runoff. These soils formed in residuum weathered from a mixture of felsic, intermediate, or mafic igneous or high grade metamorphic rocks. They are found on broad ridges and toeslopes of the Piedmont uplands on slopes of 2 to 10 percent, but can range from 0 to 15 percent. Helena sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Western North Carolina - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1965	Meteorological File - Asheville, NC (W03812)
Ending Date	December 31, 1990	Meteorological File - Asheville, NC (W03812)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Western North Carolina - Alfalfa

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)

USLE K Factor (USLEK)	0.24 tons EI^{-1*}	Soil Data Mart (NRCS) for Rowan County, PA. Data for Helena sandy loam, 1-6% slopes, surface horizon.
USLE LS Factor (USLELS)	1.34	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	0.50	Set according to guidance (EPA, 2001). NC farming practice typically on contour; value confirmed with PRZM Table 5.6
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Western North Carolina - Alfalfa

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	26	Set to weather data. Asheville, NC (W03812)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998). Alfalfa interception storage depth much like grass/pasture/hay. PIC value within range of Table 5.4 and accepted.
Maximum Active Root Depth (AMXDR)	100 cm	Maximum rooting depth set to soil profile depth. Alfalfa roots may be as deep as 20 feet with a range of 8-12 feet common (USDA 2000a). Parameter value may be inconsistent with different alfalfa scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last

		years of growth.
Date of Crop Emergence (EMD, EMM, IYREM)	01/04	http://forage.cas.psu.edu/docs/species/alfalfa.html http://forages.orst.edu/IS/NAIS/default.cfm NC has both Fall and Spring plantings. Set to Spring planting period using mid-point dates. Emergence 7-10 days after planting. Maturation occurs approximately 60 days after planting. Three and sometimes 4 cuttings per season. Harvest set to last event assuming 4 cuttings since Fall planting begins late August early Sept. in NC. Each cutting may occur 28-30 days after last.
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/05	
Date of Crop Harvest (HAD, HAM, IYRHAR)	28/08	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	87, 83, 86	Gleams Manual Table H-4, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.110	RUSLE Project, NB0PWPWN; Pasture, warm-season, no-till, Asheville, NC (USDA, 2000)
USLE C Factor (USLEC)	0.004	RUSLE Project; NB0PWPWN; Pasture, warm-season, no-till, Asheville, NC (USDA, 2000)

Table 4. PRZM 3.12 Helena Soil Parameters for Western North Carolina - Alfalfa

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 20 cm (HORIZN = 2) 18 cm (HORIZN = 3) 52 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) milton.cortes@nc.usda.gov DBAPE
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.51 g $\cdot cm^{-3}$ (HORIZN = 3) 1.5 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.153 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.250 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3)	

	0.322 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2) 3.0 cm (HORIZN = 3) 4.0 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.153 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.250cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3) 0.322 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.053 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.120 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3) 0.192 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174 (HORIZN = 3) 0.116% (HORIZN = 4)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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NORTH CAROLINA CORN (Western)

The field used to represent corn production in Western North Carolina is located in Henderson County. According to the 1997 Census of Agriculture, North Carolina is ranked 9th among major corn producing states in the U.S. Corn is planted throughout the state with the largest production located in the coastal plain and tidewater regions. Sweet corn is produced mainly on the coastal plain (MLRA 153 A and B). The crop is generally planted in the early Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region, especially in the Piedmont. However, rotation with other crops such as soybean is the principal practiced on the coastal plain. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. However, conservation tillage is continuing to grow. The crop is rarely grown under irrigation, except for sweet corn. The soil selected to simulate the field is a Chewacla loam. Chewacla loam is a fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts. Most of the series is cleared for pasture or planted in row crops, mostly corn with the remainder in small grain and hay. Chewacla loam is a very deep, somewhat poorly drained, slow runoff, moderately permeable soil formed in recent alluvium washed largely from soils formed in residuum from metamorphic and igneous rocks. They are located on flood plains. Slopes are generally between 0 to 2 percent. The soils are extensive throughout the region. Chewacla loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Henderson County North Carolina - Western Corn

Parameter	Value	Source
Starting Date	January 1, 1965	Meteorological File - Asheville, NC (W03812)
Ending Date	December 31, 1990	Meteorological File - Asheville, NC (W03812)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Henderson County North Carolina - Western Corn

Parameter	Value	Source

Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.29 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.20	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998). No contour plowing since slope is 0-2%.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004)..
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Median value of range (0-2%) (EPA 2004).
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Henderson County North Carolina - Western Corn

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to conditions prior to crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	26	Set to weather data. Meteorological File - Asheville, NC (W03812)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Table 5.4 (EPA, 1998), maximum value.
Maximum Active Root Depth (AMXDR)	90 cm	Median value (60-120 cm) (Table 5-9. EPA 1998).
Maximum Canopy Coverage (COVMAX)	100	Taken from IL corn. Also consistent with default value cited in guidance (EPA 2004).
Soil Surface Condition After Harvest (ICNAH)	3	NC corn (Eastern) parameter value.

Date of Crop Emergence (EMD, EMM, IYREM)	25/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	02/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	17/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table H-4, Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, NB0CGHLC, Corn, Grain, conventional tillage, Asheville, NC (USDA, 2000)
USLE C Factor (USLEC)	0.100 - 0.462	RUSLE Project; NB0CGHLC, Corn, Grain, conventional tillage, Asheville, NC (USDA, 2000)

Table 4. PRZM 3.12 Chewacla Soil Parameters for Henderson County North Carolina - Western Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992). Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third, and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1,2) 40 cm (HORIZN = 3,4)	PIC (Burns, 1992). Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot$cm^{-3} (HORIZN = 1,2) 1.5 g $\cdot$cm^{-3} (HORIZN = 3,4)	
Initial Water Content (THETO)	0.244 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1, 2) 0.270 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =3) 0.269 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.244 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 1, 2) 0.270 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 3) 0.269 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.094 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 1,2) 0.12 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 3) 0.119 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 4)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

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EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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EPA. 2004. Pesticide Root Zone Model (PRZM) Field and Orchard Crop Scenarios: Guidance for Selecting Field Crop and Orchard Scenario Input Parameters. November 15, 2001; Revisions July 2004.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1984. Usual Planting and Harvesting Dates for U.S. Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH DAKOTA CORN

The field used to represent corn production in North Dakota is located in Pembina County in the Red River Valley. According to the 1997 Census of Agriculture, North Dakota is ranked 19th among major producers of corn in the U.S. The crop is generally planted the Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region. However, rotation with other crops such as wheat is also practiced. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. However, conservation tillage is continuing to grow. The crop is often grown under irrigation. The soil selected to simulate the field is a benchmark soil, Bearden silty clay loam. Bearden silty clay loam, is a fine-silty, mixed, superactive, frigid Aeric Calciaquolls. These soils are nearly all under cultivation to small grains, especially alfalfa, and row crops. Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. These soils formed in calcareous silt loam and silty clay loam lacustrine sediments. They are generally found on glacial lake plains at elevations from 650 to 2000 feet above mean sea level on slopes of 0 to 3 percent. Bearden silty clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Pembina County, North Dakota Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Fargo, ND (W14914)
Ending Date	December 31, 1990	Meteorological File - Fargo, ND (W14914)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Pembina County, North Dakota Corn

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor	0.28 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)

(USLEK)		
USLE LS Factor (USLELS)	0.25	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001). No management practice assumed, low slope soil.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Pembina County, North Dakota Corn

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting. Default for row crops.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Median value (60-120 cm) (Table 5-9. EPA 1998).
Maximum Canopy Coverage (COVMAX)	100	Taken from IL corn. Also consistent with default value cited in guidance (EPA 2004).
Soil Surface Condition After Harvest (ICNAH)	1	Fallow conditions after harvest in preparation for winter crop
Date of Crop Emergence (EMD, EMM, IYREM)	05/05	http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/
Date of Crop Maturity	05/08	http://www.ext.nodak.edu/extpubs/plantsci/rowcrops

(MAD, MAM, IYRMAT)		
Date of Crop Harvest (HAD, HAM, IYRHAR)	12/08	http://www.ext.nodak.edu/extpubs/plantsci/rowcrops
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table H-4, Fallow SR/CT, poor condition; Cropping and Residue = Row Crop SR/CT/Poor (USDA, 1990)
Manning's N Value (MNGN)	0.023	RUSLE Project, F86CGWSC; Corn, grain, conventional tillage, Fargo, ND (USDA, 2000)
USLE C Factor (USLEC)	0.028 - 0.305	RUSLE Project; F86CGWSC; Corn, grain, conventional tillage, Fargo, ND (USDA, 2000)

Table 4. PRZM 3.12 Bearden Soil Parameters for Pembina County, North Dakota Corn		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 $g \cdot cm^{-3}$ (HORIZN = 1,2) 1.5 $g \cdot cm^{-3}$ (HORIZN = 3) 1.8 $g \cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =1,2) 0.292 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =3) 0.285 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4.0 cm (HORIZN = 2) 3.0 cm (HORIZN = 3) 4.0 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.377 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 1,2) 0.292cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 3) 0.285 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 1,2) 0.132 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 3) 0.125 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 4)	

Organic Carbon Content (OC)	4.06% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

EPA. 2004. Pesticide Root Zone Model (PRZM) Field and Orchard Crop Scenarios: Guidance for Selecting Field Crop and Orchard Scenario Input Parameters. November 15, 2001; Revisions July 2004.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON BERRIES (Blackberries)

The field used to represent blackberry production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is the leading state in the production of blackberries in the U.S. Marion County leads Oregon in acres planted in 1997. Three types of blackberries grow in Oregon: trailing, erect, and semi-erect. Blackberries are planted in the Spring from tissue cultures 4 to 6 feet apart in rows. The primocanes are trained on a 2-wire trellis until the canes produce fruit the following year. Once fruit appear, new primocanes replace the previous year's. It take three years to start full production of blackberries. Fields may be in every year or alternate year production. Berries are picked every 4 to 5 days, in the morning, beginning in early July. Blackberries require supplemental watering through irrigation in such a manner as to prevent excessive and prolonged wetness which encourages disease. The soil selected to simulate the field is a benchmark soil, Woodburn silt loam. Woodburn silt loam, is a fine-silty mixed, superactive, mesic Aquultic Agrixerolls. The series is used to produce berries, orchards, cannery crops, grain, hay, and pasture. Woodburn silt loam is a very deep, moderately well drained, slowly permeable soil with slow to medium runoff. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level to gently sloping broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 55 percent. The series is extensive in the Willamette Valley. Woodburn silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Berries

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1990	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.16 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Berries

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)

USLE K Factor (USLEK)	0.32 tons EI^{-1*}	Soil Data Mart Database for Marion County, OR. Data for Woodburn silt loam, 3-12% slopes. http://soildatamart.nrcs.usda.gov/
USLE LS Factor (USLELS)	3.63	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	0.5	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Range: 0-55%. Since maximum is >12%, value is set to 6% for row crop (EPA 2004).
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County, Oregon - Berries

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Bernadine Strik, Oregon State University; strikb@bcc.orst.edu
Maximum Canopy Coverage (COVMAX)	20	Bernadine Strik, Oregon State University; strikb@bcc.orst.edu
Soil Surface Condition After Harvest (ICNAH)	2	Continuous cultivation
Date of Crop Emergence	01/04	Bernadine Strik, Oregon State University;

(EMD, EMM, IYREM)		strikb@bcc.orst.edu Emergence date set to Primocane emergence. Maturity date set to middle of season.
Date of Crop Maturity (MAD, MAM, IYRMAT)	30/07	
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/07	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table H-4, Meadow, condition good. (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, A12GBGBC Grapes Alleyway, Clear Rows (USDA, 2000)
USLE C Factor (USLEC)	0.302 - 0.553	RUSLE Project; A12GBGBC Grapes Alleyway, Clear Rows (USDA, 2000)

Table 4. PRZM 3.12 Woodburn Soil Parameters for Marion County, Oregon - Berries		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	7 (Top horizon split in two)	
First, Second, Third, Fourth, Fifth, Sixth, and Seventh Soil Horizons (HORIZN = 1,2,3,4,5,6,7)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 13 cm (HORIZN = 2) 20 cm (HORIZN = 3) 40 cm (HORIZN = 4,6) 50 cm (HORIZN = 5) 30 cm (HORIZN = 7)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.44 g $\cdot cm^{-3}$ (HORIZN = 1,2,5) 1.53 g $\cdot cm^{-3}$ (HORIZN = 3) 1.45 g $\cdot cm^{-3}$ (HORIZN = 4) 1.37 g $\cdot cm^{-3}$ (HORIZN = 6,7)	
Initial Water Content (THETO)	0.301 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =7)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 5.0 cm (HORIZN = 3,4,5,6,7)	
Field Capacity (THEFC)	0.301 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3)	

	0.388 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =4) 0.394 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =5) 0.418 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =6) 0.404 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN =7)	
Wilting Point (THEWP)	0.134 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 1,2) 0.153 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 3) 0.177 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 4) 0.185 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 5) 0.173 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 6) 0.156 cm^3-$H_2O \cdot cm^{-3}$-soil (HORIZN = 7)	
Organic Carbon Content (OC)	1.86% (HORIZN = 1,2) 0.56% (HORIZN = 3) 0.3% (HORIZN = 4) 0.112% (HORIZN = 5) 0.07% (HORIZN = 6) 0.06% (HORIZN = 7)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.
EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON SWEET CORN

The field used to represent sweet corn production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 4th in sweet corn for processing. Only a small percent is produced for the fresh market. Marion County farmers harvest the most acres in the state. The crop is generally planted in the early Spring (May) and harvested beginning in September. Continuous sweet corn is practice is much of the region, however, rotation with other crops is practiced as well. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates, followed by conservation tillage and no-tillage. The crop is rarely grown under irrigation. The soil selected to simulate the field is a benchmark soil, Woodburn silt loam. Woodburn silt loam, is a fine-silty mixed, superactive, mesic Aquultic Agrixerolls. The series is used to produce berries, orchards, cannery crops, grain, hay, and pasture. Woodburn silt loam is a very deep, moderately well drained, slowly permeable soil with slow to medium runoff. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level to gently sloping broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 55 percent. The series is extensive in the Willamette Valley. Woodburn silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Sweet Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1990	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Sweet Corn

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.33 tons EI^{-1*}	Farm Manual, Table 3.1 (EPA, 1985)

USLE LS Factor (USLELS)	1.34	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Value set to maximum for row crops (EPA, 2001) slopes: 0-55%
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County, Oregon - Sweet Corn

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Manual, Table 5.4 (EPA, 1998), minimum value.
Maximum Active Root Depth (AMXDR)	90 cm	Median value (60-120 cm) (Table 5-9. EPA 1998).
Maximum Canopy Coverage (COVMAX)	100	Taken from IL corn. Also consistent with default value cited in guidance (EPA 2004).
Soil Surface Condition After Harvest (ICNAH)	1	Crop profile says some are moving to cover crops, grass, instead of wheat- most conservative scenario chosen
Date of Crop Emergence (EMD, EMM, IYREM)	16/05	Dan McGrath, OSU extension agent
Date of Crop Maturity		

(MAD, MAM, IYRMAT)	21/08	Maturation 3 weeks before harvest, general rule for sweet corn
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/09	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table H-4, SR/fallow and SR/Row crops from table H-4 (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project, A13CSWWC, Corn, Silage, Conventional Tillage, Salem, OR (USDA, 2000)
USLE C Factor (USLEC)	0.099 - 0.528	RUSLE Project; A13CSWWC, Corn, Silage, Conventional Tillage, Salem, OR (USDA, 2000)

Table 4. PRZM 3.12 Woodburn Soil Parameters for Marion County, Oregon - Sweet Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	7 (Top horizon split in two)	
First, Second, Third, Fourth, Fifth, Sixth, and Seventh Soil Horizons (HORIZN = 1,2,3,4,5,6,7)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 13 cm (HORIZN = 2) 20 cm (HORIZN = 3) 40 cm (HORIZN = 4,6) 50 cm (HORIZN = 5) 30 cm (HORIZN = 7)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.44 g $\cdot$cm^{-3} (HORIZN = 1,2,5) 1.53 g $\cdot$cm^{-3} (HORIZN = 3) 1.45 g $\cdot$cm^{-3} (HORIZN = 4) 1.37 g $\cdot$cm^{-3} (HORIZN = 6,7)	
Initial Water Content (THETO)	0.301 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot$cm^{-3}-soil	

	(HORIZN =3) 0.388 cm^3-H_2O ·cm^{-3}-soil (HORIZN =4) 0.394 cm^3-H_2O ·cm^{-3}-soil (HORIZN =5) 0.418 cm^3-H_2O ·cm^{-3}-soil (HORIZN =6) 0.404 cm^3-H_2O ·cm^{-3}-soil (HORIZN =7)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 5.0 cm (HORIZN = 3,4,5,6,7)	
Field Capacity (THEFC)	0.301 cm^3-H_2O ·cm^{-3}-soil (HORIZN =1,2) 0.350 cm^3-H_2O ·cm^{-3}-soil (HORIZN =3) 0.388 cm^3-H_2O ·cm^{-3}-soil (HORIZN =4) 0.394 cm^3-H_2O ·cm^{-3}-soil (HORIZN =5) 0.418 cm^3-H_2O ·cm^{-3}-soil (HORIZN =6) 0.404 cm^3-H_2O ·cm^{-3}-soil (HORIZN =7)	
Wilting Point (THEWP)	0.134 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1,2) 0.153 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3) 0.177 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 4) 0.185 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 5) 0.173 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 6) 0.156 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 7)	
Organic Carbon Content (OC)	1.86% (HORIZN = 1,2) 0.56% (HORIZN = 3) 0.3% (HORIZN = 4) 0.112% (HORIZN = 5) 0.07% (HORIZN = 6) 0.06% (HORIZN = 7)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.
EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

EPA. 2004. Pesticide Root Zone Model (PRZM) Field and Orchard Crop Scenarios: Guidance for Selecting Field Crop and Orchard Scenario Input Parameters. November 15, 2001; Revisions July 2004.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON WHEAT (Winter)

The field used to represent wheat production in Oregon is located in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 8th in wheat production in the U.S. The crop is generally planted in the Fall (September) and harvested the following year beginning in July. Row spacing ranges from 6 to 9 inches with seeds planted at a depth of 2 inches or less. The soil selected to simulate the field is a benchmark soil, Bashaw clay. Bashaw clay is a very-fine, smectitic, mesic Xeric Endoaquerts. The series is used to produce spring grains which the remainder in natural vegetation. Bashaw clay is a very deep, poorly drained, very slowly permeable soil with an apparent water table at 1 foot above to 0.5 feet below the surface from November to May. Unless protected, flooding is common from December to April. These soils formed in fine textured alluvium. They are found on nearly level or somewhat concave flood plains and terraces and gently sloping fans at elevations of 90 to 1,000 feet above mean sea level on slopes of 0 to 12 percent. The series occur in small bodies and is inextensive in the Willamette Valley. Bashaw clay is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Willamette Valley, Oregon - Wheat

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1990	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Willamette Valley, Oregon - Wheat

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.13 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985). Soil = Clay, <.3% OC
USLE LS Factor		Calculated according to Haan and Barfield (1978) equation: LS

(USLELS)	1.34	$= ((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	1.0	Set according to guidance; PRZM Manual Table 5.6 (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Value set to median of range (0-12%) (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Willamette Valley, Oregon - Wheat

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Residue removed from field during harvest
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	23 cm	PRZM Manual, Table 5.9, mid-point of the range (EPA, 1998). May be inconsistent with different wheat scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	99	Consistent with information from Tom Gerik used for derivation of COVMAX of TX wheat scenario.
Soil Surface Condition After Harvest (ICNAH)	1	Set to conservative input assuming field fallow until next crop. Residue removed with crop harvest.
Date of Crop Emergence (EMD, EMM, IYREM)	01/09	Emergence based on 15 days from planting; customary planting in OR between Sept 1-15 (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	10/03	Maturation based on 220 day average; PRZM Table 5.9

Date of Crop Harvest (HAD, HAM, IYRHAR)	01/07	Harvest based on Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	92, 86, 87	GLEAMS Table H-4; Close-seeded legumes Fallow = Fallow ST/CT/poor; Cropping and Residue = SR, conventional tillage, poor condition" (USDA, 1990)
Manning's N Value (MNGN)	0.023	RUSLE Project; A13WWHLC; Winter wheat, conventional tillage, Salem, OR (USDA, 2000)
USLE C Factor (USLEC)	0.017 - 0.336	RUSLE Project; A13WWHLC; Winter wheat, conventional tillage, Salem, OR (USDA, 2000)

Table 4. PRZM 3.12 Bashaw Soil Parameters for Willamette Valley, Oregon - Wheat

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 26 cm (HORIZN = 2) 64 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.3 g $\cdot cm^{-3}$ (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.487 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.441 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2) 4.0 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.487 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.441 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3)	

Wilting Point (THEWP)	0.347 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.301 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	4.64% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

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EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

PENNSYLVANIA ALFALFA

The field used to represent alfalfa production in Pennsylvania is located in York County in south-central Pennsylvania. According to the 1997 Census of Agriculture, Pennsylvania is ranked 15th overall in the production of alfalfa in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, planted early in the year and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; alfalfa is not irrigated in Pennsylvania. Cuttings range from 2 to 4 per year. Most farmers take the last cutting of the season in September. Alfalfa prefers well-drained soils with a pH near neutral (pH 6.7-6.9). The soil selected to simulate the field is a benchmark soil, Glenville silt loam. Glenville silt loam, is a fine-loamy, mixed, active, mesic, Aquic Fragiudults. These soils are in general crop production, but mostly grain, hay and pasture. Glenville silt loam is a very deep, moderately well drained or somewhat poorly drained, medium to slowly permeable soil with medium to slow runoff and consists of a fragipan at approximately 2 feet. In the fragipan, permeability is slow to moderately slow. These soils formed in residuum weathered from mica acid schist and crystalline rock containing mica. They are found on nearly level to strongly sloping upland flats, footslopes, or near the heads of drainageways. Slopes range from 0 to 15 percent. These soils are extensive in the mid-Atlantic Piedmont. Glenville silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for York County, Pennsylvania - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Harrisburg, PA (W14751)
Ending Date	December 31, 1990	Meteorological File - Harrisburg, PA (W14751)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for York County, Pennsylvania - Alfalfa

Parameter	Value	Source

Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI^{-1*}	Soil Data Mart Database for York County, PA. Data for Glenville silt loam, 3-8% slopes.
USLE LS Factor (USLELS)	3.63	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	0.60	Contour plowing is used according to Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01) "up to as high as the guy on the tractor is willing to go" (10-15%)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for York County, Pennsylvania - Alfalfa

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting. Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	120 cm	As deep as 4 ft according to Leon Restler, Ag. Extension Agent, Lancaster Co. Phone: (717) 394-6851, Date: 8/14/01 Parameter value is representative of area but may be inconsistent with different alfalfa scenarios due to

		different sources.
Maximum Canopy Coverage (COVMAX)	100	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth. Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Date of Crop Emergence (EMD, EMM, IYREM)	16/04	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01) emergence is 4-14 days after planting depending on rainfall
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/10	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	87, 83, 86	Gleams Manual Table H-4, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.110	RUSLE Project, SB5HLHLC; Hay, legume, conventional till, York (USDA, 2000)
USLE C Factor (USLEC)	0.001 - 0.017	RUSLE Project; SB5HLHLC; Hay, legume, conventional till, York (USDA, 2000)

Table 4. PRZM 3.12 Glenville Soil Parameters for York County, Pennsylvania - Alfalfa

Parameter	Value	Verification Source
Total Soil Depth (CORED)	152 cm	Soil Data Mart Database for York County, PA. Data for Glenville silt loam, 3-8% slopes. Number of horizons is inconsistent with PA turf scenario (also Glenville Soil) due to addition of thatch layer in turf scenario.
Number of Horizons (NHORIZ)	5 (Top horizon split in two)	

First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 15 cm (HORIZN = 2) 23 cm (HORIZN = 3) 54 cm (HORIZN = 4) 50 cm (HORIZN = 5)	Soil Data Mart Database for York County, PA. Data for Glenville silt loam, 3-8% slopes. http://soildatamart.nrcs.usda.gov/ Note: Glenville silt loam soil data values are specific to York County. Other scenarios using this soil type may very by county.
Bulk Density (BD)	1.3 g ·cm^{-3} (HORIZN = 1,2) 1.5 g ·cm^{-3} (HORIZN = 3) 1.7 g ·cm^{-3} (HORIZN = 4) 1.5 g ·cm^{-3} (HORIZN = 5)	
Initial Water Content (THETO)	0.33 cm^3-H_2O ·cm^{-3}-soil (HORIZN =1,2) 0.31 cm^3-H_2O ·cm^{-3}-soil (HORIZN =3) 0.24 cm^3-H_2O ·cm^{-3}-soil (HORIZN =4) 0.21 cm^3-H_2O ·cm^{-3}-soil (HORIZN =5)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2) 1 cm (HORIZN = 3) 3 cm (HORIZN = 4) 5 cm (HORIZN = 5)	Field capacity and wilting point were calculated using the Rawls and Brakensiek method with data from the SoilDataMart Database.
Field Capacity (THEFC)	0.33 cm^3-H_2O ·cm^{-3}-soil (HORIZN =1,2) 0.31 cm^3-H_2O ·cm^{-3}-soil (HORIZN =3) 0.24 cm^3-H_2O ·cm^{-3}-soil (HORIZN =4) 0.21 cm^3-H_2O ·cm^{-3}-soil (HORIZN =5)	
Wilting Point (THEWP)	0.15 cm^3-H_2O ·cm^{-3}-soil (HORIZN =1,2) 0.16 cm^3-H_2O ·cm^{-3}-soil (HORIZN =3) 0.12 cm^3-H_2O ·cm^{-3}-soil (HORIZN =4) 0.09 cm^3-H_2O ·cm^{-3}-soil (HORIZN =5)	
Organic Carbon Content	1.74% (HORIZN = 1,2)	

(OC)	0.15% (HORIZN = 3) 0.15% (HORIZN = 4) 0.15% (HORIZN = 5)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.
EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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TEXAS ALFALFA

The field used to represent alfalfa production in Texas is located in Milam County in the Texas Claypan region. According to the 1997 Census of Agriculture, Texas is not ranked in the top 20 states in production of alfalfa in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, but performs best in Texas on well drained soils with a pH of 6.5. It is planted late in the year (August) and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.5 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; approximately 70 percent of the crop is irrigated by sprinkler (55%) and flood (15%). Cuttings range from 3 to 5 per year. Most production is used in state to supply dairies and feedlots. The soil selected to simulate the field is a benchmark soil, Lufkin loam. Lufkin loam, is a fine, smectitic, thermic, Oxyaquic Vertic Paleustalfs. These soils were in general crop production in the past, but are now mostly pasture. Crops currently planted on these soils include grain sorghum, hay crops or small grain for grazing. Lufkin loam is a very deep, moderately well drained, very slowly permeable soil with medium to low runoff depending on slope. The soil has a very slow internal drainage due to the claypan at approximately 12 to 18 inches. The series formed in slightly acid to alkaline clayey sediments at elevations of 75 to 125 feet above major flood plains on slopes of mainly less than one percent, but may range up to 3 percent. The series is extensive in the Texas Claypan region of MLRA 87A and 87B and of to lesser extent in MLRA 86A. Lufkin loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Milam County, Texas - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1990	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Alfalfa

Parameter	Value	Source
Method to Calculate	4 (MUSS)	PRZM Manual (EPA, 1998)

Erosion (ERFLAG)		
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Manual, Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.27	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.0	PRZM Manual, Table 5.6 (EPA, 1998). No practice assumed.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.75%	The slope range is <1-3% (USDA 1996). The midpoint slope is selected (EPA 2004). The midpoint would range from 1.5-2%. The midpoint of that range was selected.
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Alfalfa

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum soil depth. Roots may grow to 20 feet (USDA 2000a). Parameter value may be inconsistent with different alfalfa scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001). Consistent with Ag. Agents from other Alfalfa growing regions.
Soil Surface Condition	3	Set to residue for winter months after last harvest

After Harvest (ICNAH)		during multi-year growth and during winter of last years of growth.
Date of Crop Emergence (EMD, EMM, IYREM)	01/09	TX generally restricted to Fall plantings. Dates set to mid-points. Emergence 7-10 days after planting; Maturation occurs approximately 60 days after planting.. First harvest after maturation is generally May . Three and sometimes 4 cutting per season. Harvest set to last event assuming 4 cuttings. Each cutting may occur 28-30 days after last. ttp://texaserc.tamu.edu/catalog/topics/Crops.html http://forage.cas.psu.edu/docs/species/alfalfa.html
Date of Crop Maturity (MAD, MAM, IYRMAT)	20/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	90, 88, 89	Gleams Manual Table H-4, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.110	RUSLE Project, J94HGHGC; Hay, Grass, conventional tillage, Waco, TX (USDA, 2000)
USLE C Factor (USLEC)	0.000 - 0.004	RUSLE Project; J94HGHGC; Hay, Grass, conventional tillage, Waco, TX (USDA, 2000)

Table 4. PRZM 3.12 Lufkin Soil Parameters for Milam County, Texas - Alfalfa

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 82 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.6 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.215 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.320 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3)	

Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4 cm (HORIZN = 2) 2 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.215 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.320cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.105 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.200 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.29 (HORIZN = 3)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

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USDA 1996. Official Series Description. Lufkin Series. Information from the website: http://ortho.ftw.nrcs.usda.gov/osd/dat/L/LUFKIN.html

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

USDA. 2000a. Crop Profile for Alfalfa in Minnesota. U.S. Department of Agriculture, NSF Center for Integrated Pest Management. Information from the website: http://www.ipmcenters.org/cropprofiles/.

TEXAS CORN

The field used to represent corn production in Texas is located in Milam County in the Texas Claypan region of the state. According to the 1997 Census of Agriculture, Texas is ranked 11th among major producers of corn in the U.S. The crop is generally planted the early Spring (March) and harvested beginning in September. Continuous corn is practice is much of the region. However, rotation with other crops such as soybeans and wheat is also practiced. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. The soil selected to simulate the field is a benchmark soil, Axtell very fine sandy loam. Axtell very fine sandy loam is a fine, semectitic, thermic Udertic Paleustalfs. These soils were cultivated in the past, but are now in pasture. Some areas are farmed to corn, grain sorghum, or small grain. Axtell very fine sandy loam is a very deep, moderately well drained, very slowly permeable soil with slow to rapid runoff depending on slope. These soils formed in slightly acid to alkaline clayey sediments of the Pleistocene Age. They are found on broad, nearly level to strongly sloping stream terraces and terrace remnants about 50 to 300 feet above the present streams. Slopes are generally 0 to 5 percent, but may range up to 12 percent. Axtell very fine sandy loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Milam County, Texas - Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1990	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Corn

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.31 tons EI^{-1*}	0.31 is consistent with fine sandy loam, as described in official soil description

USLE LS Factor (USLELS)	1.34	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001). Contour plowing unlikely for 2.5% slope field.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Median value of range (0-12%) (EPA 2004).
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Corn

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Median value (60-120 cm) (Table 5-9. EPA 1998).
Maximum Canopy Coverage (COVMAX)	100	Taken from IL corn. Also consistent with default value cited in guidance (EPA 2004).
Soil Surface Condition After Harvest (ICNAH)	1	Winter cover crop planted in most areas.
Date of Crop Emergence (EMD, EMM, IYREM)	16/03	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/07	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Harvest		

(HAD, HAM, IYRHAR)	10/09	Usual Planting and Harvesting Dates (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	92, 89, 90	Gleams Manual Table H-4, Fallow = Fallow SR/CT/poor; Cropping and Residue = SR, CT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, J94CGWWC; Corn, grain, conventional tillage, Waco (USDA, 2000)
USLE C Factor (USLEC)	0.132 - 0.562	RUSLE Project; J94CGWWC; Corn, grain, conventional tillage, Waco (USDA, 2000)

Table 4. PRZM 3.12 Axtell Soil Parameters for Milam County, Texas - Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third and Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1,2) 80 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.7 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.174 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1,2) 0.235cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.174 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.235cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3)	

Wilting Point (THEWP)	0.064 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1,2) 0.165 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

TEXAS COTTON

The field used to represent cotton production in Texas is located in Milam County, although cotton is grown throughout Texas. According to the 1997 Census of Agriculture, Texas ranked 1st among the major cotton producing states in the U.S. with more than 5 million acres in production. Most cotton is grown in the High Plains (67%) and Rolling Plains (20%) regions of the state. Cotton is planted in the late winter/early Spring (February and March) in the Lower Rio Grande region and progresses into June in the southern High Plains. Cotton is planted by the "skip-row" or "ultra-narrow row" method. Skip row refers to the technique where every third row is "skipped" to permit the crop to take advantage of soil moisture in semi-arid regions. Ultra-narrow row (UNR) cotton is spaced at 20 inches apart which tends to increase yields and efficiency of productions systems. Both systems require the use of irrigation. Fifty percent of cotton production in the High Plains is irrigated and less than ten percent in the Rolling Plains is irrigated. Furrow irrigation is the most common in the Lower Rio Grande and sprinkler systems are most common in the High Plains. Low Energy Precision Application center pivot irrigation is beginning to make inroad in the area because of its lower pressure requirements, lower evaporation losses and water savings. Row spacing is generally 38-inches with 3-4 plants per foot row in all but UNR cotton. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. All cotton is defoliated prior to harvesting. Conventional tillage is the dominant practice. The soil selected to simulate the field is a fine sandy loam. Crockett fine sandy loam is a fine, smectitic, thermic Udertic Paleustalfs. The series is mainly used to grow cotton, grain sorghum, and small grains, but more than half the acreage is now in pasture. Crockett fine sandy loam is a deep, moderately well drained, very slowly permeable soil with low to very high runoff depending on slope. These soils formed in residuum derived from weathered alkaline marine clays, sandy clays, or shale, interbedded with sandier materials mainly of Cretaceous age. They are located on broad nearly level to moderately sloping uplands. Slopes are generally between 1 to 5 percent, but may range from 0 to 10 percent. The series is extensive in MLRA 86, 87A, and 87B. Crockett fine sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for the Milam County, Texas - Cotton

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1990	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1.(EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2.(EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Cotton		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	Soil Data Mart Database for Milam County, TX. Data for Crockett fine sandy loam, 1 to 3 percent slopes.
USLE LS Factor (USLELS)	1.07	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	Midpoint selected (range: 0-10%) (EPA 2004).
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Cotton		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to default for fallow surface prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	65 cm	Value from CA cotton. Consistent with PRZM manual, table 5-9 (EPA 1998) which cites range of 30-90 cm.
Maximum Canopy Coverage (COVMAX)	100	Consistent with advice of Kerry Arroues USDA-NRCS for development of CA cotton scenario. Also,

		consistent with EPA 2004 guidance of default value of 100 of row crops.
Soil Surface Condition After Harvest (ICNAH)	3	Residues left on field until following year or cover crop is planted.
Date of Crop Emergence (EMD, EMM, IYREM)	16/04	Personal communication with Cullen "Dusty" Tittle, Milam Co. Extension Agent. Maturation and harvest close together because the plants are desiccated anywhere from late Aug through Sept.
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	16/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table H-4; Fallow = Fallow SR/CT/poor; Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)
USLE C Factor (USLEC)	0.111 - 0.365	RUSLE Project; J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)

Table 4. PRZM 3.12 Crockett Fine Sandy Loam Soil Parameters for Milam County, Texas - Cotton

Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	Soil Data Mart Database for Milam County, TX. Data for Crockett fine sandy loam, 1 to 3 percent slopes.
Number of Horizons (NHORIZ)	5 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 15 cm (HORIZN = 3) 74 cm (HORIZN = 4) 96 cm (HORIZN = 5)	Soil Data Mart Database for Milam County, TX. Data for Crockett fine sandy loam, 1 to 3 percent slopes. http://soildatamart.nrcs.usda.gov/
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1,2)	

	1.48 $g \cdot cm^{-3}$ (HORIZN = 3) 1.6 $g \cdot cm^{-3}$ (HORIZN = 4) 1.6 $g \cdot cm^{-3}$ (HORIZN = 5)	
Initial Water Content (THETO)	0.196 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1, 2) 0.34 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3) 0.291 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =4) 0.311 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =5)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4 cm (HORIZN = 2) 5 cm (HORIZN = 3) 2 cm (HORIZN = 4) 4 cm (HORIZN = 5)	Field capacity and wilting point were taken from the SoilDataMart Database (wthirdbar_r and wfifteenbar_r fields in the chorizon table)
Field Capacity (THEFC)	0.196 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =1, 2) 0.34 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =3) 0.291 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =4) 0.311 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN =5)	
Wilting Point (THEWP)	0.103 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.245 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3) 0.213 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 4) 0.187 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 5)	
Organic Carbon Content (OC)	0.73% (HORIZN = 1,2) 0.2% (HORIZN = 3) 0.17% (HORIZN = 4) 0.17% (HORIZN = 5)	

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

TEXAS SORGHUM

The field used to represent sorghum production in Texas is located in Milam County in the Texas Claypan region of the state. According to the 1997 Census of Agriculture, Texas is ranked 2nd among major producers of sorghum in the U.S. The crop is generally planted under both dry land and irrigation conditions in the Spring (May), but may extend into July, and harvested beginning in September. Continuous sorghum is practice is much of the region. Row spacing is generally 30 inches for planted systems or in narrow rows of 15 inches in drilled systems. Conservation tillage practices are emphasize for erosion control and include reduced-till, mulch-till, ecofallow, strip-till, ridge-till, zero-till, and no-till. The soil selected to simulate the field is a benchmark soil, Axtell very fine sandy loam. Axtell very fine sandy loam is a fine, semectitic, thermic Udertic Paleustalfs. These soils were cultivated in the past, but are now in pasture. Some areas are farmed to corn, grain sorghum, or small grain. Axtell very fine sandy loam is a very deep, moderately well drained, very slowly permeable soil with slow to rapid runoff depending on slope. These soils formed in slightly acid to alkaline clayey sediments of the Pleistocene Age. They are found on broad, nearly level to strongly sloping stream terraces and terrace remnants about 50 to 300 feet above the present streams. Slopes are generally 0 to 5 percent, but may range up to 12 percent. Axtell very fine sandy loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Milam County, Texas - Sorghum

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1990	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998.)
Snowmelt Factor (SFAC)	0.36m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Sorghum

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)

USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Manual; Representative Soils USDA (1990)
USLE LS Factor (USLELS)	0.95	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.5 (EPA 2004).
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001). No practice assumed.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Midpoint selected (range: 0-12%) (EPA 2004).
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Sorghum		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	23 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Guidance, Rev. July 2004
Soil Surface Condition After Harvest (ICNAH)	1	Default (EPA, 2001)
Date of Crop Emergence (EMD, EMM, IYREM)	10/05	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Maturity	12/09	Usual Planting and Harvesting Dates (USDA, 1984)

(MAD, MAM, IYRMAT)		
Date of Crop Harvest (HAD, HAM, IYRHAR)	22/09	Usual Planting and Harvesting Dates (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	92, 86,87	Gleams Manual Table H-4,Fallow SR/CT/poor; Cropping and Residue = small grain, SR/CT, poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project, J94SGSGC; Sorghum grain, conventional tillage, Waco TX (USDA, 2000)
USLE C Factor (USLEC)	0.050 - 0.704	RUSLE Project; J94SGSGC; Sorghum grain, conventional tillage, Waco TX (USDA, 2000)

Table 4. PRZM 3.12 Axtell Soil Parameters for Milam County, Texas - Sorghum

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third and Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1,2) 80 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot$cm^{-3} (HORIZN = 1,2) 1.7 g $\cdot$cm^{-3} (HORIZN = 3)	
Initial Water Content (THETO)	0.174 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1,2) 0.235cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.174 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN = 1,2) 0.235cm^3-H_2O $\cdot$cm^{-3}-soil	

	(HORIZN = 3)	
Wilting Point (THEWP)	0.064 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 1,2) 0.165 cm^3-H_2O ·cm^{-3}-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

TEXAS WHEAT (Winter)

The field used to represent wheat production in Texas is located in the Blacklands region, however, wheat is grown throughout Texas. According to the 1997 Census of Agriculture, Texas ranked 7th among the major wheat producing states in the U.S. with more than 2.5 million acres in production. Most wheat is grown in the High Plains region of the state. Wheat is planted in the early fall (mid-September through October) and harvested in the summer. Row spacing ranges from 6 to 9 inches with seeds planted at a depth of 2 inches or less. The soil selected to simulate the field is a Crockett fine sandy loam. Crockett fine sandy loam is a fine, smectitic, thermic Udertic Paleustalfs. The series is mainly used to grow cotton, grain sorghum, and small grains, but more than half the acreage is now in pasture. Crocket fine sandy loam is a deep. Moderately well drained, very slowly permeable soil with low to very high runoff depending on slope. These soils formed in residuum derived from weathered alkaline marine clays, sandy clays, or shale, interbedded with sandier materials mainly of Cretaceous age. They are located on broad nearly level to moderately sloping uplands. Slopes are generally between 1 to 5 percent, but may range from 0 to 10 percent. The series is extensive in MLRA 86, 87A, and 87B. Crockett fine sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for the Blacklands, Texas - Wheat

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1990	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998.)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	10 cm	Tom Gerik (254.774.6128), Professor of Agronomy at TAMU, Blacklands Resources Center, Temple, TX. He estimated that evaporation probably isn't deep because wheat production practices in Blacklands area do not include fallow (see notes for ISCOND and ICNAH). He estimated that if it were to be fallowed, the maximum depth would be 10-15 cm.

Table 2. PRZM 3.12 Erosion and Landscape Parameters for the Blacklands, Texas - Wheat

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	Soil Data Mart Database for Milam County, TX. Data for Crockett fine sandy loam, 1 to 3 percent slopes. http://soildatamart.nrcs.usda.gov/
USLE LS Factor (USLELS)	0.43	Calculated according to Haan and Barfield (1978) equation: LS = $((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1.0	PRZM Manual Table 5.6 (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004).
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	3%	consultation with Tom Gerik (254.774.6128) most highly erodible soils with slopes >5% in Blacklands area have been put into CRP or pasture. Wheat is mostly grown on soils with slopes 1-3%; the best wheat soils are Houston clay or Austin.
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for the Blacklands, Texas - Wheat

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Set to 3 for residue on surface prior to planting. Per conversation with Tom Gerik, winter wheat production in Blacklands area is conducted with some form of conservation tillage. Wheat is grown dryland, in rotation with corn, sorghum, or cotton. It is planted October 15, after disking/chisel; much residue is left on surface (up to 30% ground cover). Due to strong peds in surface horizon, there is very little wind erosion.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one

Number of Cropping Periods (NCPDS)	30	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	110 cm	Consultation with Tom Gerik (254-774-6128). Most wheat in Blacklands is grown on soils (parent material caliche/limestone) up to 6' deep. The average depth of the soils is 3-4' , with the Austin soil being the shallower and the Houston clay the deeper. 110 cm approx. 43 in. May be inconsistent with other wheat scenarios due to different sources.
Maximum Canopy Coverage (COVMAX)	99	Tom Gerik (254-774-6128). Due to good moisture conditions (35-36" per year, mostly as spring rains), canopy is very thick (99-100%).
Soil Surface Condition After Harvest (ICNAH)	3	Tom Gerik (254-774-6128), winter wheat in Blacklands area is harvested from mid-May to early June. The earliest repeat crop is the following spring. The stubble is left alone until mid to late summer, when it is disked once in August/September.
Date of Crop Emergence (EMD, EMM, IYREM)	16/10	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984). Note: Emergence set at mid-point of planting period plus 7 days for emergence. Maturation based on 200 day average period. Harvesting date set to the mid-point of most active period of harvesting. Crop maturity and harvest dates occur in the year following emergence, since this is an overwintering crop. Crop is growing at the beginning of simulation.
Date of Crop Maturity (MAD, MAM, IYRMAT)	30/04	
Date of Crop Harvest (HAD, HAM, IYRHAR)	17/06	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	94, 87, 88	Gleams Manual Table H-4; Fallow = Fallow SR/poor; Cropping and Residue = Small grain SR/good (USDA, 1990) 08/14/01 consultation with Jimmy Williams (254.774.6124), Research Scientist at Blacklands Resources Center, Temple, TX; specialty: hydrologic engineering. Winter wheat in Blacklands area is grown on highly structured soils (strong granular peds in surface horizon). Because of production practices (stubble, conservation tillage), cropping and residue CN values (87 and 88) are the ones JW recommended. He stated that the antecedent moisture has the most effect on runoff.
Manning's N Value (MNGN)	0.014	RUSLE Project, J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)
USLE C Factor (USLEC)	0.026 - 0.318	RUSLE Project; J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)

Table 4. PRZM 3.12 Crocket Fine Sandy Loam Soil Parameters for the Blacklands, Texas - Wheat		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	Soil Data Mart Database for Milam County, TX. Data for Crockett fine sandy loam, 1 to 3 percent slopes.
Number of Horizons (NHORIZ)	5 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 15 cm (HORIZN = 3) 74 cm (HORIZN = 4) 96 cm (HORIZN = 5)	Soil Data Mart Database for Milam County, TX. Data for Crockett fine sandy loam, 1 to 3 percent slopes. http://soildatamart.nrcs.usda.gov/
Bulk Density (BD)	1.55 g $\cdot$cm^{-3} (HORIZN = 1,2) 1.48 g $\cdot$cm^{-3} (HORIZN = 3) 1.6 g $\cdot$cm^{-3} (HORIZN = 4) 1.6 g $\cdot$cm^{-3} (HORIZN = 5)	
Initial Water Content (THETO)	0.196 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1, 2) 0.34 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =3) 0.291 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =4) 0.311 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =5)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4 cm (HORIZN = 2) 5 cm (HORIZN = 3) 2 cm (HORIZN = 4) 4 cm (HORIZN = 5)	Field capacity and wilting point were taken from the SoilDataMart Database (wthirdbar_r and wfifteenbar_r fields in the chorizon table)
Field Capacity (THEFC)	0.196 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =1, 2) 0.34 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =3) 0.291 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =4) 0.311 cm^3-H_2O $\cdot$cm^{-3}-soil (HORIZN =5)	

Wilting Point (THEWP)	0.103 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 1,2) 0.245 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 3) 0.213 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 4) 0.187 cm^3-H_2O $\cdot cm^{-3}$-soil (HORIZN = 5)	
Organic Carbon Content (OC)	0.73% (HORIZN = 1,2) 0.2% (HORIZN = 3) 0.17% (HORIZN = 4) 0.17% (HORIZN = 5)	

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