Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

II.D. Appendices: Drinking Water Exposure

6. N-Methyl Carbamate Surface Water Exposure Assessment

This appendix provides details on the regional surface water exposure assessments conducted in support of the N-methyl carbamate (NMC) cumulative exposure assessment. A description of the conceptual model and a summary of the analytical plan and results (focusing on the southeastern region are found in Section I.D). This appendix provides details of the analytical methods, results for each of the regions, and documentation for the modeling inputs and scenarios used for the regional surface water exposures.

A. Constructing the Conceptual Model

For surface water exposure, the Agency focused on vulnerable surface water supplies. These vulnerable systems were defined as

- small reservoirs in agricultural areas
- with high NMC use (adjusted for relative potency)
- and watersheds that are particularly prone to pesticide movement to water (by runoff and/or sedimentation)

The Agency used 1997 county-level usage data (Thelin and Gianessi, 2000), with pounds of active ingredient adjusted by the relative potency for the pesticide, to identify high carbamate use areas. Because the usage data represented agricultural usage of the pesticide (of the NMC pesticides that have the potential to reach drinking water sources, only carbaryl has non-agricultural uses), this usage data identified predominantly agricultural areas. Once the regional surface water exposure sites were identified, the Agency used pesticide use surveys from USDA National Agricultural Statistics Service (NASS) and Doane's to estimate NMC usage in more recent years.

Surface water sources of drinking water were identified using two sources:

- A spatial dataset that identifies the population, by county, that gets its drinking water from public surface water supplies (USGS, 1998);

- A spatial dataset showing the location of drinking water intakes for CWS in the U.S. This information was based on the Agency's SDWIS database.

The Agency compared relative vulnerabilities of the areas based on average-annual runoff, average 2-month runoff (beginning of the growing season), and average soil loss, as developed by the USDA Natural Resources Conservation Service (Kellogg et al, 1997).

The resulting regional surface water scenario sites are shown in Figure II.D.6.1. This approach follows the same conceptual model used for the organophosphate (OP) CRA.

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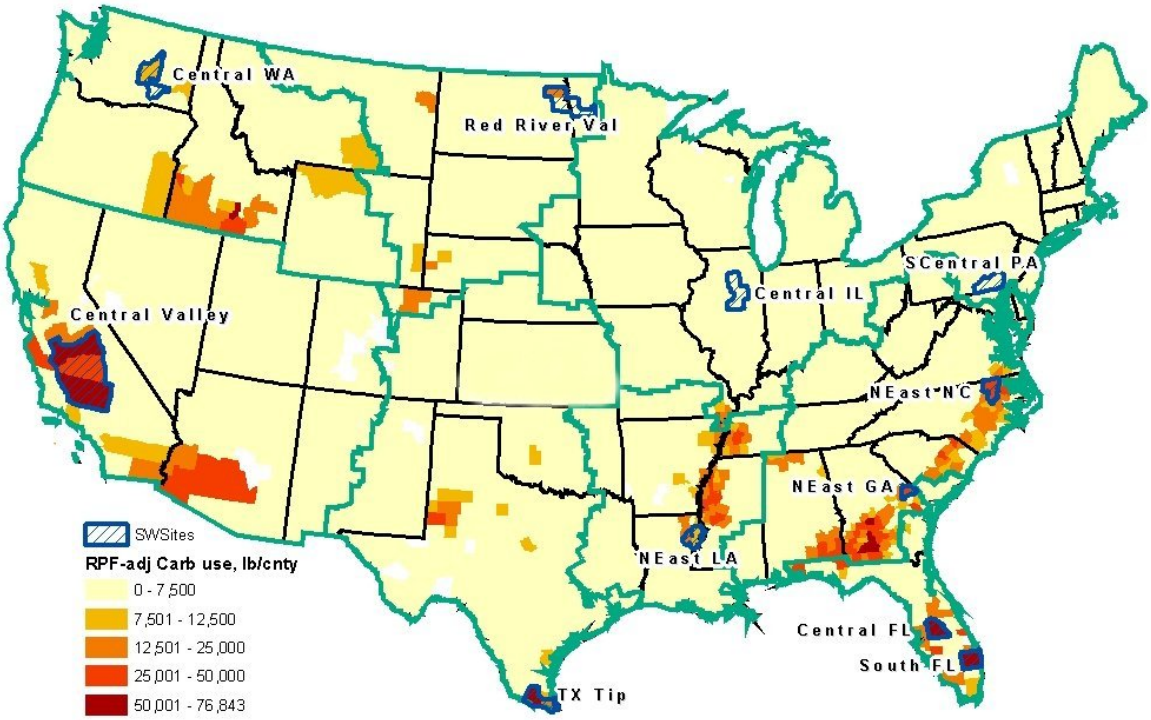
II.D.6. 1 - Carbamate cumulative risk assessment regions for drinking water exposure assessment showing high carbamate use areas and regional surface water exposure sites.



For the preliminary NMC CRA, the Agency used estimated carbamate residues from the vulnerable surface water supplies to represent potential NMC exposure from surface water in each region. The Agency assumed that concentrations in the water at the intake represented concentrations found in treated water. This assumption is protective, but not unreasonable, considering the state of published literature on drinking water treatment impacts on NMC pesticides (Appendix II.D.3). If carbamate levels in water from these vulnerable sites are not major contributors to the total regional cumulative exposure, then the Agency can reasonably conclude that drinking water exposures will not be a concern in other, less vulnerable, areas. If drinking water exposure from one or more of these vulnerable sites is a significant contributor to the total cumulative exposure, then additional refinements may be necessary to characterize the extent of the potential exposure.

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B. Estimating Daily Cumulative N-methyl Carbamate Concentrations in Surface Water

The cumulative assessment focuses on the probability or likelihood of concurrent exposure to multiple pesticides from food, water, and residential use. For surface water sources of drinking water, the Agency determined the potential for co-occurrence by considering the potential for more than one NMC pesticide to be used in the same watershed (on the same or different crops that may be grown in the watershed). The Agency determined the potential for co-occurrence at each of the regional surface water exposure sites using USDA National Agricultural Statistics Service (USDA NASS) and Doane's databases. OPP considered carbamate usage on agricultural crops for a multi-county area surrounding each of the vulnerable surface water exposure sites shown in Figure II.D.6.1, identifying those carbamate-crop uses that accounted for at least 95% of the total carbamate usage in the scenario area. Details of the methods used to collect the usage data can be found in Appendix II.D.4.

PRZM is a field-scale model, while the cumulative water assessment focuses on watershed-scale impacts (i.e., the contributions of multiple carbamate uses on multiple crops occurring in multiple fields in a watershed). The Agency used PRZM to model multiple fields in a watershed, adjusting the estimated exposure concentrations for each carbamate-crop use in the watershed by an adjustment factor that reflects the potential area treated (Figure II.D.6.2).

This cumulative adjustment factor (CAF) followed a three step process:

- The carbamate-crop combination was modeled with PRZM/EXAMS, using the region-specific usage, application timing, soil, site, and weather data. The result is a time-series of daily pesticide concentrations in a reservoir spanning a 30-year period.

- Each daily concentration is adjusted by the fraction of the watershed that is in the crop being modeled. This is done by dividing the acres of crop grown in the multi-county region by the total acres in that region (percent crop area).

- The daily concentrations are then adjusted by the fraction of acres of the crop treated by the particular carbamate. This is done by dividing the acres of crop treated by the total crop acres in the multi-county region (percent crop treated).

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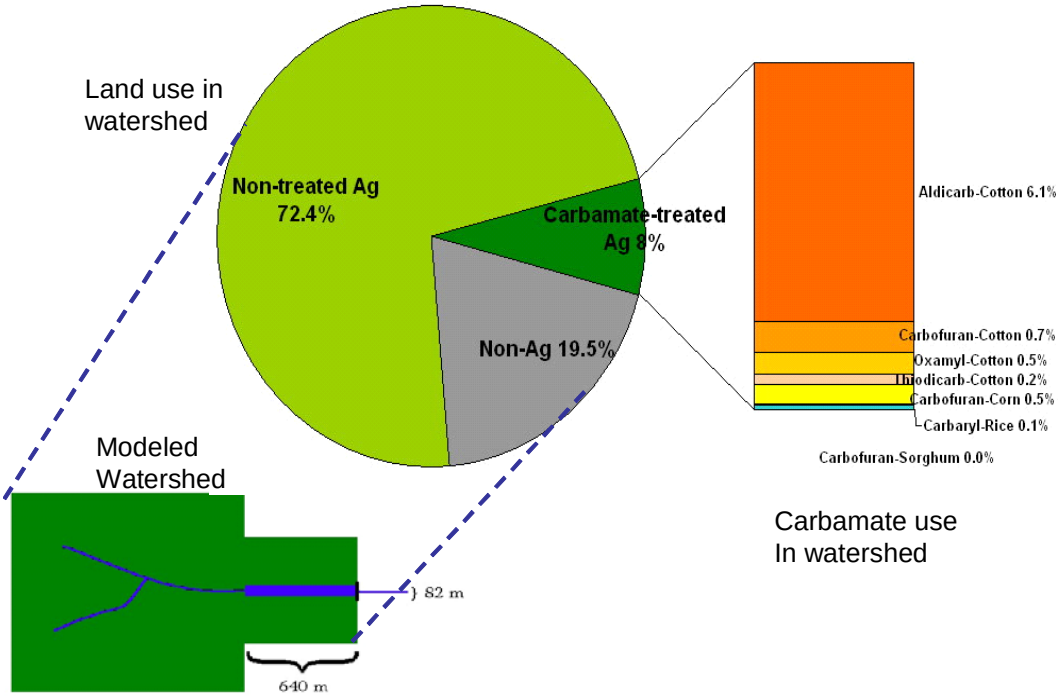
II.D.6. 2- Conceptual model for surface water sources of drinking water illustrating how multiple carbamate uses are proportioned in the watershed.



The adjustments to the estimated daily concentrations for each NMC-crop combination are shown in the following equation:

$$[\text{C-adj}]_{(\text{NMC1,CROPa})} = [\text{C-init}]_{(\text{NMC1,CROPa})} \times \text{RegCA}_{(\text{CROPa})} \times \text{FractTrt}_{(\text{NMC1,CROPa})} \times \text{RPF}_{(\text{NMC1})}$$

where

$[\text{C-adj}]_{(\text{NMC1,CROPa})}$ is the adjusted concentration for NMC1 on CROPa (a concentration is estimated for each day over the 30-year period)
$[\text{C-init}]_{(\text{NMC1,CROPa})}$ is the initial (unadjusted) concentration for NMC1 on CROPa (a concentration is estimated for each day over the 30-year period)
$\text{RegCA}_{(\text{CROPa})}$ is the regional percent crop area, expressed as a fraction = (Acres of crop planted / ttl acres ag crops) x regional PCA
$\text{FracTrt}_{(\text{NMC1,CROPa})}$ is the percent of CROPa acres treated with NMC1
$\text{RPF}_{(\text{NMC1})}$ is the relative potency factor for NMC1

The resulting adjusted concentrations for each crop-carbamate combination are summed across each day to provide a cumulative daily time series, in oxamyl equivalents, over 30 years.

The temporal component of co-occurrence of NMC pesticide residues in surface water sources of drinking water is addressed by modeling pesticide applications within

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the most likely window of application for each crop in each region. Appendix II.D.4 describes the methods used to estimate the windows of application. The Agency systematically selected the beginning of the most active window for the initial application date of each carbamate. Where multiple applications were identified, the Agency spread those evenly over the most active window.

C. Regional NMC Drinking Water Exposure Estimates From Surface Water Sources

The Agency estimated drinking water concentrations for individual carbamate pesticides and for the cumulative carbamate load for each of the regional surface water scenario sites shown in Figure II.D.6.1. Table II.D.6.1 gives the crop-carbamate combinations modeled for each region, along with the application-related inputs for each combination. More detailed usage information used for the application parameters can be found in Appendix II.D.4. Chemical-specific model inputs are described in Appendix II.D.5. Documentation of the scenario inputs are provided in Section II.D.6.D.

Table IID.6.1. Regional crop-carbamate combinations and application-related inputs used in the surface water exposure assessment.

Crop/Use	Chemical	PRZM scenario	App. Rate, kg/ha	App Date	No Apps / Interv. (da) (+)	Pct Ac Trt	CAM	Spray Drift
Southeast/ NC (Regional PCA = 0.61; NMC-use PCA = 0.40)								
Cotton	Aldicarb	NCcottonC	0.81 (0.12*)	1-May	1	0.43	1	0 [gran]
Cotton	Carbaryl	NCcottonC	0.83	1-Jun	1	0.00	2	0.055
Peanut	Aldicarb	NCpeanutC	1.20 (0.18*)	10-Apr	1	0.62	1	0 [gran]
Peanut	Carbaryl	NCpeanutC	0.63	30-May	1	0.01	2	0.055
Peanut	Oxamyl	NCpeanutC	1.39	30-May	1	0.02	2	0.055
Peanut	Methomyl	NCpeanutC	0.42	30-May	1	0.03	2	0.055
Cucumber	Carbaryl	NCcucumbCRA	1.11	27-Apr	3 / 14	0.07	2	0.055
Tobacco	Aldicarb	NCtobaccoC	1.82 (0.27*)	30-Apr	1	0.01	1	0 [gran]
Tobacco	Carbaryl	NCtobaccoC	1.21	30-Apr	3 / 36	0.01	2	0.055
Tobacco	Carbofuran	NCtobaccoC	4.44	30-Apr	2 / 53	0.00	2	0.055
Tobacco	Methomyl	NCtobaccoC	0.39	30-Apr	1	0.03	2	0.055
Southeast/GA (Regional PCA = 0.61; NMC-use PCA = 0.21)								
Cotton	Aldicarb	NCCotton / GA met file	0.65 (0.10*)	1-May	1	0.22	1	0 [gran]
Peanut	Aldicarb	NCpeanutC w/ GA met file	1.10 (0.16*)	10-Apr	1	0.34	1	0 [gran]
Pecans	Aldicarb	GAPecanC	3.22 (0.48*)	1-May	1	0.01	1	0 [gran]

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Table IID.6.1. Regional crop-carbamate combinations and application-related inputs used in the surface water exposure assessment.

Crop/Use	Chemical	PRZM scenario	App. Rate, kg/ha	App Date	No Apps / Interv. (da) (+)	Pct Ac Trt	CAM	Spray Drift
Pecans	Carbaryl	GAPecanC	2.04	1-Aug	2 / 25	0.08	2	0.055
Florida / Central (Regional PCA = 0.28; NMC-use PCA = 0.11)								
Oranges	Aldicarb	FLCitrusC	4.27 (0.64*)	1-Apr	2 / 121	0.08	1	0 [gran]
Oranges	Carbaryl	FLcitrusC	3.93	1-Mar	2 / 46	0.01	2	0.055
Oranges	Oxamyl	FLCitrusC	1.07	1-Apr	3 / 61	0.01	2	0.055
Grapefruit	Aldicarb	FLCitrusC	4.32 (0.65*)	1-Apr	2 / 121	0.07	1	0 [gran]
Grapefruit	Carbaryl	FLCitrusC	3.47	1-Mar	1	0.03	2	0.055
Florida / South (Regional PCA = 0.28; NMC-use PCA = 0.21)								
Sugarcane	Carbofuran	FLsugarcaneC	0.80	20-Jun	1	0.02	2	0.055
Sweet Corn	Methomyl	FLsweetcornC	0.39	1-Apr	8	0.40	2	0.055
Sweet Corn	Carbofuran	FLsweetcornC	1.11	1-Aug	1	0.07	2	0.055
Sweet Corn	Thiodicarb	FLsweetcornC	0.64	1-Apr	4 / 60, 168, 22	0.23	2	0.055
Sweet Corn	Methomyl from Thiodi.	FLsweetcornC	0.52	3-Apr	4 / 60, 168, 22	0.23	2	0
Pepper	Methomyl	FLpepperC	0.69	1-Apr	6 / 12	0.16	2	0.055
Pepper	Oxamyl	FLpepperC	0.57	1-Mar	6 / 20	0.15	2	0.055
Oranges	Aldicarb	FLCitrusC	4.27 (0.64*)	1-Apr	2 / 121	0.14	1	0 [gran]
Oranges	Carbaryl	FLcitrusC	3.93	1-Mar	2 / 46	0.01	2	0.055
Grapefruit	Aldicarb	FLCitrusC	4.32 (0.65*)	1-Apr	2 / 121	0.09	1	0 [gran]
Grapefruit	Carbaryl	FLcitrusC	3.47	1-Mar	1	0.07	2	0.055
Cucumber	Oxamyl	FLcucumberC	0.61	30-Jan	2 / 245	0.50	2	0.055
Cucumber	Carbofuran	FLcucumberC	1.33	20-Oct	1	0.31	2	0.055
Cucumber	Methomyl	FLcucumberC	0.64	15-Apr	5 / 12	0.21	2	0.055
Midsouth / LA (Regional PCA = 0.81; NMC-use PCA = 0.50)								
Cotton	Aldicarb	MScottonC	0.59 (0.09)	1-May	1	0.25	1	0 [gran]
Cotton	Carbofuran	MScottonC	0.49	24-Jun	1	0.03	2	0.055
Cotton	Oxamyl	MScottonC	0.21	4-May	1	0.02	2	0.055
Cotton	Thiodicarb	MScottonC	0.59	1-Jun	2 / 106	0.01	2	0.055
Cotton	Methomyl from Thiodi.	MScottonC	0.47	3-Jun	2 / 106	0.01	2	0
Corn	Carbofuran	MScornC	0.94	31-Mar	1	0.02	2	0.055
Sorghum	Carbofuran	MScornC	0.56	20-Apr	1	0.01	2	0.055
Lower Midwest / TX (Regional PCA = 0.42; NMC-use PCA = 0.20)								

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Table IID.6.1. Regional crop-carbamate combinations and application-related inputs used in the surface water exposure assessment.

Crop/Use	Chemical	PRZM scenario	App. Rate, kg/ha	App Date	No Apps / Interv. (da) (+)	Pct Ac Trt	CAM	Spray Drift
Grapefruit	Aldicarb	STXgrapeftCRA	5.21 (0.78*)	2-Jan	1	0.73	1	0 [gran]
Grapefruit	Formetanate	STXgrapeftCRA	1.02	20-Apr	1	0.35	2	0.0089
Cotton	Aldicarb	STXcottonCRA	0.54 (0.08)	10-Mar	1	0.19	1	0 [gran]
Cotton	Oxamyl	STXcottonCRA	0.26	15-Mar	2 / 69	0.19	2	0.055
Cotton	Carbofuran	STXcottonCRA	0.61	28-May	1	0.09	2	0.055
Carrots	Oxamyl	STXvegetblCRA	1.39	10-Aug	2 / 79	0.91	2	0.0049
Onions	Oxamyl	STXvegetblCRA	0.53	1-Oct	2 / 31	0.27	2	0.0049
Onions	Methomyl	STXvegetblCRA	0.54	16-Mar	3 / 213, 76	0.33	2	0.0049
Cucumber	Oxamyl	STXmelonCRA	0.73	1-Feb	2 / 151	0.31	2	0.0049
Cucumber	Methomyl	STXmelonCRA	0.52	15-Apr	3 / 20	0.34	2	0.055
Cantaloupe	Oxamyl	STXmelonCRA	1.95	15-Feb	1	0.23	2	0.0049
Spinach	Methomyl	STXvegetblCRA	0.50	30-Sep	2 / 83	0.86	2	0.0049
Watermelon	Oxamyl	STXmelonCRA	0.57	15-Jan	1	0.25	2	0.0049
Peppers	Oxamyl	STXvegetblCRA	1.11	1-Jan	2 / 182	0.77	2	0.0049
Corn	Carbofuran	STXcornCRA	0.89	16-Mar	2 / 26	0.08	2	0.0049
North/northcentral / PA (Regional PCA = 0.42; NMC-use PCA = 0.16)								
Alfalfa	Carbofuran	PAalfalfaC	0.67	9-Mar	1	0.03	2	0.055
Apples	Methomyl	PAappleC	0.44	30-May	3 / 26	0.26	2	0.0087
Apples	Oxamyl	PAappleC	0.67	20-Apr	1	0.03	2	0.0087
Apples	Formetanate	PAappleC	0.94	24-Apr	1	0.01	2	0.0087
Apples	Carbaryl	PAappleC	1.24	20-Apr	2 / 66	0.17	2	0.0087
Corn	Carbofuran	PAcornC	0.99	10-May	1	0.01	2	0.055
Peaches	Methomyl	PAappleC	0.47	15-Apr	3 / 48	0.09	2	0.0087
Peaches	Carbaryl	PAappleC	1.47	15-Jun	3 / 36	0.10	2	0.0087
Potatoes	Methomyl	PAvegetblCRA	0.50	15-Jun	5 / 21	0.04	2	0.055
Pumpkin	Carbofuran	PAvegetblCRA	0.90	15-Jun	1	0.25	1	0.0049
Sweet Corn	Methomyl	PAcornC	0.42	15-Jul	5 / 15	0.34	2	0.055
Sweet Corn	Carbofuran	PAcornC	1.11	25-Apr	1	0.08	1	0.0049
Sweet Corn	Carbaryl	PAcornC	1.09	15-Jun	3 / 31	0.07	2	0.055
Sweet Corn	Thiodicarb	PAcornC	0.64	15-Jul	3 / 38	0.05	2	0.055
Sweet Corn	Methomyl from Thiodi.	PAcornC	0.51	17-Jul	3 / 38	0.05	2	0
North/northcentral / IL (Regional PCA = 0.87; NMC-use PCA = 0.45)								
Alfalfa	Carbofuran	ILalfalfaCRA	0.79	15-Apr	1	0.01	2	0.055
Beans, Lima	Methomyl	ILbeanCRA	1.17	15-Jun	1	0.13	2	0.055
Corn	Carbaryl	ILCornC	1.11	15-May	1	0.00	2	0.055
Corn	Carbofuran	ILCornC	0.74	20-Jun	1	0.00	2	0.055
Sweet Corn	Carbaryl	ILCornC	1.66	15-Jul	3 / 21	0.06	2	0.055

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Table IID.6.1. Regional crop-carbamate combinations and application-related inputs used in the surface water exposure assessment.

Crop/Use	Chemical	PRZM scenario	App. Rate, kg/ha	App Date	No Apps / Interv. (da) (+)	Pct Ac Trt	CAM	Spray Drift
Sweet Corn	Carbofuran	ILCornC	0.39	1-May	1	0.06	2	0.0049
Northern Great Plains / MN-ND (Regional PCA = 0.83; NMC-use PCA = 0.52)								
Potatoes	Aldicarb	MNpotatoCRA	2.55 (0.38*)	15-May	1	0.02	1	0 [gran]
Potatoes	Carbofuran	MNpotatoCRA	0.89	13-May	2 / 32	0.01	2	0.0049
Potatoes	Oxamyl	MNpotatoCRA	0.67	30-May	2 / 46	0.01	2	0.055
Sugar Beets	Aldicarb	MNsugarbeetC	1.67 (0.25*)	30-Apr	1	0.01	1	0 [gran]
Sugar Beets	Carbofuran	MNsugarbeetC	1.11	1-Jun	1	0.01	2	0.0049
Wheat	Carbaryl	NDwheatC	0.89	1-Jun	1	0.02	2	0.055
Northwest / WA (Regional PCA = 0.42; NMC-use PCA = 0.23)								
Apples	Carbaryl	WAorchardCRA	1.35	15-Apr	2 / 69	0.42	2	0.0087
Apples	Formetanate	WAorchardCRA	1.08	31-Mar	1	0.05	2	0.0087
Beans, Lima	Methomyl	WAbeansCRA	1.00	30-May	2 / 61	0.43	2	0.055
Dry Beans/Peas	Aldicarb	WAbeansCRA	1.33 (0.20*)	1-Apr	1	0.17	1	0 [gran]
Carrots	Oxamyl	WAbeansCRA	1.09	1-Apr	4 / 19	0.09	2	0.055
Cherries	Carbaryl	WAorchardCRA	2.03	20-May	2 / 41	0.50	2	0.0087
Onions	Oxamyl	WAonionsCRA	1.07	15-Mar	2 / 92	0.37	2	0.055
Potatoes	Aldicarb	WApotatoCRA	3.21 (0.48*)	15-May	1	0.36	1	0 [gran]
Potatoes	Carbofuran	WApotatoCRA	0.74	10-Apr	2 / 36	0.07	2	0.055
Potatoes	Oxamyl	WApotatoCRA	1.16	10-Apr	3 / 50, 69	0.02	2	0.055
Sweet Corn	Methomyl	WAswcornCRA	0.49	30-Jun	7 / 13	0.01	2	0.055
Southeast / CA (Regional PCA = 0.56; NMC-use PCA = 0.33)								
Alfalfa	Carbofuran	CAalfalfa0C	0.67	18-Feb	1	0.06	2	0.055
Alfalfa	Methomyl	CAalfalfa0C	0.33	15-Jun	1	0.01	2	0.055
Asparagus	Methomyl	CAtomato0C	0.91	30-Jun	1	0.36	2	0.055
Broccoli	Methomyl	CAbroccCVcra	0.63	1-Aug	2 / 45	0.11	2	0.055
Cantaloupe	Carbaryl	CAtomato0C	0.86	9-Apr	1	0.17	2	0.055
Cantaloupe	Methomyl	CAtomato0C	0.69	1-Jul	2 / 38	0.36	2	0.055
Cantaloupe	Oxamyl	CAtomato0C	1.05	19-Apr	1	0.16	2	0.055
Carrots	Methomyl	CAcarrotCra	0.63	15-Aug	2 / 20	0.04	2	0.055
Cotton	Aldicarb	CAcotton0C	1.26 (0.19*)	15-Apr	1	0.30	1	0 [gran]
Cotton	Carbaryl	CAcotton0C	0.55	4-Apr	1	0.01	2	0.055
Cotton	Carbofuran	CAcotton0C	0.54	14-Aug	2 / 19	0.05	2	0.055
Cotton	Oxamyl	CAcotton0C	0.73	1-Jun	1	0.13	2	0.055

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Table IID.6.1. Regional crop-carbamate combinations and application-related inputs used in the surface water exposure assessment.

Crop/Use	Chemical	PRZM scenario	App. Rate, kg/ha	App Date	No Apps / Interv. (da) (+)	Pct Ac Trt	CAM	Spray Drift
Dry Beans/Peas	Aldicarb	CAtomato0C	1.06 (0.16*)	20-Apr	1	0.03	1	0 [gran]
Garlic	Methomyl	CAgarlic0Cra	0.50	29-Apr	3 / 7	0.05	2	0.055
Garlic	Oxamyl	CAgarlic0Cra	2.22	24-Mar	1	0.14	2	0.055
Grapefruit	Formetanate	CAcitrus0C	1.25	26-Apr	2 / 4	0.06	2	0.0087
Grapes	Carbofuran	CAgrapesC	3.11	1-May	1	0.00	2	0.0087
Grapes, Table	Methomyl	CAgrapesC	0.83	1-May	1	0.17	2	0.0087
Lemons	Formetanate	CAcitrus0C	1.17	1-May	2 / 4	0.03	2	0.0087
Lettuce	Methomyl	CAbroccCVcra	0.77	15-Jun	2 / 84	0.73	2	0.055
Nectarine	Carbaryl	CAfruit0C	3.55	19-May	1	0.04	2	0.0087
Nectarine	Formetanate	CAfruit0C	0.78	18-Feb	1	0.46	2	0.0087
Nectarine	Methomyl	CAfruit0C	0.83	20-Feb	2 / 81	0.12	2	0.0087
Onions	Methomyl	CAonion0C	0.80	11-May	2 / 35	0.04	2	0.0087
Oranges	Carbaryl	CAcitrus0C	4.89	17-May	1	0.03	2	0.0087
Oranges	Formetanate	CAcitrus0C	1.14	22-Apr	1	0.06	2	0.0087
Oranges	Methomyl	CAcitrus0C	0.67	20-Apr	1	0.01	2	0.0087
Oranges	Oxamyl	CAcitrus0C	0.56	3-Feb	4 / 13, 101, 80	0.00	2	0.0087
Peaches	Carbaryl	CAfruit0C	4.46	15-May	2 / 56	0.05	2	0.0087
Peaches	Formetanate	CAfruit0C	0.88	6-Mar	1	0.05	2	0.0087
Peaches	Methomyl	CAfruit0C	0.74	10-Apr	1	0.02	2	0.0087
Peaches	Oxamyl	CAfruit0C	2.22	3-Jan	2 / 21	0.00	2	0.0087
Pistachios	Carbaryl		4.44	5-Feb	1	0.03	2	0.0087
Plum/Prune	Carbaryl	CAfruit0C	3.30	13-Jan	1	0.03	2	0.0087
Plum/Prune	Formetanate	CAfruit0C	1.28	1-Mar	1	0.01	2	0.0087
Potatoes	Aldicarb	CAtomato0C	3.33 (0.50*)	7-May	1	0.10	1	0 [gran]
Potatoes	Methomyl	CAtomato0C	0.79	7-May	2 / 26	0.09	2	0.055
Sugar Beets	Methomyl	CAsugarbeet0C	0.58	15-Jun	1	0.54	2	0.055
Tangerine	Formetanate	CAcitrus0C	0.90	24-Apr	1	0.14	2	0.055
Tomatoes	Methomyl	CAtomato0C	0.77	15-May	2 / 69	0.40	2	0.055
Tomatoes	Oxamyl	CAtomato0C	0.66	20-Apr	1	0.01	2	0.055
Watermelon	Methomyl	CAtomato0C	0.69	10-Jun	2 / 41	0.22	2	0.055

+ For multiple applications, intervals are uniform between applications except where varying intervals are indicated.
* Because of irregularities in the way PRZM models banded in-furrow applications, OPP assumed 15% of applied aldicarb was available in the upper 4-cm of the soil for runoff, reducing the application rate accordingly.

Table II.D.6.2 summarizes the NMC cumulative residue distributions estimated for each regional exposure site. The regional surface water distributions with the highest peak NMC cumulative loads occurred in the southeastern part of the United States, where high carbamate use, particularly aldicarb, and high rainfall drove the transport of NMC residues into surface water sources of drinking water. The North Carolina site, which

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represents vulnerable surface water sources in the southeastern coastal plain, had the highest peak cumulative concentrations of any of the regional surface water sites. Aldicarb, which has the highest relative potency of the NMC pesticides, tended to be the major contributor in most of the regional surface water exposures.

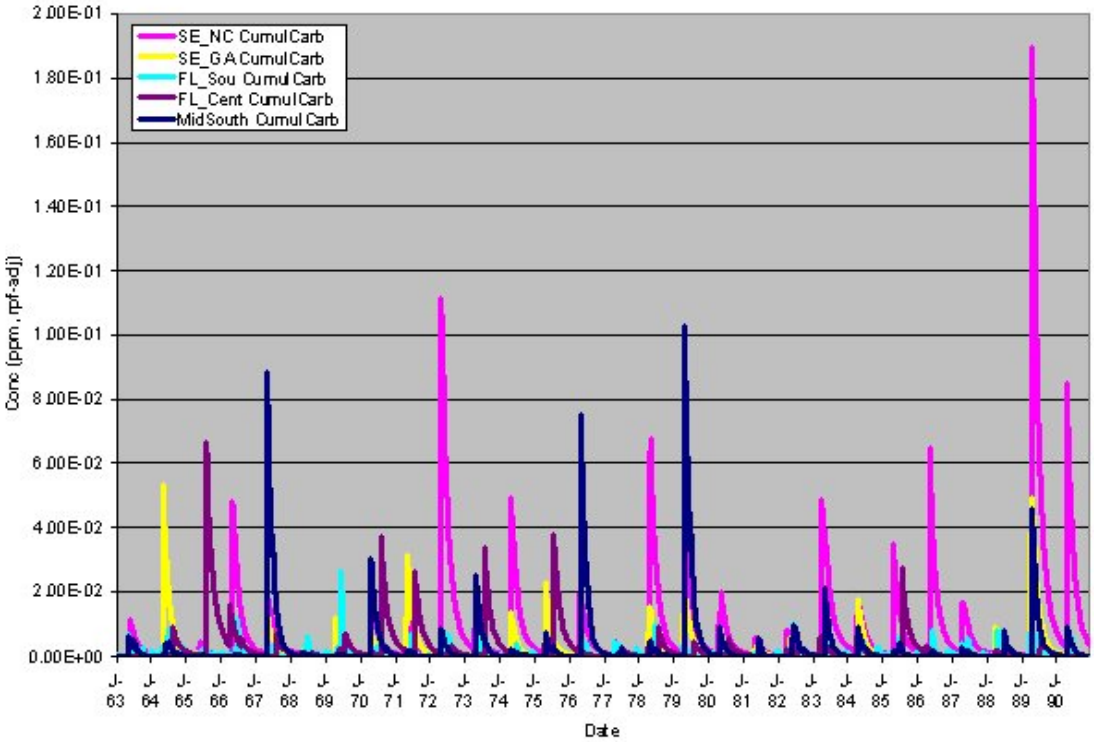
Table IID.6.2. Percentile concentrations for estimated N-methyl carbamate cumulative distributions in the surface water scenario sites.

Region/Site	Percentile concentration in ug/L (oxamyl equivalents)						Major contributor
	Max	99th	95th	90th	75th	50th	
Southeast / NC	4.2	0.92	0.20	0.079	0.0047	<0.0001	Aldicarb
Southeast / GA	1.2	0.30	0.072	0.019	0.001	<0.0001	Aldicarb
Florida / Central	1.5	0.24	0.040	0.014	0.0021	0.0004	Aldicarb
Florida / South	1.0	0.23	0.11	0.061	0.021	0.0067	Carbofuran, methomyl, oxamyl
Midsouth / LA	2.3	0.46	0.10	0.041	0.0093	0.0009	Aldicarb
Lower Midwest / TX	0.72	0.27	0.11	0.068	0.028	0.0087	Carbofuran, aldicarb, oxamyl
Southwest / CA	0.30	0.11	0.045	0.026	0.011	0.0053	Aldicarb, methomyl
Northwest / WA	0.18	0.056	0.014	0.0086	0.0048	0.0011	Aldicarb, carbofuran, methomyl, oxamyl
North/ N central / IL	0.13	0.046	0.017	0.0095	0.0026	0.0004	Carbofuran
North/ N central / PA	0.10	0.032	0.012	0.0066	0.0021	0.0006	Carbofuran
Northern Great Plains/ MN-ND	0.017	0.0079	0.0032	0.002	0.0006	0.0001	Aldicarb, carbofuran, carbaryl

Figure II.D.6.3 illustrates the year-to-year variability (over 30 years of model simulation) in predicted cumulative carbamate concentrations in surface water sources of drinking water in selected regions. For the exposure assessment, pesticide usage (amount, frequency, timing) was held constant so the variations reflect the range in variability in pesticide concentrations based on weather patterns over time. The peak concentrations in any year tend to be short-lived and reflect the intensity and timing of runoff events in relation to the time of application.

II.D.6. 3 - Estimated cumulative carbamate distribution in surface water over 30 years at five regional scenario sites: Southeast/North Carolina (pink), Southeast/ Georgia (yellow), Florida/south (light blue), Florida/central (purple), Mid-south/ Louisiana (dark blue).

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment



Estimated peak concentrations of the individual carbamate pesticides in each of the regional surface water scenario sites were in the sub-parts per billion range, except for aldicarb, which had estimated peaks as high as a single part per billion in the northeast NC site (Table II.D.6.3).

Table II.D.6.3. Estimated concentration percentiles, in mg/L (ppm), of individual NMC pesticides in each region.

	Aldicarb	Carbaryl	Carbo-furan	Formetan-ate HCl	Metho-myl	Oxamyl	Thiodi-carb
Southeast / NC							
Crops	cotton, peanut, tobacco	cotton, peanut, cucum-ber, tobacco	tobacco		peanut, tobacco	peanut	
Maximum	1.48E-03	3.82E-05	2.30E-06		2.50E-05	2.32E-04	
99th %ile	3.34E-04	1.57E-05	6.12E-07		3.83E-06	8.47E-06	
95th %ile	7.06E-05	6.57E-06	2.36E-07		1.11E-06	1.69E-06	
90th %ile	2.56E-05	4.42E-06	1.37E-07		3.82E-07	3.42E-07	
80th %ile	4.01E-06	2.36E-06	8.03E-08		9.19E-08	1.14E-08	
75th %ile	1.32E-06	1.78E-06	6.37E-08		3.56E-08	1.75E-09	
50th %ile	1.31E-08	5.04E-07	8.99E-09		1.88E-10	1.38E-13	
Southeast / GA							
Crops	cotton, peanut, pecan	pecan					
Maximum	4.28E-04	5.22E-05					
99th %ile	9.82E-05	1.18E-05					

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Table II.D.6.3. Estimated concentration percentiles, in mg/L (ppm), of individual NMC pesticides in each region.

	Aldicarb	Carbaryl	Carbo-furan	Formetan-ate HCl	Metho-myl	Oxamyl	Thiodi-carb
95th %ile	2.20E-05	3.83E-06					
90th %ile	5.93E-06	1.89E-06					
80th %ile	5.31E-07	2.98E-07					
75th %ile	1.41E-07	1.08E-07					
50th %ile	9.18E-10	9.75E-09					
Florida / South							
Crops	oranges, grapefruit	oranges, grapefruit	sugar-cane, sweet corn, cucumber		sweet corn, pepper, cucumber	pepper, oranges, cucumber	sweet corn
Maximum	2.37E-05	1.16E-05	8.23E-04		6.27E-04	1.41E-04	5.90E-05
99th %ile	4.57E-06	2.37E-06	1.83E-04		1.75E-04	2.14E-05	6.96E-06
95th %ile	8.23E-07	6.66E-07	8.04E-05		7.79E-05	5.69E-06	2.91E-06
90th %ile	2.35E-07	3.17E-07	4.04E-05		4.16E-05	2.61E-06	1.26E-06
80th %ile	3.69E-08	8.65E-08	1.17E-05		1.57E-05	1.08E-06	2.12E-07
75th %ile	1.69E-08	3.84E-08	7.31E-06		9.86E-06	8.04E-07	7.86E-08
50th %ile	3.73E-10	1.10E-09	9.59E-07		1.66E-06	1.31E-07	7.58E-11
Florida / Central							
Crops	oranges, grapefruit	oranges, grapefruit				oranges	
Maximum	5.27E-04	1.14E-04				5.40E-05	
99th %ile	8.06E-05	2.62E-05				7.56E-06	
95th %ile	1.33E-05	8.70E-06				2.02E-06	
90th %ile	4.20E-06	5.18E-06				9.95E-07	
80th %ile	7.37E-07	1.71E-06				4.21E-07	
75th %ile	3.91E-07	8.76E-07				2.56E-07	
50th %ile	3.54E-08	2.03E-08				7.80E-09	
Mid-South / LA							
Crops	Cotton		cotton, corn, sorghum		degr of thiodicarb (cotton)	cotton	cotton
Maximum	8.11E-04		3.32E-04		3.41E-04	1.94E-04	7.53E-05
99th %ile	1.62E-04		1.53E-04		4.80E-05	1.43E-05	2.86E-06
95th %ile	1.71E-05		7.18E-05		8.57E-06	1.39E-06	6.68E-07
90th %ile	3.67E-06		3.91E-05		3.15E-06	3.11E-07	1.14E-07
80th %ile	1.98E-07		1.72E-05		7.72E-07	7.94E-09	5.57E-09
75th %ile	4.70E-08		1.28E-05		4.19E-07	1.00E-09	1.32E-09
50th %ile	3.53E-10		2.29E-06		2.59E-08	3.47E-14	1.38E-12
North-Northcentral / PA							
Crops		apple, peach, sweet corn	alfalfa, corn, pumpkin, sweet corn	apple	apple, peach, potato, sweet corn	apple	sweet corn
Maximum		2.36E-05	6.91E-05	7.59E-07	7.03E-05	3.30E-06	2.58E-07
99th %ile		3.33E-06	2.28E-05	8.84E-08	1.57E-05	1.43E-07	1.18E-07
95th %ile		1.06E-06	8.58E-06	1.92E-08	5.66E-06	2.86E-08	4.89E-08

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Table II.D.6.3. Estimated concentration percentiles, in mg/L (ppm), of individual NMC pesticides in each region.

	Aldicarb	Carbaryl	Carbo-furan	Formetan-ate HCl	Metho-myl	Oxamyl	Thiodi-carb
90th %ile		6.33E-07	4.64E-06	8.60E-09	3.36E-06	6.42E-09	1.80E-08
80th %ile		3.54E-07	1.93E-06	9.49E-10	1.68E-06	2.09E-10	2.45E-09
75th %ile		2.71E-07	1.39E-06	3.35E-10	1.29E-06	3.46E-11	9.78E-10
50th %ile		1.85E-08	1.94E-07	1.92E-11	4.44E-07	4.53E-15	5.85E-12
North- NorthCentral / IL							
Crops		corn, sweet corn	alfalfa, corn, sweet corn		lima beans		
Maximum		4.44E-05	1.08E-04		1.74E-05		
99th %ile		9.68E-06	3.82E-05		2.49E-06		
95th %ile		2.52E-06	1.42E-05		5.06E-07		
90th %ile		1.45E-06	7.72E-06		1.73E-07		
80th %ile		6.16E-07	2.90E-06		8.52E-09		
75th %ile		4.49E-07	1.98E-06		2.33E-09		
50th %ile		3.87E-08	3.10E-07		1.48E-10		
Lower Midwest / TX							
Crops	Grapefruit, cotton		Cotton, corn	Grapefruit	Onions, cucum-ber, spinach	Cotton, carrots, onions, cucum-ber, can-taloupe water-melon, peppers	
Maximum	8.71E-03		1.06E-02	2.81E-03	1.68E-03	5.27E-03	
99th %ile	2.11E-03		5.08E-03	5.74E-04	2.56E-04	1.82E-03	
95th %ile	5.82E-04		2.17E-03	7.27E-05	1.02E-04	5.87E-04	
90th %ile	2.31E-04		1.29E-03	2.36E-05	5.28E-05	2.82E-04	
80th %ile	4.30E-05		6.40E-04	2.42E-06	2.18E-05	1.13E-04	
75th %ile	1.62E-05		4.67E-04	6.86E-07	1.47E-05	8.05E-05	
50th %ile	3.55E-08		5.94E-05	8.66E-09	2.19E-06	1.55E-05	
Southwest / CA Central Valley							
Crops	Cotton, potatoes, beans/ peas	Cotton, citrus, grapes, melons, stone fruit	Alfalfa, cotton, grapes	Citrus, stone fruit	Alfalfa, asparagus, carrots, cole crops, garlic, grapes, lettuce, melons, onions, stone fruit, potatoes, sugar beets, tomatoes	Cotton, garlic, melon, oranges, peaches, tomatoes	

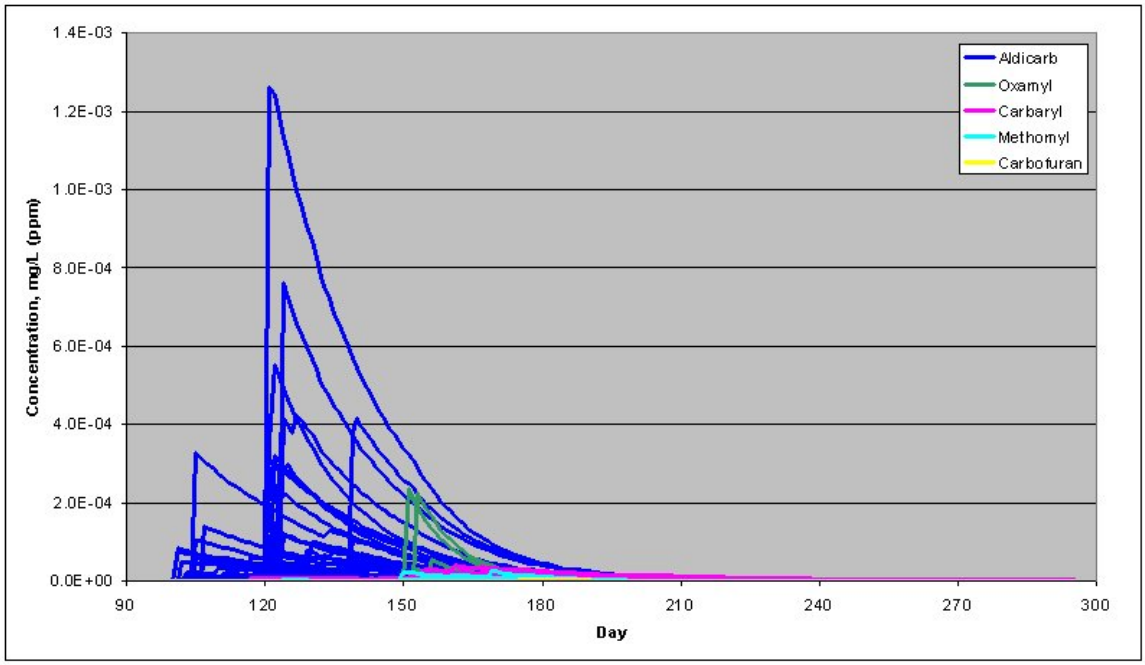
Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Table II.D.6.3. Estimated concentration percentiles, in mg/L (ppm), of individual NMC pesticides in each region.

	Aldicarb	Carbaryl	Carbo-furan	Formetan-ate HCl	Metho-myl	Oxamyl	Thiodi-carb
Maximum	8.29E-05	1.68E-05	7.88E-05	2.77E-05	4.15E-04	2.41E-05	
99th %ile	1.86E-05	5.27E-06	3.62E-05	3.58E-06	8.03E-05	1.18E-05	
95th %ile	1.37E-06	2.32E-06	1.77E-05	5.94E-07	3.13E-05	4.70E-06	
90th %ile	3.73E-07	1.23E-06	1.05E-05	3.74E-07	1.57E-05	2.21E-06	
80th %ile	7.10E-08	5.26E-07	6.06E-06	1.50E-07	7.30E-06	8.04E-07	
75th %ile	4.29E-08	3.87E-07	5.13E-06	9.49E-08	5.26E-06	5.28E-07	
50th %ile	4.64E-09	7.63E-08	2.75E-06	6.12E-09	1.84E-06	1.23E-07	
25th %ile	2.87E-10	3.89E-09	1.07E-06	1.23E-10	5.03E-07	1.95E-08	
10th %ile	3.70E-12	1.78E-09	4.35E-07	1.71E-11	1.97E-07	3.36E-09	
Minimum	4.86E-15	7.76E-10	6.70E-08	2.63E-12	1.08E-08	1.47E-12	

Surface water exposure in each of the regions reflects a distinct seasonal pattern, with greatest exposure coming during the dominant pesticide use season. Figure II.D.6.4 illustrates this pattern for the Southeast Region (North Carolina), with the greatest exposures from drinking water occurring in late spring and summer (May-July), dropping to negligible levels during the rest of the year. In contrast, the cumulative ground water exposures showed a less-pronounced seasonal trend, with estimated exposures remaining at elevated concentrations for prolonged periods. Similar pattern occur in each of the regions.

Figure II.D.6,4 – Seasonal pattern in estimated concentrations of carbamates in the Southeast / North Carolina exposure site.



Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

D. Southeast Region Scenario Documentation

1. North Carolina Cotton (NCcottonC)

The field used to represent cotton production in North Carolina is located in the Piedmont/Coastal Plain. According to the 1997 Census of Agriculture, North Carolina is ranked 5th among the major cotton producing states in the U.S. Most cotton is grown in the coastal plain region and approximately 3 percent in the Piedmont. Cotton is planted in the early Spring (mid-April) and harvested beginning in October. Continuous cotton is practice is much of the region and cotton is gradually replacing land once cultivated in tobacco. Row spacing is generally 38-inches with 3-4 plants per foot row. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. All cotton is defoliated in North Carolina prior to harvesting. Conventional tillage is the dominant practice, but, conservation tillage, no-till and strip-till practices are gaining in popularity in the region. The crop is rarely grown under irrigation, approximately 5 percent. The soil selected to simulate the field is a Boswell fine sandy loam. Boswell fine sandy loam is a fine, mixed, active, thermic Vertic Paleudalfs. Very little of the soil is in cotton and most remains in woodland or pasture. Boswell fine sandy loam is a deep, moderately well drained, moderate to rapid runoff, very slowly permeable soils formed in marine fluviatile deposits of acid clayey sediments. These soils have a high shrink-swell potential. They are located on nearly level to steep uplands of the Southern Coastal Plain. Slopes are generally between 1 to 17 percent. The soils are of large extent in the Southern Coastal Plain region. Boswell fine sandy loam is a Hydrologic Group D soil.

PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina - Cotton

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Raleigh, NC (W13722)
Ending Date	December 31, 1990	Meteorological File - Raleigh, NC (W13722)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI-1*	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.3	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina - Cotton

Parameter	Value	Source
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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. Meteorological File - Raleigh, NC (W13722)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	98	PRZM Input Collator, PIC (Burns, 1992)
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)	01/06	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/08	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/11	Usual Planting and Harvest Dates for US Field Crops (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; Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, PB8CTCTC, actually for Columbia, SC cotton, conv till (USDA, 2000)
USLE C Factor (USLEC)	0.228 - 0.748	RUSLE Project; PB8CTCTC, actually for Columbia, SC cotton, conv till (USDA, 2000)
Soil Parameters: Boswell series		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	NRCS, National Soils Characterization Database (NRCS, 2001)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 2 cm (HORIZN = 2) 88 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina - Cotton

Parameter	Value	Source
Bulk Density (BD)	1.8 g cm-3 (HORIZN = 1,2) 1.7 g cm-3 (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Initial Water Content (THETO)	0.213 cm3-H2O cm3-soil (HORIZN =1, 2) 0.354 cm3-H2O cm3-soil (HORIZN =3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.213 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.354 cm3-H2O cm3-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Wilting Point (THEWP)	0.063 cm3-H2O cm3-soil (HORIZN = 1,2) 0.213 cm3-H2O cm3-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.29% (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)

2. North Carolina Peanuts (NCpeanutC)

The field used to represent peanut production in North Carolina is located in Eastern Pitt County in the Coastal Plain. According to the 1997 Census of Agriculture, North Carolina is ranked 3rd among the major peanut producing states in the U.S., accounting for approximately 10 percent of the total U.S. crop. Peanuts are produced mainly on the northeastern coastal plain and a small amount is produced in the southeastern region. The crop is generally planted in the Spring (mid-April to early May) and harvested beginning in September. Crop rotation is the most important cultural practice, with a long rotation (3 years) followed by two years of a grass-type crop being among the most effective management practices for nematode, diseases, and weed control. Most plantings occurs on raised beds. Row spacing is generally 30 to 48 inches. Conventional tillage is practiced in the region, but strip-tillage and no-tillage practices are becoming more popular. The crop is rarely grown under irrigation, approximately 10 percent. The soil selected to simulate the field is a Craven silt loam. Craven silt loam is a fine, mixed, subactive, thermic Aquic Hapludults. Approximately one-half of the series is used for the production of row crops such as corn, tobacco, cotton, small grain, peanuts and pasture. Craven silt loam is a deep, moderately well drained, medium to rapid runoff, slowly permeable soils formed in clayey Pleistocene sediments. They are located on nearly level to sloping Coastal Plain Uplands. Slopes are generally between 0 to 12 percent. The soils are extensive throughout the Coastal Plain region. Craven silt loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina – Tobacco

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Raleigh, NC (W13722)
Ending Date	December 31, 1990	Meteorological File - Raleigh, NC (W13722)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.24 tons EI-1*	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	American Peanut Council http://peanutsusa.com/what/growing.html
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 - Raleigh, NC (W13722)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	45 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	80	PRZM Input Collator, PIC (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	3	American Peanut Council http://peanutsusa.com/what/growing.html
Date of Crop Emergence (EMD, EMM, IYREM)	11/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/08	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	12/09	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina – Tobacco

Parameter	Value	Source
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	89, 84, 86	Gleams Manual Table; close seeded legume, C soil, fallow = fallow SR/CT poor; cropping and residue = legumes SR poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project, PB9PRPRC_ runner peanuts, Augusta GA (nearest peanut) (USDA, 2000)
USLE C Factor (USLEC)	0.047 - 0.668	RUSLE Project; PB9PRPRC_ runner peanuts, Augusta GA (nearest peanut) (USDA, 2000)
Soil Parameters: Craven series		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	NRCS, National Soils Characterization Database (NRCS, 2001)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 2 cm (HORIZN = 2) 88 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Bulk Density (BD)	1.8 g cm-3 (HORIZN = 1,2) 1.7 g cm-3 (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Initial Water Content (THETO)	0.213 cm3-H2O cm3-soil (HORIZN =1, 2) 0.354 cm3-H2O cm3-soil (HORIZN =3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.213 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.354 cm3-H2O cm3-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Wilting Point (THEWP)	0.063 cm3-H2O cm3-soil (HORIZN = 1,2) 0.213 cm3-H2O cm3-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.29% (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)

3. North Carolina Tobacco (NCtobaccoC)

The field used to represent tobacco (flue-cured) production in North Carolina is located in Pitt and Johnston Counties, in Eastern North Carolina. According to the 1997 Census of Agriculture, North Carolina is the major producer of tobacco (1st overall) in the U.S. Tobacco is grown on a wide variety of soils, however, maximum yields are

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typically seen on sandy loam soils with low organic matter content. In addition, tobacco roots do not tolerate "wet" soils for prolong periods of time. Approximately 90 percent of the crop is grown in two-year rotation. Row spacing is generally from 40 to 48 inches. Tobacco is transplanted from greenhouse or plastic-covered outdoor plant beds in early spring after frost pressures (mid-April). Flower heads are removed to induce growth of lateral shoots. Harvesting is done in stages from lowest to highest leaves on the plant as the leaves ripen. Nearly all (99 percent) of tobacco is grown with conventional tillage. No-till production is used mostly for burley tobacco grown in western North Carolina. The soil selected to simulate the field is a benchmark soil, Norfolk loamy sand. Norfolk loamy sand is a fine-loamy, kaolinitic, thermic, Typic Kandiudults. Most of these soils are under cultivation in corn, cotton, peanuts, tobacco and soybeans. Norfolk loamy sand is a very deep, well drained, moderately permeable soil with slow to medium runoff. These soils formed in loamy marine sediments of the Coastal Plain. They are found on level to gently sloping uplands of the Coastal Plain. Slopes range from 0 to 10 percent. The series is of large extent throughout the Coastal Plan. Norfolk loamy sand is a Hydrologic Group B soil.

PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina – Tobacco

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Raleigh, NC (W13722)
Ending Date	December 31, 1990	Meteorological File - Raleigh, NC (W13722)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.17 tons EI-1*	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.192	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	PRZM Table 5.6 value for contour plowing on 5% slope (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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

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PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina – Tobacco

Parameter	Value	Source
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 - Raleigh, NC (W13722)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	80	NCSU Crop Profile http://ipmwww.ncsu.edu/ncpmip/
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)	11/04	PRZM Table 5.9 and NCSU Crop Profile http://ipmwww.ncsu.edu/ncpmip/
Date of Crop Maturity (MAD, MAM, IYRMAT)	07/07	PRZM Table 5.9 and NCSU Crop Profile http://ipmwww.ncsu.edu/ncpmip/
Date of Crop Harvest (HAD, HAM, IYRHAR)	16/07	PRZM Table 5.9 and NCSU Crop Profile http://ipmwww.ncsu.edu/ncpmip/
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 83	Gleams Manual Table A.3, Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor; B soil (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, PB6TBHGC; Tobacco, conventional tillage; Greensboro, NC (USDA, 2000)
USLE C Factor (USLEC)	0.071 - 0.500	RUSLE Project; PB6TBHGC; Tobacco, conventional tillage; Greensboro, NC (USDA, 2000)
Soil Parameters: Norfolk series		
Total Soil Depth (CORED)	150 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	NRCS, National Soils Characterization Database (NRCS, 2001)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 35 cm (HORIZN = 2) 55 cm (HORIZN = 3) 50 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Bulk Density (BD)	1.55 g cm-3 (HORIZN = 1,2) 1.3 g cm-3 (HORIZN = 3) 1.1 g cm-3 (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)

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PRZM 3.12 Scenario Input Parameters for Coastal Plain, North Carolina – Tobacco

Parameter	Value	Source
Initial Water Content (THETO)	0.199 cm3-H2O cm3-soil (HORIZN =1,2) 0.406 cm3-H2O cm3-soil (HORIZN =3) 0.396 cm3-H2O cm3-soil (HORIZN =4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.199 cm3-H2O cm3-soil (HORIZN = 1,2) 0.406cm3-H2O cm3-soil (HORIZN = 3) 0.396 cm3-H2O cm3-soil (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Wilting Point (THEWP)	0.089 cm3-H2O cm3-soil (HORIZN = 1,2) 0.206 cm3-H2O cm3-soil (HORIZN = 3) 0.246 cm3-H2O cm3-soil (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Organic Carbon Content (OC)	0.29% (HORIZN = 1,2) 0.116 (HORIZN = 3) 0.058% (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)

4. North Carolina Cucumbers (NCcucumbCRA)

This scenario has been developed for use in the carbamate cumulative drinking water assessment (2005). The scenario was adapted from the NC Sweet Potato scenario, which is located in the same area. Soil conditions are the same; crop-specific parameters have been adjusted to reflect cucumbers rather than sweet potatoes.

The field used to represent cucumber production in North Carolina is located in the Southern Coastal Plains in Nash County. Nash County has ~6,400 acres in cucumber/pickle production, the highest among NC counties (USDA Ag Census, 2002). According to the USDA Crop Profile for cucumbers in North Carolina, is ranked 2nd among US states in cucumber production, accounting for ~20% of pickling cucumbers (27-30,000 acres) and ~10% of slicing cucumber production (5-8,000 acres) in 1999 (USDA Crop Profile, Nov 1999; http://www.ipmcenters.org/cropprofiles/docs/nccucumbers.html). Most of the cucumber production is in eastern North Carolina. Cucumbers are adapted to a wide range of soils. The crop is grown in two production seasons (spring and summer), with the average time from seeding to first harvest of 36 to 45 days. Used April 15th planting date to reflect the spring production period. This date is based on BEAD research for the carbamate cumulative assessment (estimation method and references provided for the carbamate cumulative document).

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The soil selected to simulate the field is a Craven silt loam. Craven silt loam is a fine, mixed, subactive, thermic Aquic Hapludults. Approximately one-half of the series is used for the production of row crops such as corn, tobacco, cotton, small grain, peanuts and pasture. Craven silt loam is a deep, moderately well drained, medium to rapid runoff, slowly permeable soil formed in clayey Pleistocene sediments. They are located on nearly level to sloping Coastal Plain Uplands. Slopes are generally between 0 to 12 percent. The soils are extensive throughout the Coastal Plain region. Craven silt loam is a benchmark soil and a Hydrologic Group C soil.

Scenario Input Parameters for Nash County, North Carolina - Cucumbers

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Raleigh, NC (W13722)
Ending Date	December 31, 1990	Meteorological File - Raleigh, NC (W13722)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.42 tons EI-1*	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Mid-point of series range for Craven silt loam
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2005)
Initial Surface Condition (ISCOND)	1	Pickling cucumbers are generally planted on bare ground; slicing cucumbers are produced on plastic (USDA Crop Profile, 1999)
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 - Raleigh, NC (W13722)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Table 5.4 (EPA, 1998)

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Scenario Input Parameters for Nash County, North Carolina - Cucumbers

Parameter	Value	Source
Maximum Active Root Depth (AMXDR)	50 cm	D.C. Sanders, NCSU extension hort specialist. On-line publication on vegetable irrigation characterizing cucumber as shallow (12-18 in) to moderate (18-24 in) rooting depth (http://www.ces.ncsu.edu/depts/hort/hil/hil-33-e.html)
Maximum Canopy Coverage (COVMAX)	80	Estimated based on est for sweet potatoes; consistent w/ range for vegetable crops (70-90%) in Table A-1 of scenario input guidance (EPA, 2005)
Soil Surface Condition After Harvest (ICNAH)	3	residues remain on field until winter cover crop is planted.
Date of Crop Emergence (EMD, EMM, IYREM)	27/04	Based on planting dates of 4/15-5/15 for slicing cucs, 4/20-5/20 for pickling cucs (SE Commercial Vegetable Guide, 2005), estimated emergence 1 week after planting
Date of Crop Maturity (MAD, MAM, IYRMAT)	4/06	Assumed 1 week between crop maturity and harvest
Date of Crop Harvest (HAD, HAM, IYRHAR)	11/06	Added 45 days from planting to first harvest, based on USDA Crop Profile for NC cucumber (http://www.ipmcenters.org/cropprofiles/docs/nccucumbers.html)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table A.3,Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.011	Pb6BGBGC Green Beans, conventional tillage, Cover Code 7 (clean tilled, smooth or fallow), Greensboro, N.C. These values re-ordered from RUSLE project so that first value is for the planting date.
USLE C Factor (USLEC)	0.160 - 0.923	Pb6BGBGC Green Beans, conventional tillage, Cover Code 7 (clean tilled, smooth or fallow), Greensboro, N.C.
Soil Parameters: Craven series		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	NRCS, National Soils Characterization Database (NRCS, 2001)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 78 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1,2,3)	NRCS, National Soils Characterization Database (NRCS, 2001)

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Scenario Input Parameters for Nash County, North Carolina - Cucumbers

Parameter	Value	Source
Initial Water Content (THETO)	0.194 cm3-H2O cm3-soil (HORIZN =1, 2) 0.321 cm3-H2O cm3-soil (HORIZN =3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Field Capacity (THEFC)	0.194 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.321 cm3-H2O cm3-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Wilting Point (THEWP)	0.074 cm3-H2O cm3-soil (HORIZN = 1,2) 0.201 cm3-H2O cm3-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001)

5. Georgia Cotton

This scenario is a modification of the North Carolina cotton scenario. All of the crop and soil input parameters are the same as that used for the NC scenario. Only the weather station and weather-related parameters were changed. For this scenario, OPP used the meteorological file for Augusta, GA (W3820), which was the closest site within the same MLRA to the GA scenario (Burke County, GA).

6. Georgia Peanuts

This scenario is a modification of the North Carolina peanut scenario. All of the crop and soil input parameters are the same as that used for the NC scenario. Only the weather station and weather-related parameters were changed. For this scenario, OPP used the meteorological file for Augusta, GA (W3820), which was the closest site within the same MLRA to the GA scenario (Burke County, GA).

7. Georgia Pecans

The field used to represent peach production in Georgia is located in Mitchell or Dougherty County in Southwest Georgia (MLRA133) and the weather station representing the orchard's weather is located in Macon, GA. However, for the carbamate cumulative, OPP used the weather station for Augusta, GA, which was closest to the cumulative exposure site (in the adjacent county). Pecans are grown throughout the southwestern part of the state. Georgia and Texas generally compete from year to tear for status as the top U.S. producer. As such, production varies significantly from year to year. Trees are very large, growing up to 100 feet tall and living 80 or more years, although production declines as the trees reach the end of its life span. Tree are initially

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planted at a rate of 27 trees per acre and thinned to 8 trees per acre over an 18-20 year period; approximately 60 feet by 60 feet spacing. Pollinizers are generally planted every 9th or 11th row to facilitate adequate pollination and increases profitability of the stand. Pecan trees require approximately 50 percent foliar canopy for optimal light penetration and crop yield. Proper tree density also allows for better pesticide application. Pecan trees typically produce nuts for 40 or more years. Most (approximately 65 percent) Georgia pecans are irrigated via drip irrigation systems. Soil characteristics have a significant influences on tree development, fruit bearing capacity, and tree life. Pecan trees prefer light to medium textured soils, pH 5.5-6.0, but can grow on higher clay content and slightly higher pH soils. Soil depth should be several feet or more and water table below the primary root zone. Pecans are native to floodplains and river-bottoms having inherently high water requirements. Maturity is reached when the shuck loosens or splits from the shell - harvest then begins. Pecans are harvested with trunk or limb shakers depending on tree age. The soil selected to simulate the field is a Williston loamy fine sand. Williston loamy fine sand is a fine, mixed, superactive, hyperthermic Typic Hapludalfs. Williston loamy fine sand loam is a moderately deep, well drained, moderately rapid runoff, moderately slowly permeable soil that formed in moderately thick beds of clayey marine sediments overlying soft limestone. These soil are generally found on nearly level to sloping landscapes in the Coastal Plain. Slopes is dominantly less than 5 percent but ranges up to 8 percent on hillsides. The soil is of small extent in the Coastal Plains of the South. Williston loamy fine sand is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Mitchell County, Georgia - Pecans

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File – Augusta, GA (W3820)
Ending Date	December 31, 1990	Meteorological File – Augusta, GA (W3820)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 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)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.42 tons EI-1*	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.35 tons EI-1*	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.067	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	Mid-point of series range for Williston
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2005)

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PRZM 3.12 Scenario Input Parameters for Mitchell County, Georgia - Pecans

Parameter	Value	Source
Initial Surface Condition (ISCOND)	3	Residues remain in field between tree rows, area under trees
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Augusta, GA (W3820)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to soil horizon depth; main root cluster may grow in excess of 2 meters deep. Tap root will grow to first confining layer. http://www.uga.edu/fruit/pecan.htm
Maximum Canopy Coverage (COVMAX)	50	Based or optimal light penetration and yield. http://www.uga.edu/fruit/pecan.htm
Soil Surface Condition After Harvest (ICNAH)	3	Residues remain in field between tree rows, area under trees.
Date of Crop Emergence (EMD, EMM, IYREM)	21/04	Estimated date of canopy leaf-out; http://www.uga.edu/fruit/pecan.htm
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/09	Estimated date (based on 180-220 day required growing season) for fruit maturity; http://www.uga.edu/fruit/pecan.htm
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/10	Estimated date of harvesting; http://www.uga.edu/fruit/pecan.htm
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3,Meadow, conditions good for Hydrologic Soil C;
Manning’s N Value (MNGN)	0.07	RUSLE EPA Pesticide Project; Tb7WWSBC; Savannah, GA; Winter Wheat, Cover Code 3 (residues), Conventional Tillage (USDA, 2000)
USLE C Factor (USLEC)	0.021 - 0.259	RUSLE EPA Pesticide Project; Tb7WWSBC; Savannah, GA; Winter Wheat, Cover Code 3 (residues), Conventional Tillage (USDA, 2000)
Soil Parameters: Craven series		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	NRCS, National Soils Characterization Database (NRCS, 2001)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 20 cm (HORIZN = 2) 16 cm (HORIZN = 3) 54 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)

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PRZM 3.12 Scenario Input Parameters for Mitchell County, Georgia - Pecans

Parameter	Value	Source
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1,2) 1.7 g cm-3 (HORIZN = 3,4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Initial Water Content (THETO)	0.149 cm3-H2O cm3-soil (HORIZN =1,2) 0.245 cm3-H2O cm3-soil (HORIZN =3) 0.332 cm3-H2O cm3-soil (HORIZN =4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN =2) 4 cm (HORIZN =3) 6 cm (HORIZN =4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Field Capacity (THEFC)	0.149 cm3-H2O cm3-soil (HORIZN = 1,2) 0.245 cm3-H2O cm3-soil (HORIZN = 3) 0.332 cm3-H2O cm3-soil (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Wilting Point (THEWP)	0.069 cm3-H2O cm3-soil (HORIZN = 1,2) 0.125 cm3-H2O cm3-soil (HORIZN = 3) 0.192 cm3-H2O cm3-soil (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001)

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E. Florida Region Scenario Documentation

1. Florida Citrus

The field used to represent citrus production in Florida is located in Collier or Hendry Counties in Southwest Florida, although citrus production areas cover a substantial portion of the state. Citrus production has been moving southward in an attempt to avoid frost damage that has occurred in recent years. According to the 1997 Census of Agriculture, Florida is the major producer of citrus (oranges) for the juice market and among the highest for the fresh market. Florida is also among the highest producers in other citrus (grapefruit, tangerines, tangelos, and mandarins). Citrus is generally grown in double rows of trees (beds) with swales between to move water off site. Areas under and between rows of trees are generally non-cultivated/non-maintained except for the occasional mowing. Row spacing (pairs or rows) is approximately 20 to 25 feet (paired beds may be less than 20 feet) and between tree spacing is approximately 12 to 15 feet. Row canopies tend to be 100 percent, while the canopy between rows is less to permit the operation of maintenance and harvest equipment. Irrigation is mostly by low-volume drip or micro-sprinkler systems. The soil selected to simulate the field is a Wabasso fine sand. Wabasso fine sand, is a sandy, siliceous, hyperthermic Alfic Alaquods. These soils are often used for citrus production and truck crops. Wabasso fine sand is a deep to very deep, poorly to very poorly drained, slow to ponded runoff, rapidly permeable in the top horizon and slow to very slowly permeable in the lower horizons soil that formed in sandy and loamy marine sediments. These soils are generally found on flatwoods, flood plains, and depressions and have slopes of 0 to 2 percent. The soil is extensive in Florida. Wabasso fine sand is a Hydrologic Group D soil.

PRZM 3.12 Scenario Input Parameters for Collier & Hendry Counties, Florida - Citrus

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	Does not snow in Southern Florida such that accumulation is expected
Minimum Depth of Evaporation (ANETD)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.1 tons EI-1*	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.093	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Assume no practice under trees.

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Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
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)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to represent fallow field
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. West Palm Beach, FL (W12844)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum of soil profile. Trees may root from 7-18 feet http://edis.ifas.ufl.edu
Maximum Canopy Coverage (COVMAX)	60	http://edis.ifas.ufl.edu
Soil Surface Condition After Harvest (ICNAH)	3	Default, material under trees and between rows is generally left alone
Date of Crop Emergence (EMD, EMM, IYREM)	15/02	Date represent early to mid_season flower bloom for various varieties of citrus http://edis.ifas.ufl.edu
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/10	Date represent late season maturation for various varieties of citrus http://edis.ifas.ufl.edu
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/12	Date represents late season harvest http://edis.ifas.ufl.edu
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	87, 85, 86	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project; UC0CBCBC; Citrus bare ground; conventional tillage; Tampa, FL (USDA, 2000)
USLE C Factor (USLEC)	0.324 - 0.488	RUSLE Project; Variable with date, UC0CBCBC; Citrus bare ground; conventional tillage; Tampa, FL (USDA, 2000)
Wabasso Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 90 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001)

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Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1) 1.75 g cm-3 (HORIZN = 2)	http://www.statlab.iastate.edu/soils/ssl/)
Initial Water Content (THETO)	0.066 cm3-H2O cm3-soil (HORIZN =1) 0.178 cm3-H2O cm3-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.066 cm3-H2O cm3-soil (HORIZN = 1) 0.178 cm3-H2O cm3-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.036 cm3-H2O cm3-soil (HORIZN = 1) 0.078 cm3-H2O cm3-soil (HORIZN = 2)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1) 0.29% (HORIZN = 2)	

2. Florida Cucumber

The field used to represent cucumber (vegetable) production in Florida is located in Collier and Hendry Counties in Southwest Florida, although vegetable production areas include other regions of Florida such as the Everglades Agricultural Area, west-central and south-eastern regions. According to the 1997 Census of Agriculture, Florida is a major producer of truck crops and is the highest producer of cucumbers. Cucumbers and other truck crops are generally grown on “muck soils,” but cucumbers do as well on sandy soils which require less cleaning before marketing. All cucumbers are planted by direct seeding in Florida. Typical planting distances for slicing cucumbers are 48 to 60 inches between rows and 6 to 12 inches between plants. Pickling cucumbers are typically planted at 36 to 48 inches between rows and 2 to 4 inches between plants. When grown using plastic mulch, slicing cucumbers are planted in one or two rows per bed, with 10 to 18 inches between the rows on the bed, 48 to 72 inches between beds, and 8 to 12 inches between holes with one or two plants per hole. Pickling cucumbers are planted at a distance of 3 to 4 inches between plants. At the closest spacing, the plant population is 21,780 per acre. Seeds are planted at a depth of 0.5 to 0.75 inches. Between 35 and 65 days are required from seeding to maturity (first pick). Cucumbers in Florida are produced using several types of irrigation systems. In mulched production, drip, overhead, and seepage irrigation are used. By raising the water table, seepage irrigation restricts root growth to the bed area. Water is maintained approximately 15 to 18 inches below the soil surface, allowing seepage into the root zone. 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 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

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depressions and have slopes generally less than 2 percent. The soil is of moderate extent. Riviera sand is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Collier & Hendry Counties, Florida - Cucumber

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)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
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)	0.2	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
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)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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)	0.15	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	50 cm	Florida Cucumber Crop Profile, USDA
Maximum Canopy Coverage (COVMAX)	80	PIC (Burns, 1992)
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.

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Date of Crop Emergence (EMD, EMM, IYREM)	10/10	Florida Cucumber Crop Profile, USDA http://pestdata.ncsu.edu/cropprofiles/cropprofiles.cfm
Date of Crop Maturity (MAD, MAM, IYRMAT)	05/12	Florida Cucumber Crop Profile, USDA http://pestdata.ncsu.edu/cropprofiles/cropprofiles.cfm
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/12	Florida Cucumber Crop Profile, USDA http://pestdata.ncsu.edu/cropprofiles/cropprofiles.cfm
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR poor, Cropping and Residue = Row Crop SR/poor (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; UC0BGBGC; Green Beans, conventional tillage; Tampa, FL, Variable with date (USDA, 2000)
Riviera Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (top horizon split in two)	
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/) Ed Russell (USDA_NRCS, Fresno)
Bulk Density (BD)	1.65 g cm-3 (HORIZN = 1,2) 1.7 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.073 cm3-H2O cm3-soil (HORIZN =1,2) 0.211 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN =2,3)	
Field Capacity (THEFC)	0.073 cm3-H2O cm3-soil (HORIZN = 1,2) 0.211 cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.023 cm3-H2O cm3-soil (HORIZN = 1,2) 0.091 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

3. Florida Peppers - Bell

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The field used to represent pepper (bell peppers) production in Florida is located in Collier and Hendry Counties in Southwest Florida, although vegetable production areas include other regions of Florida such as the Everglades Agricultural Area, west-central and south-eastern regions. According to the 1997 Census of Agriculture, Florida is a major producer of truck crops and is the highest producer of bell peppers. Peppers and other truck crops are generally grown on "muck soils," but peppers do as well on sandy soils which require less cleaning before marketing. Peppers (bell peppers) are planted mainly by transplant, but some direct seeding in does occur in Florida. Typical planting distances for most peppers are 36 to 42 inches between rows and 12 to 16 inches between plants in a row. When grown using plastic mulch, which is a common practice in Florida, planting distances change very little. Peppers are generally harvested two or more times during the course of the growing season and in Southern Florida, where frost pressures are minimal, they are planted and harvested throughout the year. Peppers in Florida are produced using several types of irrigation systems. In mulched production, drip irrigation is highly recommended because of less water use, lower weed production, and some evidence of increased yields. Various forms of sprinkler irrigation may also be used. 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 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.

PRZM 3.12 Scenario Input Parameters for Collier and Hendry Counties, Florida - Bell Peppers

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, FlL(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)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
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)	0.2	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)

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Slope (SLP)	1%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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)	0.15	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	45 cm	http://www.ces.uga.edu/pubcd/b1027_w.html#Transplant
Maximum Canopy Coverage (COVMAX)	70	Based on estimates from aerial photography; specific to peppers, other vegetable crops will require a different value
Soil Surface Condition After Harvest (ICNAH)	3	Plant residues are left behind until later in the year when tilled for next series of crops
Date of Crop Emergence (EMD, EMM, IYREM)	09/01	Florida Peppers (Bell) Crop Profile, USDA, http://pestdata.ncsu.edu/cropprofiles/docs/FLpeppers_bell.html
Date of Crop Maturity (MAD, MAM, IYRMAT)	11/15	http://edis.ifas.ufl.edu/BODY_CV130#TABLE_2
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/12	Florida Peppers (Bell) Crop Profile, USDA, http://pestdata.ncsu.edu/cropprofiles/docs/FLpeppers_bell.html
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR poor, Cropping and Residue = Row Crop SR/poor (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; UC0BGBGC; Green Beans, conventional tillage; Tampa, FL, Variable with date (USDA, 2000)
Riviera Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
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/)
Bulk Density (BD)	1.65 g cm-3 (HORIZN = 1,2) 1.7 g cm-3 (HORIZN = 3)	Ed Russell (USDA_NRCS, Fresno)

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Initial Water Content (THETO)	0.073 cm3-H2O cm3-soil (HORIZN =1,2) 0.211 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN =2,3)	
Field Capacity (THEFC)	0.073 cm3-H2O cm3-soil (HORIZN = 1,2) 0.211 cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.023 cm3-H2O cm3-soil (HORIZN = 1,2) 0.091 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

4. Florida Sugarcane

The field used to represent sugarcane production in Florida is located in Hendry County in Southwest Florida, although sugarcane production areas cover an area extending east to the Everglades Agricultural Area. According to the 1997 Census of Agriculture, Florida is the major producer (yield) of sugarcane. Most sugarcane is grown on high organic "muck" soils; approximately 10 percent is grown on mineral soils. Sugarcane is grown on laser-leveled fields by placing short seed "stalks" horizontally in the prepared field. Sugarcane is produced in a three to four year cycle with the first year planting referred to as the "plant cane" crop and successive years referred to as "stubble" or "ratoon" crops which are harvested from regrowth. Yields diminish with each successive crop. At the end of the third or fourth year, sugarcane is rotated to another crop before replanting. Row spacing is approximately 60 inches. Irrigation, when needed, may be accomplished by raising the ground water level through the use of "lateral" drainage systems controlled by locks and spaced from 100 feet to 300 feet apart. The soil selected to simulate the field is a Wabasso fine sand. Wabasso fine sand, is a sandy, siliceous, hyperthermic Alfic Alaquods. These soils are used for sugarcane production, but mainly citrus production and truck crops. Wabasso fine sand is a deep to very deep, poorly to very poorly drained, slow to ponded runoff, rapidly permeable in the top horizon and slow to very slowly permeable in the lower horizons soil that formed in sandy and loamy marine sediments. These soil are generally found on flatwoods, flood plains, and depressions and have slopes of 0 to 2 percent. The soil is extensive in Florida. Wabasso fine sand is a Hydrologic Group D soil.

PRZM 3.12 Scenario Input Parameters for Hendry County, Florida - Sugarcane

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Miami, FL (W12839)
Ending Date	December 31, 1990	Meteorological File - Miami, FL (W12839)
Pan Evaporation Factor (PFAC)	0.78	PRZM Manual Figure 5.1 (EPA, 1998)

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Snowmelt Factor (SFAC)	0.0 cm C- 1	Does not snow in Southern Florida such that accumulation is expected
Minimum Depth of Evaporation (ANETD)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.1 tons EI-1*	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.093	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Assume no practice under trees.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
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)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to represent fallow field
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 - Miami, FL (W12839)
Maximum rainfall interception storage of crop (CINTCP)	0.1	Set similar to LA Sugarcane; sugarcane is a grass PIC (Burns, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum of soil profile.http://edis.ifas.ufl.edu
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Default for sugarcane while under 3-4 yr cycle. After cycle, rotate to new crop..
Date of Crop Emergence (EMD, EMM, IYREM)	01/01	typically planted August thru January, See Sugarcane Handbook http://edis.ifas.ufl.edu/
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/06	typically harvested October thru March, See Sugarcane Handbook http://edis.ifas.ufl.edu/
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/12	dates were chosen such that cycle would remain in a single calendar year and still remain within the typical range. See Sugarcane Handbook http://edis.ifas.ufl.edu/
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation

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SCS Curve Number (CN)	94, 91, 92	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project; UC0SCSCC; Sugarcane, conventional tillage, Tampa (USDA, 2000)
USLE C Factor (USLEC)	0.194 - 0.717	RUSLE Project; Variable with date, UC0SCSCC; Sugarcane, conventional tillage, Tampa (USDA, 2000)
Wabasso Soil Parameters		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 90 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1) 1.75 g cm-3 (HORIZN = 2)	
Initial Water Content (THETO)	0.066 cm3-H2O cm3-soil (HORIZN =1) 0.178 cm3-H2O cm3-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.066 cm3-H2O cm3-soil (HORIZN = 1) 0.178 cm3-H2O cm3-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.036 cm3-H2O cm3-soil (HORIZN = 1) 0.078 cm3-H2O cm3-soil (HORIZN = 2)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1) 0.29% (HORIZN = 2)	

5. 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

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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.

PRZM 3.12 Scenario Input 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)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
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)	0.2	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
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)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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
Maximum rainfall interception storage of crop (CINTCP)	0.15	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	100 cm	Set to profile depth. Roots can exceed 150 cm.
Maximum Canopy Coverage (COVMAX)	90	PIC (Burns, 1992)
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)	15/10	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	

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Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, 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)
Riviera Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
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/) Ed Russell (USDA_NRCS, Fresno)
Bulk Density (BD)	1.65 g cm-3 (HORIZN = 1,2) 1.7 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.073 cm3-H2O cm3-soil (HORIZN =1,2) 0.211 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN =2,3)	
Field Capacity (THEFC)	0.073 cm3-H2O cm3-soil (HORIZN = 1,2) 0.211 cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.023 cm3-H2O cm3-soil (HORIZN = 1,2) 0.091 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

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F. Mid-South Region Scenario Documentation

1. Mississippi Cotton (MScottonC)

The field used to represent cotton production in Mississippi is located in Yazoo County. According to the 1997 Census of Agriculture, Mississippi is ranked 4th in production and acreage of cotton in the U.S. The crop is generally planted in Spring (late April) and harvested beginning in September. Row spacing is generally 38-inches with 3-4 plants per foot row. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. The crop may be grown under irrigation by furrow or canal systems. Most crops are planted by stale seedbed, no-till, or conventional methods. The soil selected to simulate the field is a Loring silt loam. Loring silt loam is a fine-silty, mixed, active, thermic, Qxyaquic Fragiudalfs. Nearly all soils are cleared and used to grow cotton, small grains, soybeans, hay and pasture. Loring silt loam is a moderately well drained with a fragipan, medium to rapid runoff, moderate permeability above the fragipan and moderately slowly permeable in the fragipan soils formed in loess. They are located on level to strongly sloping uplands and stream terraces. Slopes are generally between 0 to 20 percent. The soils are extensive in the lower Mississippi drainage basin. Loring silt loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Yazoo County, Mississippi - Cotton

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File – Jackson, MS (W03940)
Ending Date	December 31, 1990	Meteorological File – Jackson, MS (W03940)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Pan Factor Flag (IPEIND)	2	PAN Evaporation data read from file
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.49 tons EI-1*	EXPRES; PRZM Manual Table 5.3 (EPA, 1998)
USLE LS Factor (USLELS)	0.4	EXPRES; PRZM Manual Table 5.5 (EPA, 1998)
USLE P Factor (USLEP)	0.75	EXPRES; PRZM Manual Table 5.6 (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)

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Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
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 – Jackson, MS (W03940)
Maximum rainfall interception storage of crop (CINTCP)	0.2	EXPRES; PRZM manual Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	125 cm	EXPRES; Value developed from field specific data.
Maximum Canopy Coverage (COVMAX)	98	EXPRES; Value developed from field specific data.
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	01/05	EXPRES and verified with Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	07/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	22/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	99, 93, 32	EXPRES; PRZM Manual Table 5.10_5.14 and Fig. 5.4; Field specific data.
Manning’s N Value (MNGN)	0.014	RUSLE Project, PA6CTCTC: Cotton, conventional tillage, Holly Springs, MS (USDA, 2000)
USLE C Factor (USLEC)	0.223 - 0.718	RUSLE Project; PA6CTCTC: Cotton, conventional tillage, Holly Springs, MS (USDA, 2000)
Loring Soil Parameters		
Total Soil Depth (CORED)	155 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	6	
Horizon Thickness (THKNS)	13 cm (HORIZN = 1) 23 cm (HORIZN = 2) 33 cm (HORIZN = 3) 30 cm (HORIZN = 4) 23 cm (HORIZN = 5) 33 cm (HORIZN = 6)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)

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Bulk Density (BD)	1.4 g cm-3 (HORIZN = 1,2,3) 1.45 g cm-3 (HORIZN = 4) 1.49 g cm-3 (HORIZN = 5) 1.51 g cm-3 (HORIZN = 6)	
Initial Water Content (THETO)	0.385 cm3-H2O cm3-soil (HORIZN =1) 0.370 cm3-H2O cm3-soil (HORIZN =2,3) 0.340 cm3-H2O cm3-soil (HORIZN =4) 0.335 cm3-H2O cm3-soil (HORIZN =5) 0.343 cm3-H2O cm3-soil (HORIZN =6)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 11 cm (HORIZN = 3) 10 cm (HORIZN = 4) 23 cm (HORIZN = 5) 33 cm (HORIZN = 6)	
Field Capacity (THEFC)	0.385 cm3-H2O cm3-soil (HORIZN =1) 0.370 cm3-H2O cm3-soil (HORIZN =2,3) 0.340 cm3-H2O cm3-soil (HORIZN =4) 0.335 cm3-H2O cm3-soil (HORIZN =5) 0.343 cm3-H2O cm3-soil (HORIZN =6)	
Wilting Point (THEWP)	0.151 cm3-H2O cm3-soil (HORIZN = 1) 0.146 cm3-H2O cm3-soil (HORIZN = 2,3) 0.125 cm3-H2O cm3-soil (HORIZN = 4) 0.137 cm3-H2O cm3-soil (HORIZN = 5) 0.147 cm3-H2O cm3-soil (HORIZN = 6)	
Organic Carbon Content (OC)	1.28% (HORIZN = 1) 0.49% (HORIZN = 2) 0.16% (HORIZN = 3) 0.12% (HORIZN = 4) 0.07% (HORIZN = 5) 0.06% (HORIZN = 6)	

2. Mississippi Corn (MScornC)

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The field used to represent corn production in Mississippi is located in the Southern Mississippi Valley Uplands. According to the 1997 Census of Agriculture, Mississippi is not a major corn producing state in the U.S. (not among the top 20 states) with approximately 600,000 acres in production. The crop is generally planted in the early Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region, however, rotation with other crops such as soybean is the practiced as well. 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 with more than 50 percent of the practice, followed by conservation tillage, no_tillage, and ridge tillage. The crop is rarely grown under irrigation. The soil selected to simulate the field is a benchmark soil, Grenada silt loam. Grenada silt loam is a fine-silty, mixed, active, thermic Oxyaquic Fraglossudalfs. Most of the soil is used for the production of row crops such as corn, cotton, and soybeans, the principal crops. Grenada silt loam is a very deep, moderately well drained, medium to slow runoff, moderately permeable above a fragipan and slow in the fragipan soil. The fragipan is at a depth of about two feet. The soils formed in loess. They are located on uplands and stream terraces of low relief in the Southern Mississippi Valley Silty Uplands. Slopes are generally between 0 to 8 percent, but may range to 12 percent. The soils are extensive throughout the region. Grenada silt loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Southern Mississippi Valley Uplands, Mississippi - Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File – Jackson, MS (W03940)
Ending Date	December 31, 1990	Meteorological File – Jackson, MS (W03940)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.25 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)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI-1*	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.221	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Mid-point of series range. Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)

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Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
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 – Jackson, MS (W03940)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Set to default for most row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator, PIC (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	11/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	22/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	02/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR/poor, Cropping and Residue = Row Crop, SR/Poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, OA6CGSBC; Corn, grain, conventional tillage, Natchez, MS (USDA, 2000)
USLE C Factor (USLEC)	0.024 - 0.848	RUSLE Project; OA6CGSBC; Corn, grain, conventional tillage, Natchez, MS (USDA, 2000)
Grenada Soil Parameters		
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base, Top horizon split in two)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 44 cm (HORIZN = 2) 8 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)	1.7 g cm-3 (HORIZN = 1, 2) 1.8 g cm-3 (HORIZN = 3,4)	

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Initial Water Content (THETO)	0.309 cm3-H2O cm3-soil (HORIZN =1, 2) 0.304 cm3-H2O cm3-soil (HORIZN =3) 0.216 cm3-H2O cm3-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.309 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.304 cm3-H2O cm3-soil (HORIZN = 3) 0.216 cm3-H2O cm3-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.109 cm3-H2O cm3-soil (HORIZN = 1,2) 0.104 cm3-H2O cm3-soil (HORIZN = 3) 0.116 cm3-H2O cm3-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

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G. Lower Midwest Region Scenario Documentation

1. South Texas Grapefruit (STXgrapefrtCRA)

The field used to represent grapefruit production in South Texas is representative of a field in Hildago and Cameron counties, located in the Lower Rio Grande Valley region. The meteorological file, Brownsville, TX, represents the MLRA region 83D. In 2004, Texas ranked second behind Florida in acres producing Grapefruit. Texas contained 16 percent of the total acres of grapefruit production (USDA 2004). Grapefruit trees are planted in rows 24-25 feet apart. Crops are irrigated (Texas A&M 2002) and pruned to maintain a height of approximately 15 feet. In the Lower Rio Grande Valley region of Texas, grapefruit trees bloom from March 10-20. Fruit matures between October and December and is harvested from October to May (Personal communication 2004). The soil in Hidalgo and Cameron counties is alluvial, being derived from the Rio Grande (USDA 1997). Thus there is no dominant soil type (range of coverages: 0.1-13.2%). In the Lower Rio Grande Valley region, several soil types support citrus production (Brennan, Delfinia, Hidalgo, Willacy) (Texas A&M 2002). For this scenario, Hidalgo sandy clay loam was selected as a representative soil type because it has significant yields of citrus and was recommended by an extension agent as being the most commonly associated soil with citrus (Personal communication 2004). Hidalgo sandy clay loam is a hydrologic group B soil that is classified as fine-loamy, mixed, active, hyperthermic typic calciustolls. The Hidalgo series of soils is deep, well drained, moderately permeable and formed in calcareous loamy sediments. These soils occur on nearly level to gently sloping uplands with slopes of 0-5 percent. This soil type occurs on the Rio Grande Plain of Texas and Mexico (possibly). This soil is mostly used for irrigated crop production including cotton, grain sorghum, vegetables, sugar cane and citrus (USDA1997).

PRZM 3.12 Scenario Input Parameters for Hidalgo/Cameron Counties, Texas - Grapefruit

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Brownsville, Cameron County, Texas: W12919
Ending Date	December 31, 1990	Meteorological File - Brownsville, Cameron County, Texas: W12919
Pan Evaporation Factor (PFAC)	0.69	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)

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USLE LS Factor (USLELS)	0.37	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 2.5% slope
USLE P Factor (USLEP)	1	contour plowing is not common due to 0-5% slope (consulted with extension agent)
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)	2.5%	From http://soils.usda.gov/ official soil series description (slope range = 0-5%)
Hydraulic Length (HL)	356 (pond) 464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA 2004)
Initial Surface Condition (ISCOND)	3	PRZM Scenario Guidance (2004)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	PRZM Manual (Carsel et al., 1998)
Maximum Active Root Depth (AMXDR)	243.8 cm	Consulted extension agent (Max rooting depth = 5 - 8 ft)
Maximum Canopy Coverage (COVMAX)	75%	Consulted extension agent
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Manual (Carsel et al., 1998), 3 = residue
Date of Crop Emergence (EMD, EMM, IYREM)	16/3/61	Consulted extension agent
Date of Crop Maturity (MAD, MAM, IYRMAT)	1/11/61	Consulted extension agent

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Date of Crop Harvest (HAD, HAM, IYRHAR)	1/2/61	Consulted extension agent
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	67, 74, 78	Gleams Manual Table A.3, (Hydrological soil B) meadow (USDA, 1990)
Manning's N Value (MNGN)	.014 .	RUSLE Project, TX Galveston, Citrus, (T95CBCBC)
USLE C Factor (USLEC)	.374 .385 .383 .391 .407 .422 .423 .437 .458 .456 .464 .475 .442 .424 .434 .439 .442 .325 .340 .352 .363 .371 .378 .384 .389 .362	RUSLE Project, TX Galveston, Citrus, (T95CBCBC)
Soil Parameters		
Total Soil Depth (CORED)	160 cm	http://soils.usda.gov/ (63 inches)
Number of Horizons (NHORIZ)	4 (top HORIZN split in 2)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 21 cm (HORIZN = 2) 25 cm (HORIZN = 3) 104 cm (HORIZN = 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/
Bulk Density (BD)	1.5g cm-3 (HORIZN = 1) 1.5 g cm-3 (HORIZN = 2) 1.325 g cm-3 (HORIZN = 3) 1.35 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.30 cm3 H20 cm3 soil (HORIZN = 1-4)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 1 cm (HORIZN = 3) 2 cm (HORIZN = 4)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.30 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.18 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	1.2% (HORIZN = 1) 1.2% (HORIZN = 2) 0.45% (HORIZN = 3) 0.18% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

2. South Texas Cotton (STXcottonCRA)

The field used to represent cotton production in South Texas is representative of a field in Hildago and Cameron counties, located in the Lower Rio Grande Valley region. The meteorological file, Brownsville, TX, represents the MLRA region 83D. Texas

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ranks first in production of cotton in the U.S. Cotton is the leading cash crop in Texas with a total economic impact of 5.2 billion dollars in the state (NSF 1999). Agricultural methods (irrigation, planting times, cotton types, harvesting methods) vary significantly from region to region. The Northern High Plains grows approximately 64 percent of Texas corn with 3 percent being grown in the Lower Rio Grande Valley region. In the Lower Rio Grande Valley region of Texas, cotton is planted between February and March. Corn is generally irrigated. Cotton is harvested in Texas between August and December (NSF 1999). The soil in Hildago and Cameron counties is alluvial, being derived from the Rio Grande (USDA 1997). Thus there is no dominant soil type (range of coverages: 0.1-13.2%). For this scenario, Harlingen Clay was selected as a representative soil type because it has significant yields of cotton and has the largest percent coverage of a hydrologic group C or D soil for Hildago (4.8 %) and Cameron (6.6 %) counties (USDA 2004). Harlingen Clay is a hydrologic group D soil that is classified as very-fine, smectitic, hyperthermic sodic haplusterts. The Harlingen series of soils is deep, moderately well drained, very slowly permeable soils that formed in clayey sediments. These soils have slopes of 0-1 percent and occur on stream terraces and deltas along the lower portions of the Rio Grande River and its tributaries in south Texas and Mexico. This soil is mostly used for irrigated crop land including cotton and cool season vegetables (USDA1997).

PRZM 3.12 Scenario Input Parameters for Hidalgo/Cameron Counties, Texas - Cotton

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Brownsville, Cameron County, Texas: W12919
Ending Date	December 31, 1990	Meteorological File - Brownsville, Cameron County, Texas: W12919
Pan Evaporation Factor (PFAC)	0.69	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	0.15	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 0.5% slope
USLE P Factor (USLEP)	1	contour plowing is not common due to 0-1% slope (consulted with extension agent)
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)	0.5%	From http://soils.usda.gov/ official soil series description (slope range = 0-1%)

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Hydraulic Length (HL)	356 (pond) 464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA 2004)
Initial Surface Condition (ISCOND)	2	PRZM Scenario Guidance (2004)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.20 cm	PRZM Manual (Carsel et al., 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Manual (Carsel et al., 1998)
Maximum Canopy Coverage (COVMAX)	100%	PRZM Manual (Carsel et al., 1998)
Soil Surface Condition After Harvest (ICNAH)	2	PRZM Manual (Carsel et al., 1998), 2 = cover crop consulted with extension agent, crops are rotated
Date of Crop Emergence (EMD, EMM, IYREM)	16/3/61	corn is planted late January-Late February (TX extension crop profile) + emergence of 5-15 days (PRZM manual)
Date of Crop Maturity (MAD, MAM, IYRMAT)	20/7/61	mature 110-130 days from planting (PRZM manual)
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/10/61	harvest from August 1 to December 20 (PRZM manual, Table 5-9)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	88, 89, 90	Gleams Manual Table A.3, (Hydrological soil D) Row Crop, SR, good hydrologic condition (USDA, 1990)
Manning’s N Value (MNGN)	.014.	RUSLE Project, TX Galveston Cotton, (T95CTCTC)

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USLE C Factor (USLEC)	.628 .654 .678 .697 .712 .727 .743 .784 .809 .808 .776 .639 .506 .384 .299 .295 .337 .412 .432 .358 .442 .494 .542 .585 .621	RUSLE Project, TX Galveston Cotton, (T95CTCTC)
Soil Parameters		
Total Soil Depth (CORED)	180 cm	http://soils.usda.gov/
Number of Horizons (NHORIZ)	4 (top HORIZN split in 2)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 18 cm (HORIZN = 2) 61 cm (HORIZN = 3) 91 cm (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/
Bulk Density (BD)	1.45g cm-3 (HORIZN = 1) 1.45g cm-3 (HORIZN = 2) 1.40 g cm-3 (HORIZN = 3) 1.55 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.39 cm3 H20 cm3 soil (HORIZN = 1-4)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 1 cm (HORIZN = 3) 1 cm (HORIZN = 4)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.39 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.28 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	1.2% (HORIZN = 1) 1.2% (HORIZN = 2) 0.9% (HORIZN = 3) 0.45% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

3. South Texas Vegetables (STXvegetblCRA)

The field used to represent vegetable production in South Texas is representative of a field in Hildago and Cameron counties, located in the Lower Rio Grande Valley region. The meteorological file, Brownsville, TX, represents the MLRA region 83D. Specifically, the vegetable scenario represents carrot, onion and cabbage production in the state. Texas produces 3 percent of the U.S. commercially grown carrots. The Lower Rio Grande Region produces approximately 50 percent of Texas carrots. Carrot seed is often precision planted at 1/8-1/4 inches deep between July and November. They are mechanically harvested from December to May (NSF 2003 a). Texas produces 7 percent of the U.S. commercially grown onions. The Lower Rio Grande Region produces approximately 80 percent of Texas onions. Onion seed is often precision planted at 1/4-3/4 inches deep, on 38-40 inch raised beds in October. Mechanical harvest begins 120-210 days after planting, when the tops 50-80% of the tops fall over. They are mechanically harvested from December to May (NSF 2003 b). Texas produces 15 percent of the U.S. commercially grown cabbage. The Lower Rio Grande Region produces approximately 50 percent of Texas cabbage. Cabbage seed is often planted at 6-

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15 inches apart (NSF 2003 c). The soil in Hildago and Cameron counties is alluvial, being derived from the Rio Grande (USDA 1997). Thus there is no dominant soil type (range of coverages: 0.1-13.2%). For this scenario, Harlingen Clay was selected as a representative soil type because it supports vegetable production and has largest percent coverage of a hydrologic group C or D soil for Hildago (4.8 %) and Cameron (6.6 %) counties (USDA 2004). Harlingen Clay is a hydrologic group D soil that is classified as very-fine, smectitic, hyperthermic sodic haplusterts. The Harlingen series of soils is deep, moderately well drained, very slowly permeable soils that formed in clayey sediments. These soils have slopes of 0-1 percent and occur on stream terraces and deltas along the lower portions of the Rio Grande River and its tributaries in south Texas and Mexico. This soil is mostly used for irrigated crop land including cotton and cool season vegetables (USDA 1997).

PRZM 3.12 Climate and Time Parameters for Hidalgo/Cameron Counties, Texas - Vegetable

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Brownsville, Cameron County, Texas: W12919
Ending Date	December 31, 1990	Meteorological File - Brownsville, Cameron County, Texas: W12919
Pan Evaporation Factor (PFAC)	0.69	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	0.15	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 0.5% slope
USLE P Factor (USLEP)	1	contour plowing is not common due to 0-1% slope (consulted with extension agent)
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)	0.5%	From http://soils.usda.gov/ official soil series description (slope range = 0-1%)
Hydraulic Length (HL)	356 (pond) 464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	

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Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	2	Consulted extension agent, crops are rotated
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	PRZM Manual (Carsel et al., 1998)
Maximum Active Root Depth (AMXDR)	38.1 cm	Consulted extension agent
Maximum Canopy Coverage (COVMAX)	80%	Consulted extension agent
Soil Surface Condition After Harvest (ICNAH)	2	PRZM Manual (Carsel et al., 1998)
Date of Crop Emergence (EMD, EMM, IYREM)	1/10/61	Consulted extension agent
Date of Crop Maturity (MAD, MAM, IYRMAT)	1/3/61	Consulted extension agent
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/3/61	Consulted extension agent
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	88, 89, 90	Gleams Manual Table A.3, (Hydrological soil D), Row crop, SR, good hydrologic conditions (USDA, 1990)
Manning’s N Value (MNGN)	.011 .	RUSLE Project, TX Galveston, Onion (T95ONONC)
USLE C Factor (USLEC)	.623 .673 .715 .746 .760 .698 .813 .816 .806 .785 .760 .726 .692 .590 .666 .729 .782 .824 .857 .801 .902 .901 .885 .842 .786 .742 .699 .697 .712 .574	RUSLE Project, TX Galveston, Onion (T95ONONC)
Soil Parameters		
Total Soil Depth (CORED)	180 cm	http://soils.usda.gov/ (71 inches)
Number of Horizons (NHORIZ)	4 (top HORIZN split in 2)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)

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Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 18 cm (HORIZN = 2) 61 cm (HORIZN = 3) 91 cm (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.45g cm-3 (HORIZN = 1) 1.45g cm-3 (HORIZN = 2) 1.40 g cm-3 (HORIZN = 3) 1.55 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.39 cm3 H20 cm3 soil (HORIZN = 1-4)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 1 cm (HORIZN = 3) 1 cm (HORIZN = 4)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.39 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.28 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	1.2% (HORIZN = 1) 1.2% (HORIZN = 2) 0.9% (HORIZN = 3) 0.45% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

4. South Texas Melon (STXmelonCRA)

The field used to represent melon production in South Texas is representative of a field in Hildago and Cameron counties, located in the Lower Rio Grande Valley region. The meteorological file, Brownsville, TX, represents the MLRA region 83D. Specifically, the melon scenario represents cantaloupe, honeydew melon and watermelon production in the state. Texas produces 9 percent and 10 percent of the U.S. commercially grown cantaloupe and honeydew melon, respectively (NSF 1999). Approximately 50 percent of the state's cantaloupe and honeydew melon is grown in the Lower Rio Grande Region. Seeds are planted ½ -1 inch deep 8-12 inches apart in 78-80 inch beds or 12-24 inches apart in 2 lines on 78-80 inch beds. Planting is from the third week in January to the second week of February. Second and third plantings are done two weeks after the previous plantings. Cantaloupe and honeydew melon are harvested 85-95 days after planting (NSF 2000). Texas produces 20 percent of the U.S. commercially grown watermelons, ranking number one in the country (NSF 1999). Hildago is the number one county in Texas for watermelon production. Seeds are planted 3/4 -1 inch deep 3 feet apart on 6 foot beds (NSF 2003). The soil in Hildago and Cameron counties is alluvial, being derived from the Rio Grande (USDA 1997). Thus there is no dominant soil type (range of coverages: 0.1-13.2%). For this scenario, Harlingen Clay was selected as a representative soil type because it supports melon growth and has the largest percent coverage of a hydrologic group C or D soil for Hildago (4.8 %) and Cameron (6.6 %) counties (USDA 2004). Harlingen Clay is a hydrologic group D soil that is classified as very-fine, smectitic, hyperthermic sodic haplusterts. The Harlingen series of soils is deep, moderately well drained, very slowly permeable soils that formed in clayey sediments. These soils have slopes of 0-1 percent and occur on stream terraces and deltas along the lower portions of the Rio Grande River

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and its tributaries in south Texas and Mexico. This soil is mostly used for irrigated crop land including cotton and cool season vegetables (USDA1997).

PRZM 3.12 Scenario Input Parameters for Hidalgo/Cameron Counties, Texas - Melon

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Brownsville, Cameron County, Texas: W12919
Ending Date	December 31, 1990	Meteorological File - Brownsville, Cameron County, Texas: W12919
Pan Evaporation Factor (PFAC)	0.69	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	0.15	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 0.5% slope
USLE P Factor (USLEP)	1	contour plowing is not common due to 0-1% slope (consulted with extension agent)
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)	0.5%	From http://soils.usda.gov/ official soil series description (slope range = 0-1%)
Hydraulic Length (HL)	356 (pond) 464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA. 2001)
Initial Surface Condition (ISCOND)	2	PRZM Scenario Guidance (2004)

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Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	PRZM Manual (Carsel et al., 1998)
Maximum Active Root Depth (AMXDR)	61 cm	Consulted extension agent
Maximum Canopy Coverage (COVMAX)	100%	Consulted extension agent
Soil Surface Condition After Harvest (ICNAH)	2	PRZM Manual (Carsel et al., 1998)
Date of Crop Emergence (EMD, EMM, IYREM)	1/2/61	Consulted extension agent
Date of Crop Maturity (MAD, MAM, IYRMAT)	1/5/61	Consulted extension agent
Date of Crop Harvest (HAD, HAM, IYRHAR)	7/5/61	Consulted extension agent
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	88, 89, 90	Gleams Manual Table A.3, (Hydrological soil D), Row crop, SR, good hydrologic conditions (USDA, 1990)
Manning’s N Value (MNGN)	.011	RUSLE Project, TX Galveston, Citrus, Bare Ground (T95CBCBC)
USLE C Factor (USLEC)	.715 .746 .760 .698 .813 .816 .806 .785 .760 .726 .692 .590 .666 .729 .782 .824 .857 .801 .902 .901 .885 .842 .786 .742 .699 .697 .712 .574 .623 .673	RUSLE Project, TX Galveston, Onion, Bare Ground (T95ONONC)
Soil Parameters		
Total Soil Depth (CORED)	180 cm	http://soils.usda.gov/ (71 inches)
Number of Horizons (NHORIZ)	4 (top HORIZN split in 2)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 18 cm (HORIZN = 2) 61 cm (HORIZN = 3) 91 cm (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.45g cm-3 (HORIZN = 1) 1.45g cm-3 (HORIZN = 2) 1.40 g cm-3 (HORIZN = 3) 1.55 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.39 cm3 H20 cm3 soil (HORIZN = 1-4)	Field Capacity values, PRZM Scenario Guidance (2004)

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Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 1 cm (HORIZN = 3) 1 cm (HORIZN = 4)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.39 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.28 cm3 H20 cm3 soil	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	1.2% (HORIZN = 1) 1.2% (HORIZN = 2) 0.9% (HORIZN = 3) 0.45% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

5. South Texas Corn (STXcornCRA)

The field used to represent corn production in South Texas is representative of a field in Hildago and Cameron counties, located in the Lower Rio Grande Valley region. The meteorological file, Brownsville, TX, represents the MLRA region 83D. Texas produces 2 percent of the U.S. commercially grown corn (NSF 1999). The Northern High Plains grows approximately 66 percent of Texas corn with less than 12 percent being grown in the Lower Valley region. In the Lower Valley region of Texas, corn is planted between late January and Late February. In the Northern parts of the state, planting dates are significantly different, being mid April to early May. Corn is generally planted in 30 inch rows at rates of 28,000 - 34,000 seeds/ acre. Corn is generally irrigated andharvested in the lower valley between late June and Mid July (NSF 1999). The soil in Hildago and Cameron counties is alluvial, being derived from the Rio Grande (USDA 1997). Thus there is no dominant soil type (range of coverages: 0.1-13.2%). For this scenario, Harlingen Clay was selected as a representative soil type because it has significant yields of corn and has the largest percent coverage of a hydrologic group C or D soil for Hildago (4.8 %) and Cameron (6.6 %) counties (USDA 2004). Harlingen Clay is a hydrologic group D soil that is classified as very-fine, smectitic, hyperthermic sodic haplusterts. The Harlingen series of soils is deep, moderately well drained, very slowly permeable soils that formed in clayey sediments. These soils have slopes of 0-1 percent and occur on stream terraces and deltas along the lower portions of the Rio Grande River and its tributaries in south Texas and Mexico. This soil is mostly used for irrigated crop land including cotton and cool season vegetables (USDA1997).

PRZM 3.12 Scenario Input Parameters for Hidalgo/Cameron Counties, Texas - Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Brownsville, Cameron County, Texas: W12919
Ending Date	December 31, 1990	Meteorological File - Brownsville, Cameron County, Texas: W12919
Pan Evaporation Factor (PFAC)	0.69	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

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Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	0.15	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 0.5% slope
USLE P Factor (USLEP)	1	contour plowing is not common due to 0-1% slope (consulted with extension agent)
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)	0.5%	From http://soils.usda.gov/ official soil series description (slope range = 0-1%)
Hydraulic Length (HL)	356 (pond) 464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	2	PRZM Scenario Guidance (2004)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	Maximum recommended value for grass (Carsel et al. 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Manual (Carsel et al., 1998)
Maximum Canopy Coverage (COVMAX)	100%	PRZM Manual (Carsel et al., 1998)
Soil Surface Condition After Harvest (ICNAH)	2	PRZM Manual (Carsel et al., 1998), 2 = cover crop consulted with extension agent, crops are rotated

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Date of Crop Emergence (EMD, EMM, IYREM)	1/3/61	corn is planted late January-Late February (TX extension crop profile) + emergence of 5-15 days (PRZM manual)
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/6/61	mature 110-130 days from planting (PRZM manual)
Date of Crop Harvest (HAD, HAM, IYRHAR)	1/7/61	corn is harvested between late June and mid July (http://pestdata.ncsu.edu/cropprofiles)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	88, 89, 90	Gleams Manual Table A.3, (Hydrological soil D) Row Crop, SR, good hydrologic condition (moderately well drained soil) (USDA, 1990)
Manning's N Value (MNGN)	.014	RUSLE Project, TX Galveston Corn, (T95CGSBC)
USLE C Factor (USLEC)	.536 .581 .622 .654 .680 .705 .800 .829 .843 .821 .774 .602 .452 .371.311.282 .285 .287 .288 .307 .369 .388 .039 .042 .133 .173 .215 .257	RUSLE Project, TX Galveston Corn, (T95CGSBC)
Soil Parameters		
Total Soil Depth (CORED)	180 cm	http://soils.usda.gov/ (71 inches)
Number of Horizons (NHORIZ)	4 (top HORIZN split in 2)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 18 cm (HORIZN = 2) 61 cm (HORIZN = 3) 91 cm (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.45g cm-3 (HORIZN = 1) 1.45g cm-3 (HORIZN = 2) 1.40 g cm-3 (HORIZN = 3) 1.55 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.39 cm3 H20 cm3 soil (HORIZN = 1-4)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 1 cm (HORIZN = 3) 1 cm (HORIZN = 4)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.39 cm3 H20 cm3 soil (HORIZN = 1-4)	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.28 cm3 H20 cm3 soil (HORIZN = 1-4)	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	1.2% (HORIZN = 1) 1.2% (HORIZN = 2) 0.9% (HORIZN = 3) 0.45% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

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G. North / Northcentral Scenario Documentation

1. Pennsylvania Apples (PAappleC)

The field used to represent apple production in Pennsylvania is located in Lancaster County, in south-eastern Pennsylvania. According to the 1997 Census of Agriculture, Pennsylvania is ranked 5th in apple production in the U.S. Within row tree spacing depends on the root stock and cultivation method. Spacing ranges from as little as 5 feet to 25 feet. Row spacing may be as much as twice the within row spacing to allow for maintenance and harvesting equipment. The soil selected to simulate the field is a benchmark soil, Elioak silt loam. Elioak silt loam, is a clayey, kaolinitic, mesic, Typic Hapludults. The soil is used for pastures, orchards, general local crops and non-agricultural uses. Elioak silt loam is a very deep, well drained, moderately permeable soil with medium to rapid runoff. These soils formed in residuum weathered from mica schists and phyllites, and to a minor extent from granitized schist and micaeous gneiss. They are found on summits and upper slopes in northern portions of the Piedmont Plateau. Most slopes are less than 15 percent, but can range from 0 to 30 percent. The series is of moderate extent in the mid-Atlantic Piedmont Plateau. Elioak silt loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Lancaster, PA - Apples

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Allentown, PA (W14737)
Ending Date	December 31, 1990	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.2 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.42 tons EI-1*	PRZM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	3.60	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	PRZM Table 5.6 (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)

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Initial Surface Condition (ISCOND)	3	Orchard _ material is largely left in place
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum soil depth. Roots may grow to 20 feet.
Maximum Canopy Coverage (COVMAX)	90	http://caf.wvu.edu/kearneyville/fruitloop.html Ross Byers, Horticultural Specialist VPI _ canopy somewhat open between rows; 90% reasonable upper end estimate.
Soil Surface Condition After Harvest (ICNAH)	3	Orchards floor maintained similar to a meadow
Date of Crop Emergence (EMD, EMM, IYREM)	20/04	Personal communication w/ Ross Byers, VA Tech Fruit Horticulturalist (540) 869_2560 x19 Emergence based on leaf emergence, Maturation based on canopy maturity, Harvest based on average leaf fall. Dates based on central VA and modified by: 1 day added for every 100 miles north or 100 feet higher elevation or 1day subtracted for every 100 miles south or 100 feet lower elevation.
Date of Crop Maturity (MAD, MAM, IYRMAT)	10/05	
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, meadow; condition good (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, SB5OBOBC; Orchards, bare ground; conventional tillage; York, PA (USDA, 2000)
USLE C Factor (USLEC)	0.103 - 0.515	RUSLE Project; SB5OBOBC; Orchards, bare ground; conventional tillage; York, PA (USDA, 2000)
Elioak Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 28 cm (HORIZN = 2) 62 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.70 g cm-3 (HORIZN = 1,2) 1.80 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.218 cm3-H2O cm3-soil (HORIZN =1,2) 0.243 cm3-H2O cm3-soil (HORIZN =3)	

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Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2) 2 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.218 cm3-H2O cm3-soil (HORIZN = 1,2) 0.243cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.098 cm3-H2O cm3-soil (HORIZN = 1,2) 0.163 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174 (HORIZN = 3)	

2. Pennsylvania Alfalfa (PAalfalfaC)

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.

PRZM 3.12 Scenario Input Parameters for York County, Pennsylvania - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Allentown, PA (W14737)
Ending Date	December 31, 1990	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.3 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)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)

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USLE K Factor (USLEK)	0.33 tons EI-1*	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.123	Haan and Barfield, 1978.
USLE P Factor (USLEP)	0.60	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394_6851 8/14/01)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
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)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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. 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	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394_6851 8/14/01)
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.
Date of Crop Emergence (EMD, EMM, IYREM)	15/04	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394_6851 8/14/01)
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 A.3, 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)
Glenville Soil Parameters		
Total Soil Depth (CORED)	120 cm	NRCS, National Soils Characterization Database (NRCS, 2001)

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Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 98 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g cm-3 (HORIZN = 1,2) 1.8 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.254 cm3-H2O cm3-soil (HORIZN =1,2) 0.201 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.254 cm3-H2O cm3-soil (HORIZN = 1,2) 0.201cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.094 cm3-H2O cm3-soil (HORIZN = 1,2) 0.121 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.174 (HORIZN = 3)	

3. Pennsylvania Corn (PAcornC)

The field used to represent corn production in Pennsylvania is located in Lancaster County in the south-east portion of the state. According to the 1997 Census of Agriculture, Pennsylvania is ranked 15th among major producers of corn in the U.S. The crop is generally planted the Spring (April) and harvested beginning in September. Continuous corn is practice is much of the region. However, rotation with other crops such as soybeans 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 soil selected to simulate the field is a benchmark soil, Hagerstown silt loam. Hagerstown silt loam, is a fine, mixed, semiactive, mesic Typic Hapludalfs. These soils are used fro general crops, pastures, orchards and truck crops. Large portions are in non-farm uses. Hagerstown silt loam is a very deep, well drained, moderately permeable soil with moderate to rapid runoff. These soils formed in materials weathered from hard grey limestone of rather high purity. They are found on valley floors and the adjacent hills. In some areas rock outcrops are common surface features. Slopes are generally less than 15 percent, but may range up to 45 percent. Hagerstown silt loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Lancaster County, Pennsylvania - Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Allentown, PA (W14737)

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Ending Date	December 31, 1990	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998.)
Snowmelt Factor (SFAC)	0.20m C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	1.042	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Maximum value for row crop. (EPA, 2001). Most slopes for soil series are around 2 percent.
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.17	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Winter cover crop planted in most areas.
Date of Crop Emergence (EMD, EMM, IYREM)	20/04	Usual Planting and Harvesting Dates for U.S. Field Crops and Penn. State Coop. Extension
Date of Crop Maturity (MAD, MAM, IYRMAT)	04/07	Usual Planting and Harvesting Dates for U.S. Field Crops and Penn. State Coop. Extension
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/10	Usual Planting and Harvesting Dates for U.S. Field Crops and Penn. State Coop. Extension
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation

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SCS Curve Number (CN)	89, 83, 85	Gleams Manual Table A.3, Fallow SR/CT; Cropping and Residue = Row crop, Conservation tillage, Contour plowing" (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project, SB5CGSBC, Corn, grain, conventional tillage, York, PA (USDA, 2000)
USLE C Factor (USLEC)	0.025 - 0.701	RUSLE Project; SB5CGSBC, Corn, grain, conventional tillage, York, PA (USDA, 2000)
Hagerstown Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 40 cm (HORIZN = 2) 50 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g cm-3 (HORIZN = 1) 1.7 g cm-3 (HORIZN = 2) 1.8 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.282 cm3-H2O cm3-soil (HORIZN =1) 0.2942cm3-H2O cm3-soil (HORIZN =2) 0.245 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.282 cm3-H2O cm3-soil (HORIZN = 1) 0.242cm3-H2O cm3-soil (HORIZN = 2) 0.245 cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.122 cm3-H2O cm3-soil (HORIZN = 1) 0.142 cm3-H2O cm3-soil (HORIZN = 2) 0.145 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	2.9% (HORIZN = 1) 0.174% (HORIZN = 2) 0.116% (HORIZN = 3)	

4. Pennsylvania Vegetables (PAvegetblCRA)

The Pennsylvania Vegetable crop/field scenario represents the typical potato and pumpkin crop/field conditions in southeastern Pennsylvania. Potatoes are grown in Pennsylvania from mid-July to September and mid-September to mid-May. Potato seeds are placed 7 to 12 inches apart in rows. Soil is ridged over the seed rows or hilling in order to prevent greening and to control weeds before seedlings bloom. Potatoes are

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fertilized twice, during planting using a band treatment along side the seedling rows and during cultivation or hilling. Potatoes are typically harvested from mid-July to October in Pennsylvania. 80% of the potato crop production occurs in Erie, Cambria, Schuykill, Lancaster, and Potter counties (IPM, 2004a). Pennsylvania is ranked 2nd in the United States for pumpkin production in the United States, making up 10% of total pumpkin production in the United States. The majority of pumpkin production in Pennsylvania occurs in the southeastern region. Pumpkins are mostly direct seeded with conventional tillage preparation. Pumpkins are grown in silts, gravely loams, and clays. Planting typically occurs between early June and July (IPM, 2004b).

The Clarksburg soil series was selected to represent the Pennsylvania Vegetable scenario. Clarksburg soils are silt loams, the soil type where potato and pumpkin crops are typically grown. The Clarksburg soil series is a very deep, moderately well-drained soil formed in colluvium, glacial till or residuum from limestone, calcareous and non-calcareous shale and sandstone. This soil series is located on uplands with slopes ranging from 0 to 25 percent. Soil permeability is slow to moderately slow. This taxonomic class is described as fine-loamy, mixed, super-active, mesic Oxyaquic Fragiudalfs. The typical pedon is a silt loam located on a 5 percent northeast facing slope in a cultivated field. The Harrisburg, Pennsylvania weather record is selected to represent meteorological conditions for the Pennsylvania Vegetable scenario. This is the MLRA 148 region (USDA, 2004).

PRZM 3.12 Scenario Input Parameters for Lancaster County, Pennsylvania - Vegetable

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)	0.79	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)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.37 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), Lancaster County, Pennsylvania - Vegetable: Clarksburg silt loam
USLE LS Factor (USLELS)	0.44	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), Lancaster County, Pennsylvania - Vegetable: Clarksburg silt loam
USLE P Factor (USLEP)	1	From PRZM Scenario Guidance (2004) and ID potato scenario
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)

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Slope (SLP)	12.5%	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), Lancaster County, Pennsylvania - Vegetable: Clarksburg silt loam
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	1	PRZM Scenario Guidance (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 - Lancaster, PA
Maximum rainfall interception storage of crop (CINTCP)	0.1cm	Maximum recommended value for grass (Carsel et al. 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Manual (Carsel et al., 1998)
Maximum Canopy Coverage (COVMAX)	40%	PRZM Manual (Carsel et al., 1998)
Soil Surface Condition After Harvest (ICNAH)	3	From ID potato scenario
Date of Crop Emergence (EMD, EMM, IYREM)	10/5/61	From ID potato scenario
Date of Crop Maturity (MAD, MAM, IYRMAT)	1/10/61	From ID potato scenario
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/10/61	From ID potato scenario
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table A.3, Pasture/Range, Non-CNT, Poor (USDA, 1990)
Manning’s N Value (MNGN)	.014	RUSLE Project , PA Potato (Irish), York County, File Code: S65P1PC

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USLE C Factor (USLEC)	.694 .698 .701 .705 .713 .728 .746 .767 .736 .842 .870 .872 .809 .568 .392 .282 .118 .057 .052 .213 .534 .593 .635 .663 .679 .689	RUSLE Project , PA Potato (Irish), York County, File Code: SB5P1PC
Clarksburg Soil Parameters		
Total Soil Depth (CORED)	152 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	4	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 34 cm (HORIZN = 3) 96 cm (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.3 g cm-3 (HORIZN = 1) 1.3 g cm-3 (HORIZN = 2) 1.4 g cm-3 (HORIZN = 3) 1.6 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.32cm3 H20 cm3 soil (HORIZN = 1-4)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3) 4 cm (HORIZN = 4)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.32 cm3 H20 cm3 soil (HORZIN = 1-4)	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.21 cm3 H20 cm3 soil (HORZIN = 1-4)	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	1.8% (HORIZN = 1) 0.24% (HORIZN = 2) 0.09% (HORIZN = 3) 0.09% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

5. Illinois Corn (ILcornC)

The field used to represent corn production in Illinois is located in McLean County, although the crop is grown extensively throughout the state. According to the 1997 Census of Agriculture, Illinois is ranked 2nd among the major corn producing states in the U.S. The crop is generally planted the early Spring (April) in the south, early May in the north and harvested beginning in August. Continuous corn is practice is much of the region (approximately 30 percent is continuous), however, rotation with other crops such as soybean, wheat, sorghum, and alfalfa is the dominant practice. Most of the corn is planted for feed grain, but may also be planted for oil, sweetener, and for export. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conservation tillage practices are regularly used for field corn with no_till practiced on about 20 percent of the corn acreage annually. About 50 percent of the acreage is cultivated with a row cultivator and an estimated 40 percent is rotary hoed annually. The crop is rarely grown under irrigation. The soil selected to simulate the field is an Adair clan loam. Adair clay loam is a fine, smectitic, mesic Aquertic Argiudolls. More than 50 percent of the soil is used for the production of grains with the balance in meadow and

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pasture. Adair clay loam is a deep, somewhat poorly drained, medium to rapid runoff, slowly permeable soil formed on uplands in a thin mantle of loess or loess and pedisediments and a paleosol formed in glacial till. They are on convex summits of narrow interfluves and on convex side slopes at slightly lower elevations. Slopes are generally between 2 to 18 percent, but may range to 30 percent. The soils are extensive in MLRA 108 and found in many MLRA in the region. Adair clay loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for McLean County, Illinois - Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File – Peoria, IL (W14842)
Ending Date	December 31, 1990	Meteorological File – Peoria, IL (W14842)
Pan Evaporation Factor (PFAC)	0.77	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)	16.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI-1*	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	1.126	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	PRZM Input Collator (Burns, 1992); Lyle Paul of U of Illinois indicates residues are typically chiseled in
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 – Peoria, IL (W14842)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator (Burns, 1992)

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Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Lyle Paul of U of Illinois
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator (Burns, 1992); Lyle Paul of U of Illinois
Date of Crop Emergence (EMD, EMM, IYREM)	01/05	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984) & Updated Crop Stage Information from HED (Bernard Schneider)
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	20/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, MA3CGSBC; Corn, grain, Conventional tillage, Springfield, IL (USDA, 2000)
USLE C Factor (USLEC)	0.017 - 0.638	RUSLE Project; MA3CGSBC; Corn, grain, Conventional tillage, Springfield, IL, variable with date (USDA, 2000)
Adair Soil Parameters		
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)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 34 cm (HORIZN = 2) 44 cm (HORIZN = 3) 12 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)	1.5 g cm-3 (HORIZN = 1, 2) 1.6 g cm-3 (HORIZN = 3) 1.7 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.355 cm3-H2O cm3-soil (HORIZN =1, 2) 0.338 cm3-H2O cm3-soil (HORIZN =3) 0.307 cm3-H2O cm3-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.355 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.338 cm3-H2O cm3-soil (HORIZN = 3) 0.307 cm3-H2O cm3-soil (HORIZN = 4)	

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Wilting Point (THEWP)	0.185 cm3-H2O cm3-soil (HORIZN = 1,2) 0.208 cm3-H2O cm3-soil (HORIZN = 3) 0.167 cm3-H2O cm3-soil (HORIZN = 4)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

6. Illinois Alfalfa (ILalfalfaCRA)

Alfalfa production in Illinois represents 2.2% of the alfalfa production in the United States. Alfalfa is harvested in late May to mid-June with successive cuttings occurring every 28 to 34 days until September or October (IPM, 2004). The Varna soil series was selected to represent the Illinois Alfalfa crop scenario. This soil type is a silt loam with the largest spatial extent in McLean County, Illinois, the region selected to represent alfalfa production in Illinois. The Varna soil is very deep, moderately well drained, slowly permeable soil located on till plains. It is a fine, illitic, mesic Oxyaquic Argiudolls soil. The typical pedon is located on a northwest-facing convex slope of 3 percent at an elevation of 722 feet. The weather record from Peoria, Illinois located in the MLRA region of 108 (USDA 2004).

PRZM 3.12 Scenario Input Parameters for McLean County, Illinois - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Peoria, Illinois (W14842)
Ending Date	December 31, 1990	Meteorological File - Peoria, Illinois (W14842)
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)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), McLean County, Illinois: Varna Silt Loam
USLE LS Factor (USLELS)	0.44	PRZM Manual, Table 5-5 (EPA 1998), Default slope length = 400 ft.
USLE P Factor (USLEP)	1	From PRZM Scenario Guidance (2004)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)

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Slope (SLP)	3	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), McLean County, Illinois: Varna Silt Loam
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	1	PRZM Scenario Guidance (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 - Peoria, Illinois (W14842)
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	Maximum recommended value for grass (Carsel 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Taken from Minnesota Alfalfa scenario
Maximum Canopy Coverage (COVMAX)	100%	Taken from Minnesota Alfalfa scenario
Soil Surface Condition After Harvest (ICNAH)	3	Taken from Minnesota Alfalfa scenario
Date of Crop Emergence (EMD, EMM, IYREM)	1/6/61	Taken from Minnesota Alfalfa scenario
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/8/61	Taken from Minnesota Alfalfa scenario
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/8/61	Taken from Minnesota Alfalfa scenario
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	82, 85, 87	Gleams Manual Table H-4, Close-seeded legumes or rotation meadow, straight row, poor (USDA, 1990)

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Manning's N Value (MNGN)	.110 .	RUSLE Project, File Code: MA5HLHLC (Carbondale, IL, Hay legume)
USLE C Factor (USLEC)	.015 .015 .015 .016 .016 .018 .012 .006 .002 .007 .004 .002 .007 .006 .003 .001 .005 .003 .003 .005 .009 .013 .014 .014 .015 .015	RUSLE Project, File Code: MA5HLHLC (Carbondale, IL, Hay legume)
Varna Soil Parameters		
Total Soil Depth (CORED)	152 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	5 (top horizon split in 2)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 20 cm (HORIZN = 2) 38 cm (HORIZN = 3) 31 cm (HORIZN = 4) 53 cm (HORIZN = 5)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.5 g cm-3 (HORIZN = 1) 1.5 g cm-3 (HORIZN = 2) 1.45 g cm-3 (HORIZN = 3) 1.6 g cm-3 (HORIZN = 4) 1.8 g cm-3 (HORIZN = 5)	
Initial Water Content (THETO)	0.32 cm3 H20 cm3 soil (HORIZN = 1 -5)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2,3,4,5)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.32 cm3 H20 cm3 soil (HORIZN = 1 -5)	GLEAMS Table H-3 (1990) (Silt loam)
Wilting Point (THEWP)	0.12 cm3 H20 cm3 soil (HORIZN = 1 -5)	GLEAMS Table H-3 (1990) (Silt loam)
Organic Carbon Content (OC)	1.5% (HORIZN = 1) 1.5% (HORIZN = 2) 0.6% (HORIZN = 3) 0.18% (HORIZN = 4) 0.15% (HORIZN = 5)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

7. Illinois Beans (ILbeanCRA)

The Illinois Bean scenario represents the environmental conditions for snap bean, green pea, and lima bean production in Illinois. Lima beans are typically planted in June or July after a pea crop. Lima beans may be planted between May and July (IPM, 2004 a). Snap bean seedlings are started in the greenhouse in March and April, then transplanted to the field in June. Snap beans prefer well drained soils and a soil pH ranging from 5.5 to 6.0. Snap beans are planted 3/4 to 1 inch deep at the end of the frost season for harvest in the spring. Snap beans may also be planted in early summer for harvest in late fall before the first frost. Snap bean seedlings are planted in rows 2 inches wide with 18 to 36 inches between the rows (IPM, 2004 b). Green peas are planted in

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rows 6 to 7 inches apart. Planting occurs in early spring. Green peas must be harvested prior to hot, dry weather of mid to late summer (IPM, 2004 c). The Varna soil series was selected to represent the Illinois Beans crop scenario. This soil type is a silt loam with the largest spatial extent in McLean County, Illinois, the region selected to represent bean production in Illinois. The Varna soil is very deep, moderately well drained, slowly permeable and located on till plains. It is a fine, illitic, mesic Oxyaquic Argiudolls soil. The typical pedon is located on a northwest-facing convex slope of 3 percent at an elevation of 722 feet. The weather record from Peoria, Illinois is located in the MLRA region of 108 (USDA, 2004).

PRZM 3.12 Scenario Input Parameters for McLean County, Illinois - Beans

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Peoria, Illinois (W14842)
Ending Date	December 31, 1990	Meteorological File - Peoria, Illinois (W14842)
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)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), McLean County, Illinois: Varna Silt Loam
USLE LS Factor (USLELS)	0.44	PRZM Manual, Table 5-5 (EPA 1998), Default slope length = 400 ft.
USLE P Factor (USLEP)	1	From PRZM Scenario Guidance (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)	3	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/), McLean County, Illinois: Varna Silt Loam
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		

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Initial Crop (INICRP)	1	Set to one for all crops (. EPA 2004)
Initial Surface Condition (ISCOND)	1	PRZM Scenario Guidance (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 - Peoria, Illinois (W14842)
Maximum rainfall interception storage of crop (CINTCP)	0.1 cm	Taken from Oregon Snapbeans scenario
Maximum Active Root Depth (AMXDR)	18 cm	Taken from Oregon Snapbeans scenario
Maximum Canopy Coverage (COVMAX)	80%	Taken from Oregon Snapbeans scenario
Soil Surface Condition After Harvest (ICNAH)	1	Taken from Oregon Snapbeans scenario
Date of Crop Emergence (EMD, EMM, IYREM)	16/6/61	Taken from Oregon Snapbeans scenario
Date of Crop Maturity (MAD, MAM, IYRMAT)	18/8/61	Taken from Oregon Snapbeans scenario
Date of Crop Harvest (HAD, HAM, IYRHAR)	2/9/61	Taken from Oregon Snapbeans scenario
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, Close-seeded legumes, fallow, ST/CT, poor (USDA, 1990)
Manning’s N Value (MNGN)	.023	RUSLE Project, File Code: MaISBCGC Chicago, IL, Soybean
USLE C Factor (USLEC)	.086 .089 .092 .095 .100 .109 .124 .145 .168 .278 .292 .342 .372 .395 .381 .326 .199 .067 .072 .054 .073 .093 .046 .047 .193 .219 .242 .258 .270	RUSLE Project, File Code: MaISBCGC Chicago, IL, Soybean
Varna Soil Parameters		
Total Soil Depth (CORED)	152 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	5 (top horizon split in 2)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 20 cm (HORIZN = 2) 38 cm (HORIZN = 3) 31 cm (HORIZN = 4) 53 cm (HORIZN = 5)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.5 g cm-3 (HORIZN = 1) 1.5 g cm-3 (HORIZN = 2) 1.45 g cm-3 (HORIZN = 3) 1.6 g cm-3 (HORIZN = 4) 1.8 g cm-3 (HORIZN = 5)	
Initial Water Content (THETO)	0.32 cm3 H20 cm3 soil (HORIZN = 1 -5)	Field Capacity values, PRZM Scenario Guidance (2004)

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Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2,3,4,5)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.32 cm3 H20 cm3 soil (HORIZN = 1 -5)	GLEAMS Table H-3 (1990) (Silt loam)
Wilting Point (THEWP)	0.12 cm3 H20 cm3 soil (HORIZN = 1 -5)	GLEAMS Table H-3 (1990) (Silt loam)
Organic Carbon Content (OC)	1.5% (HORIZN = 1) 1.5% (HORIZN = 2) 0.6% (HORIZN = 3) 0.18% (HORIZN = 4) 0.15% (HORIZN = 5)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship % OC = 0.6 x % Organic Matter (Doucette 2000)

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I. Northern Great Plains Region Scenario Documentation

1. Minnesota Potatoes (MNpotatoCRA)

The field used to represent potato production in Minnesota is located in Polk County, in the Red River Valley. However, the scenario should be considered as representative of the major potato producing region of the Red River Valley, which included counties in both Minnesota and North Dakota. According to the USDA Crop Profile for Potatoes in Minnesota (USDA, 2002), Minnesota ranked 7th nationally in potato production, with the largest producing regions in the northwest (Polk, Clay, Kittson, Marshall, and Red Lake counties) and the central (Sherburne, Morrison, Todd counties). Because this scenario is being developed for the N-methyl carbamate cumulative risk assessment, a scenario site in the northwest (Red River Valley) was selected to coincide with the regional cumulative assessment area. The site may still be of value as a regional potato scenario since it does represent an area of the country with relatively high potato production (North Dakota, on the other side of the Red River, is 6th in potato production, with the main producing area in ND being the Red River Valley [USDA, 2000b]). The Red River Valley MLRA (56) includes the North Dakota counties along the eastern border (Pembina, Walsh, Grand Forks, Traill, Cass, and Richland) and the Minnesota counties along the northwestern border (Kittson, Marshall, Polk, Pennington, Red Lake, Norman, Clay, Wilkin, and Traverse).

Planting begins in late April (after soil temperatures reach 45°F) through the end of May. Potatoes are harvested roughly 90 days after planting, beginning in late August and continuing through October (USDA, 2002). Row spacing is generally 32 to 36 inches, with rows 8-16 inches apart. Potatoes are generally grown once every three years on the same field to limit disease pressures (Willem Schrage, Minnesota Dept. of Agriculture). While a “significant portion” of MN potato acres are irrigated (USDA, 2002), irrigation generally occurs on coarse-textured (sandy loams or loamy sands) soils low in organic matter (USDA, 2000b). Potatoes and sugar beets may be grown on the same soils, but do not follow each other in a rotation because of the depletion of moisture (USDA, 2000b).

While the ideal potato soils are sandy-loam textured, fertile fine- to medium-textured soils are also appropriate for potato production (USDA, 2002). The soil selected to simulate the field is a benchmark soil, Bearden silty clay loam. This is the same soil used for the sugar beet scenario. 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 (i.e., sugar beets). Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. A seasonal high water table is at depths of 1.5 to 3.5 feet as some time during the period of April to June. 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. The series is of large extent in Minnesota, North Dakota, and South Dakota.

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PRZM 3.12 Scenario Input Parameters for Polk County, Minnesota – Potatoes

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)	0.50 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.17	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	PRZM Manual (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
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 – Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	http://www.css.orst.edu/Classes/CSS322/Growing.htm
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Dr. Mohamed Kahn; NDSU (701) 231_8596; Larry Smith U of MN (218) 281_8602.
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator, PIC (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	15/05	Based on beginning of most active planting dates (May 8 – May 31) and harvest dates (Sep 16 – Oct 12) for potatoes in MN, adding 7 days for emergence and 10 days between maturity & harvest (USDA 1997)
Date of Crop Maturity (MAD, MAM, IYRMAT)	06/09	

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Date of Crop Harvest (HAD, HAM, IYRHAR)	15/09	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project: F86PIPIC – Potatoes, Conventional tillage, Fargo, ND (USDA, 2000a)
USLE C Factor (USLEC)	.649 .774 .808 .816 .740 .441 .349 .233 .055 .056 .050 .496 .530 .565 .581 .588 .587 .586 .584 .583 .581 .579 .577 .580 .590 .612 .638 .639	RUSLE Project: F86PIPIC – Potatoes, Conventional tillage, Fargo, ND (USDA, 2000a). Order of C factors revised to follow crop emergence sequence (May 16 – 1605 – is the beginning date)
Bearden Soil Parameters		
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base, Top horizon split in two)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) NOTE: Used same soil parameters as used for MN Sugar Beets scenario since the scenarios are based on the same benchmark soil
Bulk Density (BD)	1.4 g cm-3 (HORIZN 1, 2) 1.5 g cm-3 (HORIZN 3) 1.8 g cm-3 (HORIZN 4)	
Initial Water Content (THETO)	0.377 cm3-H2O cm3-soil (HORIZN 1, 2) 0.292 cm3-H2O cm3-soil (HORIZN 3) 0.285 cm3-H2O cm3-soil (HORIZN 4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN 1) 2.0 cm (HORIZN 2,3,4)	
Field Capacity (THEFC)	0.377 cm3-H2O cm3-soil (HORIZN 1, 2) 0.292 cm3-H2O cm3-soil (HORIZN 3) 0.285 cm3-H2O cm3-soil (HORIZN 4)	
Wilting Point (THEWP)	0.207 cm3-H2O cm3-soil (HORIZN 1,2) 0.132 cm3-H2O cm3-soil (HORIZN 3) 0.125 cm3-H2O cm3-soil (HORIZN 4)	

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

2. Minnesota Sugar Beets (MNsugarbeetC)

The field used to represent sugar beet production in Minnesota is located in Polk County, in the Red River Valley (MLRA 56). According to the 1997 Census of Agriculture, Minnesota ranked 1st in production and acreage of sugar beets in the U.S. The crop is generally planted the late spring and harvested beginning in October. 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 crop may be grown under irrigation by furrow, canal, or center pivot systems. However, sugar beets grown in the Red River Valley do not need to be irrigated.

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 (i.e., sugar beets). Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. A seasonal high water table is at depths of 1.5 to 3.5 feet as some time during the period of April to June. 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. The series is of large extent in Minnesota, North Dakota, and South Dakota.

PRZM 3.12 Scenario Input Parameters for Polk County, Minnesota - Sugar Beets

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)	0.50 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.17	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	PRZM Manual (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)

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NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
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 - Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to soil profile depth. Roots can be as much as 8 feet deep. Dr. Mohamed Kahn; NDSU (701) 231_8596; Larry Smith U of MN (218) 281_8602.
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Dr. Mohamed Kahn; NDSU (701) 231_8596; Larry Smith U of MN (218) 281_8602.
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator, PIC (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	11/05	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984) & Updated Crop Stage Information from HED (Bernard Schneider)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, F86SUSUC); Sugar beets, Conventional tillage, Fargo, ND (USDA, 2000)
USLE C Factor (USLEC)	0.017 - 0.638	RUSLE Project; F86SUSUC); Sugar beets, Conventional tillage, Fargo, ND (USDA, 2000)
Soil Parameters - Bearden		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base, Top horizon split in two)	
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)

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Bulk Density (BD)	1.4 g cm-3 (HORIZN = 1, 2) 1.5 g cm-3 (HORIZN = 3) 1.8 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm3-H2O cm3-soil (HORIZN =1, 2) 0.292 cm3-H2O cm3-soil (HORIZN =3) 0.285 cm3-H2O cm3-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.377 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.292 cm3-H2O cm3-soil (HORIZN = 3) 0.285 cm3-H2O cm3-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm3-H2O cm3-soil (HORIZN = 1,2) 0.132 cm3-H2O cm3-soil (HORIZN = 3) 0.125 cm3-H2O cm3-soil (HORIZN = 4)	
Organic Carbon Content (OC)	4.06% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

3. North Dakota Wheat (NDwheatC)

The field used to represent wheat production in North Dakota is located in Cass County in the Red River Valley. According to the 1997 Census of Agriculture, North Dakota is ranked 1st in the production of both durum and spring wheat in the U.S. The crop is generally planted in the Spring (late April to the end of May) and harvested beginning in August. Continuous wheat is practice is much of the region. Conventional tillage is used but requires greater seedbed preparation. No-till and reduced tillage systems are designed for use in high residue conditions. 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, 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.

PRZM 3.12 Scenario Input Parameters for Cass County, North Dakota Wheat

Parameter	Value	Source

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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)	0.5m C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
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)	0.17	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
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)	464 m	Shipman Reservoir (EPA, 1999)
Crop Parameters		
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. Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	22 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	1	Fallow conditions after harvest in preparation for winter crop
Date of Crop Emergence (EMD, EMM, IYREM)	15/05	Planting and Harvesting dates for spring wheat adjusted for ""C"" value planting and harvesting date (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/07	Planting and Harvesting dates for spring wheat adjusted for ""C"" value planting and harvesting date (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	08/08	Planting and Harvesting dates for spring wheat adjusted for ""C"" value planting and harvesting date (USDA, 1984)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table A.3, Fallow = SR/CT poor; Cropping = Row Crop SR/CT poor (second number; Fallow = row crop SR/CT poor (3rd number) (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, F86WSFA Fargo, ND spring wheat, fallow, conventional tillage (USDA, 2000)
USLE C Factor (USLEC)	0.036 - 0.617	RUSLE Project; F86WSFA Fargo, ND spring wheat, fallow, conventional tillage (USDA, 2000)
Bearden Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	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 cm-3 (HORIZN = 1,2) 1.5 g cm-3 (HORIZN = 3) 1.8 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm3-H2O cm3-soil (HORIZN =1,2) 0.292 cm3-H2O cm3-soil (HORIZN =3) 0.285 cm3-H2O cm3-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.377 cm3-H2O cm3-soil (HORIZN = 1,2) 0.292cm3-H2O cm3-soil (HORIZN = 3) 0.285 cm3-H2O cm3-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm3-H2O cm3-soil (HORIZN = 1,2) 0.132 cm3-H2O cm3-soil (HORIZN = 3) 0.125 cm3-H2O cm3-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.116% (HORIZN = 3) 0.058% (HORIZN = 4)	

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

J. Northwest / WA

1. Washington Apples (WAorchardsCRA)

The field used to represent orchard production in Central Washington is representative of a field in Grant county, located in the Columbia Basin. The meteorological file, Yakima, WA represents the MLRA region 7, 8. Washington produces 53 percent of U.S. apples, ranking first in the U.S. Apple production in the state of Washington occurs primarily in three regions: Yakima Basin, North Central, and Columbia Basin. Various types of apples, including red delicious, golden delicious, pink lady, granny smith, and more are grown in orchards in Washington (NSF 2001). Taunton silt loam chosen from Grant county. This soil was chosen over the Scoon silt loam even though more orchard crops are grown in the Scoon soil, since data are available for deeper depths. This is appropriate due to the large maximum rooting depth of apples and cherry trees. Taunton silt loam is a hydrologic group C soil that is classified as coarse-loamy, mixed, superactive, mesic xeric Haplodurids. The Taunton series of soils is moderately deep to duripan, well drained soils formed in alluvium. These soils occur on terraces and basalt plains, fan terraces and mesas with slopes of 0 to 45 percent. This soil type occurs in South-central Washington, north-central Oregon and Southern Idaho where it is used for livestock grazing and irrigated crop production (USDA 2001).

PRZM 3.12 Scenario Input Parameters for Grant County, Washington - Orchard

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Yakima, Grant County, Washington
Ending Date	December 31, 1990	Meteorological File - Yakima, Grant County, Washington
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.20 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.55 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	0.70	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 4% slope
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)	3	PRZM Manual Figure 5.12 (EPA, 1998)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Slope (SLP)	3.5%	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Hydraulic Length (HL)	464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	3	Consulted extension agent, crops are rotated
Number of Different Crops (NDC)	1	Based on OR apple scenario.
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	Based on OR apple scenario.
Maximum Active Root Depth (AMXDR)	45 cm	Based on OR apple scenario.
Maximum Canopy Coverage (COVMAX)	98%	Based on OR apple scenario.
Soil Surface Condition After Harvest (ICNAH)	3	Based on OR apple scenario.
Date of Crop Emergence (EMD, EMM, IYREM)	1/5/61	Based on OR apple scenario.
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/5/61	Based on OR apple scenario.
Date of Crop Harvest (HAD, HAM, IYRHAR)	7/11/61	Based on OR apple scenario.
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	79, 82, 84	Gleams Manual Table A.3, (Hydrological soil C) (USDA, 1990)
Manning’s N Value (MNGN)	.040 .	RUSLE Project (B060FOFN.dat)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

USLE C Factor (USLEC)	.004 .005 .006 .006 .009 .010 .011 .011 .011 .010 .009 .008 .006 .005 .005 .005 .005 .005 .005 .005 .002 .003 .003 .003	RUSLE Project (B060FOFN.dat)
Soil Parameters		
Total Soil Depth (CORED)	68 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	4	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 10 cm (HORIZN = 2) 28 cm (HORIZN = 3) 20 cm (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.25 g cm-3 (HORIZN = 1) 1.25 g cm-3 (HORIZN = 2) 1.40 g cm-3 (HORIZN = 3) 1.40 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.32 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2) 2 cm (HORIZN = 3)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.32 cm3 H20 cm3 soil (HORIZN = 1, 2, 3, 4)	GLEAMS Table H-3(1990)
Wilting Point (THEWP)	0.12 cm3 H20 cm3 soil (HORIZN = 1, 2, 3, 4)	GLEAMS Table H-3(1990)
Organic Carbon Content (OC)	0.45% (HORIZN = 1) 0.45% (HORIZN = 2) 0.15% (HORIZN = 3) 0.15% (HORIZN = 4)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship %OC = 0.6x% Organic Matter (Doucette 2000)

2. Washington Beans (WAbeansCRA)

The field used to represent bean production in Central Washington is located in Grant County in the Columbia Basin. The meteorological file, Yakima, WA represents the MLRA regions 7 and 8. Beans are planted in early summer and harvested in September. For this scenario, Ekrub fine sand was selected as a representative soil type because it supports bean crops. Ekrub fine sand is a hydrologic group C soil that is classified as sandy-skeletal, mixed, mesic, shallow xeric Haplodurids. The Ekrub series of soils is shallow, somewhat excessively drained, formed in eolian sands overlying a lime-silica indurated duripan. These soils occur on terraces with slopes of 0 to 25 percent. This soil type occurs in South-central Washington where itis mostly used for range (USDA 1996).

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Yakima, Grant County, Washington
Ending Date	December 31, 1990	Meteorological File - Yakima, Grant County, Washington
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.20 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	3.6	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 12% slope
USLE P Factor (USLEP)	0.6	PRZM Manual Table 5.6 (EPA, 1998)
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)	12.5%	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Hydraulic Length (HL)	464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	1	Consulted extension agent, crops are rotated
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.

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Maximum rainfall interception storage of crop (CINTCP)	0.1 cm	Taken from OR snap beans scenario.
Maximum Active Root Depth (AMXDR)	18 cm	Taken from OR snap beans scenario.
Maximum Canopy Coverage (COVMAX)	80%	Taken from OR snap beans scenario.
Soil Surface Condition After Harvest (ICNAH)	1	Taken from OR snap beans scenario.
Date of Crop Emergence (EMD, EMM, IYREM)	61/6/61	Taken from OR snap beans scenario.
Date of Crop Maturity (MAD, MAM, IYRMAT)	18/8/61	Taken from OR snap beans scenario.
Date of Crop Harvest (HAD, HAM, IYRHAR)	2/9/61	Taken from OR snap beans scenario.
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 86, 87	Gleams Manual Table A.3, (Hydrological soil C), SR Conservation Tillage/poor, Cropping and Residue = Row Crop Contour/good (USDA, 1990)
Manning’s N Value (MNGN)	.011	RUSLE Project (A04ONONC.dat) Onion fields in Centralia, WA
USLE C Factor (USLEC)	.806 .812 .818 .822 .827 .831 .836 .786 .885 .887 .869 .829 .778 .733 .691 .666 .690 .707 .554 .582 .617 .658 .702 .735 .759 .777 .790 .799	RUSLE Project (A04ONONC.dat) Onion fields in Centralia, WA
Soil Parameters		
Total Soil Depth (CORED)	45 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	3	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	8 cm (HORIZN = 1) 22 cm (HORIZN = 2) 15 cm (HORIZN = 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1) 1.55 g cm-3 (HORIZN = 2) 1.55 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.18 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2) 5 cm (HORIZN = 3)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.18 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	GLEAMS Table H-3(1990)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

Wilting Point (THEWP)	0.03 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	GLEAMS Table H-3(1990)
Organic Carbon Content (OC)	0.15% (HORIZN = 1, 2, 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship %OC = 0.6x%Organic Matter (Doucette 2000)

3. Washington Onions (WAonionsCRA)

The field used to represent onion production in Central Washington is representative of a field in Grant county. The meteorological file, Yakima, WA represents the MLRA region 7, 8. Washington produces 16.2 percent of the U.S. dry summer onions, ranking third in the U.S. Washington storage onion production is primairly in the central part of the state in Grant, Franklin, Benton and Adams counties. Onions are cool-season crops which can grow in a variety of soil types. Onions in Grant county are grown in 3 to 4 year rotations with carrots, sweet corn, cereals and potatoes. Onions are planted on beds in multiple rows (2-12). Seeds are planted 1/4 to ½ inch deep. Most onions are irrigated (NSF 2003). For this scenario, Ekrub fine sand was selected as a representative soil type because it supports onion crops. Ekrub fine sand is a hydrologic group C soil that is classified as sandy-skeletal, mixed, mesic, shallow xeric Haplodurids. The Ekrub series of soils is shallow, somewhat excessively drained, formed in eolian sands overlying a lime-silica indurated duripan. These soils occur on terraces with slopes of 0 to 25 percent. This soil type occurs in South-central Washington where it is mostly used for range (USDA 1996).

PRZM 3.12 Scenario Input Parameters for Grant County, Washington - Onions

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Yakima, Grant County, Washington
Ending Date	December 31, 1990	Meteorological File - Yakima, Grant County, Washington
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.20 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD	17 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	3.6	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 12% slope
USLE P Factor (USLEP)	0.5	PRZM Manual Table 5.6 (EPA, 1998)

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

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)	12.5%	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Hydraulic Length (HL)	464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	1	Consulted extension agent, crops are rotated
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.5 cm	Taken from CA onion scenario.
Maximum Active Root Depth (AMXDR)	35 cm	Taken from CA onion scenario.
Maximum Canopy Coverage (COVMAX)	80%	Taken from CA onion scenario.
Soil Surface Condition After Harvest (ICNAH)	1	Taken from CA onion scenario.
Date of Crop Emergence (EMD, EMM, IYREM)	1/6/61	Oregon State University Extension and Experiment Station http://eesc.orst.edu/agcomwebfile/edmat/html/pnw546/pnw546.html#anchor256349
Date of Crop Maturity (MAD, MAM, IYRMAT)	30/8/61	Oregon State University Extension and Experiment Station http://eesc.orst.edu/agcomwebfile/edmat/html/pnw546/pnw546.html#anchor256349
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/9/61	Oregon State University Extension and Experiment Station http://eesc.orst.edu/agcomwebfile/edmat/html/pnw546/pnw546.html#anchor256349
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation

Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

SCS Curve Number (CN)	84, 86, 87	Gleams Manual Table A.3, (Hydrological soil C), SR Conservation Tillage/poor, Cropping and Residue = Row Crop Contour/good (USDA, 1990)
Manning's N Value (MNGN)	.011	RUSLE Project (A04ONONC.dat) Onion fields in Centralia, WA
USLE C Factor (USLEC)	.806 .812 .818 .822 .827 .831 .836 .786 .885 .887 .869 .829 .778 .733 .691 .666 .690 .707 .554 .582 .617 .658 .702 .735 .759 .777 .790 .799	RUSLE Project (A04ONONC.dat) Onion fields in Centralia, WA
Soil Parameters		
Total Soil Depth (CORED)	45 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	3	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	8 cm (HORIZN = 1) 22 cm (HORIZN = 2) 15 cm (HORIZN = 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1) 1.55 g cm-3 (HORIZN = 2) 1.55 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.18 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2) 5 cm (HORIZN = 3)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.18 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.03 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	0.15% (HORIZN = 1, 2, 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship %OC = 0.6x%Organic Matter (Doucette 2000)

4. Washington Potatoes (WApotatoCRA)

The field used to represent potato production in Central Washington is located in Grant County in the Columbia Basin. The meteorological file, Yakima, WA represents the MLRA regions 7 and 8. Potatoes are planted in the spring and harvested in the summer and fall. Common potato varieties grown in Washington include russets, which are grown for french fries and fresh market. Other varieties include yellow, red and blue potatoes (WSPC 2004). For this scenario, Scoon silt loam was selected as a representative soil type because it supports potato crops in Grant county in Washington. Scoon silt loam is a hydrologic group D soil that is classified as loamy, mixed, superactive, mesic and shallow Xeric Haplodurids. The Scoon series of soils is shallow to a duripan, well drained, and formed in loess and silty alluvium over a duripan. These

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soils occur on terraces and alluvial fans with slopes of 0 to 30 percent. This soil type occurs on the in South-central Washington and Southern Idaho and is mostly used for irrigated crop production and range (USDA 2001).

PRZM 3.12 Scenario Input Parameters for Grant County, Washington - Potato

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Yakima, Grant County, Washington
Ending Date	December 31, 1990	Meteorological File - Yakima, Grant County, Washington
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.20 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.55 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	0.30	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 2% slope
USLE P Factor (USLEP)	0.3	PRZM Manual Table 5.6 (EPA, 1998)
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)	2.5%	From http://soils.usda.gov/ official soil series description (slope range = 0-1%)
Hydraulic Length (HL)	356 (pond) 464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA,2001)

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Initial Surface Condition (ISCOND)	1	Consulted extension agent, crops are rotated
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.1 cm	PRZM Manual (Carsel et al., 1998)
Maximum Active Root Depth (AMXDR)	30 cm	Consulted extension agent
Maximum Canopy Coverage (COVMAX)	40%	Consulted extension agent
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Manual (Carsel et al., 1998)
Date of Crop Emergence (EMD, EMM, IYREM)	1/5/61	Consulted extension agent
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/9/61	Consulted extension agent
Date of Crop Harvest (HAD, HAM, IYRHAR)	1/10/61	Consulted extension agent
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 89, 90	Gleams Manual Table A.3, (Hydrological soil D) (USDA, 1990)
Manning’s N Value (MNGN)	.014	RUSLE Project (A04PIPC.dat)
USLE C Factor (USLEC)	.741 .753 .764 .774 .784 .795 .805 .750 .757 .858 .880 .811 .582 .389 .290 .125 .055 .050 .188 .486 .520 .582 .630 .666 .694 .713 .729	RUSLE Project (A04PIPC.dat)
Soil Parameters		
Total Soil Depth (CORED)	40 cm	http://soils.usda.gov/ Note: Only upper 16 inches of soil had data on physical properties.
Number of Horizons (NHORIZ)	3	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 5 cm (HORIZN = 2) 25 cm (HORIZN = 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.25 g cm-3 (HORIZN = 1) 1.25 g cm-3 (HORIZN = 2) 1.4 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.32 cm3 H20 cm3 soil	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2) 5 cm (HORIZN = 3)	PRZM Scenario Guidance (2004)

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Field Capacity (THEFC)	0.32 cm3 H20 cm3 soil	GLEAMS Table H-3(1990), NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Wilting Point (THEWP)	0.12 cm3 H20 cm3 soil	GLEAMS Table H-3(1990), NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Organic Carbon Content (OC)	0.45% (HORIZN = 1, 2) 0.15% (HORIZN = 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship %OC = 0.6x%Organic Matter (Doucette 2000)

5. Washington Sweet Corn (WAswcornCRA)

This scenario was developed specifically to fill in usage for the N-methyl Carbamate Cumulative assessment for total NMC use in Grant County, WA. The scenario uses the climate and soil inputs from the WA onion scenario with crop parameters specific to sweet corn. The meteorological file, Yakima, WA, represents the MLRA region 7, 8. For this scenario, Ekrub fine sand was selected as a representative soil type because it supports onion crops. Ekrub fine sand is a hydrologic group C soil that is classified as sandy-skeletal, mixed, mesic, shallow xeric Haplodurids. The Ekrub series of soils is shallow, somewhat excessively drained, formed in eolian sands overlying a lime-silica indurated duripan. These soils occur on terraces with slopes of 0 to 25 percent. This soil type occurs in South-central Washington where it is mostly used for range (USDA 1996).

PRZM 3.12 Scenario Input Parameters for Grant County, Washington – Sweet Corn

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Yakima, Grant County, Washington
Ending Date	December 31, 1990	Meteorological File - Yakima, Grant County, Washington
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.20 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD	17 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
USLE LS Factor (USLELS)	3.6	Based on slope taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) , PRZM manual length 400 m, 12% slope
USLE P Factor (USLEP)	0.5	PRZM Manual Table 5.6 (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA 2004)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)

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Slope (SLP)	12.5%	Taken from NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Hydraulic Length (HL)	464 (reservoir)	Shipman Reservoir (EPA 2004)
Irrigation Flag (IRFLAG)	0	From PRZM Scenario Guidance (2004)
Irrigation Type (IRTYP)	Not applicable	
Leaching Factor (FLEACH)	Not applicable	
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (.EPA 2004)
Initial Surface Condition (ISCOND)	1	Consulted extension agent, crops are rotated
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data.
Maximum rainfall interception storage of crop (CINTCP)	0.25 cm	Taken from OR sweet corn scenario.
Maximum Active Root Depth (AMXDR)	90 cm	Taken from OR sweet corn scenario.
Maximum Canopy Coverage (COVMAX)	100%	Taken from OR sweet corn scenario.
Soil Surface Condition After Harvest (ICNAH)	1	Taken from OR sweet corn scenario.
Date of Crop Emergence (EMD, EMM, IYREM)	10/5/61	Oregon State University Extension and Experiment Station http://eesc.orst.edu/agcomwebfile/edmat/html/pnw546/pnw546.html#anchor256349
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/8/61	Oregon State University Extension and Experiment Station http://eesc.orst.edu/agcomwebfile/edmat/html/pnw546/pnw546.html#anchor256349
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/9/61	Oregon State University Extension and Experiment Station http://eesc.orst.edu/agcomwebfile/edmat/html/pnw546/pnw546.html#anchor256349
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 86, 87	Gleams Manual Table A.3, (Hydrological soil C), SR Conservation Tillage/poor, Cropping and Residue = Row Crop Contour/good (USDA, 1990)

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Manning's N Value (MNGN)	.011	RUSLE Project (A04ONONC.dat) Onion fields in Centralia, WA
USLE C Factor (USLEC)	.806 .812 .818 .822 .827 .831 .836 .786 .885 .887 .869 .829 .778 .733 .691 .666 .690 .707 .554 .582 .617 .658 .702 .735 .759 .777 .790 .799	RUSLE Project (A04ONONC.dat) Onion fields in Centralia, WA
Soil Parameters		
Total Soil Depth (CORED)	45 cm	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Number of Horizons (NHORIZ)	3	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Horizon Thickness (THKNS)	8 cm (HORIZN = 1) 22 cm (HORIZN = 2) 15 cm (HORIZN = 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1) 1.55 g cm-3 (HORIZN = 2) 1.55 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.18 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	Field Capacity values, PRZM Scenario Guidance (2004)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2) 5 cm (HORIZN = 3)	PRZM Scenario Guidance (2004)
Field Capacity (THEFC)	0.18 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	GLEAMS Table H-3 (1990)
Wilting Point (THEWP)	0.03 cm3 H20 cm3 soil (HORIZN = 1, 2, 3)	GLEAMS Table H-3 (1990)
Organic Carbon Content (OC)	0.15% (HORIZN = 1, 2, 3)	NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/); Adjusted using the relationship %OC = 0.6x%Organic Matter (Doucette 2000)

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K. Southeast Region Scenario Documentation

1. California Alfalfa (CAalfalfa0C)

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.

PRZM 3.12 Scenario Input Parameters for San Joaquin County, California - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.45 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
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)	0.19	NRI - Average value listed for the soil series Sacramento
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, 1999)

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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)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
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 - Sacramento, CA (W23232)
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
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)	10/01	Value set to approximate planting cycle. Alfalfa is planted one 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 one 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 one 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 A.3, 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)

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Sacramento Soil Parameters		
Total Soil Depth (CORED)	176 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
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 cm-3 (HORIZN = 1, 2) 1.29 g cm-3 (HORIZN = 3) 1.48 g cm-3 (HORIZN = 4)	
Initial Water Content (THETO)	0.42 cm3-H2O cm3-soil (HORIZN =1, 2) 0.44 cm3-H2O cm3-soil (HORIZN =3) 0.39 cm3-H2O cm3-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4.0 cm (HORIZN = 2) 1 cm (HORIZN = 3,4)	
Field Capacity (THEFC)	0.44 cm3-H2O cm3-soil (HORIZN = 1, 2) 0.42 cm3-H2O cm3-soil (HORIZN = 3) 0.39 cm3-H2O cm3-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.36 cm3-H2O cm3-soil (HORIZN = 1,2,3) 0.3 cm3-H2O cm3-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.77% (HORIZN = 1,2) 0.84% (HORIZN = 3,4)	

2. California Citrus (CAcitrus0C)

The field used to represent citrus production in California is located in Fresno County in the Central Valley, although citrus production areas are quite extensive (San Joaquin, Coastal-Intermediate Region, Imperial Valley, Coachella Valley, and the Southern Interior Region). According to the 1997 Census of Agriculture, California is the major producer of citrus (lemons and oranges) for the fresh market, and among the highest producers in other citrus (grapefruit, tangerines, tangelos, and mandarins). Citrus is generally grown on the foothills to avoid frost damage. Areas under and between rows of trees are generally non-cultivated/non-maintained. Row spacing is approximately 22 feet and between tree spacing is approximately 18 feet. Row canopies tend to be 100 percent, while the canopy between rows is less to permit the operation of maintenance and harvest equipment. Irrigation is mostly by low-volume drip or micro-sprinkler systems, although furrow and overhead sprinklers are also used. The soil selected to

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simulate the field is a benchmark soil, Exeter loam. Exeter loam, is a fine-loamy, mixed, superactive, thermic Typic Durixeralfs. These soils are often used for citrus production under irrigation. Exeter loam is a moderately deep, moderately well drained, very slow to medium runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The Exeter loam has moderately slow permeability above the duripan and very slow permeability within the duripan. These soil are generally found on alluvial fans and stream terraces at elevations of up to 700 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17. Exeter loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Fresno County, California - Citrus

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	NRI - Average value listed for the soil series Exeter
USLE LS Factor (USLELS)	0.21	NRI - Average value listed for the soil series Exeter
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Exeter
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	Mark Freeman, Fresno County Cooperative Extension Agent.
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)

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Initial Surface Condition (ISCOND)	3	Mark Freeman, Fresno County Cooperative Extension Agent.
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
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	60 cm	Mark Freeman, Fresno County Cooperative Extension Agent.
Maximum Canopy Coverage (COVMAX)	80	Mark Freeman, Fresno County Cooperative Extension Agent.
Soil Surface Condition After Harvest (ICNAH)	3	Mark Freeman, Fresno County Cooperative Extension Agent.
Date of Crop Emergence (EMD, EMM, IYREM)	02/01	Value set to a default evergreen cycle with no specific crop growth milestone such as flowering of fruit set.
Date of Crop Maturity (MAD, MAM, IYRMAT)	03/01	Value set to a default evergreen cycle with no specific crop growth milestone such as flowering of fruit set.
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/12	Value set to a default evergreen cycle with no specific crop growth milestone such as flowering of fruit set.
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; D26CCCCM for cover alley citrus (USDA, 2000)
USLE C Factor (USLEC)	0.096 - 0.150	RUSLE Project; Variable with date, D26CCCCM for cover alley citrus (USDA, 2000)
Exeter Soil Parameters		
Total Soil Depth (CORED)	183 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 173 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.59 g cm-3 (HORIZN = 1) 1.76 g cm-3 (HORIZN = 2)	
Initial Water Content (THETO)	0.16 cm3-H2O cm3-soil (HORIZN =1) 0.2 cm3-H2O cm3-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.16 cm3-H2O cm3-soil (HORIZN = 1) 0.2 cm3-H2O cm3-soil (HORIZN = 2)	

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Wilting Point (THEWP)	0.06 cm3-H2O cm3-soil (HORIZN = 1) 0.11 cm3-H2O cm3-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.46% (HORIZN = 1) 0.19% (HORIZN = 2)	

3. California Cotton (CAcotton0C)

The field used to represent cotton production in California is located in Fresno County in the Central Valley, although cotton production occurs throughout the Central Valley. According to the 1997 Census of Agriculture, California is the major producer of cotton in the U.S. Cotton is generally grown on the alluvial fans and basin rims by both dry and wet seeded methods. Row spacing and planting depths are consistent with other cotton growing regions of the U.S. Both standard (30-inch) and ultra-narrow (20-inch) row spacing are used. Irrigation is mostly by flooding. The soil selected to simulate the field is a Twisselman clay. Twisselman clay is a fine, mixed, calcareous, thermic Typic Torriorthents. These soils are often used for cotton production under irrigation. Twisselman clay is a deep, well drained, slow to medium runoff, slowly permeable (very slow in saline-alkali phases) soil that formed in alluvium mainly from sedimentary rock sources. These soil are generally found on alluvial fans and basin rims at elevations of 200 to 1,000 feet above mean sea level and have slopes of 0 to 5 percent. The soil is of moderate extent. Twisselman clay is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Fresno County, California - Cotton

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.5 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.21 tons EI-1*	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.02	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)

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Slope (SLP)	2.5%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Kerry Arroues USDA_NRCS
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 -
Maximum rainfall interception storage of crop (CINTCP)	0.2	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	65 cm	Kerry Arroues USDA_NRCS
Maximum Canopy Coverage (COVMAX)	100	Kerry Arroues USDA_NRCS
Soil Surface Condition After Harvest (ICNAH)	3	Kerry Arroues USDA_NRCS
Date of Crop Emergence (EMD, EMM, IYREM)	05/05	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	03/01	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	11/11	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	Set to MS Cotton values. Field validated curve numbers.
Manning’s N Value (MNGN)	0.023	RUSLE Project; C23CTCTC; Cotton, conventional tillage, Fresno (USDA, 2000)
USLE C Factor (USLEC)	0.54 - 0.412	RUSLE Project; C23CTCTC; Cotton, conventional tillage, Fresno, Variable with date (USDA, 2000)
Twisselman Soil Parameters		
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)

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Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
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/) Ed Russell (USDA_NRCS, Fresno)
Bulk Density (BD)	1.45 g cm-3 (HORIZN = 1) 1.5 g cm-3 (HORIZN = 2) 1.6 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.36 cm3-H2O cm3-soil (HORIZN =1,2) 0.317 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN =2,3)	
Field Capacity (THEFC)	0.36 cm3-H2O cm3-soil (HORIZN = 1,2) 0.317 cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.22 cm3-H2O cm3-soil (HORIZN = 1,2) 0.197 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.29% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

4. California Fruit Trees (CAfruit0C)

The field used to represent non-citrus fruit production in California is located in Fresno County in the Central Valley, although non-citrus fruit production covers most of the central portion of the state, but mainly on Eastern slopes. According to the 1997 Census of Agriculture, California is the major producer of peaches, plums/prunes, and kiwi for the fresh market, and among the highest producers in other non-citrus fruit such as pears and apples. Areas under and between rows of trees may or may not be maintained depending on the location. Row spacing varies depending on the fruit tree (from approximately 15 to 25 feet) as does the tree spacing (approximately 12 to 20 or more feet). Row canopies tend to be very close to 100 percent, while the canopy between rows is much less to permit the operation of maintenance and harvest equipment. Irrigation is by furrow and flood for most crops, but low-volume drip or micro-sprinkler systems are growing in popularity. The soil selected to simulate the field is a benchmark soil, Exeter loam. Exeter loam, is a fine-loamy, mixed, superactive, thermic Typic Durixeralfs. These soils are often used for citrus production under irrigation. Exeter loam is a moderately deep, moderately well drained, very slow to medium runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The Exeter loam has moderately slow permeability above the duripan and very slow permeability within the duripan. These soil are generally found on alluvial fans and stream terraces at elevations of up to 700 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17. Exeter loam is a Hydrologic Group C soil.

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PRZM 3.12 Scenario Input Parameters for Fresno County, California - Fruit (non-Citrus)

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.73	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Snowmelt Factor (SFAC)	0.0 cm C- 1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI-1*	NRI - Average value listed for the soil series Exeter
USLE LS Factor (USLELS)	0.018	NRI - Average value listed for the soil series Exeter
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Exeter
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998); based on crops grown on Eastern side of slopes.
Slope (SLP)	9%	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Mark Freeman, Fresno County Cooperative Extension Agent.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	30	Set to weather data. Meteorological
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)

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Maximum Active Root Depth (AMXDR)	30 cm	Mark Freeman, Fresno County Cooperative Extension Agent.
Maximum Canopy Coverage (COVMAX)	90	Mark Freeman, Fresno County Cooperative Extension Agent.
Soil Surface Condition After Harvest (ICNAH)	3	Mark Freeman, Fresno County Cooperative Extension Agent.
Date of Crop Emergence (EMD, EMM, IYREM)	21/01	Value set to a dates for plums based on Health Effects Division information
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/06	Value set to a dates for plums based on Health Effects Division information
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	Value set to a dates for plums based on Health Effects Division information
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; C21OCOCM for orchards, covered alley in Sacramento (USDA, 2000)
USLE C Factor (USLEC)	0.034 - 0.221	RUSLE Project; Variable with date, C21OCOCM for orchards, covered alley in Sacramento (USDA, 2000)
Exeter Soil Parameters		
Total Soil Depth (CORED)	183 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 173 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.59 g cm-3 (HORIZN = 1) 1.76 g cm-3 (HORIZN = 2)	
Initial Water Content (THETO)	0.16 cm3-H2O cm3-soil (HORIZN =1) 0.2 cm3-H2O cm3-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.16 cm3-H2O cm3-soil (HORIZN = 1) 0.2 cm3-H2O cm3-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.06 cm3-H2O cm3-soil (HORIZN = 1) 0.11 cm3-H2O cm3-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.46% (HORIZN = 1) 0.19% (HORIZN = 2)	

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5. California Grapes (CAgrapesC)

The field used to represent grape production in California is located in Southern San Joaquin Valley. According to the 1997 Census of Agriculture, California is the major producer of table, wine, and raisin grapes with 85 percent of California's production in the San Joaquin Valley and the bulk of the remainder in the Coachella Valley. Grapes need at least 3 ft of well drained soil, and are typically grown on sandy or sandy loam soils. Vine rows are usually kept weed free, but there is some growth in the winter. Surface soil around the vine row is usually sealed, but some plants can grow between vine rows. The soil between rows is usually disked. Row spacing varies depending on the terrain. Canopies between rows tend to be much less than 100 percent, while the canopy along the rows is 100 percent. Irrigation is mainly by drip irrigation, but some vineyards continue to use sprinkler systems. The soil selected to simulate the field is a benchmark soil, San Joaquin loam. San Joaquin loam, is a fine, mixed, active, thermic Abruptic Durixeralfs. These soils are often used for vineyards, fruit and nut production under irrigation. San Joaquin loam is a moderately deep, well and moderately well drained, medium to very high runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The San Joaquin loam has very slow permeability above the duripan and very slow permeability within the duripan. Some areas are subject to flooding. These soil are generally found on undulating terraces at elevations from 50 to 500 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17 along the Eastern slopes of the Sacramento and San Joaquin Valleys. San Joaquin loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for San Joaquin Valley, California - Grapes

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI-1*	NRI - Average value listed for the soil series San Joaquin
USLE LS Factor (USLELS)	0.2	NRI - Average value listed for the soil series San Joaquin
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series San Joaquin
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998); based on crops grown on Eastern side of slopes.

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Slope (SLP)	2%	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
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
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	100 cm	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Maximum Canopy Coverage (COVMAX)	70	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Soil Surface Condition After Harvest (ICNAH)	3	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Date of Crop Emergence (EMD, EMM, IYREM)	01/02	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/08	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/08	Paul Verdegaal, San Joaquin County Cooperative Extension 209_468_9494
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; C21GBGBC for grapes, Sacramento, bare ground (USDA, 2000)
USLE C Factor (USLEC)	0.274 - 0.517	RUSLE Project; Variable with date, C21GBGBC for grapes, Sacramento, bare ground (USDA, 2000)
San Joaquin Soil Parameters		
Total Soil Depth (CORED)	340 cm	NRCS, National Soils Characterization Database (NRCS, 2001)

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Number of Horizons (NHORIZ)	2 (Base horizons)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 330 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.84 g cm-3 (HORIZN = 1) 1.6 g cm-3 (HORIZN = 2)	
Initial Water Content (THETO)	0.21 cm3-H2O cm3-soil (HORIZN =1) 0.28 cm3-H2O cm3-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.21 cm3-H2O cm3-soil (HORIZN = 1) 0.28 cm3-H2O cm3-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.1 cm3-H2O cm3-soil (HORIZN = 1) 0.15 cm3-H2O cm3-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.72% (HORIZN = 1) 0.16% (HORIZN = 2)	

6. California Vegetables: Root & Bulb crops – Carrots (CAcarrot0CRA), Garlic (CAgarlic0CRA), Onion (CAonion0C)

These scenarios were adapted for the N-Methyl Carbamate cumulative assessment, using the weather, runoff, and soil parameters from the CA onion scenario, changing the scenarios to reflect crop-specific parameters for carrots and garlic. All parameters are the same for these scenarios, except where noted in the table below.

The field used to represent onion production in California is located in Kern County in the San Joaquin Valley, although onion production areas are quite extensive (San Joaquin, Coastal-Intermediate Region, Imperial Valley, southern and central coastal regions, the high desert areas of Los Angeles County and the northern mountain valleys). According to the 1997 Census of Agriculture, California is the major producer of onions for the market. Bulb onions are planted from September through May and harvesting begins in April or May and completed by September. Onions are cools season, biennial plants that are commercially grown as an annual. Most onions are direct seeded, but transplants are used in some fall planted fields for an earlier harvest of short-day and intermediate-day varieties and to achieve uniform , jumbo-sized bulbs. Seeds are planted uniformly at 2 to 3 inches between plants in a row. Onions are most commonly grown in multiple rows on raised beds 40 to 42 inches wide, but some production areas use 36-inch wide beds or beds of 60 to 80 inches. Distribution of rows across beds varies depending on irrigation method and planter. With drip and sprinkler irrigation (most common types), rows are spaced equidistant across the bed at approximately 4-inch intervals. When furrow irrigation is used, the center of the bed is left vacant for salt accumulation with 2 or 3 rows planted on either side. Plant canopy can approach 100 percent in some

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narrow row fields grown under drip irrigation. Irrigation is required to avoid seed or plant dry out. Generally 24 to 36 inches of irrigated water per year is sufficient. Onions can grow on a wide range of soils.

Garlic is grown in the desert valleys, central coast, and San Joaquin Valley of California. It is typically planted in the fall (mid-September through November) and matures in late spring in the desert valleys and mid-summer in the central coast and San Joaquin Valley (UC Davis, 1976. Growing Garlic in California). Garlic is generally ready to harvest one month after maturity.

California is the top carrot-producing state in the United States and the San Joaquin Valley / Kern County is the largest carrot-producing region in the state, accounting for 75% of acreage (USDA Crop Profile for Carrots in California). Carrots may be planted in December to March or in July to September. Harvest dates are from May to July for the winter planting and from November to February for the late summer planting.

The soil selected to represent the field is Ciervo clay. Ciervo clay, is a fine, semetic, thermic Vertic Haplocambids. These soils are often used for onion and other truck crop production under irrigation. Ciervo clay is a very deep, moderately well drained, medium to high runoff soil on fan skirts that formed in alluvium mainly from sedimentary rocks at elevation of 170 to 735 feet above mean sea level. The Ciervo clay has very slow permeability. Slopes range from 0 to 2 percent. The soil is of large extent in MLRA 17. Ciervo clay is a Hydrologic Group D soil.

PRZM 3.12 Scenario Input Parameters for Kern County, California – Bulb and Root Crops (Onion, Garlic, Carrot)

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.21 tons EI-1*	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.303	Haan and Barfield, 1979
USLE P Factor (USLEP)	0.5	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)

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Slope (SLP)	1%	Mid-point of the Soil Series, Ciervo
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Default
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
Maximum rainfall interception storage of crop (CINTCP)	0.05	PRZM Input Collator (Burns, 1992)
Maximum Active Root Depth (AMXDR)	30 cm (onion)	Voss, R.E. Fresh Market Bulb Onion Production in California. U. fo CA Publication 7242. 1999.
	45 cm (garlic)	Rooting depth averages 18-24 inches (USDA crop profile for Garlic in CA)
	35 cm (carrot)	Confirmed by R.E. Voss UC Publ 7242
Maximum Canopy Coverage (COVMAX)	80	Estimated based on aerial photography
Soil Surface Condition After Harvest (ICNAH)	1	Voss, R.E. 1999. Fresh Market Bulb Onion Production in California. U. fo CA Publication 7242.
Date of Crop Emergence (EMD, EMM, IYREM)	11/01 (0nion)	PIC Recommended dates adjusted according to RUSLE Project planting dates.
	01/10 (Garlic)	Garlic typically planted mid-Sept through Nov (USDA Crop Profile, 2004)
	01/08 (Carrot)	Based on Jul-Sep planting window; also planted Dec-Mar (USDA Crop Profile)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/06 (Onion)	PIC Recommended dates adjusted according to RUSLE Project planting dates.
	01/06 (Onion)	Garlic bulbs mature in late spring in desert valleys, midsummer in central coast, San Joaquin Valley (UC Davis, Growing Garlic in CA, 1976)
	01/11 (Carrot)	Maturity set to coincide with harvest window (2 weeks between)
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/06 (Onion)	PIC Recommended dates adjusted according to RUSLE Project planting dates.

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	01/07 (Garlic)	Typical harvest dates July-Sep (WA crop profile); generally ready to harvest 1 mo after maturity (CA crop profile)
	15/11 (Carrot)	Nov-Feb harvest window for winter planting; also May-Jul harvest (USDA Crop Profile)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	92, 85, 86	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning's N Value (MNGN)	0.011	RUSLE Project; C23ONONC; Onions, Fresno CA Conventional Tillage (USDA, 2000)
USLE C Factor (USLEC)	0.521 - 0.732	RUSLE Project; C23ONONC; Onions, Fresno CA Conventional Tillage (USDA, 2000)
Ciervo Soil Parameters		
Total Soil Depth (CORED)	150 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Base horizons)	
Horizon Thickness (THKNS)	12 cm (HORIZN = 1) 50 cm (HORIZN = 2) 88 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.40 g cm-3 (HORIZN = 1) 1.36 g cm-3 (HORIZN = 2) 1.17 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.259 cm3-H2O cm3-soil (HORIZN =1) 0.266 cm3-H2O cm3-soil (HORIZN =2) 0.345 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 2.0 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.259 cm3-H2O cm3-soil (HORIZN =1) 0.266 cm3-H2O cm3-soil (HORIZN =2) 0.345 cm3-H2O cm3-soil (HORIZN =3)	
Wilting Point (THEWP)	0.15 cm3-H2O cm3-soil (HORIZN = 1) 0.158 cm3-H2O cm3-soil (HORIZN = 2) 0.202 cm3-H2O cm3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.91% (HORIZN = 1) 0.43% (HORIZN = 2) 0.32% (HORIZN = 3)	

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7. California Sugar Beets (CAsugarbeet0C)

The field used to represent sugar beet production in California is located in the Central Valley, although sugar beet production covers diverse climates. 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 a benchmark soil, Exeter loam. Exeter loam, is a fine-loamy, mixed, superactive, thermic Typic Durixeralfs. These soils are often used for citrus production under irrigation. Exeter loam is a moderately deep, moderately well drained, very slow to medium runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The Exeter loam has moderately slow permeability above the duripan and very slow permeability within the duripan. These soil are generally found on alluvial fans and stream terraces at elevations of up to 700 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17. Exeter loam is a Hydrologic Group C soil.

PRZM 3.12 Scenario Input Parameters for Central Valley, California - Sugar beets

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.75	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Snowmelt Factor (SFAC)	0.0 cm C- 1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI-1*	FARM Manual, Table A3 (EPA, 1985)
USLE LS Factor (USLELS)	0.0054	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	Per QA/QC Guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998); based on crops grown on Eastern side of slopes.
Slope (SLP)	2%	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)

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Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
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
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
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Maximum Canopy Coverage (COVMAX)	100	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Soil Surface Condition After Harvest (ICNAH)	1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
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 A.3, 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)
Exeter Soil Parameters		
Total Soil Depth (CORED)	183 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	

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Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 173 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.59 g cm-3 (HORIZN = 1) 1.76 g cm-3 (HORIZN = 2)	
Initial Water Content (THETO)	0.16 cm3-H2O cm3-soil (HORIZN =1) 0.2 cm3-H2O cm3-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.16 cm3-H2O cm3-soil (HORIZN = 1) 0.2 cm3-H2O cm3-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.06 cm3-H2O cm3-soil (HORIZN = 1) 0.11 cm3-H2O cm3-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.46% (HORIZN = 1) 0.19% (HORIZN = 2)	

8. California Vegetables: Other crops – Tomato (CAtomato0C), Broccoli/cole crops (CAbroccoliCVcra)

The field used to represent tomato production in California is located in San Joaquin County in the Central Valley, although tomatoes are produced throughout the Central Valley and Imperial Valley. According to the 1997 Census of Agriculture, California is ranked 2nd in the U.S. in production; 45 percent of California's production is in Stanislaus and Merced Counties. Tomatoes are generally grown on raised beds 60-66 inches wide. Most tomato plants are from transplants grown in nurseries. Row spacing is approximately 30 to 45 inches and plants are grown close together within rows. Spaces between rows are generally kept clear, but plants often grow into these areas. The scenario has been adapted for other crops grown in the same area on the same soil by changing the crop-specific inputs as necessary. While broccoli is grown in the San Joaquin Valley, primary production is in the coastal regions. All parameters are the same for these scenarios, except where noted in the table below.

The soil selected to simulate the field is a Stockton clay. Stockton clay is a fine, semectitic, thermic Xeric Epiaquerts. These soils are often used for tomato production under irrigation, but also for other row crops such as corn, beans, sugar beets, and grains. Stockton clay is a deep, somewhat poorly drained, slowly permeable, very slow to slow runoff soil that formed in alluvium of mixed igneous and sedimentary rock sources. These soil are generally found in basins and in swales of drainageways. They are located at elevation of 0 to 100 feet above mean sea level and have slopes of 0 to 2 percent. The soil is of moderate extent. Stockton clay is a Hydrologic Group D soil.

Parameter	Value	Source
Starting Date	January 1, 1961	Meteorological File - Sacramento, CA (W23232)
Ending Date	December 31, 1990	Meteorological File - Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C- 1	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)
Erosion and Landscape Parameters		
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.24 tons EI-1*	NRI - Average value listed for the soil series Stockton
USLE LS Factor (USLELS)	0.26	NRI - Average value listed for the soil series Stockton
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Stockton
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	0.25%	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
Hydraulic Length (HL)	464 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	0	Based on current EPA guidance (2004)
Irrigation Type (IRTYP)	Not applicable	Based on current EPA guidance (2004)
Leaching Factor (FLEACH)	Not applicable	Based on current EPA guidance (2004)
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	Not applicable	Based on current EPA guidance (2004)
Maximum Rate at which Irrigation is Applied (RATEAP)	Not applicable	Based on current EPA guidance (2004)
Crop Parameters		
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
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
Maximum rainfall interception storage of crop (CINTCP)	0.1	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	90 cm (Tomato)	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
	30 cm (Broccoli/cole)	Most roots in the top 3 feet

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Maximum Canopy Coverage (COVMAX)	90	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
Soil Surface Condition After Harvest (ICNAH)	1	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
Date of Crop Emergence (EMD, EMM, IYREM)	01/03 (Tomato)	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
	01/08 (Broccoli/cole)	Typical planting for SJV (USDA Crop Profile)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/07 (Tomato)	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
	20/10 (Broccoli/cole)	Based on USDA crop profile
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/09 (Tomato)	Bob Mullen, San Joaquin County Cooperative Extension. 209_468_9489
	30/10 (Broccoli/cole)	Based on USDA crop profile
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = Fallow, SR/ poor; Cropping and Residue = Row Crops SR/poor condition
Manning’s N Value (MNGN)	0.023	RUSLE Project; C23BDCGC for dry beans, 2000 lb, Fresno (USDA, 2000)
USLE C Factor (USLEC)	0.035- 0.255	RUSLE Project; C23BDCGC for dry beans, 2000 lb, Fresno Variable with date (USDA, 2000)
Stockton Soil Parameters		
Total Soil Depth (CORED)	180 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 162 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) Edd Russell (USDA_NRCS, Fresno)
Bulk Density (BD)	1.3 g cm-3 (HORIZN = 1,2) 1.4 g cm-3 (HORIZN = 3)	
Initial Water Content (THETO)	0.38 cm3-H2O cm3-soil (HORIZN =1,2) 0.25 cm3-H2O cm3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN =2) 2 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.38 cm3-H2O cm3-soil (HORIZN = 1,2) 0.25 cm3-H2O cm3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.25 cm3-H2O cm3-soil (HORIZN = 1,2,3)	
Organic Carbon Content (OC)	0.95% (HORIZN = 1,2) 0.4% (HORIZN = 3)	