

Barton Springs Nursery/Ornamental

NASS data for 2002 (Table 5) indicate that *outside* acreage for reported ornamental crops in Hays and Travis Counties is negligible relative to indoor acreage (< 0.1% total indoor and outdoor acreage). The majority of acreage for nursery, greenhouse, floriculture, mushrooms, sod, and vegetable seeds in both years and both counties was grown under glass or other protection. Three confirmed outdoor nursery operations reside within the BSS (Kathy Shay, personal communication; Andrea DeLong-Amaya, personal communication); all three are within the Travis county portion of the BSS. Total outside wholesale nursery production in the BSS is approximately three acres.

For the purposes of modeling a nursery/ornamental operation in the BSS, one of the nurseries* was used to conceptualize a facility that is representative of one located within the BSS. Communications with a staff member were used to parameterize the model. The nursery of interest has indoor and outdoor areas for growing and maintaining plants. Outdoor plants include cacti, annuals, perennials, shrubs, and trees. Outdoor plants are maintained on either weed control mat or on gravel. Plants are kept in pots of various sizes, ranging from 4" to multiple gallons, depending upon the type of plant kept within. Irrigation is carried out daily with either hose or sprinkler systems. Plants are maintained outside year-round, with some becoming dormant in the winter and some remaining green. Spring and fall represent the busiest times for plant production and sales for this nursery (personal communication with nursery employee).

Based on the above information, several assumptions were made to parameterize the model. First, it was assumed that the area that would yield the greatest runoff potential would be from a bare surface that would be represented by the walkways between the potted plants. These areas could potentially receive direct applications of pesticides sprayed on potted plants. Therefore, the surface of the soil was conceptualized as being gravel or dirt (area under weed mats). This was an assumption that affected selection of curve numbers, USLE C and Manning's N. Second, it was assumed that pesticide runoff of potted soil would not degrade or adsorb and would therefore, be applied directly to the soil. Third, it was assumed that other crop specific parameters (HTMAX, COVMAX and CINTCP) were relevant to influencing the application of the pesticide to the soil.

Version 2 of this scenario includes corrected parameter values that replace values outside of the ranges that PRZM is designed to accept. The corrections include setting AMXDR and CORED equal to ANETD (*i.e.*, 25 cm), setting all USLEC factors to 0.02, and setting PCDEPL to 0.5.

A soil was selected based on the overlap between the nursery of interest the soil extents (USDA 2006). Aerial photography was used to identify the location of the nursery operation and the locations of the outdoor areas of production. Only one soil type overlapped with the nursery operation: Tarrant soils and urban land. Therefore, it was determined that this soil type was a representative soil that an outdoor nursery operation in the BSS would reside upon. Tarrant is a Hydrologic Group D soil, with a USLE K factor of 0.32 (USDA 2006). Slopes range from 1 to 8 percent for this series (USDA

1997), but for the portion that overlaps with the nursery, the slope range is 0 to 2 percent. Since all three outdoor nursery operations in the BSS are located within Travis County, soil parameters were obtained soil data mart information pertaining to Travis County (USDA 2006).

The meteorological station selected for this scenario is located in Austin, Texas. This station is the closest available weather station that includes data required for PRZM.

*The identity and location of the nursery of interest has been intentionally left out of the metadata for privacy. More information can be obtained from SRC report submitted with this metadata.

Table 1. PRZM 3.12 Climate and Time Parameters for Barton Springs, TX.		
Parameter	Value	Source/Comments
Starting Date	Jan. 1, 1961	Meteorological File from Austin, TX (W13958)
Ending Date	Dec. 31, 1990	Meteorological File from Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.69	PRZM Manual Figure 5.1 (EPA 1998).
Snowmelt Factor (SFAC)	0.36	PRZM Manual, Table 5.1 (EPA 1998).
Minimum Depth of Evaporation (ANETD)	25	Mid point of range (20-30), PRZM Manual, Figure 5.2 (EPA 1998).

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Barton Springs Nursery/Ornamental.		
Parameter	Value	Source/Comments
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	Default value.
USLE K Factor (USLEK)	0.32 tons EI ⁻¹ *	Tarrant soils and urban land, Travis County (USDA 2006).
USLE LS Factor (USLELS)	0.20	Calculated according to Haan and Barfield (1978) equation: $LS = ((\lambda/72.6)^m)((430x^2 + 30x + 0.43)/6.613)$, where λ = slope length, x = SLP/100 and m = constant. In this case, λ = 400 m (default value) and m = 0.3 (EPA 2004).
USLE P Factor (USLEP)	1	Assumption that there is no contour plowing.
Field Area (AFIELD)	10 ha	Default value for Pond (EPA, 2004)
NRCS Hyetograph (IREG)	4	PRZM Manual, Figure 5.12 (EPA, 1998).
Slope (SLP)	1 %	Midpoint value for Tarrant soils and urban land Soil Slope range 0-2% (USDA 2006). The nursery land is flat, with no slopes (nursery employee)
Hydraulic Length (HL)	356 m	Default value for Pond (EPA, 2004)

Irrigation Flag (IRFLAG)	1	1 = year round (nursery employee).
Irrigation Type (IRTYP)	4	4 = over canopy sprinkler and flood. Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005). Sprinkler and hose irrigation are used daily. Irrigation continues until soil in pots is saturated and water flows out of the pots (nursery employee).
Leaching Factor (FLEACH)	0.1	Default value. Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.5	Default value. Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Maximum Rate at which Irrigation is Applied (RATEAP)	0.1	Default value. Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Barton Springs Nursery/Ornamental.		
Parameter	Value	Source/Comments
Initial Crop (INICRP)	1	Default value
Initial Surface Condition (ISCOND)	1	1 = fallow. Assumption: gravel surfaces kept clear of plant debris.
Number of Different Crops (NDC)	1	Set to number of crops in simulation. Default value.
Number of Cropping Periods (NCPDS)	30	Set to weather data in meteorological file: Austin, TX (W13958).
Maximum rainfall interception storage of crop (CINTCP)	0.1	Table 5-4 PRZM manual, light density crops (EPA, 1998).
Maximum Active Root Depth (AMXDR)	25 cm	Plants are kept in pots so roots are above the soil. However, this value was set to equal the minimum depth of evaporation (ANETD).
Maximum Canopy Coverage (COVMAX)	30 %	This value was estimated based on assumptions of presence of walkways between plant rows and presence of single plants in pots, which decreases plant density.
Soil Surface Condition After Harvest (ICNAH)	1	1 = fallow. Assumption: gravel surfaces kept clear of plant debris.
Date of Crop Emergence (EMD, EMM, IYREM)	01/01/61	Set to model continuous maturity.
Date of Crop Maturity (MAD, MAM, IYRMAT)	02/01/61	During the winter season, some outdoor plants senesce and some remain green (cold hearty perennials) year-round (nursery employee)

Date of Crop Harvest (HAD, HAM, IYRHAR)	31/12/61	
Maximum Dry Weight (WFMAX)	0.0	Not used in scenario.
Maximum Canopy Height (HTMAX)	61 cm	Heights of plants range from a couple of inches (forbes) to ten feet (trees). The average height range for plants is 1-2' (nursery employee). 2' was chosen for HTMAX since this value is more representative of the overall plant stock.
SCS Curve Number (CN)	89, 89, 89	TR-55 (Table 2-2a). CN for open space, poor condition (grass cover <50%); as well as impervious dirt areas (USDA 1986).
Manning's N Value (MNGN)	0.011	Value appropriate for gravel. Table 3-1 (USDA 1986).
USLE C Factor (USLEC)	0.02	Assumption that gravel layer will impede soil loss.

Table 4. PRZM 3.12 Tarrant soils and urban land Soil Parameters for Barton Springs, TX Nursery/Ornamental.		
Parameter	Value	Source/Comments
Total Soil Depth (CORED)	25 cm	Tarrant soils and urban land, 0-2% slopes, Travis County, TX. NRCS Soil Data Mart Database (http://soildatamart.nrcs.usda.gov/).
Number of Horizons (NHORIZ)	2	Total soil depth (CORED) was set to equal the minimum depth of evaporation (ANETD). The horizon thickness (THKNS) of horizon 2 was set to compensate for the total soil depth (CORED).
Horizon Thickness (THKNS)	10 cm (HORIZN =1) 15 cm (HORIZN =2)	Additional data were listed for a 3rd HORIZN. However, these were not included in this soil profile since the 3rd HORIZN is composed of bedrock.
Bulk Density (BD)	1.25 g/cm3 (HORIZN = 1) 1.25 g/cm3 (HORIZN = 2)	
Initial Water Content (THETO)	0.229 cm3/cm3 (HORIZN =1) 0.229 cm3/cm3 (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.229cm3/cm3 (HORIZN =1) 0.229cm3/cm3 (HORIZN =2)	PRZM Scenario Guidance (2004).
Wilting Point (THEWP)	0.166 cm3/cm3 (HORIZN =1) 0.166 cm3/cm3 (HORIZN =2)	
Organic Carbon Content (OC)	2.61 (HORIZN = 1) 2.61 (HORIZN = 2)	Adjusted using the relationship % OC = % Organic Matter/1.724 (Doucette 2000).

Table 5. NASS 1997/2002 census of agriculture for ornamental production for open areas versus under glass in Hays and Travis Counties, Texas (USDA 1997, 2002).

Crop	HAYS		TRAVIS	
	1997 Total Acres	2002 Total Acres	1997 Total Acres	2002 Total Acres
Nursery, greenhouse, floriculture, aquatic plants, mushrooms, flower seeds, vegetable seeds, sod harvested, total In open	x	65	x	111
Nursery, greenhouse, floriculture, aquatic plants, mushrooms, flower seeds, vegetable seeds, sod harvested, total Under glass (not applicable for modeling)	x	407,925	x	115,274
Nursery, floriculture, vegetable and flower seed crops, sod harvested, etc., grown in the open, irrigated	26	36	99	106
Floriculture crops – bedding/garden plants, cut flowers and cut florist greens, foliage plants, and potted flowering plants, total , in open	x	14	23	x
Bedding/garden plants, in open	4	x	6	4
Nursery stock, in open	2	27	73	90
Other nursery and greenhouse crops, in open	x	25	x	x

X = data not available, not applicable or withheld

Sensitive Parameter Uncertainties

USLE C Factor and Manning’s N Value

The RUSLE Project was not used for determining the USLE C and Manning’s N values. No appropriate scenarios existed in the project for modeling a gravel surface.

Soil Data

Only one nursery was used to identify a soil type.

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