Ecological DYnamics Simulation Model

(EDYS)

Users Guide

Version 5.1.0

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1.0 Introduction

The Ecological DYnamics Simulation (EDYS) model is a general ecosystem simulation model that is mechanistically-based and spatially-explicit (Childress and McLendon 1999; Childress et al. 1999a, 1999b, 2002). It simulates natural and anthropogenic-induced changes in hydrology, soil, plant, animal, and watershed components across landscapes, at spatial scales ranging from 1 m^2 or less to landscape levels (1,000 km^2 or larger). It is a dynamic model, simulating changes on an hourly (for aquatic) or daily (most terrestrial) basis, over periods ranging from months to centuries.

EDYS has been used for a variety of ecological evaluations by federal and state agencies, munipal and water authories, and corporations at 35 sites in 12 states and in Australia and Indonesia. It has been linked with groundwater (MODFLOW) and surface runoff (GSSHA, CASC2D, HSPF) models and is included as part of the U. S. Army Corps of Engineers System-Wide Water Resources Research Program (SWWRP) as a primary terrestrial model (Johnson and Coldren 2006; Johnson and Gerald 2006). Additionally, it has been used for regulatory compliance (U. S. Air Force Academy (USAFA) 2000; Amerikanuak 2006). Results of EDYS projects have been published in over 40 scientific and technical publications and presented at over 30 scientific meetings.

EDYS has been used for ecological evaluations, watershed management, land management decision making, environmental planning, and revegetation and restoration design analysis. Examples of land/water management scenarios that have been evaluated using EDYS include military training, recreational activities, grazing, natural and prescribed burns, fire suppression, road/trail building and closure, invasive plants inventory and eradicatiion, drought assessment, water quality/quantity, reclamation, restoration, revegetation, brush management, timber harvest, land cover design, slope stability, and climate change.

Validation studies conducted with U. S. Army Corps of Engineers (USACE), U. S. Geological Survey (USGS), Natural Resources Conservation Service (NRCS), Strategic Environmental Research and Development Program (SERDP), and CSIRO-Australia showed EDYS to be 90-95 percent accurate in simulating vegetation dynamics (McLendon and Coldren 2001; McLendon et al. 2001; Hunter et al. 2004; Mata-Gonzalez et al. 2007, 2008). Simulations of evapotranspiration (ET) and runoff did not differ statistically from recorded values at a gauged watershed (McLendon and Coldren 2005).

This document serves to provide the user of EDYS with sufficient information to understand the basics of how EDYS simulates ecological mechanisms, the types of inputs and parameters needed to set up an EDYS application, and details the steps necessary to run an EDYS simulation. All values given in the body of the document and the appendices are taken from the Owens Valley Grazing Application of EDYS.

Please refer to Childress et al. (1999a), Childress et al. (1999b), Childress and McLendon (1999), and Childress et al. (2002) for additional details on EDYS specifications and the range of mechanistic processes simulated. Examples of EDYS applications may be found in McLendon et al. (2000), Shepherd Miller, Inc. (2000), Coldren et al. (2001), McLendon et al. (2001), McLendon et al. (2002a), McLendon et al. (2002b), Price et al. (2004), Johnson and Coldren (2006), Mata-Gonzalez et al. (2007), Mata-Gonzalez et al. (2008), McLendon et al. (2009), and Coldren (2010). Suggestions for use of the EDYS model in land management may be found in McLendon et al. (1998).

2.0 Basic Model Structure

This section details the basic structure of EDYS. It addresses the following aspects of the model: the hierarchical nature of the ecological processes being simulated, the structure of the plot type (which serves as the basic building block of the model), the spatial structure used to represent actual landscapes, scale issues (both temporal and spatial), the role of forcing functions, inputs to the model, and the sequence of events during an actual simulation run.

2.1 Hierarchical Levels

EDYS is a mechanistic model, meaning that individual ecological processes are simulated, at appropriate temporal and spatial scales, and allowed to interact with each other. These interactions allow for realistic simulations of changes that occur in ecosystems. However, different ecological processes occur at different scales, both spatial and temporal. As a result, the scale and structure of the model are governed by the scales of the various processes. To accomplish this, EDYS was designed with three hierarchical levels (Figure 1), although only two of them are directly governed by the scales of the processes being simulated.

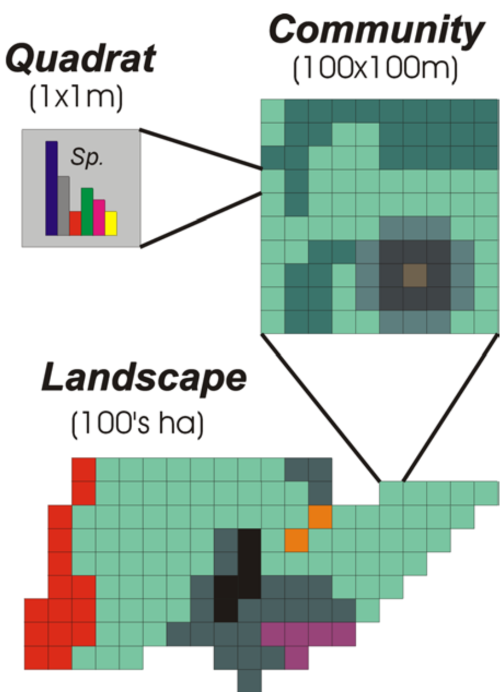


Figure 1. Scale-based hierarchical levels within EDYS, showing the aggregation of plots (quadrats) to represent communities, and the aggregation of communities to develop the simulation landscape.

The most basic level occurs at the smallest spatial scale being simulated. This level is referred to hereafter as the plot, plot type, or quadrat. Each plot is a unique combination of plant species and soil type. Processes occurring in a plot are “self-contained” in that there are no direct interactions between neighboring communities. These include such processes are plant growth, plant uptake of water, infiltration, and evaporation.

The intermediate scale is that of the community. Multiple plots in an EDYS application may be similar, with only minor differences in species composition or initial biomass. EDYS aggregates these plots into “communities” to represent small-scale ecological heterogeneity. There are currently no ecological processes that occur only within a community, so this hierarchical level may seem somewhat artificial. However, communities are often the basis for management activities, and so this level has value for that reason. Additionally, communities are used for reporting purposes.

Some processes, such as fire, surface runoff, and herbivory, act on larger spatial scales. These are “landscape-level” processes and require larger scales to accurately simulate. They do impact the plot level, but act across larger spatial scales because neighboring cells and plot types will interact. For example, erosion in a cell is dependent on several factors, one of which is the amount of water running onto the cell from adjacent cells. Figure 1 illustrates how multiple communities are aggregated into the simulation landscape, representing medium-scale ecological heterogeneity.

2.2 Plot Structure

A closer look at the structure of the plot is necessary to understand how EDYS operates. A simplified version of the plot is illustrated in Figure 2 and described in detail below.

The soil within a plot is divided into layers, the number of which is dependent on the desired accuracy of the below-ground simulations. The finer the resolution, the greater the accuracy in simulating root architecture and in tracking the movement of materials such as water and nutrients between layers. The number of layers has varied in past applications of EDYS from 13 to 35. Within each layer are variables for water holding capacities, organic matter content, nutrients, and any contaminants which may be included in the simulation. On top of the surface is a litter layer comprised of decomposing plant matter. Nutrients, organic matter, and contaminants may enter the soil profile from the litter layer.

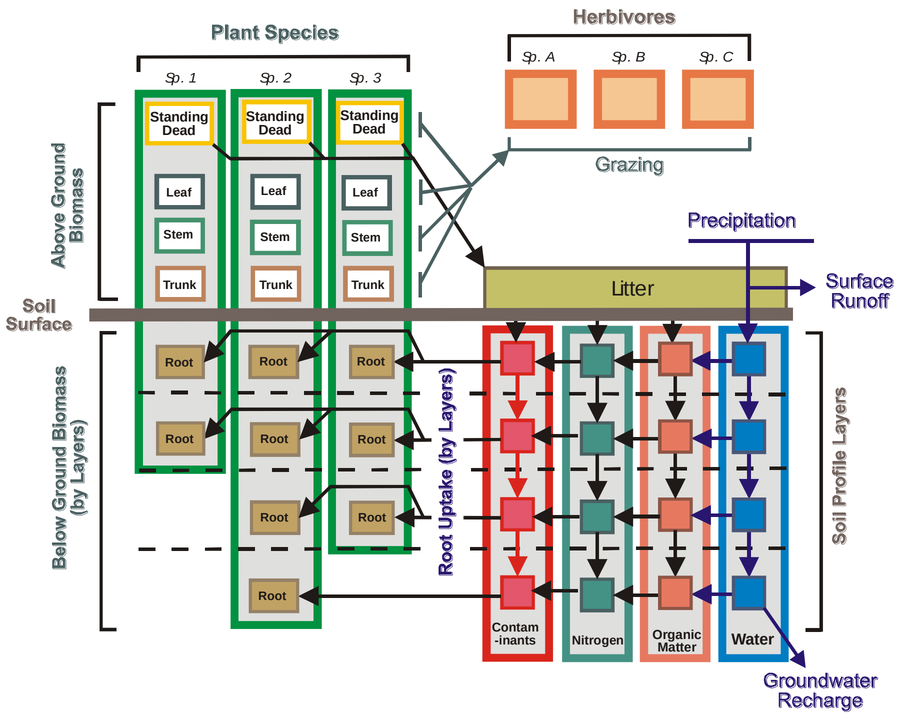


Figure 2. The basic structure of plots simulated in the EDYS model.

Plants are simulated by tracking biomass of their individual components: coarse roots, fine roots, trunks (trunks for woody species and crowns for grasses and forbs), stems, leaves, seeds (inflorescences and maturing seeds that are still attached to the plant), standing dead stems, standing dead leaves, seedling roots, seedling shoots, and the seed bank (seeds that have fallen off the plant). Changes arise from plant growth, die back, mortality, and loss of tissue due to herbivores and activities such as fire. Biomass is also tracked according to the age of the tissue. Adult plants separate biomass into old and new biomass. Old biomass is that which existed at the end of the previous growing season, while new biomass is this year's new growth.

Roots are subdivided based on biomass content of each soil layer. Roots take up water from the soil along with whatever materials, such as nutrients and contaminants, which are dissolved in the water. As evidenced in Figure 2, differing root architectures simulate competition below ground for resources. Species 2 in the diagram is the only species with roots reaching to the lowest soil layer, so it has unimpeded access to resources in that layer. Competition in the upper layers is more intense because all species have roots in those layers.

Herbivory is controlled by three aspects of herbivores: preference, competitive ability, and access to plant tissues. In nature, herbivores do not typically eat indiscriminately. There are species which they prefer ("ice cream" plants), and on those plants, there are plant parts which are preferred. EDYS captures those differing preferences by assigning a preference rating for each component for each plant species. Additionally, some herbivores are better at competing for food than others. For example, insects are better at reaching more of the plants in a pasture than cows are simply based on their greater abundance. Last, animals are restricted to eating only the food they can reach. Rabbits, for example, cannot reach leaves at the top of a tree, but may be able to reach all the leaves on a seedling of the same tree species. EDYS simulates these differences by assigning individual access percentages to each plant component of each plant species.

2.3 Spatial Structure

EDYS is a gridded model, meaning that the landscape domain is broken up into an array of square grid cells. A plot is assigned to each cell in the domain. Typically, multiple cells are assigned to each plot; however, a simple model application could have a unique plot assigned to each cell. For larger landscapes, a cell: plot ratio of 1.0 is impractical due to computer resource limitations.

During the course of a run, plot-level ecological processes are simulated daily, and then applied to all cells in the domain which are assigned to that plot. Results from the plot-level processes can then be used to simulate landscape-level processes. Consider erosion as an example. Plot-level processes determine how much of a precipitation event will run off due to slope. This amount of water is then placed on the surface of each cell (based on its plot-level results), and then allowed to "runoff". In this way, erosion and deposition are simulated across the entire landscape.

EDYS is spatially-explicit, meaning that simulation landscapes realistically represent the actual landscapes they are simulating. This is accomplished using multiple grids, each containing usually one data set. The most basic application requires three grids: the vegetation grid which contains indices to plot type data, the elevation grid which contains the average elevation for each cell, and the management unit grid which contains information relative to land management activities. These applications are local in scale and do not simulate all landscape-level processes.

More complex applications use additional grids. Applications which include erosion use five additional grids, one each for changes in sediment level, litter, nitrogen, surface water, and peak surface water. Applications which need to represent more complex management activity distributions than the standard management grid will allow use an additional grid which may contain a variety of information on management activities and disturbances. Applications which incorporate multiple precipitation regimes use a grid specifying the spatial extent of each of those regimes. Lastly, applications which simulate animal habitat extent or animal population dynamics will include one grid for each of the animal species being simulated.

Disturbances, such as fire, may alter the characteristics of one or more cells in the landscape. When this happens, new plot types are created to track the ecosystem dynamics post-disturbance. One or more of the grids used in the simulation will be altered to reflect the change in plot types. This is most typically done by altering only the vegetation grid, but in some cases other grids will also be modified. This allows EDYS to maintain both disturbed and undisturbed versions of the original plot types and simulate the spatially-explicit nature of disturbances and management activities.

2.4 Scale

EDYS incorporates two inherent scales: temporal and spatial. Temporal scale is represented by the time step used for simulating the processes. The shortest time step required among all the processes determines the basic time step for the model. Several processes, such as water uptake by plants, act on a daily basis. Therefore, the basic time step of the model is daily. This is built into the basic structure of the model and cannot be modified by a user or when building a model application.

The spatial scale of the model is represented by the size of each cell in the grids. It is determined as the minimum cell size in which average conditions are considered acceptable. In past applications, cell size has varied from $1m^2$ to 250 hectares. This value cannot be modified by a user, but is set when a model application is built.

The ecological processes simulated in EDYS are scale independent, meaning they can operate regardless of the cell size. To accomplish this, variables kept in the model are maintained on a square meter (m^2) basis, allowing the ecological processes being simulated to be scaled up, or down if appropriate, to match an application's cell size. For example, biomass variables use units of g/m^2. To determine the actual biomass contained in a cell, one must multiply the biomass variable times the size (in m^2) of the cell.

2.5 Forcing Functions

Forcing functions are inputs to the system that can have significant impact on the course of the simulation. Currently, EDYS supports two main forcing functions: precipitation and change in groundwater levels. Precipitation, either as rainfall or snow, is the primary forcing function in EDYS, supplying the majority of the water used by plants and the hydrological processes. Changes in groundwater have the potential to alter the soil moisture available for uptake by plants, and may alter root architecture in those species which are sensitive to saturated soil conditions.

Precipitation data are input via one or more files. Multiple files are only used for applications in which precipitation data from multiple recording stations are to be used. These data files contain daily precipitation values. Each monthly record is read in at the start of the month.

Groundwater data are input as grids read in at the appropriate times during the simulation. The timing when a grid is read in depends on the application and is determined by the frequency at which groundwater elevations in the model need to be updated.

2.6 Inputs

Values used in the model take one of three forms: constants, parameters, and variables. Constants are values contained within EDYS that are not subject to change, either within a simulation run or between simulation runs. Current values of constants used in EDYS can be found in Section 4.0 (Basic Algorithms) in the appropriate algorithm descriptions.

Like constants, parameters do not change during a simulation run. But unlike constants, parameters will change between applications. It is the parameters that govern how the system reacts to changes and the forcing functions. As a result, many of the parameters will be application-specific. Examples of parameters include attributes of the ecosystem such as soil water holding capacities, plant growth rates, plant water use efficiencies, and herbivore food preferences. A full list of parameters is detailed in Section 3.0.

Variables are placeholders in the model which are allowed to change during a simulation run. EDYS contains thousands of variables, so a detailed listing is not reasonable. For most variables, their initial values are input to the model when a simulation is initiated. These are typically known as "initial conditions." A list of the initial conditions is detailed in the following subsections.

Figure 3 illustrates the basic structure of inputs to the core ecological algorithms in EDYS. A GIS is used to build all of the grids input into EDYS. The spatial data used to generate the grids typically comes from a variety of sources, often in a variety of formats. "Data File" refers to a Pascal file which contains all of the landscape, plot level, and soil parameters, along with initial conditions for plants and soils. The plant species files are a series of Pascal files, one for each plant species, containing all of the plant parameters as detailed in Section 3.0. Analogous to the plants are a series of animal species files which contain all of the parameters for the animals.

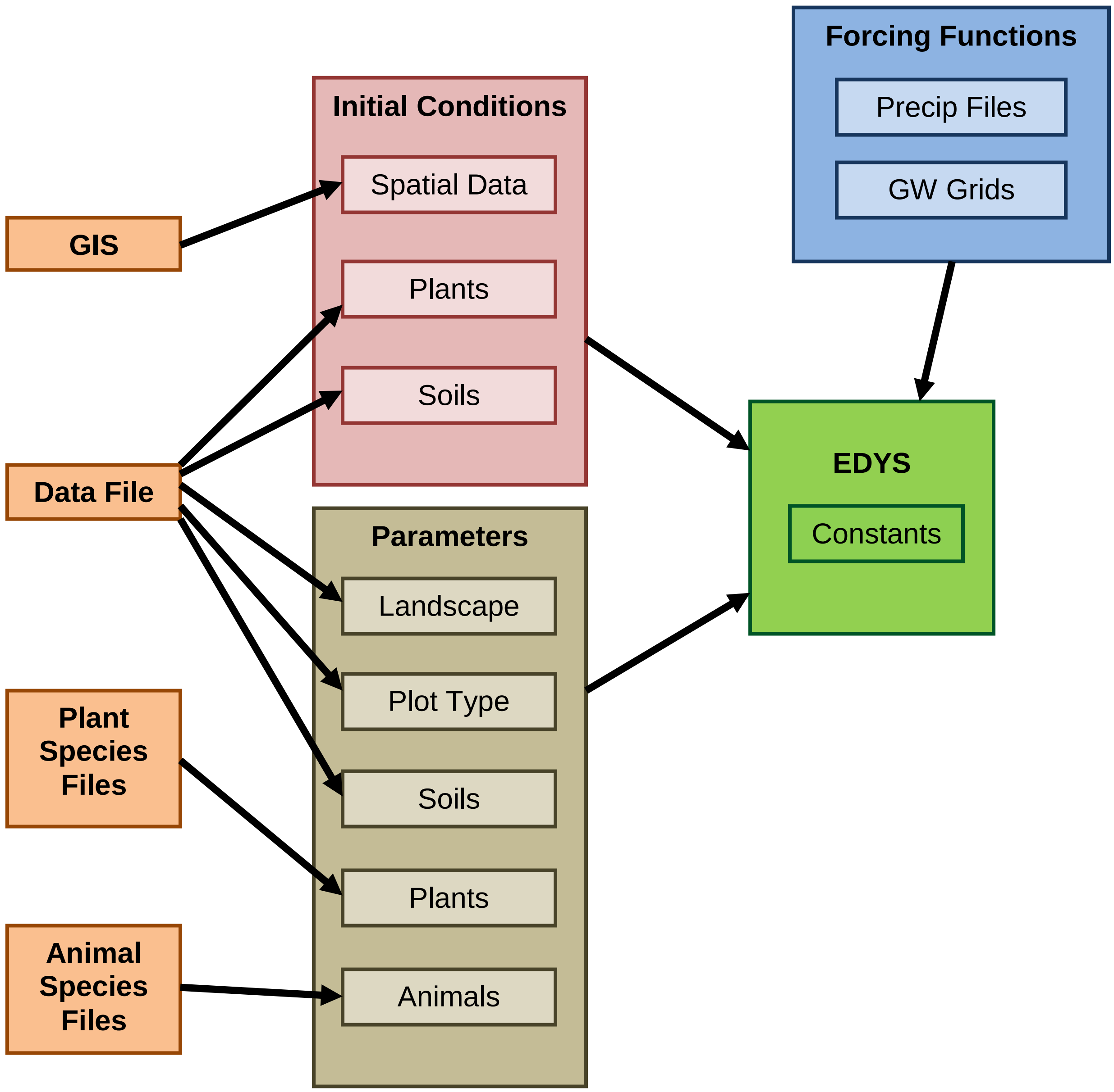


Figure 3. Basic structure of inputs to the core algorithms in EDYS.

2.6.1 Plants

The following are the plant initial conditions that are loaded when a simulation run begins. Litter initial conditions are included here because they are plant derived.

Biomass

Biomass is the initial biomass of each species for each plot type. Units are g/m^2. A value of 0.0 represents a species which does not occur, in the beginning of the simulation, in a plot type. It may ultimately move into the plot type due to activities such as seeding or planting of seedlings or due to a disturbance such as seed rain.

Litter Biomass

Litter Biomass is the initial litter biomass for each plot type. Units are g/m^2.

Litter Nitrogen

Nitrogen in the litter layer is broken out into several components. *Dissolved Nitrogen* is the nitrogen dissolved in litter water. *Free Nitrogen* is nitrogen not bound to other material such as organic matter. Nitrogen moves freely between the dissolved and free pools based on the amount of water in the litter layer at any one time. *Organic Matter Nitrogen* is nitrogen bound to litter organic matter, while *Microbial Nitrogen* is nitrogen contained in the microbial pool. *Total Nitrogen* is the sum of all nitrogen pools in the litter layer. Units are g of N/g of material (water, litter biomass, organic matter, or microbial biomass, as appropriate).

Litter Organic Matter

Litter Organic Matter is the initial amount of organic matter contained in the litter layer for each plot type. Units are g/g of litter biomass.

Litter Water

Litter Water is the initial water content of the litter layer for each plot type. Units are g of water/g of litter biomass.

2.6.2 Soils

The following are the initial soil conditions that are loaded at the start of a simulation run.

Soil Type

Soil Type is an index to the appropriate soil profile for each plot type. The profiles are numbered sequentially starting at one, and the number assigned to each is used as the index.

Initial Water Content

Initial Water Content is the depth of water contained in each soil layer, in mm.

Organic Matter Content

Organic Matter Content is the amount of organic matter contained in each soil layer, in g/m^2.

Nitrogen Content

Nitrogen Content is the total amount of nitrogen contained in each soil layer, in g/m^2.

2.6.3 Spatial Data

Spatial initial conditions consist of either four or five grids, depending on the application. The vegetation grid holds a plot number for each cell. This number is used as an index into an array of plot type records which contain the plot type data values. The values in this grid may change during a simulation run if a cell changes plot types due to a disturbance or management activity. A value of zero in a cell means it lies outside of the model domain.

The elevation grid contains the average elevation across each cell. Units are in meters. The contents of this grid may change during a simulation not only due to erosion and deposition, but also management activities which affect the elevation of individual cells. An example would be the building of a berm to control surface water flows.

The spatial extent of management activities is contained in the management unit grid and the disturbance grid. If the management areas are simple enough that they can be described using only the management unit grid, then the disturbance grid will not be used. A zero value for a cell means that no management activities will occur in that cell. That is not to say that the cell will not be disturbed during the run. Indeed, it may be subjected to a disturbance such as a natural fire. Values in both of these grids typically are not changed during a simulation run, but under rare circumstances may be.

The fifth grid containing initial conditions is the precipitation grid. It is only used in an application with multiple precipitation recording stations. Cells in this grid contain an index into the monthly precipitation data array for the respective recording station. Currently the cells in this grid do not change during a simulation run. A zero value in a cell means that cell lies outside the model domain.

2.7 Sequence of Events

Figure 4 shows the sequence of events during an EDYS simulation run. Prior to initiating the actual simulation, the user must set any simulation options and management activities to be conducted during the simulation. Once those are completed, EDYS moves into the annual loop.

Once in the annual loop, flow moves into the monthly loop. Initially, EDYS conducts necessary processes that occur prior to the daily loop. These include such calculations as determining potential production for that month and the water needed to meet that production level.

After those calculations are completed, EDYS moves into the daily loop. This is where most of the hydrological processes are simulated, along with uptake of water by plants. Additionally, decomposition, both below- and aboveground, occurs daily.

When the daily loop is complete, EDYS calculates plant growth and downward root growth based on the amount of water taken up during the month. The end of the month is when any animal population dynamics are calculated. Additionally, this is the time when herbivory, management activities, and disturbances such as fire are simulated. Last, any necessary end-of-the-month reporting is output before leaving the monthly loop.

At the end of each year in the annual loop, EDYS outputs all appropriate end-of-year reporting. Flow then continues with the next year of the simulation, or the simulation ends if this was the last year of the run.

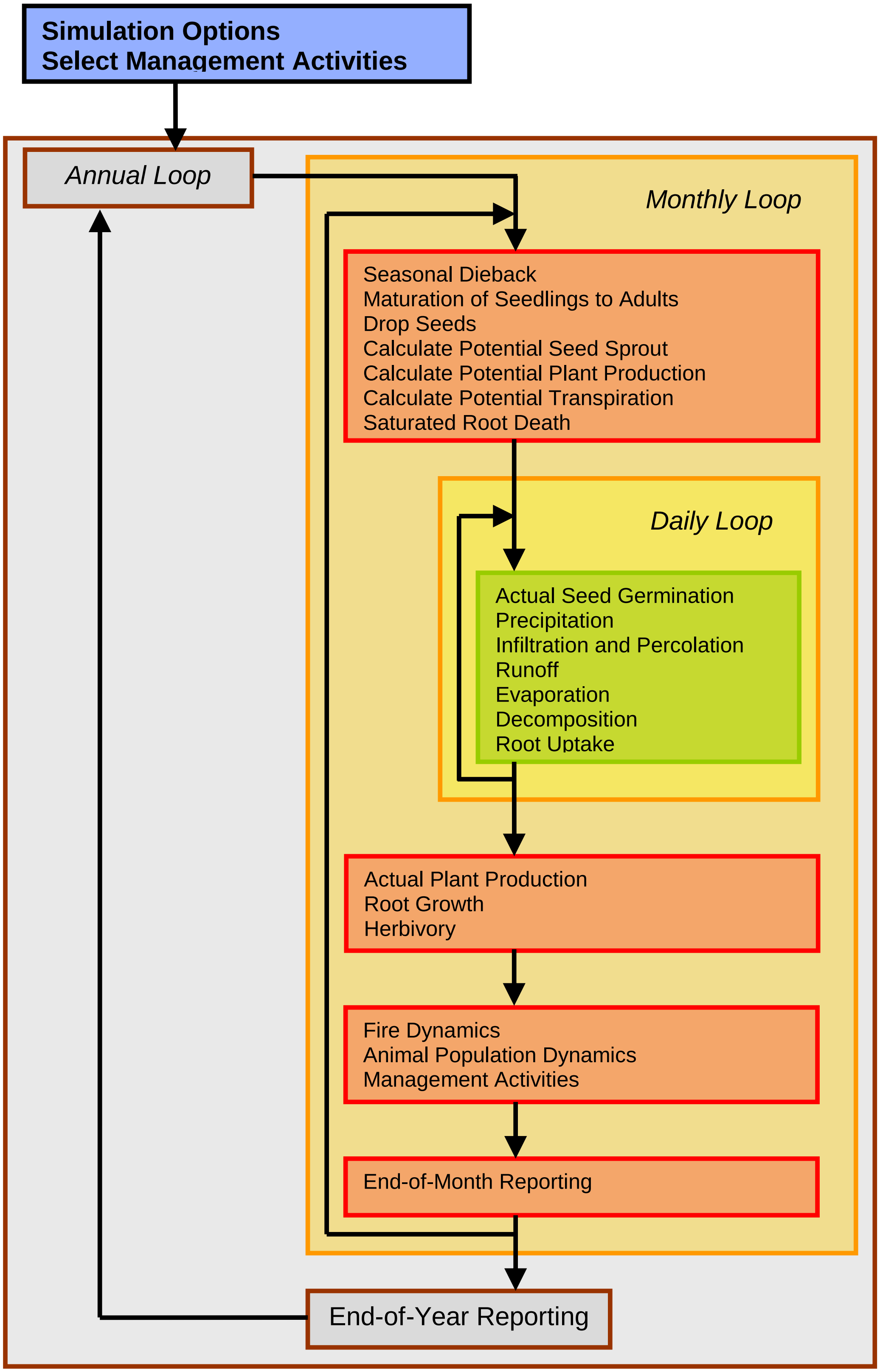


Figure 4. Flow diagram of events during an EDYS simulation run.

3.0 Parameters

Parameters are a series of input variables which do not change during the course of a simulation run. Any modifications needed to parameters must be done by altering the input files read by EDYS at the start of a run. Five general categories of parameters are recognized: landscape, plot-level, soils, plants, and animals. Each of these is detailed in separate sections below. Values for most parameters come from the scientific literature and from unpublished field studies. Some parameter values are the best estimates possible. For plants, these are often based on other species which are either ecologically similar or closely related, and that have more complete parameter sets available. For soils, these will be based on similar soil types.

3.1 Landscape Parameters

Landscape-level parameters specify the characteristics of the entire simulation domain. They determine how many communities, soils, plant species, and animal species will be simulated, along with the spatial extent of the simulation and some climatic values which do not vary across the domain.

3.1.1 General Characteristics

Locale

Locale is the name of the location of the simulation domain. It is limited to 40 characters.

NumCommunities

NumCommunities is the the number of plant communities being simulated in the application.

NumQuadrats

NumQuadrats is the number of plot types to simulate in the application. This value may differ from *NumCommunities* if more than one example of a community is being included.

NumSpecies

NumSpecies is the number of plant species included in the model application.

SpeciesName

SpeciesName lists the names for all plant species specified by *NumSpecies*. Values are limited to 8 characters.

SpeciesColor

SpeciesColor specifies the color for each of the plant species specified in *NumSpecies*. These are used only for some screen displays. Three values are needed for each plant species color, one each for red, green, and blue. Acceptable values for each color range from 0 to 255 with 0 representing no color while 255 is full saturation of that color.

NumWildlife

NumWildlife is the number of animal species included in the model application. It includes livestock along with wildlife species.

AnimalName

AnimalName lists the names for all animal species specified by *NumWildlife*. Values are limited to 8 characters.

AnimalColor

AnimalColor specifies the color for each of the animal species specified in *NumWildlife*. These are used only for some screen displays. Three values are needed for each animal species color, one each for red, green, and blue. Acceptable values for each color range from 0 to 255 with 0 representing no color while 255 is full saturation of that color.

NumSoils

NumSoils is the number of soil profiles used in the model application.

NumLayers

NumLayers is the number of soil layers used for each profile.

NumContaminants

NumContaminants is the number of contaminants in the model application.

ContaminantName

ContaminantName lists the names for all contaminants specified by *NumContaminants*. Values are limited to 8 characters.

NumPrecipFiles

NumPrecipFiles specifies how many separate precipitation regimes will be applied across the simulation landscape. The minimum value is 1; the maximum value is currently set to 10, but this can be modified if needed.

UnitsOptionsSwitch

UnitsOptionsSwitch specifies whether data in the output files and displays are in English or Metric units. Acceptable values are 'English ' and 'Metric '. Units for biomass are g/m^2 for English and lbs./acre for Metric. Units for hydrological values are acre-feet for English and m^3 for Metric.

RunoffMinimum

RunoffMinimum is the runoff water threshold above which the elevational runoff algorithm is executed. In other words, if all plot type runoff amounts do not exceed this threshold, then the erosion and sedimentation code is not executed for this day's rainfall event.

LitterNConcMax

LitterNConcMax is the maximum allowable concentration of nitrogen in the litter water. Units are g of N/g of water.

SoilNConcMax

SoilNConcMax is the maximum allowable concentration of nitrogen in soil moisture. Units are g of N/g of water.

GroundwaterFlag

GroundwaterFlag specifies whether or not the groundwater body occurs within any of the soil profiles found in the application. Acceptable values are "TRUE" and "FALSE". When set to "TRUE", EDYS expects spatial input data containing depth-to-water values to be available.

3.1.2 Spatial Values

GridType

GridType refers to whether the simulation domain is a landscape (GridType = 2) or a plot-based model (GridType = 1). In a plot-based model, certain landscape-level processes are disabled. These include runoff and natural fire.

GridSizeX

GridSizeX is the number of cells in the x-direction (east-west) of the simulation domain.

GridSizeY

GridSizeY is the number of cells in the y-direction (north-south) of the simulation domain.

Spatial Extent

Spatial Extent specifies the limits of the simulation landscape. It encompasses four parameters: *UTMXMin* and *UTMXMax* are the minimum and maximum extents, respectively, in the X-direction, while *UTMYMin* and *UTMYMax* are the minimum and maximum extents, respectively, in the Y-direction. All values are in meters and based on the Universal Transverse Mercator coordinate system.

ScaleFactor

ScaleFactor is the length of a cell side, in meters. This applies to all cells in the landscape.

GridCenterDistance

GridCenterDistance is the distance (in meters) between centers of adjacent grid cells.

3.1.3 Climatic Values

Daily Potential Evaporation

Daily Potential Evaporation is the maximum potential evaporation that can occur during any one day. A value in mm is given for each month and applies to all days within that month. Actual daily evaporation may be less, depending on moisture available in the litter layer and top several soil layers.

Snow Month

Snow Month specifies whether any precipitation falling in a month comes down as rainfall or snowfall. Twelve values are given, one for each month. Acceptable values are 0 for rainfall and 1 for snowfall.

Daily Snow Melt Rate

Daily Snow Melt Rate is the daily rate at which snow melts during a month. Values are given in mm/day and apply to all days in a month. Twelve values are given, one for each month.

3.2 Plot Type Parameters

Plot-type parameters vary between plot types in the landscape and are listed below. Keep in mind that many of the differences between plot types are actually specified as initial conditions and are not listed here. A good example of this is the plant species composition in a plot type. It is determined by the initial biomass input for each species in each plot type.

PrecipAdjFactor

PrecipAdjFactor is a multiplier used to adjust a plot type's precipitation regime, without affecting the precipitation regime used for other plot types in the simulation landscape. All rainfall events are multiplied by this factor to determine the actual rainfall used for the simulations. A value of 1.0 represents no change, a value < 1.0 represents less rainfall, while a value > 1.0 is an increase in rainfall.

DEvapAdjFactor

DEvapAdjFactor is a multiplier adjustment factor for daily potential evaporation in each plot type. *Daily Potential Evaporation* is multiplied by this factor each day to determine the maximum daily potential evaporation. A value of 1.0 represents no change, a value < 1.0 represents a decrease in potential evaporation, while a value > 1.0 is an increase in potential evaporation. This parameter can be used to simulate differences in potential evaporation, such as would occur on north-facing slopes versus south-facing slopes.

LitterMobilization

LitterMobilization is the erodability of the litter layer. Values range from 0 to 1.0, where 0 represents litter that does not move and 1.0 is normal litter.

LitWaterCap

LitWaterCap is the maximum amount of water that litter can hold, given as the number of kg of water per gram of litter biomass.

SoilMobilizationFactor

SoilMobilizationFactor represents the erodability of the top soil layer. Acceptable values range from 0 to 1.0, where 0 represents soils that do not move (i.e. concrete) while 1.0

represents normal soil. This parameter is used during a runoff event to determine how much soil can be eroded with a given amount of runoff water.

NumEvapLayers

NumEvapLayers is the number of soil layers from which soil moisture can wick upward to the surface and evaporate. This number is based on the texture of each soil profile.

KarstExportRate

KarstExportRate is the proportion of runoff water which enters karst features and moves directly into the groundwater body. Values can range from 0.0 to 1.0, with 0.0 representing a soil type without karst features, while a value of 1.0 represents the extreme case of all runoff water entering karst features (resulting in no infiltration).

InitialPrecipInfiltRate

InitialPrecipInfiltRate is the proportion of moisture available to infiltrate the soil surface that actuals does so. Values can range from 0.0 to 1.0, with 0.0 representing an impervious surface, while a value of 1.0 means that all moisture enters the soil profile.

QuadratColor

QuadratColor specifies the color for each of the plot types specified in *NumQuadrats*. These are used only for some screen displays. Three values are needed for each color, one each for red, green, and blue. Acceptable values for each color range from 0 to 255 with 0 representing no color while 255 is full saturation of that color.

3.3 Soil Parameters

Parameter values for soil types come from two main sources: site-specific soil descriptions and NRCS soil surveys. Frequently, site-specific soil descriptions are not available and so most soil parameter values are based on NRCS soil surveys. Layering within each soil type in EDYS is based on the horizons and subhorizons in the soil descriptions published by NRCS. All values for soil parameters are given in Appendices C-1 through C-150.

Layer Name

Layer Name is the name of each layer. Values are limited to five characters.

Layer Depth

Layer Depth is the depth of each layer in mm.

Wilting Point

Wilting Point is the minimum moisture content plants require to prevent wilting. It is defined as the water content at −15 bars of suction pressure. Values are given as percentage of water relative to total soil volume.

Field Capacity

Field Capacity is the soil water content left in soil after excess has drained due to gravity. It is defined as the water content in soil at -1/3 bar of suction pressure. Values are given as percentage of water relative to total soil volume.

Saturation

Saturation is the soil water content at which all pore space is filled with water. Values are given as percentage of water relative to total soil volume.

3.4 Plant Parameters

Plant parameters govern all aspects of a plant species' life cycle. They are described in detail in the sections that follow. Values can be found in Appendix Tables D-1 through D-36.

3.4.1 General Species Information

GrowthForm

(Values in Appendix D-1)

GrowthForm specifies the growth form for each species. This field is used when calculating initial biomass to ensure that biomass is allocated to the appropriate plant components, and is also used at several other locations in EDYS whenever species dynamics are growth form dependent, such as calculating canopy cover for interception, maturation of seedlings to adults, and the determination of green-out conditions. Acceptable values are as follows:

1 for annual grass
2 for perennial grass
3 for annual forb
4 for perennial forb
5 for deciduous woody
6 for evergreen woody

Biennial

(Values in Appendix D-1)

Biennial specifies whether the species is a biennial or not. This value is used at dieback to differentiate between perennials with only partial loss of tissue, annuals with complete loss of tissue, and biennials with partial loss of tissue after year one and complete loss of tissue at the end of year two. Acceptable values are:

1 for biennial
0 for annual or perennial

WoodyForm

(Values in Appendix D-1)

WoodyForm specifies whether a woody species is a shrub or a tree. This value is used when calculating initial biomass. Input values for trees are typically given as total aboveground, while shrubs are given as clippable biomass. Acceptable values are:

0 for herbaceous species
1 for shrubs
2 for trees

Seasonality

(Values in Appendix D-1)

Seasonality specifies whether a species grows seasonally or is based on wet-dry periods. Species in North America are commonly seasonal species. Species in other parts of the world, such as the Mediterranean region, start growing with the onset of the rainy season and then dieback when the rainy season ends. For this reason, they are often referred to as drought deciduous species. Acceptable values are:

1 for seasonal species
0 for drought deciduous species

Legume

(Values in Appendix D-1)

Legume refers to whether a species can manufacture needed nitrogen and is not reliant on nitrogen levels dissolved in soil moisture. This value is used when determining whether nitrogen limits new growth. Acceptable values are:

1 for leguminous species
0 for non-leguminous species

3.4.2 Allocation Matrices

MatureAllocation

(Values in Appendix D-2)

MatureAllocation is the proportion of initial biomass that is allocated to adult plant components. This matrix is used only to determine initial biomasses. Values range from 0.0 to 1.0. The sum of values for all six components equals 1.0.

NormalAllocation

(Values in Appendix D-3)

NormalAllocation is the proportion of new growth biomass that is allocated to each of the adult plant components. This matrix is used when plants are not in green-out conditions and not producing seeds. Values range from 0.0 to 1.0. The sum of values for all six components equals 1.0.

SeedMonthAllocation

(Values in Appendix D-4)

SeedMonthAllocation is the proportion of new growth biomass that is allocated to adult plant components when the species is producing seeds. Values range from 0.0 to 1.0. The sum of values for all six components equals 1.0.

GreenOutAllocation

(Values in Appendix D-5)

GreenOutAllocation is the proportion of new growth biomass that is allocated to adult plant components when the species is in green-out conditions. This can occur for two reasons: when the species is breaking dormancy; and when significant amounts of above ground biomass have been removed, due to herbivory or a disturbance such as fire, and the species attempts to return its root: shoot ratio to its pre-disturbance balanced value. Values range from 0.0 to 1.0. The sum of all values equals 1.0.

3.4.3 Nitrogen Dynamics

PlantNConc

(Values in Appendix D-6)

PlantNConc is the nitrogen concentration for each component of each plant species. It is used to establish the initial nitrogen concentrations.

PlantNReq

(Values in Appendix D-7)

PlantNReq specifies the minimum nitrogen concentration required for healthy component tissues. During plant growth, nitrogen levels above $PlantNReq_{Min} * PlantNReq$ are available for production of new tissue.

NResorb

(Values in Appendix D-8)

NResorb is the proportion of nitrogen withdrawn from a plant component before it dies back. Values range from 0.0 to 1.0.

3.4.4 Roots

RootArchitecture

(Values in Appendix D-9)

RootArchitecture is the percentage of total root biomass by percentage of soil depth. It is used to determine the initial root biomass by soil layer.

MaxRootDepth

(Values in Appendix D-9)

MaxRootDepth is the maximum rooting depth of a species.

MaxDailyRootGrowth

(Values in Appendix D-10)

MaxDailyRootGrowth (shown in Appendix as *Max Root Growth*) is the maximum amount of downward growth roots can achieve in one day under ideal conditions (no limiting resources) and when the species has not reached its maximum rooting depth. Values are in mm/day.

RootUptakeCapacity

(Values in Appendix D-10)

RootUptakeCapacity is the proportion of total monthly water demand that can be taken up in any one day. A value of 0.1 indicates that only 10% of the estimated transpiration for a species can be taken up in a day.

RootBiomassAdj

(Values in Appendix D-10)

RootBiomassAdj (shown in Appendix as *Biomass Adjustment*) is the relative per biomass uptake efficiency of roots of each species. These values are used to determine relative competitiveness of roots of different species. Species with higher values are more competitive with regards to taking up soil water. The maximum value allowed is 1.0.

RootSaturationDeathLoss

(Values in Appendix D-10)

RootSaturationDeathLoss indicates the relative vulnerability of roots of a species to saturated soil conditions. These values are use when evaluating root responses to rising groundwater. Values range from 0.0 to 1.0 with 0.0 representing complete tolerance and 1.0 representing total loss of root biomass. Intermediate values indicate a species will lose only a portion of its root biomass in a layer when that layer becomes saturated.

3.4.5 Groundwater Use

GWUseFactor

(Values in Appendix D-11)

GWUseFactor (shown in Appendix as *Groundwater Efficiency Factor*) is the percentage of groundwater used for growth when groundwater lies within various rooting depth ranges as specified below in *DTWDiscountDepth*. Values range from 0 to 100, and may be given as an equation representing a linear decrease in groundwater use over the range of depth given. These values, used in conjunction with *DTWDiscountDepth*, are used to simulate the decreasing importance of groundwater for growth when taken up at increasing depths.

DTWDiscountDepth

(Values in Appendix D-11)

DTWDiscountDepth specifies the range of depth-to-water values corresponding to various *GWUseFactor* values. See *GWUseFactor* above for a more detailed explanation.

3.4.6 Physiological Triggers

GreenOutMonth

(Values in Appendix D-12)

GreenOutMonth is the month in which the species breaks out from winter dormancy. Values range from 1 to 12 with 1 being January and 12 being December. The *GreenOutAllocation* matrix is used for growth during this month.

SeedSproutMonth

(Values in Appendix D-12)

SeedSproutMonth is the interval of months in which seeds in the SeedBank can sprout, given appropriate water conditions. Values range from 1 to 12 with 1 being January and 12 being December.

SeedSetMonth

(Values in Appendix D-12)

SeedSetMonth is the interval of months in which mature plants can produce seed. Seeds are produced only once in this interval, in the first month in which conditions are appropriate (PlantProduction, Section 4.2). Values range from 1 to 12 with 1 being January and 12 being December. The *SeedMonthAllocation* matrix is used for growth during this month.

DieBackMonth

(Values in Appendix D-12)

DieBackMonth (shown in Appendix as *Dormancy*) is the month in which the species enters dormancy. Values range from 1 to 12 with 1 being January and 12 being December.

3.4.7 Biomass Conversion Constants

DryWeightProp

(Values in Appendix D-13)

DryWeightProp (shown in Appendix as *Dry wt / Wet wt*) is the typical ratio of dry biomass to wet biomass for this species.

CanopyFactor

(Values in Appendix D-13)

CanopyFactor (shown in Appendix as *Moisture Interception*) is the precipitation depth (in mm) that is intercepted by one gram of aboveground biomass.

C50

(Values in Appendix D-13)

C50 (shown in Appendix as *Basal cover / Trunk biomass*) is the area of trunk (cm^2/m^2) covered by the species per gram on trunk biomass. This is used in a Michaelis-Menten saturation curve to calculate basal cover from trunk biomass.

3.4.8 Water Use Factors

MaintWaterUseRate

(Values in Appendix D-14)

MaintWaterUseRate (shown in Appendix as *Maintenance*) is the volume of water (in mm) required for monthly physiological maintenance for each gram of biomass. This value is used when calculating how much water to take up during a month.

NewMaintWaterUseRate

(Values in Appendix D-14)

NewMaintWaterUseRate (shown in Appendix as *New Biomass Maintenance*) is the volume of water (in mm) required for monthly physiological maintenance per gram of biomass for new biomass. This is used when calculating how much water to take up during a month.

Water2Production

(Values in Appendix D-14)

Water2Production is the volume of water (in mm) required to produce 1 g of new biomass. This is used when calculating the amount of water needed to meet each month's potential production, and again when calculating actual production based on the amount of water actually taken up.

InitialProdWaterProp

(Values in Appendix D-14)

InitialProdWaterProp (shown in Appendix as *Green-out Water Use*) is a factor used for adjusting Water2Production during green-out months. It is used when calculating the amount of water needed to meet this month's potential production.

3.4.9 Growth Rates

MaximumGrowthRate

(Values in Appendix D-15)

MaximumGrowthRate is the maximum monthly increase in biomass. The value is used as a scalar multiplier when calculating potential production at the start of a month.

MaximumBiomass

(Values in Appendix D-15)

MaximumBiomass is the maximum allowable biomass for a species in a plot type. It is based on how much biomass occurs in a monoculture of the species. This may or may not be the limit for all species in a plot type because species may be vertically stratified (shrubs may grow above grasses and forbs, and trees may grow above shrubs). This value is used to limit potential production and keep a species from growing unrealistically.

OldBiomassDeficitFactor

(Values in Appendix D-15)

OldBiomassDeficitFactor (shown in Appendix as *Maximum Old Biomass Drought Loss*) is the maximum monthly percent decrease in old biomass due to drought stress. This value is used in the PlantProduction algorithm (Section 4.2) when water taken up during the month is insufficient to handle maintenance needs of the plant.

MonthlyGrowthPercent

(Values in Appendix D-16)

MonthlyGrowthPercent (shown in Appendix as *Monthly Maximum Growth Rate*) is the monthly adjustment factor for maximum growth rate. This matrix simulates the annual growth curve for a species. Temperature is incorporated into EDYS via the *MonthlyGrowthPercent* values. Acceptable values range from 0.0 to 1.0.

3.4.10 Productivity Matrices

ComponentProdFactor

(Values in Appendix D-17)

ComponentProdFactor (shown in Appendix as *Plant Part Productivity*) is the relative productivity adjustment factor for different plant parts in calculating this month's potential production. In essence, this matrix specifies where the photosynthetic biomass is located. This matrix is used during normal growth months and seed production months. Acceptable values range from 0.0 to 1.0.

GreenOutComponentProdFactor

(Values in Appendix D-18)

GreenOutComponentProdFactor (shown in Appendix as *Green-out Plant Part Productivity*) is the relative productivity adjustment factor for different plant parts in calculating this month's potential production, but only for months when the species is in green-out conditions. In essence, this matrix specifies both where the carbohydrate reserves are for fueling growth and where any photosynthetic tissues may be. Acceptable values range from 0.0 to 1.0.

3.4.11 Competition

LightComp

(Values in Appendix D-19)

LightComp (shown in Appendix as *Light Competition Factors*) is the suppressing effect on potential growth that one species has on another due to shading. This value is used when calculating this month's potential production. The greater the value, the greater the proportional decrease in potential production. Acceptable values range from 0.0 to 1.0.

3.4.12 Physiological Controls

GreenOutTrigger

(Values in Appendix D-20)

GreenOutTrigger (shown in Appendix as *Growing Season Green-Out Maximum Root:Shoot*) is the shoot: root ratio used to trigger a switch to green-out conditions during the growing season when not during the *GreenOutMonth*. This can occur as a result of a disturbance that removes aboveground biomass. When the actual shoot: root ratio falls below GreenOutTrigger, production shifts from normal growth to green-out conditions.

SeedSproutProp

(Values in Appendix D-20)

SeedSproutProp (shown in Appendix as *Maximum 1-Month Seed Germination*) is the maximum proportion of seeds in the SeedBank that may germinate in any one month. Acceptable values range from greater than 0 to 1. A value of 1 indicates that all seeds may germinate in a single month, thus depleting the SeedBank.

SeedlingBiomassGrowth

(Values in Appendix D-20)

SeedlingBiomassGrowth (shown in Appendix as *Maximum 1st Month Seedling Growth*) is the maximum factor increase in biomass for seedlings after germination. In other words, the biomass of seeds germinating times *SeedlingBiomassGrowth* is the maximum growth allowed for seedlings that month, assuming that all needs are met.

3.4.13 Dieback Matrices

DieBackProp

(Values in Appendix D-21)

DieBackProp (shown in Appendix as *End of Growing Season Dieback*) is the proportion of each plant component that dies when the plant enters dormancy. Acceptable values range from 0.0 to 1.0.

DieBackFate

(Values in Appendix D-22)

DieBackFate indicates where tissue is transferred when it dies. Acceptable values are as follows:

- -1 – Organic matter in the soil profile
- 0 – Litter
- 7 – Standing dead stems
- 8 – Standing dead leaves

3.4.14 Fire Matrices

FuelLoad

(Values in Appendix D-23)

FuelLoad is the relative contribution of each plant component biomass to total fuel loads. These values can be used to simulate the presence of volatile compounds in tissues (with values > 1.0).

FireProp

(Values in Appendix D-24)

FireProp (shown in Appendix as *Plant Component Loss to Fire*) is the proportion of component biomass lost to moderate fires. Acceptable values range from 0.0 to 1.0.

3.4.15 Herbivory Matrices

Preference* and *Competition

(Values in Appendix D-25, D-27, D-29, D-31, D-33, D-35)

Preference and *Competition* indicate each herbivore's diet preference for each plant component and each herbivore's competitiveness relative to the other herbivores being simulated. For both parameters, lower values relate to higher the preferences or competitiveness. For example, an herbivore will select a component with a preference rank of 6 over a component with a rank of 12. A species with a competitiveness of 2 will out-compete a species with a competitiveness of 3. These two parameters are used together to allocate biomass to all herbivores during monthly herbivory.

Accessibility

(Values in Appendix D-26, D-28, D-30, D-32, D-34, D-36)

Accessibility is the percentage of the total component biomass that is accessible for consumption by each herbivore. Acceptable values range from 0 to 100. This parameter is used to limit the ability of a species to consume all of a component that it physically cannot eat. For example, deer cannot reach browse above a certain height, so the accessibility value for tree leaves may only be 30%, while it may be 100% for forb leaves.

3.5 Animal Parameters

All Owens Valley applications of EDYS currently only support native herbivores and livestock. As such, the following list of animal parameters covers only those applicable to Owens Valley applications and does not include parameters used for higher trophic level species or for simulating population dynamics.

Model Type

Model Type specifies the distribution patterns used for calculating herbivory across the landscape. A value of 1 represents a native herbivore with a uniform distribution across the entire model domain. A value of 2 is used for livestock species with stocking rates and movement across the landscape governed by user-specified grazing regimes.

Trophic Level

Trophic Level specifies the type of diet an animal consumes. Acceptable values are:

1 is for an herbivore
2 is for an omnivore (consumes both plant and animal matter)
3 is for a predator

Daily Herb Demand

Daily Herb Demand is the amount of food consumed per square meter per day by each species of animal. This value is only valid for native herbivores. For livestock (cattle, sheep, and horses), stocking rates are set by the user at run time and then used to calculate *Daily Herb Demand* during the simulation.

4.0 Basic Algorithms

The following sections detail the steps used for each of the basic algorithms used in EDYS. Each section includes lists of the constants, variables, and parameters used in the algorithm, along with step-by-step descriptions of how each algorithm works.

4.1 Common Variables

The following variables are used throughout the basic algorithm descriptions and are summarized as follows:

$Biomass_{C}$	Biomass for plant component C (g/m^2)
$Biomass_{CoarseRoot}$	Total coarse root biomass (g/m^2)
$Biomass_{FineRoot}$	Total fine root biomass (g/m^2)
$Biomass_{Roots}$	Total biomass for roots; sum of $Biomass_{CoarseRoot}$ and $Biomass_{FineRoot}$ (g/m^2)
$Biomass_{Trunk}$	Biomass for trunks (g/m^2)
$Biomass_{Stems}$	Biomass for living stems (g/m^2)
$Biomass_{Leaves}$	Biomass for living leaves (g/m^2)
$Biomass_{Seeds}$	Biomass for seeds and inflorescences still attached to the plant (g/m^2)
$Biomass_{SD}$	Total standing dead biomass (g/m^2)
$Biomass_{Seedling}$	Total seedling biomass; sum of $Biomass_{SeedlingShoot}$ and $Biomass_{SeedlingRoot}$ (g/m^2)
$Biomass_{SeedlingShoot}$	Biomass for seedling shoots (g/m^2)
$Biomass_{SeedlingRoot}$	Total biomass for seedling roots (g/m^2)
$Biomass_{SeedBank}$	Biomass of seeds laying on the soil surface (g/m^2)
$Biomass_{Litter}$	Biomass of the litter layer (g/m^2)
$OldBiomass_{C}$	Old biomass of plant component C (g/m^2)
$OldBiomass_{Total}$	Total old biomass for all plant components (g/m^2)
N_{C}	Total nitrogen for plant component C (g/m^2)
$N_{CoarseRoots}$	Total nitrogen for coarse roots (g/m^2)
$N_{FineRoots}$	Total nitrogen for fine roots (g/m^2)
N_{Roots}	Total nitrogen for roots; sum of $N_{CoarseRoots}$ and $N_{FineRoots}$ (g/m^2)
N_{Trunk}	Total nitrogen for trunks (g/m^2)
N_{Stems}	Total nitrogen for living stems (g/m^2)
N_{Leaves}	Total nitrogen for living leaves (g/m^2)
N_{Seeds}	Total nitrogen for seeds and inflorescences still attached to the plant (g/m^2)
N_{SD}	Total nitrogen for standing dead tissues (g/m^2)
$N_{SeedlingRoots}$	Total nitrogen for seedling roots (g/m^2)
N_{Shoots}	Total nitrogen for seedling shoots (g/m^2)

$N_{SeedBank}$	Total nitrogen for seeds laying on the soil surface (g/m^2)
N_{Trans}	Total nitrogen taken up along with water during transpiration (g/m^2)
N_{Litter}	Total nitrogen in the litter layer (g/m^2)
$N_{LitterOM}$	Total nitrogen in organic matter in the litter layer (g/m^2)
$N_{LitterFree}$	Total free nitrogen in the litter layer (g/m^2)
$N_{LitterMicrob}$	Total nitrogen in microbial biomass in the litter layer (g/m^2)
$SoilN_L$	Total nitrogen in soil layer L (g/m^2)
$SoilOM_L$	Total organic matter in soil layer L (g/m^2)
$SoilOMN_L$	Total nitrogen contained in organic matter in soil layer L (g/m^2)
$PotProd_C$	Potential production for plant component C (g/m^2)
$PotProd_{Trunk}$	Potential production for trunks (g/m^2)
$PotProd_{Stems}$	Potential production for stems (g/m^2)
$PotProd_{Leaves}$	Potential production for leaves (g/m^2)
$PotProd_{Seedling}$	Potential production for existing seedlings (g/m^2)
$PotProd_{NewSeedlings}$	Potential production for new seedlings that result from this month's germination; a subset of $PotProd_{Germination}$; it is based on which day seeds germinate and how many days in the month are left for growth (g/m^2)
$PotProd_{Germination}$	Maximum potential production for new seedlings that result from this month's germination (g/m^2)

4.2 Potential Production

This procedure calculates monthly potential production for each species in each plot type, assuming no resources are limiting. It is called at the start of each month.

Constants:

LightProdReductionRate	Factor used for converting proportional light shading effect on potential production; currently equals 0.10

Variables:

$Biomass_{Current}$	Current biomass (g/m^2)
$Biomass_{New}$	Potential biomass if all potential production is realized
$LeafBiomass_{ShadedSp}$	Biomass of leaves of the species being shaded
$LeafBiomass_{ShadingSp}$	Biomass of leaves of the species doing the shading
LightFactor	Factor used to determine the effect on potential production by the shading of one species on another
$SDLeafBiomass_{ShadingSp}$	Biomass of standing dead leaves of the species doing the

shading

Parameters:

$Biomass_{Maximum}$	Plant parameter *MaximumBiomass* (see Section 3.4.9)
$GOProdFactor_C$	Plant parameter *GreenOutComponentProdFactor* (see Section 3.4.10)
GreenOutTrigger	Plant parameter *GreenOutTrigger* (see Section 3.4.12)
$LightComp_{ShadingSp}$	Plant parameter *LightComp* (see Section 3.4.11)
MaxGrowthRate	Plant parameter *MaximumGrowthRate* (see Section 3.4.9)
$MonthlyGrowth\%_{Month}$	Plant parameter *MonthlyGrowthPercent* (see Section 3.4.9)
$ProdFactor_C$	Plant parameter *ComponentProdFactor* (see Section 3.4.10)
SeedlingBiomassGrowth	Plant parameter *SeedlingBiomassGrowth* (see Section 3.4.12)
SeedSproutProp	Plant parameter *SeedSproutProp* (see Section 3.4.12)

Steps:

1. Calculate light competition factor, summing the shading effect of all other species in the plot on the species of interest.

$$LightFactor = \sum\left(\frac{LeafBiomass_{ShadingSp} + SDLeafBiomass_{ShadingSp}}{LeafBiomass_{ShadedSp}} * LightComp_{ShadingSp}\right)$$

2. Check whether we are in Green Out Conditions:

   A. Yes, if in Green Out Month.

   B. Check Stem+Leaf:Root ratio

$$Ratio = \frac{Biomass_{Trunk} + Biomass_{Stems} + Biomass_{Leaves}}{Biomass_{CoarseRoot} + Biomass_{FineRoot}}$$

   If $Ratio < GreenOutTrigger$ and $MonthlyGrowth\%_{Month} \geq 0.50$ then Yes we are in Green Out conditions.

3. Calculate potential production for each plant component:

   A. If in Green Out:

$$PotProd_C = Biomass_C * GOProdFactor_C * MonthlyGrowth\%_{Month} * (1 - LightFactor)$$

   B. If not in Green Out:

$$PotProd_C = Biomass_C * ProdFactor_C * MonthlyGrowth\%_{Month} * MaxGrowthRate * (1 - LightFactor)$$

4. Are seedlings present? If so:

A. Calculate light competition factor:

$$ShadingBiomass = Biomass_{Trunk} + Biomass_{Stems} + Biomass_{Leaves} + Biomass_{SD}$$

$$LightFactor = \sum (ShadingBiomass * LightComp_{ShadingSpecies} * LightProdReductionRate)$$

B. Calculate potential production

$$PotProdSeedling = Biomass_{Seedling} * MonthlyGrowth\%_{Month} * (1 - LightFactor)$$

5. Calculate any potential seed germination

$$PotProd_{Germination} = Biomass_{SeedBank} * SeedSproutProp * SeedlingBiomassGrowth$$

6. Check whether the new growth will cause this species to exceed its maximum total biomass limit.

$$Biomass_{Current} = Biomass_{Trunk} + Biomass_{Stems} + Biomass_{Leaves} + Biomass_{SD} + Biomass_{SeedlingShoot}$$

$$Biomass_{New} = PotProd_{Trunk} + PotProd_{Stems} + PotProd_{Leaves} + PotProd_{SD} + PotProd_{SeedlingShoot}$$

If $Biomass_{Maximum} < (Biomass_{Current} + Biomass_{New})$ then this species will exceed its biomass limit, so reduce the potential production for each component proportionally.

$$PotProd_C = (Biomass_{Maximum} - Biomass_{Current}) * \left(\frac{PotProd_C}{Biomass_{New}} \right)$$

C applies to both seedlings and all adult plant components.

4.3 Potential Transpiration

This procedure calculates the water needed to meet both the potential production calculated in Section 4.2 and to meet the maintenance needs for adult plants. It is called at the start of each month.

Constants:

$MonthlyMaintAdj_{Month}$	Monthly adjustment for maintenance water use rate; used to simulate changes in maintenance water needs during the year; currently equals

January	0.50
February	0.60
March	0.70
April	0.80
May	0.90
June	1.00
July	1.10
August	1.10
September	1.00
October	0.90
November	0.80
December	0.60

Variables:

$GORehydTransEst_C$	Estimate of water needed to rehydrate tissues at green out, by plant component
$MaintTrans_C$	Total maintenance transpiration for this month, by plant component
$NewBiomass_C$	New biomass, by plant component
$NewMaintTransEst_C$	Estimate of water needed to maintain new biomass, by plant component
$OldBiomass_C$	Old biomass, by plant component
$OldBiomassDeficitTransEst_C$	Estimate of water deficit between old and current biomass, by plant component
$OldMaintTransEst_C$	Estimate of water needed to maintain old biomass, by plant component
$PotTrans_C$	Potential transpiration, by plant component
$ProdTransEst_C$	Estimate of total water needed this month to meet potential production, by plant component

Parameters:

InitialProdWaterProp	Plant parameter *InitialProdWaterProp* (see Section 3.4.8)
$MaintWaterUseRate_{New}$	Plant parameter *NewMaintWaterUseRate* (see Section 3.4.8)
$MaintWaterUseRate_{Old}$	Plant parameter *MaintWaterUseRate* (see Section 3.4.8)
WaterUseEff	Plant parameter *Water2Production* (see Section 3.4.8)

Steps:

1. Calculate rehydration amount if Green Out month

$$GORehydTransEst_C = PotProd_C * InitialProdWaterProp$$

2. Calculate monthly transpiration amount based on potential production

$$ProdTransEst_C = (PotProd_C * WaterUseEff) + GORehydTransEst_C$$

3. Calculate maintenance transpiration amount for current new biomass

$$NewMaintTransEst_C = NewBiomass_C * WaterUseEff * MaintWaterUseRate_{New} * MonthlyMaintAdj_{Month}$$

4. Calculate maintenance transpiration amount for old biomass

$$OldMaintTransEst_C = OldBiomass_C * MaintWaterUseRate_{Old}$$

5. Calculate water deficit between old and current biomass. If old biomass exceeds current biomass, then the difference is a tissue water deficit.

$$OldBiomassDeficitTransEst_C = OldBiomass_C - Biomass_C$$

6. Tally the monthly potential transpiration

$$MaintTrans_C = NewMaintTransEst_C + OldMaintTransEst_C + OldBiomassDeficitTransEst_C$$

$$PotTrans_C = ProdTransEst_C + MaintTrans_C$$

4.4 Seedling Potential Transpiration

This procedure calculates the water needed to meet both the seedling potential production calculated in Section 4.2 and to meet the maintenance needs for seedlings. It is called at the start of each month.

Constants:

$MonthlyMaintAdj_{Month}$ Monthly adjustment for maintenance water use rate; used to simulate changes in maintenance water needs during the year; currently equals

January	0.50
February	0.60
March	0.70
April	0.80

May	0.90
June	1.00
July	1.10
August	1.10
September	1.00
October	0.90
November	0.80
December	0.60

Variables:

$MaintTrans_{Seedling}$	Water needed to maintain existing seedlings
$PotTrans_{Seedling}$	Total water needed by seedlings this month
$ProdTransEst_{Seedling}$	Water needed to meet potential production of seedlings

Parameters:

$MaintWaterUseRate_{New}$	Plant parameter *NewMaintWaterUseRate* (see Section 3.4.8)
WaterUseEff	Plant parameter *Water2Production* (see Section 3.4.8)

Steps:

1. Maintenance water use

$$MaintTrans_{Seedling} = Biomass_{Seedling} * WaterUseEff * MaintWaterUseRate_{New} * MonthlyMaintAdj_{Month}$$

2. Water needed to meet potential production

$$ProdTransEst_{Seedling} = PotProd_{Seedling} * WaterUseEff$$

3. Tally total water needs for seedlings

$$PotTrans_{Seedling} = ProdTransEst_{Seedling} + MaintTrans_{Seedling}$$

4.5 Seed Germination

This procedure calculates how many seeds in the seedbank will germinate on any given day. It is called only for species and plot types with potential new seedling biomass that month. If moisture availability is sufficient, it produces new seedlings.

Constants:

GerminationWaterUse	This factor multiplied by the seed biomass yields the amount of water seeds require in order to germinate; currently equals 1.3

Variables:

AvailableWater	Water available to be absorbed by seeds in the seed bank
$Biomass_{Current}$	Current biomass (g/m^2)
$Biomass_{New}$	Biomass that would result if all potential production is realized this month
CurrentDay	Current simulation day of the month
$NewSeedlingBiomass_S$	Potential biomass of seedlings to produce this day, by plant species
$NumDays_{Month}$	Number of days this month
$ProdTransEst_{NewSeedlings}$	Estimate of water needed to meet potential production of new seedlings this month
RequiredWater	Water required for germination
SeedWater	Total water used to germinate seeds
$SoilMoisture_L$	Moisture level in soil layer L
$SproutProp_S$	Proportion of seeds sprouting this day, by plant species
TotalSeedBiomass	Total potential biomass of seedlings to produce this day

Parameters:

$Biomass_{Maximum}$	Plant parameter *MaximumBiomass* (see Section 3.4.9)
InitialProdWaterProp	Plant parameter *InitialProdWaterProp* (see Section 3.4.8)
$NormalAllocation_{FineRoots}$	Plant parameter *NormalAllocation* (see Section 3.4.2)
SeedlingBiomassGrowth	Plant parameter *SeedlingBiomassGrowth* (see Section 3.4.12)

Steps:

1. Determine total amount of seedlings to produce this day

$$TotalSeedBiomass = \sum NewSeedlingBiomass_S$$

2. Find top soil layer that still exists

3. Calculate water amount required to germinate the desired seed amount

$$RequiredWater = NewSeedlingBiomass_S * GerminationWaterUse$$

4. Loop through the profile looking for available water for germination

   A. Determine amount of water available in a soil layer

$$AvailableWater = SoilMoisture_L * \frac{NewSeedlingBiomass_S}{TotalSeedBiomass}$$

B. Do we have enough water to satisfy the demand?

1. Yes, then $WaterLoss = RequiredWater$

2. No, then $WaterLoss = AvailableWater$

C. Seeds absorb the moisture

$$SeedWater = \sum WaterLoss$$

$$SoilMoisture_L = SoilMoisture_L - WaterLoss$$

5. Determine how much of the desired germination will actually take place based on water absorption

$$SproutProp_S = \frac{SeedWater}{NewSeedlingBiomass_S * GerminationWaterUse}$$

6. If no existing seedlings for this species, set root percentages by soil layer (half in each of the top two layers) and seedling rooting depth (total of the top two layers).

7. Sprout the seeds. Move biomass from Seed Band to Seedling Roots and Shoots.

$$Loss = NewSeedlingBiomass_S * SproutProp_S$$

$$NewSeedlingBiomass_S = NewSeedlingBiomass_S - Loss$$

$$Biomass_{SeedBank} = Biomass_{SeedBank} - Loss$$

$$Biomass_{SeedlingRoot} = Biomass_{SeedlingRoot} + \left(Loss * NormalAllocation_{FineRoots}\right)$$

$$Biomass_{SeedlingShoot} = Biomass_{SeedlingShoot} + \left(Loss * \left(1 = NormalAllocation_{FineRoots}\right)\right)$$

8. Transfer Nitrogen from Seed Bank to Seedlings

$$NLoss = N_{SeedBank} * SproutProp_S$$

$$N_{SeedBank} = N_{SeedBank} - NLoss$$

$$N_{SeedlingRoot} = N_{SeedlingRoot} + \left(NLoss * NormalAllocation_{FineRoots}\right)$$

$$N_{SeedlingShoot} = N_{SeedlingShoot} + \left(NLoss * \left(1 = NormalAllocation_{FineRoots}\right)\right)$$

9. Calculate potential production for the rest of the month for these new seedlings

$$PotProd_{NewSeedlings} = Loss * SeedlingBiomassGrowth * \frac{NumDays_{Month} - CurrentDay}{NumDays_{Month}}$$

10. Adjust potential production if this growth will cause the species to exceed its maximum biomass limit

$$Biomass_{Current} = Biomass_{Trunk} + Biomass_{Stems} + Biomass_{Leaves} + Biomass_{SD} + Biomass_{SeedlingShoot}$$

$$Biomass_{New} = PotProd_{Trunk} + PotProd_{Stems} + PotProd_{Leaves} + PotProd_{Seedling} + PotProd_{NewSeedlings}$$

IF $Biomass_{Maximum} < \left(Biomass_{Current} + Biomass_{New}\right)$ then adjust:

$$PotProd_{NewSeedlings} = \left(Biomass_{Maximum} - Biomass_{Current}\right) * \frac{PotProd_{NewSeedlings}}{Biomass_{New}}$$

11. Calculate water needs to achieve this potential production

$$ProdTransEst_{NewSeedlings} = PotProd_{NewSeedlings} * WaterUseEff * InitialProdWaterProp$$

4.6 Saturated Root Death

This procedure determines the impact of rising groundwater on roots that have become saturated. For some species, this means loss of those roots, for others, only a partial loss of roots. It is performed at the start of each month.

Variables:

$NConc_{Roots}$	Concentration of nitrogen in root biomass.

Parameters:

RootSaturationDeathLoss	Plant parameter *RootSaturationDeathLoss* (see Section 3.4.4)

Steps:

Because capillarity (movement of water from the top of the water body into the layer immediately above it) has not been added to EDYS, roots are allowed to survive in the top 1 cm of the top saturated soil layer.

The following applies for species with $RootSaturationDeathLoss > 0.0$ (Not completely tolerant of saturated conditions).

1. Find the top saturated soil layer

2. Loop through layers looking to see if any roots are in saturated conditions that previously were not.

   A. At the top layer of the saturated zone

      1. Kill roots in this layer based on this species tolerance to saturation

$$Loss = Biomass_{Roots} * RootSaturationDeathLoss$$

      2. Update rooting depth

   B. Lower layers

      1. Kill all roots

$$Loss = Biomass_{Roots}$$

      2. Update rooting depth

   C. Move dead root biomass to soil organic matter

$$Biomass_{Roots} = Biomass_{Roots} - Loss$$

$$SoilOM_L = SoilOM_L + Loss$$

   D. Move nitrogen

$$NLoss = Loss * NConc_{Roots}$$

$$Nitrogen_{Roots} = Nitrogen_{Roots} - NLoss$$

$$SoilOMN_L = SoilOMN_L + NLoss$$

3. Repeat Step 2 for seedling roots

4.7 Monthly Dieback

This procedure performs die back operations when a species goes into dormancy. It is performed at the start of each month.

Variables:

Fine2CoarseProp	The proportion of fine roots that have matured sufficiently to be considered functionally as coarse roots.

Parameters:

$DieBackFate_C$	Plant parameter *DieBackFate* (see Section 3.4.13)
$DieBackProp_C$	Plant parameter *DieBackProp* (see Section 3.4.13)

Steps:

1. Continue in this procedure if correct month for end-of-season dieback

2. Calculate dieback losses by components

   A. If Biennial species and adult, then all tissue dies

   B. Otherwise, loss proportion is based on $DieBackProp_C$

$$Loss = Biomass_C * DieBackProp_C$$

$$NLoss = N_C * DieBackProp_C$$

3. Move biomass and nitrogen to respective component destination for dead tissue (based on $DieBackFate_C$

   A. Soil organic matter

$$Biomass_{Roots} = Biomass_{Roots} - Loss$$

$$SoilOM_L = SoilOM_L + Loss$$

$$N_{Roots} = N_{Roots} - NLoss$$

$$SoilOMN_L = SoilOMN_L + NLoss$$

B. Litter

$$Biomass_C = Biomass_C - Loss$$

$$Biomass_{Litter} = Biomass_{Litter} + Loss$$

$$N_C = N_C - NLoss$$

$$N_{Litter} = N_{Litter} + NLoss$$

C. Standing dead

$$Biomass_C = Biomass_C - Loss$$

$$Biomass_{SD} = Biomass_{SD} + Loss$$

$$N_C = N_C - NLoss$$

$$N_{SD} = N_{SD} + NLoss$$

4. Some fine roots will have grown large enough to functionally serve as coarse roots, so transfer biomass from fine to coarse roots for them.

A. If a grass, then $Fine2CoarseProp = 0.20$

B. Otherwise, $Fine2CoarseProp = 0.30$

$$Loss = Biomass_{FineRoots} * Fine2CoarseProp$$

$$NLoss = N_{FineRoots} * Fine2CoarseProp$$

$$Biomass_{CoarseRoots} = Biomass_{CoarseRoots} + Loss$$

$$Biomass_{FineRoots} = Biomass_{FineRoots} - Loss$$

$$N_{CoarseRoots} = N_{CoarseRoots} + NLoss$$

$$N_{FineRoots} = N_{FineRoots} - NLoss$$

4.8 Drop Seeds

This procedure simulates the dropping of seeds off adult plants. Biomass is transferred from seeds on the plant to the seed bank. It is performed at the start of each month.

Steps:

1. Continue if this is the first month after seed production

2. Move biomass from seed component to seed bank

$$Biomass_{SeedBank} = Biomass_{SeedBank} + Biomass_{Seeds}$$

$$Biomass_{Seeds} = 0.0$$

3. Move associated nitrogen

$$N_{SeedBank} = N_{SeedBank} + N_{Seeds}$$

$$N_{Seeds} = 0.0$$

4.9 Seedling Transfer

This procedure converts seedlings into adult plants. It is called at the start of each month. Because seedlings are not allowed to produce seeds, this procedure must be called for each species before the start of the seed set window (Section 3.4.6).

Parameters:

DieBackMonth	Plant parameter *DieBackMonth* (see Section 3.4.6)
$NormalAllocation_C$	Plant parameter *NormalAllocation* (see Section 3.4.2)

Steps:

1. Continue if

   A. DieBack month (*DieBackMonth*)

   or

B. Annual species and at the start of the seed set month window (so that seedling biomass has the opportunity to produce seeds)

2. Move seedling roots to adult fine roots

$$Biomass_{FineRoots} = Biomass_{FineRoots} + Biomass_{SeedlingRoots}$$

$$N_{FineRoots} = N_{FineRoots} + N_{SeedlingRoots}$$

3. Set new rooting depth if this species did not have adult plants before now.

4. Move seedling shoots to adult aboveground components

A. If trees or shrubs, aboveground biomass goes into leaves and stems only

$$Ratio_{Stems} = \frac{NormalAllocation_{Stems}}{NormalAllocation_{Stems} + NormalAllocation_{Leaves}}$$

$$Biomass_{Stems} = Biomass_{Stems} + \left(Biomass_{SeedlingShoot} * Ratio_{Stems}\right)$$

$$N_{Stems} = N_{Stems} + \left(N_{Shoots} * Ratio_{Stems}\right)$$

$$Ratio_{Leaves} = \frac{NormalAllocation_{Leaves}}{NormalAllocation_{Leaves} + NormalAllocation_{Stems}}$$

$$Biomass_{Leaves} = Biomass_{Leaves} + \left(Biomass_{SeedlingShoot} * Ratio_{Leaves}\right)$$

$$N_{Leaves} = N_{Leaves} + \left(N_{SeedlingShoots} * Ratio_{Leaves}\right)$$

B. For grasses and forbs, aboveground biomass goes into all aboveground components

$$Ratio_{C} = \frac{NormalAllocation_{C}}{NormalAllocation_{Trunk} + NormalAllocation_{Stems} + NormalAllocation_{Leaves}}$$

$$Biomass_{C} = Biomass_{C} + \left(Biomass_{SeedlingShoot} * Ratio_{C}\right)$$

$$N_{C} = N_{C} + \left(N_{SeedlingShoots} * Ratio_{C}\right)$$

4.10 Seed Sprout

This procedure calculates potential seed germination during a month. It is called at the start of each month.

Variables:

NewSeedlingBiomass	Potential seedling biomass if conditions are favorable and all seeds due to sprout this month survive and reach maximum growth.

Parameters:

$SeedSproutMonth_{End}$	Plant parameter *SeedSproutMonth* (see Section 3.4.6)
$SeedSproutMonth_{Start}$	Plant parameter *SeedSproutMonth* (see Section 3.4.6)
SeedSproutProp	Plant parameter *SeedSproutProp* (see Section 3.4.12)

Steps:

1. Clear storage for new seedlings to sprout this month

2. Check to see if timing is right for seed sprout for each species

$$SeedSproutMonth_{Start} \leq Month_{Current} \leq SeedSproutMonth_{End}$$

3. Set potential new seedling biomass for this month. How much actually germinates depends on moisture availability.

$$NewSeedlingBiomass = Biomass_{SeedBank} * SeedSproutProp$$

4.11 Plant Production

This procedure performs the actual plant growth calculations. Actual growth is based on how much water was taken up during the month and whether any limiting conditions exist (such as insufficient nitrogen to meet potential production). It is called at the end of each month.

Variables:

$ActualProd_C$	Actual production of plant component C.
Depth	Cumulative depth of each soil layer.
H2OProd	Potential production based on water availability.
$MaintTransEst_{New}$	Estimated maintenance needs for new biomass.

$MaintTransEst_{Old}$	Estimated maintenance needs for old biomass.
$NConc_C$	Nitrogen concentration for plant component C.
OBMDeficit	Old Biomass Deficit is the loss of old biomass tissue due to insufficient water availability that month.
PlantNAvail	Nitrogen in plant tissues available for new growth.
PlantNH2O	Nitrogen needed to realize all of the new growth based on water availability.
$Trans_{Total}$	Total amount of water taken up that month and available for maintenance and new growth.
Water4Growth	Water available for new growth; total transpiration minus maintenance needs that have been satisfied.
$WaterUptake_{Layer}$	Amount of water taken up from each soil layer.

Parameters:

$DieBackProp_C$	Plant parameter *DieBackProp* (see Section 3.4.13)
DTWDiscountDepth	Plant parameter *DTWDiscountDepth* (see Section 3.4.5)
$GreenOutAllocation_C$	Plant parameter *GreenOutAllocation* (see Section 3.4.2)
GreenOutMonth	Plant parameter *GreenOutMonth* (see Section 3.4.6)
GreenOutTrigger	Plant parameter *GreenOutTrigger* (see Section 3.4.12)
$GWUse_1$	Plant parameter *GWUseFactor* (see Section 3.4.5)
$GWUse_2$	Plant parameter *GWUseFactor* (see Section 3.4.5)
$NormalAllocation_C$	Plant parameter *NormalAllocation* (see Section 3.4.2)
OldBiomassDeficitFactor	Plant parameter *OldBiomassDeficitFactor* (see Section 3.4.8)
$PlantNReq_C$	Plant parameter *PlantNReq* (see Section 3.4.3)
$SeedMonthAllocation_C$	Plant parameter *SeedMonthAllocation* (see Section 3.4.2)
WaterUseEff	Plant parameter *Water2Production* (see Section 3.4.8)

Steps:

1. Is there an Old Biomass tissue water deficit? Use monthly transpiration amount to meet the deficit, if possible.

   A. Calculate the deficit

$$OBMDeficit = \sum_{AllComponents}\left(OldBiomass_C - Biomass_C\right)$$

   B. If a deficit exists, see if it can be satisfied by the monthly transpiration amount

      1. Plenty of transpiration to meet the deficit

$$Biomass_C = OldBiomass_C$$

$$Trans_{Total} = Trans_{Total} - OBMDeficit$$

2. Only some of the deficit can be met, so loop through the components (starting with the roots) adding moisture until $Trans_{Total}$ is exhausted

$$Biomass_C = Biomass_C + Trans_C$$

$$Trans_{Total} = Trans_{Total} - Trans_C$$

2. If any transpiration amount is available, try to satisfy Old Biomass maintenance

A. If sufficient transpiration is left to satisfy all the needs

$$Trans_{Total} = Trans_{Total} - MaintTransEst_{Old}$$

B. If insufficient transpiration to satisfy all the needs, deduct maintenance for each component proportionally to Old Biomass

$$Loss = (Trans_{Total} - MaintTransEst_{Old}) * \frac{OldBiomass_C}{OldBiomass_{Total}}$$

(*Loss* will be < 0)

$$Biomass_C = Biomass_C + Loss$$

$$Trans_{Total} = 0.0$$

Then, test each component to see if water loss is too great to maintain Old Biomass $[(OldBiomass_C * OldBiomassDeficitFactor) > Biomass_C]$

A. If so, calculate Old Biomass losses

$$Loss = OldBiomass_C - \frac{Biomass_C}{OldBiomassDeficitFactor}$$

B. But, it can't exceed total Biomass

If $(Loss > Biomass_C)$ then $Loss = Biomass_C$

C. Calculate nitrogen loss

$$NLoss = Loss * NConc_C$$

D. If loss is from roots, then transfer loss to soil organic matter.

Root biomass is lost at a constant proportion in each layer.

$$Biomass_{Roots} = Biomass_{Roots} - Loss$$

$$SoilOM_{L} = SoilOM_{L} + Loss$$

$$N_{Roots} = N_{Roots} - NLoss$$

$$SoilOMN_{L} = SoilOMN_{L} + NLoss$$

E. If loss from components other than roots, then dead tissue goes to litter. This assumes no water transfer from dead tissue to litter.

$$Biomass_{Litter} = Biomass_{Litter} + Loss$$

$$OldBiomass_{C} = OldBiomass_{C} - Loss$$

$$N_{Litter} = N_{Litter} + NLoss$$

$$N_{C} = N_{C} - NLoss$$

3. If any transpiration amount is available, try to satisfy New Biomass maintenance

A. If sufficient transpiration is left to satisfy all the needs

$$Trans_{Total} = Trans_{Total} - MaintTransEst_{New}$$

B. If insufficient transpiration to satisfy all the needs, loss to New Biomass is proportional to transpiration shortfall

$$Loss = \left(\sum\left(Biomass_{C} - OldBiomass_{C}\right)\right) * 0.10 * \left(1 - \frac{Trans_{Total}}{MaintTransEst_{New}}\right)$$

1. Attempt to remove losses from seeds. Any biomass losses go to litter, along with associated nitrogen.

2. If seeds did not satisfy *Loss*, then attempt to remove losses from leaves. As with seeds, any biomass losses go to litter, along with associated nitrogen.

3. If leaves did not satisfy Loss, then attempt to remove losses from stems. As before with leaves and seeds, any biomass losses go to litter,

along with associated nitrogen.

4. Determine impact of groundwater use on the amount of water actually available for growth

A. Calculate depth to each saturated layer from which water was taken up by plants

B. Calculate groundwater use factor

$$GWFactor = GWUse_1 - \left[GWUse_2 * 10 * \left(\frac{Depth}{1000} - DTWDiscountDepth \right) \right]$$

C. Adjust amount of water available based on groundwater use factor

$$Water4Growth = \sum_{Layers} \left(GWFactor * Trans_{Total} * \frac{WaterUptake_{Layer}}{WaterUptake_{Total}} \right)$$

D. Use this amount of water if it is less than $Trans_{Total}$

5. Calculate production estimate based only on transpiration amount

$$H2OProd = \frac{Trans_{Total}}{WaterUseEff}$$

6. Determine allocation pattern

A. Assume normal allocation

$$Allocation_C = NormalAllocation_C$$

B. Test for Green Out conditions

1. Green Out Month (*GreenOutMonth*)

or

2. Low stem+leaf:root ratio

$$Ratio = \frac{Biomass_{Trunk} + Biomass_{Stems} + Biomass_{Leaves}}{Biomass_{Roots}}$$

If $Ratio \leq GreenOutTrigger$ then Green Out conditions

$$Allocation_C = GreenOutAllocation_C$$

C. Test whether this is a month for seed production – must be within the window when seeds can be set, production equals or exceeds a set proportion of potential production (20% for annuals and 33% for perennials), and no seeds were previously set this year

$$Allocation_C = SeedMonthAllocation_C$$

7. Calculate production (based on transpiration) for each component

$$Prod_C = H2OProd * Allocation_C$$

8. Calculate nitrogen limits to production

A. Determine the amount of nitrogen needed to realize all of the new growth based on water availability

$$PlantNH2O = Prod_C * PlantNReq_C$$

B. Calculate how much nitrogen is available, both from the water taken up and from any surplus nitrogen contained in existing biomass

$$PlantNAvail = (N_{Trans} * Allocation_C) + [Biomass_C * (NConc_C - PlantNReq_C)]$$

C. If a legume, then it can manufacture any shortfall

$$PlantNAvail = PlantNH2O$$

D. Do we meet the nitrogen needs based on water availability?

1. Yes: $ActualProd_C = Prod_C$

2. No: $ActualProd_C = Prod_C * \frac{PlantNAvail}{PlantNH2O}$

9. Move nitrogen to proper components

$$N_C = N_C + (N_{Trans} * Allocation_C)$$

10. Allocate actual production among components

$$Biomass_C = Biomass_C + ActualProd_C$$

11. Add actual production to appropriate components of Old Biomass

$$OldBiomass_C = OldBiomass_C + \left(ActualProd_C * \left(1 - DieBackProp_C\right)\right)$$

12. If nitrogen was taken up, but no allocation for this species this month, then need to allocate that surplus nitrogen to coarse roots and trunks. This is done proportionally based on their biomasses. If no coarse roots exist for this species, use fine roots.

$$N_{Roots} = N_{Roots} + \left(N_{Trans} * \frac{Biomass_{Roots}}{Biomass_{Roots} + Biomass_{Trunk}} \right)$$

$$N_{Trunk} = N_{Trunk} + \left(N_{Trans} * \frac{Biomass_{Trunk}}{Biomass_{Roots} + Biomass_{Trunk}} \right)$$

4.12 Seedling Production

This procedure calculates actual production of seedlings each month. It is called at the end of each month.

Variables:

$Allocation_C$	Calculated allocation value for plant component C.
$Allocation_{Roots}$	Allocation value for seedling roots.
$Allocation_{Shoots}$	Allocation value for seedling shoots.
H2OProd	Total production based only on water taken up that month.
$H2OProd_C$	Production based on water taken up for plant component C.
NAvail	Tissue nitrogen available for new growth.
$NConc_C$	Nitrogen concentration for plant component C.
$NConc_{Shoots}$	Nitrogen concentration for seedling shoots.
PlantNH2O	Nitrogen needed to realize all potential growth based on water taken up that month.
$SeedlingActualProd_C$	Actual production of seedling component C.
SeedlingActualTrans	Actual amount of water taken up that month.
SeedlingMaintTransEst	Estimated amount of water needed to meet seedling maintenance needs that month.

Parameters:

$NormalAllocation_{CoarseRoots}$	Plant parameter *NormalAllocation* (see Section 3.4.2)
$NormalAllocation_{FineRoots}$	Plant parameter *NormalAllocation* (see Section 3.4.2)

$PlantNReq_C$	Plant parameter *PlantNReq* (see Section 3.4.3)
WaterUseEff	Plant parameter *Water2Production* (see Section 3.4.8)

Steps:

1. If positive production $\left(SeedlingActualTrans > SeedlingMaintTransEst\right)$

   A. Calculate production based on water uptake

$$H2OProd = \frac{SeedlingActualTrans - SeedlingMaintTransEst}{WaterUseEff}$$

   B. Determine allocation pattern. This is calculated from adult allocation matrices for aboveground allocation versus belowground allocation because EDYS does not maintain separate allocation matrices for seedlings.

$$Allocation_{Roots} = NormalAllocation_{CoarseRoots} + NormalAllocation_{FineRoots}$$

$$Allocation_{Shoots} = 1 - Allocation_{Roots}$$

   C. Calculate whether nitrogen uptake limits seedling growth

      1. Start with component production based on water uptake

$$H2OProd_C = H2OProd * Allocation_C$$

      2. Calculate nitrogen required to produce that amount of growth

$$PlantNH2O = H2OProd_C * PlantNReq_C$$

      3. Determine amount of nitrogen available, both from current tissue and from water taken up

$$NAvail = \left(N_{Trans} * Allocation_C\right) + \left(Biomass_C * \left(NConc_C - PlantNReq_C\right)\right)$$

      4. If a legume, then it can manufacture any shortfall

$$NAvail = PlantNH2O$$

      5. Adjust production levels if nitrogen is limiting

         A. Not limiting

$$SeedlingActualProd_C = H2OProd_C$$

B. Limiting

$$SeedlingActualProd_C = H2OProd_C * \frac{NAvail}{PlantNH2O}$$

D. Apply production to seedling biomass

$$Biomass_C = Biomass_C + SeedlingActualProd_C$$

$$N_C = N_C + \left(N_{Trans} * Allocation_C\right)$$

2. If negative production $\left(SeedlingActualTrans < SeedlingMaintTransEst\right)$

A. Determine allocation among components

$$Allocation_{Roots} = NormalAllocation_{CoarseRoots} + NormalAllocation_{FineRoots}$$

$$Allocation_{Shoots} = 1 - Allocation_{Roots}$$

B. Move any nitrogen taken up this month into tissue nitrogen pools before accounting for losses

$$N_{Roots} = N_{Roots} + \left(N_{Trans} * Allocation_{Roots}\right)$$

$$N_{Shoots} = N_{Shoots} + \left(N_{Trans} * Allocation_{Shoots}\right)$$

C. Calculate negative production as a reduction in biomass in proportion to the shortfall in water needs

$$Loss = \left(Biomass_{Roots} + Biomass_{Shoots}\right) * \left(1 - \frac{SeedlingActualTrans}{SeedlingMaintTransEst}\right)$$

D. Start by removing *Loss* from shoots first. If *Loss* exceeds shoot biomass, then seedlings die.

1. If $Loss < Biomass_{Shoots}$ then

$$Biomass_{Litter} = Biomass_{Litter} + Loss$$

$$Biomass_{Shoots} = Biomass_{Shoots} - Loss$$

$$N_{Shoots} = N_{Shoots} - (NConc_{Shoots} * Loss)$$

$$N_{Litter} = N_{Litter} + (NConc_{Shoots} * Loss)$$

2. If $Loss \geq Biomass_{Shoots}$ then

$$SoilOM_L = SoilOM_L + Biomass_{Roots}$$

$$Biomass_{Roots} = 0$$

$$Biomass_{Litter} = Biomass_{Litter} + Biomass_{Shoots}$$

$$Biomass_{Shoots} = 0$$

4.13 Root Growth

This procedure handles downward root growth for both seedlings and adult plants. It is called at the end of each month, once actual production has been calculated.

Constants:

AdultNewGrowthAlloc	Proportion of new growth in adults that goes to downward growth in roots; currently equals 0.50
SeedlingNewGrowthAlloc	Proportion of new growth in seedlings that goes to downward growth in roots; currently equals 0.50

Variables:

ActualProd	Total actual production
$ActualProd_{FineRoots}$	Actual production of fine roots
$Depth_L$	Thickness of soil layer L
NewDepth	New rooting depth
NewGrowth	Length of new growth of roots this month
NumDays	Number of days in the month
PotentialProd	Potential production this month
RootDepth	Rooting depth of adult plants
$Root_{S,L}$	Root biomass of species S in soil layer L
SeedlingRootDepth	Rooting depth of seedlings
$TotalDepth_L$	Cumulative depth of soil layer L

Parameters:

MaxDailyRootGrowth	Plant parameter *MaxDailyRootGrowth* (see Section 3.4.4)
MaxRootDepth	Plant parameter *MaxRootDepth* (see Section 3.4.4)

Steps:

1. Loop through all species to see if rooting depths have reached their maximum potential. Start with seedlings.

A. Calculate new rooting depth

$$NewGrowth = MaxDailyRootGrowth * NumDays * \frac{ActualProd}{PotentialProd}$$

$$NewDepth = SeedlingRootDepth + NewGrowth$$

If $NewDepth > MaxRootDepth$ then $NewDepth = MaxRootDepth$

B. Limit growth if a saturated zone is encountered and this species does not have complete tolerance of saturated conditions. If $RootSaturationDeathLoss > 0$ then *NewDepth* equals the depth to the top of the saturated zone, plus 10mm. Since EDYS does not currently support wicking of moisture upward from a saturated zone, roots are allowed to grow into the top 1cm of a saturated zone to simulate the wicking effect.

C. Allocate new growth to layers with old root biomass

$$Root_{S,L} = Root_{S,L} + \left(ActualProd * (1 - SeedlingNewGrowthAlloc) * \frac{Depth_L}{SeedlingRootDepth} \right)$$

D. Allocate new growth to layers below the old rooting depth (i.e. downward growth)

$$Diff = TotalDepth_L + Depth_L - SeedlingRootDepth$$

$$Root_{S,L} = Root_{S,L} + \left(ActualProd * SeedlingNewGrowthAlloc * \frac{Diff}{NewGrowth} \right)$$

$$SeedlingRootDepth = SeedlingRootDepth + Diff$$

2. Now do the same for adults

A. Calculate new rooting depth

$$NewGrowth = MaxDailyRootGrowth * NumDays * \frac{ActualProd}{PotentialProd}$$

$$NewDepth = RootDepth + NewGrowth$$

If $NewDepth > MaxRootDepth$ then $NewDepth = MaxRootDepth$

B. Limit growth if a saturated zone is encountered and this species does not have complete tolerance of saturated conditions. If $RootSaturationDeathLoss > 0$ then *NewDepth* equals the depth to the top of the saturated zone, plus 10mm. Since EDYS does not currently support wicking of moisture upward from a saturated zone, roots are allowed to grow into the top 1cm of a saturated zone to simulate the wicking effect.

C. Allocate new growth to layers with old root biomass

$$Root_{S,L} = Root_{S,L} + \left(ActualProd_{FineRoots} * (1 - AdultNewGrowthAlloc) * \frac{Depth_L}{RootDepth} \right)$$

D. Allocate new growth to layers below the old rooting depth (i.e. downward growth)

$$Diff = TotalDepth_L + Depth_L - RootDepth$$

$$Root_{S,L} = Root_{S,L} + \left(ActualProd_{FineRoots} * AdultNewGrowthAlloc * \frac{Diff}{NewGrowth} \right)$$

$$RootDepth = RootDepth + Diff$$

4.14 Decomposition

This procedure performs decomposition of standing dead tissue, litter, and soil organic matter. It is performed daily.

Constants:

Layer1Fixation	Rate of nitrogen fixation into the top soil layer; currently equals 0.005 g/day
Layer2Fixation	Rate of nitrogen fixation into the second soil layer; currently equals 0.0033333 g/day
Layer3Fixation	Rate of nitrogen fixation into the third soil layer; currently equals 0.0033333 g/day

LitterDecompositionRate	Decomposition rate of litter, assuming 0.300 annual proportional decomposition in which there were 160 wet days; adapted from Murphy et al. 1998; currently equals 0.00500
LitterN2MicrobN	Proportion of litter free nitrogen that moves into the litter microbial nitrogen pool during daily litter decomposition; currently equals 0.50
LitterN2OMN	Proportion of litter free nitrogen that moves into the litter organic matter nitrogen pool during daily litter decomposition; currently equals 0.50
LitterOMDecompositionRate	Decomposition rate of litter organic matter; adapted from Murphy et al. 1998; currently equals 0.00223
MicrobDecompositionRate	Rate of microbial turnover, which is assumed to be 50% turnover in 30 days of which 15 are wet; currently equals 0.043516
OM2MicrobialBiomassRate	Rate of conversion of organic matter to microbial biomass; currently equals 0.50
OMN2FreeN	Proportion of organic matter nitrogen that becomes free nitrogen during decomposition; currently equals 0.50
OMN2MicrobN	Proportion of organic matter nitrogen that becomes microbial nitrogen during decomposition; currently equals 0.50
$OMDecompositionRate_L$	Organic matter decomposition rate in layer L, assuming 60% loss of biomass over 143 days of which half were wet; currently equals 0.0126 for each soil layer
SDDecompositionRate	Decomposition rate for standing dead tissue; assumed to be 3 times the rate of litter decomposition because of exposure to light and elements; currently equals 0.01500

Variables:

DecompRate	Soil organic matter decomposition rate which varies by soil layer and moisture content of that layer
FC	Water content of a soil layer when at field capacity
LitterOM	Organic matter in the litter layer
$MicrobialBiomass_L$	Biomass of the microbial community in soil layer L
$NConc_C$	Nitrogen concentration of plant component C
Sat	Water content of a soil layer when at saturation
$SoilFreeN_L$	Total free nitrogen in soil layer L
$SoilMicrobN_L$	Total nitrogen of the soil microbial community in layer L
WP	Water content of a soil layer when at wilting point

Parameters:

$SoilFieldCapacity_L$	Soil parameter *Field Capacity* (see Section 3.3)

$SoilSaturation_L$	Soil parameter *Saturation* (see Section 3.3)
$SoilWiltingPoint_L$	Soil parameter *Wilting Point* (see Section 3.3)

Steps:

1. Decompose litter, but only if it is wet

   A. Litter microbial decomposition – all microbial nitrogen losses go to free nitrogen

   $$NLoss = N_{LitterMicrob} * MicrobDecompositionRate$$

   $$N_{LitterFree} = N_{LitterFree} + NLoss$$

   $$N_{LitterMicrob} = N_{LitterMicrob} - NLoss$$

   B. Movement of nitrogen due to decomposition of litter

   $$NLoss = N_{Litter} * LitterDecompositionRate$$

   $$N_{Litter} = N_{Litter} - NLoss$$

   $$N_{LitterMicrob} = N_{LitterMicrob} + (LitterN2MicrobN * NLoss)$$

   $$N_{LitterOM} = N_{LitterOM} + (LitterN2OMN * NLoss)$$

   C. Litter biomass

   $$Loss = Biomass_{Litter} * LitterDecompositionRate$$

   $$LitterOM = LitterOM + (0.50 * Loss)$$

   Note: 50% of biomass is simply lost as CO_2

   $$Biomass_{Litter} = Biomass_{Litter} - Loss$$

   D. Litter organic matter decomposition – organic matter biomass disappears after decomposing, but organic matter nitrogen stays as free nitrogen

   $$Loss = LitterOM * LitterOMDecompositionRate$$

   $$NLoss = N_{LitterOM} * LitterOMDecompositionRate$$

$$N_{LitterFree} = N_{LitterFree} + (OMN2FreeN * NLoss)$$

$$N_{LitterMicrob} = N_{LitterMicrob} + (OMN2MicrobN * NLoss)$$

$$LitterOM = LitterOM - Loss$$

$$N_{LitterOM} = N_{LitterOM} - NLoss$$

2. Standing dead (stem and leaf) biomass decomposition – biomass does not go to litter biomass but disappears, while nitrogen goes to litter nitrogen

$$Loss = Biomass_C * SDDecompositionRate$$

$$NLoss = Loss * NConc_C$$

$$Biomass_C = Biomass_C - Loss$$

$$N_C = N_C - NLoss$$

$$N_{Litter} = N_{Litter} + NLoss$$

3. Soil profile decomposition

A. Nitrogen fixation in top three soil layers

$$SoilMicrobN_1 = SoilMicrobN_1 + Layer1Fixation$$

$$SoilMicrobN_2 = SoilMicrobN_2 + Layer2Fixation$$

$$SoilMicrobN_3 = SoilMicrobN_3 + Layer3Fixation$$

B. Set organic matter decomposition rate for each layer – maximum at field capacity, zero at wilting point and saturation

$$Sat = SoilSaturation_L * LayerDepth_L$$

$$FC = SoilFieldCapacity_L * LayerDepth_L$$

$$WP = SoilWiltingPoint_L * LayerDepth_L$$

Current is current moisture level in this layer

1. If moisture content is greater than field capacity

$$DecompRate = OMDecompositionRate_L * \frac{Sat - Current}{Sat - FC}$$

2. If moisture content is less than field capacity

$$DecompRate = OMDecompositionRate_L * \frac{Current - WP}{FC - WP}$$

C. Organic matter decomposition – biomass simply disappears as CO_2, while nitrogen transfers to free nitrogen and microbial nitrogen

$$Loss = SoilOM_L * DecompRate$$

$$NLoss = SoilOMN_L * DecompRate$$

$$MicrobialBiomass_L = MicrobialBiomass_L + (Loss * OM2MicrobialBiomassRate)$$

$$SoilFreeN_L = SoilFreeN_L + (0.50 * NLoss)$$

$$SoilMicrobN_L = SoilMicrobN_L + (0.50 * NLoss)$$

$$SoilOM_L = SoilOM_L - Loss$$

$$SoilOMN_L = SoilOMN_L - NLoss$$

D. Soil microbial decomposition, which proceeds regardless of soil moisture levels – microbial biomass disappears as CO_2 while all nitrogen goes to free nitrogen

$$Loss = MicrobialBiomass_L * MicrobDecompositionRate$$

$$NLoss = SoilMicrobN_L * MicrobDecompositionRate$$

$$MicrobialBiomass_L = MicrobialBiomass_L - Loss$$

$$SoilFreeN_L = SoilFreeN_L + NLoss$$

$$SoilMicrobN_L = SoilMicrobN_L - NLoss$$

4.15 Transpiration

This procedure performs the uptake of water, and associated nitrogen, by plants. It is called daily during each month.

Constants:

MaxCoarseUptake	Daily physical limits of uptake by coarse roots; currently set to 12 g of water for each gram of coarse root biomass
MaxFineUptake	Daily physical limits of uptake by fine roots; currently set to 120 g of water for each gram of fine root biomass
RootUptakeEffRatio	Efficiency in water uptake of coarse roots relative to fine roots; currently set to 0.5, meaning that coarse roots are only half as efficient as fine roots
$TaxAtMaxDepth_G$	Proportion of uptake decrease at maximum depth as specified in $TaxDepth_G$; currently set to 0.4 for each growth form
$TaxDepth_G$	Maximum soil depth (in mm) at which uptake discount tax applies; based on growth forms; currently set to 5000 mm for grasses and 10000 mm for forbs and woody species
$TaxThreshold_G$	Soil depth (in mm) at which uptake discount tax kicks in; based on growth forms; currently set to 500 mm for grasses and 1000 mm for forbs and woody species

Variables:

$ActualUptake_L$	Water taken up from soil layer L
$ActualTrans_S$	Total water taken up by plant species S
$Biomass_{CoarseRoots,L}$	Coarse root biomass in soil layer L
$Biomass_{FineRoots,L}$	Fine root biomass in soil layer L
$Biomass_{SeedlingRoots}$	Biomass of seedling roots
$CurrentDepth_L$	Cumulative soil depth at layer L
$Demand_L$	Water demand in soil layer L
$MaintTransEst_C$	Estimated water need for this month's maintenance of plant component C
$MaintTrans_{Total}$	Total amount of water taken up to meet maintenance needs
$MaxUptakeAmount_L$	Maximum water that can be taken up by all roots in soil layer L
$MaxUptakeCoarseRoots_L$	Maximum water that can be taken up by coarse roots in soil layer L
$MaxUptakeFineRoots_L$	Maximum water that can be taken up by fine roots in soil layer L
$PotMaintTransResid_C$	Residual water need for this month's maintenance of plant component C; differs from $MaintTransEst_C$ in that the residual takes into account uptake during previous days of this month

$PotProdTransResid_C$	Residual water need for this month's production of plant component C; differs from $ProdTransEst_C$ in that the residual takes into account uptake during previous days of this month
$PotTrans_C$	Potential uptake for plant component C for each species
$ProdTransEst_C$	Estimated water needed to realize this month's potential production, for plant component C
$ProdTrans_{Total}$	Total amount of water taken up to meet production needs
$RootAlloc_{CoareRoots}$	Functional coarse root biomass; includes all species
$RootAlloc_{FineRoots}$	Functional fine root biomass; includes all species
$RootAlloc_S$	Functional root biomass for species S
RootAllocTotal	Total functional root biomass; includes all species
SeedlingPotTrans	Potential uptake for seedlings this day
SeedlingPotTransResid	Residual water need for seedlings; differs from *SeedlingTransEst* in that the residual takes into account uptake during previous days of this month
$SeedlingRootAlloc_S$	Functional seedling root biomass for species S
SeedlingTransEst	Estimated water need for seedlings this month
$SoilDisN_L$	Nitrogen dissolved in soil moisture in layer L
$SoilMoistureAtStartOfDay_L$	Soil moisture in layer L at the start of the simulation day
$Water_{Avail}$	Water available for roots to take up; soil moisture above wilting point
$Water_{Current}$	Current level of soil moisture
$Water_L$	Soil moisture in layer L
$Water_S$	Portion of water available that is allocated to species S
$Water_{Seedling,S}$	Portion of water available that is allocated to seedlings of species S
$Water_{WiltingPoint}$	Water content at wilting point

Parameters:

RootBiomassAdj	Plant parameter *RootBiomassAdj* (see Section 3.4.4)

Steps:

1. Calculate initial root demand for adult plants

    A. First estimate is the portion of total monthly transpiration demand

    $$PotTrans_C = MaintTransEst_C + ProdTransEst_C$$

    B. Second estimate is based on the residual monthly transpiration demand

    $$PotTrans_C = PotMaintTransResid_C + PotProdTransResid_C$$

    C. Use the smaller of the two estimates for $PotTrans_C$

2. Calculate initial root demand for seedlings

   A. First estimate is the portion of total monthly transpiration demand

$$SeedlingPotTrans = SeedlingTransEst$$

   B. Second estimate is the residual monthly transpiration demand

$$SeedlingPotTrans = SeedlingPotTransResid$$

   C. Use the smaller of the two estimates for *SeedlingPotTrans*

3. Calculate maximum allowable uptake and transport amount at each layer

$$MaxUptakeFineRoots_L = MaxFineUptake * Biomass_{FineRoots,L}$$

$$MaxUptakeCoarseRoots_L = MaxCoarseUptake * Biomass_{CoarseRoots,L}$$

$$MaxUptakeAmount_L = MaxUptakeFineRoots_L + MaxUptakeCoarseRoots_L$$

4. Loop through soil layers taking up water by each plant species

   A. Calculate the amount of water available in this layer

$$Water_{Avail} = Water_{Current} - Water_{WiltingPoint}$$

   B. Calculate functional root biomasses for all species together

$$RootAlloc_{CoarseRoots} = Biomass_{CoarseRoots} * RootBiomassAdj * RootUptakeEffRatio$$

$$RootAlloc_{FineRoots} = \left(Biomass_{FineRoots} + Biomass_{Seedlings}\right) * RootBiomassAdj$$

$$RootAllocTotal = \sum_{Species}\left(RootAlloc_{CoarseRoots} + RootAlloc_{FineRoots}\right)$$

   C. Calculate functional root biomasses for each species as proportion of total root functional biomasses

$$RootAlloc_S = \frac{RootAlloc_{CoarseRoots} + RootAlloc_{FineRoots}}{RootAllocTotal}$$

$$SeedlingRootAlloc_S = \frac{Biomass_{SeedlingRoots} * RootBiomassAdj}{RootAllocTotal}$$

D. Partition available water based on functional root biomasses

$$Water_S = RootAlloc_S * Water_{Avail}$$

$$Water_{Seedling,S} = SeedlingRootAlloc_S * Water_{Avail}$$

E. If daily potential transpiration has not been met, calculate demand for this layer for each component of each species

$$Demand_L = PotTrans_C * \frac{Biomass_{CoarseRoots,L} + Biomass_{FineRoots,L}}{Biomass_{CoarseRoots} + Biomass_{FineRoots}}$$

If the daily potential transpiration has been met by layers above this one, then $Demand_L = 0$.

F. Is the demand greater than the maximum allowed by the physical uptake limits of the roots? If so, limit the demand to the physical maximum amount.

G. Determine the amount of water to give to each species. If plenty of water is available, then $ActualUptake_L = Demand_L$; else $ActualUptake_L = Water_S$

H. Calculate the water discount tax for uptake ability based on depth. This assumes 100% of uptake of that desired until reaching the depth threshold. Below that, a linear relationship occurs until 10% of desired uptake at maximum depth. Currently, these calculations are all based on growth forms.

$$Tax = 1 - \frac{(1 - TaxAtMaxDepth_G) * (CurrentDepth_L - TaxThreshold_G)}{TaxDepth_G - TaxThreshold_G}$$

I. Apply the water discount tax

$$ActualUptake_L = ActualUptake_L * Tax$$

J. Move the water and associated nitrogen

$$Water_L = Water_L - ActualUptake_L$$

$$ActualTrans_S = ActualTrans_S + ActualUptake_L$$

$$NLoss = SoilDisN_L * \frac{ActualTrans_L}{SoilMoistureAtStartOfDay_L}$$

$$N_{Trans} = N_{Trans} + NLoss$$

$$SoilDisN_L = SoilDisN_L - NLoss$$

K. Repeat Steps E through J for seedlings

5. Revise residual potential transpiration based on this day's actual uptake. First, apply it to the maintenance transpiration estimate. Once that has been satisfied, apply it to the production transpiration estimate.

A. If maintenance transpiration estimate has not been met

$$MaintTrans_{Total} = MaintTrans_{Total} + ActualUptake_S$$

B. If maintenance transpiration estimate has been met

$$ProdTrans_{Total} = ProdTrans_{Total} + ActualUptake_S$$

4.16 Precipitation

This procedure handles precipitation events, whether rainfall or snow, and calculates the amount of each event that goes to interception, runoff, and infiltration. It does not actually perform the infiltration of moisture into the soil. It is called daily.

Constants:

LitterC50	Litter biomass (g/m^2) at 50% litter cover; currently set to 150 g/m^2
LitterCMax	Maximum litter cover in a cell; currently set to 100%
RainfallSegment	Proportion of total rainfall during each of five timed segments for rainfall events; currently equals 0.10, 0.20, 0.40, 0.20, and 0.10 for the five segments, respectively
SpeciesCMax	Maximum percent cover by any plant species at the biomass value given in its plant parameter *C50*; currently set to 50%

Variables:

Bareground	Proportion of cell area that is bare ground

BasalArea	Proportion of cell area that is occupied by woody species trunks
CalcRunoff	Amount of water from this event that will run off due to slope
CanopyCover	Total canopy cover
Cover	Canopy cover for each woody species
$DailyPrecip_{Day}$	Precipitation depth for each day
$Depth_L$	Cumulative depth of soil layer L
Infiltration	Amount of water available to infiltrate the soil surface
Interception	Amount of water from this event that will be lost to interception
Precip	Depth of water entering the system as precipitation
Slope	Average slope of each plant community
Snow	Depth of snow lying on the soil surface
SnowMelt	Water available for runoff or infiltration from snow melt
$SupplementalPrecip_{Day}$	Amount of water this day from supplemental sources such as irrigation
$Water_L$	Water content of soil layer L
$Water_{Litter}$	Water content of the litter after wetting from this precipitation event
$Water_{Runoff}$	Total amount of water that will runoff from this event
$Water_{SaturationRunoff}$	Amount of water that is unable to enter the soil profile due to saturated conditions and will runoff

Parameters:

C50	Plant parameter *C50* (see Section 3.4.7)
CanopyFactor	Plant parameter *CanopyFactor* (see Section 3.4.7)
CellArea	Spatial parameter *ScaleFactor* (see Section 3.1.2)
InitialPrecipInfiltRate	Plot type parameter *InitialPrecipInfiltRate* (see Section 3.2)
LitWaterCap	Plot type parameter *LitWaterCap* (see Section 3.2)
PrecipAdjFactor	Plot type parameter PrecipAdjFactor (see Section 3.2)
Sat_L	Soil parameter *Saturation* (see Section 3.3)
$SnowMeltRate_{Month}$	Climatic parameter *DailySnowMeltRate* (see Section 3.1.3)
$SnowMonth_{Month}$	Climatic parameter *SnowMonth* (see Section 3.1.3)

Steps:

1. Determine whether this is either a precipitation day, a snow melt day, or if there is supplemental water from irrigation. If not, then skip the rest of this procedure.

2. Precipitation or snow melt?

A. Precipitation day (assumed to come in as mm/m^2)

$$Precip = DailyPrecip_{Day} * PrecipAdjFactor$$

1. Snow or rainfall?

   A. Snow $\left(SnowMonth_{Month} = 1\right)$ - all precipitation goes to snow and none to infiltration

   $$Snow = Snow + Precip$$

   $$Precip = 0$$

   B. If rainfall, all precipitation is available for infiltration

B. Snow melt, but only if there is snow $\left(Snow > 0\right)$

1. If amount of snow melt equals or exceeds snow pack, then melt the entire snow pack

   $$SnowMelt = Snow$$

2. If snow pack exceeds snow melt for this day, melt a portion of the snow pack and save the rest for tomorrow

   $$Snow = Snow - SnowMeltRate_{Month}$$

3. Remove interception from the precipitation amount. There is no interception for snow melt or supplemental water from irrigation.

A. Calculate canopy cover

1. From woody species

   $$BasalArea = \frac{Biomass_{Trunk}}{C50} * CellArea * \frac{0.25}{1000}$$

   C50 relates to 0.25 m^2 basal area

   $$Cover = BasalArea * \frac{378.81}{CellSize}$$

   $$CanopyCover = \sum_{Species}\left(Cover * Biomass_{Leaves} * CanopyFactor\right)$$

2. From herbaceous species

$$CanopyCover = \sum_{Species} \left(Biomass_{Leaves} * CanopyFactor \right)$$

B. Interception is a maximum of 1mm for each 100% of total cover

$$Interception = CanopyCover$$

If plenty of precipitation, then $Precip = Precip - Interception$

else $Precip = 0$

4. Add in any snow melt or irrigation water

$$Precip = Precip + SnowMelt + SupplementalPrecip_{Day}$$

5. Compute any reduction in potential infiltration due to slope. This water goes to runoff.

A. First, determine current bare ground conditions, based on amount of litter and trunk biomass

$$Bareground = 1 - \left(LitterCMax * \frac{Biomass_{Litter}}{Biomass_{Litter} + LitterC50} \right)$$

$$Bareground = Bareground * \left(1 - \left(SpeciesCMax * \frac{Biomass_{Trunk}}{Biomass_{Trunk} + C50} \right) \right)$$

B. Second, determine amount of precipitation that is deflected by the slope of the plot

$$CalcRunoff = Precip * \left(1 - COS\left(\frac{Slope * \pi}{180} \right) \right)$$

C. Third, some of the deflected water will be blocked by ground cover and will still be available for infiltration.

$$CalcRunoff = CalcRunoff * Bareground$$

D. Last, remove the deflected water from the precipitation amount

$$Precip = Precip - CalcRunoff$$

6. Find to top soil layer that exists, in case any upper layers have eroded away

7. Loop through the five rainfall segments. The default is 10% of the rainfall event in the first segment, followed by 20%, 40%, 20%, and 10% for the remaining segments. This approximates the bell-shaped curve seen in most rainfall events.

A. Wet the litter layer. If any excess exists, send on to the soil layers.

1. If excess exists:

$$Excess = Precip - (LitWaterCap * Biomass_{Litter})$$

$$Water_{Litter} = LitWaterCap * Biomass_{Litter}$$

B. Saturate soil layers. If any excess exists, it becomes runoff. Rainfall segment one is allowed to move into layer 1; rainfall segment 2 moves into layers 1 and 2; rainfall segment 3 moves into layers 1, 2, and 3; rainfall segment 4 moves into layers 1, 2, 3, and 4; and rainfall segment 5 moves into layers 1, 2, 3, 4, and 5.

1. Top layer

$$Water_L = InitialPrecipInfiltRate * Sat_L * Depth_L$$

$$Excess = RainfallSegment - Water_L$$

2. Lower layers

$$Water_L = Sat_L * Depth_L$$

$$Excess = RainfallSegment - Water_L$$

3. Move excess to runoff

$$Water_{SaturationRunoff} = Water_{SaturationRunoff} + Excess$$

8. Combine runoff due to slope with runoff due to saturation of soil layers. Save this for the Runoff procedure.

$$Water_{Runoff} = Water_{SaturationRunoff} + CalcRunoff$$

9. Calculate total infiltration amount. This will be used later in the Infiltration procedure. Note that runoff water due to slope has already been removed from *Precip*.

$$Infiltration = Precip - Water_{SaturationRunoff}$$

4.17 Infiltration

This procedure conducts infiltration into the soil profile and percolation downward through the profile. The amount allowed to enter the profile was calculated above in the procedure Precipitation.

Constants:

NMobilize	Proportion of soil nitrogen available daily to be moved as water percolates through the soil profile; currently equals 0.010
OMMobilize	Proportion of soil organic matter available daily to be moved as water percolates through the soil profile; currently equals 0.001
PrecipNConc	Concentration of nitrogen in rain; currently equals 0.010 g of N / mm of rain

Variables:

$Depth_L$	Cumulative depth of soil layer L
Infiltration	Depth of water allowed to enter the soil profile
LitterOM	Organic matter content of the litter layer
LitterWaterAddition	Amount of water added to the litter layer; maximum allowed will take litter to its limit (*LitWaterCap*)
NetInfilt	Temporary variable used to track the amount of water left to infiltrate
NWave	Amount of nitrogen moving between soil layers or between litter and the top soil layer
OMWave	Amount of organic matter moving between soil layers or between litter and the top soil layer
OMNWave	Amount of organic matter nitrogen moving between soil layers or between litter and the top soil layer
$WaterExport_L$	Water that drains out the of the bottom of the soil profile
$Water_L$	Water content of soil layer L
$Water_{Litter}$	Water content of the litter layer
$Water_{Runoff}$	Water that was available to enter the soil profile but could not due to saturated conditions; added to current water that will runoff

Parameters:

$FieldCapacity_L$	Soil parameter *Field Capacity* (see Section 3.3)
LitWaterCap	Plot type parameter *LitWaterCap* (see Section 3.2)
$Saturation_L$	Soil parameter *Saturation* (see Section 3.3)

Steps:

1. If *Infiltration* from the Precipitation procedure is non-zero, then do the following steps

2. Percolation through the litter layer. Water that the litter cannot hold will infiltrate the soil. The water that passes through the litter layer picks up nitrogen and organic matter from the litter layer. These are carried into the soil when the water infiltrates the top soil layer.

$$LitterWaterAddition = (LitWaterCap * Biomass_{Litter}) - Water_{Litter}$$

$$NetInfilt = Infiltration - LitterWaterAddition$$

$$N_{Litter} = N_{Litter} + (LitterWaterAddition * PrecipNConc)$$

$$NWave = N_{Litter} * \frac{NetInfilt}{Water_{Litter}}$$

$$N_{Litter} = N_{Litter} - NWave$$

$$OMWave = LitterOM * \frac{NetInfilt}{Water_{Litter}}$$

$$LitterOM = LitterOM - OMWave$$

$$OMNWave = N_{LitterOM} * \frac{NetInfilt}{Water_{Litter}}$$

$$N_{LitterOM} = N_{LitterOM} - OMNWave$$

3. Loop through soil layers, moving the infiltration water in. Take the moisture content at any layer to field capacity. Moisture above field capacity is available to move into the lower layers. Water moving into the profile comes with dissolved nitrogen, organic matter, and organic matter nitrogen from the litter layer. These are also picked up in the soil layers and moved downward as the water moves downward. The downward movement of water goes as far as there is room to hold it.

A. First check whether this layer is saturated. If so, it contains groundwater and all the infiltration water moving into this layer becomes recharge. Downward movement of water then stops.

B. If not saturated, move water into this layer. This includes dissolved nitrogen, organic matter, and organic matter nitrogen.

$$Water_L = Water_L + NetInfilt$$

$$SoilN_L = SoilN_L + NWave$$

$$SoilOM_L = SoilOM_L + OMWave$$

$$SoilOMN_L = SoilOMN_L + OMNWave$$

C. Is this layer's moisture below field capacity? If so, then percolation stops here. If not, any water above field capacity is now available to move to the next layer. With it comes dissolved nitrogen, organic matter, and organic matter nitrogen.

$$NetInfilt = Water_L - (FieldCapacity_L * Depth_L)$$

$$NWave = SoilN_L * \frac{NetInfilt}{Water_L} * NMobilize$$

$$OMWave = SoilOM_L * \frac{NetInfilt}{Water_L} * OMMobilize$$

$$OMNWave = SoilOMN_L * \frac{NetInfilt}{Water_L} * OMMobilize$$

$$Water_L = FieldCapacity_L * Depth_L$$

$$SoilN_L = SoilN_L - NWave$$

$$SoilOM_L = SoilOM_L - OMWave$$

$$SoilOMN_L = SoilOMN_L - OMNWave$$

4. If any water remains after taking all soil layers to field capacity, use that water to saturate soil layers starting at the bottom of the profile. If enough exists to saturate the entire profile, the excess becomes runoff.

A. Loop through soil layers starting at the bottom and moving water, dissolved nitrogen, organic matter, and organic matter nitrogen.

$$Water_L = Water_L + NetInfilt$$

$$NWave = SoilN_L * \frac{NetInfilt}{Water_L} * NMobilize$$

$$OMWave = SoilOM_L * \frac{NetInfilt}{Water_L} * OMMobilize$$

$$OMNWave = SoilOMN_L * \frac{NetInfilt}{Water_L} * OMMobilize$$

$$SoilN_L = SoilN_L + NWave$$

$$SoilOM_L = SoilOM_L + OMWave$$

$$SoilOMN_L = SoilOMN_L + OMNWave$$

$$NetInfilt = Water_L - (Saturation_L * Depth_L)$$

B. When reaching the top layer, if $NetInfilt > 0$ then *NetInfilt* goes to runoff

$$Water_{Runoff} = Water_{Runoff} + NetInfilt$$

5. Drain all saturated layers (except for groundwater layers) to field capacity. Export, or potential recharge, is this water that drains out of the profile. Dissolved nitrogen moves out with the water, but organic matter stays in place.

A. For layers with moisture above field capacity

$$WaterExport_L = Water_L - (FieldCapacity_L * Depth_L)$$

$$Water_L = FieldCapacity_L * Depth_L$$

B. Move nitrogen with the export

$$NWave = SoilN_L * \frac{WaterExport_L}{Water_L}$$

$$SoilN_L = SoilN_L - NWave$$

4.18 Runoff

This procedure conducts runoff events. It starts at the cell with highest elevation and moves water and materials downhill from there. It is called daily.

Constants:

LitterC50	Litter biomass (g/m^2) at 50% litter cover; currently set to 150 g/m^2
LitterCMax	Maximum litter cover in a cell; currently set to 100%
ProfileNewPlotThreshold	Soil profile threshold used for determining whether an erosion event produces new plot types; currently set so that 1 mm or more difference between two cells of the same plot type will cause one of them to be treated as a new plot type throughout the remainder of the simulation run
$SlopeFactor_{Litter}$	Slope factor for calculating litter load capacity of water during a runoff event; assumed to be 2.5% of water volume at 1:1 Rise:Run slope; currently equals 0.025
$SlopeFactor_{Soil}$	Slope factor for calculating sediment load capacity of water during a runoff event; assumed to be 10% of water at 1:1 Rise:Run slope; currently equals 0.10
SpeciesCMax	Maximum percent cover by any plant species at the biomass value given in its plant parameter *C50*; currently set to 50%

Variables:

Bareground	Proportion of a cell that is bare ground
$Depth_L$	Cumulative depth of soil layer L
$Elev_{Cell}$	Elevation of each cell
ElevDiff	Elevational difference between two adjacent cells
$Elev_{LowerCell}$	Elevation of the cell which water is running on to
$Elev_{ThisCell}$	Elevation of the cell from which water is currently running off from
Gain	Amount of sediment added to a cell
$Litter_{Cell}$	Litter content of the current cell of focus
LitterChange	Temporary variable indicating the change in litter to each plot type
$Litter_{LowerCell}$	Litter content of the lower cell onto which water is running
$Loss_{Litter}$	Amount of litter lost from the current cell of focus
$Loss_{Soil}$	Amount of soil lost from the current cell of focus
MicrobNChange	Temporary variable showing the change in microbial nitrogen to each plot type
$MicrobN_L$	Microbial nitrogen content of soil layer L
MicrobNLoss	Temporary variable showing the loss to microbial nitrogen
NChange	Temporary variable of the change in nitrogen for each plot

	type
$N_{LowerCell}$	New nitrogen content of the lower cell after movement of nitrogen for the current focus cell
$NumCells_{PlotType}$	Number of cells of the current plot type
OMChange	Temporary variable of the change in organic matter for each plot type
OM_{Litter}	Organic matter content of the litter in the focus cell
OMLoss	Temporary variable showing the loss to organic matter
OMNChange	Temporary variable of the change in organic matter nitrogen for each plot type
OMNLoss	Temporary variable showing the loss to organic matter nitrogen
$Sediment_{Cell}$	Sediment content in the focus cell
$Sediment_{LowerCell}$	Sediment content in the lower cell in which water has moved onto
Slope	Slope between current focus cell and the lower cell on which water is running on to
$SoilN_L$	Nitrogen content in soil layer L
$SoilMicrobN_L$	Microbial nitrogen content in soil layer L
TotalElevDiff	Sum of elevational differences between the focus cell and all adjacent lower cells
$Water_{Cell}$	Water content of the current focus cell
$Water_{LowerCell}$	Water content of the lower cell on which water running is running on to
$Water_{Runoff}$	Total water to runoff for each plot type

Parameters:

C50	Plant parameter *C50* (see Section 3.4.7)
$Distance_{BetweenCells}$	Spatial parameter *GridCenterDistance* (see Section 3.1.2)
$Mobilization_{Litter}$	Plot type parameter *LitterMobilization* (see Section 3.2)
$Mobilization_{Soil}$	Plot type parameter *SoilMobilizationFactor* (see Section 3.2)

Steps:

1. Skip the following steps if no runoff today $(Water_{Runoff} = 0)$

2. Calculate initial bareground condition for each plot type. This uses both litter and trunk biomass and is based on the Michaelis-Menten saturation curve.

$$Bareground = 1 - \left(LitterCMax * \frac{Biomass_{Litter}}{Biomass_{Litter} + LitterC50} \right)$$

For all species:

$$Bareground = Bareground * \left(1 - \left(SpeciesCMax * \frac{Biomass_{Trunk}}{Biomass_{Trunk} + C50}\right)\right)$$

3. Set up temporary grids. These contain initial values for runoff water and litter biomass.

4. Loop through the elevation vector, transferring water, sediment, and nitrogen from cell to cell. The elevation vector is a list of all cells in the domain, sorted by elevation from highest to lowest. For each cell it contains the elevation and X- and Y-coordinates of that cell. The use of the elevation vector allows for faster run times for runoff calculations because EDYS does not have to search for the cell with the next highest elevation at each step. For large landscapes, the run time savings from this approach are substantial.

A. Get the elevation values and coordinates for the next highest cell

B. Is there water in this cell running off, whether runoff from this cell or from water running onto this cell from adjacent cells at higher elevation? If so, continue.

C. Calculate elevational differences between this cell and surrounding ones at a lower elevation (*TotalElevDiff*).

D. For each cell that is adjacent and lower than this cell, move litter and its associated free nitrogen, organic matter, organic matter nitrogen, and microbial nitrogen.

$$ElevDiff = Elev_{ThisCell} - Elev_{LowerCell}$$

$$Slope = \frac{ElevDiff}{Distance_{BetweenCells}}$$

$$Loss_{Litter} = Water_{Cell} * \frac{ElevDiff}{TotalElevDiff} * Bareground * Slope * Mobilization_{Litter} * SlopeFactor_{Litter}$$

If $Loss_{Litter} > Litter_{Cell}$, then $Loss_{Litter} = Litter_{Cell}$

$$NLoss = Loss_{Litter} * \frac{N_{Litter}}{Litter_{Cell}}$$

$$OMLoss = Loss_{Litter} * \frac{OM_{Litter}}{Litter_{Cell}}$$

$$OMNLoss = Loss_{Litter} * \frac{N_{LitterOM}}{Litter_{Cell}}$$

$$MicrobNLoss = Loss_{Litter} * \frac{N_{LitterMicrob}}{Litter_{Cell}}$$

$$Litter_{Cell} = Litter_{Cell} - Litter_{LowerCell}$$

$$N_{Litter} = N_{Litter} - NLoss$$

$$OM_{Litter} = OM_{Litter} - OMLoss$$

$$N_{LitterOM} = N_{LitterOM} - OMNLoss$$

$$N_{LitterMicrob} = N_{LitterMicrob} - MicrobNLoss$$

E. For each cell that is adjacent and lower than this cell, calculate how much soil to move

$$Loss_{Soil} = Water_{Cell} * \frac{ElevDiff}{TotalElevDiff} * Bareground * Slope * Mobilization_{Soil} * SlopeFactor_{Soil}$$

F. Move water to the lower cell

$$Water_{LowerCell} = Water_{LowerCell} + \left(Water_{Cell} * \frac{ElevDiff}{TotalElevDiff} \right)$$

G. Transfer soil to the lower cell. This is done here only with a temporary grid for accounting purposes. Actual adjustment of soils is done after all cells have had a chance to move water and soil.

$$Sediment_{LowerCell} = Sediment_{LowerCell} + Loss_{Soil}$$

$$Sediment_{Cell} = Sediment_{Cell} - Loss_{Soil}$$

H. Move nitrogen, in all its forms, to the lower cell. This is done for each soil layer that is affected by erosion of this cell.

$$Prop = \frac{Loss_{Soil}}{Depth_L}$$

$$NLoss = SoilN_L * Prop$$

$$OMNLoss = SoilOMN_L * Prop$$

$$MicrobNLoss = SoilMicrobN_L * Prop$$

$$N_{LowerCell} = N_{LowerCell} + NLoss + OMNLoss + MicrobNLoss$$

5. Modify the elevation grid so that future runoff events reflect changes in soil profiles from previous runoff events.

$$Elev_{Cell} = Elev_{Cell} + Sediment_{Cell}$$

6. Rebuild the elevation vector to reflect the new elevation grid. A radix sort is used to very quickly sort the elevations.

7. Create new plot types based on significant differences in sediment loss or gain. This is only done when absolutely necessary for project objectives, such as evaluating cover designs where knowledge of erosion patterns is critical. Excessive plot type proliferation can cause failure of a run due to exhaustion of computer resources; hence this capability is normally turned off.

A. Scan grid looking for cells with the following criteria:

Same plot type
Profile depths are similar (within the range given by *ProfileNewPlotThreshold*)
Sediment change is the same (loss, gain, or no change)

B. Create a new plot type and change all the identified cells to this new type

C. Calculate intrinsic slope for all cells of this new plot type

8. Average the sediment and litter losses and gains across all cells of the same plot type

9. Apply the litter losses and gains to each plot type. This also applies to nitrogen and organic matter.

$$Biomass_{Litter} = \frac{\sum_{cells} LitterChange}{NumCells_{PlotType}}$$

$$N_{Litter} = \frac{\sum_{cells} NChange}{NumCells_{PlotType}}$$

$$OM_{Litter} = \frac{\sum_{cells} OMChange}{NumCells_{PlotType}}$$

$$N_{LitterOM} = \frac{\sum_{cells} OMNChange}{NumCells_{PlotType}}$$

$$N_{LitterMicrob} = \frac{\sum_{cells} MicrobNChange}{NumCells_{PlotType}}$$

10. Apply average sediment losses to soil profiles for each plot type that lost soil during the erosion event

A. Apply the loss to layers starting at the surface and going downward until the entire loss is satisfied

1. If $Depth_L > Loss$ (i.e. enough soil in this layer to cover the loss)

$$Prop = 1 - \frac{Loss}{Depth_L}$$

$$Depth_L = Depth_L - Loss$$

$$SoilN_L = SoilN_L * Prop$$

$$SoilOM_L = SoilOM_L * Prop$$

$$SoilOMN_L = SoilOMN_L * Prop$$

$$SoilMicrobN_L = SoilMicrobN_L * Prop$$

2. If not enough soil to cover the loss, then clear out this layer (it has been eroded away) and try to satisfy the loss from the next lower layer

$$Loss = Loss - Depth_L$$

$$Depth_L = 0$$

$$SoilN_L = 0$$

$$SoilOM_L = 0$$

$$SoilOMN_L = 0$$

$$SoilMicrobN_L = 0$$

11. Apply sediment gain to the top soil layer of each plot type that gained sediment during the erosion event

A. Find the top soil layer that exists

B. Transfer gains to this layer

$$Prop = 1 + \frac{Gain}{Depth_L}$$

$$Depth_L = Depth_L * Prop$$

$$SoilN_L = SoilN_L * Prop$$

$$SoilOM_L = SoilOM_L * Prop$$

$$SoilOMN_L = SoilOMN_L * Prop$$

$$SoilMicrobN_L = SoilMicrobN_L * Prop$$

4.19 Evaporation

This procedure handles evaporation from the top soil layers. It is executed only on days with no precipitation.

Variables:

CanopyCover	Total canopy cover based on all aboveground plant components
DailyEvap	Potential evaporation for each day
Snow	Depth of snow layer on the ground
$Water_L$	Water content of soil layer L
$Water_{Litter}$	Water content of the litter layer

Parameters:

CanopyFactor	Plant parameter *CanopyFactor* (see Section 3.4.7)
EvapAdjFactor	Plot type parameter *DEvapAdjFactor* (see Section 3.2)
$Evap_{Month}$	Plot type parameter *DailyPotentialEvaporation* (see Section 3.1.3)

Steps:

1. Conduct evaporation only on days with no precipitation. So, skip the following steps if today is a precipitation day.

2. Potential evaporation for this day is given in $Evap_{Month}$, adjusted using the Evaporation Adjustment Factor (*EvapAdjFactor*). This is used when portions of the landscape are subjected to different evaporation rates, such as north-facing slopes versus south-facing slopes.

$$DailyEvap = Evap_{Month} * EvapAdjFactor$$

3. Reduce the evaporation potential due to shading by aboveground plant components.

$$CanopyCover = \sum_{Species} \sum_{Components} \left(Biomass_C * CanopyFactor \right)$$

$$DailyEvap = DailyEvap * \left(1 - CanopyCover\right)$$

4. Evaporation from snow first

A. If enough snow to cover the total potential

$$Snow = Snow - DailyEvap$$

$$DailyEvap = 0$$

B. If not enough snow to cover the total potential, take what is there.

$$DailyEvap = DailyEvap - Snow$$

$$Snow = 0$$

5. If potential evaporation has not been satisfied ($DailyEvap > 0$), then attempt to satisfy it from the litter layer

A. Enough water in the litter layer for the remaining evaporation potential

$$Water_{Litter} = Water_{Litter} - DailyEvap$$

B. Not enough water for the remaining evaporation potential

$$DailyEvap = DailyEvap - Water_{Litter}$$

$$Water_{Litter} = 0$$

6. If evaporation potential has not yet been satisfied, evaporate moisture from the soil. This process starts at the surface and moves downward through the profile, with the evaporation depth being dependent on the texture of the soil. The assumption is that the evaporation depth is the maximum depth that soil moisture can wick upward to the surface and then evaporate.

A. Find the highest soil layer that still exists (top layers could have eroded completely away)

B. Loop downward through the evaporation depth, starting at the top layer

1. Not enough water in this layer for the remaining evaporation potential

$$DailyEvap = DailyEvap - Water_L$$

$$Water_L = 0$$

2. Sufficient water in this layer for the remaining evaporation potential

$$Water_L = Water_L - DailyEvap$$

$$DailyEvap = 0$$

4.20 Fire

This procedure handles fire operations, including fire propagation and loss of plant tissue. It is called at the end of each month for natural fires, and the end of the specified month for a prescribed burn.

Constants:

$CompBurnWt_0$	Burnability weight adjustment factor for litter; currently set to 1.0
$CompBurnWt_C$	Burnability weight adjustment factors for plant components; currently set to 0.0 for coarse and fine roots, 0.5 for trunks, 1.0 for stems, 2.0 for leaves, 1.0 for seeds,

	2.0 for standing dead stems, and 3.0 for standing dead leaves
CrownFireFuelLoad	Minimum fuel load for a catastrophic crown fire; currently set to 800 g/m^2
FireLitter	Proportion of litter that burns during a fire; currently equals 1.0
FireProb	Probability used for initiating and carrying a natural fire; currently equals 10%
$GFBurnWt_G$	Burnability adjustment factor based on species growth form; currently set to 1.5 for annual grasses, 1.0 for perennial grasses, 1.0 for annual forbs, 0.5 for perennial forbs, 0.5 for deciduous woody species, and 0.1 for coniferous woody species
ModFireFuelLoad	Minimum fuel load for a cool fire to initiate and carry; currently set to 200 g/m^2
RefugeFactor	Factor used to allow for the portion of a cell that does not burn during a cool fire; currently set to 90% of a cell will burn
RelativeBurnability	Total plot type biomass where the burnability factor equals 1; currently set to 500 g/m^2

Variables:

Burnability	Factor specifying the total susceptibility of the landscape to fire
$Burnability_{PlotType}$	Factor specifying the susceptibility of each plot type to fire
$Depth_L$	Cumulative depth of soil layer L
FireInitFactor	Fire initialization factor used to determine whether a natural fire will start at the randomly chosen cell, or will spread outward from a currently burning cell
FuelLoad	Total fuel load for each plot type
FuelLoadFactor	Fuel load relative to the fuel load necessary to carry a cool fire
IntensityFactor	Fire intensity, based on fuel load and its value relative to both a cool fire and a catastrophic fire
$Loss_C$	Biomass loss of plant component C
$NConc_C$	Nitrogen concentration of plant component C
$NLoss_C$	Nitrogen loss from plant component C
OBMFactor	Factor indicating the greenness of each plant component, based on the relative amounts of new biomass to old biomass
OM_{Litter}	Organic matter content of the litter layer
Random	Random number
SCBurn	Factor specifying the susceptibility of each plant component to fire
SoilMoistureFactor	Factor adjusting susceptibility to fire based on soil moisture

	content
$SoilN_{TopLayer}$	Total nitrogen of the top soil layer
$SoilWater_{Total}$	Total soil moisture of the entire soil profile
SoilWettingCapacity	Potential soil moisture of the entire soil profile at field capacity
$Water_{Litter}$	Water content of the litter layer

Parameters:

$FieldCapacity_L$	Soil parameter *Field Capacity* (see Section 3.3)
$FireProp_C$	Plant parameter *FireProp* (see Section 3.4.14)
$FuelLoad_C$	Plant parameter *FuelLoad* (see Section 3.4.14)

Steps:

1. Calculate the burnability factor for each plot type. This is used when determining the spread of fire across the landscape.

A. Loop through aboveground components of each species

1. Adjust for the greenness of each component

$$OBMFactor = 1 - \left(\frac{Biomass_C - OldBiomass_C}{Biomass_C} \right)$$

2. Compute burnability for this species and component

$$SCBurn = Biomass_C * CompBurnWt_C * GFBurnWt_G * OBMFactor$$

3. Total burnability for this species

$$Burnability = \sum_{Components} SCBurn$$

B. Add in litter to the burnability factor for this plot type

$$Burnability = Burnability + \left(Biomass_{Litter} * CompBurnWt_0 \right)$$

C. Adjust for soil moisture content, looping through all soil layers

$$SoilWettingCapacity = \sum \left(Depth_L * FieldCapacity_L \right)$$

If $SoilWater_{Total} > SoilWettingCapacity$ then

$$SoilMoistureFactor = 0.5$$

else $$SoilMoistureFactor = 1.5 - \left(\frac{SoilWater_{Total}}{SoilWettingCapacity} \right)$$

where *SoilMoistureFactor* should range from 0.5 to 1.5 for high to low soil moisture content

$$Burnability = Burnability * SoilMoistureFactor$$

D. Now, make burnability an index relative to the *RelativeBurnability* standard

$$Burnability_{PlotType} = \frac{Burnability}{RelativeBurnability}$$

2. Conduct the fire spread across the landscape, or designated area for prescribed fires

   A. Natural fire

      1. Pick a random cell for the fire to start in

      2. Adjust fire initialization factor (*FireInitFactor*) if necessary based on management activities (i.e. military training which may increase the probability of fire)

      3. Test to see if there will be a fire:

         If $Random < \left(FireProb * Burnability_{PlotType} * FireInitFactor \right)$ then a fire starts in the randomly chosen cell

      4. Allow the fire to spread. At each burning cell, look at the eight surrounding cells and see if any of them can burn. If so, mark as burning and repeat this step until no burning cells are present in the landscape. A cell can burn if the following statement is true:

$$Random < \left(FireProb * Burnability_{PlotType} * FireInitFactor \right)$$

   B. For prescribed fire, mark all cells with the specified management unit as burning.

3. Burn the marked cells

   A. Find the top soil layer that still exists

   B. Determine the fuel load, using litter and all plant components. Fuel load contribution for each component will differ based on whether live or dead and presence of combustible compounds.

$$FuelLoad = Biomass_{Litter} + \sum_{Species} \sum_{Components} \left(Biomass_C * FuelLoad_C \right)$$

C. Calculate a fuel load factor relative to the fuel load for a moderate fire. This will be used to determine the intensity of the fire.

$$FuelLoadFactor = \frac{FuelLoad}{ModFireFuelLoad}$$

D. Loop through all components for each species, transferring biomass and nitrogen

1. Determine the fire intensity for this species and component

$$IntensityFactor = FireProp_C * FuelLoadFactor$$

If $\left(FuelLoad \geq CrownFireFuelLoad \right)$ then $IntensityFactor = 1.0$

If $\left(FuelLoad < ModFireFuelLoad \right)$ then $IntensityFactor = 0.0$

2. Adjust the *IntensityFactor*, assuming that not all of a cell burns

$$IntensityFactor = IntensityFactor * RefugeFactor$$

3. Calculate biomass and nitrogen losses and move to the appropriate place. Biomass losses disappear, while nitrogen losses go to the free nitrogen pool in to top soil layer.

$$Loss_C = Biomass_C * IntensityFactor$$

$$NLoss_C = Loss_C * NConc_C$$

$$Biomass_C = Biomass_C - Loss_C$$

$$N_C = N_C - NLoss_C$$

$$SoilN_{TopLayer} = SoilN_{TopLayer} + NLoss_C$$

E. Burn the litter. Biomass, organic matter, and water disappear while nitrogen goes to the free nitrogen pool in the top soil layer.

$$Biomass_{Litter} = Biomass_{Litter} * (1 - FireLitter)$$

$$OM_{Litter} = OM_{Litter} * (1 - FireLitter)$$

$$NLoss = FireLitter * (N_{Litter} + N_{LitterOM} + N_{LitterMicrob})$$

$$SoilN_{TopLayer} = SoilN_{TopLayer} + NLoss$$

$$N_{Litter} = N_{Litter} * (1 - FireLitter)$$

$$N_{LitterOM} = N_{LitterOM} * (1 - FireLitter)$$

$$N_{LitterMicrob} = N_{LitterMicrob} * (1 - FireLitter)$$

$$Water_{Litter} = 0.0$$

4.21 Herbivory

This procedure conducts food consumption for each herbivore. It is called at the end of each month.

Variables:

$AreaInPatch_{PlotType}$	Within a habitat patch, the amount of area of each plot type
$Biomass_{Avail}$	Biomass available for consumption, for each combination of herbivore preference and competitive ability
$DailyHerbDemand_{Patch}$	Daily demand for each herbivore for each habitat patch
$FinalDemand_{S,C}$	Biomass loss to herbivory, for plant component C of species S
$NConc_{C}$	Nitrogen concentration of plant component C
PotDemand	Potential food demand for each herbivore

Parameters:

$Accessibility_{C}$	Plant parameter *Accessibility* (see Section 3.4.15)
Competition	Plant parameter *Competition* (see Section 3.4.15)
DailyHerbDemand	Animal parameter *Daily Herb Demand* (see Section 3.5)
Preference	Plant parameter *Preference* (see Section 3.4.15)
$Seasonality_{Month}$	Animal parameter Seasonality (see Section 3.5)

Steps:

1. Calculate how much each herbivore species would like to eat this month. Do this for each plot type in the landscape.

   A. Species in which demand is uniform across the landscape (i.e. insects)

$$PotDemand = DailyHerbDemand * Seasonality_{Month}$$

   B. Species which occur in differing densities in patches throughout the landscape

$$PotDemand = \sum_{Patches}\left(\frac{DailyHerbDemand_{Patch}}{AreaInPatch_{PlotType}} * Seasonality_{Month}\right)$$

   C. If livestock, then set potential demand based on values specified in grazing regime inputs.

2. Loop through herbivore Preference and Competition classes

   A. Calculate available biomass for species and components matching the Preference and Competition. This will allow herbivory to be distributed among all components.

$$Biomass_{Avail} = \sum_{Species}\sum_{Components}\left(Biomass_C * \frac{Accessibility_C}{100}\right)$$

   B. Loop through all species and components, allocating biomass to eat for each herbivore. Don't do the actual consumption yet, we need to simply determine what each will eat. This will give an equal opportunity for consumption, not just first-come first-served.

      1. Is the critter still hungry $(PotDemand > 0)$ and biomass is available?

         A. Plenty of food available, so allocate it among plant species based on their relative abundances

$$Loss = PotDemand * \frac{Accessibility_C}{100} * \frac{Biomass_C}{Biomass_{Avail}}$$

         B. Not enough there, so take what's left

$$Loss = Biomass_C * \frac{Accessibility_C}{100}$$

      2. Set aside values of loss to implement them later

$$FinalDemand_{S,C} = Loss$$

3. Adjust potential demand based on what is being eaten

$$PotDemand = PotDemand - Loss$$

3. Implement the biomass losses, and associated nitrogen

$$Biomass_C = Biomass_C - FinalDemand_{S,C}$$

$$NLoss = FinalDemand_{S,C} * NConc_C$$

$$N_C = N_C - NLoss$$

5.0 Instructions

This section details the steps used to actually run an EDYS simulation. It covers the minimum computer requirements, computer settings, steps in running EDYS, and short descriptions of output displays and files.

5.1 System Requirements

5.1.1 Software and Hardware

Minimum recommended system requirements for running EDYS on a PC include:

- Microsoft Windows 97, 98, 2000, or XP operating system
- Intel Pentium II processor or better for maximum performance (EDYS will run successfully on other processors, but with longer run times.)
- 64 MB RAM (random access memory)
- 750 MB free disk space

5.1.2 Virtual Memory

The virtual memory requirements for running EDYS vary depending on the complexity and heterogeneity of the landscape being simulated. A simple landscape may only require 750 MB of free disk space while a large, complex landscape will probably require up to 2 GB of free disk space. Users of EDYS on systems running Microsoft Windows 95 or 98 do not need to specify virtual memory settings. Under Microsoft Windows XP, the virtual memory settings must be large enough to accommodate the required space. The instructions below specify 750 MB but users requiring more virtual memory are recommended to set the value to 2 GB.

If running Windows XP, follow these steps:

1. Click on the “Start” button in the lower left-hand corner.
2. Click on “Control Panel”.
3. Click on “Performance and Maintenance” within the “Control Panel” window.
4. Click on “System” in the “Performance and Maintenance” window.
5. In the “System Properties” window, click on the “Advanced” tab.
6. In the “Performance” panel, click on the “Settings” button.
7. In the “Performance Options” window, click on the “Advanced” tab.
8. In the “Virtual memory” panel, the value listed on the line after “Total paging file size for all disc volumes:” is the current setting for virtual memory. If the amount stated is less than 750 MB, then click on the “Change” button, else click on the “Cancel” button at the bottom of the window.

9. If changing, click on the “Custom size:” radio button, then modify the values in the edit boxes next to the labels “Initial Size (MB)” and “Maximum Size (MB)” so that the maximum size is greater than 750 MB. Click on “Set”.
10. Click on “OK”, then close all open windows. The computer will now need to be rebooted to incorporate the new virtual memory settings.

5.1.3 Display

To take full advantage of the screen displays in EDYS, the computer display should be set for a resolution of 1024x786, true color, and small fonts. To incorporate those settings in Windows XP, follow these steps:

1. Click on the “Start” button in the lower left-hand corner.
2. Click on “Control Panel”.
3. Click on “Appearance and Themes” in the “Control Panel” window.
4. Click on “Display” in the “Appearance and Themes” window.
5. In the “Display Properties” window, click the “Settings” tab.
6. In the “Screen Resolution” panel, move the slider to the ‘1024 by 768’ setting.
7. In the “Display Properties” window, click the “Appearance” tab.
8. Under “Font size:”, use the pull-down menu to select the smallest font size.

5.1.4 Directory Structure

EDYS is designed to run from any directory on any disc drive. The one requirement is that the input DAT and TXT files are located in a subdirectory called “Data”. For example, if EDYS is run from d:\EDYS\ then the input data must be contained in d:\EDYS\Data\. However, several exceptions exist to this structure. If the user has saved a spatial configuration, run options, or initial plant biomasses from a previous simulation run, then these may be loaded from any directory.

By default, output files are written to c:\EDYS\Output\. EDYS will create this directory automatically if it does not exist. Exceptions to this structure exist. The user may change the output directory and may save their spatial configurations, run options, or initial plant biomasses to any existing directory.

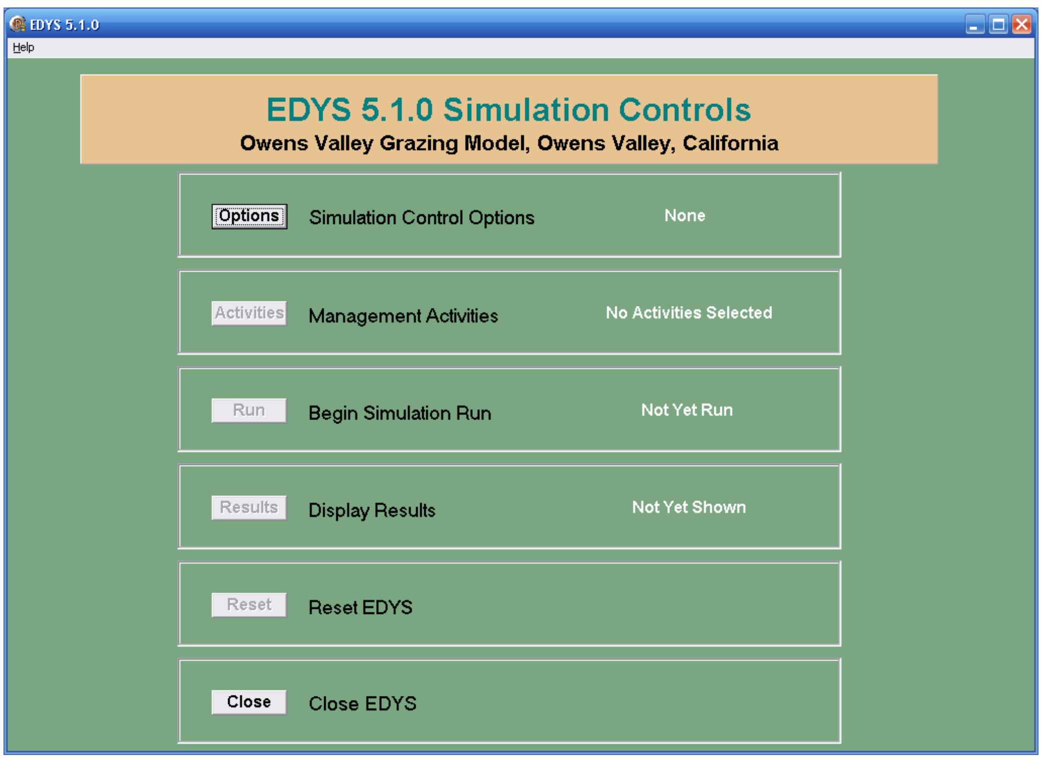
5.2 Running EDYS

5.2.1 Installing and Starting EDYS

EDYS and its associated data input files are shipped on CD-ROM. The user may run EDYS directly from the CD-ROM or may copy all files to their hard drive. If doing so, please ensure the directory structure matches the instructions given above (Section 5.1.4).

To launch EDYS, navigate within Windows Explorer to the directory containing EDYS4.exe. Then simply double-click on the file name.

When EDYS starts, the following Main Window is displayed. This window allows the user to control the simulation as it proceeds. As such, EDYS will return to this window several times during a simulation.



5.2.2 Main Window

The Main Window, shown above in Section 5.2.1, controls the flow of events during an EDYS run. All of the windows described below eventually return control of EDYS back to this form. Six buttons are displayed, but not all are active at all times. By enabling and disabling buttons during the course of a simulation, EDYS controls which steps can logically be taken and which ones cannot. For example, before a simulation is actually run, the results display button is disabled since no results are available to be displayed.

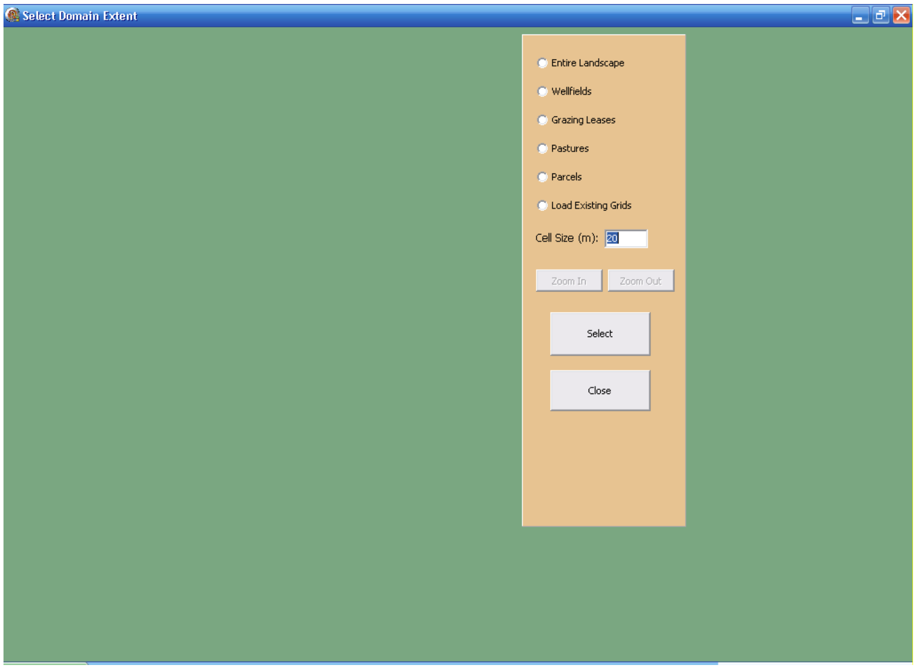
The following buttons are displayed on the Main Window:

Options	Allows the user to select options for a particular EDYS simulation run.
Activities	Allows the user to select any natural resource management activities, like brush management and prescribed fire, and to select any herbivory, if appropriate for the application.
Run	Takes the user to a window to begin the EDYS simulation run and allows the user to monitor the run.
Results	Directs flow of EDYS to a results display window so the user may view graphs and plots of the results of the current EDYS simulation.
Reset	Resets EDYS for another simulation run. All matrices and grids are returned to their original values, and options and management activities are cleared.
Close	Causes EDYS to exit.

The normal flow of events during an EDYS simulation run begins with setting the Options. This step is required. Next, any natural resource management activities or herbivory to occur during the simulation must be determined and set. After setting the activities, go to the Run Display Window to actually conduct the simulation run. Once the run has completed, go to the Results Display Window to view the results of the run. This step is optional because many of the output variables are written to text files during the run. If desired, these text files may be accessed with a word processor or spreadsheet package without visually displaying the results.

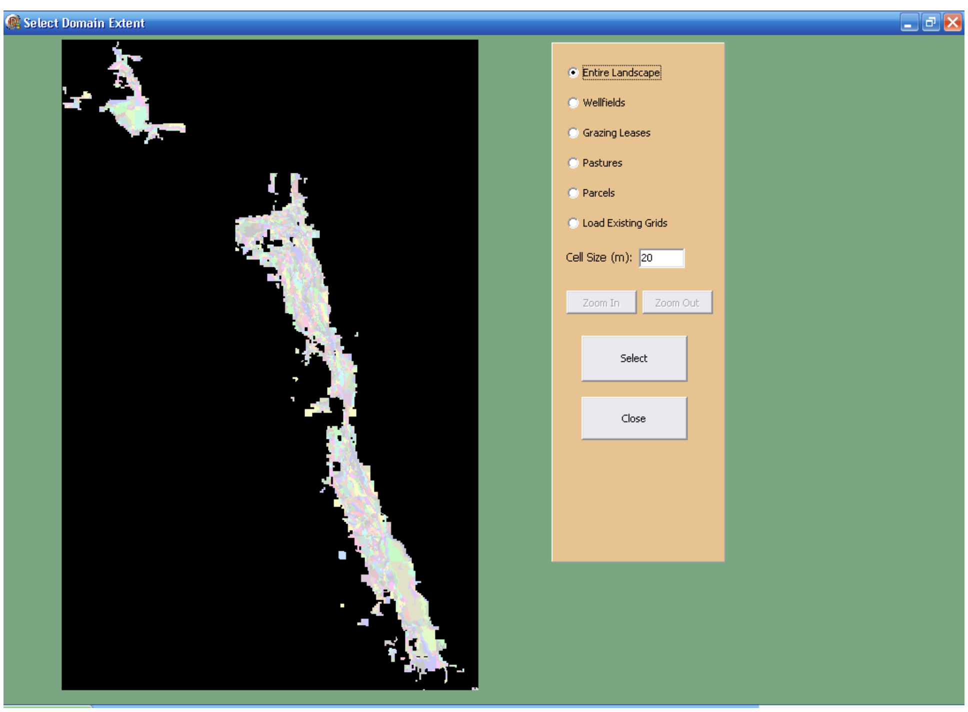
5.2.3 Simulation Options

The first step in selecting options is determining the spatial extent of the simulation to be run. For the Owens Valley Livestock Grazing application, the options include the entire landscape, a wellfield, a grazing lease, an individual pasture, or an individual parcel. When the Options Button is clicked the following window is used to guide the user in selecting the spatial extent.

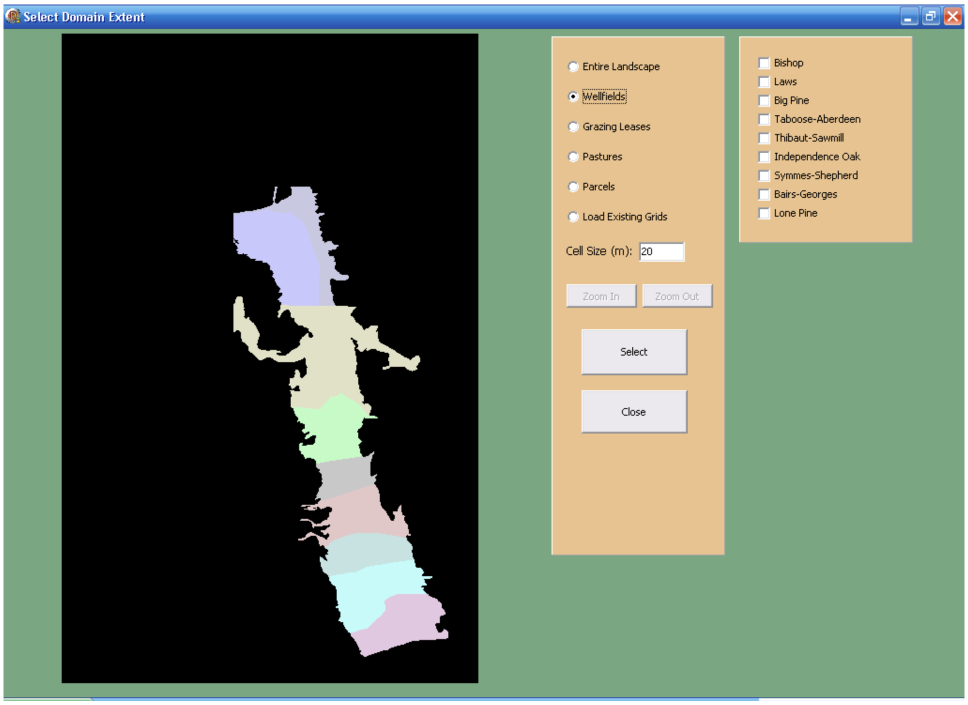


There are six options available for selecting the spatial extent of a simulation run. These are:

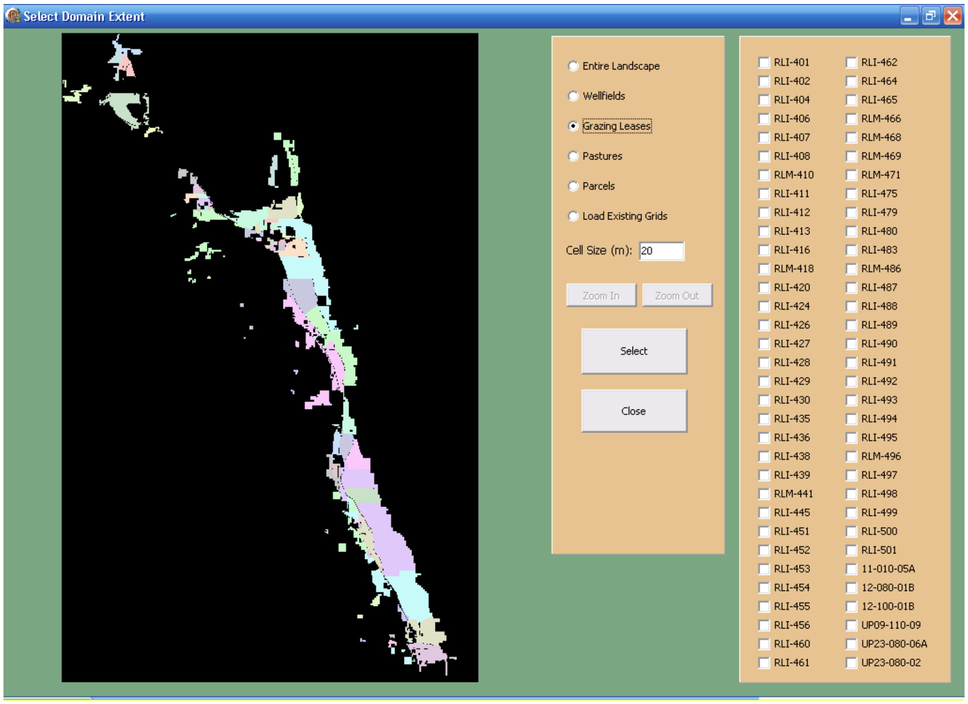
Entire Landscape This selects the entire landscape, composed of parcels in Owens Valley and Long Valley. When this option is selected, the following window is displayed. Click "Select" to run the entire landscape.



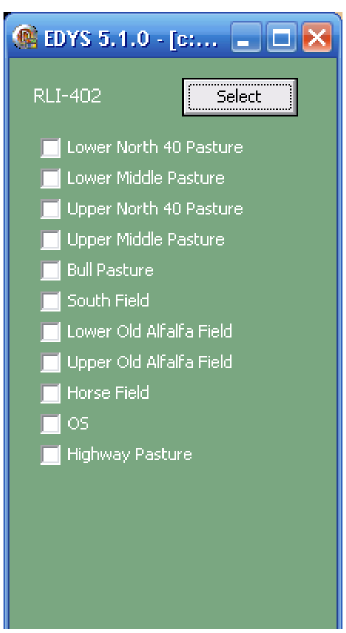
Wellfields This allows the user to select one of the wellfields as the simulation domain. When this option is selected, the following window is displayed, allowing the user to select which wellfield to use as the simulation extent. This is done by clicking on the map on the desired wellfield or the appropriate button on the right-hand side of the window. Click "Select" to continue.



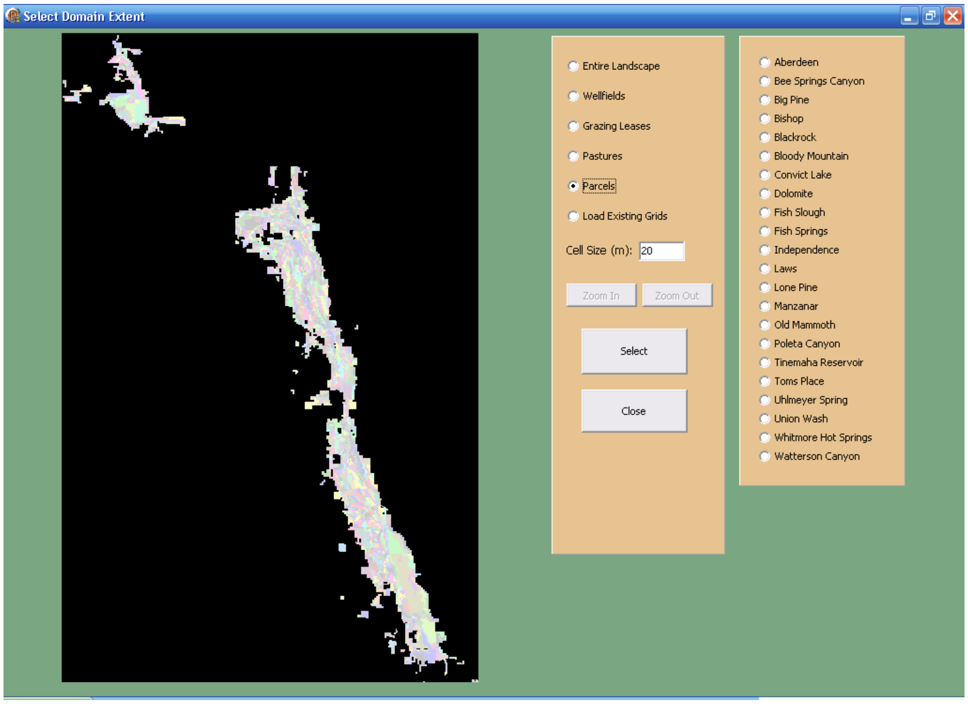
Grazing Leases This option allows for simulating only a selected grazing lease. When selected, the following window is displayed. The user may select the appropriate lease by either clicking on the map on the left, or the appropriate check box on the right-hand side of the form.



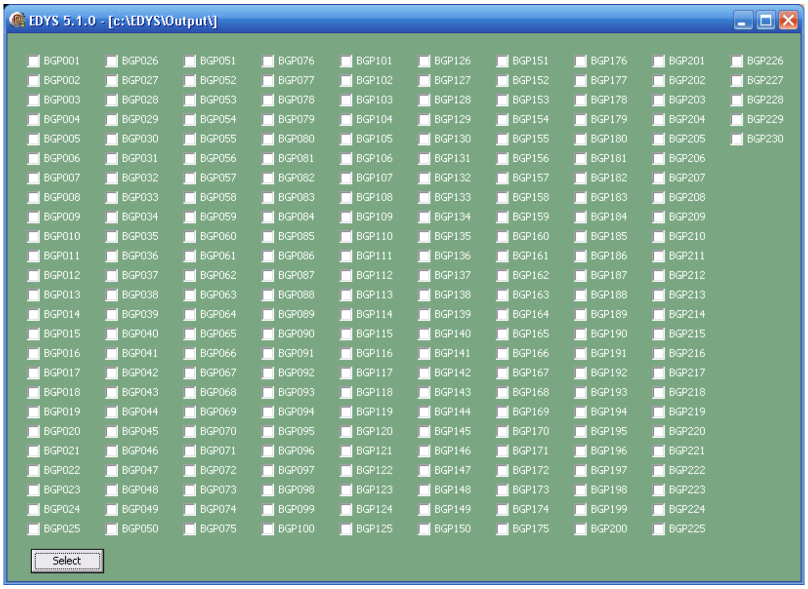
Pastures This option allows the user to select individual pasture(s) within a grazing lease. When clicked, the window above (for selecting a grazing lease) will be shown. Upon clicking on a lease on the right-hand side, the following window will be shown (this example illustrates lease RLI-402). This one shows all pastures available in the lease. The user may then select the appropriate pastures to simulate, and click "Select". The window will close. Click "Select" on the above form to continue.



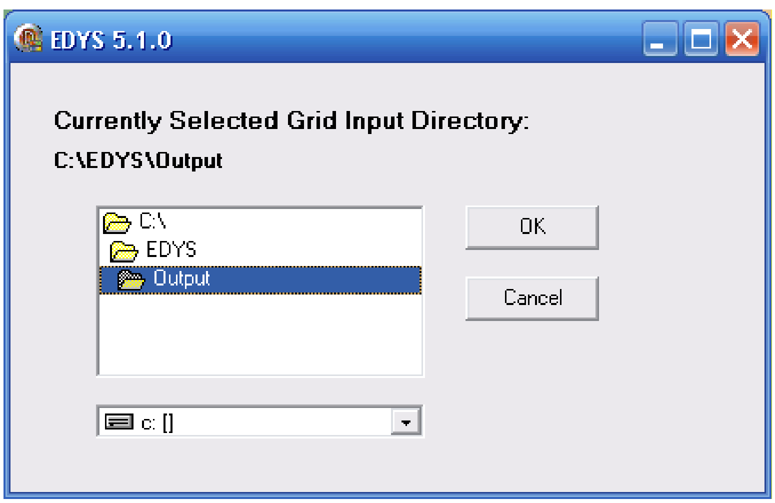
Parcels This allows the user to select individual parcels for simulating. When clicked, the following window will be shown. On the right-hand side are checkboxes for all topographic quadrangles within the entire landscape that contain parcels.



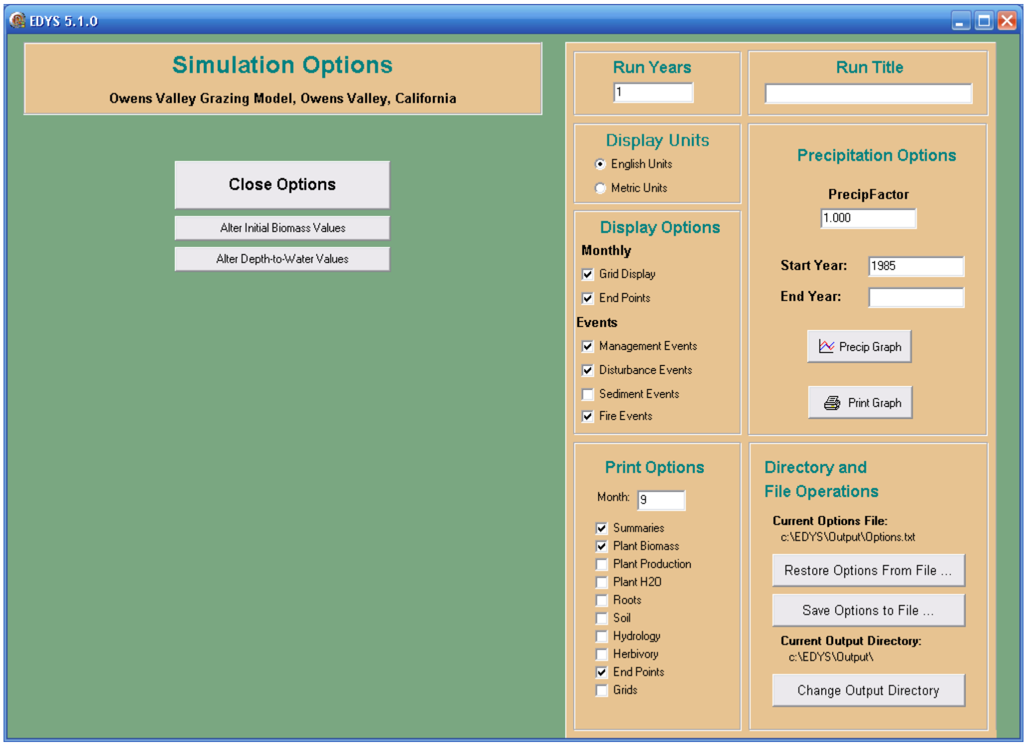
When one of the topographic quadrangle checkboxes are selected, a window showing all parcels within that quadrangle will be shown. The following window illustrates this for Big Pine. Click the appropriate checkbox and then “Select” to return control back to the above window. Click “Select” to continue.



Load Existing Grid This option allows the user to select a previously saved domain. When selected, the following window will appear. Navigate to the desired directory and click "OK" to continue.



After the domain has been selected, whether a new one or one that had been previously saved, EDYS will bring up the Options Window. This allows the user to select or deselect any of a variety of simulation control options.



Three main buttons are available to the user:

Close Options — Exit the Options Window and return to the Main Window.

Alter Initial Biomass Values — Allows the user to change initial plant biomass values. Details are given below (Section 5.2.3.1).

Alter Depth-to-Water Values — Allows the user to change the depth-to-water values used during the simulation. Details are given below (Section 5.2.3.2).

Simulation control options, displays, and file outputs are grouped together on the window by functionality. Details on each option are given below.

Run Years — Set the number of simulation years for EDYS to run. Enter the number of years as a positive integer value into the box below the heading "Run Years". The default is one year.

Run Title — Set a title for each simulation run to aid the user in identifying the files associated with each run. It is included in most of the output files.

Display Units

English Units — Set the display and output units to be English. For example, biomasses are expressed in lbs/acre, and water volume in acre-feet.

Metric Units — Set the display and output units to be Metric. For example, biomasses are expressed in g/m^2 while water volume is expressed in m^3.

Display Options

Grid Display — Display the vegetation grid during the simulation run.

End Points — Display any end point values during the run.

Management Events — Display the spatial extent of management activities during the run. The disturbed areas are illustrated as red on the vegetation grid.

Disturbance Events — Display the spatial extent of disturbance activities during the run. The disturbed areas are illustrated as red on the vegetation grid.

Sediment Events — Display the sediment and water grids during a runoff event. The sediment grid shows cells which lose soil (displayed as red) and cells gaining sediment (displayed as blue). The water grid shows the flow of water across the landscape during the runoff event. The intensity of blue represents the amount of water moving between cells. Dark blue corresponds to a greater amount of water than light blue.

Fire Events — Display the spatial extent of a fire, shown as red on the vegetation grid.

Print Options

Month — Determines in which month certain biomass data are output. Value is an integer corresponding to the number of the month (January is 1 and September is 9, for example). Usually, this value is set to the month corresponding to the end of the growing season at the specific location being simulated.

Summaries — This option builds several files containing summary information from the run. The file “Avg Biomass across the Landscape.txt” contains average biomasses for every species. Values are weighted by plot type abundances within the landscape. The files “Landscape Hydrology Totals.txt” and “Landscape Plot Hydrology.csv” contain hydrological totals by plot type and summed across the landscape. The file “Spatial Statistics.txt” contains some basic spatial information, including mean and standard deviation for patch sizes by plot types. All files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.

Plant Biomass — This option builds a number of files containing plant biomasses. Five sets of files are generated. In all file names, ‘yyyy’ is the community name and ‘xx’ is the community number, both of which were specified while building the spatial dataset. The files named “Total Biomass in yyyy, Comm xx.txt” contain total living plant biomasses. The files named “AboveGround Biomass in yyyy, Comm xx.txt” contain total aboveground plant biomasses. The files named “Clippable Biomass in yyyy, Comm xx.txt” contain total clippable plant biomasses. The files named “Live Clippable Biomass in yyyy, Comm xx.txt” contain living clippable biomasses. The files named “Leaf Biomass in yyyy, Comm xx.txt” contain only leaf biomasses. All files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.

Plant Production — This option builds files of monthly plant production. The files are named “Plant Production for yyyy, Comm xx.txt” where ‘yyyy’ is the community name and ‘xx’ is the community number as determined during creation of the spatial dataset. All files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.

Plant H2O — This option builds files of monthly plant water uptake. These files are named “Plant Water Use for yyyy, Comm xx.txt” where ‘yyyy’ is the community name and ‘xx’ is the community number as determined during creation of the spatial dataset. All files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.

Roots	This option builds three sets of files detailing monthly root biomasses by soil layer. The files names “Root Biomass for yyyy, Comm xx.txt” contains total biomasses for all adult plants. The files “Seedling Root Biomass for yyyy, Comm xx.txt’ contains total biomasses for seedlings. The files named “Root Component Biomass for yyyy, Comm xx.txt” contain adult root biomasses broken out by coarse roots and fine roots. For all files, ‘yyyy’ is the community name and ‘xx’ is the community number as determine during creation of the spatial dataset. All files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.
Soil	This option builds “Soil Totals.txt” which contains monthly totals by layer for soil depth, water, organic matter, and nitrogen content. This file is “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.
Hydrology	This option builds “Daily Plot Hydrology.txt” which contains daily values for water budgets. Values are output to it only on days when precipitation occurs. “Monthly Plot Hydrology.txt” contains monthly values for water budgets. The file “Water Uptake by Layer.txt” contains monthly water uptake by layer. These files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.
Herbivory	This option creates several files containing monthly consumption by each herbivore, listed by plant species. Files named “Herbivory Totals for xxxxxxxx.txt” contain the data for each herbivore species separately, with ‘xxxxxxxx’ being the herbivore’s name. Also, the file “Herbivory Totals.csv” contains all the consumption data together in one file. These files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.
End Points	Selecting this option generates any application-defined end point variables. Filenames will always begin with “EP”. These files are “comma delimited” and ready to import into a spreadsheet for viewing, printing, or graphing.

Precipitation Options

PrecipFactor	Alters the precipitation regime for this EDYS run. Values may be any positive real number and are multiplied by each daily precipitation amount. Normal precipitation uses a value of 1.00. A wet cycle of a 25% increase would use a value of 1.25, while a drought 75% of normal would use a value of 0.75. Default is 1.00.
Start Year	If the user knows a particular historical precipitation regime to use, enter the starting year of the desired sequence. The default is the starting year of the precipitation file specified when building the input dataset.
End Year	If the user knows the end of a particular historical precipitation regime to use, enter the ending year of the desired sequence. The default is the final year contained in the precipitation file specified when building the input dataset.
Precip Graph	Clicking this button shows a graph of annual precipitation totals for the entire period of record contained in the precipitation file.
Print Graph	Allows the user to print the precipitation graph.

Directory and File Operations

Save Options to File ...

By default, options are saved in the file Options.txt in the output directory. However, if the user desires, the file name and directory can be changed. Click on the *Save Options to File ...* button to show a file dialog window. Navigate within this window to the desired directory and set the desired file name. Note: the save operation does not take place until the user goes to the Run Display Window. This gives the user the ability to set management activities and have them saved in the options file.

Restore Options From File ...

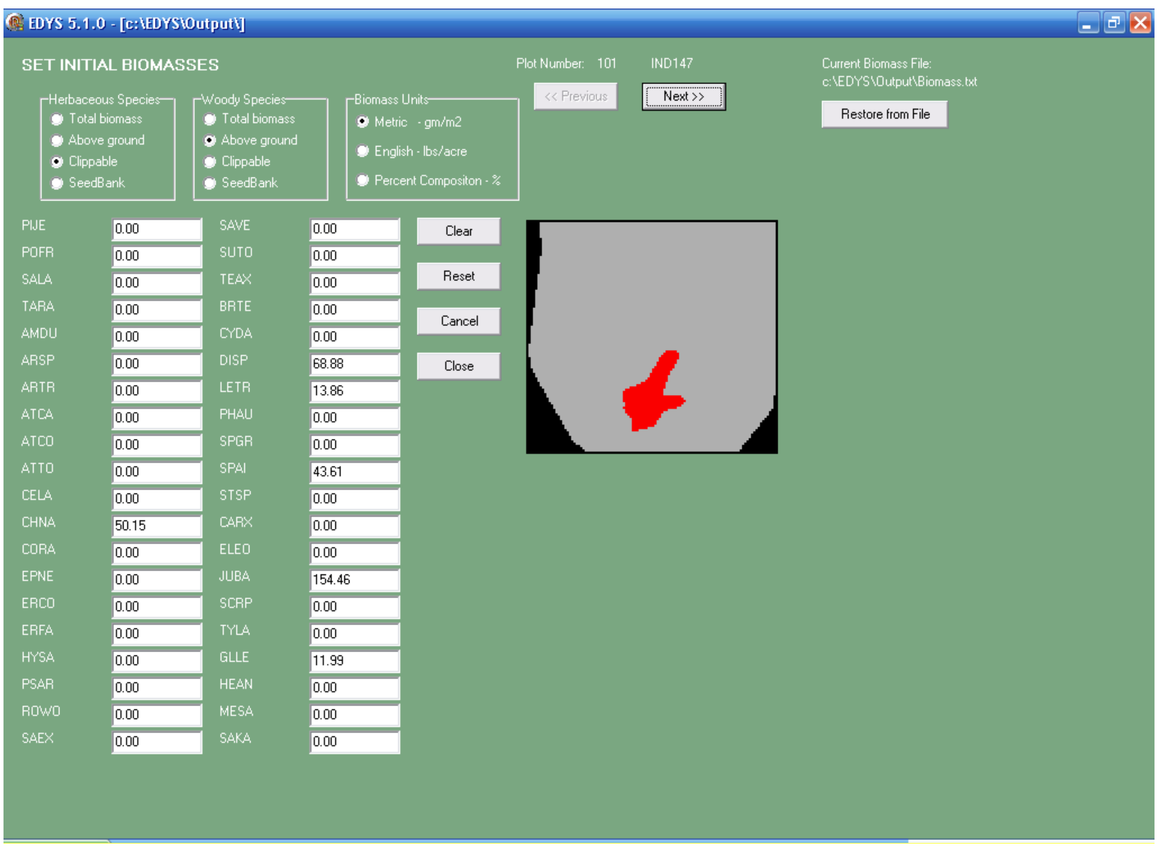
Option settings from previous runs can be accessed to facilitate running multiple complex scenarios. To select an options file from a prior run, click on the *Restore Options From File ...* button. This will pull up a form that allows the user to navigate to the desired directory and options file.

Change Output Directory

By default, all output files are located on C:\EDYS\Output. To change the output directory, click on the *Change Output Directory* button. A window will appear that allows the user to navigate to the desired output directory.

5.2.3.1 Alter Initial Biomasses

This window allows the user to run EDYS with initial plant biomass values differing from those contained in the input data file. Values can be input for each species for each plot type. However, the user cannot add species or plot types. Initial biomass may also be altered by editing the InitBiomasses.csv file in the \Data directory. This file will also exist for any domains saved in Section 5.2.3, but will contain only the parcels represented in the saved domain and not for the entire landscape. Each parcel is listed with the initial biomasses for all species, many of which will be shown as zero. Simply change the desired values and save the file in its current format (.csv).



Initial biomasses may be altered using the boxes next to each plant species on the left-hand portion of the form. Three groups of radio buttons allow the user to select the format for those values. Biomass totals can be displayed and input as either total biomass, above ground biomass (trunk, stems, leaves, seeds, standing dead stems, standing dead leaves, and seedling shoots), clippable biomass (stems, leaves, seeds, standing dead stems, standing dead leaves, and seedling shoots), and seed bank. Select the appropriate total to use when displaying and altering. Separate sets of radio buttons are available for herbaceous species and woody species. The units for the values displayed and input can be set to either metric (g/m^2), English (lb/acre), or percent composition (%). A series of buttons allows the user to navigate between plot types, the spatial distribution of which is shown in red on the grid, and to set the values:

Restore from File This button allows the user to input a previously saved set of biomass values. Clicking this button pulls up a file dialog window to allow the user to navigate to the appropriate file. After restoring values from a file, the user may now alter any of these and then save to another file. In this way, a variety of initial conditions may be created by the user. This gives the user the flexibility to test scenarios with varying initial conditions, or to repeatedly update initial conditions as knowledge of the landscape condition changes over time.

Previous Displays values for the previous plot type. This button is disabled when the first plot type is displayed (the default condition upon entry to this form). In combination with the Next button, the Previous button allows the user to move through all plot types and go back and forth between plot types if needed.

Next Displays values for the next plot type in the sequence. This button is disabled when the last plot type is displayed. In combination with the Previous button, the Next button allows the user to move through all plot types and to go back and forth between plot types if needed.

Clear Sets all displayed values to zero.

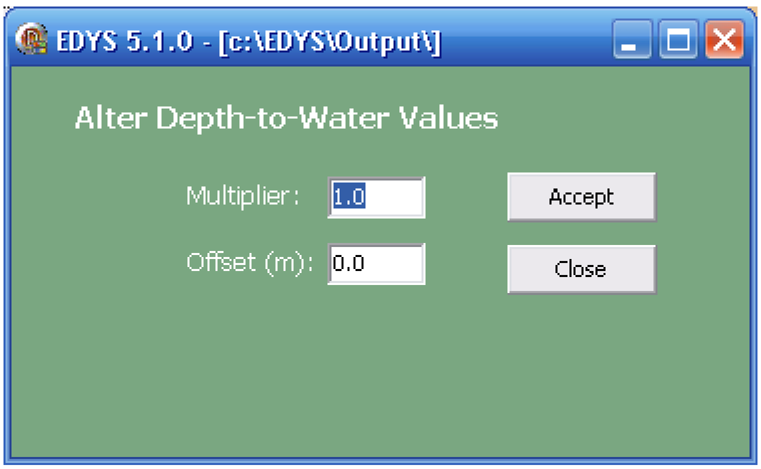
Reset Sets all displayed values back to the default initial biomasses.

Cancel Closes the form without using or saving any altered values.

Close Sets all input values to the appropriate data structures for the simulation run, and gives the user the option of saving the new values to a file for later use. If the user desires to save the values, a file dialog window will appear to allow navigation to the desired directory and file. The default file name is Biomass.txt in the output directory. If the file already exists, the user will be prompted to overwrite or to select a new file name.

5.2.3.2 Alter Depth-to-Water Values

This window allows the user to modify the depth-to-water values used during the simulation run. The Owens Valley Grazing application comes with depth-to-water data from 1985 through 2008 that were generated during the various wellfield models. However, this window allows a user to examine community responses on a local scale using depth-to-water values that differ from historical. The following window gives the user two options for altering depth-to-water.

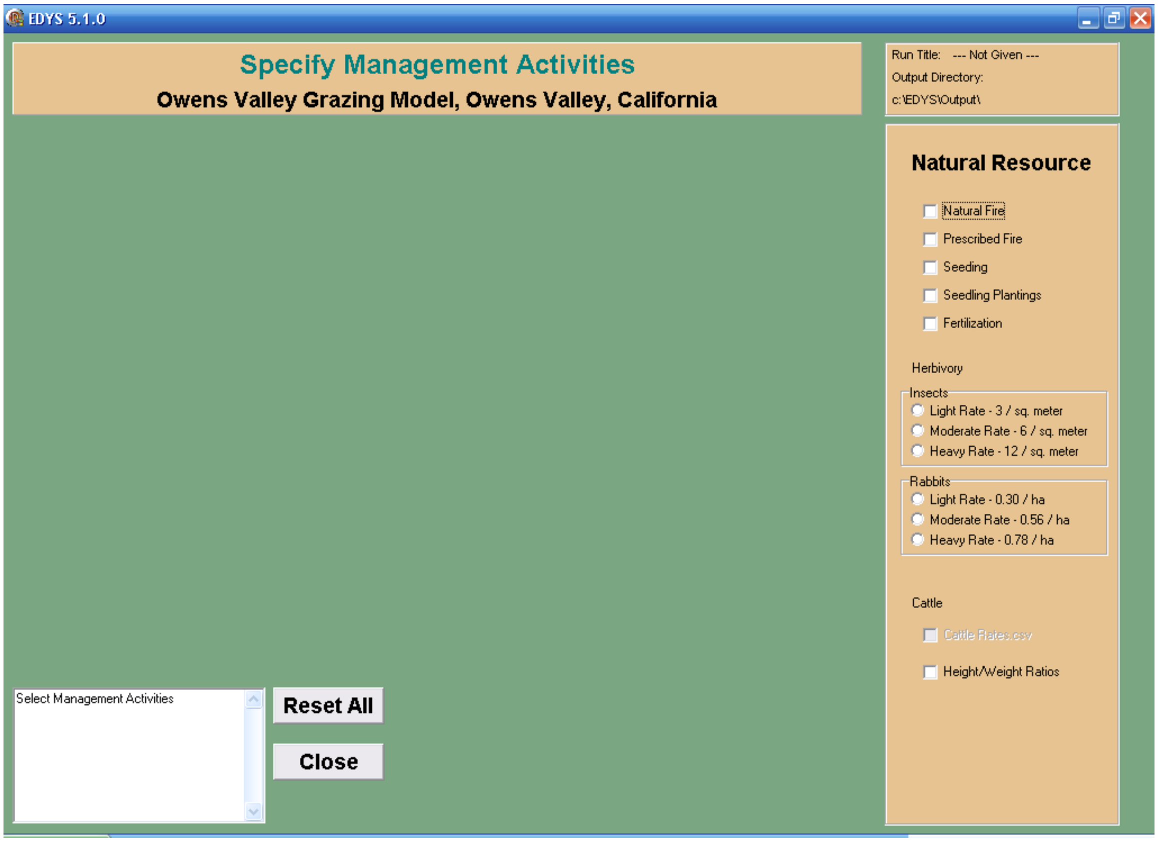


Multiplier — All values will be multiplied by this value before use. The default is 1.0. To bring the water table closer to the surface, use a value less than 1.0. A Value greater than 1.0 will lower the water table.

Offset (m) — All values will be offset by this amount. The default is 0.0. To raise the water table, use a negative value. To lower the water table, use a positive value.

5.2.4 Management Activities

The Activities Window allows the user to input all desired natural resource management activities and herbivory for the simulation run.

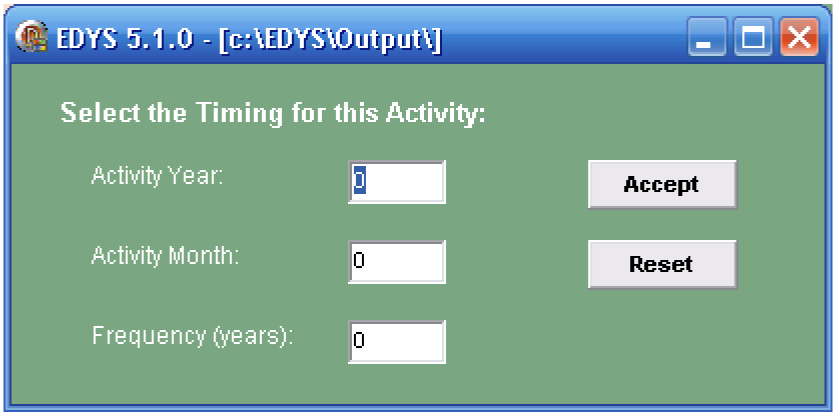


The panel on the right-hand side lists the full range of management activities supported in EDYS. The window is designed to allow the user to select any combination of these activities, with the option of entering multiple instances of each (except for Natural Fire and Herbivory), based on timing, location within the landscape, and frequency of occurrence. Up to 100 separate activities may be entered.

After clicking on an activity the management unit grid will be displayed with units shown in different colors, and all other activity options will be disabled. To select the spatial location of the activity, click on the appropriate management unit. The user will be prompted with the management unit number and asked to verify the correct unit was selected.

5.2.4.1 Setting the Timing of an Activity

This window is called when any of several management activities have been selected. It allows the user to specify the time the event will occur and its frequency.



Activity Year corresponds to the year number during the EDYS run for the event to occur. Simulations begin on 1 January of Year One. If year is not explicitly stated, it defaults to year one. *Activity Month* corresponds to the month of the year when the event occurs. It should be input as the numerical month of the year, and ranges from 1 to 12. *Activity Frequency* is the frequency in years between events (i.e. an event that occurs in years one and four will have a frequency value of three). If zero, then the event is a one-time occurrence.

5.2.4.2 Management Activity Descriptions

Below are short descriptions for all management activities supported in EDYS. For all except Natural Fire and Herbivory, once an instance of the activity has been specified, the user will be prompted whether another instance of the same activity will be entered. In this manner, the same activity can be simulated to occur at various locations in the landscape, at different times, or at different intervals.

Natural Fire — Simulates a natural fire. No other inputs are required. Natural fire is modeled as a stochastic process which may be initiated at any month during the run. Determination of whether a fire will begin, and its spread pattern, is based on a cell's fuel load, moisture content, and a stochastic factor.

Prescribed Fire — Simulates a prescribed burn within a specified management unit area. The user must select the extent of the burn along with its timing. The intensity of the fire is based on the fuel load and the moisture content of the vegetation and soil.

Fertilization — Simulates the application of fertilizer within a specified area. The user must select the area of application, the timing of the application and the amount of fertilizer (in lbs/ac) to be applied.

Seeding Simulates a seeding operation within a specified area. The user will need to select the area to be seeded, the timing of the seeding and the amount of seed to apply. All species in the application are available for seeding. While some species would not purposefully be included in a seed mix, this allows the user to simulate other instances when seeds may be applied to an area, such as the invasion of an exotic species.

Seedling Planting Simulates planting of seedlings in a given area. The user must select the extent of the area to be planted, the timing of the planting, and the number of seedlings per acre for each species to be planted. All species in the application are available for this activity.

Herbivory Grazing by native herbivores (insects and rabbits) is simulated as a uniform consumption rate across the entire landscape. The user has the choice of density of animals for each herbivore:

Insects

Light – 3 individuals / m^2

Moderate – 6 / m^2

Heavy – 12 / m^2

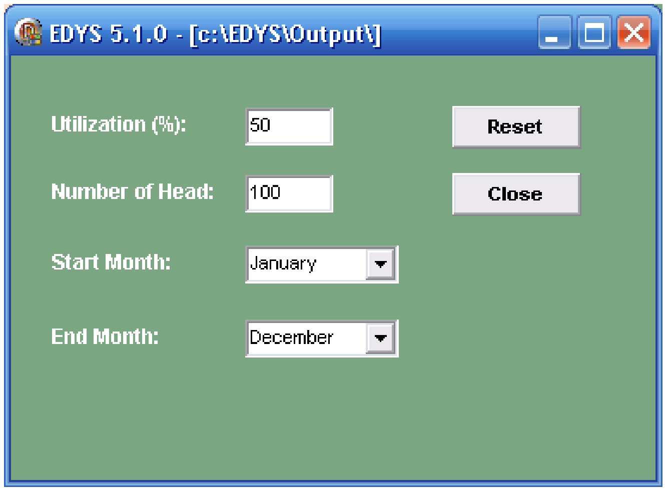
Rabbits

Light – 0.30 individuals / ha

Moderate – 0.56 / ha

Heavy – 0.78 / ha

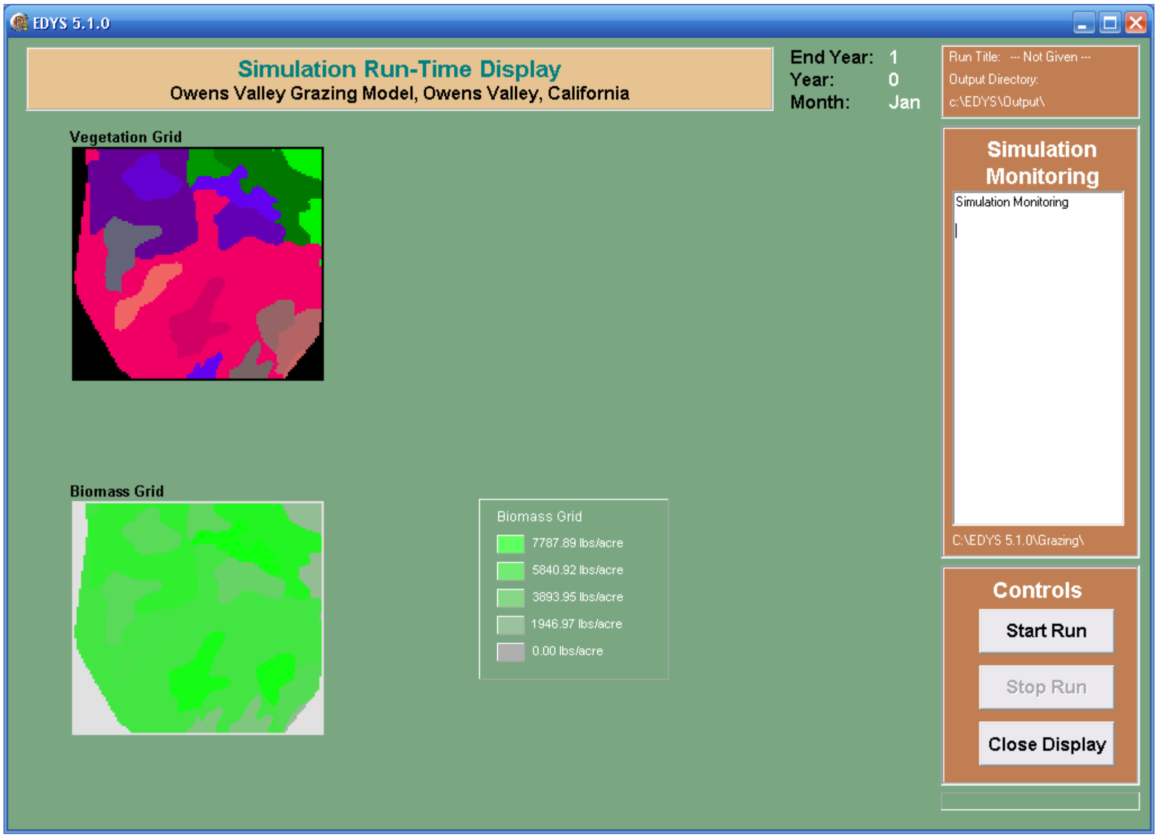
Grazing by Cattle is controlled by a user specified grazing regime and percent utilization maximum. When “Height/Weight Ratios” is clicked, the following form is shown.



5.2.5 Run Display

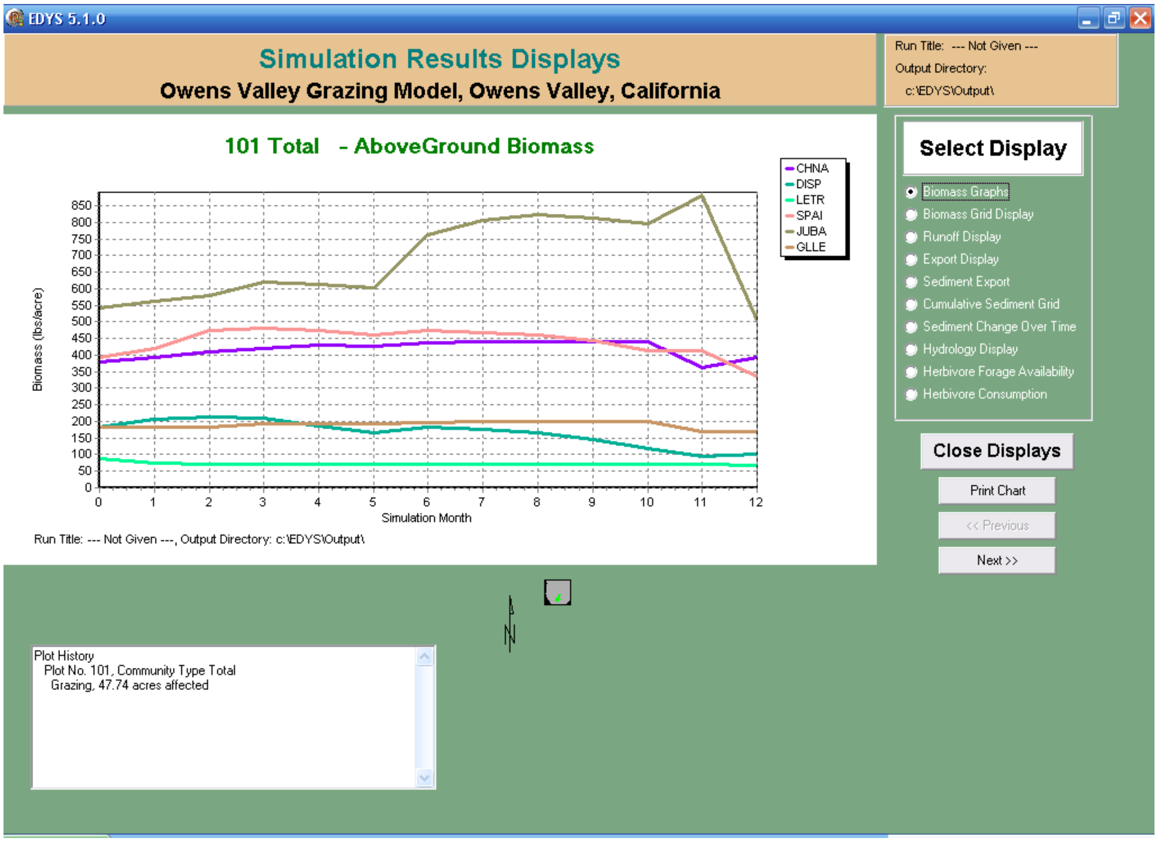
The Run Display Window, as shown below, serves three functions in EDYS. First, it shows the initial conditions prior to launching the simulation run. Second, it allows the user to monitor conditions during the run. It displays grids if any were selected by the user on the options window, displays the current month and year of the simulation, and updates the user on events such as precipitation and runoff. The progress bar below the Close Display button allows the user to monitor the progress of a run. Last, it allows the user to begin the simulation run or stop a run that has begun. Three buttons are available to control the run:

Start Run	To begin a simulation run.
Stop Run	To stop a simulation run. Execution will cease at the start of the next day of the run. This button only becomes enabled once the simulation has begun.
Close Display	Returns control to the Main Window after the simulation has completed or stopped with the Stop Run button.



5.2.6 Results Display

The Results Display Window allows the user to display some of the results from an EDYS run. The panel on the right-hand side of the form, called "Select Display", allows the user to select which set of results to view. The choices are listed below the example of the window. An example of a biomass graph is shown in the screen capture below. To exit the Results Display Window, click on the Close Display button. This returns the user to the Main Window.



Biomass Graphs	Graphs of monthly aboveground biomass for each species. Separate graphs are generated for each plot type. When this option is selected, the graph is shown on the center portion of the form. In the bottom right-hand corner is a map of the simulation area with the graphed plot type highlighted in green. In the lower left-hand corner is a box detailing the management activity history for that plot type. Also, two buttons, labeled "Previous" and "Next", appear on the right side of the form. These allow the user to step through all of the plot types in sequence, but also to backtrack if desired. The user also has the option to print the display using the "Print Chart" button.
Biomass Grid Display	Spatial display of relative total biomass. Plot types with the greatest total biomass are shown as the brightest green, while plot types with low biomass values are shown as the dullest green.
Runoff Display	Graph of monthly total water runoff off the simulation area.

Export Display	Graph of monthly total water export (water moving below the rooting zone).
Sediment Display	Graph of monthly total sediment moved off the simulation area.
Cumulative Sediment Grid	Spatial display of sediment movement within the simulation area. Cells with total sediment loss are shown in shades of red, cells with sediment gain are shown in shades of blue, while cells with no change are shown as gray.
Sediment Change Over Time	Bar graph of the number of cells showing sediment change, either loss or gain, calculated annually.
Hydrology Display	Bar graph of the annual totals for precipitation, export, runoff, evaporation, transpiration, and interception.
Herbivore Forage Availability	Bar graph of the total biomass available for each herbivore's top three plant preferences.
Herbivore Consumption	Bar graph of the total biomass consumed for each herbivore by plant species. This option is available only when herbivory was selected from the Management Activity Window.

5.2.7 Outputs

All output files are written to the following directory unless otherwise specified from the Options Window:

C:\EDYS\Output\

If this directory does not exist when EDYS is started, EDYS creates it. Any output files from a previous EDYS run which may exist in that directory will be deleted when EDYS is restarted or when EDYS is reset and re-run. Thus, if the user desires to save outputs from EDYS runs, then those files should be moved into other directories for storage or the output directory must be changed from the Options Window.

In addition to any output files specified by the user in the Options Window (listed in Section 5.2.3 under Print Options), several files are automatically generated whenever EDYS is run (listed alphabetically):

Community Cell Counts.txt

This file contains monthly cell counts for each plot type. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

Daily Sediment Movement.txt

This file records any changes in profile depth due to erosion and deposition. It is written to only after erosion events. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

EDYS Simulation Log.txt

This file serves as a simulation log file and contains a variety of information about the current EDYS run, including the date and time of the run, a listing of management activities, precipitation values, and summaries of plot dynamics whenever new plot types are created. This file's primary value is for diagnosing problems encountered during a simulation run.

List of Options and Activities.txt

This file contains a list of options and activities for the current EDYS run. It is ready for input into a word processor for viewing or printing.

Monthly Plot Slope Avg.txt

This file lists the monthly average slope for cells within each plot type or community. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

Monthly Runoff Totals.txt

This file contains monthly runoff totals for each plot type. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

Options.txt

This file contains a list of all options input for the current EDYS run. Although in text format, this file is used internally by EDYS and the values will not be easily recognizable by the user.

Plant Component Biomass.csv

This file lists the biomass for each plant component in each community on a monthly basis. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

Plant Parameter Inputs.txt

This file contains a listing of all plant parameter values. It is ready for input into a word processor for viewing or printing.

Shear Stress during Precip Events.txt

This file lists information regarding the potential for slope failure during precipitation events. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

Depth-to-Water.txt

This file lists the average depth-to-water across each community, along with minimum and maximum values for that community. It is "comma delimited" and ready to import into a spreadsheet for viewing, sorting, printing, or graphing.

Grazing Controls using Height-Weight.csv

This file lists total grazed and total ungrazed forage biomasses and percent utilization for each community and for each forage species within each community. If the given utilization value for a community is exceeded, the statement "Exceeded Utilization" is appended to the entry for that community. It is "comma delimited" and ready to import into a spreadsheet for viewing, printing, or graphing.

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Appendices

Appendix A

Landscape Parameters

Table A-1. Landscape-level parameters

Parameter	Value
Locale	'Livestock Grazing, Owens Valley, CA ‘
UnitsOptionSwitch	'English '
NumQuadrats	2419
NumSpecies	40
NumWildlife	6
NumSoils	151
NumLayers	35
NumContaminants	0
NumPrecipFiles	8
GridType	2
GridSizeX	4492
GridSizeY	6992
UTMXMin	510405
UTMXMax	565965
UTMYMin	3276195
UTMYMax	3303105
ScaleFactor	20 * 20
GridCenterDistance	20
GroundwaterFlag	TRUE
RunoffMinimum	0.1
LitterNConcMax	0.50
SoilNConcMax	0.50

Table A-2. Climatic parameters

Month	DEvap	SnowMonth	SnowMelt
January	2.54	0	100
February	3.56	0	100
March	4.83	0	100
April	5.59	0	100
May	6.35	0	100
June	7.87	0	100
July	8.89	0	100
August	8.38	0	100
September	6.35	0	100
October	5.08	0	100
November	3.56	0	100
December	2.03	0	100

Table A-3. Landscape-level plant parameters

Species	SpeciesName Parameter	SpeciesColor Parameter		
		Red	Green	Blue
Jeffrey Pine (*Pinus jeffreyi*)	'PIJE '	0	100	0
Cottonwood (*Populus fremontii*)	'POFR '	0	175	0
Red willow (*Salix laevigata*)	'SALA '	0	250	0
Saltcedar (*Tamarix ramosissima*)	'TARA '	0	0	100
Bursage (*Ambrosia dumosa*)	'AMDU '	0	0	175
Bud sage (*Artemisia spinescens*)	'ARSP '	0	0	250
Big sagebrush (*Artemisia tridentata*)	'ARTR '	100	0	0
Fourwing saltbush (*Atriplex canescens*)	'ATCA '	175	0	0
Shadscale (*Atriplex confertifolia*)	'ATCO '	250	0	0
Nevada saltbush (*Atriplex torryei*)	'ATTO '	150	0	100
Winterfat (*Cerotoides lanata*)	'CELA '	150	0	175
Rabbitbrush (*Chrysothamnus nauseosus*)	'CHNA '	150	0	250
Blackbrush (*Coleogyne ramosissima*)	'CORA '	0	150	100
Morman Tea (*Ephedra nevadensis*)	'EPNE '	0	150	175
Goldenbush (*Ericameria cooperi*)	'ERCO '	0	150	250
Wild buckwheat (*Eriogonum fasciculatum*)	'ERFA '	100	150	0
Burrobush (*Hymenoclea salsola*)	'HYSA '	175	150	0
Indigo bush (*Psorothamnus arborescens*)	'PSAR '	250	150	0
Woods Rose (*Rosa woodsii*)	'ROWO '	100	0	150
Coyote willow (*Salix exigua*)	'SAEX '	175	0	150
Greasewood (*Sarcobatus vermiculatus*)	'SAVE '	250	0	150
Inkweed (*Suaeda torreyana*)	'SUTO '	150	100	0
Horsebrush (*Tetradymia axillaris*)	'TEAX '	150	175	0
Cheatgrass (*Bromus tectorum*)	'BRTE '	150	250	0
Bermudagrass (*Cynodon dactylon*)	'CYDA '	0	100	150
Saltgrass (*Distichlis spicata*)	'DISP '	0	175	150
Creeping Wildrye (*Leymus triticoides*)	'LETR '	0	250	150
Carrizo (*Phragmites australis*)	'PHAU '	100	150	150
Alkali cordgrass (*Spartina gracilis*)	'SPGR '	175	150	150
Sacaton (*Sporobolus airoides*)	'SPAI '	250	150	150
Desert needlegrass (*Stipa speciosa*)	'STSP '	150	100	150
Sedge (*Carex* sp.)	'CARX '	150	175	150
Spikerush (*Eleocharis* sp.)	'ELEO '	150	250	150
Baltic rush (*Juncus balticus*)	'JUBA '	150	150	100
Bulrush (*Scirpus* sp.)	'SCRP '	150	150	175
Cattail (*Typha latifolia*)	'TYLA '	150	150	250
Licorice (*Glycyrrhiza lepidota*)	'GLLE '	200	150	100
Sunflower (*Helianthus annuus*)	'HEAN '	200	150	175
Alfalfa (*Medicago sativa*)	'MESA '	200	150	250
Russian thistle (*Salsola kali*)	'SAKA '	250	100	100

Table A-4. Landscape-level animal parameters

Wildlife Species	AnimalName Parameter	AnimalColor Parameter		
		Red	Green	Blue
Grasshoppers	'Insects '	0	0	255
Small mammals	'Rabbits '	50	50	255
Sheep	'Sheep '	0	250	0
Horses	'Horses '	0	0	0
Cattle	'Cattle '	200	200	0
Tule elk	'Elk '	0	200	200

Appendix B

Plot Type Parameters

Table B-1. Plot-level parameters.

Parameter	Default Value for Each Plot Type
PrecipAdjFactor	1.0
DEvapAdjFactor	1.0
LitterMobilization	1.0
LitWaterCap	0.001
SoilMobilizationFactor	1.0
NumEvapLayers	4
KarstExportRate	0.00
InitialPrecipInfiltRate	1.00

Appendix C

Soil Series Characteristics

Table C-1. Aquents-Aquic torripsamments association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	10.9	19.8	40.6	400.00	32.32
A	25	10.9	19.8	40.6	400.00	32.32
B1	25	8.0	16.3	39.6	200.00	16.16
B1	100	8.0	16.3	39.6	800.00	64.64
B1	150	8.0	16.3	39.6	1200.00	96.96
B1	200	8.0	16.3	39.6	800.00	64.64
B1	225	8.0	16.3	39.6	900.00	72.72
B2	50	1.2	6.4	41.0	85.00	6.87
B2	50	1.2	6.4	41.0	85.00	6.87
B2	100	1.2	6.4	41.0	170.00	13.74
C	100	1.0	5.2	41.8	172.50	13.94
C	200	1.0	5.2	41.8	345.00	27.88
C	250	1.0	5.2	41.8	431.25	34.85

Table C-2. Aquic Torriorthents-Aquents complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.4	11.1	40.4	193.75	15.66
A2	50	5.4	11.1	40.4	387.50	31.31
A2	100	5.4	11.1	40.4	775.00	62.62
A2	150	5.4	11.1	40.4	1162.50	93.93
A2	250	5.4	11.1	40.4	1937.50	156.55
B	75	9.0	17.5	38.8	290.63	23.48
B	100	9.0	17.5	38.8	387.50	31.31
B	150	9.0	17.5	38.8	581.25	46.97
B	150	9.0	17.5	38.8	581.25	46.97
C	100	2.9	7.3	40.4	80.25	6.48
C	100	2.9	7.3	40.4	80.25	6.48
C	100	2.9	7.3	40.4	80.25	6.48
C	150	2.9	7.3	40.4	120.38	9.73

Table C-3. Aquic Torriorthents-Aquents-Cashbaugh association, 0 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.0	9.8	40.8	193.75	15.66
A2	50	3.0	9.8	40.8	387.50	31.31
A2	100	3.0	9.8	40.8	775.00	62.62
A2	150	3.0	9.8	40.8	1162.50	93.93
A2	250	3.0	9.8	40.8	1937.50	156.55
B	75	9.7	19.1	38.9	290.63	23.48
B	100	9.7	19.1	38.9	387.50	31.31
B	150	9.7	19.1	38.9	581.25	46.97
B	150	9.7	19.1	38.9	581.25	46.97
C	100	1.1	7.0	40.5	80.25	6.48
C	100	1.1	7.0	40.5	80.25	6.48
C	100	1.1	7.0	40.5	80.25	6.48
C	150	1.1	7.0	40.5	120.38	9.73

Table C-4. Aquic Torriorthents-Aquic Torripsamments complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.4	11.1	40.4	193.75	15.66
A2	50	5.4	11.1	40.4	387.50	31.31
A2	100	5.4	11.1	40.4	775.00	62.62
A2	150	5.4	11.1	40.4	1162.50	93.93
A2	250	5.4	11.1	40.4	1937.50	156.55
B	75	9.0	17.5	38.8	290.63	23.48
B	100	9.0	17.5	38.8	387.50	31.31
B	150	9.0	17.5	38.8	581.25	46.97
B	150	9.0	17.5	38.8	581.25	46.97
C	100	2.9	7.3	40.4	80.25	6.48
C	100	2.9	7.3	40.4	80.25	6.48
C	100	2.9	7.3	40.4	80.25	6.48
C	150	2.9	7.3	40.4	120.38	9.73

Table C-5. Arizo-Yellowrock complex, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	3.1	9.1	25.6	196.88	15.91
A	75	3.1	9.1	25.6	555.19	44.86
A	75	3.1	9.1	25.6	519.75	42.00
A	75	3.1	9.1	25.6	472.50	38.18
C1	125	2.5	6.5	21.4	763.13	61.66
C1	125	2.5	6.5	21.4	701.25	56.66
C1	125	2.5	6.5	21.4	618.75	50.00
C2	125	3.1	9.1	25.6	531.56	42.95
C2	150	2.5	6.5	21.4	569.25	46.00
C2	150	2.5	6.5	21.4	495.00	40.00
C2	150	2.5	6.5	21.4	371.25	30.00
C2	150	2.5	6.5	21.4	247.50	20.00
C2	150	2.5	6.5	21.4	123.75	10.00

Table C-6. Avalmount-Lava flows complex, 5 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.0	14.2	41.1	406.25	32.83
A	75	6.0	14.2	41.1	1218.75	98.48
A	150	6.0	14.2	41.1	2437.50	196.95
2Bw1	50	7.9	19.5	40.4	562.50	45.45
2Bw1	75	7.9	19.5	40.4	843.75	68.18
2Bw1	100	7.9	19.5	40.4	1125.00	90.90
2Bw1	100	5.5	16.1	40.5	1125.00	90.90
2Bw1	175	5.5	16.1	40.5	1968.75	159.08
2Bw2	100	3.4	14.2	39.7	787.50	63.63
2Bw2	150	3.4	14.2	39.7	1181.25	95.45
2Bw2	150	3.4	14.2	39.7	1181.25	95.45
2Bw2	150	2.7	12.3	40.1	1181.25	95.45
2Bw2	200	2.7	12.3	40.1	1575.00	127.26

Table C-7. Badland

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	1.9	6.1	3.4	43.50	3.51
A	25	1.9	6.1	3.4	43.50	3.51
B	50	1.7	4.3	32.1	90.00	7.27
B	75	1.7	4.3	32.1	135.00	10.91
B	100	1.7	4.3	32.1	180.00	14.54
B	150	1.7	4.3	32.1	270.00	21.82
B	200	1.7	4.3	32.1	360.00	29.09
C	75	0.3	1.3	28.4	142.50	11.51
C	100	0.3	1.3	28.4	190.00	15.35
C	125	0.3	1.3	28.4	237.50	19.19
C	150	0.3	1.3	28.4	285.00	23.03
C	200	0.3	1.3	28.4	380.00	30.70
C	225	0.3	1.3	28.4	427.50	34.54

Table C-8. Bairs bouldery loamy coarse sand, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.8	13.6	45.1	412.50	33.33
A	75	6.8	13.6	45.1	1206.60	97.49
A	100	6.8	13.6	45.1	1567.50	126.65
A	150	6.8	13.6	45.1	2289.40	184.98
A	150	6.8	13.6	45.1	2227.50	179.98
Bt	100	10.3	18.9	44.0	1400.00	113.12
Bt	125	10.3	18.9	44.0	1700.00	137.36
Bt	125	10.3	18.9	44.0	1650.00	133.32
Bt	125	10.3	18.9	44.0	1600.00	129.28
Bt	125	10.3	18.9	44.0	1550.00	125.24
C	130	6.8	12.5	45.1	1608.80	129.99
C	130	6.8	12.5	45.1	1555.10	125.65
C	140	6.8	12.5	45.1	1617.00	130.65

Table C-9. Bairs-Kilburn family complex, 8 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	4.0	11.4	44.9	825.00	66.66
A1	75	4.0	11.4	44.9	2475.00	199.98
A2	75	2.8	9.5	44.0	1856.25	149.99
A2	125	2.8	9.5	44.0	3093.75	249.98
Bt1	100	7.2	16.5	42.3	1600.00	129.28
Bt1	100	7.2	16.5	42.3	1600.00	129.28
Bt1	125	7.2	16.5	42.3	2000.00	161.60
Bt1	150	7.2	16.5	42.3	2400.00	193.92
Bt2	125	10.6	18.0	41.4	1000.00	80.80
Bt2	200	10.6	18.0	41.4	1600.00	129.28
C	100	7.1	14.3	42.3	160.00	12.93
C	150	7.1	14.3	42.3	240.00	19.39
C	150	7.1	14.3	42.3	240.00	19.39

Table C-10. Berent-Glenbrook-Nanamkin families association, 30 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	4.5	10.4	46.5	206.30	16.67
A1	25	4.5	10.4	46.5	185.60	15.00
A2	75	5.3	11.2	46.0	495.00	40.00
A2	100	5.3	11.2	46.0	577.50	46.66
A2	100	5.3	11.2	46.0	495.00	40.00
C	125	5.3	11.5	45.9	515.60	41.66
C	125	5.3	11.5	45.9	443.40	35.83
C	125	5.3	11.5	45.9	371.30	30.00
C	150	5.3	11.5	45.9	358.90	29.00
C	150	5.3	11.5	45.9	272.30	22.00
C	150	5.3	11.5	45.9	185.60	15.00
C	150	5.3	11.5	45.9	99.00	8.00
C	200	5.3	11.5	45.9	33.00	2.67

Table C-11. Blindspring gravelly loamy sand, dry, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.5	16.0	36.6	189.06	15.28
A2	50	7.6	17.8	38.9	330.00	26.66
C	100	5.9	15.1	35.2	577.50	46.66
C	100	5.9	15.1	35.2	522.50	42.22
C	100	5.9	15.1	35.2	467.50	37.77
C	100	5.9	15.1	35.2	385.00	31.11
C	125	5.9	15.1	35.2	378.13	30.55
C	125	5.9	15.1	35.2	275.00	22.22
C	125	5.9	15.1	35.2	206.25	16.67
C	125	6.2	14.9	36.3	154.69	12.50
C	175	6.2	14.9	36.3	192.50	15.55
C	175	6.2	14.9	36.3	168.44	13.61
C	175	6.2	14.9	36.3	144.38	11.67

Table C-12. Brantel gravelly coarse sand, 2 to 8 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	0.8	4.8	43.2	171.88	13.89
A	25	0.8	4.8	43.2	171.88	13.89
C1	50	0.9	7.6	40.9	137.50	11.11
C1	125	0.9	7.6	40.9	343.75	27.78
C1	125	0.9	7.6	40.9	343.75	27.78
C1	150	0.9	7.6	40.9	412.50	33.33
C1	150	0.9	7.6	40.9	412.50	33.33
C1	150	0.9	7.6	40.9	412.50	33.33
C2	100	0.4	4.9	42.1	137.50	11.11
C2	125	0.4	4.9	42.1	171.88	13.89
C2	125	0.4	4.9	42.1	171.88	13.89
C2	150	0.4	4.9	42.1	206.25	16.67
C2	200	0.4	4.9	42.1	275.00	22.22

Table C-13. Brantel gravelly loamy sand, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	10.0	76.0	48.0	171.88	13.89
A	25	10.0	76.0	48.0	171.88	13.89
C1	50	1.2	9.6	47.2	137.50	11.11
C1	125	1.2	9.6	47.2	343.75	27.78
C1	125	1.2	9.6	47.2	343.75	27.78
C1	150	1.2	9.6	47.2	412.50	33.33
C1	150	1.2	9.6	47.2	412.50	33.33
C1	150	1.2	9.6	47.2	412.50	33.33
C2	100	0.4	4.9	41.9	137.50	11.11
C2	125	0.4	4.9	41.9	171.88	13.89
C2	125	0.4	4.9	41.9	171.88	13.89
C2	150	0.4	4.9	41.9	206.25	16.67
C2	200	0.4	4.9	41.9	275.00	22.22

Table C-14. Buscones very gravelly loamy sand, 2 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	0.1	6.5	42.4	171.88	13.89
A2	50	0.9	8.3	40.6	137.50	11.11
A2	75	0.9	8.3	40.6	206.25	16.67
A2	100	0.9	8.3	40.6	275.00	22.22
A2	100	0.9	8.3	40.6	275.00	22.22
A2	100	0.9	8.3	40.6	275.00	22.22
C	50	0.7	7.3	40.8	68.75	5.56
C	50	0.7	7.3	40.8	68.75	5.56
C	75	0.7	7.3	40.8	103.13	8.33
C	75	0.7	7.3	40.8	103.13	8.33
C	75	0.7	7.3	40.8	103.13	8.33
Cr	50	0.0	0.0	0.1	0.12	0.01
Cr	50	0.0	0.0	0.1	0.12	0.01

Table C-15. Buscones-Cashbaugh-Rock outcrop association, 0 to 8 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	0.6	6.2	41.4	68.75	5.56
A1	50	0.6	6.2	41.4	137.50	11.11
A1	75	0.6	6.2	41.4	206.25	16.67
A1	100	0.6	6.2	41.4	275.00	22.22
A1	100	0.6	6.2	41.4	275.00	22.22
A1	100	0.6	6.2	41.4	275.00	22.22
C	50	0.8	7.7	40.5	68.75	5.56
C	50	0.8	7.7	40.5	68.75	5.56
C	75	0.8	7.7	40.5	103.13	8.33
C	75	0.8	7.7	40.5	103.13	8.33
C	75	0.8	7.7	40.5	103.13	8.33
Cr	50	0.0	0.0	0.1	0.12	0.01
Cr	50	0.0	0.0	0.1	0.12	0.01

Table C-16. Cajon loamy sand, stratified substratum, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.5	10.9	46.4	412.50	33.33
A	75	4.5	10.9	46.4	1188.00	95.99
A	125	4.5	10.9	46.4	1897.50	153.32
A	150	4.5	10.9	46.4	2178.00	175.98
C1	125	4.5	10.9	46.4	1811.30	146.35
C1	125	4.5	10.9	46.4	1725.00	139.38
C1	125	4.5	10.9	46.4	1638.80	132.41
C1	125	4.5	10.9	46.4	1552.50	125.44
C1	125	4.5	10.9	46.4	1466.30	118.47
C2	125	6.9	14.0	45.1	1280.00	103.42
C2	125	6.9	14.0	45.1	1200.00	96.96
C2	150	6.9	14.0	45.1	1320.00	106.66
C3	100	3.8	8.8	47.0	837.50	67.67

Table C-17. Cajon gravelly loamy sand, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.9	9.9	46.8	431.30	34.85
A2	50	3.9	9.9	46.8	828.00	66.90
C1	100	3.9	9.9	46.8	1587.00	128.23
C1	120	3.9	9.9	46.8	1821.60	147.19
C1	130	3.9	9.9	46.8	1883.70	152.20
C1	130	3.9	9.9	46.8	1794.00	144.96
C1	160	3.9	9.9	46.8	2097.60	169.49
C1	160	3.9	9.9	46.8	1987.20	160.57
C2	125	3.9	9.9	46.8	1466.30	118.47
C2	125	3.9	9.9	46.8	1380.00	111.50
C2	125	3.9	9.9	46.8	1293.80	104.54
C2	125	3.9	9.9	46.8	1185.90	95.82
C2	125	3.9	9.9	46.8	1078.10	87.11

Table C-18. Cajon-Mazourka complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.8	14.3	39.6	202.50	20.25
A	25	4.8	14.3	39.6	186.30	18.95
C1	50	10.4	14.4	36.2	359.10	37.28
C1	75	10.4	14.4	36.2	436.05	47.71
C2	75	10.4	14.4	36.2	315.50	38.06
C2	75	10.4	14.4	36.2	262.91	33.86
C3	75	11.7	18.0	40.3	196.80	27.74
C4	100	11.7	18.0	40.3	227.20	34.18
C4	125	11.7	18.0	40.3	250.00	40.00
C5	150	16.4	26.0	47.4	218.90	38.66
C5	175	16.4	26.0	47.4	198.63	40.57
C6	175	18.5	25.6	46.3	138.60	36.29
C7	375	13.9	18.2	46.3	180.90	68.47

Table C-19. Cajon-Mazourka-Eclipse complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	3.8	8.6	47.0	209.40	16.92
A	50	3.8	8.6	47.0	376.90	30.45
2BAtn	75	9.2	19.4	44.7	465.00	37.57
2BAtn	100	9.2	19.4	44.7	542.50	43.83
2Btn	125	11.5	22.4	44.5	562.50	45.45
2BCtn	100	7.5	17.0	45.0	400.00	32.32
2BCtn	125	7.5	17.0	45.0	430.00	34.74
C	100	5.0	10.5	46.1	297.00	24.00
C	100	5.0	10.5	46.1	239.30	19.33
C	150	5.0	10.5	46.1	272.30	22.00
C	150	5.0	10.5	46.1	185.60	15.00
C	200	5.0	10.5	46.1	132.00	10.67
C	200	5.0	10.5	46.1	33.00	2.67

Table C-20. Cajon-Typic Torriorthents complex, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.2	11.8	45.9	212.50	17.17
A	50	6.2	11.8	45.9	382.50	30.91
A	75	6.2	11.8	45.9	510.00	41.21
C1	100	6.2	11.5	45.9	595.00	48.08
C1	100	6.2	11.5	45.9	510.00	41.21
C1	125	6.2	11.5	45.9	531.30	42.93
C1	125	6.2	11.5	45.9	456.90	36.92
C2	125	3.8	7.9	47.3	393.80	31.82
C2	125	3.8	7.9	47.3	317.20	25.63
C2	150	3.8	7.9	47.3	288.80	23.33
C2	150	3.8	7.9	47.3	196.90	15.91
C2	175	3.8	7.9	47.3	122.50	9.90
C2	175	3.8	7.9	47.3	30.60	2.47

Table C-21. Cambidic Haplodurids-Typic Haplodurids association, cool, 5 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	7.4	14.8	38.2	193.75	15.66
A	25	9.7	19.3	41.9	174.38	14.09
A	50	9.7	19.3	41.9	310.00	25.05
A	75	9.7	19.3	41.9	406.88	32.88
C1	100	9.7	19.3	41.9	465.00	37.57
C1	75	0.1	0.2	0.4	18.22	1.47
C1	100	0.1	0.2	0.4	18.22	1.47
C1	150	5.2	12.6	34.4	581.25	46.97
C1	150	5.2	12.6	34.4	465.00	37.57
C2	150	5.2	12.6	34.4	232.50	18.79
C2	200	5.2	12.6	34.4	279.00	22.54
C2	200	5.2	12.6	34.4	248.00	20.04
C3	200	5.2	12.6	34.4	93.00	7.51

Table C-22. Cartago gravelly loamy coarse sand, 5 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.2	12.0	45.4	206.30	16.67
A	100	6.2	12.0	45.4	742.50	59.99
A	125	6.2	12.0	45.4	825.00	66.66
C1	110	6.2	12.0	45.4	635.30	51.33
C1	120	6.2	12.0	45.4	594.00	48.00
C1	120	6.2	12.0	45.4	495.00	40.00
C1	125	6.2	12.0	45.4	443.40	35.83
C1	125	6.2	12.0	45.4	371.30	30.00
C1	125	6.2	12.0	45.4	299.10	24.16
C1	125	6.2	12.0	45.4	226.90	18.33
C2	125	6.2	12.0	45.4	154.70	12.50
C2	125	6.2	12.0	45.4	82.50	6.67
C2	150	6.2	12.0	45.4	24.80	2.00

Table C-23. Cartago gravelly loamy coarse sand, moist, 5 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.2	12.0	45.4	206.30	16.67
A	100	6.2	12.0	45.4	742.50	59.99
A	125	6.2	12.0	45.4	825.00	66.66
C1	110	6.2	12.0	45.4	635.30	51.33
C1	120	6.2	12.0	45.4	594.00	48.00
C1	120	6.2	12.0	45.4	495.00	40.00
C1	125	6.2	12.0	45.4	443.40	35.83
C1	125	6.2	12.0	45.4	371.30	30.00
C1	125	6.2	12.0	45.4	299.10	24.16
C1	125	6.2	12.0	45.4	226.90	18.33
C2	125	6.2	12.0	45.4	154.70	12.50
C2	125	6.2	12.0	45.4	82.50	6.67
C2	150	6.2	12.0	45.4	24.80	2.00

Table C-24. Cartago gravelly loamy sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.0	11.3	30.5	200.00	16.16
A	25	4.0	11.3	30.5	180.00	14.54
A	50	4.0	11.3	30.5	320.00	25.86
A	50	4.0	11.3	30.5	304.00	24.56
A	100	4.0	11.3	30.5	544.00	43.96
A	100	4.0	11.3	30.5	480.00	38.78
C1	100	3.8	10.4	30.2	384.00	31.03
C1	125	3.8	10.4	30.2	420.00	33.94
C1	125	3.8	10.4	30.2	300.00	24.24
C1	125	3.8	10.4	30.2	240.00	19.39
C2	250	7.6	15.5	38.6	387.50	31.31
C2	250	7.6	15.5	38.6	155.00	12.52
C3	175	4.9	13.1	33.1	56.00	4.52

Table C-25. Cartago gravelly loamy sand, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.0	11.3	30.5	200.00	16.16
A	25	4.0	11.3	30.5	180.00	14.54
A	50	4.0	11.3	30.5	320.00	25.86
A	50	4.0	11.3	30.5	304.00	24.56
A	100	4.0	11.3	30.5	544.00	43.96
A	100	4.0	11.3	30.5	480.00	38.78
C1	100	3.8	10.4	30.2	384.00	31.03
C1	125	3.8	10.4	30.2	420.00	33.94
C1	125	3.8	10.4	30.2	300.00	24.24
C1	125	3.8	10.4	30.2	240.00	19.39
C2	250	7.6	15.5	38.6	387.50	31.31
C2	250	7.6	15.5	38.6	155.00	12.52
C3	175	4.9	13.1	33.1	56.00	4.52

Table C-26. Cashbaugh-Buscones complex, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.3	9.2	42.6	375.00	30.30
A2	25	2.9	8.9	41.2	187.50	15.15
A2	25	2.9	8.9	41.2	187.50	15.15
A2	25	2.9	8.9	41.2	187.50	15.15
A2	50	2.9	8.9	41.2	375.00	30.30
A2	50	2.9	8.9	41.2	375.00	30.30
A2	50	2.9	8.9	41.2	375.00	30.30
A2	75	2.9	8.9	41.2	562.50	45.45
2R	25	0.0	0.0	0.1	0.06	0.01
2R	25	0.0	0.0	0.1	0.06	0.01
2R	25	0.0	0.0	0.1	0.06	0.01
2R	50	0.0	0.0	0.1	0.12	0.01
2R	50	0.0	0.0	0.1	0.12	0.01

Table C-27. Cashbaugh-Buscones-Calpine family complex, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.3	9.2	42.6	375.00	30.30
A2	25	2.9	8.9	41.2	187.50	15.15
A2	25	2.9	8.9	41.2	187.50	15.15
A2	25	2.9	8.9	41.2	187.50	15.15
A2	50	2.9	8.9	41.2	375.00	30.30
A2	50	2.9	8.9	41.2	375.00	30.30
A2	50	2.9	8.9	41.2	375.00	30.30
A2	75	2.9	8.9	41.2	562.50	45.45
2R	25	0.0	0.0	0.1	0.06	0.01
2R	25	0.0	0.0	0.1	0.06	0.01
2R	25	0.0	0.0	0.1	0.06	0.01
2R	50	0.0	0.0	0.1	0.12	0.01
2R	50	0.0	0.0	0.1	0.12	0.01

Table C-28. Chidago gravelly loamy sand, 2 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	1.1	7.6	4.2	171.88	13.89
A2	25	2.9	8.0	40.5	68.75	5.56
A2	50	0.9	8.0	40.5	137.50	11.11
A2	50	0.9	8.0	40.5	137.50	11.11
A2	50	0.9	8.0	40.5	137.50	11.11
C	50	0.7	7.0	40.7	68.75	5.56
C	75	0.7	7.0	40.7	103.13	8.33
C	75	0.7	7.0	40.7	103.13	8.33
C	100	0.7	7.0	40.7	137.50	11.11
C	125	0.7	7.0	40.7	171.88	13.89
C	125	0.7	7.0	40.7	171.88	13.89
C	150	0.7	7.0	40.7	206.25	16.67
Cr	100	0.0	0.0	0.1	0.25	0.02

Table C-29. Conway sandy loam, 0 to 8 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.9	26.1	51.0	1400.00	113.12
A1	25	9.9	26.1	51.0	1400.00	113.12
A1	50	9.9	26.1	51.0	2800.00	226.24
A2	75	10.2	22.3	46.4	3150.00	254.52
A2	125	10.2	22.3	46.4	5250.00	424.20
A3	100	9.9	19.5	43.1	2800.00	226.24
A3	150	9.9	19.5	43.1	4200.00	339.36
A3	150	9.9	19.5	43.1	4200.00	339.36
C	150	2.9	14.9	41.0	2100.00	169.68
C	200	6.7	14.9	41.0	2800.00	226.24
Cg	150	6.9	19.1	41.0	1050.00	84.84
Cg	150	6.9	19.1	41.0	1050.00	84.84
Cg	150	6.9	19.1	41.0	1050.00	84.84

Table C-30. Conway-Aquents-Watterson complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.9	26.1	51.0	1400.00	113.12
A1	25	9.9	26.1	51.0	1400.00	113.12
A1	50	9.9	26.1	51.0	2800.00	226.24
A2	75	10.2	22.3	46.4	3150.00	254.52
A2	125	10.2	22.3	46.4	5250.00	424.20
A3	100	9.9	19.5	43.1	2800.00	226.24
A3	150	9.9	19.5	43.1	4200.00	339.36
A3	150	9.9	19.5	43.1	4200.00	339.36
C	150	2.9	14.9	41.0	2100.00	169.68
C	200	6.7	14.9	41.0	2800.00	226.24
Cg	150	12.1	21.5	40.7	1050.00	84.84
Cg	150	12.1	21.5	40.7	1050.00	84.84
Cg	150	12.1	21.5	40.7	1050.00	84.84

Table C-31. Conway-Watterson complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	8.1	20.3	40.1	1400.00	113.12
A1	25	8.1	20.3	40.1	1400.00	113.12
A1	50	8.1	20.3	40.1	2800.00	226.24
A2	75	6.5	13.0	41.2	3150.00	254.52
A2	125	6.5	13.0	41.2	5250.00	424.20
A3	100	8.4	15.7	40.7	2800.00	226.24
A3	150	8.4	15.7	40.7	4200.00	339.36
A3	150	8.4	15.7	40.7	4200.00	339.36
C	150	2.9	14.7	40.8	2100.00	169.68
C	200	7.8	14.7	40.8	2800.00	226.24
Cg	150	6.4	11.5	41.4	1125.00	90.90
Cg	150	6.4	11.5	41.4	1125.00	90.90
Cg	150	6.4	11.5	41.4	1125.00	90.90

Table C-32. Cozetica gravelly coarse sand, 0 to 8 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	1.4	5.7	44.2	750.00	60.60
A2	100	2.9	7.8	43.2	3000.00	242.40
C1	75	1.6	7.4	43.4	2250.00	181.80
C1	125	1.6	7.4	43.4	3750.00	303.00
2C2	100	17.0	8.3	43.0	1500.00	121.20
2C3	100	1.6	7.0	43.6	1500.00	121.20
2C3	125	1.6	7.0	43.6	1875.00	151.50
3C4	100	14.0	5.7	44.2	750.00	60.60
3C5	125	1.5	6.8	43.7	937.50	75.75
4C6	150	0.7	6.8	40.8	225.00	18.18
4C6	150	0.7	6.8	40.8	225.00	18.18
4C6	200	0.7	6.8	40.8	300.00	24.24
5C7	125	0.6	6.1	41.2	187.50	15.15

Table C-33. Dechambeau gravelly sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.9	8.0	41.5	200.00	16.16
A1	50	2.9	8.0	41.5	400.00	32.32
A2	50	2.9	9.1	41.0	400.00	32.32
A2	50	46.0	9.1	41.0	400.00	32.32
C1	50	3.4	7.3	41.7	160.00	12.93
C1	100	3.4	7.3	41.7	320.00	25.86
C1	100	3.4	7.3	41.7	320.00	25.86
C2	100	3.6	7.8	40.5	160.00	12.93
C2	100	3.6	7.8	40.5	160.00	12.93
C3	125	2.3	6.3	41.2	200.00	16.16
C3	200	2.3	6.3	41.2	320.00	25.86
C3	250	2.3	6.3	41.2	400.00	32.32
C3	300	2.3	6.3	41.2	480.00	38.78

Table C-34. Dechambeau gravelly sandy loam, 2 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.9	8.0	41.5	200.00	16.16
A1	50	2.9	8.0	41.5	400.00	32.32
A2	50	2.9	9.1	41.0	400.00	32.32
A2	50	46.0	9.1	41.0	400.00	32.32
C1	50	3.4	7.3	41.7	160.00	12.93
C1	100	3.4	7.3	41.7	320.00	25.86
C1	100	3.4	7.3	41.7	320.00	25.86
C2	100	3.6	7.8	40.5	160.00	12.93
C2	100	3.6	7.8	40.5	160.00	12.93
C3	125	2.3	6.3	41.2	200.00	16.16
C3	200	2.3	6.3	41.2	320.00	25.86
C3	250	2.3	6.3	41.2	400.00	32.32
C3	300	2.3	6.3	41.2	480.00	38.78

Table C-35. Dehy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap	25	10.0	25.0	44.0	1575.00	127.26
Ap	25	10.0	25.0	44.0	1391.25	112.41
Ap	50	10.0	25.0	44.0	2467.50	199.37
A1	50	11.0	27.0	46.0	2100.00	169.68
A1	75	11.0	27.0	46.0	2441.25	197.25
A1	75	11.0	27.0	46.0	1653.75	133.62
A2	75	12.0	24.0	45.0	1800.00	145.44
A2	100	12.0	24.0	45.0	1800.00	145.44
Bw	175	9.0	22.0	42.0	2362.50	190.89
Bw	175	9.0	22.0	42.0	2100.00	169.68
Bw	175	9.0	22.0	42.0	1575.00	127.26
2C	250	9.0	22.0	42.0	1125.00	90.90
2C	250	9.0	22.0	42.0	562.50	45.45

Table C-36. Dehy sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap	25	13.0	23.0	40.0	2100.00	169.68
Ap	25	13.0	23.0	40.0	1837.50	148.47
Ap	50	13.0	23.0	40.0	3150.00	254.52
A1	50	13.0	23.0	40.0	2625.00	212.10
A1	75	13.0	23.0	40.0	3150.00	254.52
A1	75	13.0	23.0	40.0	2362.50	190.89
A2	75	13.0	23.0	40.0	1575.00	127.26
A2	75	13.0	23.0	40.0	787.50	63.63
Bw	200	16.0	29.0	45.0	2600.00	210.08
Bw	200	16.0	29.0	45.0	2275.00	183.82
Bw	200	16.0	29.0	45.0	1950.00	157.56
2C	225	7.0	15.0	32.0	1856.25	149.99
2C	225	7.0	15.0	32.0	1485.00	119.99

Table C-37. Dehy sandy loam, loamy substratum, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap	25	12.8	24.9	53.7	1575.00	127.26
Ap	75	12.8	24.9	53.7	4725.00	381.78
A1	50	12.7	22.8	47.4	2100.00	169.68
A1	75	12.7	22.8	47.4	3150.00	254.52
A1	75	12.7	22.8	47.4	3150.00	254.52
A2	75	10.5	18.8	42.7	1575.00	127.26
A2	75	10.5	18.8	42.7	1575.00	127.26
Bw	100	14.4	24.7	39.4	150.00	12.12
Bw	200	14.4	24.7	39.4	300.00	24.24
Bw	275	14.4	24.7	39.4	412.50	33.33
C	100	6.8	12.5	39.0	150.00	12.12
C	175	6.8	12.5	39.0	262.50	21.21
C	200	6.8	12.5	39.0	300.00	24.24

Table C-38. Dehy-Conway-Lubkin association, 0 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	9.8	23.8	43.7	1391.30	112.41
A	25	9.8	23.8	43.7	1181.30	95.45
A	50	9.8	23.8	43.7	2100.00	169.68
A	75	11.3	22.0	44.2	3825.00	309.06
A	75	11.3	22.0	44.2	2812.50	227.25
C1	100	11.0	19.9	42.7	3200.00	258.56
C1	100	11.0	19.9	42.7	2400.00	193.92
C1	100	11.0	19.9	42.7	1600.00	129.28
C1	100	11.0	19.9	42.7	1280.00	103.42
C2	125	7.6	15.5	38.6	1443.80	116.66
C2	125	7.6	15.5	38.6	1237.50	99.99
C2	300	5.2	12.6	34.4	1980.00	159.98
C2	300	5.2	12.6	34.4	1485.00	119.99

Table C-39. Dehy-Dehy calcareous complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap	25	12.8	24.9	53.7	1575.00	127.26
Ap	75	12.8	24.9	53.7	4725.00	381.78
A1	50	2.9	22.8	47.4	2100.00	169.68
A1	75	12.7	22.8	47.4	3150.00	254.52
A1	75	12.7	22.8	47.4	3150.00	254.52
A2	75	10.5	18.8	42.7	1575.00	127.26
A2	75	10.5	18.8	42.7	1575.00	127.26
Bw	100	14.4	24.7	39.4	50.00	12.12
Bw	200	14.4	24.7	39.4	300.00	24.24
Bw	275	14.4	24.7	39.4	412.50	33.33
C	100	6.8	12.5	39.0	150.00	12.12
C	175	6.8	12.5	39.0	262.50	21.21
C	200	6.8	12.5	39.0	300.00	24.24

Table C-40. Division-Numu complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
An1	25	8.7	28.9	41.2	775.00	62.62
An1	25	8.7	28.9	41.2	581.30	46.97
An2	100	7.9	19.6	39.5	1575.00	127.26
An3	125	7.9	19.6	39.5	1082.80	87.49
2Bqkm	175	0.1	0.2	0.4	11.00	0.89
2Btnq	100	13.5	28.8	48.4	427.50	34.54
2Btnq	100	13.5	28.8	48.4	285.00	23.03
2Btn	125	13.5	28.8	48.4	320.60	25.91
2Bt	75	13.5	28.8	48.4	160.30	12.95
3C1	100	14.6	27.8	48.1	158.60	12.81
3C2	100	11.2	23.9	45.1	126.00	10.18
3C2	200	11.2	23.9	45.1	126.00	10.18
4C3	375	11.2	23.9	45.1	59.10	4.77

Table C-41. Fluvaquentic Endoaquolls-Xerofluvents complex, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	12.2	12.2	39.3	1500.00	121.20
A	75	12.2	12.2	39.3	4500.00	363.60
A	100	12.2	12.2	39.3	6000.00	484.80
A	100	12.2	12.2	39.3	6000.00	484.80
B	100	3.7	3.7	39.3	4800.00	387.84
B	125	3.7	3.7	39.3	6000.00	484.80
B	125	3.7	3.7	39.3	6000.00	484.80
B	250	3.7	3.7	39.3	12000.00	969.60
C1	100	15.1	15.1	40.4	3000.00	242.40
C1	125	15.1	15.1	40.4	3750.00	303.00
C2	100	0.9	0.9	39.0	1650.00	133.32
C2	150	0.9	0.9	39.0	2475.00	199.98
C3	125	16.6	16.6	44.0	937.50	75.75

Table C-42. Goodale loamy coarse sand, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.6	11.6	34.4	412.50	33.33
A2	25	6.6	11.6	34.4	371.25	30.00
A2	50	6.6	11.6	34.4	660.00	53.33
A2	50	6.6	11.6	34.4	594.00	48.00
A2	75	6.6	11.6	34.4	767.25	61.99
A2	75	6.6	11.6	34.4	668.25	53.99
C	100	6.5	10.3	34.2	703.50	56.84
C	100	6.5	10.3	34.2	536.00	43.31
C	150	6.5	10.3	34.2	753.75	60.90
C	150	6.5	10.3	34.2	703.50	56.84
C	200	6.5	10.3	34.2	670.00	54.14
C	225	6.5	10.3	34.2	376.88	30.45
C	275	6.5	10.3	34.2	230.31	18.61

Table C-43. Goodale-Cartago complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.8	12.1	45.1	412.50	33.33
A1	25	6.8	12.1	45.1	396.00	32.00
A2	75	6.8	10.9	45.5	1138.50	91.99
A2	75	6.8	10.9	45.5	1089.00	87.99
A2	100	6.8	10.9	45.5	1386.00	111.99
A2	100	6.8	10.9	45.5	1320.00	106.66
C	75	6.2	9.2	46.3	940.50	75.99
C	75	6.2	9.2	46.3	891.00	71.99
C	150	6.2	9.2	46.3	1683.00	135.99
C	150	6.2	9.2	46.3	1584.00	127.99
C	150	6.2	9.2	46.3	1485.00	119.99
C	250	6.2	9.2	46.3	2268.80	183.32
C	250	6.2	9.2	46.3	2062.50	166.65

Table C-44. Goodale-Cartago complex, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.8	12.1	45.1	412.50	33.33
A1	25	6.8	12.1	45.1	396.00	32.00
A2	75	6.8	10.9	45.5	1138.50	91.99
A2	75	6.8	10.9	45.5	1089.00	87.99
A2	100	6.8	10.9	45.5	1386.00	111.99
A2	100	6.8	10.9	45.5	1320.00	106.66
C	75	6.2	9.2	46.3	940.50	75.99
C	75	6.2	9.2	46.3	891.00	71.99
C	150	6.2	9.2	46.3	1683.00	135.99
C	150	6.2	9.2	46.3	1584.00	127.99
C	150	6.2	9.2	46.3	1485.00	119.99
C	250	6.2	9.2	46.3	2268.80	183.32
C	250	6.2	9.2	46.3	2062.50	166.65

Table C-45. Goodale-Cartago complex, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.0	10.0	32.0	206.25	16.67
A2	25	5.0	10.0	32.0	185.63	15.00
A2	50	5.0	10.0	32.0	330.00	26.66
A2	50	5.0	10.0	32.0	288.75	23.33
A2	75	5.0	10.0	32.0	371.25	30.00
A2	75	5.0	10.0	32.0	309.38	25.00
C	100	4.0	11.0	33.0	330.00	26.66
C	100	4.0	11.0	33.0	297.00	24.00
C	150	4.0	11.0	33.0	396.00	32.00
C	150	4.0	11.0	33.0	371.25	30.00
C	200	4.0	11.0	33.0	462.00	37.33
C	225	6.0	9.0	31.0	334.13	27.00
C	275	6.0	9.0	31.0	363.00	29.33

Table C-46. Goodale-Cartago complex, moist, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.8	12.1	45.1	412.50	33.33
A1	25	6.8	12.1	45.1	396.00	32.00
A2	75	6.8	10.9	45.5	1138.50	91.99
A2	75	6.8	10.9	45.5	1089.00	87.99
A2	100	6.8	10.9	45.5	1386.00	111.99
A2	100	6.8	10.9	45.5	1320.00	106.66
C	75	6.2	9.2	46.3	940.50	75.99
C	75	6.2	9.2	46.3	891.00	71.99
C	150	6.2	9.2	46.3	1683.00	135.99
C	150	6.2	9.2	46.3	1584.00	127.99
C	150	6.2	9.2	46.3	1485.00	119.99
C	250	6.2	9.2	46.3	2268.80	183.32
C	250	6.2	9.2	46.3	2062.50	166.65

Table C-47. Goodale-Cartago complex, moist, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.8	12.1	45.1	412.50	33.33
A1	25	6.8	12.1	45.1	396.00	32.00
A2	75	6.8	10.9	45.5	1138.50	91.99
A2	75	6.8	10.9	45.5	1089.00	87.99
A2	100	6.8	10.9	45.5	1386.00	111.99
A2	100	6.8	10.9	45.5	1320.00	106.66
C	75	6.2	9.2	46.3	940.50	75.99
C	75	6.2	9.2	46.3	891.00	71.99
C	150	6.2	9.2	46.3	1683.00	135.99
C	150	6.2	9.2	46.3	1584.00	127.99
C	150	6.2	9.2	46.3	1485.00	119.99
C	250	6.2	9.2	46.3	2268.80	183.32
C	250	6.2	9.2	46.3	2062.50	166.65

Table C-48. Harrel sandy loam, 0 to 8 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	7.3	15.7	39.6	193.75	15.66
A1	75	7.3	15.7	39.6	581.25	46.97
C1	75	10.4	19.5	39.5	465.00	37.57
C1	100	10.4	19.5	39.5	620.00	50.10
C1	100	10.4	19.5	39.5	620.00	50.10
C1	125	10.4	19.5	39.5	775.00	62.62
C2	100	10.9	19.3	39.2	465.00	37.57
C2	150	10.9	19.3	39.2	697.50	56.36
C2	150	10.9	19.3	39.2	697.50	56.36
2Btq1	200	11.5	20.8	39.2	610.00	49.29
2Btq2	100	15.7	26.5	40.3	305.00	24.64
3Bq	150	18.8	35.0	44.6	228.75	18.48
3Bq	150	18.8	35.0	44.6	228.75	18.48

Table C-49. Helendale-Cajon complex, dry, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.8	8.2	47.1	431.30	34.85
A2	75	5.4	12.0	46.0	1206.00	97.44
Bt	100	6.8	13.3	45.3	1541.00	124.51
Bt	100	6.8	13.3	45.3	1474.00	119.10
Bt	125	6.8	13.3	45.3	1758.80	142.11
Bt	150	6.8	13.3	45.3	2010.00	162.41
Bt	175	6.8	13.3	45.3	2227.80	180.00
C	100	5.1	11.5	46.1	1251.00	101.08
C	100	5.1	11.5	46.1	1181.50	95.47
C	125	5.1	11.5	46.1	1390.00	112.31
C	125	5.1	11.5	46.1	1303.10	105.29
C	150	5.1	11.5	46.1	1433.40	115.82
C	150	5.1	11.5	46.1	1303.10	105.29

Table C-50. Hesperia loamy sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap	25	6.7	13.5	40.0	206.25	16.67
Ap	50	6.7	13.5	40.0	412.50	33.33
Ap	125	6.7	13.5	40.0	1031.25	83.33
C1	75	7.2	16.6	38.7	123.75	10.00
C1	100	7.2	16.6	38.7	165.00	13.33
C1	125	7.2	16.6	38.7	206.25	16.67
C2	75	8.9	16.7	38.8	123.75	10.00
C2	100	8.9	16.7	38.8	165.00	13.33
C2	150	8.9	16.7	38.8	247.50	20.00
C2	150	8.9	16.7	38.8	247.50	20.00
C2	200	8.9	16.7	38.8	330.00	26.66
C2	200	8.9	16.7	38.8	330.00	26.66
C3	125	6.2	11.5	39.4	206.25	16.67

Table C-51. Hesperia-Cartago complex, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap	25	4.8	14.3	39.6	202.50	20.25
Ap	25	4.8	14.3	39.6	186.30	18.95
Ap	50	4.8	14.3	39.6	340.20	35.32
C1	75	10.4	14.4	36.2	436.05	47.71
C1	100	10.4	14.4	36.2	420.66	50.75
C1	125	10.4	14.4	36.2	409.33	54.12
C1	150	10.4	14.4	36.2	364.23	54.79
C2	150	18.5	25.6	46.3	251.64	41.73
C2	200	18.5	25.6	46.3	264.96	50.00
C2	225	18.5	25.6	46.3	200.88	48.47
C2	225	18.5	25.6	46.3	108.54	41.08
C3	250	13.9	18.2	36.6	63.75	47.60
C3	325	13.9	18.2	36.6	44.20	58.79

Table C-52. Hessica fine sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.3	11.5	41.4	785.00	66.73
A	25	4.3	11.5	41.4	722.20	61.70
Btkn1	25	15.1	32.9	52.6	533.40	45.85
Btkn1	50	15.1	32.9	52.6	965.20	83.57
Btkn2	75	15.1	32.9	52.6	1143.00	100.97
Btkn2	75	15.1	32.9	52.6	885.83	80.39
Btkn2	75	15.1	32.9	52.6	729.62	67.89
Btkn3	100	11.0	19.0	41.0	951.16	91.89
Btkn4	150	9.5	18.9	36.2	1349.19	133.59
Btkn4	150	9.5	18.9	36.2	1108.08	114.30
Btkn5	175	10.0	18.9	36.2	1011.47	110.84
BCtkn	175	10.0	18.9	36.2	700.25	85.94
C	400	7.2	23.8	43.7	857.68	129.01

Table C-53. Hessica sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	9.4	19.2	43.3	525.00	42.42
A	25	9.4	19.2	43.3	525.00	42.42
Btkn1	75	12.5	20.6	38.6	78.75	6.36
Btkn2	75	13.1	20.7	38.5	78.75	6.36
Btkn2	150	13.1	20.7	38.5	157.50	12.73
Btkn3	100	15.5	23.2	38.6	105.00	8.48
Btkn4	100	17.4	26.3	39.4	105.00	8.48
Btkn4	200	17.4	26.3	39.4	300.00	24.24
Btkn5	75	15.0	23.5	38.9	112.50	9.09
Btkn5	100	15.0	23.5	38.9	150.00	12.12
BCtkn	175	5.7	11.9	39.1	262.50	21.21
C	200	4.3	9.8	39.7	300.00	24.24
C	200	4.3	9.8	39.7	300.00	24.24

Table C-54. Hessica-Eclipse association, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.3	11.5	41.4	785.00	66.73
A	25	4.3	11.5	41.4	722.20	61.70
Btkn1	25	15.1	32.9	52.6	533.40	45.85
Btkn1	50	15.1	32.9	52.6	965.20	83.57
Btkn2	75	15.1	32.9	52.6	1143.00	100.97
Btkn2	75	15.1	32.9	52.6	885.83	80.39
Btkn2	75	15.1	32.9	52.6	729.62	67.89
Btkn3	100	11.0	19.0	41.0	951.16	91.89
Btkn4	150	9.5	18.9	36.2	1349.19	133.59
Btkn4	150	9.5	18.9	36.2	1108.08	114.30
Btkn5	175	10.0	18.9	36.2	1011.47	110.84
BCtkn	175	10.0	18.9	36.2	700.25	85.94
C	400	7.2	23.8	43.7	857.68	129.01

Table C-55. Honova loamy coarse sand, 9 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.6	9.7	41.1	193.75	15.66
A2	25	2.9	9.7	40.8	155.00	12.52
A2	25	2.9	9.7	40.8	155.00	12.52
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
R	25	0.0	0.0	0.1	0.07	0.01
R	25	0.0	0.0	0.1	0.07	0.01
R	25	0.0	0.0	0.1	0.07	0.01
R	25	0.0	0.0	0.1	0.07	0.01

Table C-56. Honova loamy coarse sand, slightly moist, 9 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.6	9.7	41.1	193.75	15.66
A2	25	2.9	9.7	40.8	155.00	12.52
A2	25	2.9	9.7	40.8	155.00	12.52
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
A3	25	6.2	15.0	39.6	108.75	8.79
R	25	0.0	0.0	0.1	0.07	0.01
R	25	0.0	0.0	0.1	0.07	0.01
R	25	0.0	0.0	0.1	0.07	0.01
R	25	0.0	0.0	0.1	0.07	0.01

Table C-57. Inyo sand, 0 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	1.6	6.8	42.3	206.25	16.67
A	50	1.6	6.8	42.3	412.50	33.33
A	50	1.6	6.8	42.3	412.50	33.33
C1	75	14.0	8.0	40.5	121.88	9.85
C1	125	14.0	8.0	40.5	203.13	16.41
C1	150	14.0	8.0	40.5	243.75	19.70
C1	200	14.0	8.0	40.5	325.00	26.26
C2	75	1.9	7.9	40.6	121.88	9.85
C2	150	1.9	7.9	40.6	243.75	19.70
C2	175	1.9	7.9	40.6	284.38	22.98
C3	75	2.4	7.1	41.0	121.88	9.85
C3	150	2.4	7.1	41.0	243.75	19.70
C3	200	2.4	7.1	41.0	325.00	26.26

Table C-58. Inyo sand, 9 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.0	9.9	46.2	206.30	16.67
A	50	5.0	9.9	46.2	371.30	30.00
C	75	5.0	10.9	46.1	487.50	39.39
C	100	5.0	10.9	46.1	568.80	45.96
C	100	5.0	10.9	46.1	487.50	39.39
C	125	5.0	10.9	46.1	507.80	41.03
C	125	5.0	10.9	46.1	436.70	35.29
C	125	5.0	10.9	46.1	365.60	29.54
C	150	5.0	10.9	46.1	353.40	28.56
C	150	5.0	10.9	46.1	268.10	21.66
C	150	5.0	10.9	46.1	182.80	14.77
C	150	5.0	10.9	46.1	97.50	7.88
C	175	5.0	10.9	46.1	28.40	2.30

Table C-59. Inyo gravelly loamy coarse sand, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.1	12.5	46.0	206.30	16.67
C1	75	5.0	10.9	46.1	548.40	44.31
C1	75	5.0	10.9	46.1	487.50	39.39
C1	100	5.0	10.9	46.1	568.80	45.96
C1	100	5.0	10.9	46.1	487.50	39.39
C1	125	5.0	10.9	46.1	507.80	41.03
C1	125	5.0	10.9	46.1	436.70	35.29
C1	125	5.0	10.9	46.1	365.60	29.54
C1	125	5.0	10.9	46.1	294.50	23.80
C1	125	5.0	10.9	46.1	223.40	18.05
C1	150	5.0	10.9	46.1	182.80	14.77
C2	150	5.0	10.9	46.1	97.50	7.88
C2	200	5.0	10.9	46.1	32.50	2.63

Table C-60. Inyo-Poleta complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.0	12.0	33.0	226.88	18.33
A	25	5.0	12.0	33.0	198.00	16.00
A	50	5.0	12.0	33.0	346.50	28.00
A	50	5.0	12.0	33.0	313.50	25.33
C1	100	4.0	11.0	30.0	552.50	44.64
C1	100	4.0	11.0	30.0	455.00	36.76
C1	100	4.0	11.0	30.0	357.50	28.89
C2	125	4.0	11.0	30.0	325.00	26.26
C2	125	4.0	11.0	30.0	243.75	19.70
C3	200	6.0	13.0	36.0	292.50	23.63
C3	200	6.0	13.0	36.0	260.00	21.01
C3	200	6.0	13.0	36.0	227.50	18.38
C3	200	6.0	13.0	36.0	195.00	15.76

Table C-61. Inyo-Westguard association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	3.8	8.4	37.7	208.75	20.88
A	50	3.8	8.4	37.7	384.10	39.08
C1	75	4.4	9.6	39.6	461.70	49.09
C1	75	4.4	9.6	39.6	315.90	37.42
C1	75	5.5	11.7	40.3	262.20	32.98
C1	100	5.5	11.7	40.3	284.80	38.78
C2	125	15.4	25.7	46.6	253.83	38.18
C2	125	15.4	25.7	46.6	215.39	35.11
C2	125	11.4	18.1	42.2	192.78	34.80
C2	125	11.4	18.1	42.2	155.97	31.85
C2	150	11.4	18.1	42.2	144.15	34.78
C3	225	8.2	18.2	43.3	136.80	45.14
C3	225	8.2	18.2	43.3	70.11	39.81

Table C-62. Lithic Torriorthents-Lithic Haplargids-Rock outcrop complex, 30 to 75 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.7	14.0	44.7	71.40	5.77
A2	50	9.1	21.4	45.5	112.00	9.05
A2	75	9.1	21.4	45.5	126.00	10.18
Ck	75	5.6	10.8	45.8	91.90	7.42
Ck	100	5.6	10.8	45.8	61.30	4.95
Cr	100	0.4	0.8	1.8	0.00	0.00
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	175	0.4	0.8	1.8	0.00	0.00
Cr	200	0.4	0.8	1.8	0.00	0.00

Table C-63. Lithic Torriorthents-Lithic Haplargids-Rock outcrop complex, cool, 30 to 75 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.7	14.0	44.7	71.40	5.77
A2	50	9.1	21.4	45.5	112.00	9.05
A2	75	9.1	21.4	45.5	126.00	10.18
Ck	75	5.6	10.8	45.8	91.90	7.42
Ck	100	5.6	10.8	45.8	61.30	4.95
Cr	100	0.4	0.8	1.8	0.00	0.00
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	175	0.4	0.8	1.8	0.00	0.00
Cr	200	0.4	0.8	1.8	0.00	0.00

Table C-64. Lithic Torriorthents-Lithic Haplargids-Rock outcrop complex, warm, 30 to 75 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.7	14.0	44.7	71.40	5.77
A2	50	9.1	21.4	45.5	112.00	9.05
A2	75	9.1	21.4	45.5	126.00	10.18
Ck	75	5.6	10.8	45.8	91.90	7.42
Ck	100	5.6	10.8	45.8	61.30	4.95
Cr	100	0.4	0.8	1.8	0.00	0.00
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	175	0.4	0.8	1.8	0.00	0.00
Cr	200	0.4	0.8	1.8	0.00	0.00

Table C-65. Lubkin gravelly loamy sand, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.8	13.6	45.1	412.50	33.33
A	100	6.8	13.6	45.1	1584.00	127.99
Btk	75	10.3	18.9	44.0	1121.30	90.60
Btk	75	10.3	18.9	44.0	1072.50	86.66
Btk	100	10.3	18.9	44.0	1365.00	110.29
Btk	125	10.3	18.9	44.0	1625.00	131.30
Btk	150	10.3	18.9	44.0	1852.50	149.68
Bk	125	6.8	11.9	45.1	1507.50	121.81
Bk	125	6.8	11.9	45.1	1423.80	115.04
Bk	125	6.8	11.9	45.1	1340.00	108.27
Bk	125	6.8	11.9	45.1	1256.30	101.51
2C	150	5.6	10.0	45.9	1381.90	111.66
2C	200	5.6	10.0	45.9	1675.00	135.34

Table C-66. Lubkin-Tinemaha complex, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.3	14.7	44.4	372.50	33.53
A	25	6.3	14.7	44.4	171.35	17.43
A	75	6.3	14.7	44.4	469.35	48.72
Btk1	100	5.6	16.3	44.0	450.00	51.00
Btk1	100	5.6	16.3	44.0	327.75	41.22
Btk2	100	5.6	16.3	44.0	246.00	34.68
Btk2	100	5.6	16.3	44.0	204.75	31.38
Btk2	125	5.6	16.3	44.0	225.94	36.83
Bk	250	6.9	12.1	39.2	405.46	73.19
Bk	250	6.9	12.1	39.2	252.65	60.96
2C1	250	10.2	20.4	45.1	115.76	46.01
2C1	325	10.2	20.4	45.1	59.72	52.55
2C2	400	10.2	20.4	45.1	47.04	62.56

Table C-67. Lubkin-Tinemaha complex, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.3	14.7	44.4	372.50	33.53
A	25	6.3	14.7	44.4	171.35	17.43
A	75	6.3	14.7	44.4	469.35	48.72
Btk1	100	5.6	16.3	44.0	450.00	51.00
Btk1	100	5.6	16.3	44.0	327.75	41.22
Btk2	100	5.6	16.3	44.0	246.00	34.68
Btk2	100	5.6	16.3	44.0	204.75	31.38
Btk2	125	5.6	16.3	44.0	225.94	36.83
Bk	250	6.9	12.1	39.2	405.46	73.19
Bk	250	6.9	12.1	39.2	252.65	60.96
2C1	250	10.2	20.4	45.1	115.76	46.01
2C1	325	10.2	20.4	45.1	59.72	52.55
2C2	400	10.2	20.4	45.1	47.04	62.56

Table C-68. Lubkin-Tinemaha complex, moist, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.3	14.7	44.4	372.50	33.53
A	25	6.3	14.7	44.4	171.35	17.43
A	75	6.3	14.7	44.4	469.35	48.72
Btk1	100	5.6	16.3	44.0	450.00	51.00
Btk1	100	5.6	16.3	44.0	327.75	41.22
Btk2	100	5.6	16.3	44.0	246.00	34.68
Btk2	100	5.6	16.3	44.0	204.75	31.38
Btk2	125	5.6	16.3	44.0	225.94	36.83
Bk	250	6.9	12.1	39.2	405.46	73.19
Bk	250	6.9	12.1	39.2	252.65	60.96
2C1	250	10.2	20.4	45.1	115.76	46.01
2C1	325	10.2	20.4	45.1	59.72	52.55
2C2	400	10.2	20.4	45.1	47.04	62.56

Table C-69. Lucerne loamy fine sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	8.0	17.0	38.0	412.50	33.33
Bt1	25	10.0	24.0	43.0	365.63	29.54
Bt1	50	10.0	24.0	43.0	650.00	52.52
Bt1	50	10.0	24.0	43.0	568.75	45.96
Bt2	75	10.0	24.0	43.0	731.25	59.09
Bt2	150	10.0	24.0	43.0	1218.75	98.48
Bt2	150	10.0	24.0	43.0	975.00	78.78
Bt3	150	5.0	11.0	28.0	731.25	59.09
Bt3	175	5.0	11.0	28.0	568.75	45.96
Bt4	300	3.0	8.0	24.0	510.00	41.21
Bt4	300	3.0	8.0	24.0	510.00	41.21
Bt4	325	3.0	8.0	24.0	552.50	44.64
Btb	350	3.0	8.0	24.0	595.00	48.08

Table C-70. Lucerne gravelly loamy sand, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.0	12.0	33.0	412.50	33.30
A1	25	5.0	12.0	33.0	363.00	29.30
A2	75	5.0	12.0	33.0	940.50	76.00
A2	75	5.0	12.0	33.0	804.40	65.00
Bt1	100	1.0	20.0	42.0	877.50	71.00
Bt1	100	1.0	20.0	42.0	650.00	52.50
Bt2	100	1.0	20.0	42.0	487.50	39.40
Bt2	125	1.0	20.0	42.0	507.80	41.00
Bt3	125	1.0	20.0	42.0	406.30	32.80
Bt3	125	4.0	11.0	32.0	203.10	16.40
BC	200	4.0	11.0	32.0	272.00	22.00
BC	200	4.0	11.0	32.0	204.00	16.50
C	225	4.0	11.0	32.0	114.80	9.30

Table C-71. Lucerne gravelly sandy loam, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.9	14.0	45.1	400.00	32.32
A1	75	6.9	14.0	45.1	1152.00	93.08
BAt	100	16.6	25.1	42.2	1380.00	111.50
BAt	100	16.6	25.1	42.2	1320.00	106.66
BC	110	10.3	17.9	43.7	1501.50	121.32
BC	110	10.3	17.9	43.7	1430.00	115.54
BC	125	10.3	17.9	43.7	1543.80	124.74
BC	125	10.3	17.9	43.7	1462.50	118.17
BC	140	10.3	17.9	43.7	1547.00	125.00
BC	140	10.3	17.9	43.7	1456.00	117.64
BC	150	10.3	17.9	43.7	1462.50	118.17
BC	150	10.3	17.9	43.7	1340.60	108.32
BC	150	10.3	17.9	43.7	1218.80	98.48

Table C-72. Manzanar silt loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	11.5	30.1	47.6	2500.00	202.00
A	75	11.5	30.1	47.6	7031.30	568.13
A	100	11.5	30.1	47.6	8750.00	707.00
BAtk	100	14.8	31.1	47.4	8450.00	682.76
BAtk	150	14.8	31.1	47.4	11700.00	945.36
BAtk	150	14.8	31.1	47.4	10725.00	866.58
BCtg	125	19.1	33.4	47.0	8125.00	656.50
BCtg	125	19.1	33.4	47.0	7312.50	590.85
BCtg	150	19.1	33.4	47.0	7800.00	630.24
BCtg	150	19.1	33.4	47.0	6825.00	551.46
Cg	100	12.6	19.2	42.5	4425.00	357.54
Cg	100	12.6	19.2	42.5	3687.50	297.95
Cg	150	12.6	19.2	42.5	4425.00	357.54

Table C-73. Manzanar-Division association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	13.2	27.7	47.8	1875.00	151.50
A	25	13.2	27.7	47.8	1725.00	139.38
A	75	13.2	27.7	47.8	4725.00	381.78
BAt	100	13.2	27.7	47.8	5700.00	460.56
BAt	100	13.2	27.7	47.8	5100.00	412.08
Btk	150	13.2	27.7	47.8	6750.00	545.40
Btk	150	13.2	27.7	47.8	5850.00	472.68
Btk	150	13.2	27.7	47.8	4950.00	399.96
Btkg	150	17.8	33.1	50.6	3982.50	321.79
Btkg	150	17.8	33.1	50.6	3097.50	250.28
Btg	125	6.8	17.3	37.0	2000.00	161.60
2BCtg	125	6.8	17.3	37.0	1200.00	96.96
2Cg	175	6.8	17.3	37.0	560.00	45.25

Table C-74. Manzanar-Westguard association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	9.9	24.8	51.5	1625.00	133.25
A	50	9.9	24.8	51.5	2990.00	245.70
A	50	12.2	22.6	51.9	2451.00	202.53
A	75	12.2	22.6	51.9	2902.50	241.88
Bat	75	12.7	24.7	55.6	2075.06	174.93
Bat	75	12.7	24.7	55.6	1709.14	145.66
Bat	75	12.7	24.7	55.6	1343.21	116.38
Btk	75	30.2	39.4	54.1	1259.21	109.96
Btk	100	30.2	39.4	54.1	1537.50	135.30
Btkg	225	10.7	17.9	42.5	3742.20	334.03
Btg	200	10.7	17.9	42.5	2248.40	210.67
2BCtg	125	10.2	22.0	46.3	783.00	80.64
2Cg	400	10.2	22.0	46.3	1814.40	202.75

Table C-75. Manzanar-Winnedumah association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	10.7	30.0	47.6	2031.30	164.13
A	75	10.7	30.0	47.6	5742.20	463.97
A	100	10.7	30.0	47.6	7187.50	580.75
BAt	100	16.5	30.5	46.1	6987.50	564.59
BAt	100	16.5	30.5	46.1	6500.00	525.20
BCtg	100	18.6	31.6	45.8	6012.50	485.81
BCtg	125	18.6	31.6	45.8	6906.30	558.03
BCtg	125	18.6	31.6	45.8	6296.90	508.79
BCtg	150	18.6	31.6	45.8	6825.00	551.46
BCtg	150	18.6	31.6	45.8	6093.80	492.38
Cg	150	15.2	24.1	43.5	6342.20	512.45
Cg	150	15.2	24.1	43.5	5477.30	442.57
Cg	150	15.2	24.1	43.5	4612.50	372.69

Table C-76. Mazourka loamy sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.9	13.9	35.9	206.25	16.51
2BAtn	25	5.9	13.9	35.9	185.63	14.86
2BAtn	25	5.9	13.9	35.9	165.00	13.21
2Btn	125	9.2	22.6	42.3	634.38	50.76
2Btn	125	9.2	22.6	42.3	543.75	43.51
2BCtn	125	9.2	22.6	42.3	453.13	36.26
2BCtn	125	9.2	22.6	42.3	362.50	29.01
2C1	175	9.2	22.6	42.3	456.75	36.55
2C1	200	9.2	22.6	42.3	464.00	37.13
2C2	125	12.3	20.3	43.6	295.31	23.64
2C2	125	12.3	20.3	43.6	275.63	22.06
2C2	150	12.3	20.3	43.6	212.63	17.02
2C2	150	12.3	20.3	43.6	189.00	15.13

Table C-77. Mazourka loamy sand, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.1	12.0	46.0	206.30	16.67
2Btn	100	13.7	24.4	44.1	675.00	54.54
2Btn	150	13.7	24.4	44.1	900.00	72.72
2Btn	150	13.7	24.4	44.1	787.50	63.63
BCtn	100	8.0	15.7	44.7	487.50	39.39
BCtn	125	8.0	15.7	44.7	507.80	41.03
2C1	75	8.0	14.0	44.5	262.00	21.17
2C1	100	8.0	14.0	44.5	292.50	23.63
2C1	100	8.0	14.0	44.5	235.60	19.04
2C2	100	13.8	20.7	42.2	170.50	13.78
2C2	150	13.8	20.7	42.2	174.40	14.09
2C2	150	13.8	20.7	42.2	93.00	7.51
2C2	175	13.8	20.7	42.2	27.10	2.19

Table C-78. Mazourka-Cajon complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	1.5	6.2	42.4	206.25	16.67
A	25	1.5	6.2	42.4	206.25	16.67
2ABtn	50	1.6	7.0	42.0	82.50	6.67
2Btn	50	10.1	18.5	38.6	72.50	5.86
2Btn	150	10.1	18.5	38.6	217.50	17.57
2BCtn	75	12.0	21.2	38.8	108.75	8.79
2BCtn	175	12.0	21.2	38.8	253.75	20.50
2C1	100	1.4	8.2	40.2	157.50	12.73
2C1	100	1.4	8.2	40.2	157.50	12.73
2C2	100	1.1	5.8	41.4	162.50	13.13
2C2	200	1.1	5.8	41.4	325.00	26.26
2C2	200	1.1	5.8	41.4	325.00	26.26
2C2	250	1.1	5.8	41.4	406.25	32.83

Table C-79. Mazourka-Eclipse complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	3.8	8.8	47.0	206.30	16.67
2BAtn	50	9.2	19.4	44.7	348.80	28.18
2BAtn	50	9.2	19.4	44.7	310.00	25.05
2Btn	100	11.5	22.4	44.5	507.50	41.01
2Btn	125	11.5	22.4	44.5	543.80	43.94
2C1	100	9.8	19.9	44.6	393.80	31.82
2C1	100	9.8	19.9	44.6	338.60	27.36
2C1	125	9.8	19.9	44.6	354.40	28.63
2C1	125	9.8	19.9	44.6	285.50	23.07
2C1	175	9.8	19.9	44.6	303.20	24.50
2C2	150	6.8	11.9	45.1	180.00	14.54
2C2	175	6.8	11.9	45.1	112.00	9.05
2C2	200	6.8	11.9	45.1	32.00	2.59

Table C-80. Mazourka-Pokonahbe complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
ABtn	25	6.3	13.1	45.4	412.50	33.33
ABtn	75	6.3	13.1	45.4	1188.00	95.99
ABtn	100	6.3	13.1	45.4	1518.00	122.65
ABtn	125	6.3	13.1	45.4	1815.00	146.65
BCtn1	125	11.5	22.4	44.5	1627.50	131.50
BCtn2	175	10.3	19.3	44.1	2240.00	180.99
2C1	100	3.9	9.9	46.8	1311.00	105.93
2C1	100	3.9	9.9	46.8	1242.00	100.35
2C2	100	3.8	7.8	47.2	1224.00	98.90
2C2	125	3.8	7.8	47.2	1440.00	116.35
2C2	125	3.8	7.8	47.2	1350.00	109.08
2C2	150	3.8	7.8	47.2	1485.00	119.99
2C2	175	3.8	7.8	47.2	1575.00	127.26

Table C-81. Mazourka-Slickspots-Cajon complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	3.7	10.2	30.2	206.25	16.67
A	50	3.7	10.2	30.2	412.50	33.33
2BAtn	50	10.9	22.5	44.2	310.00	25.05
2BAtn	50	10.9	22.5	44.2	310.00	25.05
2Btn	75	10.1	22.6	43.6	326.25	26.36
2BCtn	100	10.1	22.6	43.6	362.50	29.29
2BCtn	100	10.1	22.6	43.6	362.50	29.29
2C1	125	11.0	19.0	42.4	354.38	28.63
2C1	150	11.0	19.0	42.4	378.00	30.54
2C2	175	3.9	10.9	30.4	420.00	33.94
2C2	200	3.9	10.9	30.4	448.00	36.20
2C2	200	3.9	10.9	30.4	288.00	23.27
2C2	200	3.9	10.9	30.4	256.00	20.68

Table C-82. Mazourka-Slickspots-Eclipse complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	1.5	6.2	42.4	206.25	16.67
A	25	1.5	6.2	42.4	206.25	16.67
2ABtn	50	1.6	7.0	42.0	82.50	6.67
2Btn	50	10.1	18.5	38.6	72.50	5.86
2Btn	150	10.1	18.5	38.6	217.50	17.57
2BCtn	75	12.0	21.2	38.8	108.75	8.79
2BCtn	175	12.0	21.2	38.8	253.75	20.50
2C1	100	1.4	8.2	40.2	157.50	12.73
2C1	100	1.4	8.2	40.2	157.50	12.73
2C2	100	1.1	5.8	41.4	162.50	13.13
2C2	200	1.1	5.8	41.4	325.00	26.26
2C2	200	1.1	5.8	41.4	325.00	26.26
2C2	250	1.1	5.8	41.4	406.25	32.83

Table C-83. Mazourka hard substratum-Mazourka-Eclipse complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	3.9	10.9	30.4	206.25	16.67
2BAtn	25	3.9	10.9	30.4	198.00	16.00
2BAtn	50	3.9	10.9	30.4	363.00	29.33
2Btn	75	7.6	15.6	38.6	495.00	40.00
2BCtn	50	9.0	20.1	40.4	288.00	23.27
2BCtn	75	9.0	20.1	40.4	396.00	32.00
2C1	125	7.6	15.6	38.6	556.88	45.00
2C1	125	7.6	15.6	38.6	391.88	31.66
2C1	125	7.6	15.6	38.6	247.50	20.00
2C1	125	7.6	15.6	38.6	165.00	13.33
2C2	225	7.6	15.6	38.6	185.63	15.00
2C2	225	8.0	15.5	38.9	109.69	8.86
2C2	250	8.0	15.5	38.9	0.00	0.00

Table C-84. Millpond-Lucerne complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.0	12.0	29.0	400.00	32.32
A	25	5.0	12.0	29.0	360.00	29.09
Bt1	75	10.0	19.0	40.0	930.00	75.14
Bt2	125	13.0	24.0	41.0	1356.25	109.59
Bt2	125	13.0	24.0	41.0	1162.50	93.93
Bqkm	200	10.0	12.0	13.0	44.00	3.56
2Bqk	125	3.0	7.0	18.0	515.63	41.66
2Bqk	125	3.0	7.0	18.0	515.63	41.66
2Bqk	125	3.0	7.0	18.0	412.50	33.33
2Bqk	125	3.0	7.0	18.0	412.50	33.33
2Bqk	150	3.0	7.0	18.0	247.50	20.00
3Bq	125	4.0	10.0	26.0	200.00	16.16
3Bq	150	4.0	10.0	26.0	121.00	9.70

Table C-85. Millpond-Lucerne complex, 2 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	5.0	12.0	29.0	400.00	32.32
A	25	5.0	12.0	29.0	360.00	29.09
Bt1	75	10.0	19.0	40.0	930.00	75.14
Bt2	125	13.0	24.0	41.0	1356.25	109.59
Bt2	125	13.0	24.0	41.0	1162.50	93.93
Bqkm	200	10.0	12.0	13.0	44.00	3.56
2Bqk	125	3.0	7.0	18.0	515.63	41.66
2Bqk	125	3.0	7.0	18.0	515.63	41.66
2Bqk	125	3.0	7.0	18.0	412.50	33.33
2Bqk	125	3.0	7.0	18.0	412.50	33.33
2Bqk	150	3.0	7.0	18.0	247.50	20.00
3Bq	125	4.0	10.0	26.0	200.00	16.16
3Bq	150	4.0	10.0	26.0	121.00	9.70

Table C-86. Morey family-Winnedumah-Rindge family complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	11.0	30.5	47.9	3750.00	303.00
A	75	11.0	30.5	47.9	10687.50	863.55
Bt1	100	18.0	33.8	48.1	13275.00	1072.62
Bt1	100	18.0	33.8	48.1	12537.50	1013.03
Bt1	125	18.0	33.8	48.1	14750.00	1191.80
Bt2	100	18.0	33.8	48.1	11062.50	893.85
Bt2	125	18.0	33.8	48.1	12906.30	1042.83
Bt2	150	18.0	33.8	48.1	14381.30	1162.01
Bt2	150	18.0	33.8	48.1	13275.00	1072.62
Bt2	175	18.0	33.8	48.1	14196.90	1147.11
Bt3	100	23.5	36.7	47.4	7250.00	585.80
Bt3	125	23.5	36.7	47.4	8156.30	659.03
Bt3	150	23.5	36.7	47.4	8700.00	702.96

Table C-87. Muranch family, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.4	12.3	41.7	2000.00	161.60
A1	75	5.4	12.3	41.7	6000.00	484.80
A1	150	5.4	12.3	41.7	12000.00	969.60
A2	50	12.2	21.3	47.3	3200.00	258.56
A2	100	12.2	21.3	47.3	6400.00	517.12
A2	125	12.2	21.3	47.3	8000.00	646.40
Bw	75	14.2	21.9	43.6	3318.75	268.16
Bw	100	14.2	21.9	43.6	4425.00	357.54
Bw	125	14.2	21.9	43.6	5531.25	446.93
Bw	175	14.2	21.9	43.6	7743.75	625.70
C	150	3.8	8.4	45.7	5250.00	424.20
C	150	3.8	8.4	45.7	5250.00	424.20
C	200	3.8	8.4	45.7	7000.00	565.60

Table C-88. Numu loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Anz1	25	10.0	21.0	43.0	750.00	60.60
Anz1	25	10.0	21.0	43.0	562.50	45.45
Anz2	50	10.0	21.0	43.0	750.00	60.60
Anz2	50	10.0	21.0	43.0	600.00	48.48
Anz3	125	15.0	26.0	47.0	1334.38	107.82
Anz3	125	15.0	26.0	47.0	1143.75	92.42
Anz3	125	15.0	26.0	47.0	953.13	77.01
Btnz	100	27.0	39.0	52.0	580.00	46.86
Btnz	100	27.0	39.0	52.0	435.00	35.15
Btqnz	125	8.0	18.0	40.0	400.00	32.32
Btq	150	8.0	18.0	40.0	360.00	29.09
2C1	250	8.0	18.0	40.0	280.00	22.62
3C2	250	8.0	18.0	40.0	120.00	9.70

Table C-89. Pits-Dumps complex, 0 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	1.9	6.1	3.4	43.50	3.51
A	25	1.9	6.1	3.4	43.50	3.51
B	50	1.7	4.3	32.1	90.00	7.27
B	75	1.7	4.3	32.1	135.00	10.91
B	100	1.7	4.3	32.1	180.00	14.54
B	150	1.7	4.3	32.1	270.00	21.82
B	200	1.7	4.3	32.1	360.00	29.09
C	75	0.3	1.3	28.4	142.50	11.51
C	100	0.3	1.3	28.4	190.00	15.35
C	125	0.3	1.3	28.4	237.50	19.19
C	150	0.3	1.3	28.4	285.00	23.03
C	200	0.3	1.3	28.4	380.00	30.70
C	225	0.3	1.3	28.4	427.50	34.54

Table C-90. Playa

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	24.0	32.3	32.8	35.63	2.88
A	25	23.4	33.8	41.5	35.63	2.88
A	25	23.4	33.8	41.5	35.63	2.88
A	25	23.4	33.8	41.5	35.63	2.88
A	50	23.4	33.8	41.5	71.25	5.76
C	50	31.6	44.7	53.5	34.38	2.78
C	75	31.6	44.7	53.5	51.56	4.17
C	125	31.6	44.7	53.5	85.94	6.94
C	150	31.6	44.7	53.5	103.13	8.33
C	225	31.6	44.7	53.5	154.69	12.50
C	225	31.6	44.7	53.5	154.69	12.50
C	250	31.6	44.7	53.5	171.88	13.89
C	250	31.6	44.7	53.5	171.88	13.89

Table C-91. Plutos family-Cashbaugh-Rock outcrop association, 0 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A11	25	1.3	9.4	40.9	171.88	13.89
A11	50	1.3	9.4	40.9	343.75	27.78
A12	50	1.2	8.5	41.3	275.00	22.22
A12	50	1.2	8.5	41.3	275.00	22.22
A12	50	1.2	8.5	41.3	275.00	22.22
A12	75	1.2	8.5	41.3	412.50	33.33
AC	50	0.9	7.5	41.1	206.25	16.67
AC	50	0.9	7.5	41.1	206.25	16.67
AC	50	0.9	7.5	41.1	206.25	16.67
C	75	0.8	6.2	41.8	206.25	16.67
C	75	0.8	6.2	41.8	206.25	16.67
IIR	50	0.2	0.4	0.5	0.12	0.01
IIR	50	0.2	0.4	0.5	0.12	0.01

Table C-92. Plutos family-Cashbaugh-Rock outcrop association, 30 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A11	25	1.3	9.4	40.9	171.88	13.89
A11	50	1.3	9.4	40.9	343.75	27.78
A12	50	1.2	8.5	41.3	275.00	22.22
A12	50	1.2	8.5	41.3	275.00	22.22
A12	50	1.2	8.5	41.3	275.00	22.22
A12	75	1.2	8.5	41.3	412.50	33.33
AC	50	0.9	7.5	41.1	206.25	16.67
AC	50	0.9	7.5	41.1	206.25	16.67
AC	50	0.9	7.5	41.1	206.25	16.67
C	75	0.8	6.2	41.8	206.25	16.67
C	75	0.8	6.2	41.8	206.25	16.67
IIR	50	0.2	0.4	0.5	0.12	0.01
IIR	50	0.2	0.4	0.5	0.12	0.01

Table C-93. Plutos family-Rock outcrop association, 0 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A11	25	1.3	9.4	40.9	171.88	13.89
A11	50	1.3	9.4	40.9	343.75	27.78
A12	50	1.2	8.5	41.3	275.00	22.22
A12	50	1.2	8.5	41.3	275.00	22.22
A12	50	1.2	8.5	41.3	275.00	22.22
A12	75	1.2	8.5	41.3	412.50	33.33
AC	50	0.9	7.5	41.1	206.25	16.67
AC	50	0.9	7.5	41.1	206.25	16.67
AC	50	0.9	7.5	41.1	206.25	16.67
C	75	0.8	6.2	41.8	206.25	16.67
C	75	0.8	6.2	41.8	206.25	16.67
IIR	50	0.2	0.4	0.5	0.12	0.01
IIR	50	0.2	0.4	0.5	0.12	0.01

Table C-94. Pokonahbe loamy fine sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
An1	25	8.0	15.1	44.6	400.00	32.32
An1	50	8.0	15.1	44.6	768.00	62.05
An2	50	9.8	19.9	44.6	713.00	57.61
An2	75	9.8	19.9	44.6	1023.00	82.66
2Btn	100	15.9	28.3	44.9	1239.00	100.11
2Btn	100	15.9	28.3	44.9	1180.00	95.34
2Btn	125	15.9	28.3	44.9	1401.30	113.22
3C	150	8.1	16.8	44.8	1728.00	139.62
3C	150	8.1	16.8	44.8	1632.00	131.87
3C	150	8.1	16.8	44.8	1536.00	124.11
3C	175	8.1	16.8	44.8	1680.00	135.74
3C	175	8.1	16.8	44.8	1540.00	124.43
3C	175	8.1	16.8	44.8	1400.00	113.12

Table C-95. Pokonahbe-Numu complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
An1	25	4.6	25.3	40.9	206.25	30.30
An1	50	4.6	25.3	40.9	206.25	60.60
An2	50	4.8	21.5	40.5	675.00	54.54
An2	75	4.8	21.5	40.5	1012.50	81.81
2BAtn	150	7.4	21.0	40.5	1800.00	145.44
2Btn	75	14.8	25.5	40.7	774.38	62.57
2Btn	100	14.8	25.5	40.7	1032.50	83.43
3C1	125	16.6	29.5	42.0	1106.25	89.39
3C1	150	16.6	29.5	42.0	1327.50	107.26
3C1	200	16.6	29.5	42.0	1770.00	143.02
3C2	150	5.0	13.6	39.9	1200.00	96.96
3C2	150	5.0	13.6	39.9	1200.00	96.96
3C3	200	7.5	14.0	38.8	320.00	25.86

Table C-96. Pokonahbe-Rindge family association, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
An1	25	8.0	15.1	44.6	400.00	32.32
An2	50	9.8	19.9	44.6	744.00	60.12
An2	50	9.8	19.9	44.6	713.00	57.61
2BAtn	50	15.9	28.3	44.9	671.00	54.22
2BAtn	75	15.9	28.3	44.9	960.80	77.63
2BAtn	100	15.9	28.3	44.9	1220.00	98.58
BCtn	110	8.1	16.8	44.8	1337.60	108.08
BCtn	120	8.1	16.8	44.8	1382.40	111.70
BCtn	130	8.1	16.8	44.8	1414.40	114.28
BCtn	160	8.1	16.8	44.8	1638.40	132.38
BCtn	180	8.1	16.8	44.8	1728.00	139.62
3C	200	21.1	36.6	44.8	1650.00	133.32
3C	250	21.1	36.6	44.8	1875.00	151.50

Table C-97. Poleta loamy sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	8.0	16.0	39.0	240.00	19.39
A1	25	8.0	16.0	39.0	220.00	17.78
A2	50	8.0	16.0	39.0	400.00	32.32
Bk	100	10.0	21.0	43.0	720.00	58.18
Bk	100	10.0	21.0	43.0	640.00	51.71
Bk	100	10.0	21.0	43.0	560.00	45.25
Bk	100	10.0	21.0	43.0	480.00	38.78
BC	150	11.0	22.0	44.0	600.00	48.48
BC	150	8.0	20.0	40.0	480.00	38.78
BC	150	8.0	20.0	40.0	240.00	19.39
2Bqkm	125	0.1	0.3	0.5	2.40	0.19
2B	175	9.0	18.0	41.0	144.40	11.67
2B	250	9.0	18.0	41.0	8.30	0.67

Table C-98. Poleta-Mazourka complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.8	8.0	43.1	412.50	33.33
A2	50	3.3	7.9	43.1	825.00	66.66
Bk	75	7.9	17.3	4.1	120.00	9.70
Bk	150	7.9	17.3	4.1	240.00	19.39
Bk	225	7.9	17.3	4.1	360.00	29.09
2bkqm	100	0.3	0.8	25.4	1.98	0.16
2bkqm	175	0.3	0.8	25.4	3.47	0.28
BC	50	2.2	7.3	43.5	82.50	6.67
BC	100	2.2	7.3	43.5	165.00	13.33
2B	100	4.3	12.4	41.8	165.00	13.33
2B	125	4.3	12.4	41.8	206.25	16.67
2B	150	4.3	12.4	41.8	247.50	20.00
2B	175	4.3	12.4	41.8	288.75	23.33

Table C-99. Poleta-Mazourka-Slickspots complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.8	8.0	43.1	412.50	33.33
A2	50	3.3	7.9	43.1	825.00	66.66
Bk	75	7.9	17.3	4.1	120.00	9.70
Bk	150	7.9	17.3	4.1	240.00	19.39
Bk	225	7.9	17.3	4.1	360.00	29.09
2bkqm	100	0.3	0.8	25.4	1.98	0.16
2bkqm	175	0.3	0.8	25.4	3.47	0.28
BC	50	2.2	7.3	43.5	82.50	6.67
BC	100	2.2	7.3	43.5	165.00	13.33
2B	100	4.3	12.4	41.8	165.00	13.33
2B	125	4.3	12.4	41.8	206.25	16.67
2B	150	4.3	12.4	41.8	247.50	20.00
2B	175	4.3	12.4	41.8	288.75	23.33

Table C-100. Poleta-Tinemaha complex, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.8	8.0	43.1	206.25	33.33
A2	50	3.3	7.9	43.1	825.00	66.66
Bk	75	7.9	17.3	4.1	120.00	9.70
Bk	150	7.9	17.3	4.1	240.00	19.39
Bk	225	7.9	17.3	4.1	360.00	29.09
2bkqm	100	0.3	0.8	25.4	1.98	0.16
2bkqm	175	0.3	0.8	25.4	3.47	0.28
BC	50	2.2	7.3	43.5	82.50	6.67
BC	100	2.2	7.3	43.5	165.00	13.33
2B	100	4.3	12.4	41.8	165.00	13.33
2B	125	4.3	12.4	41.8	206.25	16.67
2B	150	4.3	12.4	41.8	247.50	20.00
2B	175	4.3	12.4	41.8	288.75	23.33

Table C-101. Rienhakel sand, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.4	13.9	36.7	418.80	33.84
A	50	6.4	13.9	36.7	753.80	60.90
A	75	6.4	13.9	36.7	1067.80	86.28
A	75	6.4	13.9	36.7	1005.00	81.20
Btkn1	75	13.8	26.8	47.5	871.90	70.45
Btkn1	75	13.8	26.8	47.5	813.80	65.75
Btkn2	75	13.8	26.8	47.5	697.50	56.36
Btkn2	75	13.8	26.8	47.5	581.30	46.97
Bkn	150	11.7	22.5	44.7	960.00	77.57
C1	150	11.7	22.5	44.7	840.00	67.87
C1	175	11.7	22.5	44.7	700.00	56.56
C1	250	14.8	30.2	49.2	487.50	39.39
2C2	250	14.8	30.2	49.2	0.00	26.26

Table C-102. Rock outcrop

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
C1	25	0.2	0.7	25.3	206.25	0.04
C1	25	0.2	0.7	25.3	206.25	0.00
C2	50	0.2	0.7	10.0	0.11	0.01
C2	75	0.2	0.7	10.0	0.17	0.01
C2	100	0.2	0.7	10.0	0.22	0.02
C2	150	0.2	0.7	10.0	0.33	0.03
C2	200	0.2	0.7	10.0	0.44	0.04
C3	75	0.2	0.7	0.9	0.19	0.02
C3	100	0.2	0.7	0.9	0.25	0.02
C3	125	0.2	0.7	0.9	0.31	0.03
C3	150	0.2	0.7	0.9	0.38	0.03
C3	200	0.2	0.7	0.9	0.50	0.04
C3	225	0.2	0.7	0.9	0.56	0.05

Table C-103. Sabies loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	15.2	31.0	49.6	206.25	16.67
A2	50	15.2	31.0	49.6	360.00	29.09
Cn1	75	15.0	32.7	50.6	480.38	38.81
Cn1	75	15.0	32.7	50.6	434.63	35.12
Cn1	125	15.0	32.7	50.6	648.13	52.37
Cn2	125	14.1	32.1	50.3	533.75	43.13
Cn2	150	14.1	32.1	50.3	503.25	40.66
Cn2	150	14.1	32.1	50.3	366.00	29.57
Cn3	75	12.1	22.5	44.9	139.50	11.27
Cn3	75	12.1	22.5	44.9	104.63	8.45
Ckn1	100	12.1	22.5	44.9	124.00	10.02
Ckn1	100	12.1	22.5	44.9	108.50	8.77
Ckn2	375	7.6	15.5	38.6	360.00	29.09

Table C-104. Sabies-Yaney complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	15.2	31.0	49.7	206.25	16.67
A2	50	15.2	31.0	49.7	360.00	29.09
Cn1	75	15.0	32.7	50.6	480.38	38.81
Cn1	75	15.0	32.7	50.6	434.63	35.12
Cn1	125	15.0	32.7	50.6	648.13	52.37
Cn1	125	14.1	32.1	50.3	533.75	43.13
Cn2	150	14.1	32.1	50.3	503.25	40.66
Cn2	150	14.1	32.1	50.3	366.00	29.57
Cn3	75	12.1	22.5	44.9	139.50	11.27
Cn3	75	12.1	22.5	44.9	104.63	8.45
Cknb	100	12.1	22.5	44.9	124.00	10.02
Cknb	100	12.1	22.5	44.9	108.50	8.77
Ckn	375	7.6	15.5	38.6	360.00	29.09

Table C-105. Seaman-Yellowrock complex, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	9.0	16.0	40.0	196.88	15.91
A	50	9.0	16.0	40.0	354.38	28.63
A	125	9.0	16.0	40.0	787.50	63.63
A	125	9.0	16.0	40.0	689.06	55.68
A	125	9.0	16.0	40.0	590.63	47.72
2C1	100	11.0	22.0	44.0	387.50	31.31
2C1	100	11.0	22.0	44.0	310.00	25.05
2C2	100	11.0	22.0	44.0	279.00	22.54
2C2	100	11.0	22.0	44.0	248.00	20.04
3C3	175	9.0	16.0	40.0	413.44	33.41
3C3	175	9.0	16.0	40.0	385.88	31.18
4C4	150	12.0	23.0	45.0	209.25	16.91
4C4	150	12.0	23.0	45.0	186.00	15.03

Table C-106. Seaman-Yellowrock complex, moist, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	10.1	22.0	43.4	193.75	15.66
A	50	10.1	22.0	43.4	348.75	28.18
A	125	10.1	22.0	43.4	775.00	62.62
A	125	10.1	22.0	43.4	678.13	54.79
A	125	10.1	22.0	43.4	581.25	46.97
2C1	100	12.1	22.5	44.9	387.50	31.31
2C1	100	12.1	22.5	44.9	310.00	25.05
2C2	100	12.1	22.5	44.9	279.00	22.54
2C2	100	12.1	22.5	44.9	248.00	20.04
3C3	175	7.6	15.5	38.6	413.44	33.41
3C3	175	7.6	15.5	38.6	385.88	31.18
4C4	150	11.3	22.3	44.3	209.25	16.91
4C4	150	11.3	22.3	44.3	186.00	15.03

Table C-107. Seaman-Yellowrock-Cajon complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.3	13.6	40.7	198.75	19.88
A	25	4.3	13.6	40.7	182.85	18.60
A	50	4.3	13.6	40.7	333.90	34.66
C1	50	4.6	12.3	38.1	282.20	30.88
C1	50	4.6	12.3	38.1	215.80	25.56
C1	75	4.6	12.3	38.1	289.46	35.61
C1	75	4.6	12.3	38.1	238.42	31.52
C2	125	15.2	22.8	42.5	289.71	42.43
C2	125	15.2	22.8	42.5	246.40	38.96
C4	150	13.9	21.0	39.6	262.44	45.30
C4	200	13.9	21.0	39.6	273.78	54.30
C4	250	10.9	17.7	36.9	232.38	60.84
C4	300	10.9	17.7	36.9	136.89	61.65

Table C-108. Shabbell sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap1	25	9.7	20.9	42.6	1812.50	146.45
Ap1	75	9.7	20.9	42.6	4893.75	395.42
Ap2	50	9.7	20.9	42.6	2900.00	234.42
Ap2	75	9.7	20.9	42.6	3806.25	307.55
AB	75	9.7	20.9	42.6	3262.50	263.61
AB	100	9.7	20.9	42.6	3625.00	292.90
Bt	100	8.3	20.2	40.4	3000.00	242.40
Bt	125	8.3	20.2	40.4	2812.50	227.25
C1	175	8.3	20.2	40.4	2625.00	212.10
C1	175	8.3	20.2	40.4	2100.00	169.68
C2	175	8.3	20.2	40.4	1575.00	127.26
C2	175	8.3	20.2	40.4	1050.00	84.84
C2	175	8.3	20.2	40.4	525.00	42.42

Table C-109. Shabbell-Shondow-Xerofluvents association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap1	25	4.7	14.0	44.5	206.25	66.66
Ap2	25	4.0	11.7	44.9	1650.00	133.32
Ap2	75	4.0	11.7	44.9	2475.00	199.98
AB	150	4.0	10.1	43.6	3712.50	299.97
Bt	100	8.0	19.3	41.0	1500.00	121.20
Bt	125	8.0	19.3	41.0	2250.00	181.80
Bt	125	8.0	19.3	41.0	2250.00	181.80
Bt	150	8.0	19.3	41.0	3000.00	242.40
C1	100	6.9	15.9	39.6	984.38	79.54
C1	200	6.9	15.9	39.6	1181.25	95.45
C2	100	8.1	14.0	38.7	157.50	12.73
C2	125	8.1	14.0	38.7	157.50	12.73
C2	200	8.1	14.0	38.7	196.88	15.91

Table C-110. Shabbell-Winnedumah complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
Ap1	25	6.5	15.6	38.6	206.25	64.64
Ap2	50	5.1	12.0	39.1	1600.00	129.28
Ap2	75	5.1	12.0	39.1	2400.00	193.92
AB	150	8.3	16.9	42.0	3600.00	290.88
Bt	100	9.5	15.4	40.3	1650.00	133.32
Bt	150	9.5	15.4	40.3	2475.00	199.98
Bt	150	9.5	15.4	40.3	2475.00	199.98
Bt	200	9.5	15.4	40.3	3300.00	266.64
C1	125	1.4	5.1	43.0	1062.50	85.85
C1	150	1.4	5.1	43.0	1275.00	103.02
C2	100	1.6	5.1	41.8	172.50	13.94
C2	100	1.6	5.1	41.8	172.50	13.94
C2	125	1.6	5.1	41.8	215.63	17.42

Table C-111. Shondow loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	13.4	26.5	47.3	1496.25	120.90
A	25	13.4	26.5	47.3	1353.75	109.38
A	50	13.4	26.5	47.3	2351.25	189.98
A	50	13.4	26.5	47.3	1781.25	143.93
Btkn1	100	15.3	26.9	47.8	2475.00	199.98
Btkn1	100	15.3	26.9	47.8	1787.50	144.43
Btkn2	125	15.3	26.9	47.8	1890.63	152.76
Btkn2	125	15.3	26.9	47.8	1718.75	138.88
Bkn	100	15.3	26.9	47.8	1237.50	99.99
C1	175	10.5	21.8	43.6	1806.88	146.00
C1	175	10.5	21.8	43.6	1548.75	125.14
C1	175	10.5	21.8	43.6	1290.63	104.28
2C2	275	6.4	14.1	36.8	1361.25	109.99

Table C-112. Shondow-Hessica association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	11.1	24.8	45.5	1068.80	86.36
A	50	11.1	24.8	45.5	1995.00	161.20
A	50	11.1	24.8	45.5	1567.50	126.65
A	75	11.1	24.8	45.5	2137.50	172.71
Btkn1	75	14.0	26.3	47.3	2025.00	163.62
Btkn1	75	14.0	26.3	47.3	1687.50	136.35
Btkn2	100	14.0	26.3	47.3	1650.00	133.32
Btkn2	100	14.0	26.3	47.3	1200.00	96.96
Bkn	150	12.2	21.8	44.5	1200.00	96.96
Bkn	150	12.2	21.8	44.5	960.00	77.57
Bkn	150	12.2	21.8	44.5	720.00	58.18
C1	300	12.2	21.8	44.5	900.00	72.72
C2	200	6.2	13.4	36.5	525.00	42.42

Table C-113. Taboose-Lava flows complex, 5 to 30 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.5	11.3	32.6	581.25	46.97
A	25	4.5	11.3	32.6	325.50	26.30
A	25	4.5	11.3	32.6	251.88	20.35
A	50	4.5	11.3	32.6	348.75	28.18
C1	125	7.3	18.0	38.2	750.00	60.60
C1	125	7.3	18.0	38.2	656.25	53.03
C1	125	7.3	18.0	38.2	562.50	45.45
C1	125	7.3	18.0	38.2	468.75	37.88
2C2	175	5.4	9.4	31.1	542.50	43.83
2C2	175	5.4	9.4	31.1	271.25	21.92
2C2	175	5.4	9.4	31.1	244.13	19.73
2C2	175	5.4	9.4	31.1	189.88	15.34
2C2	175	5.4	9.4	31.1	135.63	10.96

Table C-114. Taboose-Lava flows complex, dry, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.5	16.2	36.7	356.25	28.79
A	50	6.5	16.2	36.7	675.00	54.54
A	50	6.5	16.2	36.7	600.00	48.48
C1	100	2.5	6.5	21.4	1085.00	87.67
C1	100	2.5	6.5	21.4	930.00	75.14
C1	100	2.5	6.5	21.4	775.00	62.62
C1	100	2.5	6.5	21.4	620.00	50.10
C1	100	2.5	6.5	21.4	465.00	37.57
2C2	175	2.5	6.5	21.4	542.50	43.83
2C2	175	2.5	6.5	21.4	271.25	21.92
2C2	175	2.5	6.5	21.4	244.13	19.73
2C2	175	2.5	6.5	21.4	217.00	17.53
2C2	175	2.5	6.5	21.4	135.63	10.96

Table C-115. Timosea-Neuralia complex, warm, 2 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	9.8	17.3	44.0	412.50	33.33
A	75	9.8	17.3	44.0	1188.00	95.99
AB	75	10.3	17.9	43.7	1138.50	91.99
AB	100	10.3	17.9	43.7	1452.00	117.32
Btk	75	15.5	23.9	42.5	992.30	80.17
Btk	100	15.5	23.9	42.5	1260.00	101.81
Btk	110	15.5	23.9	42.5	1316.70	106.39
Btk	125	15.5	23.9	42.5	1417.50	114.53
Btk	125	15.5	23.9	42.5	1338.80	108.17
Btk	140	15.5	23.9	42.5	1411.20	114.02
Btk	150	15.5	23.9	42.5	1417.50	114.53
BCtk	200	9.2	16.8	44.2	1870.00	151.10
BCtk	200	9.2	16.8	44.2	1700.00	137.36

Table C-116. Tinemaha gravelly loamy coarse sand, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.3	13.1	45.4	412.50	33.33
A	75	6.3	13.1	45.4	1188.00	95.99
A	125	6.3	13.1	45.4	1897.50	153.32
A	125	6.3	13.1	45.4	1815.00	146.65
A	150	6.3	13.1	45.4	2079.00	167.98
Bt	100	15.5	23.0	42.0	1200.00	96.96
Bt	125	15.5	23.0	42.0	1425.00	115.14
Bt	125	15.5	23.0	42.0	1350.00	109.08
Bt	125	15.5	23.0	42.0	1275.00	103.02
Bt	125	15.5	23.0	42.0	1200.00	96.96
C	125	6.3	13.1	45.4	1275.00	103.02
C	125	6.3	13.1	45.4	1168.80	94.44
C	150	6.3	13.1	45.4	1275.00	103.02

Table C-117. Torrifluvents, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	15.0	29.0	49.0	2137.50	172.71
A	50	15.0	29.0	49.0	3562.50	287.85
A	75	15.0	29.0	49.0	4275.00	345.42
An1	75	5.0	9.0	31.0	2925.00	236.34
An1	100	5.0	9.0	31.0	1300.00	105.04
An2	150	16.0	27.0	48.0	1710.00	138.17
An3	150	16.0	27.0	48.0	1282.50	103.63
An3	150	16.0	27.0	48.0	1068.75	86.36
Cn1	125	12.0	25.0	46.0	871.88	70.45
Cn2	125	12.0	25.0	46.0	678.13	54.79
Cn3	150	12.0	25.0	46.0	581.25	46.97
Cn3	150	12.0	25.0	46.0	465.00	37.57
C	175	12.0	25.0	46.0	271.25	21.92

Table C-118. Torrifluvents-Fluvaquentic Endoaquolls complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	13.0	29.0	49.0	1500.00	121.20
A	75	13.0	29.0	49.0	3937.50	318.15
An1	100	13.0	29.0	49.0	4500.00	363.60
An1	100	13.0	29.0	49.0	3600.00	290.88
An2	200	9.0	17.0	40.0	6400.00	517.12
An2	200	9.0	17.0	40.0	5760.00	465.41
An3	200	9.0	17.0	40.0	4800.00	387.84
Cn1	75	13.0	29.0	49.0	1350.00	109.08
Cn1	75	13.0	29.0	49.0	1125.00	90.90
Cn2	75	13.0	29.0	49.0	900.00	72.72
Cn3	125	4.0	13.0	31.0	1237.50	99.99
Cn3	125	4.0	13.0	31.0	1031.25	83.33
C	125	13.0	31.0	49.0	375.00	30.30

Table C-119. Torrifluvents-Fluvaquentic Endoaquolls complex, cool, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	17.2	32.8	52.7	206.25	143.93
A	50	17.2	32.8	52.7	206.25	287.85
A	75	17.2	32.8	52.7	5343.75	431.78
Bt1	75	20.9	37.8	50.1	1950.00	157.56
Bt1	100	20.9	37.8	50.1	2600.00	210.08
Bt2	75	15.1	30.4	43.6	1068.75	86.36
Bt2	100	15.1	30.4	43.6	1425.00	115.14
Bt2	125	15.1	30.4	43.6	1781.25	143.93
Bt2	150	15.1	30.4	43.6	2137.50	172.71
C	100	6.1	17.4	38.5	155.00	12.52
C	175	6.1	17.4	38.5	271.25	21.92
C	200	6.1	17.4	38.5	310.00	25.05
C	250	6.1	17.4	38.5	387.50	31.31

Table C-120. Torriorthents-Haplargids-Rock outcrop complex, 15 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	7.2	12.8	40.0	196.88	15.91
A	25	7.2	12.8	40.0	196.88	15.91
A	25	7.2	12.8	40.0	196.88	15.91
BC	25	8.8	1.5	38.8	39.38	3.18
BC	25	8.8	1.5	38.8	39.38	3.18
BC	25	8.8	1.5	38.8	39.38	3.18
BC	50	8.8	1.5	38.8	78.75	6.36
BC	50	8.8	1.5	38.8	78.75	6.36
BC	50	8.8	1.5	38.8	78.75	6.36
ROCK	300	0.0	0.0	0.1	0.00	0.00
ROCK	300	0.0	0.0	0.1	0.00	0.00
ROCK	300	0.0	0.0	0.1	0.00	0.00
ROCK	300	0.0	0.0	0.1	0.00	0.00

Table C-121. Typic Psammaquents, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	1.5	6.2	42.4	206.25	16.67
A	50	1.5	6.2	42.4	206.25	33.33
A	50	1.5	6.2	42.4	412.50	33.33
A	75	1.5	6.2	42.4	618.75	50.00
B	100	1.2	10.0	40.0	495.00	40.00
B	150	1.2	10.0	40.0	742.50	59.99
B	175	1.2	10.0	40.0	866.25	69.99
B	175	1.2	10.0	40.0	866.25	69.99
B	200	1.2	10.0	40.0	990.00	79.99
C1	50	8.3	16.8	38.6	77.50	6.26
C2	100	1.0	5.0	41.9	165.00	13.33
C2	150	1.0	5.0	41.9	247.50	20.00
C2	200	1.0	5.0	41.9	330.00	26.66

Table C-122. Typic Torriorthents-Yaney complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	9.8	22.8	43.3	178.15	14.44
A	75	9.8	22.8	43.3	468.00	37.81
A	75	9.8	22.8	43.3	409.50	33.09
A	75	9.8	22.8	43.3	370.50	29.94
C1	150	9.6	17.5	41.0	688.50	55.63
C1	150	9.6	17.5	41.0	567.00	45.81
C1	150	9.6	17.5	41.0	445.50	36.00
C1	175	9.6	17.5	41.0	378.00	30.54
C1	175	9.6	17.5	41.0	283.50	22.91
C2	100	8.6	16.4	39.8	121.50	9.82
C2	100	8.6	16.4	39.8	108.00	8.73
C2	100	8.6	16.4	39.8	94.50	7.64
C3	150	3.9	10.9	30.4	128.25	10.36

Table C-123. Ulymeyer gravelly loamy coarse sand, moist, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.2	12.4	45.4	418.80	33.84
A	75	6.2	12.4	45.4	1206.00	97.44
A	100	6.2	12.4	45.4	1541.00	124.51
A	100	6.2	12.4	45.4	1474.00	119.10
C	100	6.2	12.0	45.4	1407.00	113.69
C	100	6.2	12.0	45.4	1340.00	108.27
C	125	6.2	12.0	45.4	1591.30	128.57
C	125	6.2	12.0	45.4	1507.50	121.81
C	150	6.2	12.0	45.4	1708.50	138.05
C	150	6.2	12.0	45.4	1608.00	129.93
C	150	6.2	12.0	45.4	1507.50	121.81
C	150	6.2	12.0	45.4	1381.90	111.66
C	150	6.2	12.0	45.4	1256.30	101.51

Table C-124. Ulymeyer gravelly loamy coarse sand, slightly dry, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.2	12.4	45.4	418.80	33.84
A	75	6.2	12.4	45.4	1206.00	97.44
A	100	6.2	12.4	45.4	1541.00	124.51
A	100	6.2	12.4	45.4	1474.00	119.10
C	100	6.2	12.0	45.4	1407.00	113.69
C	100	6.2	12.0	45.4	1340.00	108.27
C	125	6.2	12.0	45.4	1591.30	128.57
C	125	6.2	12.0	45.4	1507.50	121.81
C	150	6.2	12.0	45.4	1708.50	138.05
C	150	6.2	12.0	45.4	1608.00	129.93
C	150	6.2	12.0	45.4	1507.50	121.81
C	150	6.2	12.0	45.4	1381.90	111.66
C	150	6.2	12.0	45.4	1256.30	101.51

Table C-125. Ulymeyer-Rovana complex, slightly moist, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	4.4	11.0	32.4	418.80	33.84
A	50	4.4	11.0	32.4	753.80	60.90
A	75	4.4	11.0	32.4	1005.00	81.20
A	75	4.4	11.0	32.4	879.40	71.05
A	75	4.4	11.0	32.4	753.80	60.90
C1	75	3.0	8.9	26.2	628.10	50.75
C1	100	3.0	8.9	26.2	670.00	54.14
C1	100	3.0	8.9	26.2	586.30	47.37
C1	100	3.0	8.9	26.2	335.00	27.07
C2	150	3.0	8.9	26.2	376.90	30.45
C2	225	3.0	8.9	26.2	376.90	30.45
C2	225	3.0	8.9	26.2	113.10	9.14
C2	225	3.0	8.9	26.2	75.40	6.09

Table C-126. Vitrandic Torripsamments-Avalmount-Rock outcrop complex, 50 to 75 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	2.1	6.5	43.9	206.25	31.31
B	50	1.9	7.6	40.7	75.00	6.06
B	100	1.9	7.6	40.7	150.00	12.12
B	100	1.9	7.6	40.7	150.00	12.12
B	100	1.9	7.6	40.7	150.00	12.12
B	150	1.9	7.6	40.7	2.25	0.18
B	200	1.9	7.6	40.7	3.00	0.24
C	75	1.8	7.0	41.0	112.50	9.09
C	100	1.8	7.0	41.0	150.00	12.12
C	125	1.8	7.0	41.0	187.50	15.15
C	150	1.8	7.0	41.0	225.00	18.18
C	200	1.8	7.0	41.0	300.00	24.24
C	225	1.8	7.0	41.0	337.50	27.27

Table C-127. Vitrandic Torripsamments-Cinder land association, 15 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	2.1	6.5	43.9	387.50	31.31
B	50	1.9	7.6	40.7	75.00	6.06
B	100	1.9	7.6	40.7	150.00	12.12
B	100	1.9	7.6	40.7	150.00	12.12
B	100	1.9	7.6	40.7	150.00	12.12
B	150	1.9	7.6	40.7	2.25	0.18
B	200	1.9	7.6	40.7	3.00	0.24
C	75.0	1.8	7.0	41.0	112.50	9.09
C	100	1.8	7.0	41.0	150.00	12.12
C	125	1.8	7.0	41.0	187.50	15.15
C	150	1.8	7.0	41.0	225.00	18.18
C	200	1.8	7.0	41.0	300.00	24.24
C	225	1.8	7.0	41.0	337.50	27.27

Table C-128. Watterson sandy loam, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.4	20.0	43.5	206.25	64.64
A1	75	9.4	20.0	43.5	206.25	193.92
A1	100	9.4	20.0	43.5	3200.00	258.56
A2	75	5.3	11.6	41.6	1200.00	96.96
A2	100	5.3	11.6	41.6	1600.00	129.28
A2	150	5.3	11.6	41.6	2400.00	193.92
A2	150	5.3	11.6	41.6	2400.00	193.92
A2	200	5.3	11.6	41.6	3200.00	258.56
2C	100	2.8	7.4	41.7	837.50	67.67
2C	100	2.8	7.4	41.7	837.50	67.67
2C	125	2.8	7.4	41.7	1046.88	84.59
2C	150	2.8	7.4	41.7	1256.25	101.51
2C	150	2.8	7.4	41.7	1256.25	101.51

Table C-129. Watterson gravelly loamy sand, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.2	12.2	44.4	206.25	64.64
A1	25	5.2	12.2	44.4	206.25	64.64
A1	25	5.2	12.2	44.4	800.00	64.64
A2	25	5.2	10.2	41.9	400.00	32.32
A2	25	5.2	10.2	41.9	400.00	32.32
A2	25	5.2	10.2	41.9	400.00	32.32
2C	75	7.9	13.8	39.7	581.25	46.97
2C	125	7.9	13.8	39.7	968.75	78.28
2C	175	7.9	13.8	39.7	1356.25	109.59
2C	225	7.9	13.8	39.7	1743.75	140.90
2C	225	7.9	13.8	39.7	1743.75	140.90
2C	225	7.9	13.8	39.7	1743.75	140.90
2C	300	7.9	13.8	39.7	2325.00	187.86

Table C-130. Watterson gravelly sandy loam, wet, 0 to 4 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	7.0	14.7	43.9	206.25	62.62
A1	75	7.0	14.7	43.9	206.25	187.86
A1	125	7.0	14.7	43.9	3875.00	313.10
A2	75	3.8	10.1	39.8	116.25	9.39
A2	100	3.8	10.1	39.8	155.00	12.52
A2	150	3.8	10.1	39.8	2.33	0.19
A2	150	3.8	10.1	39.8	2.33	0.19
A2	200	3.8	10.1	39.8	310.00	25.05
2C	100	0.5	5.6	41.7	160.00	12.93
2C	100	0.5	5.6	41.7	160.00	12.93
2C	100	0.5	5.6	41.7	160.00	12.93
2C	150	0.5	5.6	41.7	240.00	19.39
2C	150	0.5	5.6	41.7	240.00	19.39

Table C-131. Watterson gravelly sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	5.2	12.2	44.4	206.25	64.64
A1	25	5.2	12.2	44.4	206.25	64.64
A1	25	5.2	12.2	44.4	800.00	64.64
A2	25	5.2	10.2	41.9	400.00	32.32
A2	25	5.2	10.2	41.9	400.00	32.32
A2	25	5.2	10.2	41.9	400.00	32.32
2C	75	7.9	13.8	39.7	581.25	46.97
2C	125	7.9	13.8	39.7	968.75	78.28
2C	175	7.9	13.8	39.7	1356.25	109.59
2C	225	7.9	13.8	39.7	1743.75	140.90
2C	225	7.9	13.8	39.7	1743.75	140.90
2C	225	7.9	13.8	39.7	1743.75	140.90
2C	300	7.9	13.8	39.7	2325.00	187.86

Table C-132. Watterson gravelly sandy loam, 4 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	9.4	20.0	43.5	800.00	64.64
A1	75	9.4	20.0	43.5	2400.00	193.92
A1	100	9.4	20.0	43.5	3200.00	258.56
A2	75	5.3	11.6	41.6	1200.00	96.96
A2	100	5.3	11.6	41.6	1600.00	129.28
A2	150	5.3	11.6	41.6	2400.00	193.92
A2	150	5.3	11.6	41.6	2400.00	193.92
A2	200	5.3	11.6	41.6	3200.00	258.56
2C	100	2.8	7.4	41.7	837.50	67.67
2C	100	2.8	7.4	41.7	837.50	67.67
2C	125	2.8	7.4	41.7	1046.88	84.59
2C	150	2.8	7.4	41.7	1256.25	101.51
2C	150	2.8	7.4	41.7	1256.25	101.51

Table C-133. Watterson-Conway-Ulymeyer complex, 0 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	7.0	14.7	43.9	206.25	62.62
A1	75	7.0	14.7	43.9	206.25	187.86
A1	125	7.0	14.7	43.9	3875.00	313.10
A2	75	3.8	10.1	39.8	116.25	9.39
A2	100	3.8	10.1	39.8	155.00	12.52
A2	150	3.8	10.1	39.8	2.33	0.19
A2	150	3.8	10.1	39.8	2.33	0.19
A2	200	3.8	10.1	39.8	310.00	25.05
2C	100	0.5	5.6	41.7	160.00	12.93
2C	100	0.5	5.6	41.7	160.00	12.93
2C	100	0.5	5.6	41.7	160.00	12.93
2C	150	0.5	5.6	41.7	240.00	19.39
2C	150	0.5	5.6	41.7	240.00	19.39

Table C-134. Westguard-Rienhakel association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	0.7	15.0	37.0	2125.00	171.70
A1	25	0.7	15.0	37.0	1487.50	120.19
A2	75	0.7	15.0	37.0	3187.50	257.55
A2	125	0.7	15.0	37.0	3187.50	257.55
A2	125	0.7	15.0	37.0	2125.00	171.70
Btqkn	75	1.0	21.0	43.0	600.00	48.48
Btqkn	75	1.0	21.0	43.0	360.00	29.09
Bkn	75	1.0	21.0	43.0	240.00	19.39
Bkn	75	1.0	21.0	43.0	180.00	14.54
2Btqk	100	0.9	29.0	45.0	159.30	12.87
2Btqk	100	0.9	29.0	45.0	147.00	11.88
2Cq	250	1.0	28.0	45.0	213.80	17.27
2Cq	375	1.0	28.0	45.0	213.80	17.27

Table C-135. Whitewolf-Toquerville families association, 15 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.8	8.8	47.0	218.80	17.68
A1	25	3.8	8.8	47.0	201.30	16.26
A2	75	4.5	11.5	46.3	519.80	42.00
A2	100	4.5	11.5	46.3	627.00	50.66
A2	100	4.5	11.5	46.3	561.00	45.33
A2	125	4.5	11.5	46.3	618.80	50.00
C	125	4.5	11.5	46.3	536.30	43.33
C	140	4.5	11.5	46.3	485.10	39.20
C	150	4.5	11.5	46.3	371.30	30.00
C	160	4.5	11.5	46.3	264.00	21.33
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	200	0.4	0.8	1.8	0.00	0.00

Table C-136. Whitewolf-Toquerville families association, warm, 15 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	3.8	8.8	47.0	218.80	17.68
A1	25	3.8	8.8	47.0	201.30	16.26
A2	75	4.5	11.5	46.3	519.80	42.00
A2	100	4.5	11.5	46.3	627.00	50.66
A2	100	4.5	11.5	46.3	561.00	45.33
A2	125	4.5	11.5	46.3	618.80	50.00
C	125	4.5	11.5	46.3	536.30	43.33
C	140	4.5	11.5	46.3	485.10	39.20
C	150	4.5	11.5	46.3	371.30	30.00
C	160	4.5	11.5	46.3	264.00	21.33
Cr	125	0.4	0.8	1.8	0.00	0.00
Cr	150	0.4	0.8	1.8	0.00	0.00
Cr	200	0.4	0.8	1.8	0.00	0.00

Table C-137. Winerton fine sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	4.5	15.5	41.4	387.50	31.31
A1	75	4.5	15.5	41.4	387.50	31.31
A2	50	7.3	16.8	41.1	387.50	31.31
A2	100	7.3	16.8	41.1	387.50	31.31
A2	100	7.3	16.8	41.1	387.50	31.31
Btn	125	18.5	30.7	43.0	34.38	2.78
Btn	150	18.5	30.7	43.0	68.75	5.56
Bkm	100	0.2	0.7	25.3	0.10	0.01
Bkm	125	0.2	0.7	25.3	0.10	0.01
Cg	100	17.5	30.0	46.6	450.00	36.36
Cg	150	17.5	30.0	46.6	450.00	36.36
Cg	200	17.5	30.0	46.6	450.00	36.36
Cg	200	17.5	30.0	46.6	450.00	36.36

Table C-138. Winerton-Hessica complex, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.3	14.7	44.4	186.25	18.63
A1	25	5.6	16.3	44.0	172.50	17.55
A1	50	5.6	16.3	44.0	315.00	32.70
A2	50	6.9	12.1	39.2	277.10	30.32
A2	50	6.9	12.1	39.2	211.90	25.10
A2	75	6.9	12.1	39.2	284.23	34.96
A2	75	6.9	12.1	39.2	234.11	30.95
Btn	125	6.9	12.1	39.2	276.54	40.50
Btn	150	6.9	12.1	39.2	282.24	44.63
Bkm	225	14.4	24.6	47.4	328.35	57.99
Cg	200	13.5	24.0	50.0	186.26	41.70
Cg	225	13.5	24.0	50.0	120.60	39.80
Cg	225	13.5	24.0	50.0	61.81	35.09

Table C-139. Winnedumah silt loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
An1	25	12.6	25.9	46.8	1250.00	101.00
An1	125	12.6	25.9	46.8	4375.00	353.50
An2	125	13.3	26.8	47.4	2500.00	202.00
An2	125	13.3	26.8	47.4	1562.50	126.25
An3	125	13.3	26.8	47.4	1093.80	88.38
An3	175	13.3	26.8	47.4	1312.50	106.05
BAtn	125	13.3	26.8	47.4	650.00	52.52
BAtn	125	13.3	26.8	47.4	487.50	39.39
Bt	150	18.5	29.9	49.3	390.00	31.51
2Btkb	125	18.5	29.9	49.3	97.50	7.88
2Btkb	125	18.5	29.9	49.3	81.20	6.57
2Btb1	200	12.5	26.6	47.0	96.00	7.76
2Btb2	200	12.5	26.6	47.0	32.00	2.59

Table C-140. Winnedumah fine sandy loam, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
An	25	10.9	23.0	45.0	1812.50	146.45
An	75	10.9	23.0	45.0	5165.60	417.38
An	125	10.9	23.0	45.0	8156.30	659.03
An	125	10.9	23.0	45.0	7703.10	622.41
BAtn	75	13.2	26.9	45.7	4425.00	357.54
BAtn	100	13.2	26.9	45.7	5531.30	446.93
BAtn	100	13.2	26.9	45.7	5162.50	417.13
BAtn	100	13.2	26.9	45.7	4793.80	387.34
Bt	100	18.2	29.1	43.8	4500.00	363.60
Bt	125	18.2	29.1	43.8	5156.30	416.63
2Btb	150	10.9	23.0	45.0	4968.80	401.48
2Btb	200	10.9	23.0	45.0	5962.50	481.77
2Btb	200	10.9	23.0	45.0	5300.00	428.24

Table C-141. Xeric Argidurids, 2 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.0	14.0	37.0	226.88	18.33
A1	25	6.0	14.0	37.0	185.63	15.00
A2	25	9.0	20.0	42.0	144.38	11.67
A2	50	9.0	20.0	42.0	247.50	20.00
Bt	50	31.0	46.0	55.0	175.00	14.14
Bt	100	31.0	46.0	55.0	280.00	22.62
Bt	100	31.0	46.0	55.0	252.00	20.36
Bt	100	31.0	46.0	55.0	126.00	10.18
Cqm	250	0.1	0.3	0.5	1.26	0.10
Cqm	250	0.1	0.3	0.5	1.26	0.10
Cqm	375	0.1	0.3	0.5	1.26	0.10
C	75	6.0	14.0	36.0	99.00	18.00
C	75	6.0	14.0	36.0	61.88	5.00

Table C-142. Xeric Haplodurids, 2 to 9 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	6.8	12.9	45.1	206.30	16.67
A1	50	6.8	12.9	45.1	354.80	28.66
A1	50	6.8	12.9	45.1	297.00	24.00
ACq	75	6.8	12.9	45.1	348.00	28.12
ACq	125	6.8	12.9	45.1	440.00	35.55
ACq	125	6.8	12.9	45.1	300.00	24.24
ACq	150	6.8	12.9	45.1	168.00	13.57
Cqm	150	0.4	0.8	1.8	0.00	0.00
Cqm	150	0.4	0.8	1.8	0.00	0.00
Cqm	150	0.4	0.8	1.8	0.00	0.00
Cqm	150	0.4	0.8	1.8	0.00	0.00
Cqm	150	0.4	0.8	1.8	0.00	0.00
Cqm	150	0.4	0.8	1.8	0.00	0.00

Table C-143. Xerofluvents, 0 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	7.2	13.8	41.2	412.50	33.33
A	50	7.2	13.8	41.2	825.00	66.66
A	100	7.2	13.8	41.2	1650.00	133.32
A	100	7.2	13.8	41.2	1650.00	133.32
B1	75	10.1	16.2	40.4	123.75	10.00
B1	100	10.1	16.2	40.4	165.00	13.33
B2	100	8.9	17.4	38.8	147.50	11.92
B2	150	8.9	17.4	38.8	221.25	17.88
B2	150	8.9	17.4	38.8	221.25	17.88
C	100	15.0	23.5	39.1	162.50	13.13
C	150	15.0	23.5	39.1	243.75	19.70
C	200	15.0	23.5	39.1	325.00	26.26
C	200	15.0	23.5	39.1	325.00	26.26

Table C-144. Yaney-Yaney loam association, 0 to 2 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	4.3	9.0	40.2	206.25	16.67
A1	25	4.3	9.0	40.2	206.25	16.67
A2	50	4.3	9.0	40.2	400.00	32.32
A3	75	1.7	6.2	41.4	600.00	48.48
A3	75	1.7	6.2	41.4	600.00	48.48
Ckn1	200	6.4	12.5	39.5	600.00	48.48
Ckn1	200	6.4	12.5	39.5	600.00	48.48
Ckn2	200	2.1	9.3	40.3	600.00	48.48
Ckn2	200	2.1	9.3	40.3	600.00	48.48
Ckqn	50	7.3	17.2	39.0	82.50	6.67
C-kn	75	6.0	14.3	39.2	123.75	10.00
Cn1	150	5.1	17.0	38.7	247.50	20.00
Cn2	175	4.4	9.5	40.3	288.75	23.33

Table C-145. Yellowrock-Seaman complex, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A	25	6.9	14.0	45.1	196.90	15.91
C	75	6.9	14.2	45.2	556.90	45.00
C	100	6.9	14.2	45.2	660.00	53.33
C	100	6.9	14.2	45.2	577.50	46.66
C	150	6.9	14.2	45.2	742.50	59.99
2C	100	6.9	15.1	45.2	400.00	32.32
2C	120	6.9	15.1	45.2	412.80	33.35
2C	130	6.9	15.1	45.2	374.40	30.25
2C	140	6.9	15.1	45.2	324.80	26.24
2C	160	6.9	15.1	45.2	281.60	22.75
3C	120	6.8	11.9	45.1	148.50	12.00
3C	130	6.8	11.9	45.1	85.80	6.93
3C	150	6.8	11.9	45.1	24.80	2.00

Table C-146. Yermo very gravelly sandy loam, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	7.6	15.8	38.7	193.75	15.66
A2	25	7.6	15.8	38.7	174.38	14.09
A2	25	7.6	15.8	38.7	155.00	12.52
C1	75	8.2	16.7	39.6	406.88	32.88
C1	75	8.2	16.7	39.6	348.75	28.18
C1	125	8.2	16.7	39.6	484.38	39.14
C1	125	8.2	16.7	39.6	387.50	31.31
C1	125	8.2	16.7	39.6	348.75	28.18
C1	150	8.2	16.7	39.6	372.00	30.06
C1	150	11.0	19.6	42.8	348.75	28.18
C1	200	11.0	19.6	42.8	434.00	35.07
C2	200	11.0	19.6	42.8	279.00	22.54
C2	200	11.0	19.6	42.8	248.00	20.04

Table C-147. Yermo extremely gravelly sandy loam, 2 to 5 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	7.6	15.8	38.7	193.75	15.66
A2	25	7.6	15.8	38.7	174.38	14.09
A2	25	7.6	15.8	38.7	155.00	12.52
C1	75	8.2	16.7	39.6	406.88	32.88
C1	75	8.2	16.7	39.6	348.75	28.18
C1	125	8.2	16.7	39.6	484.38	39.14
C1	125	8.2	16.7	39.6	387.50	31.31
C1	125	8.2	16.7	39.6	348.75	28.18
C1	150	8.2	16.7	39.6	372.00	30.06
C1	150	11.0	19.6	42.8	348.75	28.18
C1	200	11.0	19.6	42.8	434.00	35.07
C2	200	11.0	19.6	42.8	279.00	22.54
C2	200	11.0	19.6	42.8	248.00	20.04

Table C-148. Yermo stony-Yermo complex, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	8.3	12.3	36.2	206.25	16.67
A2	25	8.8	18.7	40.9	180.00	14.54
A2	25	8.8	18.7	40.9	160.00	12.93
C1	75	7.0	15.0	37.8	420.00	33.94
C1	75	7.0	15.0	37.8	360.00	29.09
C1	75	7.0	15.0	37.8	300.00	24.24
C1	100	7.0	15.0	37.8	320.00	25.86
C1	100	7.0	15.0	37.8	288.00	23.27
C1	225	7.0	10.8	33.7	594.00	48.00
C1	225	7.0	10.8	33.7	556.88	45.00
C1	225	7.0	10.8	33.7	519.75	42.00
C2	150	7.0	10.8	33.7	222.75	18.00
C2	175	7.0	10.8	33.7	231.00	18.66

Table C-149. Yermo stony-Yermo complex, cool, 5 to 15 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	8.3	12.3	36.2	206.25	16.67
A2	25	8.8	18.7	40.9	180.00	14.54
A2	25	8.8	18.7	40.9	160.00	12.93
C1	75	7.0	15.0	37.8	420.00	33.94
C1	75	7.0	15.0	37.8	360.00	29.09
C1	75	7.0	15.0	37.8	300.00	24.24
C1	100	7.0	15.0	37.8	320.00	25.86
C1	100	7.0	15.0	37.8	288.00	23.27
C1	225	7.0	10.8	33.7	594.00	48.00
C1	225	7.0	10.8	33.7	556.88	45.00
C1	225	7.0	10.8	33.7	519.75	42.00
C2	150	7.0	10.8	33.7	222.75	18.00
C2	175	7.0	10.8	33.7	231.00	18.66

Table C-150. Zono coarse sand, 15 to 50 percent slopes

Layer Name	Depth (mm)	Wilting Point (%)	Field Capacity (%)	Saturation (%)	Organic Matter (g/m^2)	Nitrogen (g/m^2)
A1	25	2.0	7.4	42.7	206.25	22.22
A1	50	2.0	7.4	42.7	206.25	44.44
A2	100	3.2	10.1	41.0	825.00	66.66
A2	125	3.2	10.1	41.0	1031.25	83.33
A2	150	3.2	10.1	41.0	1237.50	99.99
A2	150	3.2	10.1	41.0	1237.50	99.99
2C	150	0.9	5.0	43.1	1237.50	99.99
3Ab1	100	2.6	8.5	40.4	335.00	27.07
3Ab2	75	1.9	7.3	40.9	251.25	20.30
3Ab2	100	1.9	7.3	40.9	335.00	27.07
3Cr	150	0.0	0.0	0.1	0.38	0.03
3Cr	150	0.0	0.0	0.1	0.38	0.03
3Cr	175	0.0	0.0	0.1	0.45	0.04

Appendix D

Plant Parameters

Table D-1. General information.

Species	Growth Form	Woody Form	Seasonality	Legume	Biennial
PIJE	6	2	1	0	0
POFR	5	2	1	0	0
SALA	5	2	1	0	0
TARA	5	2	1	0	0
AMDU	6	1	1	0	0
ARSP	6	1	1	0	0
ARTR	6	1	1	0	0
ATCA	6	1	1	0	0
ATCO	6	1	1	0	0
ATTO	6	1	1	0	0
CELA	5	1	1	0	0
CHNA	5	1	1	0	0
CORA	5	1	1	0	0
EPNE	6	1	1	0	0
ERCO	5	1	1	0	0
ERFA	5	1	1	0	0
HYSA	5	1	1	0	0
PSAR	6	1	1	0	0
ROWO	5	1	1	0	0
SAEX	5	1	1	0	0
SAVE	5	1	1	0	0
SUTO	6	1	1	0	0
TEAX	6	1	1	0	0
BRTE	1	0	1	0	0
CYDA	2	0	1	0	0
DISP	2	0	1	0	0
LETR	2	0	1	0	0
PHAU	4	0	1	0	0
SPGR	2	0	1	0	0
SPAI	2	0	1	0	0
STSP	2	0	1	0	0
CARX	4	0	1	0	0
ELEO	4	0	1	0	0
JUBA	4	0	1	0	0
SCRP	4	0	1	0	0
TYLA	4	0	1	0	0
GLLE	4	0	1	1	0
HEAN	3	0	1	0	0
MESA	4	0	1	1	0
SAKA	3	0	1	0	0

Table D-2. Mature allocation matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.29	0.05	0.37	0.22	0.07	0.00
POFR	0.17	0.03	0.59	0.17	0.04	0.00
SALA	0.20	0.03	0.38	0.30	0.09	0.00
TARA	0.30	0.08	0.32	0.23	0.07	0.00
AMDU	0.41	0.10	0.08	0.37	0.04	0.00
ARSP	0.41	0.10	0.08	0.37	0.04	0.00
ARTR	0.41	0.10	0.08	0.37	0.04	0.00
ATCA	0.37	0.26	0.07	0.20	0.10	0.00
ATCO	0.42	0.31	0.05	0.17	0.05	0.00
ATTO	0.37	0.26	0.07	0.20	0.10	0.00
CELA	0.41	0.10	0.08	0.24	0.17	0.00
CHNA	0.41	0.10	0.08	0.24	0.17	0.00
CORA	0.32	0.08	0.10	0.32	0.18	0.00
EPNE	0.35	0.12	0.08	0.45	0.00	0.00
ERCO	0.41	0.10	0.08	0.24	0.17	0.00
ERFA	0.23	0.06	0.35	0.18	0.18	0.00
HYSA	0.41	0.10	0.08	0.24	0.17	0.00
PSAR	0.41	0.10	0.08	0.37	0.04	0.00
ROWO	0.42	0.11	0.19	0.12	0.16	0.00
SAEX	0.46	0.12	0.29	0.07	0.06	0.00
SAVE	0.48	0.17	0.06	0.21	0.08	0.00
SUTO	0.06	0.01	0.09	0.42	0.42	0.00
TEAX	0.37	0.26	0.07	0.20	0.10	0.00
BRTE	0.05	0.20	0.10	0.15	0.50	0.00
CYDA	0.27	0.23	0.20	0.20	0.10	0.00
DISP	0.28	0.24	0.07	0.26	0.15	0.00
LETR	0.22	0.19	0.16	0.28	0.15	0.00
PHAU	0.31	0.26	0.15	0.16	0.12	0.00
SPGR	0.39	0.31	0.04	0.17	0.09	0.00
SPAI	0.25	0.22	0.26	0.08	0.19	0.00
STSP	0.25	0.22	0.26	0.08	0.19	0.00
CARX	0.24	0.37	0.10	0.29	0.00	0.00
ELEO	0.24	0.37	0.10	0.29	0.00	0.00
JUBA	0.24	0.37	0.10	0.29	0.00	0.00
SCRP	0.31	0.26	0.15	0.16	0.12	0.00
TYLA	0.31	0.26	0.15	0.16	0.12	0.00
GLLE	0.48	0.12	0.20	0.12	0.08	0.00
HEAN	0.13	0.02	0.00	0.54	0.31	0.00
MESA	0.47	0.08	0.03	0.14	0.28	0.00
SAKA	0.14	0.03	0.00	0.75	0.08	0.00

Table D-3. Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	Jan	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Feb	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Mar	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Apr	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	May	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Jun	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Jul	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Aug	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Sep	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Oct	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Nov	0.12	0.37	0.13	0.21	0.17	0.00
PIJE	Dec	0.12	0.37	0.13	0.21	0.17	0.00
POFR	Jan	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Feb	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Mar	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Apr	0.16	0.48	0.10	0.16	0.10	0.00
POFR	May	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Jun	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Jul	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Aug	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Sep	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Oct	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Nov	0.16	0.48	0.10	0.16	0.10	0.00
POFR	Dec	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Jan	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Feb	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Mar	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Apr	0.16	0.48	0.10	0.16	0.10	0.00
SALA	May	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Jun	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Jul	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Aug	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Sep	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Oct	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Nov	0.16	0.48	0.10	0.16	0.10	0.00
SALA	Dec	0.16	0.48	0.10	0.16	0.10	0.00
TARA	Jan	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Feb	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Mar	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Apr	0.13	0.38	0.15	0.25	0.09	0.00
TARA	May	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Jun	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Jul	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Aug	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Sep	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Oct	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Nov	0.13	0.38	0.15	0.25	0.09	0.00
TARA	Dec	0.13	0.38	0.15	0.25	0.09	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
AMDU	Jan	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Feb	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Mar	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Apr	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	May	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Jun	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Jul	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Aug	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Sep	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Oct	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Nov	0.05	0.14	0.16	0.27	0.38	0.00
AMDU	Dec	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Jan	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Feb	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Mar	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Apr	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	May	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Jun	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Jul	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Aug	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Sep	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Oct	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Nov	0.05	0.14	0.16	0.27	0.38	0.00
ARSP	Dec	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Jan	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Feb	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Mar	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Apr	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	May	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Jun	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Jul	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Aug	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Sep	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Oct	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Nov	0.05	0.14	0.16	0.27	0.38	0.00
ARTR	Dec	0.05	0.14	0.16	0.27	0.38	0.00
ATCA	Jan	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Feb	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Mar	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Apr	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	May	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Jun	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Jul	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Aug	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Sep	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Oct	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Nov	0.04	0.11	0.23	0.39	0.23	0.00
ATCA	Dec	0.04	0.11	0.23	0.39	0.23	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
ATCO	Jan	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Feb	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Mar	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Apr	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	May	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Jun	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Jul	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Aug	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Sep	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Oct	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Nov	0.07	0.20	0.18	0.30	0.25	0.00
ATCO	Dec	0.07	0.20	0.18	0.30	0.25	0.00
ATTO	Jan	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Feb	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Mar	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Apr	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	May	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Jun	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Jul	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Aug	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Sep	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Oct	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Nov	0.04	0.11	0.23	0.39	0.23	0.00
ATTO	Dec	0.04	0.11	0.23	0.39	0.23	0.00
CELA	Jan	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Feb	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Mar	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Apr	0.05	0.16	0.18	0.30	0.31	0.00
CELA	May	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Jun	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Jul	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Aug	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Sep	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Oct	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Nov	0.05	0.16	0.18	0.30	0.31	0.00
CELA	Dec	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Jan	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Feb	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Mar	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Apr	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	May	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Jun	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Jul	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Aug	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Sep	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Oct	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Nov	0.05	0.16	0.18	0.30	0.31	0.00
CHNA	Dec	0.05	0.16	0.18	0.30	0.31	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
CORA	Jan	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Feb	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Mar	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Apr	0.09	0.25	0.18	0.30	0.18	0.00
CORA	May	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Jun	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Jul	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Aug	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Sep	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Oct	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Nov	0.09	0.25	0.18	0.30	0.18	0.00
CORA	Dec	0.09	0.25	0.18	0.30	0.18	0.00
EPNE	Jan	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Feb	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Mar	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Apr	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	May	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Jun	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Jul	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Aug	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Sep	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Oct	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Nov	0.08	0.34	0.23	0.35	0.00	0.00
EPNE	Dec	0.08	0.34	0.23	0.35	0.00	0.00
ERCO	Jan	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Feb	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Mar	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Apr	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	May	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Jun	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Jul	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Aug	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Sep	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Oct	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Nov	0.05	0.16	0.18	0.30	0.31	0.00
ERCO	Dec	0.05	0.16	0.18	0.30	0.31	0.00
ERFA	Jan	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Feb	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Mar	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Apr	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	May	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Jun	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Jul	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Aug	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Sep	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Oct	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Nov	0.11	0.17	0.16	0.12	0.44	0.00
ERFA	Dec	0.11	0.17	0.16	0.12	0.44	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
HYSA	Jan	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Feb	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Mar	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Apr	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	May	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Jun	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Jul	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Aug	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Sep	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Oct	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Nov	0.05	0.16	0.18	0.30	0.31	0.00
HYSA	Dec	0.05	0.16	0.18	0.30	0.31	0.00
PSAR	Jan	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Feb	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Mar	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Apr	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	May	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Jun	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Jul	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Aug	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Sep	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Oct	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Nov	0.05	0.14	0.16	0.27	0.38	0.00
PSAR	Dec	0.05	0.14	0.16	0.27	0.38	0.00
ROWO	Jan	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Feb	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Mar	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Apr	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	May	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Jun	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Jul	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Aug	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Sep	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Oct	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Nov	0.06	0.16	0.15	0.26	0.37	0.00
ROWO	Dec	0.06	0.16	0.15	0.26	0.37	0.00
SAEX	Jan	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Feb	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Mar	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Apr	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	May	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Jun	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Jul	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Aug	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Sep	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Oct	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Nov	0.08	0.24	0.10	0.17	0.41	0.00
SAEX	Dec	0.08	0.24	0.10	0.17	0.41	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
SAVE	Jan	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Feb	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Mar	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Apr	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	May	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Jun	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Jul	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Aug	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Sep	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Oct	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Nov	0.06	0.18	0.16	0.27	0.33	0.00
SAVE	Dec	0.06	0.18	0.16	0.27	0.33	0.00
SUTO	Jan	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Feb	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Mar	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Apr	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	May	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Jun	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Jul	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Aug	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Sep	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Oct	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Nov	0.02	0.05	0.28	0.46	0.19	0.00
SUTO	Dec	0.02	0.05	0.28	0.46	0.19	0.00
TEAX	Jan	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Feb	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Mar	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Apr	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	May	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Jun	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Jul	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Aug	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Sep	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Oct	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Nov	0.04	0.11	0.23	0.39	0.23	0.00
TEAX	Dec	0.04	0.11	0.23	0.39	0.23	0.00
BRTE	Jan	0.10	0.30	0.15	0.15	0.30	0.00
BRTE	Feb	0.10	0.30	0.12	0.13	0.35	0.00
BRTE	Mar	0.08	0.30	0.15	0.15	0.32	0.00
BRTE	Apr	0.08	0.25	0.15	0.15	0.37	0.00
BRTE	May	0.08	0.20	0.15	0.17	0.40	0.00
BRTE	Jun	0.08	0.20	0.15	0.17	0.40	0.00
BRTE	Jul	0.08	0.20	0.15	0.17	0.40	0.00
BRTE	Aug	0.00	0.00	0.00	0.00	0.00	0.00
BRTE	Sep	0.00	0.00	0.00	0.00	0.00	0.00
BRTE	Oct	0.05	0.45	0.10	0.10	0.30	0.00
BRTE	Nov	0.05	0.45	0.10	0.10	0.30	0.00
BRTE	Dec	0.10	0.30	0.15	0.15	0.30	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
CYDA	Jan	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Feb	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Mar	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Apr	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	May	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Jun	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Jul	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Aug	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Sep	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Oct	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Nov	0.05	0.22	0.24	0.24	0.25	0.00
CYDA	Dec	0.05	0.22	0.24	0.24	0.25	0.00
DISP	Jan	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Feb	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Mar	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Apr	0.06	0.22	0.23	0.23	0.26	0.00
DISP	May	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Jun	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Jul	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Aug	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Sep	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Oct	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Nov	0.06	0.22	0.23	0.23	0.26	0.00
DISP	Dec	0.06	0.22	0.23	0.23	0.26	0.00
LETR	Jan	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Feb	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Mar	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Apr	0.08	0.33	0.20	0.19	0.20	0.00
LETR	May	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Jun	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Jul	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Aug	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Sep	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Oct	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Nov	0.08	0.33	0.20	0.19	0.20	0.00
LETR	Dec	0.08	0.33	0.20	0.19	0.20	0.00
PHAU	Jan	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Feb	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Mar	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Apr	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	May	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Jun	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Jul	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Aug	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Sep	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Oct	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Nov	0.04	0.14	0.24	0.24	0.34	0.00
PHAU	Dec	0.04	0.14	0.24	0.24	0.34	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
SPGR	Jan	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Feb	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Mar	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Apr	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	May	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Jun	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Jul	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Aug	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Sep	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Oct	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Nov	0.06	0.17	0.25	0.24	0.28	0.00
SPGR	Dec	0.06	0.17	0.25	0.24	0.28	0.00
SPAI	Jan	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Feb	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Mar	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Apr	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	May	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Jun	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Jul	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Aug	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Sep	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Oct	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Nov	0.07	0.29	0.15	0.14	0.35	0.00
SPAI	Dec	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Jan	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Feb	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Mar	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Apr	0.07	0.29	0.15	0.14	0.35	0.00
STSP	May	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Jun	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Jul	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Aug	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Sep	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Oct	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Nov	0.07	0.29	0.15	0.14	0.35	0.00
STSP	Dec	0.07	0.29	0.15	0.14	0.35	0.00
CARX	Jan	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Feb	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Mar	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Apr	0.04	0.17	0.24	0.55	0.00	0.00
CARX	May	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Jun	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Jul	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Aug	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Sep	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Oct	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Nov	0.04	0.17	0.24	0.55	0.00	0.00
CARX	Dec	0.04	0.17	0.24	0.55	0.00	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
ELEO	Jan	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Feb	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Mar	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Apr	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	May	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Jun	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Jul	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Aug	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Sep	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Oct	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Nov	0.04	0.17	0.24	0.55	0.00	0.00
ELEO	Dec	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Jan	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Feb	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Mar	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Apr	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	May	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Jun	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Jul	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Aug	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Sep	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Oct	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Nov	0.04	0.17	0.24	0.55	0.00	0.00
JUBA	Dec	0.04	0.17	0.24	0.55	0.00	0.00
SCRP	Jan	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Feb	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Mar	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Apr	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	May	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Jun	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Jul	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Aug	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Sep	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Oct	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Nov	0.04	0.14	0.24	0.24	0.34	0.00
SCRP	Dec	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Jan	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Feb	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Mar	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Apr	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	May	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Jun	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Jul	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Aug	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Sep	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Oct	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Nov	0.04	0.14	0.24	0.24	0.34	0.00
TYLA	Dec	0.04	0.14	0.24	0.24	0.34	0.00

Table D-3 (continued). Current allocation matrix.

Species	Month	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
GLLE	Jan	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Feb	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Mar	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Apr	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	May	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Jun	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Jul	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Aug	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Sep	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Oct	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Nov	0.10	0.16	0.16	0.12	0.46	0.00
GLLE	Dec	0.10	0.16	0.16	0.12	0.46	0.00
HEAN	Jan	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Feb	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Mar	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Apr	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	May	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Jun	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Jul	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Aug	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Sep	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Oct	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Nov	0.06	0.09	0.33	0.33	0.19	0.00
HEAN	Dec	0.06	0.09	0.33	0.33	0.19	0.00
MESA	Jan	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Feb	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Mar	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Apr	0.14	0.21	0.16	0.17	0.32	0.00
MESA	May	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Jun	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Jul	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Aug	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Sep	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Oct	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Nov	0.14	0.21	0.16	0.17	0.32	0.00
MESA	Dec	0.14	0.21	0.16	0.17	0.32	0.00
SAKA	Jan	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Feb	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Mar	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Apr	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	May	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Jun	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Jul	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Aug	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Sep	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Oct	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Nov	0.07	0.10	0.25	0.52	0.06	0.00
SAKA	Dec	0.07	0.10	0.25	0.52	0.06	0.00

Table D-4. SeedMonthAllocation matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.12	0.37	0.06	0.10	0.15	0.20
POFR	0.16	0.48	0.05	0.08	0.09	0.14
SALA	0.16	0.48	0.05	0.08	0.09	0.14
TARA	0.13	0.38	0.07	0.13	0.08	0.21
AMDU	0.05	0.14	0.08	0.13	0.34	0.26
ARSP	0.05	0.14	0.08	0.13	0.34	0.26
ARTR	0.05	0.14	0.08	0.13	0.34	0.26
ATCA	0.04	0.11	0.12	0.20	0.21	0.32
ATCO	0.07	0.20	0.09	0.15	0.22	0.27
ATTO	0.04	0.11	0.12	0.20	0.21	0.32
CELA	0.05	0.16	0.09	0.15	0.28	0.27
CHNA	0.05	0.16	0.09	0.15	0.28	0.27
CORA	0.09	0.25	0.09	0.15	0.16	0.26
EPNE	0.08	0.34	0.12	0.18	0.00	0.28
ERCO	0.05	0.16	0.09	0.15	0.28	0.27
ERFA	0.00	0.17	0.00	0.12	0.22	0.49
HYSA	0.05	0.16	0.09	0.15	0.28	0.27
PSAR	0.05	0.14	0.08	0.13	0.34	0.26
ROWO	0.06	0.16	0.07	0.13	0.33	0.25
SAEX	0.08	0.24	0.05	0.08	0.37	0.18
SAVE	0.06	0.18	0.08	0.13	0.30	0.25
SUTO	0.02	0.05	0.14	0.23	0.17	0.39
TEAX	0.04	0.11	0.12	0.20	0.21	0.32
BRTE	0.00	0.00	0.00	0.00	0.00	1.00
CYDA	0.00	0.22	0.00	0.29	0.29	0.20
DISP	0.00	0.22	0.00	0.29	0.28	0.21
LETR	0.00	0.33	0.00	0.19	0.10	0.38
PHAU	0.00	0.14	0.00	0.24	0.17	0.45
SPGR	0.00	0.17	0.00	0.24	0.14	0.45
SPAI	0.00	0.29	0.00	0.14	0.18	0.39
STSP	0.00	0.29	0.00	0.14	0.18	0.39
CARX	0.00	0.17	0.00	0.55	0.00	0.28
ELEO	0.00	0.17	0.00	0.55	0.00	0.28
JUBA	0.00	0.17	0.00	0.55	0.00	0.28
SCRP	0.00	0.14	0.00	0.24	0.17	0.45
TYLA	0.00	0.14	0.00	0.24	0.17	0.45
GLLE	0.00	0.16	0.00	0.12	0.23	0.49
HEAN	0.00	0.00	0.00	0.00	0.00	1.00
MESA	0.00	0.21	0.00	0.17	0.16	0.46
SAKA	0.00	0.00	0.00	0.00	0.00	1.00

Table D-5. GreenOutAllocation matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.00	0.35	0.00	0.20	0.45	0.00
POFR	0.00	0.40	0.00	0.20	0.40	0.00
SALA	0.00	0.40	0.00	0.20	0.40	0.00
TARA	0.00	0.35	0.00	0.25	0.40	0.00
AMDU	0.00	0.10	0.00	0.25	0.65	0.00
ARSP	0.00	0.10	0.00	0.25	0.65	0.00
ARTR	0.00	0.10	0.00	0.25	0.65	0.00
ATCA	0.00	0.10	0.00	0.35	0.55	0.00
ATCO	0.00	0.20	0.00	0.30	0.50	0.00
ATTO	0.00	0.10	0.00	0.35	0.55	0.00
CELA	0.00	0.15	0.00	0.30	0.55	0.00
CHNA	0.00	0.15	0.00	0.30	0.55	0.00
CORA	0.00	0.25	0.00	0.30	0.45	0.00
EPNE	0.00	0.30	0.00	0.70	0.00	0.00
ERCO	0.00	0.15	0.00	0.30	0.55	0.00
ERFA	0.00	0.15	0.00	0.15	0.70	0.00
HYSA	0.00	0.15	0.00	0.30	0.55	0.00
PSAR	0.00	0.10	0.00	0.25	0.65	0.00
ROWO	0.00	0.15	0.00	0.25	0.60	0.00
SAEX	0.00	0.20	0.00	0.20	0.60	0.00
SAVE	0.00	0.15	0.00	0.25	0.60	0.00
SUTO	0.00	0.05	0.00	0.60	0.35	0.00
TEAX	0.00	0.10	0.00	0.35	0.55	0.00
BRTE	0.00	0.20	0.00	0.20	0.60	0.00
CYDA	0.00	0.20	0.00	0.25	0.55	0.00
DISP	0.00	0.20	0.00	0.25	0.55	0.00
LETR	0.00	0.30	0.00	0.20	0.50	0.00
PHAU	0.00	0.14	0.00	0.24	0.62	0.00
SPGR	0.00	0.15	0.00	0.20	0.65	0.00
SPAI	0.00	0.25	0.00	0.15	0.60	0.00
STSP	0.00	0.25	0.00	0.15	0.60	0.00
CARX	0.00	0.15	0.00	0.85	0.00	0.00
ELEO	0.00	0.15	0.00	0.85	0.00	0.00
JUBA	0.00	0.15	0.00	0.85	0.00	0.00
SCRP	0.00	0.14	0.00	0.24	0.62	0.00
TYLA	0.00	0.14	0.00	0.24	0.62	0.00
GLLE	0.00	0.15	0.00	0.20	0.55	0.00
HEAN	0.00	0.09	0.00	0.30	0.61	0.00
MESA	0.00	0.20	0.00	0.15	0.65	0.00
SAKA	0.00	0.10	0.00	0.84	0.06	0.00

Table D-6. PlantNConc matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0.0057	0.0129	0.0006	0.0023	0.0062	0.0058	0.0021	0.0031	0.0100	0.0105	0.0052
POFR	0.0036	0.0107	0.0021	0.0037	0.0074	0.0069	0.0034	0.0038	0.0102	0.0109	0.0062
SALA	0.0037	0.0128	0.0025	0.0044	0.0088	0.0082	0.0040	0.0045	0.0121	0.0129	0.0076
TARA	0.0127	0.0349	0.0129	0.0148	0.0303	0.0258	0.0093	0.0155	0.0284	0.0303	0.0255
AMDU	0.0064	0.0220	0.0053	0.0082	0.0152	0.0243	0.0074	0.0078	0.0250	0.0266	0.0219
ARSP	0.0064	0.0220	0.0053	0.0082	0.0152	0.0243	0.0074	0.0078	0.0250	0.0266	0.0219
ARTR	0.0064	0.0220	0.0053	0.0082	0.0152	0.0243	0.0074	0.0078	0.0250	0.0266	0.0219
ATCA	0.0101	0.0348	0.0084	0.0130	0.0240	0.0384	0.0117	0.0122	0.0254	0.0270	0.0346
ATCO	0.0111	0.0384	0.0093	0.0143	0.0265	0.0424	0.0129	0.0135	0.0368	0.0379	0.0382
ATTO	0.0101	0.0348	0.0084	0.0130	0.0240	0.0384	0.0117	0.0122	0.0254	0.0270	0.0346
CELA	0.0067	0.0222	0.0055	0.0084	0.0156	0.0248	0.0076	0.0080	0.0257	0.0273	0.0223
CHNA	0.0067	0.0222	0.0055	0.0084	0.0156	0.0248	0.0076	0.0080	0.0257	0.0273	0.0223
CORA	0.0085	0.0294	0.0071	0.0110	0.0203	0.0189	0.0099	0.0101	0.0191	0.0203	0.0171
EPNE	0.0066	0.0226	0.0035	0.0100	0.0100	0.0160	0.0090	0.0051	0.0094	0.0100	0.0144
ERCO	0.0067	0.0222	0.0055	0.0084	0.0156	0.0248	0.0076	0.0080	0.0257	0.0273	0.0223
ERFA	0.0044	0.0150	0.0137	0.0092	0.0152	0.0357	0.0083	0.0078	0.0351	0.0373	0.0322
HYSA	0.0067	0.0222	0.0055	0.0084	0.0156	0.0248	0.0076	0.0080	0.0257	0.0273	0.0223
PSAR	0.0064	0.0220	0.0053	0.0082	0.0152	0.0243	0.0074	0.0078	0.0250	0.0266	0.0219
ROWO	0.0088	0.0298	0.0074	0.0135	0.0210	0.0109	0.0080	0.0103	0.0244	0.0260	0.0098
SAEX	0.0086	0.0291	0.0072	0.0111	0.0205	0.0327	0.0100	0.0104	0.0283	0.0301	0.0295
SAVE	0.0088	0.0298	0.0074	0.0113	0.0210	0.0335	0.0102	0.0107	0.0301	0.0320	0.0302
SUTO	0.0088	0.0298	0.0074	0.0113	0.0210	0.0335	0.0102	0.0107	0.0301	0.0320	0.0302
TEAX	0.0101	0.0348	0.0084	0.0130	0.0240	0.0384	0.0117	0.0122	0.0254	0.0270	0.0346
BRTE	0.0090	0.0090	0.0104	0.0106	0.0110	0.0173	0.0073	0.0073	0.0090	0.0142	0.0173
CYDA	0.0052	0.0159	0.0138	0.0093	0.0153	0.0175	0.0084	0.0078	0.0209	0.0222	0.0175
DISP	0.0045	0.0138	0.0120	0.0081	0.0133	0.0175	0.0073	0.0068	0.0268	0.0285	0.0175
LETR	0.0052	0.0188	0.0163	0.0110	0.0181	0.0175	0.0099	0.0093	0.0451	0.0480	0.0175
PHAU	0.0025	0.0084	0.0153	0.0104	0.0170	0.0175	0.0053	0.0087	0.0314	0.0334	0.0175
SPGR	0.0046	0.0140	0.0121	0.0082	0.0135	0.0175	0.0042	0.0069	0.0168	0.0179	0.0175
SPAI	0.0035	0.0106	0.0092	0.0062	0.0102	0.0175	0.0056	0.0052	0.0235	0.0250	0.0175
STSP	0.0035	0.0106	0.0092	0.0062	0.0102	0.0175	0.0056	0.0052	0.0235	0.0250	0.0175
CARX	0.0048	0.0148	0.0128	0.0087	0.0142	0.0175	0.0079	0.0072	0.0489	0.0520	0.0175
ELEO	0.0048	0.0148	0.0128	0.0087	0.0142	0.0175	0.0079	0.0072	0.0489	0.0520	0.0175
JUBA	0.0048	0.0148	0.0128	0.0087	0.0142	0.0175	0.0079	0.0072	0.0489	0.0520	0.0175
SCRP	0.0025	0.0084	0.0153	0.0104	0.0170	0.0175	0.0053	0.0087	0.0314	0.0334	0.0175
TYLA	0.0025	0.0084	0.0153	0.0104	0.0170	0.0175	0.0053	0.0087	0.0314	0.0334	0.0175
GLLE	0.0046	0.0163	0.0219	0.0148	0.0243	0.0611	0.0135	0.0124	0.0408	0.0434	0.0550
HEAN	0.0050	0.0171	0.0156	0.0106	0.0173	0.0299	0.0054	0.0089	0.0449	0.0478	0.0269
MESA	0.0046	0.0162	0.0218	0.0148	0.0242	0.0664	0.0075	0.0123	0.0330	0.0351	0.0598
SAKA	0.0048	0.0164	0.0149	0.0101	0.0166	0.0357	0.0052	0.0085	0.0303	0.0322	0.0322

Table D-7. Required PlantNConc matrix.

Species	Min	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	1.00	0.0036	0.0091	0.0004	0.0017	0.0048	0.0039	0.0014	0.0021	0.0068	0.0071	0.0035
POFR	1.00	0.0024	0.0073	0.0014	0.0025	0.0050	0.0047	0.0023	0.0026	0.0069	0.0074	0.0042
SALA	1.00	0.0025	0.0087	0.0020	0.0030	0.0060	0.0056	0.0029	0.0031	0.0083	0.0088	0.0052
TARA	1.00	0.0086	0.0237	0.0088	0.0102	0.0206	0.0175	0.0063	0.0105	0.0193	0.0206	0.0173
AMDU	1.00	0.0045	0.0154	0.0037	0.0057	0.0106	0.0170	0.0052	0.0055	0.0175	0.0186	0.0153
ARSP	1.00	0.0045	0.0154	0.0037	0.0057	0.0106	0.0170	0.0052	0.0055	0.0175	0.0186	0.0153
ARTR	1.00	0.0045	0.0154	0.0037	0.0057	0.0106	0.0170	0.0052	0.0055	0.0175	0.0186	0.0153
ATCA	1.00	0.0086	0.0296	0.0071	0.0111	0.0204	0.0326	0.0099	0.0104	0.0216	0.0230	0.0294
ATCO	1.00	0.0075	0.0261	0.0063	0.0097	0.0180	0.0288	0.0088	0.0088	0.0092	0.0250	0.0260
ATTO	1.00	0.0086	0.0296	0.0071	0.0111	0.0204	0.0326	0.0099	0.0104	0.0216	0.0230	0.0294
CELA	1.00	0.0051	0.0169	0.0042	0.0064	0.0119	0.0188	0.0058	0.0061	0.0198	0.0209	0.0169
CHNA	1.00	0.0051	0.0169	0.0042	0.0064	0.0119	0.0188	0.0058	0.0061	0.0198	0.0209	0.0169
CORA	1.00	0.0058	0.0200	0.0048	0.0075	0.0138	0.0129	0.0068	0.0069	0.0130	0.0138	0.0116
EPNE	1.00	0.0045	0.0154	0.0024	0.0068	0.0068	0.0109	0.0061	0.0035	0.0064	0.0068	0.0098
ERCO	1.00	0.0051	0.0169	0.0042	0.0064	0.0119	0.0188	0.0058	0.0061	0.0198	0.0209	0.0169
ERFA	1.00	0.0026	0.0090	0.0082	0.0055	0.0091	0.0224	0.0050	0.0047	0.0211	0.0224	0.0193
HYSA	1.00	0.0051	0.0169	0.0042	0.0064	0.0119	0.0188	0.0058	0.0061	0.0198	0.0209	0.0169
PSAR	1.00	0.0045	0.0154	0.0037	0.0057	0.0106	0.0170	0.0052	0.0055	0.0175	0.0186	0.0153
ROWO	1.00	0.0030	0.0102	0.0025	0.0045	0.0071	0.0038	0.0027	0.0034	0.0083	0.0088	0.0034
SAEX	1.00	0.0058	0.0198	0.0049	0.0075	0.0139	0.0222	0.0068	0.0071	0.0192	0.0205	0.0201
SAVE	1.00	0.0027	0.0093	0.0023	0.0035	0.0065	0.0104	0.0031	0.0033	0.0093	0.0099	0.0093
SUTO	1.00	0.0060	0.0204	0.0065	0.0077	0.0143	0.0228	0.0068	0.0073	0.0204	0.0228	0.0204
TEAX	1.00	0.0086	0.0296	0.0071	0.0111	0.0204	0.0326	0.0099	0.0104	0.0216	0.0230	0.0294
BRTE	0.75	0.0090	0.0090	0.0104	0.0106	0.0110	0.0173	0.0073	0.0073	0.0090	0.0142	0.0173
CYDA	1.00	0.0036	0.0111	0.0097	0.0065	0.0107	0.0123	0.0059	0.0055	0.0146	0.0155	0.0123
DISP	1.00	0.0030	0.0091	0.0079	0.0053	0.0088	0.0116	0.0048	0.0045	0.0177	0.0188	0.0116
LETR	1.00	0.0031	0.0113	0.0098	0.0066	0.0109	0.0105	0.0060	0.0056	0.0271	0.0288	0.0105
PHAU	1.00	0.0015	0.0050	0.0092	0.0062	0.0102	0.0105	0.0032	0.0052	0.0188	0.0200	0.0105
SPGR	1.00	0.0028	0.0084	0.0073	0.0049	0.0091	0.0105	0.0025	0.0042	0.0101	0.0107	0.0105
SPAI	1.00	0.0028	0.0084	0.0073	0.0049	0.0081	0.0138	0.0044	0.0041	0.0186	0.0198	0.0138
STSP	1.00	0.0028	0.0084	0.0073	0.0049	0.0081	0.0138	0.0044	0.0041	0.0186	0.0198	0.0138
CARX	1.00	0.0029	0.0089	0.0077	0.0052	0.0085	0.0105	0.0047	0.0043	0.0293	0.0312	0.0105
ELEO	1.00	0.0029	0.0089	0.0077	0.0052	0.0085	0.0105	0.0047	0.0043	0.0293	0.0312	0.0105
JUBA	1.00	0.0029	0.0089	0.0077	0.0052	0.0085	0.0105	0.0047	0.0043	0.0293	0.0312	0.0105
SCRP	1.00	0.0015	0.0050	0.0092	0.0062	0.0102	0.0105	0.0032	0.0052	0.0188	0.0200	0.0105
TYLA	1.00	0.0015	0.0050	0.0092	0.0062	0.0102	0.0105	0.0032	0.0052	0.0188	0.0200	0.0105
GLLE	1.00	0.0028	0.0098	0.0131	0.0089	0.0146	0.0367	0.0081	0.0074	0.0245	0.0260	0.0330
HEAN	1.00	0.0030	0.0103	0.0094	0.0064	0.0104	0.0180	0.0032	0.0054	0.0270	0.0287	0.0161
MESA	1.00	0.0013	0.0041	0.0055	0.0037	0.0096	0.0166	0.0019	0.0031	0.0083	0.0088	0.0150
SAKA	1.00	0.0029	0.0098	0.0090	0.0062	0.0062	0.0214	0.0031	0.0051	0.0182	0.0193	0.0193

Table D-8. Nitrogen resorption matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.06	0.12	0.00	0.08	0.67	0.00
POFR	0.07	0.14	0.00	0.08	0.67	0.00
SALA	0.07	0.14	0.00	0.08	0.67	0.00
TARA	0.06	0.12	0.00	0.08	0.67	0.00
AMDU	0.06	0.11	0.00	0.08	0.57	0.00
ARSP	0.06	0.11	0.00	0.08	0.57	0.00
ARTR	0.06	0.11	0.00	0.08	0.57	0.00
ATCA	0.06	0.11	0.00	0.08	0.57	0.00
ATCO	0.06	0.11	0.00	0.08	0.57	0.00
ATTO	0.06	0.11	0.00	0.08	0.57	0.00
CELA	0.06	0.11	0.00	0.08	0.57	0.00
CHNA	0.06	0.11	0.00	0.08	0.57	0.00
CORA	0.05	0.10	0.00	0.08	0.57	0.00
EPNE	0.05	0.11	0.00	0.50	0.00	0.00
ERCO	0.06	0.11	0.00	0.08	0.57	0.00
ERFA	0.04	0.09	0.00	0.18	0.44	0.00
HYSA	0.06	0.11	0.00	0.08	0.57	0.00
PSAR	0.06	0.11	0.00	0.08	0.57	0.00
ROWO	0.06	0.11	0.00	0.08	0.57	0.00
SAEX	0.06	0.11	0.00	0.08	0.57	0.00
SAVE	0.06	0.11	0.00	0.08	0.57	0.00
SUTO	0.05	0.10	0.00	0.07	0.50	0.00
TEAX	0.06	0.11	0.00	0.08	0.57	0.00
BRTE	0.00	0.00	0.00	0.00	0.00	0.00
CYDA	0.04	0.09	0.00	0.22	0.44	0.00
DISP	0.04	0.09	0.00	0.22	0.44	0.00
LETR	0.04	0.09	0.00	0.22	0.44	0.00
PHAU	0.04	0.09	0.00	0.22	0.44	0.00
SPGR	0.04	0.09	0.00	0.22	0.44	0.00
SPAI	0.04	0.09	0.00	0.22	0.44	0.00
STSP	0.04	0.09	0.00	0.22	0.44	0.00
CARX	0.04	0.09	0.00	0.44	0.44	0.00
ELEO	0.04	0.09	0.00	0.44	0.44	0.00
JUBA	0.04	0.09	0.00	0.44	0.44	0.00
SCRP	0.04	0.09	0.00	0.22	0.44	0.00
TYLA	0.04	0.09	0.00	0.22	0.44	0.00
GLLE	0.02	0.04	0.00	0.09	0.22	0.00
HEAN	0.00	0.00	0.00	0.00	0.00	0.00
MESA	0.01	0.02	0.00	0.06	0.11	0.00
SAKA	0.00	0.00	0.00	0.00	0.00	0.00

Table D-9. Root architecture matrix.

	Percent of Soil Profile Depth												Max.
Species	**0-1**	**1-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**	**80-90**	**90-100**	**Root Depth (cm)**
PIJE	2	7	10	21	15	12	8	7	6	5	4	3	240
POFR	5	10	10	20	15	12	10	6	5	4	2	1	600
SALA	5	10	10	20	15	12	10	6	5	4	2	1	600
TARA	3	12	13	19	13	11	9	5	5	4	3	3	5340
AMDU	2	9	12	21	14	11	6	6	6	5	4	4	900
ARSP	2	9	12	21	14	11	6	6	6	5	4	4	900
ARTR	2	9	12	21	14	11	6	6	6	5	4	4	900
ATCA	6	21	21	19	9	9	6	3	2	2	1	1	550
ATCO	2	6	12	21	19	15	9	6	4	2	2	2	390
ATTO	6	21	21	19	9	9	6	3	2	2	1	1	550
CELA	2	7	7	16	19	9	8	7	7	7	6	5	620
CHNA	2	7	7	16	19	9	8	7	7	7	6	5	620
CORA	3	13	16	19	11	9	9	9	6	3	1	1	500
EPNE	4	16	20	16	16	13	13	7	3	1	1	1	200
ERCO	2	7	7	16	19	9	8	7	7	7	6	5	620
ERFA	6	20	20	39	2	2	2	2	2	2	2	1	110
HYSA	2	7	7	16	19	9	8	7	7	7	6	5	620
PSAR	2	9	12	21	14	11	6	6	6	5	4	4	900
ROWO	2	6	8	15	10	15	13	10	10	6	3	1	370
SAEX	5	10	10	20	15	12	10	6	5	4	2	1	300
SAVE	3	10	11	22	15	9	6	6	6	5	4	3	550
SUTO	5	15	15	31	8	6	4	4	4	3	3	2	70
TEAX	6	21	21	19	9	9	6	3	2	2	1	1	550
BRTE	28	35	11	8	6	3	2	2	2	2	1	1	150
CYDA	2	6	6	13	12	12	12	10	7	7	7	6	90
DISP	2	6	6	13	12	12	12	10	7	7	7	6	154
LETR	4	12	11	17	13	8	8	6	8	6	4	3	150
PHAU	5	12	15	30	11	5	5	4	4	4	3	2	127
SPGR	6	18	20	24	13	7	3	2	2	2	2	1	396
SPAI	5	19	16	21	13	5	3	2	10	4	1	1	620
STSP	5	19	16	21	13	5	3	2	10	4	1	1	620
CARX	7	8	15	29	16	4	4	3	3	4	4	3	160
ELEO	7	8	15	29	16	4	4	3	3	4	4	3	160
JUBA	7	8	15	29	16	4	4	3	3	4	4	3	160
SCRP	5	12	15	30	11	5	5	4	4	4	3	2	127
TYLA	5	12	15	30	11	5	5	4	4	4	3	2	127
GLLE	1	8	1	7	10	14	12	13	14	10	9	1	430
HEAN	6	24	6	9	12	16	10	7	2	3	3	2	310
MESA	1	1	1	7	10	14	12	13	14	10	9	8	314
SAKA	4	13	22	28	16	8	3	2	1	1	1	1	200

Table D-10. Root efficiency matrices.

Species	Max Root Growth (mm/day)	Uptake Capacity	Biomass Adjustment	Saturation Death Loss
PIJE	12.5	0.1	0.60	1.00
POFR	12.5	0.1	0.60	0.20
SALA	12.5	0.1	0.60	0.00
TARA	12.5	0.1	0.60	1.00
AMDU	12.5	0.1	0.75	1.00
ARSP	12.5	0.1	0.75	1.00
ARTR	12.5	0.1	0.75	1.00
ATCA	12.5	0.1	0.75	0.80
ATCO	12.5	0.1	0.75	0.90
ATTO	12.5	0.1	0.75	0.80
CELA	12.5	0.1	0.75	1.00
CHNA	12.5	0.1	0.75	1.00
CORA	12.5	0.1	0.75	1.00
EPNE	12.5	0.1	0.80	1.00
ERCO	12.5	0.1	0.75	1.00
ERFA	12.5	0.1	0.90	1.00
HYSA	12.5	0.1	0.75	1.00
PSAR	12.5	0.1	0.75	1.00
ROWO	12.5	0.1	0.80	0.80
SAEX	12.5	0.1	0.70	0.00
SAVE	12.5	0.1	0.75	0.80
SUTO	12.5	0.1	0.85	1.00
TEAX	12.5	0.1	0.75	0.80
BRTE	12.5	0.1	1.00	1.00
CYDA	12.5	0.1	0.90	0.90
DISP	12.5	0.1	0.90	0.10
LETR	12.5	0.1	0.95	0.10
PHAU	12.5	0.1	0.85	0.00
SPGR	12.5	0.1	0.90	0.00
SPAI	12.5	0.1	1.00	0.80
STSP	12.5	0.1	1.00	0.80
CARX	12.5	0.1	0.95	0.00
ELEO	12.5	0.1	0.95	0.00
JUBA	12.5	0.1	0.95	0.00
SCRP	12.5	0.1	0.85	0.00
TYLA	12.5	0.1	0.85	0.00
GLLE	12.5	0.1	0.90	1.00
HEAN	12.5	0.1	0.90	1.00
MESA	12.5	0.1	0.90	1.00
SAKA	12.5	0.1	0.90	1.00

Table D-11. Groundwater response matrices.

Species	DTW Discount Depth (m)	GW Efficiency Factor
PIJE	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 – Deep	0.0
POFR	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 – Deep	0.0
SALA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
TARA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
AMDU	0.0 - 0.2	0.0
	0.2 - 0.8	100.0 - 3.0*10(DTW - 0.2)
	0.8 - 1.3	79.0 - 5.0*10(DTW - 0.8)
	1.3 - 2.6	54.0
	2.6 - 5.6	46.0
	5.6 - 7.6	18.0
	7.6 - Deep	0.0
ARSP	0.0 - 0.2	0.0
	0.2 - 0.8	100.0 - 3.0*10(DTW - 0.2)
	0.8 - 1.3	79.0 - 5.0*10(DTW - 0.8)
	1.3 - 2.6	54.0
	2.6 - 5.6	46.0
	5.6 - 7.6	18.0
	7.6 - Deep	0.0
ARTR	0.0 - 0.2	0.0
	0.2 - 0.8	100.0 - 3.0*10(DTW - 0.2)
	0.8 - 1.3	79.0 - 5.0*10(DTW - 0.8)
	1.3 - 2.6	54.0
	2.6 - 5.6	46.0
	5.6 - 7.6	18.0
	7.6 - Deep	0.0

Table D-11 (continued). Groundwater response matrices.

Species	DTW Discount Depth (m)	GW Efficiency Factor
ATCA	0.0 - 0.4	0.0
	0.4 - 0.9	72.0
	0.9 - 2.4	63.0
	2.4 - 3.2	57.0
	3.2 - 3.5	40.0
	3.5 - 4.2	28.0
	4.2 - 5.0	22.0
	5.0 - 6.4	7.0
	6.4 - 7.7	7.0 - 0.8*10(DTW - 6.4)
ATCO	0.0 - 0.4	0.0
	0.4 - 0.9	72.0
	0.9 - 2.4	63.0
	2.4 - 3.2	57.0
	3.2 - 3.5	40.0
	3.5 - 4.2	28.0
	4.2 - 5.0	22.0
	5.0 - 6.4	7.0
	6.4 - 7.7	7.0 - 0.8*10(DTW - 6.4)
ATTO	0.0 - 0.4	0.0
	0.4 - 0.9	72.0
	0.9 - 2.4	63.0
	2.4 - 3.2	57.0
	3.2 - 3.5	40.0
	3.5 - 4.2	28.0
	4.2 - 5.0	22.0
	5.0 - 6.4	7.0
	6.4 - 7.7	7.0 - 0.8*10(DTW - 6.4)
CELA	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
CHNA	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
	6.1 - 7.6	18.0
	7.6 - Deep	0.0

Table D-11 (continued). Groundwater response matrices.

Species	DTW Discount Depth (m)	GW Efficiency Factor
CORA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
EPNE	0.0 - 0.4	0.0
	0.4 - 4.1	84.0 - 1.4*10(DTW - 0.4)
	4.1 - Deep	25.0 - 0.4*10(DTW - 4.1)
ERCO	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
ERFA	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
HYSA	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
PSAR	0.0 - 0.2	0.0
	0.2 - 0.8	100.0 - 3.0*10(DTW - 0.2)
	0.8 - 1.3	79.0 - 5.0*10(DTW - 0.8)
	1.3 - 2.6	54.0
	2.6 - 5.6	46.0
	5.6 - 7.6	18.0
	7.6 - Deep	0.0
ROWO	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0

Table D-11 (continued). Groundwater response matrices.

Species	DTW Discount Depth (m)	GW Efficiency Factor
SAEX	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
SAVE	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
SUTO	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
TEAX	0.0 - 0.4	0.0
	0.4 - 0.9	72.0
	0.9 - 2.4	63.0
	2.4 - 3.2	57.0
	3.2 - 3.5	40.0
	3.5 - 4.2	28.0
	4.2 - 5.0	22.0
	5.0 - 6.4	7.0
	6.4 - 7.7	7.0 - 0.8*10(DTW - 6.4)
BRTE	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
CYDA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
DISP	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0

Table D-11 (continued). Groundwater response matrices.

Species	DTW Discount Depth (m)	GW Efficiency Factor
LETR	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
PHAU	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
SPGR	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
SPAI	0.0 - 0.2	0.0
	0.2 - 0.8	100.0 - 3.0*10(DTW - 0.2)
	0.8 - 1.3	79.0 - 5.0*10(DTW - 0.8)
	1.3 - 2.6	54.0
	2.6 - 5.6	46.0
	5.6 - 7.6	18.0
	7.6 - Deep	0.0
STSP	0.0 - 0.2	0.0
	0.2 - 0.8	100.0 - 3.0*10(DTW - 0.2)
	0.8 - 1.3	79.0 - 5.0*10(DTW - 0.8)
	1.3 - 2.6	54.0
	2.6 - 5.6	46.0
	5.6 - 7.6	18.0
	7.6 - Deep	0.0
CARX	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
ELEO	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0

Table D-11 (continued). Groundwater response matrices.

Species	DTW Discount Depth (m)	GW Efficiency Factor
JUBA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
SCRP	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
TYLA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
GLLE	0.0 - 0.4	0.0
	0.4 - 2.3	93.0 - 2.0*10(DTW - 0.4)
	2.3 - 3.2	45.0
	3.2 - 3.7	31.0 - 4.0*10(DTW - 3.2)
	3.7 - 5.0	38.0
	5.0 - 5.6	31.0 - 5.0*10(DTW - 5.0)
	5.6 - 7.7	5.0
	7.7 - Deep	0.0
HEAN	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
MESA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0
SAKA	0.0 - 0.2	100.0
	0.2 - 1.2	100.0
	1.2 - 3.6	98.0 - 1.5*10(DTW - 1.2)
	3.6 - 6.1	52.0 - 1.1*10(DTW - 3.6)
	6.1 - 7.6	18.0
	7.6 - Deep	0.0

Table D-12. Physiological month triggers.

Species	Green-out	Seed-sprout		Seed-set		Dormancy
		Start	End	Start	End	
PIJE	4	4	9	5	9	3
POFR	4	4	8	4	9	11
SALA	4	4	9	4	9	11
TARA	4	4	9	5	8	10
AMDU	3	3	9	5	9	11
ARSP	3	3	9	5	9	11
ARTR	3	3	9	5	9	11
ATCA	3	4	8	6	9	11
ATCO	3	3	9	5	8	11
ATTO	3	4	8	6	9	11
CELA	3	3	9	5	9	11
CHNA	3	3	9	5	9	11
CORA	3	2	10	3	9	2
EPNE	3	3	9	5	8	11
ERCO	3	3	9	5	9	11
ERFA	3	3	9	4	9	11
HYSA	3	3	9	5	9	11
PSAR	3	3	9	5	9	11
ROWO	3	3	9	4	9	11
SAEX	3	3	9	4	9	11
SAVE	3	3	9	5	9	11
SUTO	3	3	9	5	9	11
TEAX	3	4	8	6	9	11
BRTE	10	10	4	4	7	7
CYDA	4	4	9	5	9	11
DISP	4	4	9	5	9	11
LETR	3	3	10	5	8	12
PHAU	3	3	10	4	6	11
SPGR	3	3	10	7	11	11
SPAI	3	3	10	5	10	12
STSP	3	3	10	5	10	12
CARX	3	3	10	5	9	12
ELEO	3	3	10	5	9	12
JUBA	3	3	10	5	9	12
SCRP	3	3	10	4	6	11
TYLA	3	3	10	4	6	11
GLLE	3	3	9	5	9	11
HEAN	3	3	9	5	9	10
MESA	3	2	10	5	6	11
SAKA	3	2	9	6	9	10

Table D-13. Biomass conversion constants.

Species	Dry wt/ Wet wt	Moisture interception /g biomass	Basal cover/ Trunk biomass
PIJE	0.60	0.0080	549.0
POFR	0.55	0.0095	1310.0
SALA	0.55	0.0095	350.0
TARA	0.55	0.0095	108.0
AMDU	0.32	0.0085	50.0
ARSP	0.32	0.0085	50.0
ARTR	0.32	0.0085	50.0
ATCA	0.30	0.0080	20.0
ATCO	0.30	0.0075	20.0
ATTO	0.30	0.0080	20.0
CELA	0.32	0.0080	20.0
CHNA	0.32	0.0080	20.0
CORA	0.50	0.0085	23.5
EPNE	0.30	0.0030	15.0
ERCO	0.32	0.0080	20.0
ERFA	0.28	0.0090	6.0
HYSA	0.32	0.0080	20.0
PSAR	0.32	0.0085	50.0
ROWO	0.32	0.0100	15.0
SAEX	0.32	0.0100	15.0
SAVE	0.30	0.0075	20.0
SUTO	0.35	0.0070	2.0
TEAX	0.30	0.0080	20.0
BRTE	0.30	0.0082	1.0
CYDA	0.35	0.0085	2.0
DISP	0.35	0.0085	2.0
LETR	0.38	0.0090	4.0
PHAU	0.30	0.0080	4.0
SPGR	0.39	0.0090	3.0
SPAI	0.35	0.0088	80.0
STSP	0.35	0.0088	80.0
CARX	0.33	0.0080	2.0
ELEO	0.33	0.0080	2.0
JUBA	0.33	0.0080	2.0
SCRP	0.30	0.0080	4.0
TYLA	0.30	0.0080	4.0
GLLE	0.28	0.0090	8.0
HEAN	0.17	0.0090	1.0
MESA	0.25	0.0085	2.0
SAKA	0.32	0.0070	1.5

Table D-14. Water use factors.

Species	Maintenance (mm/g bio/mon)	New biomass maintenance	Water to production	Green-out water use
PIJE	0.0000035	0.02	0.87	0.40
POFR	0.0250000	0.02	0.90	0.45
SALA	0.0500000	0.02	1.00	0.45
TARA	0.0000035	0.02	1.08	0.45
AMDU	0.0001260	0.03	0.66	0.68
ARSP	0.0001260	0.03	0.66	0.68
ARTR	0.0001260	0.03	0.66	0.68
ATCA	0.0000110	0.02	1.10	0.70
ATCO	0.0000095	0.02	0.65	0.70
ATTO	0.0000110	0.02	1.10	0.70
CELA	0.0000110	0.02	0.61	0.68
CHNA	0.0000110	0.02	0.61	0.68
CORA	0.0000080	0.02	1.07	0.50
EPNE	0.0000063	0.02	1.53	0.70
ERCO	0.0000110	0.02	0.61	0.68
ERFA	0.0000126	0.03	0.59	0.72
HYSA	0.0000110	0.02	0.61	0.68
PSAR	0.0001260	0.03	0.66	0.68
ROWO	0.0000140	0.03	1.07	0.68
SAEX	0.0000154	0.03	0.42	0.68
SAVE	0.0000095	0.02	0.84	0.70
SUTO	0.0000063	0.02	0.37	0.65
TEAX	0.0000110	0.02	1.10	0.70
BRTE	0.0000150	0.04	0.21	0.70
CYDA	0.0000154	0.04	1.08	0.65
DISP	0.0000095	0.03	0.40	0.65
LETR	0.0000154	0.04	0.97	0.62
PHAU	0.0000150	0.04	0.98	0.70
SPGR	0.0000150	0.04	0.54	0.61
SPAI	0.0000118	0.03	0.44	0.65
STSP	0.0000118	0.03	0.44	0.65
CARX	0.0000154	0.04	0.79	0.67
ELEO	0.0000154	0.04	0.79	0.67
JUBA	0.0000154	0.04	0.79	0.67
SCRP	0.0000150	0.04	0.98	0.70
TYLA	0.0000150	0.04	0.98	0.70
GLLE	0.0000154	0.03	0.95	0.72
HEAN	0.0000120	0.03	0.40	0.83
MESA	0.0000120	0.03	0.73	0.75
SAKA	0.0000080	0.02	0.26	0.68

Table D-15. Growth rates.

Species	Maximum growth Rate	Maximum biomass	Maximum old biomass drought loss
PIJE	0.72	39860	0.10
POFR	2.00	14500	0.10
SALA	1.30	14700	0.20
TARA	1.23	7200	0.10
AMDU	0.25	1276	0.25
ARSP	0.25	1276	0.25
ARTR	0.25	1276	0.25
ATCA	2.50	1456	0.20
ATCO	1.50	1057	0.20
ATTO	2.50	1456	0.20
CELA	4.90	1300	0.30
CHNA	4.90	1300	0.30
CORA	0.50	4140	0.20
EPNE	0.20	492	0.30
ERCO	4.90	1300	0.30
ERFA	1.80	400	0.20
HYSA	4.90	1300	0.30
PSAR	0.25	1276	0.25
ROWO	1.80	711	0.30
SAEX	5.00	1400	0.20
SAVE	0.40	1269	0.20
SUTO	2.50	720	0.80
TEAX	2.50	1456	0.20
BRTE	3.50	678	0.40
CYDA	4.25	2000	0.30
DISP	3.65	1068	0.30
LETR	4.50	1343	0.40
PHAU	1.50	2608	0.40
SPGR	2.40	1300	0.35
SPAI	3.50	1136	0.30
STSP	3.50	1136	0.30
CARX	1.00	936	0.40
ELEO	1.00	936	0.40
JUBA	1.00	936	0.40
SCRP	1.50	2608	0.40
TYLA	1.50	2608	0.40
GLLE	7.00	1355	0.20
HEAN	6.90	474	0.40
MESA	6.75	1569	0.40
SAKA	5.75	1230	0.40

Table D-16. Monthly maximum growth rates.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PIJE	0.10	0.10	0.30	0.60	1.00	1.00	1.00	0.90	0.80	0.50	0.20	0.10
POFR	0.00	0.00	0.20	0.60	1.00	1.00	1.00	1.00	0.80	0.40	0.10	0.00
SALA	0.00	0.10	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.40	0.20	0.10
TARA	0.00	0.00	0.30	0.60	0.90	1.00	1.00	1.00	0.80	0.30	0.10	0.00
AMDU	0.10	0.15	0.30	0.70	1.00	1.00	0.90	0.80	0.80	0.40	0.20	0.10
ARSP	0.10	0.15	0.30	0.70	1.00	1.00	0.90	0.80	0.80	0.40	0.20	0.10
ARTR	0.10	0.15	0.30	0.70	1.00	1.00	0.90	0.80	0.80	0.40	0.20	0.10
ATCA	0.10	0.10	0.20	0.40	0.80	1.00	1.00	1.00	1.00	0.60	0.30	0.10
ATCO	0.10	0.15	0.30	0.70	1.00	1.00	1.00	0.90	0.70	0.50	0.30	0.10
ATTO	0.10	0.10	0.20	0.40	0.80	1.00	1.00	1.00	1.00	0.60	0.30	0.10
CELA	0.10	0.10	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.60	0.40	0.20
CHNA	0.10	0.10	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.60	0.40	0.20
CORA	0.20	0.20	0.50	0.80	1.00	1.00	1.00	1.00	0.90	0.50	0.30	0.20
EPNE	0.20	0.30	0.40	0.80	1.00	1.00	1.00	0.70	0.50	0.40	0.30	0.20
ERCO	0.10	0.10	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.60	0.40	0.20
ERFA	0.00	0.10	0.20	0.50	1.00	1.00	1.00	0.90	0.80	0.40	0.20	0.00
HYSA	0.10	0.10	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.60	0.40	0.20
PSAR	0.10	0.15	0.30	0.70	1.00	1.00	0.90	0.80	0.80	0.40	0.20	0.10
ROWO	0.00	0.05	0.20	0.70	1.00	1.00	0.90	0.80	0.60	0.40	0.20	0.10
SAEX	0.10	0.15	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.60	0.40	0.20
SAVE	0.10	0.15	0.30	0.70	1.00	1.00	1.00	0.90	0.70	0.50	0.30	0.10
SUTO	0.10	0.10	0.30	0.60	1.00	1.00	1.00	1.00	0.80	0.40	0.20	0.10
TEAX	0.10	0.10	0.20	0.40	0.80	1.00	1.00	1.00	1.00	0.60	0.30	0.10
BRTE	0.10	0.30	0.50	1.00	1.00	1.00	0.20	0.00	0.00	0.60	0.50	0.25
CYDA	0.00	0.00	0.35	0.75	0.90	1.00	1.00	1.00	0.60	0.30	0.15	0.00
DISP	0.30	0.30	0.40	0.40	0.60	0.80	1.00	1.00	0.60	0.40	0.30	0.20
LETR	0.30	0.40	0.50	0.70	0.90	1.00	0.90	0.80	0.70	0.60	0.40	0.30
PHAU	0.10	0.20	0.40	0.80	1.00	1.00	1.00	1.00	0.80	0.40	0.20	0.10
SPGR	0.00	0.12	0.50	0.60	0.70	1.00	1.00	1.00	0.60	0.40	0.25	0.05
SPAI	0.30	0.35	0.40	0.45	0.50	0.90	1.00	1.00	0.90	0.80	0.25	0.20
STSP	0.30	0.35	0.40	0.45	0.50	0.90	1.00	1.00	0.90	0.80	0.25	0.20
CARX	0.20	0.35	0.50	0.75	1.00	1.00	1.00	0.90	0.80	0.60	0.40	0.20
ELEO	0.20	0.35	0.50	0.75	1.00	1.00	1.00	0.90	0.80	0.60	0.40	0.20
JUBA	0.20	0.35	0.50	0.75	1.00	1.00	1.00	0.90	0.80	0.60	0.40	0.20
SCRP	0.10	0.20	0.40	0.80	1.00	1.00	1.00	1.00	0.80	0.40	0.20	0.10
TYLA	0.10	0.20	0.40	0.80	1.00	1.00	1.00	1.00	0.80	0.40	0.20	0.10
GLLE	0.00	0.10	0.30	0.70	1.00	1.00	1.00	0.90	0.70	0.40	0.20	0.10
HEAN	0.00	0.00	0.50	0.90	1.00	1.00	1.00	1.00	0.80	0.50	0.10	0.00
MESA	0.00	0.20	0.50	0.90	1.00	1.00	1.00	0.90	0.80	0.30	0.10	0.00
SAKA	0.00	0.20	0.40	0.90	1.00	1.00	1.00	1.00	0.10	0.02	0.00	0.00

Table D-17. Plant part productivity.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.00	0.00	0.00	0.00	1.00	0.00
POFR	0.00	0.00	0.00	0.00	1.00	0.00
SALA	0.00	0.00	0.00	0.10	1.00	0.00
TARA	0.00	0.00	0.00	0.01	1.00	0.00
AMDU	0.00	0.00	0.00	0.00	1.00	0.00
ARSP	0.00	0.00	0.00	0.00	1.00	0.00
ARTR	0.00	0.00	0.00	0.00	1.00	0.00
ATCA	0.00	0.00	0.00	0.10	1.00	0.00
ATCO	0.00	0.00	0.00	0.10	1.00	0.00
ATTO	0.00	0.00	0.00	0.10	1.00	0.00
CELA	0.00	0.00	0.10	0.30	1.00	0.00
CHNA	0.00	0.00	0.10	0.30	1.00	0.00
CORA	0.00	0.00	0.00	0.05	1.00	0.00
EPNE	0.00	0.00	0.10	1.00	1.00	0.00
ERCO	0.00	0.00	0.10	0.30	1.00	0.00
ERFA	0.00	0.00	0.10	0.20	1.00	0.00
HYSA	0.00	0.00	0.10	0.30	1.00	0.00
PSAR	0.00	0.00	0.00	0.00	1.00	0.00
ROWO	0.00	0.00	0.00	0.10	1.00	0.00
SAEX	0.00	0.00	0.00	0.20	1.00	0.00
SAVE	0.00	0.00	0.00	0.10	1.00	0.00
SUTO	0.00	0.00	0.00	0.40	1.00	0.00
TEAX	0.00	0.00	0.00	0.10	1.00	0.00
BRTE	0.00	0.00	0.20	0.40	1.00	0.00
CYDA	0.00	0.00	0.30	0.40	1.00	0.00
DISP	0.00	0.00	0.20	0.30	1.00	0.00
LETR	0.00	0.00	0.20	0.40	1.00	0.00
PHAU	0.00	0.00	0.00	0.20	1.00	0.00
SPGR	0.00	0.00	0.10	0.30	1.00	0.00
SPAI	0.00	0.00	0.20	0.30	1.00	0.00
STSP	0.00	0.00	0.20	0.30	1.00	0.00
CARX	0.00	0.00	0.10	1.00	1.00	0.00
ELEO	0.00	0.00	0.10	1.00	1.00	0.00
JUBA	0.00	0.00	0.10	1.00	1.00	0.00
SCRP	0.00	0.00	0.00	0.20	1.00	0.00
TYLA	0.00	0.00	0.00	0.20	1.00	0.00
GLLE	0.00	0.00	0.00	0.10	1.00	0.00
HEAN	0.00	0.00	0.00	0.20	1.00	0.00
MESA	0.00	0.00	0.05	0.30	1.00	0.00
SAKA	0.00	0.00	0.05	0.70	1.00	0.00

Table D-18. Green-out plant part productivity.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.00	0.00	0.01	0.05	1.00	0.00
POFR	0.00	0.00	0.00	0.01	1.00	0.00
SALA	0.00	0.00	0.00	0.02	1.00	0.00
TARA	0.02	0.00	0.05	0.01	1.00	0.00
AMDU	0.05	0.00	0.10	0.10	1.00	0.00
ARSP	0.05	0.00	0.10	0.10	1.00	0.00
ARTR	0.05	0.00	0.10	0.10	1.00	0.00
ATCA	0.05	0.00	0.10	0.20	1.00	0.00
ATCO	0.05	0.00	0.10	0.10	1.00	0.00
ATTO	0.05	0.00	0.10	0.20	1.00	0.00
CELA	0.05	0.00	0.15	0.30	1.00	0.00
CHNA	0.05	0.00	0.15	0.30	1.00	0.00
CORA	0.01	0.00	0.03	0.10	1.00	0.00
EPNE	0.00	0.00	0.10	0.30	1.00	0.00
ERCO	0.05	0.00	0.15	0.30	1.00	0.00
ERFA	0.10	0.00	0.15	0.20	1.00	0.00
HYSA	0.05	0.00	0.15	0.30	1.00	0.00
PSAR	0.05	0.00	0.10	0.10	1.00	0.00
ROWO	0.05	0.00	0.15	0.20	1.00	0.00
SAEX	0.05	0.00	0.15	0.30	1.00	0.00
SAVE	0.05	0.00	0.10	0.10	1.00	0.00
SUTO	0.10	0.00	0.10	0.10	1.00	0.00
TEAX	0.05	0.00	0.10	0.20	1.00	0.00
BRTE	0.00	0.00	0.50	0.50	1.00	0.00
CYDA	0.30	0.00	0.20	0.50	1.00	0.00
DISP	0.30	0.00	0.20	0.40	1.00	0.00
LETR	0.20	0.00	0.10	0.50	1.00	0.00
PHAU	0.20	0.00	0.30	0.10	1.00	0.00
SPGR	0.20	0.00	0.20	0.20	1.00	0.00
SPAI	0.10	0.00	0.20	0.40	1.00	0.00
STSP	0.10	0.00	0.20	0.40	1.00	0.00
CARX	0.10	0.00	0.20	0.50	1.00	0.00
ELEO	0.10	0.00	0.20	0.50	1.00	0.00
JUBA	0.10	0.00	0.20	0.50	1.00	0.00
SCRP	0.20	0.00	0.30	0.10	1.00	0.00
TYLA	0.20	0.00	0.30	0.10	1.00	0.00
GLLE	0.40	0.00	0.15	0.20	1.00	0.00
HEAN	0.05	0.00	0.20	0.10	1.00	0.00
MESA	0.10	0.00	0.30	0.20	1.00	0.00
SAKA	0.05	0.00	0.30	0.10	1.00	0.00

Table D-19. Light competition factors.

Species	PIJE	POFR	SALA	TARA	AMDU	ARSP	ARTR	ATCA
PIJE	0.00	0.10	0.20	0.30	0.00	0.00	0.00	0.00
POFR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALA	0.00	0.05	0.00	0.25	0.00	0.00	0.00	0.00
TARA	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.00
AMDU	0.10	0.10	0.10	0.50	0.02	0.05	0.10	0.05
ARSP	0.10	0.10	0.10	0.50	0.00	0.00	0.00	0.00
ARTR	0.10	0.10	0.10	0.50	0.00	0.00	0.00	0.00
ATCA	0.10	0.10	0.10	0.50	0.00	0.05	0.08	0.00
ATCO	0.10	0.10	0.10	0.50	0.00	0.02	0.07	0.00
ATTO	0.10	0.10	0.10	0.50	0.00	0.05	0.08	0.00
CELA	0.05	0.05	0.05	0.25	0.00	0.00	0.00	0.00
CHNA	0.10	0.10	0.10	0.50	0.00	0.04	0.08	0.00
CORA	0.10	0.10	0.10	0.50	0.00	0.05	0.10	0.05
EPNE	0.10	0.10	0.10	0.50	0.00	0.05	0.10	0.08
ERCO	0.10	0.10	0.10	0.50	0.00	0.05	0.10	0.05
ERFA	0.10	0.08	0.10	0.40	0.02	0.04	0.08	0.05
HYSA	0.10	0.10	0.10	0.50	0.00	0.02	0.05	0.00
PSAR	0.10	0.10	0.10	0.50	0.00	0.02	0.07	0.05
ROWO	0.08	0.05	0.05	0.25	0.00	0.01	0.02	0.00
SAEX	0.05	0.05	0.05	0.25	0.00	0.00	0.00	0.00
SAVE	0.10	0.10	0.10	0.50	0.00	0.02	0.07	0.00
SUTO	0.10	0.10	0.10	0.50	0.05	0.08	0.10	0.08
TEAX	0.10	0.10	0.10	0.50	0.00	0.02	0.05	0.00
BRTE	0.10	0.10	0.10	0.50	0.00	0.04	0.08	0.05
CYDA	0.08	0.08	0.08	0.03	0.00	0.02	0.04	0.02
DISP	0.09	0.09	0.09	0.40	0.00	0.02	0.06	0.03
LETR	0.10	0.09	0.09	0.30	0.00	0.02	0.04	0.02
PHAU	0.10	0.10	0.10	0.30	0.00	0.00	0.00	0.00
SPGR	0.10	0.10	0.20	0.50	0.00	0.00	0.10	0.10
SPAI	0.10	0.10	0.10	0.45	0.00	0.01	0.05	0.02
STSP	0.10	0.10	0.10	0.45	0.02	0.05	0.05	0.02
CARX	0.07	0.07	0.08	0.30	0.01	0.02	0.04	0.01
ELEO	0.10	0.10	0.20	0.50	0.00	0.00	0.10	0.10
JUBA	0.10	0.07	0.08	0.30	0.01	0.02	0.04	0.01
SCRP	0.10	0.07	0.08	0.30	0.00	0.02	0.04	0.01
TYLA	0.10	0.07	0.08	0.30	0.00	0.00	0.00	0.00
GLLE	0.10	0.10	0.10	0.45	0.00	0.02	0.05	0.02
HEAN	0.15	0.20	0.30	0.60	0.02	0.05	0.10	0.10
MESA	0.10	0.10	0.10	0.45	0.00	0.02	0.05	0.02
SAKA	0.10	0.10	0.10	0.50	0.00	0.04	0.08	0.05

Table D-19 (continued). Light competition factors.

Species	ATCO	ATTO	CELA	CHNA	CORA	EPNE	ERCO	ERFA
PIJE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POFR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TARA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AMDU	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
ARSP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARTR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATCA	0.00	0.03	0.01	0.02	0.00	0.00	0.00	0.00
ATCO	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00
ATTO	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
CELA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHNA	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
CORA	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
EPNE	0.08	0.08	0.05	0.00	0.00	0.00	0.00	0.00
ERCO	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
ERFA	0.05	0.05	0.00	0.07	0.02	0.00	0.00	0.00
HYSA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PSAR	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
ROWO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAEX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAVE	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00
SUTO	0.08	0.08	0.05	0.10	0.02	0.00	0.05	0.05
TEAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BRTE	0.05	0.05	0.00	0.00	0.05	0.00	0.05	0.05
CYDA	0.02	0.02	0.05	0.00	0.00	0.00	0.00	0.00
DISP	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
LETR	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
PHAU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SPGR	0.10	0.10	0.00	0.00	0.10	0.00	0.10	0.00
SPAI	0.02	0.02	0.00	0.00	0.00	0.00	0.10	0.00
STSP	0.02	0.02	0.10	0.06	0.00	0.00	0.02	0.00
CARX	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00
ELEO	0.10	0.10	0.00	0.00	0.10	0.00	0.10	0.00
JUBA	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00
SCRP	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
TYLA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GLLE	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
HEAN	0.00	0.10	0.00	0.00	0.10	0.00	0.10	0.05
MESA	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
SAKA	0.05	0.05	0.00	0.00	0.02	0.00	0.02	0.00

Table D-19 (continued). Light competition factors.

Species	HYSA	PSAR	ROWO	SAEX	SAVE	SUTO	TEAX	BRTE
PIJE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POFR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TARA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AMDU	0.00	0.05	0.05	0.00	0.05	0.00	0.05	0.00
ARSP	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
ARTR	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
ATCA	0.00	0.05	0.00	0.50	0.00	0.00	0.00	0.00
ATCO	0.00	0.05	0.00	0.50	0.00	0.00	0.00	0.00
ATTO	0.00	0.05	0.00	0.50	0.00	0.00	0.00	0.00
CELA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHNA	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
CORA	0.00	0.05	0.05	0.30	0.05	0.00	0.05	0.00
EPNE	0.08	0.08	0.08	0.50	0.08	0.00	0.08	0.00
ERCO	0.05	0.05	0.05	0.50	0.05	0.00	0.05	0.00
ERFA	0.05	0.05	0.05	0.05	0.05	0.00	0.05	0.00
HYSA	0.00	0.00	0.05	0.50	0.00	0.00	0.00	0.00
PSAR	0.00	0.00	0.05	0.50	0.00	0.00	0.00	0.00
ROWO	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00
SAEX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAVE	0.00	0.00	0.05	0.50	0.00	0.00	0.00	0.00
SUTO	0.05	0.05	0.08	0.05	0.05	0.00	0.05	0.02
TEAX	0.00	0.00	0.05	0.50	0.00	0.00	0.00	0.00
BRTE	0.04	0.05	0.08	0.50	0.04	0.00	0.04	0.00
CYDA	0.01	0.02	0.04	0.45	0.01	0.00	0.01	0.00
DISP	0.01	0.02	0.04	0.45	0.01	0.00	0.01	0.00
LETR	0.01	0.02	0.02	0.45	0.01	0.00	0.01	0.00
PHAU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SPGR	0.00	0.00	0.10	0.45	0.20	0.00	0.20	0.00
SPAI	0.00	0.02	0.03	0.50	0.00	0.00	0.00	0.00
STSP	0.01	0.03	0.04	0.50	0.01	0.00	0.01	0.00
CARX	0.00	0.01	0.02	0.45	0.00	0.00	0.00	0.00
ELEO	0.00	0.00	0.10	0.45	0.20	0.00	0.20	0.00
JUBA	0.00	0.01	0.02	0.45	0.00	0.00	0.00	0.00
SCRP	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00
TYLA	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
GLLE	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.00
HEAN	0.02	0.10	0.10	0.50	0.20	0.00	0.10	0.00
MESA	0.00	0.02	0.00	0.05	0.00	0.00	0.00	0.00
SAKA	0.02	0.04	0.05	0.50	0.02	0.00	0.02	0.02

Table D-19 (continued). Light competition factors.

Species	CYDA	DISP	LETR	PHAU	SPGR	SPAI	STSP	CARX
PIJE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POFR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TARA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AMDU	0.00	0.00	0.04	0.80	0.00	0.00	0.00	0.00
ARSP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARTR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATCA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATTO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CELA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHNA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORA	0.00	0.00	0.04	0.80	0.00	0.04	0.00	0.00
EPNE	0.00	0.00	0.04	0.80	0.04	0.00	0.00	0.00
ERCO	0.00	0.00	0.04	0.80	0.00	0.04	0.00	0.00
ERFA	0.00	0.00	0.04	0.50	0.00	0.04	0.00	0.00
HYSA	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
PSAR	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
ROWO	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00
SAEX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAVE	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
SUTO	0.02	0.05	0.10	0.50	0.05	0.08	0.06	0.05
TEAX	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
BRTE	0.00	0.01	0.02	0.90	0.00	0.03	0.00	0.00
CYDA	0.00	0.01	0.01	0.80	0.00	0.01	0.00	0.00
DISP	0.00	0.00	0.00	0.80	0.00	0.01	0.00	0.00
LETR	0.00	0.00	0.00	0.80	0.00	0.01	0.00	0.00
PHAU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SPGR	0.00	0.00	0.40	0.90	0.00	0.20	0.00	0.00
SPAI	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
STSP	0.00	0.00	0.01	0.05	0.00	0.02	0.00	0.00
CARX	0.00	0.00	0.00	0.90	0.00	0.02	0.00	0.00
ELEO	0.00	0.00	0.40	0.90	0.00	0.20	0.00	0.00
JUBA	0.00	0.00	0.00	0.90	0.00	0.02	0.00	0.00
SCRP	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
TYLA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GLLE	0.00	0.00	0.00	1.00	0.00	0.02	0.00	0.00
HEAN	0.00	0.10	0.80	0.90	0.00	0.20	0.00	0.00
MESA	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
SAKA	0.00	0.02	0.04	1.00	0.00	0.05	0.04	0.05

Table D-19 (continued). Light competition factors.

Species	ELEO	JUBA	SCRP	TYLA	GLLE	HEAN	MESA	SAKA
PIJE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POFR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TARA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AMDU	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
ARSP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARTR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATCA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ATTO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CELA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHNA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORA	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
EPNE	0.00	0.00	0.00	0.08	0.02	0.00	0.02	0.02
ERCO	0.00	0.00	0.00	0.08	0.02	0.00	0.02	0.02
ERFA	0.00	0.00	0.00	0.08	0.02	0.00	0.02	0.02
HYSA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PSAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROWO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAEX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUTO	0.05	0.05	0.05	0.10	0.08	0.04	0.08	0.05
TEAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BRTE	0.00	0.00	0.00	0.04	0.02	0.00	0.02	0.04
CYDA	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
DISP	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
LETR	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
PHAU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SPGR	0.00	0.00	0.00	0.00	0.20	0.00	0.10	0.20
SPAI	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
STSP	0.00	0.00	0.00	0.03	0.00	0.01	0.02	0.00
CARX	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00
ELEO	0.00	0.00	0.00	0.00	0.20	0.00	0.10	0.20
JUBA	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00
SCRP	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
TYLA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GLLE	0.00	0.00	0.05	0.05	0.00	0.00	0.03	0.00
HEAN	0.00	0.00	0.20	0.08	0.10	0.00	0.20	0.00
MESA	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
SAKA	0.00	0.05	0.00	0.08	0.07	0.20	0.08	0.00

Table D-20. Physiological controls.

Species	Growing Season Green-out Maximum Root:shoot	Maximum 1-month Seed Germination	Maximum 1st month Seedling Growth
PIJE	0.49	0.82	27.9
POFR	2.76	0.80	10.0
SALA	0.66	0.83	15.0
TARA	0.41	0.70	27.9
AMDU	0.75	0.54	20.0
ARSP	0.75	0.54	20.0
ARTR	0.75	0.54	20.0
ATCA	0.53	0.36	15.0
ATCO	0.24	0.01	15.0
ATTO	0.53	0.36	15.0
CELA	0.80	0.40	25.0
CHNA	0.80	0.40	25.0
CORA	0.38	0.60	55.8
EPNE	0.37	0.82	10.0
ERCO	0.80	0.40	25.0
ERFA	0.47	0.02	30.0
HYSA	0.80	0.40	25.0
PSAR	0.75	0.54	20.0
ROWO	0.47	0.90	15.0
SAEX	0.66	0.83	15.0
SAVE	0.62	0.67	15.0
SUTO	0.76	0.02	20.0
TEAX	0.53	0.36	15.0
BRTE	0.84	0.85	30.0
CYDA	0.27	0.82	30.0
DISP	0.76	0.58	25.0
LETR	0.53	0.90	30.0
PHAU	0.19	0.65	43.0
SPGR	0.11	0.60	43.0
SPAI	0.87	0.80	35.0
STSP	0.87	0.80	35.0
CARX	0.26	0.96	20.0
ELEO	0.26	0.96	20.0
JUBA	0.26	0.96	20.0
SCRP	0.19	0.65	43.0
TYLA	0.19	0.65	43.0
GLLE	0.47	0.02	30.0
HEAN	1.43	0.86	350.0
MESA	0.20	0.71	350.0
SAKA	1.22	0.44	350.0

Table D-21. End of growing season dieback.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	0.02	0.10	0.01	0.04	0.33	1.00
POFR	0.02	0.10	0.01	0.10	1.00	1.00
SALA	0.03	0.15	0.02	0.15	1.00	1.00
TARA	0.02	0.10	0.01	0.04	1.00	1.00
AMDU	0.04	0.15	0.03	0.15	0.50	1.00
ARSP	0.04	0.15	0.03	0.15	0.50	1.00
ARTR	0.04	0.15	0.03	0.15	0.50	1.00
ATCA	0.05	0.20	0.05	0.20	0.85	1.00
ATCO	0.05	0.20	0.05	0.20	0.95	1.00
ATTO	0.05	0.20	0.05	0.20	0.85	1.00
CELA	0.10	0.20	0.10	0.20	1.00	1.00
CHNA	0.10	0.20	0.10	0.20	1.00	1.00
CORA	0.03	0.15	0.02	0.10	0.95	1.00
EPNE	0.10	0.20	0.05	0.10	1.00	1.00
ERCO	0.10	0.20	0.10	0.20	1.00	1.00
ERFA	0.10	0.20	0.05	0.95	1.00	1.00
HYSA	0.10	0.20	0.10	0.20	1.00	1.00
PSAR	0.04	0.15	0.03	0.15	0.50	1.00
ROWO	0.04	0.15	0.03	0.15	1.00	1.00
SAEX	0.03	0.15	0.02	0.15	1.00	1.00
SAVE	0.05	0.20	0.05	0.20	0.95	1.00
SUTO	0.10	0.20	0.10	0.30	1.00	1.00
TEAX	0.05	0.20	0.05	0.20	0.85	1.00
BRTE	1.00	1.00	1.00	1.00	1.00	1.00
CYDA	0.10	0.20	0.05	0.60	1.00	1.00
DISP	0.15	0.20	0.10	0.80	1.00	1.00
LETR	0.10	0.20	0.05	0.85	1.00	1.00
PHAU	0.10	0.21	0.07	0.99	0.99	1.00
SPGR	0.10	0.21	0.07	0.99	1.00	1.00
SPAI	0.12	0.20	0.10	0.95	0.95	1.00
STSP	0.12	0.20	0.10	0.95	0.95	1.00
CARX	0.10	0.20	0.05	0.95	0.90	1.00
ELEO	0.10	0.20	0.05	0.95	0.90	1.00
JUBA	0.10	0.20	0.05	0.95	0.90	1.00
SCRP	0.10	0.21	0.07	0.99	0.99	1.00
TYLA	0.10	0.21	0.07	0.99	0.99	1.00
GLLE	0.10	0.20	0.05	0.95	1.00	1.00
HEAN	1.00	1.00	1.00	1.00	1.00	1.00
MESA	0.40	0.70	0.50	1.00	1.00	1.00
SAKA	1.00	1.00	1.00	1.00	1.00	1.00

Table D-22. Dieback fate.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds
PIJE	-1	-1	7	7	0	0
POFR	-1	-1	7	7	0	0
SALA	-1	-1	7	7	0	0
TARA	-1	-1	7	7	0	0
AMDU	-1	-1	7	7	0	0
ARSP	-1	-1	7	7	0	0
ARTR	-1	-1	7	7	0	0
ATCA	-1	-1	7	7	0	0
ATCO	-1	-1	7	7	0	0
ATTO	-1	-1	7	7	0	0
CELA	-1	-1	7	7	0	0
CHNA	-1	-1	7	7	0	0
CORA	-1	-1	7	7	0	0
EPNE	-1	-1	7	7	0	0
ERCO	-1	-1	7	7	0	0
ERFA	-1	-1	0	7	0	0
HYSA	-1	-1	7	7	0	0
PSAR	-1	-1	7	7	0	0
ROWO	-1	-1	7	7	0	0
SAEX	-1	-1	7	7	0	0
SAVE	-1	-1	7	7	0	0
SUTO	-1	-1	7	7	0	0
TEAX	-1	-1	7	7	0	0
BRTE	-1	-1	0	7	8	0
CYDA	-1	-1	0	0	8	0
DISP	-1	-1	0	7	8	0
LETR	-1	-1	0	7	0	0
PHAU	-1	-1	0	7	8	0
SPGR	-1	-1	0	7	8	0
SPAI	-1	-1	0	7	8	0
STSP	-1	-1	0	7	8	0
CARX	-1	-1	0	7	8	0
ELEO	-1	-1	0	7	8	0
JUBA	-1	-1	0	7	8	0
SCRP	-1	-1	0	7	8	0
TYLA	-1	-1	0	7	8	0
GLLE	-1	-1	0	7	0	0
HEAN	-1	-1	0	7	8	0
MESA	-1	-1	0	7	0	0
SAKA	-1	-1	0	7	8	0

Table D-23. Fuel loads.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0.00	0.00	0.40	0.65	1.50	0.90	0.95	2.00	0.00	1.50	0.90
POFR	0.00	0.00	0.25	0.40	1.00	1.00	0.75	1.50	0.00	1.00	1.00
SALA	0.00	0.00	0.20	0.60	1.00	1.00	1.00	2.00	0.00	1.00	1.00
TARA	0.00	0.00	0.10	0.30	1.00	0.50	0.75	1.50	0.00	1.00	0.60
AMDU	0.00	0.00	0.75	1.50	2.00	1.00	2.00	4.00	0.00	2.00	1.00
ARSP	0.00	0.00	0.75	1.50	2.00	1.00	2.00	4.00	0.00	2.00	1.00
ARTR	0.00	0.00	0.75	1.50	2.00	1.00	2.00	4.00	0.00	2.00	1.00
ATCA	0.00	0.00	0.60	1.40	1.50	1.00	2.00	3.00	0.00	1.50	1.00
ATCO	0.00	0.00	0.60	1.40	1.50	1.00	2.00	3.00	0.00	1.50	1.00
ATTO	0.00	0.00	0.60	1.40	1.50	1.00	2.00	3.00	0.00	1.50	1.00
CELA	0.00	0.00	0.75	2.00	2.00	1.00	3.00	4.00	0.00	2.00	1.00
CHNA	0.00	0.00	0.75	2.00	2.00	1.00	3.00	4.00	0.00	2.00	1.00
CORA	0.00	0.00	0.70	1.00	1.80	1.50	1.70	2.25	0.00	1.80	1.50
EPNE	0.00	0.00	1.00	1.00	1.00	1.00	1.50	2.00	0.00	1.00	1.00
ERCO	0.00	0.00	0.75	2.00	2.00	1.00	3.00	4.00	0.00	2.00	1.00
ERFA	0.00	0.00	1.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
HYSA	0.00	0.00	0.75	2.00	2.00	1.00	3.00	4.00	0.00	2.00	1.00
PSAR	0.00	0.00	0.75	1.50	2.00	1.00	2.00	4.00	0.00	2.00	1.00
ROWO	0.00	0.00	0.50	0.75	1.00	1.00	1.00	1.50	0.00	1.00	1.00
SAEX	0.00	0.00	0.20	0.60	1.00	1.00	1.00	2.00	0.00	1.00	1.00
SAVE	0.00	0.00	0.60	1.00	1.50	1.00	1.50	3.00	0.00	1.00	1.00
SUTO	0.00	0.00	0.75	1.00	1.50	1.00	1.50	2.00	0.00	1.50	1.00
TEAX	0.00	0.00	0.60	1.40	1.50	1.00	2.00	3.00	0.00	1.50	1.00
BRTE	0.00	0.00	1.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
CYDA	0.00	0.00	0.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
DISP	0.00	0.00	0.90	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
LETR	0.00	0.00	0.90	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
PHAU	0.00	0.00	0.90	0.95	1.00	0.95	1.50	1.50	0.00	1.00	1.00
SPGR	0.00	0.00	0.90	0.95	1.00	1.00	1.25	1.50	0.00	1.00	1.00
SPAI	0.00	0.00	0.90	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
STSP	0.00	0.00	0.90	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
CARX	0.00	0.00	1.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
ELEO	0.00	0.00	1.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
JUBA	0.00	0.00	1.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
SCRP	0.00	0.00	0.90	0.95	1.00	0.95	1.50	1.50	0.00	1.00	1.00
TYLA	0.00	0.00	0.90	0.95	1.00	0.95	1.50	1.50	0.00	1.00	1.00
GLLE	0.00	0.00	1.00	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
HEAN	0.00	0.00	0.95	1.00	1.00	1.00	1.50	1.75	0.00	1.00	1.00
MESA	0.00	0.00	0.95	1.00	1.00	1.00	1.50	1.50	0.00	1.00	1.00
SAKA	0.00	0.00	0.95	1.00	1.00	1.00	1.75	1.75	0.00	1.00	1.00

Table D-24. Plant component loss to fire.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0.00	0.00	0.00	0.10	0.20	0.10	0.20	0.20	0.00	0.99	0.50
POFR	0.00	0.00	0.01	0.05	0.05	0.00	0.05	0.05	0.00	1.00	0.50
SALA	0.00	0.00	0.05	0.20	0.50	0.50	0.90	1.00	0.00	0.90	0.50
TARA	0.00	0.00	0.00	0.10	0.10	0.05	0.10	0.10	0.00	0.99	0.30
AMDU	0.00	0.00	0.50	0.80	0.95	0.95	0.90	1.00	0.00	1.00	0.50
ARSP	0.00	0.00	0.50	0.80	0.95	0.95	0.90	1.00	0.00	1.00	0.50
ARTR	0.00	0.00	0.50	0.80	0.95	0.95	0.90	1.00	0.00	1.00	0.50
ATCA	0.00	0.00	0.50	0.80	1.00	0.90	0.90	1.00	0.00	1.00	0.50
ATCO	0.00	0.00	0.50	0.80	1.00	0.90	0.90	1.00	0.00	1.00	0.50
ATTO	0.00	0.00	0.50	0.80	1.00	0.90	0.90	1.00	0.00	1.00	0.50
CELA	0.00	0.00	0.70	0.90	1.00	1.00	1.00	1.00	0.00	1.00	0.50
CHNA	0.00	0.00	0.70	0.90	1.00	1.00	1.00	1.00	0.00	1.00	0.50
CORA	0.00	0.00	0.01	0.70	0.80	0.80	0.99	0.99	0.00	0.99	0.50
EPNE	0.00	0.00	0.80	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.50
ERCO	0.00	0.00	0.70	0.90	1.00	1.00	1.00	1.00	0.00	1.00	0.50
ERFA	0.00	0.00	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00	0.50
HYSA	0.00	0.00	0.70	0.90	1.00	1.00	1.00	1.00	0.00	1.00	0.50
PSAR	0.00	0.00	0.50	0.80	0.95	0.95	0.90	1.00	0.00	1.00	0.50
ROWO	0.00	0.00	0.30	0.50	0.75	0.70	0.75	1.00	0.00	1.00	0.50
SAEX	0.00	0.00	0.05	0.20	0.50	0.50	0.90	1.00	0.00	0.90	0.50
SAVE	0.00	0.00	0.50	0.80	1.00	0.90	0.90	1.00	0.00	1.00	0.50
SUTO	0.00	0.00	0.90	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.50
TEAX	0.00	0.00	0.50	0.80	1.00	0.90	0.90	1.00	0.00	1.00	0.50
BRTE	0.00	0.00	0.90	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.01
CYDA	0.00	0.00	0.15	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.40
DISP	0.05	0.00	0.40	0.90	0.95	0.95	1.00	1.00	0.00	1.00	0.50
LETR	0.00	0.00	0.50	0.90	0.95	1.00	1.00	1.00	0.00	1.00	0.50
PHAU	0.00	0.00	0.20	0.90	0.90	0.90	0.99	0.99	0.00	0.70	0.40
SPGR	0.00	0.00	0.20	0.90	0.90	0.90	0.99	0.99	0.00	0.80	0.40
SPAI	0.05	0.00	0.40	0.90	0.90	0.90	1.00	1.00	0.00	1.00	0.30
STSP	0.05	0.00	0.40	0.90	0.90	0.90	1.00	1.00	0.00	1.00	0.30
CARX	0.00	0.00	0.30	0.30	1.00	1.00	1.00	1.00	0.00	0.90	0.50
ELEO	0.00	0.00	0.30	0.30	1.00	1.00	1.00	1.00	0.00	0.90	0.50
JUBA	0.00	0.00	0.30	0.30	1.00	1.00	1.00	1.00	0.00	0.90	0.50
SCRP	0.00	0.00	0.20	0.90	0.90	0.90	0.99	0.99	0.00	0.70	0.40
TYLA	0.00	0.00	0.20	0.90	0.90	0.90	0.99	0.99	0.00	0.70	0.40
GLLE	0.00	0.00	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00	0.50
HEAN	0.00	0.00	0.20	0.99	0.99	0.99	1.00	1.00	0.00	0.95	0.50
MESA	0.00	0.00	0.20	0.90	0.90	0.90	1.00	1.00	0.00	0.95	0.50
SAKA	0.00	0.00	0.30	0.99	0.99	0.99	1.00	1.00	0.00	0.90	0.50

Table D-25. Insect preference and competition matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0,1	0,1	0,1	0,1	10,1	0,1	0,1	0,1	0,1	10,1	0,1
POFR	23,1	21,1	23,1	23,1	7,1	7,1	24,1	12,1	20,1	6,1	8,1
SALA	23,1	21,1	23,1	23,1	5,1	5,1	24,1	11,1	20,1	4,1	6,1
TARA	0,1	0,1	0,1	0,1	5,1	6,1	0,1	12,1	0,1	4,1	0,1
AMDU	22,1	21,1	23,1	23,1	12,1	13,1	24,1	16,1	20,1	11,1	14,1
ARSP	22,1	21,1	23,1	23,1	12,1	13,1	24,1	16,1	20,1	11,1	14,1
ARTR	22,1	21,1	23,1	23,1	12,1	13,1	24,1	16,1	20,1	11,1	14,1
ATCA	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
ATCO	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
ATTO	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
CELA	22,1	21,1	23,1	15,1	13,1	14,1	24,1	17,1	20,1	12,1	15,1
CHNA	22,1	21,1	23,1	15,1	13,1	14,1	24,1	17,1	20,1	12,1	15,1
CORA	0,1	0,1	0,1	0,1	6,1	7,1	0,1	12,1	0,1	6,1	0,1
EPNE	22,1	21,1	23,1	15,1	15,1	16,1	24,1	19,1	20,1	14,1	17,1
ERCO	22,1	21,1	23,1	15,1	13,1	14,1	24,1	17,1	20,1	12,1	15,1
ERFA	15,1	20,1	16,1	11,1	1,1	1,1	17,1	3,1	19,1	1,1	4,1
HYSA	22,1	21,1	23,1	15,1	13,1	14,1	24,1	17,1	20,1	12,1	15,1
PSAR	22,1	21,1	23,1	23,1	12,1	13,1	24,1	16,1	20,1	11,1	14,1
ROWO	22,1	21,1	23,1	23,1	5,1	5,1	24,1	11,1	20,1	4,1	6,1
SAEX	23,1	21,1	23,1	23,1	5,1	5,1	24,1	11,1	20,1	4,1	6,1
SAVE	22,1	21,1	23,1	23,1	11,1	12,1	24,1	12,1	20,1	10,1	13,1
SUTO	22,1	21,1	23,1	23,1	8,1	9,1	24,1	13,1	20,1	7,1	10,1
TEAX	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
BRTE	0,1	0,1	8,1	7,1	4,1	5,1	0,1	10,1	0,1	2,1	8,1
CYDA	15,1	20,1	13,1	8,1	2,1	3,1	15,1	4,1	19,1	1,1	5,1
DISP	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
LETR	15,1	20,1	13,1	7,1	1,1	2,1	15,1	3,1	19,1	1,1	5,1
PHAU	0,1	0,1	9,1	8,1	4,1	6,1	0,1	11,1	0,1	5,1	0,1
SPGR	0,1	0,1	8,1	6,1	3,1	7,1	12,1	8,1	0,1	2,1	0,1
SPAI	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
STSP	22,1	21,1	23,1	23,1	10,1	11,1	24,1	12,1	20,1	9,1	12,1
CARX	15,4	20,4	13,4	8,1	2,1	4,1	14,1	4,1	19,1	1,1	5,1
ELEO	15,4	20,4	13,4	8,1	2,1	4,1	14,1	4,1	19,1	1,1	5,1
JUBA	15,4	20,4	13,4	8,1	2,1	4,1	14,1	4,1	19,1	1,1	5,1
SCRP	0,1	0,1	9,1	8,1	4,1	6,1	0,1	11,1	0,1	5,1	0,1
TYLA	0,1	0,1	9,1	8,1	4,1	6,1	0,1	11,1	0,1	5,1	0,1
GLLE	15,1	20,1	16,1	11,1	1,1	1,1	17,1	3,1	19,1	1,1	4,1
HEAN	0,1	0,1	10,1	6,1	1,1	4,1	0,1	10,1	0,1	1,1	0,1
MESA	0,1	0,1	9,1	5,1	1,1	4,1	13,1	8,1	0,1	1,1	0,1
SAKA	0,1	0,1	10,1	6,1	6,1	6,1	0,1	12,1	0,1	4,1	0,1

Table D-26. Insect accessibility matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0	0	1	1	99	50	1	99	0	99	5
POFR	0	0	0	0	99	99	0	99	0	99	0
SALA	0	0	0	0	99	99	0	99	0	99	0
TARA	0	0	1	1	99	50	1	99	0	99	5
AMDU	0	0	0	10	99	99	0	99	0	99	0
ARSP	0	0	0	10	99	99	0	99	0	99	0
ARTR	0	0	0	10	99	99	0	99	0	99	0
ATCA	0	0	0	10	99	99	0	99	0	99	0
ATCO	0	0	0	10	99	99	0	99	0	99	0
ATTO	0	0	0	10	99	99	0	99	0	99	0
CELA	0	0	0	20	99	99	0	99	0	99	0
CHNA	0	0	0	20	99	99	0	99	0	99	0
CORA	0	0	1	1	99	75	1	99	0	99	10
EPNE	0	0	0	0	10	10	0	10	0	10	0
ERCO	0	0	0	20	99	99	0	99	0	99	0
ERFA	0	0	90	99	99	99	99	99	0	99	20
HYSA	0	0	0	20	99	99	0	99	0	99	0
PSAR	0	0	0	10	99	99	0	99	0	99	0
ROWO	0	0	0	10	99	99	0	99	0	99	0
SAEX	0	0	0	0	99	99	0	99	0	99	0
SAVE	0	0	0	5	99	99	0	99	0	99	0
SUTO	0	0	0	10	99	99	0	99	0	99	0
TEAX	0	0	0	10	99	99	0	99	0	99	0
BRTE	0	0	95	100	100	100	100	100	0	95	10
CYDA	5	0	80	99	99	99	99	99	0	90	0
DISP	0	0	50	90	90	90	90	90	0	90	0
LETR	5	0	50	90	99	99	60	99	0	99	0
PHAU	0	0	0	80	80	90	80	80	0	50	0
SPGR	0	0	50	95	95	99	95	95	0	50	0
SPAI	0	0	50	80	90	90	80	90	0	80	0
STSP	0	0	50	80	90	90	80	90	0	80	0
CARX	0	0	10	80	90	99	80	80	0	50	0
ELEO	0	0	10	80	90	99	80	80	0	50	0
JUBA	0	0	10	80	90	99	80	80	0	50	0
SCRP	0	0	0	80	80	90	80	80	0	50	0
TYLA	0	0	0	80	80	90	80	80	0	50	0
GLLE	0	0	90	99	99	99	99	99	0	99	20
HEAN	0	0	80	99	99	99	99	99	0	99	10
MESA	0	0	80	99	99	99	99	99	0	99	0
SAKA	0	0	80	99	99	99	99	99	0	99	0

Table D-27. Rabbit preference and competition matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0,2	0,2	15,2	13,2	10,2	10,2	0,2	11,2	12,2	9,2	0,2
POFR	26,2	25,2	28,5	26,5	18,5	19,5	30,5	25,5	23,2	16,2	20,2
SALA	25,2	24,2	27,5	25,5	17,5	19,5	30,5	25,5	22,2	15,2	20,2
TARA	0,2	0,2	14,2	12,2	9,2	8,2	0,2	8,2	11,2	8,2	9,2
AMDU	20,2	19,2	25,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
ARSP	20,2	19,2	25,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
ARTR	20,2	19,2	25,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
ATCA	20,2	19,2	23,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
ATCO	20,2	19,2	23,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
ATTO	20,2	19,2	23,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
CELA	19,2	18,2	22,2	19,2	16,2	13,2	29,2	20,2	16,2	14,2	13,2
CHNA	19,2	18,2	22,2	19,2	16,2	13,2	29,2	20,2	16,2	14,2	13,2
CORA	0,2	0,2	15,2	12,2	8,2	5,2	0,2	8,2	13,2	7,2	0,2
EPNE	15,2	14,2	22,2	15,2	15,2	15,2	29,2	29,2	12,2	13,2	15,2
ERCO	19,2	18,2	22,2	19,2	16,2	13,2	29,2	20,2	16,2	14,2	13,2
ERFA	9,2	9,2	15,2	6,2	3,2	2,2	21,2	19,2	7,2	2,2	3,2
HYSA	19,2	18,2	22,2	19,2	16,2	13,2	29,2	20,2	16,2	14,2	13,2
PSAR	20,2	19,2	25,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
ROWO	19,2	18,2	23,2	19,2	5,2	2,2	29,2	18,2	16,2	3,2	6,2
SAEX	25,2	24,2	27,5	25,5	17,5	19,5	30,5	25,5	22,2	15,2	20,2
SAVE	20,2	19,2	23,2	20,5	14,5	14,5	29,5	19,5	17,2	12,2	14,2
SUTO	20,2	19,2	23,2	20,5	15,5	15,5	29,5	20,5	17,2	13,2	15,2
TEAX	20,2	19,2	23,2	20,5	13,5	12,5	29,5	19,5	17,2	11,2	12,2
BRTE	0,2	0,2	8,2	7,2	5,2	5,2	11,2	9,2	0,2	4,2	0,2
CYDA	9,2	9,2	13,2	10,2	6,2	6,2	13,2	11,2	7,2	4,2	6,2
DISP	9,2	9,2	13,2	9,2	6,2	5,2	14,2	12,2	7,2	4,2	5,2
LETR	9,2	9,2	13,2	8,2	5,2	4,2	14,2	12,2	7,2	3,2	5,2
PHAU	0,2	0,2	9,2	8,2	7,2	8,2	0,2	9,2	8,2	6,2	0,2
SPGR	0,2	0,2	8,2	7,2	5,2	4,2	7,2	6,2	9,2	4,2	5,2
SPAI	10,2	9,2	15,2	10,2	7,2	7,2	14,2	12,2	7,2	5,2	7,2
STSP	10,2	9,2	15,2	10,2	7,2	7,2	14,2	12,2	7,2	5,2	7,2
CARX	10,5	9,5	12,5	8,5	6,5	6,5	14,5	12,5	7,5	4,5	7,5
ELEO	10,5	9,5	12,5	8,5	6,5	6,5	14,5	12,5	7,5	4,5	7,5
JUBA	10,5	9,5	12,5	8,5	6,5	6,5	14,5	12,5	7,5	4,5	7,5
SCRP	0,2	0,2	9,2	8,2	7,2	8,2	0,2	9,2	8,2	6,2	0,2
TYLA	0,2	0,2	9,2	8,2	7,2	8,2	0,2	9,2	8,2	6,2	0,2
GLLE	9,2	9,2	15,2	6,2	3,2	2,2	21,2	19,2	7,2	2,2	3,2
HEAN	0,2	0,2	4,2	2,2	1,2	1,2	7,2	6,2	9,2	1,2	4,2
MESA	0,2	0,2	4,2	3,2	1,2	1,2	4,2	2,2	5,2	1,2	0,2
SAKA	0,2	0,2	7,2	6,2	6,2	6,2	10,2	10,2	8,2	4,2	0,2

Table D-28. Rabbit accessibility matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	1	0	1	0	0	0	0	0	10	99	50
POFR	1	0	1	1	1	0	1	1	60	90	0
SALA	1	0	1	1	1	0	1	1	50	80	0
TARA	1	0	1	0	0	0	0	0	10	99	50
AMDU	2	1	99	50	50	25	50	40	60	95	5
ARSP	2	1	99	50	50	25	50	40	60	95	5
ARTR	2	1	99	50	50	25	50	40	60	95	5
ATCA	2	1	99	60	60	30	60	50	60	95	10
ATCO	2	1	99	60	60	30	60	50	60	95	10
ATTO	2	1	99	60	60	30	60	50	60	95	10
CELA	5	2	99	90	90	95	90	80	60	95	0
CHNA	5	2	99	90	90	95	90	80	60	95	0
CORA	1	0	2	40	40	0	40	40	10	99	20
EPNE	5	2	99	95	95	95	95	90	60	95	5
ERCO	5	2	99	90	90	95	90	80	60	95	0
ERFA	5	1	90	99	99	99	99	90	10	90	40
HYSA	5	2	99	90	90	95	90	80	60	95	0
PSAR	2	1	99	50	50	25	50	40	60	95	5
ROWO	2	1	99	60	60	40	60	50	60	95	20
SAEX	1	0	1	1	1	0	1	1	50	80	0
SAVE	2	1	99	60	50	40	60	40	60	95	10
SUTO	2	1	99	60	50	40	60	40	60	95	0
TEAX	2	1	99	60	60	30	60	50	60	95	10
BRTE	0	0	90	100	95	95	100	90	0	85	5
CYDA	5	1	90	99	99	99	99	90	10	90	0
DISP	5	1	80	90	90	90	90	80	10	80	20
LETR	5	1	90	99	99	99	99	90	10	90	10
PHAU	0	0	10	70	80	25	70	80	0	40	0
SPGR	0	0	50	90	90	50	90	90	0	50	10
SPAI	5	1	80	90	90	90	90	80	10	80	0
STSP	5	1	80	90	90	90	90	80	10	80	0
CARX	0	0	20	90	99	99	90	90	0	50	0
ELEO	0	0	20	90	99	99	90	90	0	50	0
JUBA	0	0	20	90	99	99	90	90	0	50	0
SCRP	0	0	10	70	80	25	70	80	0	40	0
TYLA	0	0	10	70	80	25	70	80	0	40	0
GLLE	5	1	90	99	99	99	99	90	10	90	40
HEAN	5	0	90	99	99	99	99	99	0	99	10
MESA	5	0	90	99	99	99	99	99	5	99	0
SAKA	5	0	90	99	99	99	99	99	0	99	0

Table D-29. Sheep preference and competition matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0,4	0,4	0,4	22,4	18,4	0,4	0,4	19,4	0,4	16,4	0,4
POFR	30,6	30,6	29,5	28,5	19,5	21,5	31,5	21,5	19,6	15,6	29,6
SALA	30,6	30,6	28,5	27,5	12,5	13,5	30,5	18,5	10,6	9,6	28,6
TARA	31,6	31,6	30,5	29,5	25,5	24,5	31,5	25,5	24,6	23,6	29,6
AMDU	30,6	30,6	29,6	26,5	14,5	12,5	31,5	25,5	12,6	12,6	15,6
ARSP	30,6	30,6	29,6	26,5	14,5	12,5	31,5	25,5	12,6	12,6	15,6
ARTR	30,6	30,6	29,6	26,5	14,5	12,5	31,5	25,5	12,6	12,6	15,6
ATCA	30,6	30,6	29,6	27,5	13,5	12,5	32,5	22,5	26,6	11,6	12,6
ATCO	30,6	30,6	29,6	26,5	15,5	14,5	31,5	22,5	25,6	12,6	11,6
ATTO	30,6	30,6	29,6	27,5	13,5	12,5	32,5	22,5	26,6	11,6	12,6
CELA	31,6	31,6	29,6	23,6	23,6	12,6	25,6	25,6	29,6	20,6	12,6
CHNA	31,6	31,6	29,6	23,6	23,6	12,6	25,6	25,6	29,6	20,6	12,6
CORA	30,6	30,6	27,6	21,6	20,6	22,6	25,6	22,6	30,6	20,6	10,6
EPNE	24,6	24,6	23,6	16,6	16,6	15,6	25,6	25,6	24,6	8,6	9,6
ERCO	31,6	31,6	29,6	23,6	23,6	12,6	25,6	25,6	29,6	20,6	12,6
ERFA	22,6	22,6	19,6	15,6	14,6	8,6	19,6	18,6	22,6	4,6	7,6
HYSA	31,6	31,6	29,6	23,6	23,6	12,6	25,6	25,6	29,6	20,6	12,6
PSAR	30,6	30,6	29,6	26,5	14,5	12,5	31,5	25,5	12,6	12,6	15,6
ROWO	20,6	20,6	19,6	12,6	11,6	10,6	20,6	18,6	20,6	6,6	10,6
SAEX	30,6	30,6	28,5	27,5	12,5	13,5	30,5	18,5	10,6	9,6	28,6
SAVE	30,6	30,6	27,6	24,5	17,5	16,5	29,5	19,5	30,6	11,6	9,6
SUTO	31,6	31,6	30,6	28,5	22,5	21,5	32,5	24,5	32,6	14,6	13,6
TEAX	30,6	30,6	29,6	27,5	13,5	12,5	32,5	22,5	26,6	11,6	12,6
BRTE	0,6	0,6	6,6	6,6	5,6	6,6	7,6	7,6	0,6	3,6	0,0
CYDA	5,6	7,6	5,6	2,6	2,6	2,6	3,6	5,6	5,6	2,6	4,6
DISP	8,6	9,6	8,6	5,6	4,6	3,6	8,6	7,6	7,6	1,6	6,6
LETR	5,6	5,6	6,6	5,6	2,6	3,6	6,6	7,6	5,6	2,6	8,6
PHAU	0,0	0,0	9,6	8,6	15,6	12,6	15,6	9,6	0,6	12,6	15,6
SPGR	12,6	12,6	10,6	6,6	7,6	7,6	8,6	8,6	12,6	5,6	9,6
SPAI	8,6	8,6	7,6	5,6	2,6	2,6	6,6	4,6	8,6	1,6	5,6
STSP	8,6	8,6	7,6	5,6	2,6	2,6	6,6	4,6	8,6	1,6	5,6
CARX	12,6	12,6	10,6	6,6	7,6	7,6	8,6	8,6	12,6	5,6	9,6
ELEO	12,6	12,6	10,6	6,6	7,6	7,6	8,6	8,6	12,6	5,6	9,6
JUBA	12,6	12,6	10,6	6,6	7,6	7,6	8,6	8,6	12,6	5,6	9,6
SCRP	19,6	19,6	20,6	12,6	10,6	9,6	21,6	20,6	19,6	5,6	6,6
TYLA	0,6	0,6	14,6	13,6	10,6	10,6	14,6	13,6	0,6	6,6	0,6
GLLE	22,6	22,6	19,6	15,6	14,6	8,6	19,6	18,6	22,6	4,6	7,6
HEAN	0,0	0,0	9,6	7,6	4,6	4,6	9,6	6,6	0,0	2,6	3,6
MESA	19,6	19,6	18,6	2,6	2,6	2,6	3,6	3,6	19,6	2,6	4,6
SAKA	20,6	21,6	22,6	5,6	5,6	7,6	25,6	25,6	20,6	2,6	5,6

Table D-30. Sheep accessibility matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0	0	0	5	5	2	5	5	0	99	50
POFR	0	0	1	1	2	0	1	1	5	90	0
SALA	10	5	1	5	7	1	5	5	5	90	0
TARA	5	1	1	2	10	1	2	2	2	80	0
AMDU	1	0	90	90	90	90	90	60	5	90	0
ARSP	1	0	90	90	90	90	90	60	5	90	0
ARTR	1	0	90	90	90	90	90	60	5	90	0
ATCA	1	0	99	99	90	95	99	60	5	90	0
ATCO	1	0	90	90	80	90	90	60	5	90	0
ATTO	1	0	99	99	90	95	99	60	5	90	0
CELA	1	0	90	90	60	90	90	50	4	80	0
CHNA	1	0	90	90	60	90	90	50	4	80	0
CORA	1	0	40	90	95	80	90	80	3	50	0
EPNE	1	0	90	90	90	90	90	90	5	80	0
ERCO	1	0	90	90	60	90	90	50	4	80	0
ERFA	0	0	90	95	95	99	95	90	4	80	0
HYSA	1	0	90	90	60	90	90	50	4	80	0
PSAR	1	0	90	90	90	90	90	60	5	90	0
ROWO	1	0	70	80	80	80	80	70	4	80	0
SAEX	10	5	1	5	7	1	5	5	5	90	0
SAVE	1	0	99	99	80	90	90	50	4	80	0
SUTO	1	0	99	99	90	90	99	70	4	80	0
TEAX	1	0	99	99	90	95	99	60	5	90	0
BRTE	0	0	70	98	95	98	98	90	0	75	0
CYDA	5	0	60	80	90	95	70	90	2	50	0
DISP	5	0	60	90	80	80	90	80	2	50	0
LETR	5	0	60	80	90	95	80	90	2	50	0
PHAU	0	0	10	80	70	90	80	80	0	70	30
SPGR	0	0	50	70	80	80	50	60	3	60	0
SPAI	0	0	60	90	90	90	90	90	2	50	0
STSP	0	0	60	90	90	90	90	90	2	50	0
CARX	0	0	50	70	80	80	50	60	3	60	0
ELEO	0	0	50	70	80	80	50	60	3	60	0
JUBA	0	0	50	70	80	80	50	60	3	60	0
SCRP	0	0	10	40	40	90	40	40	1	20	0
TYLA	0	0	10	95	95	95	95	95	0	40	0
GLLE	0	0	90	95	95	99	95	90	4	80	0
HEAN	0	0	60	60	60	10	40	40	0	90	50
MESA	0	0	90	95	95	99	95	90	4	80	0
SAKA	0	0	90	95	95	90	95	90	2	50	0

Table D-31. Horse preference and competition matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0,4	0,4	0,4	22,4	18,4	0,4	0,4	19,4	0,4	16,4	0,4
POFR	30,4	30,4	29,3	28,3	19,3	21,3	31,3	21,3	19,4	18,4	29,4
SALA	30,4	30,4	29,3	28,3	13,3	14,3	31,3	19,3	11,4	10,4	29,4
TARA	31,4	31,4	30,3	29,3	25,3	24,3	31,3	25,3	24,4	23,4	29,4
AMDU	30,4	30,4	29,4	26,3	11,3	10,3	31,3	21,3	8,4	6,4	12,4
ARSP	30,4	30,4	29,4	26,3	11,3	10,3	31,3	21,3	8,4	6,4	12,4
ARTR	30,4	30,4	29,4	26,3	11,3	10,3	31,3	21,3	8,4	6,4	12,4
ATCA	30,4	30,4	29,4	26,3	12,3	11,3	31,3	21,3	25,4	10,4	11,4
ATCO	30,4	30,4	29,4	26,3	15,3	14,3	31,3	22,3	25,4	12,4	11,4
ATTO	30,4	30,4	29,4	26,3	12,3	11,3	31,3	21,3	25,4	10,4	11,4
CELA	31,4	31,4	30,4	24,4	24,4	13,4	26,4	26,4	30,4	21,4	13,4
CHNA	31,4	31,4	30,4	24,4	24,4	13,4	26,4	26,4	30,4	21,4	13,4
CORA	30,4	30,4	29,4	23,4	23,4	21,4	26,4	26,4	30,4	21,4	12,4
EPNE	26,4	26,4	25,4	18,4	18,4	17,4	27,4	27,4	26,4	10,4	11,4
ERCO	31,4	31,4	30,4	24,4	24,4	13,4	26,4	26,4	30,4	21,4	13,4
ERFA	22,4	22,4	21,4	17,4	16,4	10,4	21,4	20,4	22,4	4,4	6,4
HYSA	31,4	31,4	30,4	24,4	24,4	13,4	26,4	26,4	30,4	21,4	13,4
PSAR	30,4	30,4	29,4	26,3	11,3	10,3	31,3	21,3	8,4	6,4	12,4
ROWO	20,4	20,4	19,4	12,4	11,4	10,4	20,4	18,4	20,4	6,4	10,4
SAEX	30,4	30,4	29,3	28,3	13,3	14,3	31,3	19,3	11,4	10,4	29,4
SAVE	30,4	30,4	29,4	26,3	19,3	18,3	31,3	21,3	30,4	13,4	11,4
SUTO	31,4	31,4	30,4	27,3	21,3	20,3	31,3	23,3	31,4	13,4	12,4
TEAX	30,4	30,4	29,4	26,3	12,3	11,3	31,3	21,3	25,4	10,4	11,4
BRTE	0,3	0,3	5,3	5,3	4,3	5,3	7,3	6,3	0,3	2,3	0,0
CYDA	6,4	7,4	6,4	1,4	1,4	1,4	4,4	4,4	6,4	1,4	5,4
DISP	7,4	8,4	7,4	4,4	3,4	2,4	7,4	6,4	6,4	1,4	5,4
LETR	7,4	8,4	7,4	4,4	1,4	2,4	7,4	5,4	7,4	1,4	5,4
PHAU	0,0	0,0	4,5	5,5	2,5	4,5	5,5	6,5	0,5	2,5	0,5
SPGR	8,3	8,3	6,3	3,3	3,3	3,3	5,3	5,3	8,3	2,3	6,3
SPAI	8,4	8,4	7,4	5,4	2,4	2,4	6,4	4,4	8,4	1,4	5,4
STSP	8,4	8,4	7,4	5,4	2,4	2,4	6,4	4,4	8,4	1,4	5,4
CARX	8,3	8,3	6,3	3,3	3,3	3,3	5,3	5,3	8,3	2,3	6,3
ELEO	8,3	8,3	6,3	3,3	3,3	3,3	5,3	5,3	8,3	2,3	6,3
JUBA	8,3	8,3	6,3	3,3	3,3	3,3	5,3	5,3	8,3	2,3	6,3
SCRP	19,3	19,3	20,3	12,3	10,3	9,3	21,3	20,3	19,3	5,3	6,3
TYLA	18,3	18,3	20,3	12,3	10,3	7,3	21,3	20,3	5,3	5,3	6,3
GLLE	22,4	22,4	21,4	17,4	16,4	10,4	21,4	20,4	22,4	4,4	6,4
HEAN	0,0	0,0	15,5	15,5	10,5	12,5	16,5	18,5	0,0	8,5	12,5
MESA	19,4	19,4	18,4	1,4	1,4	1,4	2,4	2,4	19,4	1,4	3,4
SAKA	20,4	21,4	20,4	6,4	6,4	6,4	23,4	23,4	20,4	3,4	6,4

Table D-32. Horse accessibility matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0	0	0	5	5	2	5	5	0	99	50
POFR	0	0	1	1	2	0	1	1	5	90	0
SALA	10	5	1	5	7	1	5	5	5	90	0
TARA	5	1	1	3	10	1	2	2	2	90	0
AMDU	1	0	99	99	90	95	99	60	5	90	0
ARSP	1	0	99	99	90	95	99	60	5	90	0
ARTR	1	0	99	99	90	95	99	60	5	90	0
ATCA	1	0	99	99	90	95	99	60	5	90	0
ATCO	1	0	99	99	90	95	99	60	5	90	0
ATTO	1	0	99	99	90	95	99	60	5	90	0
CELA	1	0	99	99	60	95	99	50	4	80	0
CHNA	1	0	99	99	60	95	99	50	4	80	0
CORA	1	0	50	95	95	80	95	90	3	60	0
EPNE	1	0	99	99	99	99	99	99	4	80	0
ERCO	1	0	99	99	60	95	99	50	4	80	0
ERFA	0	0	90	95	95	99	95	90	4	80	0
HYSA	1	0	99	99	60	95	99	50	4	80	0
PSAR	1	0	99	99	90	95	99	60	5	90	0
ROWO	1	0	80	90	90	95	90	80	4	80	0
SAEX	10	5	1	5	7	1	5	5	5	90	0
SAVE	1	0	99	99	85	95	99	60	4	80	0
SUTO	1	0	99	99	90	95	99	70	4	80	0
TEAX	1	0	99	99	90	95	99	60	5	90	0
BRTE	0	0	70	98	95	98	98	90	0	75	0
CYDA	5	0	60	80	90	95	80	90	2	50	0
DISP	5	0	60	90	90	99	90	90	2	50	0
LETR	5	0	60	80	90	95	80	90	2	50	0
PHAU	0	0	10	80	90	80	80	80	0	90	20
SPGR	0	0	50	70	80	90	50	60	3	60	0
SPAI	0	0	70	90	95	99	90	90	2	50	0
STSP	0	0	70	90	95	99	90	90	2	50	0
CARX	0	0	50	70	80	90	50	60	3	60	0
ELEO	0	0	50	70	80	90	50	60	3	60	0
JUBA	0	0	50	70	80	90	50	60	3	60	0
SCRP	0	0	10	40	40	90	40	40	1	20	0
TYLA	5	0	25	70	90	80	70	80	1	20	0
GLLE	0	0	90	95	95	99	95	90	4	80	0
HEAN	0	0	90	90	90	90	90	90	0	0	70
MESA	0	0	90	95	95	99	95	90	4	80	0
SAKA	0	0	90	95	95	99	95	90	2	50	0

Table D-33. Cattle preference and competition matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0,4	0,4	0,4	22,4	18,4	0,4	0,4	19,4	0,4	16,4	0,4
POFR	29,5	29,5	29,4	28,4	19,4	21,4	31,4	21,4	19,5	18,5	29,5
SALA	29,5	29,5	29,4	28,4	13,4	14,4	31,4	19,4	11,5	10,5	29,5
TARA	0,4	0,4	0,4	22,4	14,4	4,4	0,4	18,4	0,4	16,4	6,4
AMDU	29,5	29,5	29,5	26,4	10,4	10,4	31,4	20,4	6,5	6,5	12,5
ARSP	29,5	29,5	29,5	26,4	10,4	10,4	31,4	20,4	6,5	6,5	12,5
ARTR	29,5	29,5	29,5	26,4	10,4	10,4	31,4	20,4	6,5	6,5	12,5
ATCA	29,5	29,5	29,5	26,4	11,4	11,4	31,4	20,4	9,5	9,5	11,5
ATCO	29,5	29,5	29,5	26,4	14,4	14,4	31,4	21,4	11,5	11,5	11,5
ATTO	29,5	29,5	29,5	26,4	11,4	11,4	31,4	20,4	9,5	9,5	11,5
CELA	30,5	30,5	30,5	23,5	23,5	13,5	25,5	25,5	20,5	20,5	13,5
CHNA	30,5	30,5	30,5	23,5	23,5	13,5	25,5	25,5	20,5	20,5	13,5
CORA	0,4	0,4	0,4	21,4	17,4	8,4	0,4	18,4	0,4	16,4	0,4
EPNE	25,5	25,5	25,5	17,5	17,5	17,5	26,5	26,5	9,5	9,5	11,5
ERCO	30,5	30,5	30,5	23,5	23,5	13,5	25,5	25,5	20,5	20,5	13,5
ERFA	21,5	21,5	21,5	16,5	16,5	10,5	20,5	20,5	4,5	4,5	6,5
HYSA	30,5	30,5	30,5	23,5	23,5	13,5	25,5	25,5	20,5	20,5	13,5
PSAR	29,5	29,5	29,5	26,4	10,4	10,4	31,4	20,4	6,5	6,5	12,5
ROWO	19,5	19,5	19,5	12,5	12,5	12,5	19,5	19,5	6,5	6,5	10,5
SAEX	29,5	29,5	29,4	28,4	13,4	14,4	31,4	19,4	11,5	10,5	29,5
SAVE	29,5	29,5	29,5	26,4	18,4	18,4	31,4	20,4	12,5	12,5	11,5
SUTO	30,5	30,5	30,5	27,4	20,4	20,4	31,4	22,4	12,5	12,5	12,5
TEAX	29,5	29,5	29,5	26,4	11,4	11,4	31,4	20,4	9,5	9,5	11,5
BRTE	0,3	0,3	6,3	5,3	5,3	5,3	8,3	8,3	0,3	4,3	0,0
CYDA	6,5	6,5	6,5	1,5	1,5	1,5	4,5	4,5	1,5	1,5	5,5
DISP	7,5	7,5	7,5	2,5	2,5	2,5	5,5	5,5	1,5	1,5	5,5
LETR	6,5	6,5	6,5	1,5	1,5	1,5	5,5	5,5	1,5	1,5	5,5
PHAU	0,4	0,4	14,4	13,4	10,4	10,4	14,4	13,4	0,4	6,4	0,4
SPGR	0,4	0,4	12,4	4,4	4,4	4,4	6,4	5,4	0,4	3,4	0,4
SPAI	7,5	7,5	7,5	2,5	2,5	2,5	5,5	5,5	1,5	1,5	5,5
STSP	7,5	7,5	7,5	2,5	2,5	2,5	5,5	5,5	1,5	1,5	5,5
CARX	6,2	6,2	6,2	3,4	3,4	3,4	5,4	5,4	2,4	2,4	6,4
ELEO	6,2	6,2	6,2	3,4	3,4	3,4	5,4	5,4	2,4	2,4	6,4
JUBA	6,2	6,2	6,2	3,4	3,4	3,4	5,4	5,4	2,4	2,4	6,4
SCRP	0,4	0,4	14,4	13,4	10,4	10,4	14,4	13,4	0,4	6,4	0,4
TYLA	0,4	0,4	14,4	13,4	10,4	10,4	14,4	13,4	0,4	6,4	0,4
GLLE	21,5	21,5	21,5	16,5	16,5	10,5	20,5	20,5	4,5	4,5	6,5
HEAN	0,4	0,4	8,4	7,4	7,4	7,4	17,4	17,4	0,4	4,4	0,4
MESA	0,4	0,4	6,4	5,4	5,4	5,4	6,4	6,4	0,4	4,4	0,4
SAKA	0,4	0,4	9,4	8,4	8,4	8,4	22,4	22,4	0,4	4,4	0,4

Table D-34. Cattle accessibility matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0	0	0	5	5	2	5	5	0	99	50
POFR	0	0	1	1	1	0	1	1	25	90	0
SALA	10	5	1	5	5	1	5	5	20	90	0
TARA	0	0	0	10	10	5	10	10	0	95	40
AMDU	1	0	99	99	80	90	99	50	20	80	0
ARSP	1	0	99	99	80	90	99	50	20	80	0
ARTR	1	0	99	99	80	90	99	50	20	80	0
ATCA	1	0	99	99	80	90	99	50	20	80	0
ATCO	1	0	99	99	80	90	99	50	20	80	0
ATTO	1	0	99	99	80	90	99	50	20	80	0
CELA	1	0	99	99	60	95	99	50	20	80	0
CHNA	1	0	99	99	60	95	99	50	20	80	0
CORA	0	0	0	99	95	95	99	95	0	90	0
EPNE	1	0	99	99	99	99	99	99	20	80	0
ERCO	1	0	99	99	60	95	99	50	20	80	0
ERFA	0	0	70	90	95	90	90	90	40	80	0
HYSA	1	0	99	99	60	95	99	50	20	80	0
PSAR	1	0	99	99	80	90	99	50	20	80	0
ROWO	1	0	60	80	80	80	80	60	20	80	0
SAEX	10	5	1	5	5	1	5	5	20	90	0
SAVE	1	0	99	99	80	90	99	50	20	80	0
SUTO	1	0	99	99	80	90	99	50	20	80	0
TEAX	1	0	99	99	80	90	99	50	20	80	0
BRTE	0	0	10	90	80	90	90	70	0	20	0
CYDA	10	0	40	70	80	90	70	80	40	50	0
DISP	10	0	40	80	80	95	80	80	40	50	0
LETR	10	0	40	70	80	95	70	80	40	50	0
PHAU	0	0	10	95	95	95	95	95	0	40	0
SPGR	0	0	5	99	95	99	99	95	0	50	0
SPAI	0	0	40	70	80	90	70	80	40	50	0
STSP	0	0	40	70	80	90	70	80	40	50	0
CARX	0	0	30	50	60	80	50	50	50	60	0
ELEO	0	0	30	50	60	80	50	50	50	60	0
JUBA	0	0	30	50	60	80	50	50	50	60	0
SCRP	0	0	10	95	95	95	95	95	0	40	0
TYLA	0	0	10	95	95	95	95	95	0	40	0
GLLE	0	0	70	90	95	90	90	90	40	80	0
HEAN	0	0	20	95	95	99	95	95	0	25	0
MESA	0	0	20	90	90	99	90	90	0	25	0
SAKA	0	0	30	95	95	99	95	95	0	25	0

Table D-35. Elk preference and competition matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0,3	0,3	0,3	11,3	9,3	10,3	0,3	14,3	0,3	8,3	0,3
POFR	30,3	30,3	29,2	28,2	18,2	21,2	31,2	20,2	19,3	17,3	29,3
SALA	30,3	30,3	29,2	27,2	12,2	14,2	31,2	18,2	11,3	10,3	29,3
TARA	31,3	31,3	30,2	29,2	25,2	24,2	31,2	25,2	24,3	23,3	29,3
AMDU	30,3	30,3	29,3	26,2	9,2	9,2	31,2	12,2	29,3	6,3	12,3
ARSP	30,3	30,3	29,3	26,2	9,2	9,2	31,2	12,2	29,3	6,3	12,3
ARTR	30,3	30,3	29,3	26,2	9,2	9,2	31,2	12,2	29,3	6,3	12,3
ATCA	29,3	29,3	29,3	26,2	10,2	10,2	30,2	19,2	27,3	9,3	11,3
ATCO	30,3	30,3	29,3	26,2	10,2	10,2	30,2	20,2	29,3	11,3	11,3
ATTO	29,3	29,3	29,3	26,2	10,2	10,2	30,2	19,2	27,3	9,3	11,3
CELA	31,3	31,3	30,3	18,3	18,3	12,3	24,3	24,3	30,3	19,3	13,3
CHNA	31,3	31,3	30,3	18,3	18,3	12,3	24,3	24,3	30,3	19,3	13,3
CORA	30,3	30,3	29,3	20,3	20,3	13,3	24,3	24,3	29,3	20,3	12,3
EPNE	26,3	26,3	25,3	16,3	16,3	16,3	25,3	25,3	25,3	9,3	11,3
ERCO	31,3	31,3	30,3	18,3	18,3	12,3	24,3	24,3	30,3	19,3	13,3
ERFA	22,3	22,3	20,3	15,3	14,3	14,3	19,3	18,3	21,3	4,3	6,3
HYSA	31,3	31,3	30,3	18,3	18,3	12,3	24,3	24,3	30,3	19,3	13,3
PSAR	30,3	30,3	29,3	26,2	9,2	9,2	31,2	12,2	29,3	6,3	12,3
ROWO	20,3	20,3	18,3	10,3	7,3	6,3	16,3	15,3	19,3	4,3	10,3
SAEX	30,3	30,3	29,2	27,2	12,2	14,2	31,2	18,2	11,3	10,3	29,3
SAVE	30,3	30,3	29,3	25,2	16,2	16,2	30,2	19,2	29,3	10,3	11,3
SUTO	31,3	31,3	30,3	26,2	19,2	19,2	30,2	21,2	30,3	11,3	12,3
TEAX	29,3	29,3	29,3	26,2	10,2	10,2	30,2	19,2	27,3	9,3	11,3
BRTE	0,3	0,3	8,3	7,3	6,3	8,3	9,3	10,3	0,3	5,3	0,0
CYDA	5,3	6,3	5,3	1,3	1,3	1,3	4,3	4,3	6,3	1,3	5,3
DISP	6,3	7,3	6,3	3,3	2,3	2,3	6,3	5,3	5,3	1,3	5,3
LETR	7,3	8,3	7,3	3,3	1,3	1,3	5,3	4,3	8,3	1,3	5,3
PHAU	0,0	0,0	3,3	3,3	2,3	5,3	4,3	5,3	0,0	2,3	8,3
SPGR	7,1	7,1	6,1	2,2	2,2	2,2	4,2	4,2	6,2	2,2	6,2
SPAI	8,3	8,3	7,3	3,3	2,3	2,3	5,3	4,3	7,3	1,3	5,3
STSP	8,3	8,3	7,3	3,3	2,3	2,3	5,3	4,3	7,3	1,3	5,3
CARX	7,1	7,1	6,1	2,2	2,2	2,2	4,2	4,2	6,2	2,2	6,2
ELEO	7,1	7,1	6,1	2,2	2,2	2,2	4,2	4,2	6,2	2,2	6,2
JUBA	7,1	7,1	6,1	2,2	2,2	2,2	4,2	4,2	6,2	2,2	6,2
SCRP	21,1	21,1	21,1	10,2	8,2	8,2	21,2	16,2	21,2	4,2	6,2
TYLA	20,1	21,1	20,1	9,2	8,2	7,2	21,2	19,2	19,2	5,2	6,2
GLLE	22,3	22,3	20,3	15,3	14,3	14,3	19,3	18,3	21,3	4,3	6,3
HEAN	0,0	0,0	12,3	11,3	12,3	15,3	17,3	17,3	0,0	10,3	15,3
MESA	20,3	20,3	18,3	1,3	1,3	1,3	2,3	2,3	21,3	1,3	3,3
SAKA	21,3	21,3	20,3	6,3	6,3	6,3	21,3	21,3	22,3	3,3	6,3

Table D-36. Elk accessibility matrix.

Species	CRoot	FRoot	Trunk	Stems	Leaves	Seeds	SDStems	SDLeaves	SdlgRoot	SdlgShoot	SeedBank
PIJE	0	0	1	10	10	5	10	10	0	99	50
POFR	0	0	1	1	2	0	1	1	5	90	0
SALA	10	5	1	5	7	1	5	5	5	90	0
TARA	5	1	1	3	10	1	2	2	2	90	0
AMDU	1	0	99	99	95	99	99	70	5	90	0
ARSP	1	0	99	99	95	99	99	70	5	90	0
ARTR	1	0	99	99	95	99	99	70	5	90	0
ATCA	0	0	99	99	95	99	99	70	5	90	0
ATCO	1	0	99	99	95	99	99	70	5	90	0
ATTO	0	0	99	99	95	99	99	70	5	90	0
CELA	1	0	99	99	70	99	99	60	5	90	0
CHNA	1	0	99	99	70	99	99	60	5	90	0
CORA	1	0	60	95	95	90	95	90	3	70	0
EPNE	1	0	99	99	99	99	99	99	5	90	0
ERCO	1	0	99	99	70	99	99	60	5	90	0
ERFA	0	0	90	95	99	99	95	90	4	80	0
HYSA	1	0	99	99	70	99	99	60	5	90	0
PSAR	1	0	99	99	95	99	99	70	5	90	0
ROWO	1	0	90	95	99	99	95	90	5	90	0
SAEX	10	5	1	5	7	1	5	5	5	90	0
SAVE	1	0	99	99	90	95	99	70	5	90	0
SUTO	1	0	99	99	95	95	99	80	5	90	0
TEAX	0	0	99	99	95	99	99	70	5	90	0
BRTE	0	0	70	90	95	90	80	90	0	90	0
CYDA	5	0	70	90	95	99	90	90	2	50	0
DISP	5	0	70	95	95	99	95	90	2	50	0
LETR	5	0	70	90	95	99	90	90	3	60	0
PHAU	0	0	20	85	95	90	80	80	0	30	40
SPGR	0	0	60	70	90	95	70	80	3	60	0
SPAI	0	0	80	95	95	99	95	90	2	50	0
STSP	0	0	80	95	95	99	95	90	2	50	0
CARX	0	0	60	70	90	95	70	80	3	60	0
ELEO	0	0	60	70	90	95	70	80	3	60	0
JUBA	0	0	60	70	90	95	70	80	3	60	0
SCRP	0	0	20	60	70	95	60	60	1	20	0
TYLA	5	0	40	80	90	90	80	90	1	20	0
GLLE	0	0	90	95	99	99	95	90	4	80	0
HEAN	0	0	30	90	90	10	90	90	0	90	40
MESA	0	0	95	95	95	99	95	90	4	80	0
SAKA	0	0	90	95	95	99	95	90	3	60	0

Appendix E

Animal Parameters

Table E-1. Animal parameters for general characteristics of the herbivores simulated in Owens Valley applications of EDYS.

Species	Model Type	Trophic Level
Cattle	2	1
Elk	1	1
Horses	2	1
Insects	1	1
Rabbits	1	1
Sheep	2	1

Table E-2. Dietary consumption parameters for native herbivores.

Species	Stocking Rate	Density	Consumption (g/m^2/day)
Insects	Light	3 / m^2	0.1
	Moderate	6 / m^2	0.2
	Heavy	12 / m^2	0.4
Rabbits	Light	0.30 / ha	0.00330
	Moderate	0.56 / ha	0.00616
	Heavy	0.78 / ha	0.00858
Elk	Light	1.0 / km^2	0.006527
	Moderate	2.0 / km^2	0.013100
	Heavy	4.0 / km^2	0.026100